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POSTS AND TELEGRAPHS.

POSTS & TELEGRAPHS,

PAST AND PRESENT:

WITH AN ACCOUNT OF THE TELEPHONE,
AND PHONOGRAPH.

"Our English Post-Office is a splendid triumph of civilization."—LORD MACAULAY.

"Canst thou send lightnings, that they may go, and say unto thee, Here we are?"—JOB xxxviii. 35.

"Thou bringest certain strange things to our ears."—ACTS xvii. 20.

By WILLIAM TEGG, F.R.H.S.

AUTHOR OF

"Meetings and Greetings," "One Hour's Reading," "The Knot Tied,"
&c., &c., &c.

LONDON:

WILLIAM TEGG & CO., PANCRAS LANE, CHEAPSIDE.

1878.

THIS WORK
IS RESPECTFULLY DEDICATED, BY PERMISSION,

To John Tilley, Esq., C.B.,

SECRETARY

TO THE GENERAL POST OFFICE,

LONDON,

BY WILLIAM TEGG, F.R.H.S.



P R E F A C E .

HILL must admit that the long-sighted views of Rowland Hill, when, in 1839, he projected the idea of an universal penny postal system, have now been more than fully realized. Previous to that time, the cost of conveying a letter from one part of the United Kingdom to another was greater than the majority of the common people could bear. Rowland Hill, with an innate practical knowledge of what was required by the general public, proposed an universal rate of a penny postage. The idea propounded by Mr. Hill was at first

repudiated by the public generally as chimerical; but, after the strongest opposition had been met with and overcome, what was the result? That the poorest persons in any part of the world may communicate with their friends and relations at a cost which affects their means only in the very slightest degree.

In the present work, I have attempted to throw together a few paragraphs relating to the early and recent history of the Post-office. The information has been derived from the best and most recent authorities, and may be confidently relied upon.

Following the advantage of the penny postal system of 1840, there came a greater one. The Telegraphic System of the Nation is well known, but how very few people know how it came about! Well, it came about in this way. When the Electric and Magnetic Telegraphic Intercommunication were in the hands of private companies

the traffic was small, the expenses large, and the profits infinitesimal.

The shareholders of the Telegraph Companies were therefore glad to hail a proposal made in 1854 by Mr. Allen, that the Nation should acquire the telegraphs of the country at a fair assessment of their estimated value.

Two years afterwards, Mr. Baines, who was then of the Post-office, advocated the same idea. In 1861, Mr. Ricardo, who was at that time Chairman of the Electric and International Telegraph Company, proposed that the Government should acquire the telegraphic system of the country.

The suggestion recommended itself to the public, and a general agitation ensued. The result of this movement was, that in 1865 the Chamber of Commerce of Edinburgh, under the Presidency of Mr. George Harrison, an eminently public-spirited gentleman of that great city, brought the matter before Government in a tangible and vigorous manner,

and the support of the views then advocated, by other public bodies, finally conduced to the success of the system as it at present exists.

This work would not be complete without an account of the Telephone. I have therefore placed before the reader the most recent information on this most important discovery, and also append a description of the Phonograph or Phonograph.

WILLIAM TEGG, F.R.H.S.

1878.

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PART I.
THE POST OFFICE.

THE POST AMONG THE ANCIENTS.

THE establishment of runners for the purpose of conveying letters of State, was originated in the East long before the Christian era. Herodotus mentions that, amongst the ancient Persians, stations were appointed at intervals along the great roads of the empire; where couriers were constantly kept in readiness to bear despatches.* Similar provision was made in the Roman empire in the time of Augustus, according to Suetonius, and probably existed at an earlier period. It is from the Latin word *positus* (a fixed place) that our word *post* is derived. Amongst the Romans, however, the use of the post was entirely confined to the purposes of the State.

* Cyrus, when engaged in the Scythian Expedition, caused it to be tried how far horses could go in a day without baiting, and at that distance along his route, appointed stages and men to keep horses in constant readiness.

The earliest mention of the "post" in the Bible, is in 2 Chronicles xxx. when Hezekiah wrote letters to all Israel and Judah to keep the Passover. In verse 6 we read :—" So the *posts* went with the letters from the king and his princes throughout all Israel and Judah." The word translated "posts" signifies "runners," that is, men specially trained and kept to deliver despatches speedily by running. In the Book of Job, ix. 25, the patriarch is represented as comparing the brief tenure of his life to the celerity of these runners :—" Now my days are swifter than a *post*." Particular mention is made of these posts in the Book of Esther. Haman having obtained the authority of King Ahasuerus, the king's scribes wrote to the "king's lieutenants, and to the governors that were over every province, and to the rulers of every people of every province, according to the writing thereof, and to every people after their language : in the name of King Ahasuerus was it written, and sealed with the king's ring. And the letters were sent by *posts* into all the king's provinces, to destroy, to kill, and to cause to perish, all Jews, both young and old, little children and women, in one day." And "the *posts* went out, being hastened by the king's commandment" (Esther iii. 12—15). Eleven months intervened between the date of the decree and the day of execution ; a proof of the slowness of conveyance in those days, as well as of the

great extent of the empire of the Medes and Persians. When Haman's evil design was discovered by Mordecai, he obtained the king's permission (through the influence of Queen Esther) to send letters in the king's name, to the Jews, and the governors of the provinces, from India to Ethiopia, a hundred and twenty-seven in number, giving permission to the Jews to stand for their lives and to slay their enemies; and these letters were sent by "*posts* on horseback, and riders on mules, camels, and young dromedaries." The posts were also hastened and pressed on by the king's commandment (Esther viii. 9—14).

In the fearful picture drawn by the prophet Jeremiah of the predicted fall of Babylon, he alludes to the terrible message sent to the king, and the manner of its delivery:—"One *post* shall run to meet another, and one messenger to meet another, to show the king of Babylon that his city is taken at one end, and that the passages are stopped, and the reeds they have burned with fire, and the men of war are afrighted" (Jer. li. 31, 32).

The post is not alluded to in the New Testament, but the Grecian games afforded to the inspired writers much more striking images of swiftness.

There is one reference to it in the Apocrypha, Wisdom v. 9: "Passed away as a *post* that hasted by."

Letters are frequently mentioned in the Bible, as

may be seen from the following list of the various passages in which the word occurs either in the singular or plural :—

PASSAGES IN THE BIBLE IN WHICH THE WORD
“LETTER ” IS MENTIONED.

- | | |
|-------------------------|--|
| 2 Sam. xi. 14. | David wrote a letter to Joab. |
| 2 Kings v. 5. | I will send a letter to the king of Israel. |
| 2 Kings v. 6. | Now when this letter is come unto thee. |
| 2 Kings x. 2. | Now as soon as this letter cometh to you. |
| 2 Kings x. 6, 7. | Then he wrote a letter. |
| 2 Kings xix. 14. | } Hezekiah received the letter. |
| Isaiah xxxvii. 14. | |
| Ezra iv. 7. | The letter was written in the Syrian tongue. |
| Ezra iv. 8, 17, 18, 23. | Rehum the chancellor, and Shimshai the scribe, wrote a letter against Jerusalem. |
| Ezra v. 6. | The copy of the letter that Tatnai . . . sent unto Darius. |
| Ezra v. 7. | They sent a letter unto him. |
| Ezra vii. 11. | Now this is the copy of the letter. |
| Neh. ii. 8. | A letter unto Asaph, the keeper of the king's forest. |

- Neh. vi. 5. Then sent Sanballat his servant unto me with an open letter in his hand.
- Esther ix. 29. Wrote to confirm this second letter of Purim.
- Jer. xxix. 1. Now these are the words of the letter that Jeremiah the prophet sent.
- Jer. xxix. 29. Zephaniah the priest read this letter in the ears of Jeremiah.
- Acts xxiii. 25. And he (Claudius Lysias) wrote a letter (to Felix) after this manner.
- Acts xxiii. 34. When the governor had read the letter, he asked of what province he (Paul) was.
- 2 Cor. vii. 8. For though I made you sorry with a letter.
- Gal. vi. 11. Ye see how large a letter I have written unto you.
- 2 Thess. ii. 2. Be not soon shaken in mind neither by spirit, nor by word, nor by letter.
- Heb. xiii. 22. For I have written a letter unto you in few words.

In the Apocrypha.

- Esther xvi. 19. Copy of this letter in all places.
- 2 Maccabees ix. 18. The letter underwritten.

PASSAGES IN THE BIBLE IN WHICH THE WORD
 " LETTERS " IS MENTIONED.

- 1 Kings xxi. 8, 9. Jezebel wrote letters in Ahab's name.
- 2 Kings x. 1. Jehu wrote letters, and sent to Samaria.
- 2 Kings xx. 12. The King of Babylon sent letters to Hezekiah.
- 2 Chron. xxx. 1. Hezekiah wrote letters also to Ephraim and Manasseh.
- 2 Chron. xxx. 6. So the posts went with the letters from the king.
- 2 Chron. xxxii. 17. Sennacherib wrote letters to rail on the God of Israel.
- Neh. ii. 7. Let letters be given me to the governors beyond the river.
- Neh. ii. 9. And gave them the king's letters.
- Neh. vi. 17. The nobles of Judah sent many letters to Tobiah, and the letters of Tobiah came unto them.
- Neh. vi. 19. And Tobiah sent letters to put me in fear.
- Esther i. 22. For he (Ahasuerus) sent letters into all the king's provinces.
- Esther iii. 13. The letters were sent by posts into all the king's provinces.

- Esther viii. 5. To reverse the letters devised by Haman to destroy the Jews.
- Esther viii. 10. And sent letters by posts on horse-back.
- Esther ix. 25. He (the king) commanded by letters.
- Esther ix. 20 & 30. Mordecai sent letters to all the Jews.
- Jer. xxix. 25. Because thou hast sent letters in thy name.
- Acts ix. 2. And desired of him (the high priest) letters to Damascus.
- Acts xv. 23. And they (the apostles) wrote letters . . . after this manner.
- Acts xxii. 5. From whom also I received letters unto the brethren.
- Acts xxviii. 21. We neither received letters out of Judæa.
- 1 Cor. xvi. 3. Whomsoever ye shall approve by your letters.
- 2 Cor. iii. 1. Or need we letters of commendation from you?
- 2 Cor. x. 9. That I may not seem as if I would terrify you by letters.
- 2 Cor. x. 10. For his letters, say they, are weighty and powerful.
- 2 Cor. x. 11. Such as we are in word by letters when we are absent.

In the Apocrypha.

- 1 Maccabees xii. 2. He (Jonathan) sent letters to the Lacedæmonians.
- 1 Maccabees xii. 5. This is the copy of the letters.
- 1 Maccabees xii. 7. There were letters sent in time past.
- 1 Maccabees xii. 8. And received the letters.
- 1 Maccabees xii. 17. To deliver you our letters.
- 1 Maccabees xii. 19. And this is the copy of the letters.
- 1 Maccabees xiv. 20. And this is the copy of the letters that the Lacedæmonians sent.
- 1 Maccabees xv. 1. Moreover Antiochus son of Demetrius the king sent letters.
- 2 Maccabees xi. 16. For there were letters written unto the Jews.

EARLY HISTORY OF THE POST
ON THE CONTINENT AND IN GREAT BRITAIN.

THE post was first organized in Europe by Charlemagne in 807, but it fell into disuse at his death. In the latter half of the fifteenth century, however, it was revived by Louis XI., who established a body of 230 couriers for State purposes.

The first letter-post seems to have been established

in the Hanse towns in the early part of the thirteenth century. A line of such posts, connecting Austria with Lombardy, followed in the reign of the Emperor Maximilian. They were organized by the Princes of Thurn and Taxis, who also established another line from Vienna to Brussels. These princes (says Lewin in "Her Majesty's Mails") "have always held peculiar rights and privileges in relation to the postal systems of Germany, and, up to this date (1864), their posts are entirely distinct from the existing Crown establishments, and, in fact, maintained in rivalry to some of the German States." This has ceased since the consolidation of the German Empire.

In the Wardrobe Accounts of the Kings of England, entries of payments to royal messengers for the conveyance of letters to various parts have been found as far back as the middle of the thirteenth century. In the supervision of these royal messengers may be traced the origin of our Postmasters-General.

The first person appointed to this duty was Sir Brian Tuke, who is described in the records as "Magister Nunciorum Cursorum sive Postarum." Secretary Thomas Cromwell wrote to him in August, 1533, complaining of "great default in conveyance of letters," and signifying the king's pleasure "that posts be better appointed." The worthy functionary, in reply, states that :—

"The King's Grace hath no moo ordinary postes,

ne of many days hath had, but betwene London and Calais. . . . For, sir, ye knowe well that, except the hackney horses betwene Gravesende and Dovour, there is no suche usual conveyance in post for men in this realme as in the accustomed places of France and other parties ; ne men can keepe horses in redynes withoute some way to bere the charges ; but when placardes be sent for suche cause (to order the immediate forwarding of some State packet) *the constables many tymes be fayne to take horses oute of plowes and cartes, wherein can be no extreme diligence.*"

We should think not, Master Tuke. The worthy postmaster further shows how simple and rude were the arrangements of that day, by detailing the manner in which the royal letters were conveyed in what we should have considered to be one of their most important stages :—

"As to postes betwene London and the courte, there be nowe but two ; wherof the one is a good robust felowe, and was wont to be diligent, evil intreated many tymes, he and other postes, by the herbigours,* for lack of horse rome or horse mete, withoute which diligence cannot be. The other hath been the most payneful felowe, in nyght and daye, that I have knowen amongst the messengers. If he nowe slak he shal be changed, as reason is."

In 1545 Sir Brian Tuke was succeeded by Sir

* Chaucer, *Herberjours*, providers of lodgings, innkeepers.

William Paget and John Mason, Esq., as joint Post-masters-General, the grant of office being under the same designation as their predecessors. They were to receive as wages £66 13s. 4d. a year, besides their expenses. Money, however, was then worth twelve times as much as now.

In the library of the Society of Antiquaries is a proclamation of Philip and Mary, without date, but probably issued in 1555, regulating the supply of horses for the conveyance of letters to Dover.

Soon after the arrival of the Flemings in this country, they established a post of their own between London and the Continent, appointing one of their body postmaster. "Afterwards," says Stowe, "by long custom they pretended a right to appoint a master of the Strangers' Post, and that they were in possession of it from the year 1514." They retained the privilege till 1558, when the foreign merchants fell out about the appointment. The Flemings, aided by the Spanish Ambassador, chose one Raphael van den Putte, and the Italians one of their own body. The case was referred to the English Council, when the right of appointment to the office by foreigners was disputed by the English merchants, who asserted, in their petitions to the Privy Council, "that the postmaster's place was one of great trust and credit in every realm, and therefore should be committed to the charge of the national subjects, and not to strangers."

They also complained of the "strangers" keeping back letters to gain advantage in the markets. In 1581 it was finally settled that the master of the post should have the charge of both the English and foreign offices, and that the title should be changed to Chief-Postmaster. The first who bore this title was Thomas Randolph, who succeeded Sir John Mason in 1567.

Thomas Randolph was followed by Sir J. Stanhope in 1591, in which year a royal proclamation was issued for "redress of disorders in postes which convey and bring to, and out of, the parts beyond seas, packets of letters . . . particularly to prevent the inconvenience both to our service and the lawfull trade of honest merchants, by prohibiting that no persons whatsoever should take upon them publicly or privately to procure, bring to, or carry out any packets or letters to or from the countries beyond the seas, except such our ordinary posts and messengers for these parts, as either by our master of the posts, or the masters of the posts-general of those countries reciprocally, should be found nominated for that kind of service." Prohibition is renewed in more stringent terms, and command given to all mayors, sheriffs, justices, officers of Customs and of the posts, "to make diligent search of all *mails*, budgets, and other carriages of all such disavowed carriers, messengers, or suspected persons; and all such so discovered to apprehend and stay." Before the accession of James I.

some of the Scotch towns appointed special messengers to convey despatches to and from Court. One was appointed in Aberdeen in 1590, called the Council Post, dressed in blue cloth, embroidered with the town arms.

In 1603 royal orders were issued regulating the supply of horses "to all riding in post," authorizing the owners to charge 2½d. per mile for the hire of each horse of all such as ride on public affairs, besides the guide's groats. Each post officer was directed to keep three horses expressly for the conveyance of government letters, and such letters were to be forwarded within a quarter of an hour of their receipt, and to travel at the rate of not less than seven miles an hour in summer, and five in winter.

It was in 1619 that the new office of Postmaster-General of England, for foreign parts, was created by letters patent. Rushworth says (vol. ii. p. 145), "James I. constituted the office of the Postmaster of England for foreign parts, who should have the sole taking up, sending and conveying of all letters into those parts, with power to take moderate salaries; and did appoint, first, Matthew de Quester to execute that employment; afterwards William Frizel and Thomas Witherings and their deputies, to do all things appertaining to the same. The merchants of the English nation praying his then Majesty to continue them in that office; his most excellent

Majesty that now is (1632), affecting the welfare of his people, and considering how much it imports his state and this realm, that the secrets thereof be not disclosed to foreign nations by a promiscuous use or taking up of foreign letters, was pleased to appropriate the said office to Frizel and Withering, aforesaid, with prohibition to all others to intermeddle therewith."

The year 1635 is memorable as the date of the first establishment of a regular, though limited, system of internal postage. Up to this time, observed Charles I., in a proclamation, on the subject, there had been no certain intercourse between the kingdoms of England and Scotland; wherefore he now commands his postmaster of England for foreign parts, to settle a running post or two, to run night and day between Edinburgh and London, to go thither and come back again in six days; and to take with them all such letters as shall be directed to any post town in or near that road. Bye-posts are, at the same time, ordered to be established; and it is promised that as soon as possible the like conveyances should be settled for the Oxford and Bristol road, and also for that leading through Colchester and Norwich. The rates of postage are fixed at 2d. the single letter for any distance under 80 miles; 4d. up to 140 miles; 6d. for any longer distance, and 8d. to any place in Scotland. It is ordered that no other messengers nor foot posts shall carry any letters, but those alone which shall be

employed by the King's Postmaster-General, unless to places to which the King's posts do not go, with the exception of common carriers, or messengers particularly sent on purpose, or persons carrying a letter for a friend. The mode of conveyance contemplated in this scheme was by persons riding on horseback, which continued to be the general post system until the introduction of mail coaches in 1784. The proclamation directs that 2½d. per mile shall be paid on the roads to the several postmasters for every single horse carrying the letters. If this post actually performed the distance between London and Edinburgh in three days, it was quicker than the conveyance of letters a century later, which, according to Giles Jacob, in his "Law Dictionary," second edition, published in 1732, then extended to every considerable market town, "and is so expeditious that every twenty-four hours the post goes sixty miles." It is believed, however, that the rate appointed in Charles's proclamation (which was about 140 miles in the twenty-four hours) was never accomplished.

Witherings (who was both inland and foreign Postmaster) was superseded, in 1640, for abuses in the execution of both his offices; and they were sequestered into the hands of Philip Burlamachy, to be exercised henceforth under the care and sight of the King's principal Secretary of State. Prideaux, who was appointed in 1644, was a very able Postmaster,

and established, says Blackstone, "a weekly conveyance of letters to all parts of the country, thereby saving to the public the charge of maintaining postmasters, to the amount of £7,000 per annum." In 1649 the revenue amounted to £5,000. Farming commenced the following year, and continued, as regards some of the bye-posts, to the end of the last century. The revenue was at first farmed for £5,000.*

The Corporation of London, in 1649, started an inland post in opposition to that of Parliament, but it was soon afterwards suppressed by the Council of State.

The old records of the Masters of the Posts show the posting arrangements which, in many respects, lasted till the introduction of Railways:—

Route from London to Berwick in Queen Elizabeth's time. 1. London. 2. Waltham. 3. Ware. 4. Royston. 5. Caxton. 6. Huntingdon. 7. Stilton. 8. Stainford. 9. Grantham. 10. Newark. 11. Tookesford (Tuxford). 12. Foroby (Ferriby). 13. Doncaster. 14. Ferry Bridge.

Letters, even as early as Edward II.'s time, had the words, "Haste, Post Haste!" written on the backs. Stowe gives the following copy of a Post Office Proclamation to the various Postmasters:—

"Whereas the management of the post of the letters of Great Britain and Ireland is committed to our care

* In 1663 it was farmed for £21,500 to Daniel O'Neal, and in 1674 to Sir William Petty for £43,000.

and conduct; these are therefore in His Majesty's name to require you in your respective stages to use all diligence and expedition in the safe and speedy conveyance of this mail and letters: that you ride five miles in an hour, according to your articles, from London to East Grinstead, and from thence to return accordingly. And hereof you are not to fail, as you will answer the contrary at your perils.

(Signed) "CORNWALLIS. JAS. CRAGGS."

TIME BILL.

"To the several Postmasters between London and East Grinstead.

"Haste, Haste, Post Haste!"

MILES.	"From the London Office at Half-an-hour past Two in the Morning, July 17, 1719.
" 16	Received at Epsom Half-an-hour past Six, and sent away Three-quarters past. Alexander Findlater.
" 8	Received at Dorking Half-an-hour after Eight, and sent away at Nine. Chas. Castleman.
" 6	Received at Rygate Half-an-hour past Ten, and sent away again at Eleven. Jno. Bullock.
" 16	Received at East Grinstead at Half-an-hour after Three in the Afternoon."

This was a quicker rate than in use in other parts of the country, as the post-boys were usually only required to go at the rate of three miles an hour.

The post-boys in the "good old times" appear to have been a very disorderly, loitering set of fellows. The surveyors complained that "the gentry doe give much money to the riders, whereby they be very subject to get in liquor, which stopes the mails."

Harley (Earl of Oxford) remonstrated with the authorities on the delay in an express sent to him, but the Postmaster-General replied that he had no ground for complaint, as it had travelled 136 miles in thirty-six hours (less than four miles an hour) which, he added, "is the usual rate of expresses!"

Campbell, in his "Tales of the Highlands," relates the following incident, which shows that matters were not much improved nearly a century later:—

"Near Inverary we regained a spot of comparative civilization, and came up with the post-boy, whose horse was quietly grazing at some distance, whilst red-jacket himself was immersed in play with other lads. 'You rascal!' I said to him, 'are you the post-boy, and thus spending your time?' 'Na, na, sir,' he answered, 'I'm no the post, I'm only an Express!'"

A Penny Post for London and its suburbs was first started by Mr. Robert Murray, an upholsterer, in 1683, of which a full account will be found in the next

chapter; but the following year, several charges having been brought against him, he was removed. One of these charges was as follows:—"He stops under specious pretences most parcells that are taken in, which is great damage to tradesmen, by losing their customers or spoiling their goods, and many times hazards the life of the patient, when physic is sent by a doctor or apothecary."

In 1708, Mr. Povey established a foot-post, called the "Halfpenny Carriage," for the conveyance of letters in London for a halfpenny. The authorities, however, soon compelled him to desist.

The London Penny Post was much improved in July, 1794, and a few years later became the "Two-penny Post," an institution which continued its name till the introduction of the Penny Postage. It still continued on a separate footing till the division of the Metropolis into postal districts, when it was amalgamated with the General Post Office, the red coats of the General Postmen being superseded by the blue liveries still in use. The establishment of cross-posts and the introduction of mail coaches, will receive notice in separate chapters. A great abuse was swept away on the introduction of the penny postage. The commercial houses and other firms who wished to pay for the privilege had their letters picked out from the general heap, and delivered by special postmen, and were thus enabled to get their correspondence an hour

earlier than those who could not, or would not pay the black mail ("quarterage" it was termed) of 5s. per quarter. The postage on these letters, for which the postmen were responsible, was collected monthly, the quarterage—their own fee—being an ample recompense for the risk—for many of these men made incomes of £300 to £400 per annum. This selfish system served, of course, to delay the delivery of ordinary letters, which could not be sorted till the others had been sent out.

It seems almost incredible that so late as a century ago, the letters for a large number of towns were packed in the valise of a single post-boy, whose average progress was three and a-half miles an hour. On the 22nd February, 1779, an advertisement appeared, stating that the post-boy carrying the mail had been robbed, by two footpads, with crape over their faces, of the whole mail, containing bags for Liverpool, Manchester, Wigan, Chester, and thirty other towns, besides the Irish Mail!

These post-boys were rough and ready little fellows, but not so rough as the animals they rode, the strangest collection of horseflesh ever seen—and played an important part in conveying letters to the outskirts of the metropolis and the districts beyond, so late as thirty or forty years ago. The letters were packed into a leather portmanteau strapped on to the horse's back, behind them. On the birthday of the

reigning sovereign, they each received a scarlet jacket and waistcoat—nothing more. Sam Weller has asked two puzzling queries respecting them :—“Who ever knowed a churchyard where there was a post-boy’s tombstone, or ever seed a dead post-boy?”

It may be useful to insert here the derivation of the word “mail.” It is derived from the French word “maille,” meaning a bag or sack, but literally the mesh of a net, a most appropriate and comprehensive term for the heterogeneous contents of post-bags. The term “mail” is, perhaps, strictly the packets or boxes of letters, &c., made up for dispatch by the post, though the word has been and is frequently used, for the sake of brevity, for the vehicle or vessel carrying them ; to travel “by mail” being a term long in vogue.

THE PENNY POST OF 1683.

As we have before stated, a penny post was established in London, in 1683, two years before the death of Charles II., for the conveyance of letters and parcels within the City, by Robert Murray, an upholsterer by trade, who, like a great many others, was dissatisfied with the Government, which, in its anxiety to provide for the postal requirements of the country, had entirely neglected the City and suburbs.

The post, established by Murray at a vast expense,

was ultimately handed over to a William Docwray, whose name is now well known in the annals of Post Office history. The arrangements of the new penny post were simple, and certainly liberal enough. All letters or parcels not exceeding a *pound* weight, or any sum of money not exceeding £10 in value, or parcel not worth more than £10, could be conveyed at a cost of one penny; or within a radius of ten miles from a given centre, for the charge of twopence. Several district offices were opened in various parts of London, and receiving houses were freely established in all the leading thoroughfares. Stowe, in his *Annals* says, that in the windows of the latter offices, or other prominent place, were large printed placards intimating, "Penny post letters taken in here." "Letter Carriers," he continues, "gather them each hour, and take them thence to the grand office in their respective circuits. After the said letters and parcels are duly entered in the books, they are delivered at stated periods by other carriers." The deliveries in the City were from six to eight daily, while from three to four were found sufficient to supply the wants of the suburbs.

The public appreciated and supported the new venture, and it soon became a great commercial success, useful to the citizens, and profitable to the proprietor. No sooner, however, did a knowledge of this fact reach the ears of those in authority over the General Post Office, than the Duke of York, acting

under instructions, and by virtue of the settlement made to him, objected to its being continued, on the ground that it was an invasion of his legal rights. Party spirit began to rise in the matter, and sides were taken as to whether such an important enterprise should not be in the hands of the Government, instead of a private person. It was denounced by the Protestant party as a means for the Papists disseminating their views among the middle and lower orders; and, according to Lord Macaulay, Titus Oates himself hinted that the Jews were at the bottom of the whole concern, and expressed an opinion that, if the bags were opened and examined, they would be found to be full of treason! The messengers and porters of the City likewise joined in the common cavil, and declared that the penny post was an infringement of their rights, and frustrated it in every way they possibly could, such as tearing down the placards, assaulting the carriers, and otherwise.

At length, therefore, the authorities, alarmed at the rapidly-growing success of the undertaking, applied to the court of King's Bench, wherein it was decided that the new or so-called penny post was an infraction of the privileges of the authorities of the General Post Office, and the royal interest, and that consequently it, with all its organization, profits, and advantages, should be handed over to, and remain the property of, the royal establishment. Damages, together with slight

costs, were at the same time awarded against Docwray ; but it is gratifying to know that in about a year after he had been thus forcibly dispossessed of his useful and valuable scheme, he was appointed to the office of the Controller of the District Post. As this was conferred upon him by the Duke of York, it is reasonable to suppose that this appointment was chiefly made as a recompense for the losses he had suffered, and the misfortunes he had met with. "Under William and Mary," says Mr. Lewin, "Docwray was allowed a pension, differently stated by different authorities, of £500 or £200 a year." This pension, however, he was only allowed to enjoy for four years, when it was withdrawn, and he was discharged from his position, on account of several charges of malversation and mismanagement having been brought against him. The officers and others under his control petitioned the Commissioners of the Treasury to the effect, "that the Controller doth what in him lyes to lessen the revenue of the Penny Post Office, that he may farm it, and get it into his own hands ;" also that "he had removed the Post Office to an inconvenient place to forward his ends." There certainly appears to have been no practical limit as to the size or weight of parcels transmitted through the post during the time of Docwray's management, and the memorial further says, "He forbids the taking in of any band-boxes—except very small—and all

parcels above a pound ; which, when they were taken in, did bring a considerable advantage to the Post Office ;" that these same parcels were taken by porters and watermen at a far greater charge, " which is a loss to the public," as the penny post messengers did the work much cheaper and more satisfactorily. It was insinuated, says Mr. Lewin, " that the parcels were not only delayed, but misappropriated ; that letters were opened and otherwise tampered with : and these charges being partially substantiated, Docwray, who deserved better treatment, was removed from all connection with the department."

ESTABLISHMENT OF CROSS-POSTS.

IN 1710 the whole establishment was remodelled, and additional powers given to the Post Office authorities. The revenue was considerably increased in consequence. Power was given by the Act of Parliament, passed in the above-mentioned year, to establish cross-posts, for the accommodation of those parts of the country lying out of the line of the great post roads. Nothing, however, was done till 1720, when, singular to relate, an official connected with the Post Office made proposals to the Government to establish cross-posts between Exeter and Chester, *via* Bristol, Gloucester, and Worcester, thus connecting the West

of England with the Lancashire districts and the Irish mail route. This official was Mr. Ralph Allen, Deputy Postmaster of Bath, whom Fielding has immortalized as Allworthy, in *Tom Jones*.* Having satisfied the Treasury that his scheme would be not only a great public benefit, but also increase the revenue, they granted him a lease for life of all the cross-posts that should be established. He undertook to pay a fixed rental of £6,000 a-year, as well as bear all the costs of the new service, he receiving the surplus revenue for his own profit. The enterprise soon proved remunerative; and the Government renewed the contract with Allen from time to time, at the same rental, but exacted from him, each time, the establishment of new routes, so that before his death, they extended to all parts of the country.

From the accounts which he left behind him it appeared that his net profits amounted to £10,000 a-year, or nearly half a million in all. He made a very liberal use of his money, and bequeathed, by a codicil to his will, £1,000 to the Hon. William Pitt (afterwards the great Earl of Chatham), with whom he was on terms of friendship.

On Allen's demise the postal authorities undertook

* Pope alludes to him in the well-known lines,

“ Let humble Allen, with an awkward shame,
Do good by stealth, and blush to find it fame.”

the work themselves, and in two years quadrupled the amount of the proceeds.

Previous to the introduction of the cross-posts, letters from one part of the country to another had to be brought to London, causing considerable delay in forwarding them to their destination ; and Allen is entitled to be ranked as one of the greatest of our post-office reformers, for the ability, skill, and enterprise which he showed, in devising and carrying out his plans for remedying this very serious defect in the post-office system.

WAGGONS, STAGE COACHES, MAIL COACHES.

THE only modes of travelling in this country three centuries ago, were riding on horseback or walking. Ladies rode on pillions (*i.e.* soft saddles) which were fixed on the horses' backs, behind a relative or serving-man. Queen Elizabeth used thus to ride into the City from her palace at Greenwich, behind her Lord Chancellor.

Waggons, without springs, first came into use to convey passengers in her reign, and she drove in one on the occasion of her Fifth Parliament. The state of the roads was execrable ; the best being that from Dover to London, though four days were spent on this short distance, by Queen Henrietta and her

household. About 1650 waggons started from the "Axe Inn," Aldermanbury, every Monday and Thursday, taking ten days for the journey in summer and twelve in winter.

Stage coaches were first used, early in the seventeenth century, and became pretty general in the metropolis and suburbs, the rate of travelling being not more than two or three miles an hour. By the end of this century they were placed on three of the principal roads in the kingdom. The following is a copy of the original announcement for the coach between London and York: "Whoever is desirous of going between London and York, or York and London, let them Repair to the Black Swan, in Holborn, or the Black Swan, in Coney Street, York, where they will be conveyed in a stage coach (if God permits) which starts every Thursday, at Five in the morning." This coach, however, only ran in the summer, and, even during that period, passengers had frequently to get out and walk, owing to the wretched state of the roads, and, when the floods were out, had to put up at some inn on the road till the water had subsided.

The introduction of stage coaches was denounced by some as a great evil, tending to slothfulness, and rendering persons unable or unwilling to travel on horseback, and not able to endure frost, snow, or rain, or to lodge in the field! Another writer thus argued

in their favour: "Besides the excellent arrangement of conveying men and letters on horseback, there is of late such an admirable commodiousness, both for men and women, to travel from London to the principal towns of the country, that the like hath not been known in the world, and that is by stage coaches, wherein any one may be transported to any place, sheltered from foul weather and foul ways; free from endamaging of one's health and one's body by the hard jogging or over-violent motion; and this not only at a low price (about a shilling for every five miles) but with such velocity and speed in one hour, as that the posts in some forraign countreys make in a day." Outside seats, and that place of honour, the box seat, were improvements of a later age.

Travelling in Scotland was even slower than in England. The carrier between Selkirk and Edinburgh occupied a fortnight in going and returning, the distance being only thirty-eight miles. In 1678 the coach between Edinburgh and Glasgow, a distance of forty-four miles, drawn by six horses, took six days to complete its journey, to and fro. So recently as 1750, thirty-six hours were required for the journey between these two places. How little passenger traffic there was between London and Edinburgh may be gathered from the fact that, in 1763, there was only one stage coach, which started once a month from each of these cities, taking a fortnight to perform the

journey. At the same time the journey from London to York took four days. In 1835 seven coaches started daily between London and Edinburgh, doing the distance in forty-eight hours.

In 1763 it is estimated that the number of passengers between these two cities, by all kinds of conveyance, did not exceed fifty, of which twenty-five travelled by the stage coach. In 1835 the coaches alone conveyed about 140 persons daily.

In 1754 a "flying coach" (as it was termed) was started by a company of merchants, at Manchester, to travel at what was then considered a very rapid rate—four or five miles an hour. In the company's prospectus it was stated that, "However incredulous it may appear, this coach will actually (barring accidents) arrive in London in four days and a-half after leaving Manchester." Three years later a rival coach was started from Liverpool, which conveyed passengers between Warrington and London in three days. Each passenger had to pay two guineas—one guinea as earnest, and the other on taking coach; only 14 lbs. of luggage free of charge were allowed, and 3d. per lb. for any excess.

These "flying coaches" were the means of suggesting one of the greatest reforms in the history of the General Post Office—the establishment of mail coaches, which owed their origin to the energy and perseverance of Mr. John Palmer, a resident of Bath,

and founder and manager of a theatre in that city. The dilatoriness of the post as well as of coach travelling had frequently deprived him of the services of some London star. Having travelled over the country, and thus acquired personal knowledge of the deficiencies that existed in all parts, for the conveyance of passengers and letters, he published pamphlets and memorialized the Government. The Post Office authorities (as might be imagined) strenuously opposed him; some considered him an enthusiast, others a bore; but, through the valuable countenance of Mr. Pitt, he succeeded in starting his first mail coach on the 24th of August, 1784. It left London at eight in the morning, and arrived at Bristol at eleven at night. The advantages to be derived from Palmer's plan were quickly apparent, and the Government entered into a contract with him, engaging to allow him $2\frac{1}{2}$ per cent. commission on the saving effected in the transmission of the letters. But when it was discovered that this saving amounted to £20,000 a year, Parliament refused to vote this sum to carry out the agreement, but *cheated* him with a grant of £50,000. Palmer lived till 1818, and consequently must have been known to many persons still living, while to many more the recollections of mail coaches (only superseded by the superior facilities of railway travelling) will recall many pleasing recollections.

It may here be added that Mr. Palmer's avocations

as manager of the Bath theatre made him familiar with that great western road, which was still in such public favour, alike with people of fashion and with gentlemen of the highway. No road in England was so much travelled by the wealthy, and on none were they eased of their superfluities with so polite an air. In the intervals of this more agreeable department of their calling, the highwaymen relieved their *ennui* by a sedulous attention to the mails. So habitual were the robberies of the post that they came to be regarded by its officials as among the necessary conditions of human affairs. They urged on the public the precaution of sending all bank notes and bills of exchange in halves, and pointed the warning with a philosophical remark, that "*there are no other means of preventing robberies with effect*, as it has been proved that the strongest carts that could be made, lined and bound with iron, were soon broken open by a robber." Another functionary, who had reflected upon this matter still more deeply, suggested that "when desperate fellows have once determined on a mail robbery, the consequence would be murder in case of resistance."

At this period, in addition to the recognized perils of the roads, the postal service was characterized by extreme irregularity in the departure of mails and the delivery of letters ; by an average speed of about three miles and a-half an hour ; and by a rapidly increasing

diversion of correspondence into illicit channels. Yet, when Mr. Palmer suggested that by building mail coaches, of a construction expressly adapted to run at a good speed, by horsing them liberally, and attaching an armed guard to each coach, the public would be greatly benefited, and the post-office revenue considerably increased, one official person expressed his regret, "that the author of the plan should not first have been informed of the nature of the business," and boldly asserted that the constant endeavours which had long been directed towards the improvement of postal affairs, "in all situations and under all circumstances, has made them now almost as perfect as can be, without exhausting the revenue arising therefrom." Another predicted, that the new methods, if adopted, "will fling the whole commercial correspondence of the country into confusion, and will justly raise such a clamour as the Postmaster will not be able to appease."

At one time this pertinacious opposition seemed likely to succeed, but Mr. Pitt said the scheme ought to have a trial.

Its success in one year exceeded the expectations of even Mr. Palmer, notwithstanding the fact that he met with every opposition from the office.

The "Picture of London," 1825, thus describes the introduction of the mail coach system. "The mode of carrying letters by the General Post was greatly

improved a few years since, by an admirable plan, invented by Mr. Palmer. Previously to its adoption, letters were conveyed by cart, without protection from robbery, and subject to frequent delays. At present, they are forwarded, according to Mr. Palmer's plan, in coaches, distinguished by the name of *mail coaches*, provided with a well-armed guard, and conducted at the rate of eight miles an hour, including stoppages. Government contract with the coach-keepers merely for carrying the mail, the owners making a considerable profit besides, by the conveyance of passengers and parcels. It is not easy to imagine a combination of different interests to one purpose more complete than this. The wretched situation, however, of the horses, on account of the length of the stages which they are frequently driven, is a disgrace to the humane character of the British nation, and requires the interference of the Legislature; no stage should be allowed to exceed twelve miles in length. The rapidity of this mode of conveyance, considered as embracing the leading routes of an entire kingdom, is unequalled in any country; and the present rate of charge for each passenger is little more than *sixpence* per mile."

ANNUAL PROCESSION OF MAIL COACHES.

IT was an annual custom for the mail coaches to go in procession from Millbank to Lombard Street on the King's birthday. At about twelve o'clock, the horses belonging to the different mails, with new harness, and the postmen and postboys on horseback, arrayed in their new scarlet coats and jackets, proceeded from Lombard Street to Millbank, and there dined. At this place the coaches were fresh painted; from thence the procession, being arranged, began to move about five o'clock in the afternoon, headed by the general footmen, on horseback. The mails followed them, filled with the wives and children, friends and relations of the coachmen and guards; while the postboys sounding their bugles and cracking their whips, brought up the rear. From the commencement of the procession, the bells of the different churches rang out merrily, and continued their rejoicing peals till it arrived at the General Post Office, in Lombard Street, from whence they sparkled abroad to all parts of the kingdom. Great crowds assembled to witness the cavalcade as it passed through the principal streets of the metropolis. The clean and cheerful appearance of the coachmen and guards, each with a large bouquet of flowers in his bright scarlet coat, the beauty of the cattle, and the general excellence of the equipment, presented a

most agreeable spectacle to every eye and mind, that could be gratified by seeing and reflecting on the advantages derived to trade and social intercourse by the magnificent establishment.*

The "Post-Office London Directory" for 1826 gives the following list of mail coaches from London: Birmingham, Brighton, Bristol, Carlisle and Leeds; Carmarthen, by Gloucester; Chester, Dover; Dover (Foreign Mail Coach); Edinburgh, by York; Edinburgh, Aberdeen, Inverness, and Thurso; Falmouth, by Exeter; Glasgow and Carlisle, by Manchester; Harwich (Foreign Mail Coach); Hastings, Holyhead, Liverpool, Louth, by Boston; Ludlow, by Worcester; Norwich, by Ipswich; Norwich, by Newmarket; Poole, by Southampton; Portsmouth, Yarmouth and Ipswich. Twenty-four in all. This number was afterwards increased to twenty-seven, at which it remained till they were rapidly superseded by the railways. The total number of mail coaches in England, in 1836, was fifty four-horse, and forty-nine two-horse; thirty in Ireland, and ten in Scotland.

The post of mail guard was highly lucrative, for though the Government allowance was merely nominal, yet the gratuities from bankers for carrying their money parcels, and the passengers' fees, made up a very handsome income.

* Hone's Everyday Book.

In times of great political excitement, such as the trial of Queen Caroline, and the passing of the first Reform Bill, crowds of persons would line the mail routes, anxiously waiting to learn the news, which was shouted to them by the guards as the mails passed rapidly on.

THE POST IN IRELAND.

DURING the seventeenth and eighteenth centuries, the postal service in Ireland was more remunerative than that of Scotland. Previous to the introduction of mail coaches, the mails were conveyed by post-runners, to whom special allowances were made for each particular service, but there were no contracts nor fixed rules as to time; but three and a-half miles an hour seems to have been the average pace. The bags were usually conveyed by boys. In the immediate neighbourhood of the metropolis some kind of cart was employed in the service; in other parts the bags were carried on the backs of ponies or mules, or were conveyed on foot.

At this time, there were mails to Cork, Belfast, Limerick, and Waterford, six days a-week, and to Galway, Wexford, and Enniskillen, three days a-week. There were also three posts a-day to Killarney, but the letters were conveyed by foot-messengers at the

cost of the inhabitants, and of the newspaper printers in Cork.

The introduction of mail coaches into Ireland did not render the conveyance of letters more secure, as the mail, it was stated, was robbed quite as often as before, though frequently accompanied by four armed guards.

As early as the time of Queen Elizabeth packets sailed from Holyhead and Liverpool to Dublin. Cromwell kept up both lines, but, at the Restoration, only that between Chester and Dublin was maintained. A new line was afterwards substituted for that which was discontinued, between Port Patrick and Donaghadee, a short and easy route. The postage to Dublin was 6d.

The late Mr. Bianconi, who did so much to improve passenger traffic in Ireland by the introduction of his long cars, in 1830, induced the authorities to allow him to carry the mails, which he did at a cheap rate, only stipulating that he should not be bound to carry them at times which would interfere with his passenger traffic. In 1848, he had fourteen hundred horses engaged in his business. On the introduction of railways, Bianconi directed his energies to the creation of new districts, and is said to have been ready at a moment's notice to move his cars, men, and horses, to any part of the country, however remote, wherever there was a chance of remuneration for his capital.

In 1860, he possessed a thousand horses, which were employed in drawing sixty or seventy cars daily, traversing twenty-two counties, the distances travelled amounting to between three and four thousand miles. This remarkable man continued his business till within a short time of his death, which took place at his seat in Ireland, on the 22nd September, 1875. He had reached the venerable age of eighty-five.

A SCOTTISH PENNY POST.

IN the year 1766 a penny post was established by one Peter Williamson, a native of Aberdeen. He had been in captivity among the Indians for many years, and after his return he settled down in Edinburgh as keeper of a coffee-stall or shop, in the hall of the Parliament-house. Being frequently employed by the advocates and "writers" frequenting the Scottish forum to carry letters and messages to different parts of the city, and, as he had doubtless heard of the English penny posts, he began a regular post with hourly deliveries, and established agents at different parts of the city to collect letters. He employed four carriers, who appeared in uniform, to take the letters from the different agents, and then to deliver them as addressed. For both these purposes they were accustomed to ring a bell as they proceeded, in order to

give due notice of their approach. The undertaking was so successful that other speculators were induced to set up rival establishments, which of course led to great confusion. The authorities saw the success of the undertaking, and, aware of its importance, they succeeded in prevailing upon Williamson to accept a pension for the goodwill of his venture, and then merged it into the general concern.

LETTER FRANKING.

THE privilege of franking letters by the knights, &c., chosen to represent the Commons in Parliament, began, according to a report of the Committee of the House of Commons in 1735, "with the creating of a post-office in the kingdom by Act of Parliament." The Bill referred to was introduced in 1660, and contained a proviso securing the privilege. Sir Walter Earle proposed the following clause, that "members' letters should come and go free during the time of their sittings." It encountered considerable opposition. Sir Heneage Finch (afterwards Lord Chancellor) called it "a real poor mendicant proviso, and below the honour of the House." Serjeant Charlton urged in its favour that "letters for counsel on circuit went free." The Speaker, Sir Harbottle Grimstone, refused for some time to put the question, saying he

felt ashamed of it. It was, however, eventually put, and carried by a large majority. On the Bill being sent up to the Lords, they threw out this clause, as there was no mention made in it that their letters should pass free. This omission was supplied some years later, when both Houses had the privilege secured to them. How this privilege was exercised to convey not only letters, but goods, servants, dogs, &c., may be seen in official documents still in existence among the Post Office records. "Two maid-servants going as laundresses to my Lord Ambassador Methuen." "Doctor Crichton carrying with him a *cow*, and divers necessaries." "Fifteen couples of hounds going to the King of the Romans with a free pass." "Three suits of *cloaths* for some nobleman's lady at the Court of Portugal." "Two bales of stockings for the use (!) of the Ambassador to the Crown of Portugal." The control of the packet-service having been taken away from the Post Office authorities, the privilege of franking was no longer permitted to be abused in this manner, but was confined to letters endorsed on the cover with the signature of a member of either House. The privilege was, however, allowed to be exercised all the year round, instead of being confined to the time when Parliament was sitting; nor was it restricted to letters on the business of the nation (the original intention of the privilege), but was extended to letters of all descrip-

tions, and apparently with scarcely any limitation as to numbers. Members supplied their friends, either gratuitously or for a consideration, with whole packets of franks at once. Some even paid their servants' wages with them, the servants disposing of them to the highest bidder. Forgeries of members' signatures, as might be expected, were carried on wholesale. The amount of franked correspondence increased from £24,000 in 1715, to £170,000 in 1763. Parliament in the following year enacted, as a means to cure the evil, that the whole address of the letter should be in the handwriting of the member, and his signature to be also appended. But this was only partially successful; and in 1784 it was ordered that all franks should be dated, the month to be written in full, and the letters to be posted on the day they bore date.

The estimated value of franked letters from this date till the establishment of the penny postage (when the privilege was taken away), was £80,000 per annum.

The following remarks on the restrictions on franking are taken from a letter written by the poet Cowper to the Rev. W. Unwin, October 2nd, 1784:—

“ The privilege of franking having been so cropped, I know not in what manner I and my bookseller are to settle the conveyance of proof-sheets hither and back again. They must travel, I imagine, by coach, a large quantity of them at a time; for, like other

authors, I find myself under a poetical necessity of being frugal."

A story is related of Coleridge the poet, which reveals an ingenious method of obtaining information from a letter without paying the postage; and thus it may be called franking it without the aid of a Peer or M.P. When a young man he visited the Lake district, and halted at the door of a wayside inn while the postman was delivering a letter to the barmaid. The postage was a shilling, which the girl, sighing deeply and handing back the letter, said she was too poor to pay. The poet, in spite of the girl strongly objecting to accept his kindness, insisted on paying the postage for her. When the postman had left she told him that the letter was only blank paper, but, by a few hieroglyphics at the back of it, which had been arranged between her and her brother (the sender of the letter) she was enabled to find out all she wanted to know. "We are so poor," she added, "that we have invented this manner of corresponding and franking our letters."

THE ANCIENT SUPERScription OF LETTERS.

THE custom of adding to the direction of letters the word, "These," as was formerly done, arose from the original usage having been to add the words, "Hasten these." See, in the *Gentleman's Magazine* for May,

1799, a letter from Jeremy Taylor so addressed. Some old letters have this inscription :—"To———, Give *these* with speed ;" but a common address of the letters preserved in the State Paper Office, on the Gunpowder Plot of the 5th November is, "Hasten these," meaning "these presents ;" while one of them is endorsed, "Haste! haste! haste!"

ORIGIN OF "SHIP LETTERS."

THE Statute of Queen Anne sanctioned the conveyance of letters from abroad by private ships, but it was not till 1799, that an Act was passed to enable the Postmaster-General to forward letters by them. Masters of vessels refusing to take the bags were subjected to heavy penalties. The postage was half the ordinary rates.

At the present time letters may still be forwarded by private ships, if so addressed, and if by a particular vessel the name of the ship must be added. There is, however, now no saving in postage by this conveyance, nor can letters be forwarded by private ships sailing for New York.

The small number of letters now conveyed by private ship is shown by the Government estimate for 1875-6. England, £3 ; Scotland, £30 ; Ireland, £75.

INSTRUCTIONS TO CAPTAINS IN THE PACKET SERVICE.

IN the beginning of the last century, the following were the Government instructions to captains of vessels carrying the mails:—"You must run while you can, fight when you can no longer run, and throw the mails overboard when fighting will no longer avail." As the service involved considerable risk to life and limb, a scale of pensions was awarded according to the amount of injury received. For every arm or leg amputated above the elbow or knee, £8 per annum; below the arm or knee, twenty nobles. Loss of sight of one eye, £4; pupil, £5; sight of both eyes, £12; pupils, £14; and according to these rules we consider also how much the hurts affect the body, and make the allowances accordingly.

THE FIRST GENERAL POST OFFICES.

THE first General Post Office was in Cloak Lane, near Dowgate Hill. It was afterwards removed to the "Black Swan," in Bishopsgate Street. After the great fire of 1666, it found an habitation in Brydges Street, Covent Garden, at the "Two Black Pillars." About 1690 it was transferred to Sir Robert

Viner's mansion in Lombard Street, which continued to be the chief office until the erection of the building in St. Martin's-le-Grand, which was completed 23rd September, 1829. Nothing can better serve to show the difference between the growth of the postal business of the country before and during the last half-century, than the fact that the Lombard Street Office existed nearly one hundred and forty years, while that in St. Martin's-le-Grand was found so unequal to the continually increasing demand for space, as to require in less than forty years to be supplemented by an addition, as large as the original building. The "Picture of London" (1808), thus describes the importance of the Post Office, and the wretched accommodation provided for carrying on its duties:—
"The Post Office is the most important spot on the face of the globe. It receives information from the Poles; it distributes instruction to the Antipodes; it connects together more numerous and distinct collections of men than any other similar establishment. It is, in the highest degree realized, the seat of terrestrial perception and volition—the brain of the whole earth; and this is hidden in a narrow alley, misshapen even to deformity, and scarcely accessible to the very mail coaches which collect there for their nightly freight." Many years, however, elapsed before the St. Martin's-le-Grand office was opened, of which an account will be found in the next chapter.

OPENING OF THE GENERAL POST OFFICE,
ST. MARTIN'S-LE-GRAND.

AN Act for the removal of the Post Office establishment from its old and confined quarters in Lombard Street was passed as far back as 1815, but it was not till September 23rd, 1829, that the new building (designed by Sir R. Smirke, R.A.) was completed. Its dimensions are about 398 feet long, 130 broad, and 60 feet high. The principal feature in it, originally, was the grand public hall, long since, through want of space, appropriated to the ordinary postal business. This hall was 80 feet long, by about 60 wide, and was divided by Ionic columns into a centre and two aisles, the centre rising to the height of about 53 feet. In the northern aisle, were the Inland, American, Ship-letter, and newspaper offices; and in the southern, the Foreign and Twopenny-Post departments, and the offices of the Receiver-General and Accountant. On the second and third stories were lodging-rooms for the clerks of the foreign office, it being then considered necessary, from the uncertainty of the time of arrival of the mails, that they should be always on the spot. At this time, and for many years subsequently, the foreign mails were made up on Tuesdays and Fridays till 11 p.m. : those nights, in the mercantile world, being termed the "Foreign-Post Nights." The following

was the strength of the establishment in 1829. Inland Office—morning duty, 113 clerks, &c.—evening duty, 119. Returned Letter Office, an inspector and 9 clerks; Foreign Office, a comptroller, deputy, and 16 clerks and sorters, including the West India Office; the Letter-Bill Office, a superintendent and 7 clerks; the Bye-Letter Office, an accountant and 4 clerks; besides the offices of the Receiver-General, Accountant-General, Surveyor and Superintendent of mail coaches, and the Secretary, which employed nearly fifty persons, making a staff of less than 350, in all.

The principal offices of the Twopenny (or London District) Post, were at this time in St. Martin's-le-Grand, and Gerrard Street, Soho. The average number of letters passing through them in the month of May, was 40,000. There were six collections and deliveries in town daily, and two despatches from it, and three deliveries at most places in the country within the limits of these offices.

The number of receiving-houses at this time, for the General Post Office, was about 50, and for the Twopenny Post upwards of 100. The building, soon after it was erected, was found unequal to the continually increasing business, and a new gallery had to be built. As pressure increased, especially after the adoption of the penny postage, additional rooms were added, the public hall was utilized, and many officials were located at different houses in the vicinity.

THE NEW GENERAL POST OFFICE.

It was not alone on account of the Government taking the telegraph service in hand that a larger building had to be provided. The Post Office work proper had so increased, that additional accommodation had to be contemplated before the telegraph department was thought of. The new General Post Office is a handsome structure, built of Portland stone ; and covers an acre of ground, it contains nearly two hundred rooms. The building was erected during the period when Mr. Ayrton was First Commissioner of Works, from the designs of Mr. James Williams, of the Board of Works, no outside architect being employed in connection with it. Its erection was begun in December, 1869, the first stone being laid by Mr. Ayrton on the 16th December, 1870, and it was formally opened early in 1874. The site cost about £50,000, and the building about £150,000.

The building contains the Postmaster-General's rooms, the Secretary's office, the Solicitor's office, the Receiver and Accountant-General's office, and the Telegraph Engineer's office. The third and fourth floors are used principally for the Telegraph instruments, and are occupied by the officers who work them, while in the basement is the "Battery-room," which extends right across the building, and is fitted up with

tiers of shelves on which the "Daniel" batteries are ranged. The shelves are three miles in length, and are capable of accommodating 40,000 cells; but at present, there are in them only 24,000. From the entrance hall, access is gained to a spacious corridor extending all round the building, and communicating, by wide staircases, with similar corridors on the upper floors. On the outside are the different offices, and through the windows on the inside may be seen two small open quadrangles, in one of which is the boiler house with a chimney-stack rising to the height of 130 feet. In this quadrangle also are placed the steam engines for pumping water from an artesian well, and for other important purposes. The large engines for working the air pumps in connection with the pneumatic tubes are in the other quadrangle.

One of the most remarkable features of this department is the pneumatic service. This is carried on by means of a large number of leaden tubes with iron casings, through which, by the creation of a vacuum, the forms on which the messages are written are blown. These tubes not only communicate from one part of the building to another, and from one part of the room to another, but also with about twenty of the principal telegraph stations in London. The mode of working is as follows: The telegram is folded up and placed in a small guttapercha case, called a *carrier*, and inserted in the tube. A telegraphic signal is sent

to the attendant at the other end of the tube, and the message quickly reaches its destination. The tubes for this service in the building are $1\frac{1}{2}$ inch in diameter, the outside tubes from $2\frac{1}{4}$ to 3 inches. The longest tube is that to Charing Cross, about a mile and a half distant, the time occupied in the passage of the message being four minutes. There is between Paris and Versailles, a tube twelve miles long. The "carriers" occasionally stick fast in this tube, and it is then necessary to open it to remedy the defect, the difficulty being to find the exact spot where the stoppage occurs. Several ingenious methods have been devised with this object, of which the following specially deserves notice. A delicate elastic skin is stretched over the end of the tube, so that any motion of the air within it will cause a slight vibration of the skin at the end. A pistol is then fired near this membrane, and the explosion causes a great wave of air to roll along inside the tube, until it strikes the "carrier." It is then turned back again, and produces a tremulous motion in the skin. The number of seconds that elapse between the report of the pistol and the return of the wave are carefully noted, and as sound travels at the rate of 1,142 feet per second, the position of the message in the tube can be easily ascertained. The tubes at St. Martin's-le-Grand being lined with lead, have, we believe, been hitherto free from these stoppages.

The instrument-galleries resemble two long rooms

united by a large square central space, so as to form one great apartment. There is nearly a mile of tables, on which are the instruments for receiving and sending the messages. The number of hands (male and female) employed in this room, in the busiest part of the day, is nearly a thousand. The night staff amounts to three hundred.

Various kinds of instruments are here at work, some doing single duty, and others both sending and receiving messages at the same time. The process of sending and receiving messages by one wire is called "duplex telegraphy." The "Wheatstone Automatic" is capable of transmitting 120 words a minute; but the messages for this instrument have previously to be prepared at another instrument, which has a keyboard with three or four keys, at which the operator sits. By merely touching the keys, he is enabled, by pneumatic pressure, to punch holes in a long strip of paper, half an inch wide—a certain number of holes made at different widths and positions representing different letters. The principle of the "Wheatstone Automatic" is, that the current of electricity is broken, so that certain parts of the paper are not punctured, and it is only transmitted through the holes; and the same effects are, of course, produced on the strip at the receiving instrument.

Messages for the "Press" are attended to by a special staff of the most experienced operators, who

are engaged exclusively upon them from five in the evening till two in the morning. In the official Report for 1875, it is stated that on the occasion of an important debate in Parliament, and an unusual number of interesting occurrences in different parts of the country, nearly 440,000 words—equal to about 220 columns of the *Times*, were transmitted from the central station in London in a single night.

The total number of post-offices in the United Kingdom now (1877) is 13,447, of which number 896 are head offices.

The total number of officers employed by the Post Office in 1876 was 45,024, of whom 11,654 are employed on telegraph work. In London alone the staff employed is 10,380, of whom 5,500 are attached to the Chief Offices in St. Martin's-le-Grand.

The gross postal revenue in the year ending the 31st of March, 1877, was £6,017,000; the net revenue £1,947,000.

THE CIRCULATION DEPARTMENT AT WORK.

IN this department, as its name implies, the business of sorting and making up the mails, both inland and foreign, is carried on.

The first business, which commences at 5 o'clock a.m., or even earlier, is to prepare for the early morning mails and deliveries in town and suburbs. The letters are collected from the various pillar-boxes, in some districts as early as 3 o'clock a.m. The bags, as they are brought in, are turned out upon long tables; the letters are then placed face upwards, those that appear to have an insufficient number of stamps affixed being quickly picked out, and marked with the amount of the extra (double) postage. Little letters are frequently found intruding into the larger ones; in one week 727 letters had "pigged" into larger envelopes. These are picked out (an operation called *pigging*). Torn and unfastened letters are also picked out. The stamps are now obliterated, and the letters distributed among the various sorters. The sorters' tables are three rows of shelves divided into compartments, and labelled with the names of the principal main lines of Railway, and of certain large towns such as Liverpool, Manchester and Birmingham; or marked Scotch, Irish, London District, Foreign, and *Blind*. These last, as elsewhere more fully explained, are letters with apparently illegible or insufficient addresses.

In this work hundreds are engaged simultaneously, but with little noise or apparent bustle. Now and then a sorter may be observed to place letters on one side. This is frequently on account of their containing coin, which ought only to be placed in registered letters, and the parties to whom they are delivered will be charged special fees. During the six months following the compulsory registration of these letters, 58,000 of them were thus charged. Unpaid letters entail a large amount of extra trouble, as many officers through whose hands they pass have to keep an account of the postage chargeable upon them.

From 6 to 8 o'clock p.m., when the night mails are made up, is the busiest time of this department. The showers of letters and newspapers that fall into the receiving-boxes at St. Martin's-le-Grand during the last half or quarter-of-an-hour before closing are a sight to be witnessed; though, since they have been received at the back of the Post Office in Foster Lane, as well as in the front of the building, it is not so astounding as it was when drawn to one focus. The able pens of Sir F. B. Head, Charles Dickens, and other celebrated authors, have depicted the scene most admirably. Sir F. B. Head thus describes it. On the night he witnessed it, the India Mail newspapers were added to those of the heaviest night of the week. At five minutes to six o'clock the receiving-men on duty were so overwhelmed with bags of all colours and sizes that

most of those who had brought only large bundles chucked the bundles themselves into the Office. As fast as the bags were emptied into baskets (each holding about five hundred newspapers), they were dragged by scarlet postmen into the lifting-machine, in which on its platforms they were to be seen through the bars of their respective cages, one set after another rising towards the sorting-halls. "The window was jammed down precisely at six o'clock by the two lean janitors, whom, apparently exhausted by their extraordinary exertions, we observed instantly to sit down on a bar behind them, in order in peaceful quietness to wipe with their shirt-sleeves the perspiration which stood in dewdrops on their pale, honest faces."

The following account, written by Charles Dickens and Mr. W. H. Wills, appeared in the first volume of *Household Words* :—

They crossed the hall at a quarter before six ; "it was just then drizzling newspapers. The great window of that department being thrown open, the first black fringe of a thunder-cloud of newspapers, impending over the Post Office, was discharging itself fitfully, now in large drops, now in little ; now in sudden plumps, now stopping altogether. By degrees it began to rain hard ; by fast degrees the storm came on harder and harder, until it blew, rained, hailed, snowed newspapers. A fountain of newspapers played in at the window. Waterspouts of

newspapers broke from enormous sacks, and engulfed the men inside. A prodigious main of newspapers, at the Newspaper River Head, seemed to be turned on, threatening destruction to the miserable Post Office. The Post Office was so full already that the window foamed at the mouth with newspapers. Newspapers flew out like froth, and were tumbled in again by the bystanders. All the boys in London seemed to have gone mad, and to be besieging the Post Office with newspapers. Now and then there was a girl; now and then a woman; now and then a weak old man; but as the minute hand of the clock crept near to six, such a torrent of boys and such a torrent of newspapers came tumbling in together pell-mell, head over heels, one above another, that the giddy head looking on chiefly wondered why the boys springing over one another's heads, and flying the garter into the Post Office, with the enthusiasm of the corps of acrobats at M. Franconi's, didn't post themselves nightly along with the newspapers, and get delivered all over the world. Suddenly it struck six. Shut, sesame!"

Large vans, called "accelerators," now fill the post-office yard, and are loaded with the mail-bags as they are made up, to be conveyed to the various railway termini, where on arrival they are quickly transferred to the "travelling post-office" attached to the mail train.

THE TRAVELLING POST-OFFICE.

A VERY short time elapsed after the first conveyance of the mails by railway before it was found necessary to construct a special carriage for the conveyance of the letters and post-office servants in charge, so that sorting might be carried on during the journey. The first travelling post carriage was used on the Grand Junction Railway, between Liverpool and Birmingham, on the 1st July, 1837; and, on the completion of the line from London to Birmingham was employed for the postal traffic on that line also. Its appearance must be familiar to most persons, from the models which have been shown at the great Exhibitions, as well as at the Art Loan Collection at South Kensington, (1876). It is similar in appearance to an ordinary saloon carriage, and is about 22 feet long, and well lighted with lamps. Along the whole length of one side are tiers of boxes or pigeon-holes, the larger being for newspapers and packets, and the smaller for letters. On the other side are sunken recesses with upright pegs, on which are hung canvas bags with the names of the different post towns on the route marked upon them. These recesses, as well as the ends of the carriage, are padded, as a protection against accidents. Under the counters or desks, which extend the whole length of the carriage,

bags are packed ready for delivery as the train arrives at the different stations. The original bags being opened and turned out, the business of sorting and resorting commences. The registered letters are taken care of by one clerk, while bundles of ordinary letters are distributed among the sorters who stand opposite the sets of boxes bearing the names of the various towns for which they have to make up mails. The newspapers, books, and other packets have also to be similarly dealt with. But how are these bags delivered, and others received, as the train flies past many stations without stopping? This brings under our notice the apparatus which solves the difficulty.

The machinery by which this feat is so admirably accomplished is worked from a van adjoining the travelling post-office, with which it is connected by a strong iron gangway. The arrangement provides for the simultaneous receipt and despatch of bags. For the purpose of receiving the letters a large strong net is fixed on one side of the van, ready to be drawn at the proper moment. Close to the door, and on each side of it, are hollow iron bars, inside each of which, and worked by a rope and pulley, is an iron arm fixed, on which the bags to be delivered, now secured in leathern pouches, are suspended. The apparatus at the stations is, as may be supposed, the exact counterpart of this; a net being spread to catch

each pouch as it drops from the extended arm, and the bags to be taken in the train-net are hung from iron standards of a sufficient height fixed in the ground. On nearing the spot where the bags are exchanged, the door is pushed back into the groove in which it works, the sorter touches a spring which holds up the net, so that it is loosened from its supports, and projects over the sides of the carriage. The iron arm worked by the pulley-rope is drawn round into the carriage, where the pouch is immediately fastened to it by means of a catch or spring, but so lightly that a touch from the net apparatus at the station will bring it off; it is then let down, remaining by virtue of its own weight at right angles to the door. The pouch quickly disappears from the arm, and at the same moment another falls into the carriage-net. The process of sorting the new arrival of letters is then carried on as before.

From the returns of the medical authorities of the Post Office it does not appear that a greater amount of sickness prevails among the travelling sorters than there is among the staff engaged in the general offices. Many of the men who have travelled one hundred miles a day (Sundays included) for several years, have stated that they find themselves better for the change from stationary work.

DEAD LETTERS.

DEAD letters and dead newspapers are such as cannot be delivered to the persons to whom they are written for one or more of the following cogent reasons :—

1. Because they have no addresses at all.
2. Because their addresses are—even to the “blind man”—illegible.
3. Because the persons to whom they are addressed refuse to receive them.
4. Because the persons to whom they are addressed cannot be found.
5. Because the person to whom they are addressed is found to be really dead and gone !

The dead-letter department is, undoubtedly, one of high trust and honour ; and, in accordance with the principles by which it should be governed, it is a rule in the Office NEVER to open a letter if it can possibly be returned to the writer without doing so. The seals of chartered companies and of noblemen are usually sufficient to effect this object ; and if the public, especially men of business, would inscribe upon their seals or print upon their envelopes their addresses, instead of their monograms, crests, or coats-of-arms, they would in any of the cases we have mentioned, including that of sending money in undirected envelopes, enable the inspector of the dead-letter

office to return them their letters, packets, &c., *unopened*.

THE "BLIND" MAN.

THE duty of solving all the enigmas, and of deciphering the astonishing specimens of writing that are continuously afflicting the Inland Post Office, is imposed upon several gentlemen selected from the sorting clerks, who, from being gifted with extraordinary memory, very sharp wits, and above all, with what Sam Weller termed "a pair of patent double-million-magnifying-gas-microscopes-of-hextra-power eyes," are gravely distinguished throughout the department, as well as in its books, by the title of "The Blind Men." Accordingly, to his little desk, five feet long, two broad, modestly leaning against the wall of a small chamber close to the "Foreign" room, and adjoining the large double sorting-hall, are brought all the letters which every sorter has, in despair, chucked into the "blind" pigeon-hole; and as, gazing for several minutes at nothing but the blind man's back, we beheld one basketful of botherations after another brought to him, we could not—when we considered that this badgering is mercilessly continued throughout every day, week, month, and year of the gentleman's life—help wondering why the Society for the Prevention of Cruelty to Animals has not yet come to the rescue!

No one, however, who has watched the facility with which every compositor in a printing-office can read bad writing, would be much surprised at the ease with which the blind man gets over that portion of his troubles. And, again, as almost any person can readily learn to understand "broad" Yorkshire, broad Devonshire, broad Scotch, or any other *patois*, so it is not, on reflection, surprising that a gentleman of ready abilities should, in due time, learn to decipher "broad writing"—such as "sromfredavi," for Sir Humphrey Davy; "Ner the Wises," for near Devizes; "Biley Rikey," for Billericay; "Steghelhesler Sussexese," for Chichester, Sussex; "Wardling Street, Noher Londer Brutz Schibseed," for Watling Street, near London Bridge, Cheapside; "Wharan Que ner Ne Veasal Pin Tin," for Wareham Quay, near New-castle-upon-Tyne.

The following are a few of the most curious and vague addresses of letters taken to this department:—

Uncle John
 Hopposite the Church
 London. Hengland.

Coneyach lunentick
 a siliam

To my Sister Bridget, or else to my Brother Tom Burke, in care of the Praste, who lives in the Parish

of Balcumbury in Cork, or if not to some dacent neighbour in Ireland.

Obern Yenen

[*Holborn Union*]

Ann M

Olleywhite

[*isle of Wight*]

Amshire.

Ash Bedles in such

[*Ashby-de-la-Zouch*]

for John Hasel, Grinder

in the County of Lestyshur

For Mister Wiley wot brinds de Baber in Lancaster ware te gal is.

This last was too great a puzzle for the blind man of a past generation, but it has been deciphered by the present as addressed to Mr. Wiley, who prints the Paper in Lancaster, where the Gaol is. The communication enclosed was from a foreigner against public schools.

ADDRESSES OF LETTERS TO ROYALTY.

Keen Vic Tory at

Winer Castle

Miss Queene Victoria
of England

To the King of Rusheys
Forren, with speed.

But where the direction is incorrect, or, as in the generality of cases, the post-towns are omitted, the difficulty is not only clearly evident, but it at first appears to be insuperable ; nevertheless, in attentively watching the blind man's back, it is astonishing to observe how easily and fluently he does his work. For a considerable time he is to be seen, apparently from memory, writing post-haste the omitted post-towns on each letter as rapidly as he can handle them. Now and then, as if his gas-lamp had, without any apparent reason, half fainted away, he holds a letter before him for a few moments, turning it a little on this side, and then on that, until he suddenly deciphers it.

In extreme cases, he is occasionally obliged convulsively to scratch the side of his head, just above his right ear, for half-a-second with the sharp-pointed black holder of his iron pen ; however, on he goes, placing occasionally beside him, at the left extremity of his desk, those letters for which reference to his little library, arranged before him, is necessary ; and thus, with the help of about half-a-dozen thick well-thumbed books, and of an intelligent assistant who

sits beside him, he usually manages by the evening mail, or, at all events, by that of the following day, to despatch the mass of mysteries which have been so mercilessly imposed upon him.

OPENING LETTERS AT THE POST OFFICE.

OPENING or detaining letters at the Post Office except under a warrant from one of the principal Secretaries of State was prohibited by a Statute of Queen Anne, which has been confirmed by more recent acts. These warrants, during the last century, were frequently granted, and in 1735 a very strict examination, both of Home and Foreign correspondence, was carried out.

Oliver Cromwell made many improvements in the Post Office, thinking, as he stated, that they would be "the best means to discover and prevent many dangerous and wicked designs against the commonwealth."

In 1806 Lord Spencer introduced the custom of recording the dates of all warrants granted for the opening of letters, and the grounds on which they were issued. Since 1822 these warrants have been kept at the Home Office. From a return made to the House of Commons, in 1853, it appears, that in the preceding ten years only six letters had been opened ; four of them related to cases of felony, the remaining

two being of so innocent a character as to be returnable to those entitled to them.

The exercise of this power by Sir James Graham in 1844, in causing the letters of the Italian patriot, Mazzini, to be opened, and some intelligence contained in them to be forwarded to the Austrian Government, created great commotion in this country, and Committees of both Houses were appointed to inquire into the matter. Nothing, however, was elicited to show that the liberty of the subject was in danger, and the privilege of opening letters by the Government authorities was left pretty much as before. Since that time its exercise has not created any public interest.

The "Secret Office," as it was termed, in which the letters were opened, has been well described in a paper by Dr. Wynter, from which the following account is taken.

THE SECRET OFFICE.

THERE is one room in the Post Office which visitors should not fail to inquire for—the late Secret Office. When Smirke designed the building he must have known the particular use to which this room would be put; a more low-browed, villanous-looking apartment could not well be conceived. It looks the room of a

sneak, and it was one—an official sneak, it is true, but none the less a sneak. As we progress in civilization, force gives place to ingenious fraud. When Wolsey wished to gain possession of the letters of the Ambassador to Charles V. he did so openly and dauntlessly, having ordered, as he says,

“A privye watche shoulde be made in London, and by a certain circute and space aboutes it ; in the which watche, after mydnyght, was taken passing between London and Brayreford, be certain of the watche appointed to that quarter, one riding towards the said Brayreford ; who, examyned by the watche, answered so closely, that upon suspicion thereof, they searched hym, and founde secretly hyd aboutes hym a little pacquet of letters superscribed in Frenche.”

More modern ministers of state liked not this rough manner, but turning up their cuffs, and by the aid of a light finger, obtained what they wanted, without the sufferer being in the least aware of the activity of their digits.

In this room the official letter-picker was appropriately housed. Unchallenged, and in fact unknown to any of the army of a thousand persons that garrisoned the Post Office, he passed by a secret staircase every morning to his odious duties ; every night he went out again unseen. He was, in short, the Man in the Iron Mask of the Post Office.

Behold him, in the latter day of his pride, in 1842,

when the Chartists kept the North in commotion, and Sir James Graham issued more warrants authorizing the breaking open letters than any previous Secretary of State in the present century.—Behold him in the full exercise of his stealthy art!

Some poor physical-force wretch at Manchester or Birmingham has been writing some trashy letters about pikes and fire-balls to his London confederates. See the springs a powerful Government set to catch such miserable game! Immediately upon the arrival of mails from the North, the bags from the above-mentioned places, together with one or two others to serve as a blind to the Post Office people, are immediately taken, sealed as they are, to the den of this secret inquisitor. He selects from them the letters he intends to operate upon. Before him lie the implements of his craft—a range of seals bearing upon them the ordinary mottoes, and a piece of tobacco pipe. If none of the seals will fit the impressions upon the letters, he carefully takes copies in bread; and now the more serious operation commences. The tobacco pipe red-hot pours a burning blast upon the yielding wax; the letter is opened, copied, resealed, and returned to the bag, and reaches the person to whom it is directed, apparently unviolated.

In the case of Mazzini's letters, however (the opening of which exposed the whole concern), the dirty work was not even done by deputy; his letters were

forwarded unopened to the Foreign Office and there read by the Minister himself. The abuses to which the practice was carried during the last century were of the most flagrant kind. Walpole used to issue warrants for the purpose of opening letters in almost unlimited numbers, and the use to which they were sometimes put might be judged by the following :—

“In 1741, at the request of A., a warrant issued to permit A's eldest son to open and inspect any letters which A's youngest son might write to two females, one of whom that youngest son had imprudently married.”

The foregoing, says Dr. Wynter, is from the Report of the Secret Committee appointed to investigate the practice in 1844, which contains some curious matter. Whole mails, it appears, were sometimes detained for several days during the war, and all the letters individually examined. French, Dutch, and Flemish enclosures were rudely rifled, and kept or sent forward at pleasure. There can be no doubt, that in some cases, such as frauds upon banks or the revenue, forgeries, or murder, the power of opening letters was used, impartially to individuals and beneficially to the State; but the discoveries made by this means were so few that it did not in any way counterbalance the great public crime of violating public confidence and perpetuating an official immorality.

THE MAIL-PACKET SERVICE.

THIS is one of the most expensive and important branches of the postal service. In the seventeenth and eighteenth centuries it was under the control of the Post Office authorities. It was then removed to the Admiralty till 1860, when it once more came into the hands of the Postmaster-General.

In 1853 a Treasury Committee was appointed to inquire into the contract packet service, and they reported that, "It is unreasonable to expect that any person, or association of persons, should incur the expense and risk of building vessels, forming costly establishments, and opening a new line of communication at a heavy outlay of capital, without some security that they would be allowed to continue the service long enough to reap some benefits from their undertaking. It must be borne in mind that the expensive vessels built for the conveyance of the mails, at a high rate of speed, are not in demand for the purposes of ordinary traffic, and cannot therefore be withdrawn and applied to another service at a short notice. . . . The value of the services thus rendered to the State cannot, we think, be measured by a mere reference to the amount of the postal revenue, or even of the commercial advantages accruing from it. It is undoubtedly startling at first sight to see that the

immediate pecuniary result of the packet system is a loss to the revenue of about £325,000 a year; but although this circumstance shows the necessity for a careful revision of the service, and though we believe that much may be done to make the service self-supporting, we do not consider that the money thus expended is to be regarded, even from a fiscal point of view, as a national loss."

The conveyance of mails in steamers was first adopted by the British Post Office in 1821. The Holyhead Station for Ireland, and the Dover Station for the Continent, were selected for the first experiments. Heretofore, the practice had been to engage sailing vessels, under agreements with their owners and commanders, at fixed annual payments, for the carriage of the mails; the proceeds of passengers and freight accruing, of course, to the owners. After various fruitless negotiations with steam packet companies, it was determined to build vessels at the cost of the Government. Eventually six such vessels were stationed at Holyhead, and several others at Dover and elsewhere. The Report of the Commissioners of Revenue Inquiry led to the gradual and advantageous introduction of commercial contracts for this service, the first of which was made by the Postmaster-General, in 1833, with the Mona Isle Steam Company, to run steamers twice a-week between Liverpool and Douglas. In the following year the

General Steam Navigation Company contracted to carry the mails twice a-week between London and Rotterdam and London and Hamburg, for £17,000 a-year. This contract remained in force until 1853, when these mails were transferred to the Ostend route. In 1837 a contract was made with Mr. Richard Bourne to convey the mail weekly from Falmouth to Vigo, Oporto, Lisbon, and Gibraltar, for £29,600 per annum. This contract was transferred, in 1843, to the Peninsular and Oriental Company, the port of Southampton was substituted for Falmouth, and the trips limited to three, monthly, the subsidy being proportionally reduced. In 1839 an epoch was marked in world-history, as well as in postal affairs, by the establishment of a fortnightly mail line between Liverpool, Halifax, and Boston, by contract between the Postmaster-General and Samuel Cunard, of Halifax, at £60,000 a-year. Soon the port was made alternately Boston and New York; and, with this change the contract had greater activity, weekly trips being required instead of fortnightly, and the subsidy being raised by the renewal contract of 1850 to £173,340 a-year, with certain contingent allowances in addition. In 1840 a contract was made for mail steamers to Malta, Corfu, and Alexandria, and extended in 1845 to Suez, Bombay, Ceylon, Calcutta, Hong Kong, and Shanghai. This contract was renewed in 1853, and made terminable in 1862, on twelve months' notice.

By its terms the Peninsular and Oriental Company was bound to provide two packets for the conveyance of the Indian mails, one to steam between Southampton and Malta; and another between Marseilles and Malta; then one between Malta and Alexandria, and one between Suez and Aden; one between Aden and Bombay, and another between Aden and Calcutta. But owing to the rapid increase of Indian traffic, the Company, of its own accord, doubled the service between Malta and Alexandria, and also between Suez and Aden. The terms of the contract with the Post Office secured its performance for a subsidy of £244,800 a-year; but the communication having now become double during the greater part of the route, the amount was increased in 1857, which insured an additional packet between Marseilles and Malta, and thus made the most important mail service double throughout. In 1856, a new contract was made for a monthly service between Southampton, Marseilles, Malta, Alexandria, Suez, and Sydney, with the European and Australian Mail Steam Packet Company, at £185,000 a-year. Under this contract the Company runs 336,000 miles a-year, at 11s. per mile. In 1850 a contract was made with the West India Royal Mail Packet Company for the service of the West Indies, and of Central America, Mexico, and Brazil. The Company runs steamers, under that contract, twice a month, over an aggregate

annual mileage of 547,296 miles, and the average pay is 9s. 10d. per mile.

“The objects which appear to have led to the formation of these contracts,” to quote the words of the report of the Committee of 1853, already referred to, “and to the large expenditure involved, were—to afford a rapid, frequent and punctual communication with those distant ports which feed our main arteries of British commerce, and with the most important of our foreign possessions ; to foster maritime enterprise ; and to encourage the production of a superior class of vessels which would promote the convenience and wealth of the country in time of peace and assist in defending its shores against hostile aggression. These expectations have not been disappointed. The ocean has been traversed with a precision and regularity hitherto deemed impossible ; and steam ships have been constructed of a size and power that, without Government aid, could hardly—at least for many years—have been produced.”

THE OVERLAND ROUTE TO INDIA.

THE introduction of this route which, till the opening of the Suez Canal, so greatly facilitated the conveyance both of letters and passengers to the East Indies and China, owed its origin to the enterprise and

courage of the late Lieut. Thomas Waghorn, R.N., who was born at Chatham in the year 1800. At the age of twelve he was appointed a midshipman in the Royal Navy, and before he was seventeen was promoted to lieutenant. After a short cruise he volunteered for the Aracan war, and having received the command of the East India Company's cutter *Matchless*, and seen much service both on land and at sea, he returned to Calcutta in 1827.

At this time he first proposed a plan, to which he had for a long time turned his attention, for a steam communication between England and India. He made proposals to the directors of the Peninsular and Oriental Steam Company, the Board of Control, and the East India Company; but he was opposed in nearly every quarter. He was, however, successful in gaining the patronage of the late Lord Ellenborough, and received permission to carry Government despatches through Egypt for the Governor of Bombay; and, in spite of every difficulty, succeeded in his mission. With assistance from the Bombay Steam Committee he commenced establishing the Overland route, built hotels and halting-places in the desert between Cairo and Suez, and placed steamers upon the Red Sea. After the Government had taken up the project he did not cease his activity, and continued to explore other routes than that through France; and in 1847 found that journeying by

Trieste saved thirteen days. Unfortunately, the heavy expenses he incurred in the prosecution of this route brought him to ruin, and, worn out by his labours and disappointments, and the ingratitude of the Government and the great commercial bodies, his health gave way, and he died in 1850. A small pension was granted to his widow; and it is but the other day that the straitened circumstances of one of his relatives were brought before the public. Such is the manner in which the Government of this country and other public bodies show their obligation to those who have sacrificed life and fortune in promoting the commercial interests of this great Empire.

THE PENNY POST OF 1840.

IT would, we believe, have been impossible, even for the comprehensive mind of Rowland Hill, to have formed any adequate idea of the enormous increase in the postal service which his reform, by the re-introduction of the penny post, was destined to effect. We find the matter thus mentioned in that most useful work of reference, *Chambers's Book of Days*:—"The 10th of January, 1840, will be a memorable day in the history of civilization, as that on which the idea of a penny postage was first* exem-

* It will be seen by a previous article that although Rowland Hill

plified. The practical benefits derived from this reform are so well known that it is needless to dwell upon them. Let us rather turn attention to the remarkable yet modest man, whom we have to thank for this noble invention. Rowland Hill, born in 1795, was devoted through all his early years, even from boyhood, to the business of a teacher. At the age of forty we find him engaged in conducting the colonization of South Australia upon the plan of Mr. Edward Gibbon Wakefield, for which his powers of organization gave him great advantage, and in which his labours were attended with a high degree of success. It was about the year 1835 that he turned his attention to the postal system of the country, with the conviction that it was susceptible of reform. He continued, under enormous difficulties, to collect information upon the subject, so as to satisfy himself, and enable him to satisfy others, that the public might be benefited by a cheaper postage, and yet the revenue remain ultimately undiminished. The leading facts upon which he based his conclusions have been detailed in an authoritative document. The cost of a letter to the Post Office, he saw, was divisible into three branches: first, that of re-

reformed the postal system of his time he did not *first* introduce it, but profiting, no doubt, by what he knew of Docwray's invention, he determined to adopt his plan to modern times, when education was more general.

ceiving a letter and preparing it for its journey, which, under the old *régime*, was troublesome enough, as the postage varied first in proportion to the distance it had to travel; and again, according as it was composed of one, two, or three sheets of paper, each item of charges being exorbitant. For instance, a letter from London to Edinburgh, if single, was rated at 1s. 1½d.; if double, 2s. 3d.; and if treble, at 3s. 4½d.; and any—the minutest enclosure—being treated as an extra sheet. The duty of taxing letters, or writing upon each of them its postage, thus became a complicated transaction, occupying much time and employing the labour of many clerks. This, and other duties which we will not stop to specify, comprised the first of the three branches of the expense which each letter imposed on the office. The second was the cost of transit from post-office to post-office; and this expense, even for so great a distance as from London to Edinburgh proved, upon careful examination, to be no more than the ninth part of a farthing! The third branch was that of delivering the letter and receiving the postage—letters being, for the most part, sent away unpaid. Rowland Hill saw that, although a considerable reduction of postage might and ought to be made, even if the change rested there, yet that, if he could cheapen the cost to the Post Office, the reduction to the public could be carried very much further, without entailing on the

revenue any ultimate loss of a serious amount. He therefore addressed himself to the simplification of the various processes. If, instead of charging according to the number of sheets or scraps of paper, a weight could be fixed below which a letter, whatever might be its contents, should only bear a single charge, much trouble to the office would be spared ; while an unjust mode of taxation would be abolished. For certainly a double letter did not impose double cost, nor a treble letter threefold cost, to the Post Office. But if the alteration had rested there, a great source of labour to the Office would have remained ; because postage would still have been augmented upon each letter according to the distance it had to travel. In the absence of knowledge as to the very minute cost of mere transit, such an arrangement would appear just ; or, to place the question in another light, it would seem unjust to charge as much for delivering a letter at a distance of a mile from the office at which it was posted as delivering a letter at Edinburgh, transmitted from London. But when Rowland Hill had, by his investigation, ascertained that the difference of cost of transit in the one instance and the other was an insignificant fraction of a farthing, it became obvious that it was a nearer approximation to perfect justice to pass over this petty inequality than to tax it even to the amount of the smallest coin of the realm. With regard to the

third head, all that could be done for lessening the cost attendant on delivering the letters from house to house, was to devise some plan of prepayment which should be acceptable to the public (so long accustomed to throw the cost of correspondence on the receiver of a letter instead of the sender), and which, at the same time, should not entail the task of collection to the receiving-office, while it relieved the letter-carriers attached to the distributing-office ; otherwise, comparatively little would have been gained by the change. This led to the proposal for prepayment by stamped labels, whereby the Post Office is altogether relieved from the duty of collecting postage. Thus, one by one were the impediments all removed to the accomplishment of a grand object—uniformity of postage throughout the British Isles.

“It necessarily followed, from the economy thus proposed, that the universal rate might be a low one, which again might be expected to react favourably on the new system, in enabling a wider public to send and receive letters. A brother of Mr. Hill, a few years before, suggested the *Penny Magazine*. Perhaps this was the basis of Mr. Hill's conception, that each letter of a certain moderate weight should be charged one penny. The idea was simple and intelligible, and, when announced in a pamphlet in 1837, it was at once heartily embraced by the public. Neither the Government nor the Opposition patron-

ized it. The Post Office authorities discountenanced it as much as possible. Nevertheless, from the mere force of public sentiment, it was introduced into Parliament, and ratified in 1839.

“The Whig ministry of the day were so far just to Mr. Hill that they gave him a Treasury appointment, to enable him to work out his plan ; and this he held till the Conservative party came into power in 1841. Having been by them turned out of office, on the allegation that his part of the business was accomplished, he might have shared the fate of many other public benefactors, if the community had not already become profoundly impressed with a sense of the value of his scheme. They marked their feeling towards him by a subscription, which amounted to £15,000. On the replacement of the Whigs in 1846, he was brought back into office as the Secretary to the Postmaster-General ; in which position, and as Secretary to the Post Office (to which honour he attained in 1854), he has been duly active in effecting improvements. Of these, the chief has been the organization of the Money-Order Office, by which upwards of thirty millions sterling are annually transmitted from hand to hand at an insignificant expense. Thirty-seven years have now fully proved the virtues of the penny postage, the number of letters transmitted by the Office annually having advanced from seventy-seven, to six hundred, millions, with an additional

outlay, on the part of the public, of only 50 per cent. Nor has England alone to thank Rowland Hill, for there is no civilized country which has not adopted his scheme. It was surely by a most worthy exercise of the Royal power that the inventor of penny postage received, in 1860, the dignity of Knight Commander of the Bath.”

“PACKETS” BY POST.

ON its being notified by the Postmaster-General, immediately after the establishment of Mr. Rowland Hill's Penny System, that, at progressive rates of postage, letters and “packets” of any description might be forwarded by post—provided they did not exceed sixteen ounces in weight—it was no doubt expected that there would suddenly appear a crowd of rectangular parcels of various lengths, breadths, and thicknesses—some sealed, some wafered, some tied, but all containing written or printed documents of more or less importance.

It appears, however, from a certain most extraordinary ledger, that a portion of the public availed themselves of this inestimable literary indulgence with about as much consideration as a herd of very hungry pigs might be expected to evince on being allowed, for recreation, to walk in a garden of beauti-

ful tulips ; and certainly, if the ghost of our excellent old friend, the late Sir Francis Freeling could but, by conjuration, be made to read the list of the "packets" which have been transmitted and delivered by post, like that of Hamlet, it would exclaim to the Post-master-General,

"O, horrible ! O, horrible ! most horrible !
If thou hast nature in thee, bear it not."

For instance, it appears that there have been transmitted as "packets," from Blackburn, in Lancashire, to Spitalfields, London, two canary-birds, delivered by the postman alive and well. From Devonport to London, a pork pie. To London, a woodcock, also a pair of piebald mice, which were kept in the Post-Office a month, fed, and at last delivered to the owner, who called for them. From Manchester to Castle Street, Borough, two rabbits and one bird, and fifteen parcels of plum pudding. From Bognor to Plymouth, a lobster. In one day thirty-one letters containing wedding cake was transmitted. On more than one occasion, without any envelope, a bank note was sent, of which (one was for no less than £50) the two ends were merely folded upon each other, and wafered, the back of the note being directed ! Innumerable leeches were also posted in bladders, several of which burst, the water having wetted the letters, and many of the poor creatures were found crawling over the correspondence

of the country. From Plymouth to "Hunmanby" a bottle of cream was sent. From a mother to her son was posted a pottle of strawberries which, being smashed in the bag, completely destroyed a "packet" full of very valuable lace addressed to an eminent royal personage. A ship-biscuit was found, the address of which was on a very small piece of paper pasted thereon. From Totnes to Dublin was sent an uncovered bottle full of liquor, merely labelled with an address, and the words "sample of cyder." From Exmouth to Hastings half-a-pound of soft soap was posted in thin paper. From Bishop's Stortford to Brunswick Square a fish, also several packages of plants, in wet moss. From Hastings to Bath a bunch of grapes, and also shrimps. From Kingston to Mrs. ———, Westminster Bridge Road, a roast duck. A flask of gunpowder. Fifty-three separate "packets," containing each a box of lucifer matches, one of which, on being handled, exploded in the post-office. A traveller, or bagman, wrote to his beloved wife for his pistol: she affectionately sent it, merely labelled—loaded to the mouth with powder, ball, and slugs. To the Countess of ——— a pair of flesh brushes; the mail cart in coming from the West was upset into a brook, which dissolving the paper-covering of these brushes, they, probably fancying they had arrived at their journey's end, instantly set to work and destroyed a considerable portion of the epistolary contents of the bag.

To Mr. ——— a live snake. From London to Wellington a very long cucumber. To a naturalist in London a live mouse, two china tea-cups, and a box of live spiders. From Oxford Street to Merrion Square, Dublin, addressed to Miss ———, a most beautiful head-dress, of the genus Tigamarce. From London to Sudbury two sweetbreads. To ——— a human heart, a partridge, a mackerel, a paper of fish-hooks—and last, but not least, a human stomach!

ESTABLISHMENT OF DISTRICT POST-OFFICES.

THE division of the metropolis into different postal districts was carried out in 1854. There were originally ten of these divisions, the eastern-central (E.C.), western-central (W.C.), north (N.), north-east (N.E.), north-west (N.W.), south (S.), south-east (S.E.), south-west (S.W.), east (E.), and west (W.). Several of these districts have since been amalgamated, viz., the N.E. with the E., and the S. with the S.E. and S.W. district, thus reducing the number to eight. Each of these districts has its head-office and receiving-houses, pillar-boxes, and distinct staff.

Previous to the establishment of these district offices, the General and London District post-offices retained their separate organization. They were now amalgamated, and the red-coats of the General Post letter carriers finally disappeared.

The effect of the change in lessening the work at St. Martin's-le-Grand was very great. All London letters, instead of being forwarded to the central office, are now distributed in the district in which they are posted, or forwarded at once to the district to which they belong.

The mode of carrying on business at a head district office is somewhat of this kind. The collectors bring in the bags of letters from the different receiving-houses and pillar-boxes. These bags, on arrival, are opened only by persons specially appointed, and their contents checked with the "Bill" which accompanies them. These bills are white when they come from a head receiving-office, blue from a subordinate one, and green from a pillar-box.

The room in which the principal business is conducted is very long and spacious, with rows of tables partitioned off into spaces of about a yard, over each of which are two shelves.

The bags being turned out, and their contents checked, the collector arranges the letters with their faces upwards, and the stamper, after obliterating the stamps, transfers them to the sorting tables. At the edge of each of the two shelves above the tables are three-sided strips of wood, which can be turned so as to display labels on which are printed the eight postal districts, and fifteen provincial districts, towns, railways, &c. The letters are now sorted according to

these labels. The bags containing the Scotch, Irish, Continental, and Colonial letters, are forwarded by cart to the General Post Office, while the packages of country letters are sent off direct to the railway station, if it happen to be in the locality of the district office.

The letters for each postal district are also put into separate bags, and forwarded to the other different stations, thus effecting a great saving of time in the delivery, and easing the work of the main establishment.

POSTAL RATES AND REGULATIONS.

THE following is an exact copy of the regulations of the Penny Post in 1797 :—

PENNY POST REGULATIONS, JANUARY 1st, 1797.
—There are *two principal offices*, one in the *General Post Office Yard, Lombard Street*, and the other in *Gerrard Street, Soho*. There are, besides, numerous receiving-houses for letters, both in town and country.

There are SIX collections and deliveries of letters in town daily (Sundays excepted), and there are two despatches *from* and three deliveries *at* most places in the country, within the limits of the penny post.

The hours by which letters should be put into the

receiving-houses in town, for each delivery, are as follow :—

<i>For delivery in Town.</i>			<i>For delivery in the Country.</i>		
		Delivery.			Delivery.
Over Night by 8		First.	The preceding		
o'clock for the		Second.	evening, by 5		
Morning, 8 „		Third.	o'clock for the	First.	
„ 10 „		Fourth.	Morning, 8 „	Second.	
„ 12 „		Fifth.	Aftern'n, 2 „	Third.	
Aftern'n, 2 „		Sixth.			
„ 5 „					

But letters, whether for town or country, may be put in at either of the two principal offices, at least half-an-hour later for each dispatch.

Letters put in on Saturday evenings are delivered in the country on Sunday morning.

The dated stamp, or, if there are two, that having the latest hour, shows also the time of the day by which letters are despatched for delivery from the principal offices.

The postage of a letter going from one part of the town to another is 1d.

To or from the country, or from one part of the country to another, 2d.

To or from general or foreign post-offices, 1d.

The postage of penny post letters may, or may not, be paid on putting in, at the option of the sender,

but the penny postage for letters to go by the general or foreign mails, must be paid on putting in, and is not optional.

No penny post letter must weigh more than four ounces.

The penny post delivery includes all places within the following circle, which is also inclusive :—

In KENT—Plumstead, beyond Woolwich ; Shooters' Hill, Eltham, Mottingham, South End, beyond Lewisham, and Sydenham. In SURREY—Dulwich, part of Norwood, Streatham, Mitcham, Morden, Merton, Wimbledon, Putney Heath, and Ham and Petersham, beyond Richmond. In MIDDLESEX and HERTS—Brentford, Ealing, Hanwell, Wembly beyond Willesden ; Kingsbury, The Hyde, Mill Hill, and Highwood Hill beyond Hendon ; Totteridge, Whetstone, and East Barnet beyond Finchley ; Southgate, Winchmore Hill, and Enfield. In ESSEX—Chingford and Loughton beyond Walthamstow, and Woodford, Chigwell and Chigwell Row ; Barking Side, Chadwell beyond Ilford, and Ripple Side beyond Barking.

Cash, in gold or silver, or other articles of value enclosed in letters (notes or drafts for money excepted), to be mentioned to the office-keeper at putting in ; but bank-notes, or others payable to bearer, to be cut in half, and the second part not to be sent till the receipt of the first is acknowledged.

This office is not liable to make good the loss of any property sent by post.

N.B.—Penny post letters are frequently by mistake put into the general post, by which means they are unavoidably delayed in the delivery: it is therefore recommended that they be put into the penny-post offices, or receiving-houses, in order that they may be regularly forwarded by their proper conveyance.

Persons having occasion to complain of delay in the delivery of their letters, are requested to send the covers inclosed, in a line to the Comptroller or Deputy-Comptroller, stating the precise time of delivery, as the dated stamp will assist materially in discovering with whom the neglect lies.

By the Act 37 George III. c. 18, the rates of postage for country and foreign letters were again raised, and the following were directed to be taken from and after the 5th day of January, 1797:—

For every letter conveyed by post, not exceeding 15 miles from the office where such letter was put in, to the office where such letter may be delivered, single, 3d.; double, 6d.; treble, 9d.; and for every ounce in weight, 1s. 15 miles and not exceeding 30, 4d.; 30 to 40, 5d.; 40 to 90, 6d.; 90 to 150, 7d.; 150 or upwards, 8d.; double, treble, and ounce weight letters being respectively charged twice, thrice, and four times the single rates. Letters to Scotland were

to be charged, in addition—single, 1d. ; double, 2d. ; treble, 3d. ; ounce, 4d. Letters to or from Great Britain and Lisbon, or any other part in Portugal, 1s. single, and to or from the British dominions in America, 1s., the inland rate of postage, according to the distance the letters were conveyed, being charged in addition.

No letter was to be rated higher than as a treble letter, unless it should be 1 oz. in weight ; and all letters of 1 oz. to be rated as four single letters, and every $\frac{1}{4}$ oz. in excess to be reckoned as a single letter. These rates were still further augmented a few years later, which continued to be in force till the 5th of December, 1839 :—

In Great Britain.

		Postage of a Single Letter.			
From any Post Office in England or Wales					
to any place not exceeding 15 miles		-	4d.		
Above 15 miles and not exceeding 20 miles			5d.		
"	20	"	30	"	6d.
"	30	"	50	"	7d.
"	50	"	80	"	8d.
"	80	"	120	"	9d.
"	120	"	170	"	10d.
"	170	"	230	"	11d.
"	230	"	300	"	12d.

And so in proportion ; the postage increasing pro-

gressively 1d. for every single letter for every like distance of 100 miles.

On the 5th of December, 1839, a uniform rate of 4d. per letter was introduced, as an experiment towards testing the advisability of reducing the postage by degrees to the penny rate, and probably to ascertain the capabilities of the establishment in collecting and delivering a considerably increased number of letters.

The 10th of January following (1840) was the day which witnessed the most beneficent and useful of all postal reforms, viz., the adoption of a uniform rate of 1d. per half-ounce, for all letters to or from any part of the United Kingdom and the Channel Islands. A further reduction to 1d. an ounce for every ounce above the first, came into operation in April, 1865. Another important improvement and reduction, for many business purposes, was the adoption and issue of the halfpenny post-cards, on the 1st of October, 1870. In consequence of the urgent remonstrances of the wholesale stationers against these cards being sold without any charge beyond the postage, the Government subsequently restricted their sale to packets of 12, at 7d. a packet, or 8d. for those of a superior quality, thus depriving poor persons of the privilege of communicating with their friends by the purchase of a single card. This restriction has been recently relaxed, and the

following scale of prices fixed by the Postmaster-General :—

<i>Stout Post Cards.</i>			<i>Thin Post Cards.</i>		
	<i>d.</i>			<i>d.</i>	
1 ...	$\frac{3}{4}$	4 ...	$2\frac{3}{4}$	1 ...	$\frac{3}{4}$
2 ...	$1\frac{1}{2}$	5 ...	$3\frac{1}{2}$	2 ...	$1\frac{1}{2}$
3 ...	2	6 ...	4	3 ...	$1\frac{3}{4}$
				4 ...	$2\frac{1}{2}$
				5 ...	3
				6 ...	$3\frac{1}{4}$

Foreign, $1\frac{1}{4}$ d. each.

This may be looked upon as tending in the right direction to revert to the original tariff of a halfpenny post-card. It is also to be hoped that the double post-cards now in use in some parts of the Continent, to enable the receiver to send back an answer free of expense, will speedily be introduced in this country.

It should be noted that there is no card-post to British India.

NEWSPAPER POST.—It may be useful here to give the definition of a newspaper according to the "Post Office Act, 1870." The following are the conditions required to be fulfilled by a publication before it is entitled to be registered at the General Post Office, and for which an annual fee of 5s. is charged.

1st. The publication must consist wholly or in great part of political or other news, or of articles relating thereto, or to other current topics, with or without advertisements.

2nd. It must be printed and published in the United Kingdom, must be published in numbers at intervals of not more than seven days, and must be printed on a sheet or sheets unstitched.

3rd. The full title and date of publication must be printed at the top of the first page, and the whole or part of the title and the date of publication at the top of every subsequent page.

4th. A supplement must consist wholly or in great part of matter like that of a newspaper, or of advertisements, printed on a sheet or sheets, or on a piece or pieces of paper unstitched; or wholly or in part of engravings, prints, or lithographs illustrative of articles in the newspaper. The supplement must in every case be published with the newspaper, and must have the title and date of publication of the newspaper printed at the top of every page; or, if it consists of engravings, prints, or lithographs, at the top of every sheet or side.

During the time when newspapers paid a stamp duty, they were conveyed free by post. The first duty of one penny was imposed in June, 1712, for the purpose of checking seditious papers. In 1724, a penny was charged for every sheet, and a half-penny for every half-sheet. In 1761, the duty was one penny, or £4 1s. 8d. per thousand. In 1776, the duty was raised to 1½d.; in 1789, to 2d.; in 1794, to 2½d.; in 1797 to 3½d.; and in 1815, to 4d. In 1836 it was

reduced to 1d. and $\frac{1}{2}$ d. for supplements, and was finally abolished (with the exception of the compulsory stamp being retained for postal purposes) in 1855. On the 30th September, 1870, the impressed stamps were done away with entirely, and $\frac{1}{2}$ d. stamps affixed to the covers came into use on the following day. Stamped wrappers were subsequently issued.

The half-penny stamp serves for a newspaper of any weight, but if a packet containing two or more papers, weighs under 2 oz., it will be charged as if it were a box packet of the same weight, viz. $\frac{1}{2}$ d.

Formerly newspapers (when stamped) might be transmitted free more than once, but this privilege is now withdrawn.

The last regulations for transmission and retransmission of stamped newspapers contained the following scale of stamps and dimensions of newspaper:—

Impressed Stamp.	Number of Sheets.	Superficial Extent of Letter-Press on one side.
<i>d.</i>		<i>inches.</i>
1	2	2'295
$1\frac{1}{2}$	3	3'445
2	4	4'590

For transmission abroad, newspapers may be published at intervals of 31 days, and the postage must

in all cases be prepaid in stamps. All newspapers for transmission abroad must be posted within eight days from the day of publication, or they will be charged at the rate of book postage.

No packet of newspapers must be above two feet in length, or one in width or depth. For inland postage it must not exceed 14 lbs. in weight, but for abroad, the weight varies in different countries. The postal rate to the different European countries, the United States, and our principal Colonies, is 1d. for every 4 oz., and to British India 2d. for the same weight, *vid* Brindisi, and 1d. *vid* Southampton.

BOOK POST.—A Treasury Warrant was issued on the 5th June, 1855, providing for the carriage by post of books, pamphlets, &c., at the rate of 4 oz. for 1d. This rate was altered on the 7th October, 1870, to $\frac{1}{2}$ d. under 2 oz., and $\frac{1}{2}$ d. for every additional 2 oz.

Circulars—*i.e.*, letters which, according to internal evidence, are being sent in identical terms to several persons, and the whole or the greater part of which is printed, engraved, or lithographed, may also be sent by book post.

No Book Packet may be above 5 lbs. in weight nor above 1 ft. 6 in. long, 9 in. wide, or 6 in. deep.

COLONIAL AND FOREIGN BOOK POST.

THE rate in the European countries, the United States, and our principal colonies, is 1d. for every 2 oz., and to British India (*vid* Brindisi) 3d. for every 2 oz., and 2d. for the same weight *vid* Southampton.

COLONIAL AND FOREIGN PATTERN AND
SAMPLE POST.

THERE is a Pattern and Sample Post to most of our Colonies, as well as the principal Foreign Countries; but it is restricted to *bond fide* trade patterns or samples of merchandise. The rates of postage are the same as for book packets. The packet must not exceed 24 inches in length, or 12 inches in width or depth.

INDIAN PARCEL POST.

PARCELS to any part of British India can be sent through the Indian Parcel Post Agency, at 22, Leadenhall Street, and (Branch Office) at 25, Cockspur Street.

The charge is 1s. per lb., prepayment optional.

Insurance may be effected, if desired, at the rate (to be prepaid) of 1s. up to £3 value, 2s. 6d. up to £10 value, and 5s. up to £20 value. The maximum weight, size, and value of a parcel are :—Weight 50 lbs., size 2 feet long by 1 foot broad, and 1 foot deep, value £20.

The following are forbidden contents :—Jewelry, watches, precious stones, liquids, or articles of a dangerous or damaging nature.

The above information is as much probably as will be useful to the general reader. The regulations and charges of the Post Office are constantly changing, but the fullest and latest particulars are to be found in the BRITISH POSTAL GUIDE.

This useful little book, which (as is stated on the title-page) contains the chief public regulations of the Post Office, with other information, is published quarterly by command of the Postmaster-General. It is issued at the small price of 6d. and contains full particulars of Rates of Postage, British and Foreign list of Mails, Post Offices in the United Kingdom, Telegraph Stations and Regulations, a list of the principal streets in the London postal district, and the districts in which they are situated, the regulations of the Savings Bank Department, and list of the different branch offices, Tables of Life Insurance and Annuities, and many other matters connected with the various departments of the Post Office. Any person

may prevent delay in obtaining a copy of the Guide, by giving his name to a postmaster as a regular purchaser, and paying the cost in advance.

The other publications of the Post-Office are :—

1. The Postmaster-General's Annual Report, to be had at Messrs. Eyre and Spottiswoode's, East Harding Street, Fetter Lane, E.C., and at Mr. Hansard's, 13, Great Queen Street, W.C.—Price 3d., by post, 4d.

2. List of Places Abroad, containing about 8,000 places not mentioned in the Postal Guide, to be had of all Postmasters.

3. Foreign Telegrams, including Tariff and List of Foreign Telegraph Offices, prices 2s., or 2s. 3½d. by post, on application to the Storekeeper, General Post Office, London.

4. Local Postal Guides.

5. Post-office Daily List, single numbers 1½d. each, or £1 per annum, weekly edition, 5s. per annum.

INTRODUCTION OF POSTAGE STAMPS AND ENVELOPES.

POST-PAID envelopes were in use in France in the time of Louis XIV. Pelisson states that they originated in 1653 with M. de Velay, who established,

under royal authority, a private penny-post in Paris. He placed boxes at the corners of the principal streets to receive the letters, which were obliged to be enclosed in these envelopes.


They were suggested to the Government by Mr. Charles Whiting in 1830, and the eminent publisher, the late Mr. Charles Knight, also proposed stamped covers for papers. Dr. T. E. Gray, of the British Museum, claimed the credit of suggesting that letters should be prepaid by the use of stamps as early as 1834.

The subject was, very naturally, discussed by the authorities on the proposed introduction of the penny-postage; and on the 23rd of August, 1839, Government issued an advertisement, inviting "all artists, men of science, and the public in general," to offer proposals "as to the manner in which the stamp may best be brought into use." Two prizes were offered, one of £200, and the other £100, and three months allowed for sending in plans. Mr. Mulready's (R.A.) design for envelopes was accepted. It was an allegorical drawing, intended to represent the benefits of the circulation of letters all over the world. Those printed in black represented 1d. postage, and the blue 2d. They were received by the public with an immense amount of ridicule, and were withdrawn after having been in use six months. Government now offered £500, for the best design and plan for a

simple postage label. Although a thousand were sent in, not one of them was chosen. The Post Office and Stamp Office authorities then jointly concocted the postage stamp now in use. They were originally printed with black ink, but it being found that the red cancelling marks were easily removed without defacing the stamp, the colour was changed to brown, and afterwards to red. Blue was adopted for the 2d. stamp, and has never been changed. Other colours have been added as fresh stamps have been introduced. The present style of envelope, with the medallion printed on a peculiar kind of paper with lines of thread or silk stretched through it, quickly followed.

Eight years elapsed before any foreign country followed our example in using stamps, which were introduced into France only in 1848. They were soon afterwards adopted by the principal European States and in America.

The perforating machine, which was invented by Mr. Henry Archer, was purchased by the Government in 1852, for £4,000, for the double purpose of guarding against fraud, and facilitating the task of separating one stamp from another.*

* We may here suggest a great improvement in the perforation of stamps. Were they *oval*, thus , the separation would be quicker, better, and less likely to tear them, than is now so often the case.

POSTAGE STAMPS EXCHANGED FOR MONEY.

To discourage the transmission of coin by post, all postmasters in the United Kingdom at whose offices money-order business is transacted, and all letter receivers in the London district, are permitted, though not compelled, to purchase postage stamps from the public, if not soiled or damaged, at a charge of $2\frac{1}{2}$ per cent., the charge, however, never being less than $\frac{1}{2}$ d. Under this arrangement the payments are as follows:—For stamps not exceeding 1s. 8d. in value, the full price, minus $\frac{1}{2}$ d. Above 1s. 8d. and not exceeding 3s 4d. the full price, minus 1d., and so in proportion for larger amounts.

TOWN DELIVERIES OF LETTERS.

THE portion of each postal district within about three miles of the General Post Office is designated the town delivery, and the remainder the suburban.

Within the limits of the east-central district there are daily twelve deliveries, and within the town limits of the other districts eleven deliveries:—The first, or general post delivery, including all Inland, Colonial, and Foreign letters arriving in sufficient time, com-

mences about 7.30 a.m., and, except on Mondays, or on other days when there are large arrivals of letters from abroad, is generally completed throughout London by nine o'clock. In the eastern-central district the second delivery begins about 8.40 a.m. and includes the correspondence received by night mail from Ireland, and by the North mails arriving at 6.40 and 8.0 a.m. ; and the third delivery in this district, corresponding with the second in other districts, is made at about 10 a.m. and includes the letters collected in London generally at 8.45 a.m., and the correspondence by the Scotch mail arriving about 9 a.m. The next nine deliveries are made in every district hourly, and include all letters reaching the General Post Office, or the district offices, in time for each despatch. The last delivery, extending to all the districts, begins at about 7.45 p.m. Each delivery within the town limits occupies one hour.

SUBURBAN DELIVERIES.

THERE are six despatches daily in the suburban districts. The first (at 6.30 a.m.) is to all places within the London district, and includes the correspondence by the night mails from the provinces, and any Colonial or Foreign mails arriving in sufficient

time. This delivery is generally completed in the nearer suburbs by 9 a.m., and at the more distant between 9 and 10 a.m. The second despatch (at 9.30 a.m.) is to the nearer suburban districts only. The third despatch (at 11.30 a.m.) comprises, with a few exceptions, every part of the London district. The fourth despatch (at 2.30 p.m.) is to most of the suburban districts. The fifth (at 4.30 p.m.) extends to the whole of the suburban districts, and, except in the remote rural places, the letters are delivered the same evening. The sixth despatch is at 7 p.m. Letters for this despatch posted at the town receiving-houses and pillar-boxes by 6 p.m., or at the chief office of the district to which they are addressed by 7.30 p.m. are delivered the same evening : except at a few distant places, where the delivery is made early the following morning. The deliveries begin from one to two hours after the stated time of despatch, according to the distance from London.

REGISTERED LETTERS.

THE fee for registering a letter, newspaper, or book-packet, passing between any two places in the United Kingdom, was reduced, on the 1st of January in the present year, from 4d. to 2d. The fee chargeable for

registration to places abroad will be found in the "Postal Guide."

Besides the reduction of the registration fee, the public will be much benefited by rural post messengers being now permitted to register letters on their rounds; by compensation up to £2, in the event of a letter containing an enclosure of intrinsic value being lost in the post; and by the sale at all post-offices and by the rural post messengers, of registered-letter envelopes, bearing a 2d. stamp for the payment of the registration fee. These envelopes (of which at present only two sizes are issued) are $5\frac{1}{4}$ in. by 3 in. and 6 in. by $3\frac{1}{4}$ in. They are sold for $2\frac{1}{4}$ d. each, or 2s. $2\frac{1}{2}$ d. per packet of 12. The ordinary postage fee must be prepaid by affixing the necessary stamps.

The following conditions must be complied with to enable persons to recover compensation for the loss of a registered letter. That the sender duly observed all the conditions of registration required; that it was enclosed in a reasonably strong envelope; and, if it contained money, that it was enclosed in one of the special registered-letter envelopes sold by the Post Office. Application must be made to the Secretary of the Post Office immediately on the loss of a registered letter being discovered; and when the complaint is that the contents of a letter have been abstracted, the envelope must accompany the application, otherwise the question of compensation will not be entertained.

The Postmaster-General, whose decision shall be final, must be satisfied that the loss occurred while the letter was in the custody of the British Post Office, and was not caused by any contributory negligence on the part of the sender. A letter intended to be registered must not be dropped into a letter-box, but must be given to an agent of the Post Office, whether a postmaster, his assistant, or a rural post messenger. Inland letters containing coin, jewelry, or watches cannot be sent unregistered, and if dropped into a letter-box they will, as heretofore, be compulsorily registered by the Post Office, and charged on delivery with a registration fee of 8d., four times the fee proposed to be charged under the new system. A similar fee of 8d. will be charged on letters, without regard to the contents, marked with the word "Registered," but dropped into the ordinary letter-box instead of being handed to an agent of the Post Office, in accordance with the regulation above mentioned. Under the regulations of the General Postal Union, no letter containing coin, jewelry, or watches can be sent, even if registered, to any foreign country; and this regulation, which appears to be hardly sufficiently well understood, will hold good under the new system. The Postmaster-General hopes that now registration is made so cheap and so easy, the public will altogether abstain from sending letters containing enclosures of value through the post unregistered.

INTRODUCTION OF PILLAR BOXES.

THE first pillar-post was erected at the corner of Farringdon Street and Fleet Street and came into use in March, 1855. They were soon extended to all parts of the metropolis as well as to many country districts. In 1860 they numbered 1,958; 1862, 3,460; 1875, 10,186; 1876, 10,835.

These boxes are intended for letters only, and newspapers and book-packets when placed in them are liable to detention.

On the inside of the door of one of these boxes is a hook on which is suspended a green paper which states on it the time of clearance. This is called the bill, and the postman has to bring it away with him, and tie it up with his bundle of letters. Its production at the receiving office is the proof that the box has been duly cleared.

THE GENERAL POSTAL UNION.

A POSTAL congress was assembled at Berne, on the invitation of the German Government, in the month of September, 1874, at which a draft article of Treaty to establish a General Postal Union was discussed by

representatives from all the States of Europe, as well as from the United States of America and Egypt. A treaty was concluded and signed on the 9th October, by all except France; but she joined at a subsequent meeting, it being stipulated that while it should take effect in other countries on the 1st July, 1875, it should not come into operation in France till the 1st of January, 1876.

Under this treaty it was arranged that the $\frac{1}{2}$ oz. should be the uniform weight for a single letter, for which the postage, prepaid, should be 2 $\frac{1}{2}$ d. and postage cards half that amount. Unpaid letters to be charged double. Newspapers at the rate of 6d. for 4 oz. Books and pattern packets 1d. for 2 oz.

The adoption of this plan has been a great boon to commerce. The latest countries who have joined the Union are Japan, Brazil, and the Portuguese Colonies. Their rates are, however, twice as heavy as those above mentioned—at least for letters and post-cards.

ENCLOSURES IN NEWSPAPERS.

ABOUT a quarter of a century ago the Post Office made strenuous efforts to suppress a species of petty fraud which was then very common, *i.e.*, the insertion of letters in newspapers, or writing on the

wrapper or inside of the paper itself. The public may not be aware that the Post Office authorities possess a very ingenious means, which, however, it would not be proper for us to reveal, for the detection of such petty frauds. At the time we mention, the following are a few samples of the punishments inflicted upon the offenders, or rather, we should say, the friends of the offenders, because in all such cases the penalty had to be paid by the receiver of the paper :—

For writing on the Envelope.

Postage charged by weight.

				<i>s.</i>	<i>d.</i>
"With speed"	...	...	...	1	2
"Send soon"	...	...	...	1	0
"To be punctually forwarded"	...	...	...	1	4
"With my Compliments"...	...	...	...	1	2
"It is requested that this paper be delivered without delay, otherwise a complaint will be made to headquarters"	...	...	...	1	0
"Postman, you be honest and true"	...	...	...	1	2

For merely writing in the Inside.

Postage charged by weight.

			<i>s.</i>	<i>d.</i>
"From John (not Lord John)"	...	...	1	0

				<i>s.</i>	<i>d.</i>
"My love to Jessie"	...	...	...	1	2
"My sweetest"	...	...	...	1	4
"All's well"...	...	...	...	1	0
"Do come"...	...	...	...	1	2
"One o'clock on the 10th"	...	...	...	0	10
"No news yet"	...	...	...	1	0
"Mrs. B. is suckling"	...	...	...	1	4

THE POST OFFICE LIBRARY.

THE Post Office Library and Literary Association was formed in 1858, and is now very useful and flourishing. There had previously been a small library attached to one of the minor branches in London; but in the above year it was decided to establish one on a larger and broader basis, to include the higher officers and clerks in all the departments. After doing all they could themselves (and we miss no prominent official name among the very liberal donors of money and books on the occasion), the promoters appealed to the public, and met with many cordial and handsome responses. The late Prince Consort sent the sum of £50, and the Postmaster-General (Lord Colchester) gave £25. Many well-known names in the world of literature, and many of the

London publishers sent books. Messrs. Smith and Son sent 300 volumes, with the message that "the Post-Office does so much for us, and does it so well, that we feel it a privilege to take part in this undertaking." The institution possesses a fine reading room.*

CURIOUS POSTAL STATISTICS.

THE total estimated number of letters which passed through the Post-Office in 1876 throughout the United Kingdom was 1,018,955,200, of which, in round numbers, 856,000,000 are credited to England and Wales, 71,792,000 to Ireland, and 91,120,000 to Scotland. The total number of post-cards passing through the Post-Office in the same period was 92,935,700, and the number of book-packets and newspapers 298,790,000, the total estimated number of newspapers being 125,065,800. There was only an increase of 1 per cent. in the number of letters posted as compared with the previous year; but the increase in the use of post-cards was 6·7 per cent., and in the number of book-packets and newspapers transmitted 6·8 per cent. The proportion of letters to population is as 35 to one in England, 13 to one in Ireland, and 26 to

* Lewin: Her Majesty's Mails.

one in Scotland—an average of 31 per head of the population throughout the United Kingdom. The number of registered letters during 1876 was 5,095,116, but of these 867,875 were official remittance letters. Excluding these, the ratio of registered to ordinary letters is as 1 to 241. This is the first time for several years that the number of registered letters has been ascertained by actual counting.

The average daily number of remittances from the head office to postmasters, of postage and telegraph stamps, post-cards, newspaper wrappers, and embossed envelopes, which are forwarded as registered packets, is 700, weighing in the aggregate from 2 to 3 tons, and occasionally exceeding 4 tons, in weight. A registered letter addressed to a bank was observed to be altogether unfastened, and it contained bank notes of the value of £3,000. During the fifteen months ended the 31st of March, 1877, the number of letters received in the Returned Letter Office was 5,897,724, being an estimated increase per annum upon the numbers of 1875 of 371,890. The number of letters sent to the Returned Letter Office was about one in every 216 of the total number of letters. It was found possible either to return to the writers or re-issue nearly nine-tenths of the whole number received. Other instances of carelessness are given. Upwards of 33,100 letters were posted without addresses, and 832 of these letters were found to contain

altogether nearly £390 in cash and bank notes, and nearly £5,000 in cheques. In different post-offices 78,575 postage stamps were found loose, through being insecurely affixed by the senders. The number of newspapers for places abroad, detained for insufficient postage or other cause, was 203,335 ; and 14,346 miscellaneous articles reached the Returned Letter Office wholly destitute of covers, chiefly through the use of flimsy covers quite unsuitable for the purpose. Then, in spite of money-orders and registration, the public will continue to send money by unsafe means. Four sovereigns were found in one newspaper in the Returned Letter Office ; a gold locket was in another ; and a large seal on the back of a letter becoming chipped, £1 10s. in gold was found embedded in the wax. Shabby people try to defraud the Post Office by concealing in the folds of newspapers such things as cigars, tobacco, collars, seaweed, ferns and flowers, gloves, handkerchiefs, music, patterns, stockings, money, postage stamps, and, worse than all—perhaps a pious fraud—sermons.

IS THE SCHOOL BOARD AN UNNECESSARY INSTITUTION ?

WILL it be believed that in the Report of the Postmaster-General for 1875, he has occasion to write as

follows?—It seems to us so astonishing that a large portion of the public are so ignorant, that they cannot understand the simplest forms of the English language. The rules for the transmission of letters, newspapers, and small parcels are published by the Post Office authorities in very plain and sensible terms; nevertheless, the people do not seem to be able to keep themselves free from errors.

The Post Office, while fulfilling its first duty to the public by affording means for the rapid transmission of correspondence, is also made the vehicle of conveyance for small articles of almost endless variety; and the following were observed passing through the post during the year, *viz.*, silkworms and gentles; flowers, fruits, and vegetables; various kinds of game; wearing apparel; models of metal fittings and toys; leeches, snails, eggs, six white mice, a sparrow, two snakes, a crayfish, and a dog. Several of these being prohibited articles were sent to the Returned Letter Office.

The dog was posted at the Lombard Street office, and, having fallen into the bag affixed to the letter-box, was not discovered until the contents were turned out at St. Martin's-le-Grand.

The failure of letters to reach the persons for whom they are intended is not always attributable to the Post Office.

An unregistered letter was recently received at

Liverpool in a very thin cover bearing an almost illegible address, and was delivered to a firm to whom it was supposed to be directed. On being opened, the letter and its enclosures, five £100 notes, were found to be intended for another firm, to whom they were eventually delivered.

The following is a copy of the address of a letter which also reached Liverpool, the names of persons and places being here omitted. "This letter is for Mrs. M. ———, she lives in some part of Liverpool. From her father John ———, a tailor from———; he would be thankful to some postmaster in Liverpool if he would find her out." The addressee, unfortunately, could not be found, and the letter was sent to the Returned Letter Office.

It happens not unfrequently that complaints are made of the failure both of letters and telegrams, which, after inquiry has taken place, are found in the waste-paper baskets or pockets of the addressees.

Superstition rarely stands in the way of the extension of postal accommodation or convenience; but a case of the kind recently occurred in the west of Ireland. Application was made for the erection of a wall letter-box, and authority had been granted for setting it up; but when arrangements came to be made for providing for the collection of letters, no one could be found to undertake the duty, in consequence of a general belief among the poorer people in the

neighbourhood that, at that particular spot, "a ghost went out nightly on parade." The ghost was stated to be a large white turkey without a head.

POST OFFICE DESPATCH.

UNDER date of December 8, 1839, the following circumstance is recorded in the *Annual Register*:—An amusing incident occurred at Windsor this evening. A carriage-and-four drove up to the palace, and out stepped a personage attired like a foreigner of distinction, on his travels; with a foraging-cap, a boa wound round his neck, and furred gloves. He announced himself as the bearer of important despatches, which must be delivered immediately into the Queen's own hands. Her Majesty, on receiving a communication to this effect, sent orders to the foreign gentleman to deliver up his packets. This he sturdily refused to do. An officer of the household was deputed to obtain the documents, but with no better success. Colonel Grey, equerry in waiting, went on the same errand; but was assured that the Queen's autographical command would alone procure the precious deposit. An inspector of police, stationed at the castle, then received orders to convey the furred gentleman to the station-house. There he displayed some newspapers addressed to the Queen, with a

foreign postmark ; declaring that he could not, consistently with the oath he had taken, deliver them up without the Queen's command in her own hand-writing. Persuasion being useless, the papers were taken from the man by force.

It turned out that this mysterious personage was a Mr. Saunders, a clerk in the Post Office, St. Martin's-le-Grand ! The same morning, being Sunday, after the usual despatch had been forwarded to Windsor, it was discovered that one parcel had been left behind ; the clerks were told by their superior, that they must bear among themselves the expense of sending the packet to Windsor : Saunders said he was going past Buckingham Palace, and would see whether it could not be forwarded thence to the Queen ; but instead of this, he preferred making the ridiculous expedition to Windsor, in the hope of obtaining an interview with royalty.

After passing Sunday night in the station-house, Saunders was taken in custody to London, and for a time suspended from his employment at the Post Office.

THE POETRY OF POST OFFICE LIFE.

SCARCELY a day passes in any of our provincial post-offices without some incident occurring calculated to surprise, amuse, or sadden. Very probably

within a few minutes one person will have come to make a complaint that a certain letter or letters ought to have arrived, and must have been kept back; another will make an equally unreasonable request, or propound some strange inquiry, which the poor post-office clerk is supposed to be omniscient enough to answer. Most often, however, the cases of inquiry disclose sorrowful facts, and all the consolation which can be offered—supposing that the clerk has any of “the milk of human kindness” in him, a quality of mind or heart much too rare, we confess, in the Post Office service—will likely be the consolation of hope. Amusing circumstances are often brought out by requests tendered at the post-office, that letters which have been posted may be returned to the writers. A formal but most essential rule makes letters once posted the property of the Postmaster-General until they are delivered as addressed, and they must not be given up to the *writers* on any pretence whatever. One or two requests of this kind related to us we are not likely soon to forget. On one occasion, a gentlemanly-looking commercial traveller called at an office and expressed a fear that he had enclosed two letters in wrong envelopes, the addresses of which he furnished. It appeared from the account which he reluctantly gave, after a refusal to grant his request, that his position and prospects depended upon his getting his letters, and correcting the mistakes, inas-

much as they revealed plans which he had adopted to serve two mercantile houses in the same line of business, whose interests clashed at every point. He failed to get his letters, but we hope he has retrieved himself, and is now serving one master faithfully.

Another case occurred in which a fast young gentleman confessed to carrying on a confidential correspondence with two young ladies at the same time, and that he had, or feared he had, crossed two letters which he had written at the same sitting. We heartily hope a full exposure followed. Writing of this, we are reminded of a case where a country postmaster had a letter put into his hand through the office window, together with the following message, delivered with great emphasis :—" Here's a letter ; she wants it to go along as fast as it can, 'cause there's a feller wants to have her here, and she's courted by another feller that's not here, and she wants to know whether he is going to have her or not."

These cases, however, are uninteresting compared with one related by another postmaster. A tradesman's daughter, who had been for some time engaged to a prosperous young draper in a neighbouring town, heard from one whom she and her parents considered a credible authority, that he was on the verge of bankruptcy. "Not a day was to be lost in breaking the bond by which she and her small fortune were linked to penury." A letter, strong and conclusive in

its language, was at once written and posted, when the same informant called upon the young lady's friends to contradict and explain his previous statement, which had arisen out of a misunderstanding. "They rushed at once to the post-office, and no words can describe the scene; the reiterated appeals, the tears, the wringing of hands, the united entreaties of father, mother, and daughter, for the restoration of the fatal letter." But the rule admitted of no exception, and the young lady had to repent at leisure her inordinate haste.

We close with a graphic extract from the reminiscences of a Post Office official, in which the every-day life of a country post-office is admirably described:— "For the poor we are often persuaded both to read and write their letters; and the Irish especially, with whom penmanship was a rare accomplishment, seldom failed to succeed in their eloquent petitions; though no one can realize the difficulty of writing from a Paddy's dictation, where 'the pratees, and the pig, and the priest, God bless him!' become involved in one long, perplexed sentence, without any period from beginning to end of the letter. One such epistle, the main topic of which was an extravagant lamentation over the death of a wife, rose to the pathetic climax, 'and now I am obleeged to wash meeself, and bake meeself!'"*

* Lewin: Her Majesty's Mails.

THE MONEY-ORDER OFFICE.

THIS office was originally founded in 1792. No Order could then be issued for more than five guineas, and the charge for that amount was 4s. 6d., or nearly five per cent. It was, in fact, a private speculation of three of the Post Office officials. In 1838 it was made a branch of the general Institution, and two rooms and a staff of three clerks were considered a sufficient provision for carrying on the business of the department.

Before the establishment of this branch the following were the postal directions as to the transmission of bank notes, money, and other valuables through the Post :—

BANK NOTES AND DRAFTS.

Persons wishing to send bank notes or drafts by post, are advised to cut such notes or drafts in halves, and send them at two different times, waiting till the receipt of one half is acknowledged before the other is sent.

MONEY, RINGS, OR LOCKETS, ETC.

When money, rings, or lockets, &c., are sent by the post from London, particular care should be taken to deliver the same to the clerk at the window at the General Post Office ; and when any such letter is to be sent from the country, it should be delivered into the hands of the postmaster ; but it is to be observed that this office does not engage to insure the party from loss.

The public were not slow to take advantage of the new facility for sending small amounts by means of the Post-Office Orders. In 1839, 188,291 Orders were issued for £313,124; in 1861, 7,580,455 Orders were issued for £14,616,348; and in 1865 they had increased in amount to £17,829,290.

The following table gives the progress of this branch from 1870 to 31st March, 1877.

<i>Year.</i>				<i>Amount.</i>
1870	-	-	-	£19,993,987.
1871	-	-	-	22,098,589.
1872	-	-	-	24,013,747.
1873	-	-	-	25,600,069.
1874	-	-	-	26,296,441.
1875	-	-	-	26,497,918.
1877	-	-	-	27,516,698.

(Year ending 31st March.)

The number of inland orders in the last-mentioned year was 17,822,921.

The business soon outgrew the little accommodation provided for it in St. Martin's-le-Grand, and a new building was consequently erected in Aldersgate Street.

The Orders were only issued at first for sums not exceeding £5, the charge being 3d. under £2, and 6d. beyond that amount. In 1862 they were extended to sums not exceeding £10, the charges being 9d. for sums between £5 and £7, and 1s. for sums between £7 and £10.

The amount of commission in 1863 was £144,000, and for the financial year ending March 31st, 1876, £222,669.

The commission on Inland Money Orders was for some years past on the following scale:—

For sums under 10s.	...	...	...	1d.
„ of 10s. and under	£1	...	...	2d.
„ „	£1	„	£2	...
„ „	£2	„	£3	...
and 1d. per	£	or fractional part up to	£10.	

On the 1st January, in the present year, the rate for Orders under 10s. has been raised from 1d. to 2d., and for Orders for 10s. and under £1 from 2d. to 3d. The rate has been increased on account of the cost of the Money-Order Office exceeding the revenue by about £10,000 a-year. The new tariff for registered letters coupled with compensation, in the event of loss, up to £2, will no doubt tend largely to diminish the number of Orders for small amounts.

A Money Order, at the expiration of twelve months from that in which it was issued becomes legally void, but when a good reason can be given for the delay in presenting it, an application for payment, subject to a certain deduction, is entertained. No application can be entertained for compensation for alleged injury for the nonpayment of a Money Order at the expected time.

After once paying a Money Order, by whomsoever presented, the Office is not liable to any further claim.

To guard against any person who has become wrongfully possessed of a Money Order getting it cashed, the authorities recommend the following precautions :—

1st. When the remitter is well known to the payee, to sign the letter enclosing the order with his initials only.

2nd. When this is not the case, either to make the Order payable ten days after date, or to register the letter enclosing it, or to make the Order payable through a bank by crossing it like an ordinary cheque.

3rd. When it is not considered expedient to adopt either of these courses, to send the remitter's name (without a knowledge of which payment cannot be obtained) in a separate letter from that containing the Money Order ; although this latter precaution is much less effective than either of the others.

Payment of an Order cannot be demanded the same day as that on which it was issued.

In case of the miscarriage, or loss, of an Inland Money Order in transmission through the post, a duplicate will be granted, free of charge, on a written application, with the necessary particulars, being forwarded to the Controller of the Money-Order Office in England, Scotland, or Ireland, according to the country in which the original Order was issued. Should an Order be lost after the delivery of the letter in which it was enclosed, an additional commission,

which should be forwarded in postage stamps, together with the application for a duplicate Order, will be charged, This charge, for orders not exceeding £5, will be 1s. ; not exceeding £10, 2s. If it be desired to stop payment of an Inland Order, application must be made at the office where the Order is payable, and a second commission must be paid. If alteration in the name of a payee or remitter of an Inland Money Order should be required, application, accompanied by the payment of a second commission, must be made by the remitter to the postmaster of the office at which the order was issued. Should transfer of payment of an Inland Order from one office to another in the United Kingdom, or repayment of the amount of an order, be required, an application, enclosing the Order, must be made to the postmaster at whose office the Order is payable, who will transmit in exchange a new Order, payable at the place desired, but for a less sum than the original Order by the amount of the second commission charged for the re-issue. Proper printed forms for making applications in all these cases may be obtained at any Money-Order Office ; and postmasters are required to give information how to apply for duplicate Orders, &c.

No letter carrier, rural messenger, or other servant of the Post Office is bound to procure a Money Order for any person or to obtain payment for one, but such services are not forbidden.

On August 5th, 1870, by virtue of a convention with France, the system was brought into use with that country.

Money Orders are now issued on the following Colonies, British Agencies and Foreign Countries :—

Alexandria	India
Berbice (New Amsterdam)	Italy
Belgium	Malta
Belize (Brit. Honduras)	Mauritius
British Columbia	Natal
Cape of Good Hope	New Brunswick
Canada	Newfoundland
Ceylon (Colombo)	New South Wales
Constantinople	New Zealand
Coquimo	Norway
Demerara	Nova Scotia
Denmark	Panama
Egypt	Prince Edward Island
Falkland Isles	Queensland
France	St. Helena
German Empire	Seychelle Islands
Gibraltar	Shanghai
Gold Coast	Smyrna
Heligoland	South Australia
Holland	Straits Settlements
Hong Kong	Suez
	Switzerland

Tasmania	West Coast of Africa
United States	West Indies
Valparaiso	Western Australia
Victoria	Yokohama

It will be observed that neither with Russia, Austria, Spain, Portugal, nor Sweden, is this safe and convenient mode of transmitting small sums of money at present established, although we have this privilege at Constantinople.

The scale of commission for Orders payable abroad is as follows :—

For sums not exceeding...	£2	£5	£7	£10
If payable in Belgium, Denmark, France, the German Empire, Heligoland, Holland, Italy, Norway, Switzerland, Gibraltar, Malta, Constantinople, or Smyrna	<i>s. d.</i> 0 9	<i>s. d.</i> 1 6	<i>s. d.</i> 2 3	<i>s. d.</i> 3 0
Any other place abroad on which Orders are drawn (including most of our Colonies)... ..	1 0	2 0	3 0	4 0

POST OFFICE SAVINGS BANKS.

EARLY in November, 1856, Mr. John Bullar, the eminent counsel,—whose attention had been directed to the subject by the working of the Putney Penny Bank,—suggested the employment of the Money-Order department of the Post Office as an additional Savings Bank agency; and the subject was brought under the notice of the Post Office authorities, but the suggestion did not meet with approval at the time, and nothing came of it. However, the subject was revived by Mr. Charles W. Sikes, of the Huddersfield Banking Company, in a letter to the Right Hon. W. E. Gladstone, M.P., Chancellor of the Exchequer, in 1859, who, unconscious that the idea had occurred to others, was struck by the facilities which the Money-Order Office presented for the purpose. In his letter he pointed out that one of the principal advantages of the scheme was, that the organization of the Money-Order department of the Post Office was in full working efficiency, and was already extended to every city and town, and to many villages of the United Kingdom. He showed that wherever the local inspector of the Post Office had evidence that as many as five Money Orders would be required in a week, the practice was to make that branch of the Post Office a money-order office. It was then estimated (1859),

that such an Office was established, on an average, within three miles of every working man's door in the kingdom. These offices were open daily; they received money from all comers, and gave vouchers for the amount transmitted through them; they held the money until it was drawn, and paid it out on a proper voucher being presented. The Post Office was, in fact, a bank for the transmission of money, holding it from periods of from twenty-four hours to weeks and months. Mr. Sikes argued that the Post Office should be enabled to hold more money from more comers, and to increase the time of holding it, allowing the usual interest; and it would become, to all intents and purposes, a national bank of deposit.

Mr. Sikes' plan was briefly this: that the money-order offices be constituted receivers for a chief bank in London; that Commissioners of Savings Banks be authorized by the Legislature to issue through them savings bank interest notes, such notes, or receipts, to bear interest at the rate of $2\frac{1}{2}$ per cent. per annum; that the interest notes should be for exact pounds, from one to thirty—the latter sum being the maximum allowed to be deposited in a savings bank in one year. The interest notes would resemble the deposit receipts, bearing interest, issued by joint stock banks in England and Scotland, and would only be negotiable at the money-order office by which they were issued. The payment of 6d. on each transaction

would leave a considerable profit to the Post Office. Mr. Sikes carefully worked out his scheme in detail, and it is to him more especially, and to Mr. Gladstone, that we are indebted for the introduction of the Post Office Savings Bank. With regard to the practical working out of this scheme, and its adaptation to the machinery of the Post Office, the public are chiefly indebted to Mr. Scudamore, C.B., who first became famous on account of the services he rendered in this matter, and to Mr. Chetwynd, who was the first Comptroller of the Post Office Savings Banks.

Though, as a general rule, the old Savings Banks were in a sound condition, yet, through the frauds of the actuaries and managers, it frequently happened that one or other of them was broken up, which inflicted severe losses upon those who were least able to bear it. There were also many places (more especially the rural districts) where Savings Banks did not exist, or, if they did, where they were open only for an hour or two, once a week.

It was thought that, by establishing a system of Savings Banks connected with the Post Office, any person might open an account any week-day, and his money would be safely lodged with the Government. He would also be able to make deposits, or to give notice to withdraw the whole or part of his money at any of these banks, in whatever part of the country he might happen to be.

In order to prevent too great a rivalry with the old banks, it was directed that the rate of interest to be allowed to depositors should be only £2 10s. per cent. per annum, while many of the old banks were enabled, from their large business and the liberal interest granted by Government, to allow their customers 3 per cent.

The new system came into operation on the 16th of September, 1861.

Business soon began to flow into this new channel, as will appear from the Parliamentary Return on the 31st March, 1862 :—

	<i>Number of Banks.</i>	<i>Deposits.</i>
England	1,795	£668,879 10 2
Wales	129	28,392 2 10
Scotland	299	10,237 9 8
Ireland	300	26,064 18 8
Channel Islands	9	1,679 15 0
	<u>2,532</u>	<u>£735,253 16 4</u>
		London District £267,309 13 8

In 1866, the capital held in the United Kingdom had increased to £8,121,175.

In December, 1870, the number of depositors in the United Kingdom amounted to 1,183,153, and the total sum held to £15,099,104 : on the 10th December, 1871, it had increased to £17,303,815.

Years.	Number of Depositors.	Amount of Deposits.	Deposited during the year.	Withdrawn.
		£	£	£
1874	1,670,000	23,000,000	8,300,000	6,900,000
1875	1,777,103	25,187,000	—	—
1876	1,702,374	26,996,550	8,982,350	7,792,477

The cost of management and expenses for the last-mentioned year was £125,912 ; and each transaction is supposed to cost the State 8d.

The Post Office Savings Bank department also receives money to purchase life annuities through the medium of the Commissioners for the Reduction of the National Debt. Mr. Gladstone introduced, besides, a system of Life Insurance for small sums, the premiums being paid by instalments at short periods, as an encouragement to the working classes to insure their lives. A very small business has hitherto been done ; some of the insurance offices (notably the Prudential) being able by means of a large army of canvassers, who go from house to house to receive the subscriptions, and by lower premiums, successfully to compete with the Government.

No accommodation could be found in the new building at St. Martin's-le-Grand for this department. It has been for some years past located in St. Paul's Church-yard, and Carter Lane, Doctors' Commons. A permanent building is, however, now being erected on the site of the old Probate Registry, in Queen Victoria Street.

In the Post Office savings banks the number of accounts open at the end of 1876 was 1,702,374, as against 1,777,133 at the close of 1875, but the decrease is more than explained by the special treatment of many small accounts. The total amount of the balances at the credit of depositors, together with

interest accrued at the close of 1876, was £26,996,550, being an increase of £1,809,550 on the total of the previous year.

POST OFFICE SAVINGS BANKS, LIFE INSURANCE,
AND ANNUITIES.

The Postmaster-General desires to call attention to the advantages offered by the Post Office :—

- 1st.—For investing savings and small sums of money, with Government security for repayment.
- 2nd.—For life insurance.
- 3rd.—For making provision for old age by means of an annuity.

SAVINGS BANK.—You can commence an account by depositing a shilling; and you can pay in your money or take it out at any Post Office savings bank in the kingdom, no matter where you open your account. Interest is given on deposits at the rate of 6d. a-year for each complete £1. Married women and children equally with other people can have separate deposit accounts.

LIFE INSURANCE.—You can insure your life for any amount between £20 and £100; and you can pay the premiums either in one sum or in periodical amounts of not less than two shillings.

For instance, a man in his thirtieth year can insure his life for £50 by a single payment of £21 11s. 10d., or by monthly payments of 2s. 2d.

ANNUITIES.—You can buy an Annuity, immediate or deferred,* of not more than £50, or a deferred monthly allowance of not more than £4 3s. 4d., either for yourself or for any person above ten years of age.

The purchase money for an immediate annuity must be paid down in one sum. For a deferred annuity it may be paid by annual instalments. And for a deferred monthly allowance it may be paid by monthly or more frequent instalments.

FURTHER INFORMATION.

There is a Post Office savings bank in every town and in most villages, and at most savings banks there is an insurance and annuity office. A list of them is kept at all post-offices.

You can obtain at any post-office printed papers containing the principal rules either of the Post Office Savings Bank, or of the insurance and annuity offices; and if, after reading these, you wish for further information, you can obtain it by writing a letter on the subject, the postage of which need not be paid, to—

THE SECRETARY,

General Post Office,
London.

General Post Office.

* NOTE.—A deferred Annuity is one which is payable at some future period.

A PNEUMATIC POST.

IN the report of the Telegraphs Select Committee there is a very distinct and definite recommendation with regard to the extended use of pneumatic tubes in London and large towns generally. The use of such tubes need not be confined to the transmission of telegrams, technically so called, it having been explained in evidence how persons wishing for speedy postal communication might write their communications on a prescribed form, fold them up, address them, and hand them in at any telegraph office having the means of pneumatic communication with the central office. The idea was even so far elaborated as to point to the establishment of a sub-central pneumatic station at Charing Cross, which should hold the same relation to the West-end as St. Martin's-le-Grand holds to the City. Seizing upon the main idea, the committee showed how, by means of such tubes, "pneumatic letters" might be transmitted to various parts of a city and delivered with the same speed as a telegraph message ; also, that although these pneumatic tubes are costly in construction, they are cheaply worked, because they do not require clerks, as in the case of wires, nor do they need frequent renewals ; while they can be worked with simplicity, delivering the letter by a single operation,

without the re-transmissions and duplicate copying required in ordinary telegrams. Whether the German Post Office officials have been studying a report intended for our own postal authorities we do not know, but it would appear that the pneumatic letter system, or "blow-post," as it is characteristically termed, is in operation in Berlin at this moment, and is in course of being considerably extended. The system, when complete, will comprise 26 kilomètres of tubing and fifteen stations. The tubes will be of wrought iron, having a bore of 65 millimètres, and they will lie about one mètre below the surface of the ground. Wrought-iron tubes are the exception in our pneumatic system, the method generally adopted being a leaden tube enclosed in a cast-iron pipe. We are, of course, unable to pronounce upon the merits of the two systems, although it would appear on the face of the matter that the freedom from corrosion and the smoother surface afforded by such a workable metal as lead are all in favour of an easier and more rapid working. The exhausting machines and apparatus required for working the Berlin system are situated at four of the fifteen stations. Both compressed and rarefied air, or a combination of the two, are employed in propelling the "carriers" or boxes, into which the telegrams or letters are placed, and steam engines of about 12-horse power are used in condensing and rarefying the air. Each of the four

main stations has two engines, which drive a compressing and an exhausting apparatus, and large containers, or reservoirs, are used for the condensed and rarefied air. The tension of the condensed air is about three atmospheres, and that of the rarefied about 35 millimètres of mercury; and the former, heated to 45 deg. C. by the act of compression, is cooled in the reservoirs, which are surrounded with water. The letters and cards which have to be forwarded are of a prescribed size, twenty being the complement assigned to each "carrier." From ten to fifteen carriers are packed and forwarded at a time—a sort of pneumatic "train," in fact; and behind the last "vehicle" is placed a box with a leather ruffle, in order to secure the best closure of the tube. The velocity of the carriers averages 1,000 mètres per minute, and a train is despatched every quarter of an hour, each of the two circuits or routes into which the system is divided being traversed in twenty minutes, including stoppages. The entire cost of this novel and apparently complete system is estimated at 1,250,000 marks; and it is always well to remember, in speaking of the cost of a pneumatic system as compared with that of an ordinary telegraph, that the outlay is as nearly final as possible, there being practically no limit to the "life" of a pneumatic tube, especially if it be constructed of lead and protected from external injury by an outer coating of iron. A

“blow-post” letter appears to cost 3d. in Berlin, or about one-fourth of the cost of a telegram ; and the average time of delivery in any quarter of the city is stated to be one hour. Admitting our own metropolitan telegraphic system to be perfect as far as it goes, it is perfectly clear from the report of the Select Committee already referred to that a cheaper rate than 1s. for local telegrams is not to be hoped for so long as the costly machinery of wires, instruments, and clerks is maintained for telegraphing over distances readily compassable by the pneumatic system. What strikes us on reading an account of the Berlin system is that these pneumatic tubes afford an opportunity of combining the postal and telegraph services in such a way as to confer a *maximum* benefit on the public at a *minimum* of cost. At all events, it will hardly be doubted that what is necessary and possible in Berlin is more necessary and should be equally possible in London ; and it would seem to be positive economy to replace the wires which are now happily being removed from our housetops in all directions by leaden tubes to be filled with air, which costs next to nothing, rather than by iron pipes full of a costly and perishable combination of copper and gutta-percha.

PNEUMATIC TUBES.—We observe from operations in progress in Parliament Street that the House of Commons Telegraph Office is about to be connected

with the Central Telegraph Office by means of a pneumatic tube. Hitherto all communications between the House of Commons and St. Martin's-le-Grand have been carried on by means of wires, so that there must necessarily have been a limit to the carrying capacity of the telegraphs, which must have been soon reached. The pneumatic tube now being laid is of large capacity, and is of lead enclosed in an iron pipe, in accordance with the method usually adopted in the City and some of our larger provincial towns. The more these tubes are extended the sooner shall we be in a position to realize the idea of a "blow-post."

PART II.



TELEGRAPHS,

LAND AND SUBMARINE.



PART II.

TELEGRAPHS, LAND AND SUBMARINE.

TELEGRAPHY AMONG THE ANCIENTS.

THE importance of a means of rapid and efficient communication between distant places is sufficiently obvious, and was recognized at a very early period. The simplest and most effective of these were "beacon-fires,"—that is, cradles of consumable materials placed in an elevated position, by lighting which, some intelligence, either for good or for evil, might be conveyed over an extensive district of country in a short space of time.

Illustrations of the use of fire-signals are abundant. Lord Macaulay alludes to them in the "Armada."

"Forthwith a guard at every gun was placed along the wall ;
The beacon blazed upon the roof of Edgcombe's lofty hall,

From Eddystone to Berwick bound, from Lynn to Milford Bay,
That time of slumber was as bright and busy as the day ;

For swift to east, and swift to west, the ghastly war-flame spread,
 High on St. Michael's Mount it shone ; it shone on Beachy Head.
 Far on the deep the Spaniard saw, along each southern shire,
 Cape beyond cape, in endless range, those twinkling points of fire."

Reference is also made to this means of communication in Sir Walter Scott's "Lay of the Last Minstrel," when the approach of the English from the border-stations along

"Height, and hill, and cliff"

is announced :—

"Till high Dunedin the blazes saw,
 From Soltra and Dumpender Law ;
 And Lothian heard the Regent's order,
 That all should bowne them for the border."

In a note illustrative of this matter, the author refers to an enactment of the Scottish Parliament, in 1455, which directs that "one bale or faggot, shall be the notice of the approach of the English in any manner ; two bales that they are *coming indeed* ; and four bales blazing beside each other, to say that they *are coming in earnest*."

SEMAPHORES.

THE word is derived from *sēma*, a sign, and *phero*, I bear. They were first established in France in 1795,

for the purpose of conveying intelligence to and from the capital to the armies in the field. For this purpose towers were built at distances from five to ten miles apart, on high ground. The apparatus for telegraphing was composed of six shutters arranged in two frames, by opening and shutting which in various combinations, sixty-three distinct signals could be forwarded.

In 1816 Sir H. Popham improved upon this plan by substituting a mast with two arms, bearing some resemblance to a railway signal. These arms were worked by winches placed in the look-out room of the tower. A powerful telescope was fixed in the direction of the mast at the next station. By these means communications were made with great rapidity, the time taken in telegraphing the fall of the ball at Greenwich Observatory at 1 o'clock to Portsmouth, not exceeding forty-five seconds.

THE TELEGRAPH PROPHESED.

IT is a well-known fact that there were many astute philosophers in the seventeenth century, foremost amongst whom was Sir Kenelm Digby, a son of one of the Gunpowder Conspirators. Such were his natural gifts and acquirements, that there seemed to be no

post in literature, politics, or warfare that he could not undertake with credit. He was a philosopher, a theologian, a metaphysician, a mathematician, a politician, a commander by land and by sea, and distinguished himself in each capacity. But it was a mania with Sir Kenelm and the philosophers of his day—and perhaps it is of our day too—to expect too much from science. He professed great faith in “sympathetic powder,” which Butler, who keenly satirizes the philosophical credulity of his day, thus ridicules :—

“Cure warts and corns with application
Of medicines to the imagination ;
Fright agues into dogs, and scare
With rhymes the tooth-ach and catarrh ;
And fire a mine of China here
With sympathetic gunpowder.”

Glanvil, whose faith in the powers of witches was as firm as Sir Kenelm's in sympathetic powder, among many ridiculous conjectures of the possible achievements of science, hit upon a very remarkable one, which cannot but be striking to us. In a work addressed to the Royal Society more than two centuries ago, he says :—“ I doubt not but that posterity will find many things that now are but rumours verified into practical reality. It may be, some ages hence, a voyage to the Southern unknown tracts—yea, possibly to the moon—will not be more strange than one to America. To those that come after us, it may be

as ordinary to buy a pair of wings to fly with into the remotest regions, as now a pair of boots to ride a journey. And to *confer at the distance of the Indies by sympathetic conveyances* may be as usual to future times as to us in literary correspondence." This last conjecture, the possibility of which has now been realized, doubtless appeared, when hazarded two centuries ago, as visionary and impossible as a flight to the moon. Even Butler, were he living in these days of electric communication, would not have thought it so impossible to fire a mine in China by touching a wire in Britain. Glanvil, with much pertinency, further remarks:—"Antiquity would not have believed the almost incredible force of our cannons, and would not have as coldly entertained the wonders of the telescope. In these we all condemn antique incredulity. And it is likely posterity will have as much cause to pity us. But those who are acquainted with the diligence and ingenious endeavours of true philosophers will despair of nothing."

A still more minute foreshadowing of the Telegraph is to be found in the "Prolusiones Academicæ" of Famiano Strada, a learned Jesuit, who was born at Rome in 1572. It is referred to by Addison in the *Spectator* (No. 241), from which the following extract is taken:—

"Strada, in one of his prolusiones, gives an account of a chimerical correspondence between two friends

by the help of a certain loadstone, which had such virtue in it, that if it touched two several needles, when one of the needles so touched began to move, the other, though at never so great a distance, moved at the same time, and in the same manner as the hours of the day are marked upon the ordinary dial-plate. They then fixed one of the needles on each of these plates in such a manner, that it could move round without impediment, so as to touch any of the four-and-twenty letters. Upon their separating from one another into distant countries, they agree to withdraw themselves punctually into their closets at a certain hour of the day, and to converse with one another by means of this their invention. Accordingly when they were some hundred miles asunder, each of them shut himself up in his closet at the time appointed, and immediatly cast his eye upon his dial-plate. If he had a mind to write anything to his friend, he directed his needle to every letter that formed the words which he had occasion for, making a little pause at the end of every word or sentence, to avoid confusion. The friend in the meanwhile, saw his own sympathetic needle moving of itself to every letter which that of his correspondent pointed at. By this means they talked together over a whole Continent, and conveyed their thoughts to one another in an instant over cities or mountains, seas or deserts."

If the science of electricity had been a little better

known to Strada, he could scarcely have failed to have given the world the advantage of telegraphic communication two centuries ago.

GENERAL DESCRIPTION OF ELECTRIC TELEGRAPHS FOR LAND AND SEA.

THE first requisite for electro-telegraphic communication between two localities is an insulated conductor extending from one to the other. This with proper apparatus for originating electric currents at one end, and for discovering the effects produced by them at the other end, constitutes an electric telegraph. Faraday's term "electrode," literally a way for electricity to travel along, might be well applied to designate the insulated conductor along which the electric messenger is despatched to bear tidings of the distant intelligence. It is, however, more commonly called "the wire" or "the line."

The apparatus for generating the electric action at the one end is commonly called the *transmitting apparatus*, the *transmitting instrument*, or the *sending apparatus* or *instrument*, or sometimes simply the *sender*. The apparatus used at the other end of the line to render the effects of this action perceptible to any of the senses—eye, ear, or taste (all have been

used in actual telegraph signalling)—is called the *receiving apparatus* or *instrument*. In land telegraphs the main electrode consists generally of galvanized wire stretched through the air from pole to pole, at a sufficient height above the ground for security. The supporters or insulators, as they are called, by means of which it is attached to the poles, are of very different form and arrangement in different telegraphs, but involve essentially a stem of glass, porcelain, coarse earthenware, or other non-conducting substance, protected by an overhanging screen or roof from falling rain, one end of the stem being firmly attached to the pole, and the other bearing the wire. The best idea of a single telegraph insulator will be formed by considering a common umbrella with its stem of insulating substance, attached upright to the top of a pole, and bearing the wire supported on a notch on the top outside. The umbrella may be of either one substance with the stem—as glass, or glazed earthenware, for instance—or it may be of a stronger material, such as iron, with an insulating stem fitted to it, to support it below. The best insulators undoubtedly are those of continuous glass, but well-glazed earthenware, which is cheaper, and insulates well so long as the glazing is sufficient to prevent the porous subject within from absorbing moisture, may be used with economical advantage in some cases. In all submarine telegraphs hitherto made, the conductor is of copper, either solid wire, as in earlier lines, or a

little rope or "strand" laid together spirally. This conductor is insulated by a continuous coating of gutta-percha enclosing it. A layer of tarred yarn, forming round the gutta-percha a soft, tough bed, and strong iron wires laid firmly and close to one another, round it in spirals, but slightly inclined to the longitudinal direction, are added for protecting the gutta-percha from external injury, and complete what is called an electric cable. This iron sheath ought to be extremely strong in cables that lie in shallow water or rocky bottoms, in situations exposed to the disturbing influences of waves or currents, or to accidental rough usage from ships' anchors or otherwise. On the other hand, for cables which lie on a soft bottom under very deep water, the iron sheath need not be stronger than to afford the necessary protection to the copper and gutta-percha during the process of submerging, the extremely tranquil condition of the great ocean depths, in most localities, affording complete immunity both from continued wear and tear and from accidental damages, to an electric cable once submerged in good condition.

In some submarine cables several separate insulated conductors are enclosed in a common iron sheath for the sake of economy; but as each is separately insulated in its own gutta-percha, and as each gutta-percha is separately sheathed in tarred yarn, which, under sea-water, becomes thoroughly

moist, and keeps the cylindrical surface of the gutta-percha round each wire at the earth's electric potential, we may regard such an arrangement as equivalent, in electrical circumstances, to so many independent electric cables laid side by side. It will be a question whether any kind of mutual influence can sensibly affect the electric action through a number of conductors so placed. It cannot be overlooked that in reality there is an effect produced by electro-magnetic induction (one of Faraday's first electrical discoveries), according to which the rising and falling of a current through one of the conductors, must give rise to currents respectively in the similar ones, and in contrary directions in the others; but it has been theoretically demonstrated that this influence is so small in an extended cable, as to be insensible in ordinary telegraphic work, through any considerable length of wire.*

TELEGRAPH CABLES—THEIR MAINTENANCE AND DURABILITY.

IN a discussion at the Institution of Civil Engineers, in 1861, a discussion took place on the maintenance and durability of submarine cables, and although the

* Encyclopædia Britannica.

most learned men took part in the proceedings, it was found impossible to notice the effect of temperature upon wires, the comparative advantages of screw and paddle steamers in laying and repairing cables, and other important circumstances which regulated this complicated problem. The two great points, however, which mainly affect the question were much dwelt upon: first, the necessity of thoroughly surveying a route before laying down a cable; and, secondly, the application of some exterior protective covering for cables in all waters—shallow or otherwise.

The old soundings and surveys were, perhaps, sufficient for the purposes of navigation, but they are quite inadequate for the submergence of a telegraph. The mean interval of such soundings in deep water, it seems, was twenty miles. Now, on the Valentia side of the Atlantic, there has been ascertained to be a dip of 7,200 feet in ten miles, and near the coast of Greenland of 3,468 feet in three miles; while the recent examinations of the line from this country to Labrador show that near Iceland there is a series of abrupt elevations and depressions at short intervals, producing a saw-like surface composed of volcanic rock, which never loses its abrasive character. It is stated that in selecting a route for a submarine telegraph, deep water should be avoided, wherever that is possible, even if a considerable detour has to be made. In a depth of 100 fathoms, a cable is beyond the

reach of attrition, and as little likely to be injured as when laid at a depth of 200 or 300 fathoms, whilst it can be repaired almost as easily as if it lay in water of 30 or 40 fathoms deep. The nature of the bottom is most important, as, where rough ground or rocks exist, the cable cannot be grappled. To ascertain this correctly, the use of the sounding-lead alone is not sufficient; a mushroom anchor, which will bring up a bucketful of surface material, and occasionally deep-pronged grapnels, ought to be employed. The line should be divided into short sections of, say, 100 miles in length; for although it might be possible to "work" through 500 or 1,000 miles in length, yet when one section is damaged, the consequences are more serious.

The submarine cables for shallow water are four:— 1, the hempen cable; 2, galvanized iron; 3, unprotected iron cable; 4, iron cable with protective covering. The first is commonly destroyed in a few days by abrasion; the second is durable when buried in mud or sand, but, if exposed to the free action of the tide, it is liable to corrode. It possesses, however, a durability of about three years over No. 3, but after that period the zinc generally disappears. Indeed, all undersea cables, whether galvanized or not, are subject to corrosion—a defect supposed to result from lying upon protruding veins of copper ore, or other material electro-negative with respect to iron. The first cable

laid between Hurst Castle and the Isle of Wight became so deeply corroded in eighteen months, that a ship's anchor broke it. This was replaced by a smaller cable, which did not last a year, and subsequently by a third of stronger construction, which has been superseded by a fourth.

Submarine telegraphs have foes more numerous and insidious than other marine creatures of the eel species. It frequently happens, in repairing a cable, that on the surface of the gutta-percha there is found a small lump, a little hole, or a piece blown out, as if burned by a flash of lightning. These effects have been attributed to lightning. On the other hand, it is contended that the great enemy to the working of a cable is ozone. When the smallest puncture admits the least drop of water in connection with the cable, the decomposition which takes place generates ozone, which is known to attack, in a rapid manner, all inorganic substances like india-rubber or gutta-percha. As to the comparative merits of india-rubber and gutta-percha as insulating materials, the electrical qualities of the former have been proved to be far superior to the latter, and the only thing wanting to justify the use of india-rubber for long deep-sea cables is positive proof of its durability.

The submarine cables laid in 1852, for connecting Hampshire with Hurst Castle, also crossing the Yarmouth river in the Isle of Wight, were coated with

india-rubber, and were found to be very durable. The great thing needed for a submarine telegraph is continual attention ; nor does there seem any reason why cables should not be taken up, examined and repaired periodically, and the communication maintained uninjured for almost an indefinite period. However, deep-sea cables will rarely bear much lifting ; and that between Toulon and Algiers, which permitted itself, upon the occurrence of a "kink" in its paying out, to be hauled back for three miles out of water 1,600 fathoms deep, is considered exceptionally tensile.

The cable in question had a covering of hemp and steel, like the more celebrated Rangoon one, with which more pains have been taken perhaps, than any other of its snaky sisterhood. One of the chief causes of failure in laying submarine cables has been neglecting to thoroughly test cables under water before they are deposited in the ocean. In the Rangoon case, a complete record was obtained of the copper and gutta-percha resistances of each mile of cable, so that when the core was joined together, it was possible to detect the slightest defect, which, if allowed to pass, might afterwards develop itself into a fault. Moreover, in laying the cable, or afterwards, any decrease of the insulation was immediately known. It was originally intended that the Rangoon cable should never leave the water; that it should be kept in tanks

during the progress of manufacture, and be paid out from tanks into the sea. As, however, the tanks could not bear the great pressure, the cable became exposed to atmospheric influences. It was soon observed that there was a decrease of insulation, indicating a considerable increase of temperature. Subsequently this became so great, that it was necessary to test the coil of cable in every part. For this purpose a peculiar thermometer was used, constructed upon the principle of the resistance of copper-wire to the electric current, or tube of metal. In coiling the cable on board, several of these thermometers were inserted at different layers of the coil. When tested, after being on board only one week, it was discovered that a spontaneous generation of heat had taken place, and that the heat developed itself unequally throughout the mass, the highest temperature being about three feet below the upper surface of the coil. A large quantity of water, at a temperature of 42 degrees Fahrenheit was poured upon the cable, and this was observed to issue from the bottom of the hold at 72 degrees Fahrenheit. This occurrence seemed to show, that other cables, more particularly the Atlantic cable, which had been coiled on board wet, might have been ruined from the same cause. If the heating had been allowed to continue a few days longer, the gutta-percha would have been softened, and the copper conductor would have become eccentric to the insu-

lating material. It was considered probable that this generation of heat was due to fermentation of the hemp covering, whilst it had also been attributed simply to the rusting of the iron.

The failures of deep-sea telegraphy have been, indeed, exceedingly disheartening, and, as already pointed out, the cable which lies ghost-like at the bottom of the Red Sea, and of no earthly advantage to any one, except the zoophytes, who are said to be so closely attached to it, cost the public many thousands a-year. It has been noticed elsewhere in this book, that one Atlantic cable conveyed only a single complete message and answer between the Old world and the New, and then began to babble isolated words—for want of insulation. Now, we know all about the causes of that failure; but at the time it did seem strange that a single interchange of civility between the Queen and the President should have arrived at each end so fortunately without the loss of a word, and that the poor cable should so soon after turn idiotic. At all events, those messages cost considerably more than a quarter of a-million, which appears to be a good deal of money for a couple of compliments.

The men of science say, that the details of the Atlantic cable were arranged before anything was practically known about deep-sea cables; but the cable was designed on enlightened principles. Great

mistakes were, however, made in organising the undertaking—the radical fault being the precipitate manner in which the contracts were let, precluding any preliminary practical experiments. The Red Sea cable was another instance in which a disastrous waste of public money had its origin in causes entirely apart from scientific difficulties. After the concession had been purchased, it was found that, owing to a complication of arrangements, the directors had also acquired an engineer and a contractor ; that, practically, the form of cable was decided upon ; and that little remained for the board to do but pay. Some of the chief causes of telegraphy do really, therefore, seem to fall more within the scope of the moralist, and the man of the world, than the man of science. If a telegraph could be established to-morrow between this earth and the very purest of the heavenly bodies, people would be found to make a job of it. It has been made perfectly plain long ago, that there are in electric telegraphy other considerations beyond scientific knowledge and mechanical skill, and those who have to deal with the subject must be prepared to cope with difficulties arising from other, and far different causes.

At the meeting of civil engineers referred to at the beginning of this article, a piece of cable on the table was an instance in point. It was taken from a line laid between England and the Continent, for the In-

ternational Telegraph Company. It contained four conducting wires, and whilst the cable was coiled, the whole acted perfectly; but when it was laid, only three of the wires were capable of performing their duty. The contractors expended a large sum in ineffectual attempts to raise the cable, and to discover the cause of the failure, during the stormy season. On the return of propitious weather they were more successful, and they then discovered that a nail had been skilfully inserted into the cable, in such a manner as to destroy the action of one wire. A person who had been on board during the submersion of the cable, at length confessed that he had been in the pay of other persons, and had, at their instigation, sought for employment under the contractors, and had, under instruction, inserted the nail. It will, therefore, be seen that the obstacles which have to be combated in laying, and maintaining submarine telegraphs, have been more of a moral than of a mechanical nature, and that there has been underhand work under the sea.

TELEGRAPHIC INSTRUMENTS.

It must not be imagined, says Dr. Wynter, in his "Curiosities of Civilization," that Mr. Wheatstone's was the only patent for a telegraph in the year 1837.

A number of inquiring minds were, simultaneously with the professor, wandering in the tangled wood of doubt ; and when he burst his way through, others speedily emerged at different points, one after another. Consequently, the year 1837 was distinguished by a complete crop of telegraphs, any one of which would perhaps have held its ground had it stood alone. But not one of them was practically equal to the first, and they have long since departed to the tomb, already stored with abortive schemes of so many merely ingenious minds. The rapidity with which the needle instrument transmits messages, the small amount of electricity required to work it, and the simplicity of its construction, are its chief recommendations. Upwards of two hundred letters can be forwarded by it within a minute. Its great drawback—a drawback that will appear greater every year—is, that it can only be worked by a system of signs, which it requires some practice to understand. As long as the public is content to send its messages open to the daylight, this plan will hold its ground, as a practised manipulator can indicate the letters as fast as it is possible to read, much less to transcribe them, at the other end of the wire ; but immediately that the public come to demand secrecy—to put a seal, as of old, on its letters—this telegraph will, we predict, fall into *public* disuse ; and the revolving dial telegraph, invented by Mr. Wheatstone in 1840, or the recording telegraph

of Bain or Morse, or, more likely still, the American printing telegraph of House, will come into play. This latter instrument appears to contain within itself capabilities of very high excellence ; for instance, it requires no one to interpret and then to re-write its messages—this it does itself. In fact, it extends the compositors' fingers as far as the wire can be stretched. Messages are thus printed at the rate of fifty letters a minute, say at five hundred miles distance, in common Roman characters, in long slips of paper similar to those used on the recording instrument. Any description of its complicated mechanism would be altogether unintelligible to general readers. "While the arrangements of the telegraph of Morse," said Mr. Justice Woodbury, of America, in giving judgment in a patent case, "can be readily understood by most mechanics and men of science, it requires days, if not weeks, with some, thoroughly to comprehend all the parts and movements of the telegraph of House." His system is in use for thousands of miles on the American lines. Bakewell's copying telegraph is naturally suggested by the telegraph of House, from the fact that it reproduces its messages, although in a different manner. The sender of the message may be said to write with a pen long enough to stretch to the most distant correspondent ; that is, he not only forwards instantaneously the substance of a message, but it is conveyed in his own handwriting. The principle is similar to

that of Davy's chemical recording telegraph. The person sending the message writes it on a piece of tinfoil, with a pen dipped in varnish or any other non-conducting substance ; this message is then placed round a metal cylinder, which is made to revolve at a certain regulated pace. In contact with this cylinder is a blunt steel point, which, by the action of a screw, makes a spiral line from the top to the bottom of the cylinder, thus touching every portion of the written message enveloping it. In connection with the steel point is the conducting wire, and at the end of the wire is a similar steel point working spirally upon a like cylinder. It will be at once seen that the current will always be transmitted, except at those portions of the tinfoil which are covered with the non-conducting varnish, and which, therefore, cut off the flow of electricity, and the handwriting will appear at the other end of the telegraphic wire upon a piece of chemically-prepared paper rolled upon its cylinder, and moving synchronously with it. The transmitted letter appears to have been written in white upon a dark ground, the white parts, of course, indicating where the current has been broken, and where, consequently, no decomposition of the chemically-prepared paper has taken place.

THE EARLY DAYS OF TELEGRAPHY.

IN most of our manufactories it may be too truly said, that "the workmanship exceeds the materials." Before a common coffin-nail can be made, the bowels of the earth must be ransacked, ores made in Cornwall must be smelted in Wales, by coals which have been excavated, raised, carted, re-carted, &c. The amount of labour which has been expended in the fabrication of every trifling commodity exhibited in our shops is, in a similar manner, almost incalculable. Indeed, if our countrywomen did but know how many hours of unwholesome and unremitting application have been required—nay, how many constitutions have been ruined—in the fabrication of light beautiful dresses and trinkets that adorn their persons, they would surely feel that their dance, delightful as it may have appeared to them, has been that of death to many of the poorest of their sex. Even the tedious details of the trifling volume we are now writing prove that, while the public are luxuriously flying along the rails of only one arterial railway, an army of upwards of ten thousand workmen are labouring in a variety of ways for the management, protection, and maintenance of the way; and as we were not insensible of the usual necessity of these details, we certainly did expect to find that a proportionate amount of labour would be requisite for

the simultaneous transmission of messages, with extraordinary velocity, to distances of from one to upwards of four hundred miles. Simplicity, however, is the characteristic of science, and certainly the attics or garrets of the London Central Telegraph Station strikingly illustrate the truth of the axiom; for the whole of the Company's stock-in-trade which we found therein, consisted of four or five intelligent looking boys, from fourteen to fifteen years of age, and eight little "*instruments*," each about half the size of those which German women and Italian men carry on their backs through our streets. Indeed, as our advertising horse-dealers in offering, or, as it is technically termed, in *chaunting* their cob to the notice of "a heavy timid gentleman," invariably assure him that "a child can ride it," so it may truly be said of the electric telegraph, which transmits its intelligence at the incomprehensible rate of 280,000 miles per *second*, that a *boy can guide it!*

Although the ordinary rate at which electric communication is now effected has been easily expressed above by a few figures, it is evident that it is a velocity which the human mind has not power to comprehend.

When Shakespeare, in the exercise of his unbounded imagination, made Puck, in obedience to Oberon's order to him—

"Be thou here again
Ere the leviathan can swim a league"

reply—

“I'll put a girdle round about the earth
In forty minutes.”

how little did our immortal bard think that this light, fanciful offer of a “fairy” to the “king of fairies” would, in the 19th century, not only be substantially realised, but surpassed, since the electric telegraph would convey intelligence more than twenty-eight thousand times round the earth, while Puck, at his vaunted speed, was crawling round it only *once*!

On every instrument there is a dial, on which are inscribed the names of six or eight stations with which it usually communicates. When much business is to be transacted, a boy is necessary for each of these instruments. Generally, however, one lad can, without practical difficulty, manage about three; but as the whole of them are ready for work by night as well as by day, they are incessantly attended, in watches of eight hours each, by these satellite boys by day, and by men at night.

As fast as the various messages for delivery, flying one after another from the ground floor, up the chimney, reach the level of the instrument, they are brought by the superintendent to the particular one by which they are to be communicated, and its boy, with the quickness characteristic of his age, then instantly sets to work.

His first process is, by means of the electric current,

to sound a little bell, which simultaneously alarms all the stations on the line ; but although the attention of the sentinel at each is thus attracted, yet it almost instantly subsides in all, except in that to the name of which he causes the index needle to point; a signal by which the clerk at that station at once knows that the forthcoming message is addressed solely *to him*. He, therefore, by a corresponding signal, announces to the London boy that he is ready to receive it. By means of brass handles, fixed to the dial, which the message-sender grasps with each hand, he now begins rapidly to spell off his information by certain twists of his wrists, each of which imparts to the needle on his dials, as well as on the dials of his distant correspondent, a convulsive movement, designating a particular letter of the telegraphic alphabet.

By this arrangement he is enabled to transmit a word of ordinary size in three seconds, or about twenty per minute. In case of any accident to the wire of one of his needles, he can, by a different alphabet, transmit his messages by a series of movements of the single needle, at the reduced rate of about eight to nine words per minute.

While a boy at one instrument is thus engaged in transmitting to—say Liverpool—a message written by its London author, in ink which is scarcely dry, another boy at the adjoining instrument, by the reverse

of the process, is attentively reading the quivering movements of his dial, which, by a sort of St. Vitus' dance, are rapidly swelling into a message, *via* the wire of the South Western Railway—say from Gosport. These, word by word, he repeats aloud to an assistant, who, seated by his side, receives them about as fast as his attendant can conveniently write them on a sheet of paper, which, as soon as the message is concluded, descends to the "Booking Office," where, inscribed in due form, it is, without delay, despatched to its destination by messenger, cab, or express, according to order. The following trifling anecdotes will not only practically exemplify the process we have just described, but will demonstrate the rapidity with which the Company are enabled to transmit messages.

Some time ago, a gentleman, walking into the reception-hall of the London Office, stated that he had important business to communicate to a friend at Edinburgh, who by appointment was, he knew, at that moment waiting there to reply to it in the Company's Telegraph Office. On being presented with the half-sheet of paper, headed with its printed form, as prescribed, he wrote his query, which, after passing through the glass window to the "Booking Office," flew upwards to the instrument department. From this, with the utmost despatch, it was transmitted to Edinburgh, and a brief reply having been almost in-

stantly returning to the instrument, and committed to writing, it was lowered to the "gentleman in waiting." He thus quietly walked off with his answer, which, we were informed at the office, he obtained within the space of five minutes, including the time consumed by himself and his friend in writing the few words which had passed between them; for, during their passage and return, the electric wires had only detained them exactly the three hundred and fiftieth part of a second!

In a dull foggy day an engine on the London and North Western Railway, tired of standing idly with its steam up, suddenly ran away, and, without anyone to guide it, proceeded at a rapid rate towards the Euston Station, where everyone who witnessed its start expected it would cause an amount of damage almost incalculable. The electric telegraph, however, soon overtook and passed the fugitive, and conveyed intelligence to Camden Station in abundant time for full preparations to be made there for its reception, by turning the points of the rails into a sideway containing only a few ballast waggons.

In like manner a "gentleman" who had taken for himself and his family only second-class tickets, but had been comfortably enjoying a first-class carriage with them, was greatly astonished on arriving at his destination to see standing at the window of his carriage, almost before the train had stopped, the

Company's station-clerk, who very loudly said to him, in presence of his fellow-travellers, "Mr. —, I'll trouble you for excess of fare for yourself and party!"

The first murderer who was apprehended through the use of the telegraph was the notorious Tawell, a Quaker, who poisoned his paramour. The description of his flight and capture are admirably told by Sir F. B. Head, in "Stokers and Pokers," from which we have taken the liberty of transferring it to our pages.

TELEGRAPHIC PROGRESS.

IT was announced a few weeks ago that experiments had been successfully made between London and Liverpool, whereby four messages—two in each direction—could be passed through a single telegraphic wire at the same time. The system is that known as the "Quadruplex," and is of American invention or adaptation. Probably very few persons who read the announcement altogether realized that it is ten years short of half a century since the first really practical telegraph was introduced into this country. It is true that in 1756 one Charles Morrison, a "clever Scotchman of obscure position," invented what he was pleased to describe in the *Scots Magazine* of that day as "An Expeditious Method of Conveying Intelli-

gence." The world was comparatively young 125 years ago, and there was not a very great deal of "intelligence" to convey. But Morrison's telegraph, if it might be dignified by the name, was too little expeditious, and too clumsy, even for the wants of that time, for it required a separate wire for each letter of the alphabet, and was otherwise somewhat intricate in its operations. It came to nothing, and its attempted revival some twenty years later by one Le Sage, a Frenchman, was attended with as little success abroad as at home. The labours of Mr.—afterwards Sir Francis—Ronalds, of Hammersmith, in 1816, have been alluded to in the public journals oftener than once in recent years, although it is doubtful whether they have met with their due meed of recognition at the hands of the telegraphing public. Ronalds, it is true can hardly be said to have invented any complete system of telegraphic communication; but he foreshadowed the various uses of the telegraph in the most extraordinary manner, and may be said almost to have laid down some of the principles of its construction and maintenance, which have since been followed out. He met with the usual reward of inventors of that day—he was snubbed by the Government officials to whom he attempted to explain his discovery, and told in almost as many words that telegraphs were wholly unnecessary, and that the semaphore was all that was likely to be required. It

is useful to remember that this happened only sixty years ago. Disheartened, and probably disgusted, Mr. Ronalds retired from the field, although not before he had brought together a most interesting and valuable collection of works relating to electrical science and the electric telegraph.

The year 1837—a little over forty years ago—witnessed the introduction of the first really practical telegraph. With this year the name and fame of W. Fothergill Cooke and Charles Wheatstone are imperishably associated. These earlier telegraphs were of the "Needle" type, and the story is still good enough to relate, how one of them, with no fewer than five needles and an equal number of wires, was unable to make the letter "Q," and how the word "Quaker," as applied to Tawell the murderer, had to be spelt "Kwaker" in the message sent from Slough to Paddington, ordering his arrest. The Double Needle telegraph, however, may be said to be the first which was really employed for commercial purposes; and we are under the impression that its use is still continued by certain railway companies to this day. As a "hand" telegraph, with vanishing signals, the Double Needle has probably never been surpassed for rapidity of communication, under favourable conditions. But it required two wires, and was ill-adapted for working long distances, and its use speedily became confined to the secondary purpose of train signalling, which is usually carried on

over short sections of line. Just about the time when the Double Needle telegraph was beginning to be felt unequal to the pressure of commercial wants, Alexander Bain, another "clever Scotchman," came on the scene with his chymical printing telegraph, which, so far as the perforating process was concerned, may be said to have contained the germ of the Wheatstone system, to be presently dealt with. The Bain method was exceedingly simple. Chymically prepared paper in a long, narrow strip was unwound from a roller driven by clockwork and a weight. A needle or pen—generally a piece of thin steel wire—was so adjusted as to press on the paper in a slanting direction, and as currents of electricity were sent from the distant station, by depressing a "key" or lever in connexion with the battery, blue marks of long or short duration, the result of chymical decomposition, were produced on the strip of paper. There was no mechanical action, as in the needle instrument, or indeed in the more modern forms of printing and acoustic telegraphs; and the "Bain Receiver" is probably the most sensitive form of apparatus which has yet been introduced. The inventor died less than a year ago in comparative poverty. Like many of his class, he lived before his time; for it is not at all certain that an important revival of the Bain method may not be witnessed in these days of high-speed telegraphs.

So far, the telegraph had been a matter of purely

British invention. Certainly its infancy, and probably its childhood, were fostered by British genius and British industry. But curiously enough, it transplanted itself to the New World very early in youth, and in its present stage of manhood—if, indeed, it has reached that stage—it seems to thrive best in the land of its adoption. In 1844, only seven years after the introduction of the invention of Messrs. Cooke and Wheatstone, the Morse printing telegraph was invented, or rather perfected; the first experiment with the system having been made in that year between Washington and Baltimore. It was probably ten years or more before the system was adopted to any extent in this country. Since then, it has become universal, and the Morse Alphabet is probably the only language about which all the nations of the world are agreed. Dots and dashes are as well understood at Teheran as in New York or London: and if the combinations are slightly different in different countries, the principle is the same. The original form of Morse instrument embossed the marks or signs on a strip of paper by means of a pointer or stile. Later forms have been improved by the addition of the Siemens ink-writing principle; while the latest form of all may be said to be the “Morse Sounder,” which discards both paper and ink, and appeals to the ear of the “reader,” instead of the eye. It will be important to note by-and-by that this is the method

adopted in connexion with the Quadruplex system. Of the systems in use contemporaneously with the Morse, the Hughes Type Printing instrument may be said to have been the most important, as it is certainly the most ingenious. By its means the leading journals are able to present their readers daily with several columns of Foreign News, telegraphed direct from Paris and Vienna, and "set up" from the printed slip of paper, without previous transcription or preparation of any kind. The Hughes instrument differs from all others in that it is mainly mechanical, the electrical action being confined to the sending a single short current at the instant the type-wheel is in the proper position, and only a single wave is needed to produce a letter. The sending and receiving instruments are exactly alike, and are manipulated by means of a keyboard somewhat resembling that of a pianoforte, of as many keys as there are letters, figures, and signs to be printed. For every depression of the piano-like key of the Hughes instrument a letter is jerked out at the distant end, while under certain conditions combinations of as many as five letters can be produced during a single revolution of the type-wheel. Perhaps no greater contrast to the Double Needle telegraph, which required numerous combinations for almost every letter, and often a second operator to write the messages down, could be found than the nimble though noisy "Hughes," the use of which is now

almost solely confined to the Continental systems. The "Bell" telegraph of Sir Charles Bright, worked almost exclusively by the late Magnetic Telegraph Company, has probably never been excelled for speed by any acoustic system of telegraphy, in addition to which it may be worked interchangeably with the Single Needle telegraph, now so commonly used at the smaller post-offices and on railways. Curiously enough, however, it has almost dropped out of use. Among the minor inventions which have contributed in no small degree to the success of practical telegraphy in England, must be mentioned those of Mr. Cromwell F. Varley, at one time electrician to the late Electric and International Telegraph Company. At this moment the Varley Insulator is probably the most perfect form of insulator in use.

In dealing with the next phase of telegraphic progress we are carried back to first principles, so to speak. Just as Sir Charles Wheatstone was practically the first inventor in the English telegraphic field, so he may be said to have been the latest; the Automatic telegraph, which bears his name, being probably the latest English invention which has been adopted into our postal system. The working of the Wheatstone system may be roughly set down as a fast-speed application of the Morse system. The Double Needle method might, under favourable conditions, be worked up to a speed of forty

words, or 200 letters, per minute. The Wheatstone method is capable of producing and recording no fewer than 120 words, or 600 letters, per minute; and inasmuch as the former required two wires, and the latter only requires one, the carrying power of the telegraph may be said to have increased sixfold between the earliest and latest inventions of the great founder of the automatic system. It is doubtful whether, but for this invaluable method of transmission, the Post Office could have coped efficiently with the great service of news distribution which its increased facilities have practically created. For it has to be borne in mind that not only in the matter of speed but in the adaptability of the preparatory process to a large number of transmitting machines, the automatic system is perfectly unique, and is as yet unsurpassed as a "single" system. Necessarily complex and delicate in its arrangements, the automatic telegraph is a curious contrast to that other invention of Wheatstone's, the Alphabetical, or "A, B, C" telegraph, which, as its name implies, is the very alphabet of practical telegraphy. Next to the automatic, in point of time, comes the "Duplex," or double-working system; and here we take leave of English inventiveness, just as we took leave of it in 1844 to cross the Atlantic in search of the Morse. It is not altogether clear whether the system of double or "two-way" working is to be regarded in the light of

an invention involving patent rights, as in the case of the Wheatstone system. But it is certain that its application to long lines of telegraph must be so regarded, and equally certain that the honour of first introducing it in this way belongs to America. A good many years ago one Gintl, an Austrian telegraph director, made an attempt to send messages in opposite directions on the same wire at the same time, and a similar experiment was made in England, with tolerably satisfactory results. But somehow the matter remained in abeyance, until Mr. Stearns, an American inventor, resolved the difficulty, and induced the British Post Office to adopt his method of double-working, as he had previously induced the great American telegraph companies to adopt it. The Stearns method may be said to be a combination method, in which the principles laid down by one Frischen, an early inventor, have been combined with the practical experience of later years.

Out of the Duplex sprang the Quadruplex system, the latest, as it is the most lively, instance of telegraphic progress. Very little appears to be known about the system as yet, except that it comes to us from America, where it is said to have been adopted with the most perfect success on the great telegraph lines. It is the invention, so far as we can make out, of Messrs. Prescott and Gerritt Smith, electricians to the Western Union Telegraph Company, of New

York, and may be briefly and popularly described as the Duplex doubled. The clerks work in pairs at either end of the wire, through which a double stream of messages is sent in both directions simultaneously, and the method of receiving signals affords a striking exemplification of that which has made American telegraphy notable among the systems of the world—sound reading. It has been frequently stated that the average speed of the ordinary Morse telegraph is from 30 to 40 words a minute, and we assume, therefore, that the speed of the Quadruplex method is about four times as great, or something more than the speed of the Automatic system worked singly as it now is. We are not aware of any attempt having been made to “double” or duplex this system; but we apprehend that there need be no difficulty in carrying out such a plan, and this being so, an improvement on the Quadruplex method would necessarily at once ensue. It is very desirable in the interests of the telegraph service, as well as those of the public, that too much stress should not be laid on these undoubtedly important improvements in the methods of telegraphic communication. High-speed systems of telegraphy necessarily involve high skill on the part of the operators, a high state of perfection in the lines, and a steadiness of climate which unfortunately does not belong to this England of ours. It is always well to remember that what is possible in America, with its

fine dry climate and long lengths of single telegraphic line, is not always or even mostly possible in England, where the weather is "variable as the shade," and the wires on most trunk lines are as thick and close as the yarns of a rope-walk. If the Quadruplex Telegraph does nothing more than enable us to keep down the increase of wires on these already over-weighted routes, it will not have come in vain; although we should prefer to see an attempt made to exhaust the possibilities of our own Wheatstone system, before adopting a method which may, after all, only prove partially successful in our fickle climate. The Wheatstone probably stands alone among the fast-speed methods in its freedom from interruption from atmospheric causes, and, being automatic, it does not, of course, necessitate the employment of highly-skilled operators.

It is impossible to quit the interesting subject of telegraphic progress without feeling that England hardly stands where she did in relation to this important matter. The cradle of the electric telegraph, so to speak, she has gradually fallen behind the younger country, which thirty years ago sent us the Morse instrument, and in these later years has sent us the Duplex and the Quadruplex Telegraph. The telephone, too, although the invention of a Scotchman, comes to us from America, as also does the Exchange Telegraph; while the type printing instrument is the

invention of Mr. David E. Hughes, of Kentucky, a gentleman who is well known in this country and on the Continent. Even in that all-important matter for English telegraphy, the construction of underground lines over long distances, it would seem that we are about to take a lesson from Germany, a recent announcement in the Berlin newspapers informing us that a prominent English official has been there recently for the purpose of studying the system of subterranean telegraphs which the German Post Office is developing. All this is the more remarkable when we consider that English capital and English brains have been mainly instrumental in laying down and working the great telegraphic lines of the world. What are our English electricians about, and what are the functions of our so-called "Society of Telegraph Engineers," in relation to the great question of practical telegraphy? It was only the other day, in connexion with Mr. Graham Bell's paper on the Telephone, that a past President of the Society, lamenting the decadence of English telegraphy, reminded English electricians that they must look to their laurels if they were to hold their own against foreign competitors. The state of matters is very different in regard to the science of civil and mechanical engineering, in which England still leads the world.*

* *Times*, Nov. 22nd, 1877.

TAWELL AND THE TELEGRAPH.

IN cases where crimes have been committed, the astonishing detective powers of the electric telegraph have already proved most valuable to the community. As, however, the numberless instances which might be cited are but endless exemplifications of the same principle, we will merely offer to our readers the fragment of one of them.

* * * *

He never expected that! He had made up his mind to give her the stuff, he had deliberately bought it, had paid for it, had put it into his pocket, had driven with it to the terminus of the Great Western Railway, had flown with it along the line to Slough, had walked with it to the cottage.

He had already deprived the poor creature of her character, and now, on the first day of the year 1845, he had come down to her on purpose to deprive her of her life.

With affected kindness he had offered her refreshment, had waited while, with his money, she went to buy it, he had summoned up courage? no, cowardice and wickedness enough secretly to pour the stuff from a tiny phial into her glass; he had seen her, with feelings of gratitude to him, raise the mixture to her faded lips; he had watched her swallow

the first mouthful; then another, then drink; he had expected every instant, as she reached the dregs, to see his degraded victim drop down dead before his eyes; he could bear all this, but he did not know that it was the nature of the horrid poison he had purchased, to betray the hand that had administered it. Oh! he never expected that loud, horrid, piercing convulsive scream! As, terrified and scared he opened the door to escape, the inhabitants of the neighbouring cottages, alarmed by the frightful noise they had just heard, sympathetically opened theirs. They saw him leave the house with hurried steps, observed him make for the Slough road, where by another party he was observed to be "confused—to tremble—and on being addressed, he made no reply." And yet he had only done what he had deliberately intended to perpetrate; he knew there was no rest for the wicked; but, oh! he had never expected that shrill, fearful, haunting scream! On reaching the station he took his place in a departing train, and in a few minutes he apparently had effected his escape!

Everybody who has travelled by the Great Western Railway knows how joyously its well-appointed trains skim along the level country between Slough and London. He no doubt appreciated the speed, valued the wings with which he was flying, more than any of his fellow-passengers. He probably felt that no power on earth could overtake him, and that, if he

could but dive into the mass of population in London, he would in perfect security flow with its streams unnoticed.

But whatever may have been his fears, his hopes, his fancies, or his thoughts, there suddenly flashed along the wires of the electric telegraph which were stretched close beside him, the following words :—

“A MURDER HAS JUST BEEN COMMITTED AT SALT HILL, AND THE SUSPECTED MURDERER WAS SEEN TO TAKE A FIRST-CLASS TICKET TO LONDON BY THE TRAIN WHICH LEFT SLOUGH AT 7h. 42m. P.M. HE IS IN THE GARB OF A QUAKER, WITH A BROWN GREAT COAT ON, WHICH REACHES NEARLY DOWN TO HIS FEET. HE IS IN THE LAST COMPARTMENT OF THE SECOND FIRST-CLASS CARRIAGE.”

And yet, fast as these words flew like lightning past him, the information they contained, with all its details, as well as every secret thought that had preceded them, had already consecutively flown millions of times faster; indeed, at the very instant that, within the walls of the little cottage at Salt Hill, there had been uttered that dreadful scream, it had simultaneously reached the judgment seat of Heaven!

On arriving at the Paddington Station, after mingling for some moments with the crowd, he got into an omnibus; and as it rumbled along, taking up one passenger and putting down another, he probably

felt that his identity was every minute becoming confounded and confused by the exchange of fellow-passengers for strangers that was constantly taking place. But all the time he was thinking, the cad of the omnibus—a policeman in disguise—knew that he held his victim like a rat in a cage. Without, however, apparently taking the slightest notice of him, he took one sixpence, gave change for a shilling, handed out this lady, stuffed in that one, until, arriving at the Bank, the guilty man, stooping as he walked towards the carriage door, descends the steps, paid his fare, crossed over to the Duke of Wellington's statue, where pausing for a few moments, anxiously to gaze around him, he proceeded to the Jerusalem Coffee House, thence over London Bridge to the Leopard Coffee House, in the Borough, and finally to a lodging-house in Scott's yard, Cannon Street.

He probably fancied that, by making so many turns and doubles, he had not only effectually puzzled all pursuit, but that his appearance at so many coffee-houses would assist him, if necessary, in proving an *alibi*; but, whatever may have been his motives or his thoughts, he had scarcely entered the lodging when the policeman, who, like a wolf, had followed him every step of the way, opening his door, very calmly said to him (the words no doubt were infinitely more appalling to him even than the scream that had been haunting him)—

"HAVEN'T YOU JUST COME FROM SLOUGH?" The monosyllable "NO," confusedly uttered in reply, substantiated his guilt.

The policeman made him his prisoner; he was thrown into jail,—tried, found guilty of wilful murder, and HANGED.

A few months afterwards, we happened to be travelling by rail from Paddington to Slough, in a carriage filled with people, all strangers to one another. Like English travellers they were all mute. For nearly fifteen miles no one had uttered a single word, until a short-bodied, short-necked, short-nosed, exceedingly respectable-looking man in the corner, fixing his eyes on the apparently fleeting posts and rails of the electric telegraph, significantly nodded to us as he muttered aloud—

"THEM'S THE CORDS THAT HUNG JOHN TAWELL!"*

* "Stokers and Pokers."

The editor was well acquainted with John Tawell. He formerly carried on a large business in Sydney, as a chemist; and by great perseverance and attention he realized a large fortune. Our house received very large remittances from him for investments, and for the distribution of charitable gifts. Upon his return to England he was a daily visitor at 73, Cheapside. From his general kind manner no one would have supposed him to be guilty of the crime for which he suffered. The day before he committed the murder, we dined together; and his manner on that occasion was what it always was—quiet.

THE DEVELOPMENT OF TELEGRAPHY.

IT is a surprising fact that the system of telegraphing has attained to its present state of perfection only within the past few years ; and it is still more so because since the year 1821 the principles of the action of two working telegraphs have been known to scientific men. But for years practical men saw no benefit that could arise from the dreams of philosophers, and the statements of the philosophers were regarded only as dreams. No one imagined that the telegraph would ever be necessary as a social engine, or that a Company would ever find it a paying investment, much less that the Postmaster-General should see, in a few years, that its possession was an absolute necessity in connection with his department ; that the interests of all the Companies should be bought by the Government, and that the telegraph should become the sole property of the nation. Before this was effected, however, a great change had been wrought in the public as well as the official mind, for, some years ago, when Mr. Rinaldo attempted to draw the attention of some of the Government officials to the working of his instrument, he received for an answer that "The telegraph is of no use in time of peace, and the semaphore in time of war answers all the required purposes." It often so happens, that in

order to develop an invention of importance and value fully, another gigantic scheme has to be entered upon, so that the two may work in harmony. Such was the case with regard to the telegraph and the introduction of railways. The vast advantage to a railway of a method of conveying signals instantaneously throughout its entire length was at once seen, and the continuity of its property, together with the protection afforded by its servants, presented facilities for its introduction and maintenance which had never before occurred.

THE FIRST TELEGRAPH.

It is well known that some interesting experiments were made on Shooter's Hill in the middle of the last century, but it was not until Professor Wheatstone, in conjunction with Mr. Cook, in 1837, took out a patent for their instrument, that anything practical was done. The directors of the London and Birmingham Railway sanctioned the laying down of wires between the Euston Square and Camden Town stations, and towards the end of July the telegraph was ready for work. Late in the evening of the 25th of that month, in a dingy little room near the booking-office at Euston Square, by the light of a flaring dip-candle, which only made the surrounding darkness visible,

sat the inventor, Professor Wheatstone, with a throbbing pulse and a heart full of hope. In a similar room at the Camden Town station sat Mr. Cook, his co-patentee, and among others, two witnesses, well known to fame, Mr. Charles Fox and Mr. Stephenson. These gentlemen listened to the first word spelt by that trembling tongue of steel, and then came the answer from Mr. Cook. The feelings of the inventor can be better imagined than described, but this is what Professor Wheatstone says himself on the subject: "Never did I feel such a tumultuous sensation before, as when, all alone in the still room, I heard the needles click, and as I spelled the words, I felt all the magnitude of the invention, now proved to be practical without cavil or dispute." The telegraph, thenceforward, as far as its mechanism was concerned, went on without a check, and the modifications of Professor Wheatstone's instrument were made for the purpose of rendering it more economical in its construction and working.

After the successful working of the mile-and-a-quarter line, the directors of the London and Birmingham Railway proposed to lay it down to the latter town if the Birmingham and Liverpool Directors would continue it on their line, but they objected, and the telegraph received notice to quit the ground it already occupied. However, in 1839, Mr. Brunel, the eminent engineer, determined to adopt it on the Great

Western line. Accordingly, it was at first carried as far as West Drayton, a distance of thirteen miles, and afterwards to Slough, eighteen miles. The wires were insulated and encased in an iron tube or box, and placed below the ground—not suspended upon posts as at present. The telegraph had, up to this time, been strictly confined to railway business, and in furtherance of this object Mr. Brunel proposed to continue it to Bristol, but this proposal was nearly fatal to the project. At a general meeting of the Great Western Railway Company at Bristol, when the report of the directors, including the recommendation of Mr. Brunel, was submitted, a Mr. Hayward of Manchester,—of all places in the world,—got up and denounced the invention as a “new-fangled scheme,” and proposed a resolution repudiating the agreement entered into with the patentees, which was adopted.

This was, for the moment, a serious drawback, but it led to the application of the telegraph to public purposes. In order to keep the wires in the ground, Mr. Cook proposed to maintain the telegraph at his own expense, and the Railway Directors agreed to this on the condition that he would send their railway signals free of charge; and in return he was to be allowed to transmit messages for the public. Here, then, is the first popular use made of the telegraph.

THE TELEGRAPH AND THE THIEVES.

THE first application of the telegraph to police purposes took place about this time on the Great Western Railway, and, as it was the first intimation to thieves of the existence of such a wily detective, we may quote the following extract from the telegraph book kept at Paddington Station :—

“ Eton Montem day, August 28, 1844. The Commissioners of Police have issued orders that several officers of the detective force shall be stationed at Paddington to watch the movements of suspicious persons going by the down train, and give notice by the electric telegraph to the Slough Station of the number of such suspected persons, and dress, their names if known, also the carriages in which they are.”

“ Paddington, 10.20 a.m. Mail train just started. It contains three thieves, named Sparrow, Burrell, and Spurgeon, in the first compartment of the fourth first-class carriage.”

“ Slough, 10.48 a.m. Mail train arrived. *The officers have cautioned the three thieves.*”

“ Paddington, 10.50. Special train just left. It contained two thieves ; one named Oliver Martin, who is dressed in black, *cape on his hat* ; the other named Fiddler Dick, in black trousers and light blouse. Both

in the third compartment of the first second-class carriage."

"Slough, 11.16 a.m. Special train arrived. Officers have taken the two thieves into custody, a lady having lost her bag, containing her purse with two sovereigns in it ; one of the sovereigns was sworn to by the lady as having been her property. It was found in Fiddler Dick's watch fob."

This, it would appear, is the manner in which the telegrams were obeyed. When the train arrived, a policeman opened the door of the third compartment of the first second-class carriage, and asked the passengers if they had missed anything? A search in pockets and bags accordingly ensued, and one old lady called out that her purse was gone. The policeman, without a moment's hesitation, said, "Fiddler Dick, you're wanted;" at the same time beckoning to the individual who rejoiced in such a suggestively mirthful cognomen. The culprit, thunderstruck that he should be known, came out of the carriage and gave himself up as well as the stolen property, with the air of a beaten man. The effect of the capture so cleverly brought about is thus spoken of in the telegraph book :—

"Slough, 11.51 a.m. Several of the suspected persons who came by the various down trains are lurking about Slough, uttering bitter invectives against the telegraph. Not one of those cautioned has ventured to proceed to the Montem."

THE FIRST SUBMARINE TELEGRAPHS.

THE following interesting details relating to early submarine Telegraphy are extracted from the letters of Dr. W. H. Russell, which originally appeared in the *Times* during the laying of the Atlantic Telegraph :—

“ If any person takes an interest in determining who was the inventor of electric telegraphy, he should study the works and mark the improvements of the natural philosophers of the last as well as of the present century, and he can then arrive at some result without exciting national jealousy, or injuring individual susceptibilities. Humboldt assigns the credit of making the first electric telegraph to Salva, who constructed a line 26 miles long, from Madrid to Aranjuez, in 1798. Russia claims the honour of having invented aerial lines, because Baron von Schilling proposed a line for the Emperor from St. Petersburg to Peterhoff, below Cronstadt, in 1834, and was laughed at by scientific Muscovites for his pains. But the Baron certainly did transmit messages along wires supported by poles in the air. The Count du Moncel, in his ‘*Traité de Télégraphie Electrique*,’ gives to Mr. Wheatstone the palm as the original inventor of submarine cables, to which award, no doubt, there will be some dissent. Mr. Wheatstone, however, as early as 1840, brought before the House of Commons

the project of a cable, to be laid between Dover and Calais, though he does not seem to have had at the time any decided views as to the mode in which insulation was to be obtained. In 1843, Professor Morse, detailing the results of some experiments with an electric magnetic telegraph between Washington and Baltimore, in a letter to the Secretary of the United States, wrote : ' The practical inference from this law is that a telegraphic communication, on the electric-magnetic plan, may with certainty be established across the Atlantic Ocean. Startling as this may seem now, I am confident the time will come when this project will be realized.'

" But for the experiments and discoveries of Oersted, Sturgeon, Ampère, Davy, Henry, and Faraday, and a long list of others, such suggestions would have remained as little likely to be realized as the Bishop of Llandaff's notions of a flying machine, or the crude theories of the alchemists. He who first produces a practical result—something which, however imperfect, gives a result to be seen and felt, and appreciated by the senses—is the true ποιητής, the maker and inventor, whom the world should recognize, no matter how much may be done by others to improve his work ; each of these improvers being, after his kind, deserving of recognition for what he does. A year before Professor Morse wrote the letter to Mr. Spencer, he took some steps to show that what he prophesied was

practicable. In the autumn of the year 1842, he stretched a submarine cable from Castle Garden to Governor's Island, in the harbour of New York; demonstrated to the American Institute the possibility of effecting electric communication through the sea, and submitted, that telegraphic communication might with certainty be established across the Atlantic. Later in the same year he sent a current across the canal at Washington. But that was not the first current transmitted under water, for, as early as 1839, Sir W. O'Shaughnessy, the late Superintendent of Electric Telegraphs in India, hauled an insulated wire across the Hooghly at Calcutta, and produced electrical phenomena at the other side of the river. In 1846, Colonel Colt, the patentee of the revolver, and Mr. Robinson, of New York, laid a wire across the river from New York to Brooklyn, and from Long Island to Coney Island. In 1849, Mr. Walker sent messages to shore through two miles of insulated wire from a battery on board a steamer off Folkestone.

"It was not till 1851 that an electric cable was actually laid in the open sea, and worked successfully; and the wire which then connected Dover with Calais was, beyond question, the first important line of submarine telegraph ever attempted. In the year 1850, Mr. Brett obtained a concession from the French Government for effecting this object, an object regarded at the time as purely chimerical, and decried by the

press as a gigantic swindle. The cable which was made for the purpose, consisted of a solid copper wire, covered with gutta-percha. When tested by Mr. Wollaston, it was found to be so imperfect from air-holes in the gutta-percha, that the water found its way to the copper wire, an imperfection which was, however, forthwith repaired. This cable was manufactured at the gutta-percha works, in the Wharf Road, City Road, under the superintendence of the late Mr. Samuel Statham ; coiled on a drum, it was then conveyed by steam-tug to Dover, and, in the year 1850, paid out from Dover to Calais. The landing-place in France was Cape Grisnez, from which place a few messages passed, so as to comply with the terms of the concession and test the accuracy of the principle. The communication thus established between the Continent and England was, however, after a few hours, abruptly stopped by a singular accident.

“ A diligent fisherman, plying his vocation, having brought up part of the cable in his trawl, cut off a piece, which he bore in triumph to Boulogne, exhibiting it there as a specimen of rare sea-weed, with its centre filled with gold. It is believed that this ‘piscator ignobilis’ returned again and again to search for further specimens of this treasure of the deep ; it is, at all events, perfectly certain that he succeeded in destroying the submarine cable.

“ This accident caused the attention of scientific men

to be directed to the discovery of some mode of preserving submarine cables from similar casualties, and a suggestion was made to Mr. Wollaston, and to Mr. T. R. Crampton, by Mr. Küper, who was engaged in the manufacture of wire ropes, that the wire insulated with gutta-percha should form a core or centre to a wire rope, so as to give protection to it during the process of paying out and laying down, as well as to guard it from the anchors of vessels and the rocks, and to secure a perfect electrical continuity.

“Mr. Crampton, who had already accepted the contract for laying the cable between England and France, and had given much of his time to the study of the subject, adopted this idea, and in 1851, he and several other gentlemen, associated for the purpose, laid the cable between England and the Continent. It was made by Wilkins and Weatherby, Newall and Co., Küper and Co., and Mr. Crampton. The exertions of the last-named eminent engineer in laying the first cable under water, and his devotion to an object towards which he contributed largely in money, are known only to a few, and have never been adequately acknowledged.

“The success of that form of cable having been thus completely established, several lines of similar character were laid during the following years, between England and Ireland and parts of the Continent: one made by Newall and Co.—eighteen miles long—across

press as a gigantic swindle. The cable which was made for the purpose, consisted of a solid copper wire, covered with gutta-percha. When tested by Mr. Wollaston, it was found to be so imperfect from air-holes in the gutta-percha, that the water found its way to the copper wire, an imperfection which was, however, forthwith repaired. This cable was manufactured at the gutta-percha works, in the Wharf Road, City Road, under the superintendence of the late Mr. Samuel Statham ; coiled on a drum, it was then conveyed by steam-tug to Dover, and, in the year 1850, paid out from Dover to Calais. The landing-place in France was Cape Grisnez, from which place a few messages passed, so as to comply with the terms of the concession and test the accuracy of the principle. The communication thus established between the Continent and England was, however, after a few hours, abruptly stopped by a singular accident.

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“The success of that form of cable having been thus completely established, several lines of similar character were laid during the following years, between England and Ireland and parts of the Continent: one made by Newall and Co.—eighteen miles long—across

the Great Belt; one from Dover to Ostend, by the same makers and by Küper and Co.; one from Donaghadee to Portpatrick, by Newall and Co.; one from Holyhead to Howth; and one from Orfordness to the Hague."

THE FIRST ATLANTIC TELEGRAPH.

THE following interesting history of this great undertaking is taken from the *Encyclopædia Britannica*:—

"In the year 1857 as much iron as would make a cube of 20 feet side was drawn into wire long enough to reach from the earth to the moon, and bind several times round each globe. This wire was made into 126 lengths of 2,500 miles, and spun into 18 strands of seven wires each. A single strand of seven copper wires of the same length, weighing in all 110 grains per foot, was three times coated with gutta-percha, to an entire outer thickness of $\frac{1}{4}$ of an inch; and this was 'served' outside with 240 tons of tarred yarn, and then laid over with 18 strands of iron wire in long contiguous spirals, and passed through a bath of melted pitch. In August of that year about a sixth of the entire length of this compound rope was laid from the Irish shore westwards, and lost by a breakage at the stern of the *Niagara*. The remainder was con-

veyed in the two ships to Devonport, and stored for the winter in Keyham Dockyard. A length of fifty-five miles of the portion which had been lost, was lifted, in tolerably good condition, a few months later. During the ensuing winter and spring about 900 miles more of similar cable were manufactured ; and in the months of April and May, 1858, the whole length of 3,000 British statute miles was shipped on board H.M.S. *Agamemnon* and the U.S. steam frigate *Niagara*. After an experimental cruise in the Bay of Biscay, to test the appliances for laying the cable, by actual trials in water 2,500 fathoms deep, and some slight alteration in the machinery, made in consequence of returning to Plymouth, the two ships, accompanied by H.M.S. *Valorous* and *Gorgon*, paddle steamers—the former tender to the *Agamemnon*, the latter to the *Niagara*—set out for the middle of the Atlantic on the 10th of June. After three unsuccessful, but not discouraging attempts, in which between 400 and 500 statute miles of cable were lost, the ships returned from the different points they had reached, to rendezvous in Queenstown Harbour, where, on the arrival of the *Agamemnon* on the 12th of July, the whole squadron were again together, and remained long enough to take in coal and make other preparations for a final attempt. On the 17th of July they again put to sea westwards. On the 29th they met at the mid-ocean rendezvous, joined

the ends of the cable between the two ships bearing it, and commenced laying it in 2,400 fathoms water, the *Niagara* continuing westwards, and the *Agamemnon* returning to the east. This time no accident stopped the continuous paying-out; and on the 5th of August the two ships cut the cable, and left the ends on shore on the two sides of the Atlantic. The possibility of laying an electric cable across 2,000 miles of ocean, in depths of from 1,800 to 2,500 fathoms—seriously doubted by nearly all practical engineers, and considered a perfectly chimerical project by some of the most eminent—was triumphantly demonstrated. The risk of failure in future attempts was brought almost within the limits of a common ‘sea-risk;’ the weather having been by no means favourable, especially on the *Agamemnon’s* side, where, during three days of the six, strong breezes from several quarters were experienced, and at one time a fresh gale of head-wind. The telegraphic operations performed between Valentia and Trinity Bay during the remainder of the month of August will render the year 1858 ever memorable in the history of the world. The world’s news was read on the same day in the capitals of Europe and America. Question and answer passed freely, and friendly conversation was held between the operators on the two sides of the Atlantic. The Queen of England and the President of the United States interchanged con-

gratulatory messages, and assurances of mutual goodwill on the part of the two great nations under their authority. One short message saved thousands of pounds of money, and an inestimable amount of anxiety, by giving timely notice of an accident which disabled one of the Transatlantic steamers off the American coast, bound for England. Another—nearly the last utterance of the failing cable—countermanded two British regiments under orders to embark, and prevented them from leaving the American colonies on a bootless voyage across the Atlantic. The last words of the [first] Atlantic telegraph were read at Valentia on the 20th October, 1858—‘two hundred and forty t—k (? two) ——— Daniell's now in circuit.’ The full message, as was afterwards learned in the old method of receiving intelligence from the other side of the Atlantic, was ‘two hundred and forty trays and seventy-two liquid Daniell's now in circuit.’

[A note explains that “trays” meant a form of battery introduced for nautical and land telegraphic use, which has the good electrical qualities of Daniell's, without the disadvantage inseparable from the use of process cells. It consisted of copper trays, each strewn with crystals of sulphate of copper, covering its bottom, and filled with saw-dust moistened with sulphuric acid and water, on the top of which an amalgamated zinc plate was laid. These trays, thus

charged, were piled one with its outside copper bottom on the top of the zinc of another, in columns of from five to twenty, after the fashion of an old voltaic pile.]

“This prodigious power, one thousand times as much as would have given perfect signals to the mirror galvanometer in use as receiving instrument at Valentia through the same cable, if ordinarily well insulated, proved insufficient for continuing telegraphic work, and it became certain that only mending the insulation in one or more faulty places could restore communication. Before the process of laying was complete, indications of very imperfect insulation had been given by the readings of the ‘marine galvanometer,’ recorded on board of each ship. After the ends were landed, the insulation became further deteriorated; every attempt to establish communication by means of the regular telegraphic instruments prepared for the use of the Company proved a failure; and it was only by the introduction of the mirror receiving instrument on each side of the Atlantic that an interchange of intelligence was effected.

“As soon as messages began to come from Newfoundland, they were read with the greatest ease at Valentia, on the new system. At Newfoundland, on the other hand, three days passed, during which messages, continually being sent from Valentia, were not read or even recognized to be signals at all; and

it was only by the occasional introduction of the mirror instrument into circuit, in accordance with instructions given at Devonport to special operators sent out in charge of it, that the first words were read on the other side of the Atlantic. A 'detector,' or common telegraph galvanometer, of a kind then much used by British practical electricians, was next tried, and it was found possible to read by it, although with great difficulty (the signal deflections scarcely amounting to half a degree), and only at an excessively slow rate (half a word per minute or less); but when, as was often the case, these attempts failed altogether, the mirror was had recourse to, to see whether any message was coming or not. Matters were conducted in this unsatisfactory way at the Newfoundland station for about a week after the first words had been read, until the mirror was permanently introduced into circuit, and regularly used as a receiving instrument, in accordance with an order transmitted through the cable from Valentia on the 21st of August. From that time forward the messages were read with about equal ease at the two ends; but the days of the first Atlantic telegraph were numbered. On the 1st of September it conveyed the two military messages; on the following day it conveyed one congratulatory message for a public meeting in New York, addressed to Mr. Cyrus Field, to whose untiring energy it in a great measure owed its exist-

ence; and it failed to convey a second similar message on the same day. From that time to its death-struggle, on the 20th of October, it was silent."

ACQUISITION OF THE TELEGRAPHS BY THE POST OFFICE AUTHORITIES.

THIS important step was taken under the provisions of Acts of Parliament passed in the Sessions of 1868 and 1869, and the reasons which induced the Government to consent to the purchase of the various lines in the United Kingdom may be gathered from the following statements taken from the able and comprehensive report of Mr. Scudamore, and submitted by the Postmaster-General (Lord Hartington) to the Lords' Commissioners:—

Owing to the depression in trade, the increase in the amount of telegraphic business during the fifteen months ended the 31st of March, 1876, fell considerably short of the increase in previous years. The number of messages dealt with was 26,440,439, being an increase of 960,000 over the number in the preceding fifteen months. The amount of matter transmitted on behalf of the Press was about equal to the amount transmitted in the preceding fifteen months. The number of post-offices open for the transaction of

telegraph business on the 31st of March, 1877, was 3,734, in addition to which there were 1,636 railway stations open for the transaction of public telegraph business. The arbitration between the North-Eastern Railway Company and the Department was the only one which it was found possible to conclude. The railway company claimed the sum of £540,292, with interest thereon at 5 per cent. from the 1st of February, 1870, until payment. Under the award they obtained the sum of £168,696, or less than one-fourth of their claim on Her Majesty's Treasury.

Mr. Scudamore's report continues—"Five years have passed since the agitation in favour of the transfer which had been proposed by Mr. Allan in 1854, by Mr. Baines in 1856, and by Mr. Ricardo, formerly chairman of the Electric and International Telegraph Company, in 1861, was formally and vigorously begun by the Edinburgh Chamber of Commerce, which advocated that the following results were attainable:—The reduction and simplification of the charges for the transmission of telegrams throughout the United Kingdom; the extension of the wires from railway stations lying outside of town populations to post-offices in the centre of such populations, the extension of the wires already carried into large cities towards the suburbs of such cities, and the extension of the wires from towns into rural and other districts unprovided with telegraphic accommodation. From the

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combined effect of these extensions, it was hoped that a saving of time, as well as of cost of portorage, would accrue to the senders and receivers of messages.

“Such a complete separation of the commercial telegraph system from the railway telegraph system, as would entirely relieve the commercial wires from railway messages, and throw on the railway wires those commercial messages only which arise out of the circumstances of railway traffic. Free trade in the collection of news for the Press, of which collection the telegraph companies had hitherto had a monopoly, with low rates for the transmission of such news, no matter by what or by how many agencies it might be collected.

“Those who contended that the charges for the transmission of telegrams by the companies were too high, rested their case solely upon the tariff which the Electric and International Company, the British and Irish Magnetic Company, and the United Kingdom Company, under the provisions of the Telegraph Act of 1863, had agreed to adopt for messages passing over, but not beyond, their own lines. Under that tariff the charge in Great Britain was a shilling for a twenty-word message, over distances not exceeding 100 miles; one-and-sixpence for distances exceeding 100 but not exceeding 200 miles; and two shillings for a distance exceeding 200 miles. For messages

passing between Great Britain and Ireland, the charge ranged from three, to six shillings.

“The case against this tariff was so strong, that the promoters of the transfer never found it worth their while to point out that it was limited in its operation to certain lines and districts ; and that beyond those lines and districts, there were very many unfavourable exceptions to it. In order that the public may know the full extent to which they have been benefited by the transfer, it is necessary that these exceptions should be noticed. There were twenty-five branch telegraph lines, over which, for the transmission of messages, an extra charge was made, over and above the tariff already mentioned.

“On these branch lines there were about 475 stations, to all of which the extra charge applied. That was always high, and sometimes extremely so in proportion to the ordinary tariff.

“Irrespective of the stations on these branch lines, there were about 460 railway stations in connection with the system of the Electric and International Telegraph Company, on messages to and from which, an extra charge was levied, as a fee to the station-master for his attendance and trouble.

“Again, although the ordinary tariff was levied by the Companies on the lines between towns in both of which all companies had stations, yet if a message were forwarded by one company from a town in which it

had, but the other companies had not a station, to a town in which the other companies had, but it had not a station, the charge on it was composed of the charge, according to tariff, from the forwarding station to the handing over station, and a further charge, according to tariff, from the handing over station to the receiving station.

“Lastly, the charge for a message between the Isle of Man and the United Kingdom was four-and-sixpence, whilst the charge for transmission between the Channel Islands and the United Kingdom was six-and-eightpence for a London, and seven-and-eightpence for a provincial message.

“The amount of the charges was not the only disadvantage of the system of charge which prevailed prior to the transfer. An almost equal disadvantage arose out of the complexity of the charges. It was difficult for the clerks, and still more difficult for the public, to tell what the cost of a message would be, and there can be little doubt that the prevailing uncertainty as to the charge, prevented many from sending messages, who would have otherwise sent them freely.

“The proposals for the transfers of the telegraphs from private companies to the Government were put forward by Mr. Baines in 1856. He had not long ceased to be an officer of the Electric Telegraph Company, and had fully in his mind the disadvantages and difficulties which were inseparable from a tariff so

variable as that which then prevailed. He proposed that the transmission charge of messages should be at the rate of sixpence for twenty words, irrespective of distance. A tariff irrespective of distance had at that time been established in Belgium and Switzerland, but in no other country. In 1861, the United Kingdom Telegraph Company was formed with the intent to establish a uniform rate, of a shilling, irrespective of distance, but it was compelled by the rival companies to abandon that rate and adopt, in concurrence with them, the rate which prevailed up to the time of the transfer. In 1865, the Edinburgh Chamber of Commerce advocated the establishment of a sixpenny rate, irrespective of distance, and their example was followed by other Chambers of Commerce throughout the kingdom."

Mr. Scudamore continues : "I have frequently expressed the opinion, which I still hold, that a sixpenny rate for messages of ten words, is what will at no very distant date be found the best for this country ; but I did not think it prudent when I drew up my first reports on the subject to recommend the adoption of such a low rate. The lowest uniform rate was at that time a rate of one franc, the rate prevailing in Belgium and Switzerland, and it seemed to me that until some experience had been gained of the capacity of the English telegraphs to bear the increase of work, which a reduction of tariff would bring about, it would

be well to proceed cautiously ; and I therefore recommended the adoption of a shilling rate ; a shilling rate being in this country much what a franc is in Belgium and France.

“When the Telegraph Bill of 1868 was before the Parliamentary Committee, a sixpenny rate was strongly recommended by Mr. Allan, and by Mr. Patterson, who represented the Liverpool Chamber of Commerce, and Mr. Potter, one of the members of the Committee, proposed that it should be adopted. The proposal was, however, rejected.

“When the Bill, after it had been amended by the Committee, came again before the House of Commons, Mr. Potter once more urged the adoption of a sixpenny rate, upon which the then Chancellor of the Exchequer Mr. Ward Hunt, said : ‘ That both he and I believed in a sixpenny rate, and no doubt that eventually the rate would be reduced to sixpence, but that it was thought prudent to try the effect of a shilling rate in the first instance.’

“The unofficial advocates of the transfer, in their proposals for an alteration of tariff, dealt merely with the initial charge for a message of twenty words.

“The Government proposal, as it was submitted to the Committee in 1868, was that the transmission rate for twenty words should be one shilling ; and that half a rate should be charged for each additional ten words, or part of ten words. On the motion of Mr.

Goschen, however, it was decided that a quarter rate should be charged for each additional five words, or part of five words. This was an important improvement.

“The following clause from the Telegraph Act of 1868 shows the final decision of Parliament with respect to the charges for the transmission of telegraph messages. These charges can be reduced without further legislative action, but the principle of uniformity cannot be abandoned without the sanction of Parliament.

“ 15. The Postmaster-General, with the consent of the Commissioners of Her Majesty's Treasury, may from time to time make regulations for determining the hours during which the offices appointed by him to be places for the receipt and despatch of messages, shall be open for the transaction of telegraphic business, and for fixing the sum to be from time to time paid for the transmission of messages, and for services rendered in connection therewith, and for the general conduct of telegraphic business ; provided always,

“(1.) That the charges for the transmission of messages throughout the United Kingdom shall uniformly, and without regard to distance, be at a rate not exceeding one shilling, for the first twenty words of each message, or part of twenty words, and not exceeding threepence for each additional five words, or part of five words.

“(2.) That the names and addresses of senders, and receivers of messages shall not be counted as part of the words for which payment shall be required.

“(3.) That the sums charged for the transmission of messages, shall be held to cover the costs of delivery by special foot messenger, within the limit of one mile of the terminal telegraphic office, or within the limit of the town postal delivery of that office ; when it is a head post-office, and the town postal delivery extends for more than a mile from it.

“(4.) That when the addressee does not reside within the above-described limits, and the sender desires to have his message delivered by special foot messenger ; the charge to him for portage by such special messenger shall not exceed sixpence per double mile, or any part thereof, beyond such limits.

“(5.) That when the addressee does not reside within the above-described limits, and the sender does not desire to incur the cost of special delivery, his message shall be delivered free of extra charge by the ordinary postal delivery next following on the arrival of the message at the terminal telegraphic office.’

“Those who advocated the transfer of the telegraphs to Government, were of course actuated by a desire to bring the telegraph offices closer to the population ; and to reduce, for the senders and receivers of messages, the labour and cost of their transmission over a certain portion of the then existing routes.

Prior to the transfer of the telegraphs to the State, the principal telegraph system of the country—that of the Electric and International Company—had grown up, on the principal railways of the country, and in connection with them. This had come to pass—partly because the telegraph was seen to be indispensable to the exigencies of railway traffic before it was thought likely to be of great service, or to be of interest to the general public ;—partly because railways in some other respects, though not in all, afforded the best routes for telegraph lines ; and, partly, because, in the case of the particular Company, to which I have referred, there was such an amount of connection between the Board of that Company, and the Boards of certain Railway Companies, as enabled the Telegraph Company to obtain a monopoly of way-leave over certain railway lines. The result was, that in a vast number of cases, the telegraph lines followed the railway lines, and terminated at the railway stations ; which, in a great majority of cases, were outside the town populations.

“ Mr. Baines, writing in 1856, and with his recollections of the Electric Telegraph Company fresh upon him, says :—‘ I have shown that of the 730 post-towns, 260 only are telegraph stations ; of the latter only fifty have offices within the limits of the respective towns, the remainder being at the railway stations, which are rarely within a mile of the towns

from which their respective titles are taken, and not unfrequently two or three miles distant from them. An important increase of business must therefore result from the telegraph being readily available, and thus obviating the necessity for the conveyance of messages by hand, over the distance between the railway station and the town. It is clear that if the post-offices of all towns were removed to railway stations, a very considerable contraction of postal business would ensue; (not to speak of the inconvenience resulting to the public), as no letters, save those of comparative importance, would in all probability (owing to the intervening distance) be posted. This principle is equally applicable to the electric telegraph.'

"As a matter of course, circumstances had in many respects changed between 1856 and the autumn of 1865, at which time the formal agitation for the transfer commenced; nor would Mr. Baines's remarks as to the post-towns have held good then.

"By that time the Electric Company had extended their lines from many more railway stations into post-towns, into which the Magnetic and United Kingdom Companies, which worked chiefly on the common roads, had carried their lines also; but a large number of places which really required telegraphic accommodation, were still served from railway stations lying outside the town limits.

"In the appendix to my first report on the subject

(which was made in July, 1866), I gave a list of 486 towns in England and Wales, having a population of 2,000 and upwards, per town, (the list did not include the largest towns), and showed that at only 144 of those 486 towns was the telegraph office within the town limits.

“ I may here observe, that at the present moment only thirty-five out of these 486 towns are without a telegraph-office in the very centre of the population ; and that this change is due to the action of the Post Office.

“ Nor, when the lines were extended from the railway stations into towns, was the accommodation, even in the greatest towns, satisfactory to the public. The first memorial from the Edinburgh Chamber of Commerce contains the following remarks :—‘ There are at present about 300 places in which all the three companies have offices, generally situated, as in the case of our own city, within a few yards of each other. Many of these offices could be dispensed with, and their cost applied to the establishment of others placed where the convenience of the public, rather than the necessities of competition, required them to be placed.’

“ In 1868 the Electric and International put forth a pamphlet, in which they proposed a transfer.

“ In London, the Magnetic and United Kingdom Companies had established a considerable number of

branch offices ; but in London also they adhered to their plan of competing for the traffic of busy localities. The London and Provincial Company, too, had established what was designed to be mainly a local system for the transmission, primarily, of messages from one part of London to another. In reality, however, the lines of this company were mere feeders to the lines of other companies, and were used mainly for the transmission of messages from the provinces over certain districts to London. Purely local messages were comparatively few in number, the time required for their transmission being usually greater than that in which the post, or special messenger could have delivered them. Statements to this effect constantly appeared in the public prints for some years prior to the transfer.

“ In my first report (July, 1866), I stated that when the transfer took place I should propose—

“ To open a central telegraphic-office at each of the ten district Post Offices in London ;

“ To open subordinate telegraphic-offices at the sorting-offices and receiving-offices in each district ;

“ To connect the subordinate telegraphic-offices of each district with the central telegraphic-office of that district ;

“ To establish direct communication between each central telegraphic-office and every other central telegraphic-office in London.

“While small towns and the suburbs of large towns were thus insufficiently provided for, even less provision was made for the wants of rural districts. These were almost entirely dependent upon the railway stations, at many of which the service was occasional only, and at but few of which was there a regular messenger.

“The railway companies were fully alive to the disadvantage of the system, and though they at first, while they jointly with the telegraph companies were opposing the transfer, urged that the connection between them and the telegraph companies was indispensable to the public safety, they afterwards took care to provide for the complete severance of that connection, by procuring the insertion of the following clause in the Act of 1868 :—

““On such acquisition as aforesaid, all the posts, wires, instruments, and other telegraphic apparatus belonging to the railway company, and also all posts, wires, and instruments, and other telegraphic apparatus belonging to the telegraph companies on the railway companies' lines and canals which are necessary for establishing a complete system of telegraphy in connection with the working of trains, and the traffic of the lines and canals, shall become the absolute property of the railway company, and shall be handed over to them by the Postmaster-General, free of charge, in efficient working order, so that the

railway company may be in a position at once to take up and carry on their own telegraph work on their own system; and thereafter the posts, wires, instruments, and other telegraphic apparatus shall be maintained and worked by the railway company.'

"This clause has been carried out to the very letter wherever it is applicable. The advantage of the separation of the railway from the commercial work will be found in the fact that so far as the safety of railway passengers can be secured by the employment of a free and unencumbered telegraph, the risks of railway travelling over great lengths of important line must have been diminished by the operations of the Government measure."

TELEGRAPHIC PRESS NEWS.

PRIOR to the acquisition of the telegraphs by the State, the telegraphic companies, whilst competing with each other for ordinary messages, were in combination for collecting and transmitting news to newspapers and news-rooms. The rates which they charged for the collection and transmission of news were moderate; but as they had the command of the entire telegraphic communication of the United Kingdom, the newspaper proprietors who required news by

telegraph were compelled to resort to them for it, and to take what the companies were willing to supply.

To ascertain what the views of newspaper proprietors were with regard to this agreement, the representatives of the Provincial Press were examined before a Parliamentary Committee on the Telegraph Bill of 1868, and from their evidence it was clear that they were dissatisfied with the then existing arrangements, chiefly because there were delays and errors of a serious character ; because the cost was too high ; and because the companies sent a quantity of matter which the newspapers did not require, and refused to supply them with a quantity of matter which they did require. They were especially dissatisfied with the monopoly of collection possessed by the Telegraph Companies, and in their opinion the then existing arrangements tended to check the distribution of news by telegraph throughout the country. They approved of the provisions of the Bill then before the Committee, and thought the effect of them would be, if they became law, greatly to increase the spread of news by telegraph throughout the country ; at an increased cost, it might be, to newspaper proprietors, but with a proportionate advantage to them and to their readers.

In furtherance of their views, the following clause was inserted in the Telegraphs Act of 1868 :—

“ Notwithstanding anything in this Act, it shall be

lawful for the Postmaster-General, with the consent of the Commissioners of Her Majesty's Treasury, from time to time to make contracts, agreements, and arrangements with the proprietor or publisher of any public registered newspaper, or the proprietor or occupier of any news-room, club, or exchange-room, for the transmission and delivery or the transmission or delivery, of telegraphic communications at rates not exceeding one shilling for every hundred words transmitted between the hours of 6 p.m. and 9 a.m., and at rates not exceeding one shilling for every seventy-five words transmitted between the hours of 9 a.m. and 6 p.m., to a single address, with an additional charge of twopence for every hundred words, or twopence for every seventy-five words, as the case may be, of the same telegraphic communication so transmitted to every additional address. Provided always that the Postmaster-General may, from time to time, with the like consent, let to any such proprietor, publisher, or occupier, the special use of a wire (during a period of twelve hours *per diem* as may be agreed on) for the purpose of such newspaper, news-room, club-room, or exchange-room, at a rate not exceeding five hundred pounds *per annum*. Provided also, that no such proprietor, publisher, or occupier, shall have any undue priority or preference in respect of such rates over any other such proprietor, publisher, or occupier.

DIFFICULTIES IN THE WAY.

THE report proceeds to describe the difficulties that the Post Office Department had to encounter in the prosecution of its undertaking. These are classed under three heads :—

Difficulties arising out of the very natural reluctance of the Telegraph Companies to extend the systems under their control so long as the proposal for the acquisition of those systems by the State was under consideration.

Difficulties, unavoidable at the outset of the undertaking, and arising out of the nature and magnitude of the change which was demanded by, and promised to the public, and which was nothing less than a complete reorganization of the telegraph system throughout the country.

Difficulties attributable to the delay which took place in the passing, in 1869, of the Money Bill which was required to give effect to the Act of 1868.

Very little was done in the five years prior to the transfer towards the extension of the inland telegraph system.

The agitation for the transfer of the telegraphs began to take shape in 1866, and, as a matter of course, had a powerful effect upon all the companies. The Electric Company, which in 1866 increased its mileage

of wire 2,500, added only 2,000 miles in 1867, and only 700 miles in 1868; and this additional mileage was placed mainly on existing lines of great importance. Hardly anything was done for the extension of the inland system in 1867 and 1868 by the other companies; and in 1869, no extensions were made save those which were carried out on behalf of the Post Office, and at its cost, and in view of the transfer.

In short, there can be no doubt that during five years prior to the transfer of the telegraph system in this country it made very little progress, and that in the two years prior to the transfer it made no progress at all. During the whole of that time the public had been crying out for extensions, so that the Post Office started with a heavy arrear of work upon its hands, and heavily in debt to public expectation.

The change demanded by the public, and promised by the legislature, was a sweeping and radical one; and in carrying it out it was scarcely possible for the department to avoid giving some dissatisfaction to some classes of the community.

The telegraph companies declared in 1868, that their lines were used mainly by stockbrokers, mining agents, shipbrokers, colonial brokers, racing and betting men, fishmongers, fruit merchants, and others engaged in business of a speculative character, or who deal in articles of a perishable nature.

It was their opinion, too, that "general merchants used the telegraph comparatively little, compared with those engaged in the more speculative branches of commerce."

There is no reason to doubt the accuracy of this view. By maintaining high charges as long as they could, by reducing those charges inch by inch as it were, and only under pressure, by the confinement of their operations to important towns, and by planting their offices mainly in the business centres of these towns, the telegraph companies had brought speculative men, and speculative men only, to a *free* use of the telegraph. Whoever could make money on a turn of the market, whoever could advantageously place a few pounds when Bumblebee went below Dulcibella in the betting, whoever had it at heart to let Thames Street know that there was a large take of herrings at Wick, rushed cheerfully to the telegraph office and would have submitted to any inconvenience and paid any charge to get his message through in time. But the general public, puzzled by a variable and complex tariff, and disheartened by the distance of telegraph offices from their doors, had got to regard the telegraph as a medium of communication which might be used in times of sore necessity, and then only, and to look upon a telegraph message with a feeling amounting to fear. This is within the knowledge of most people, and for years there will be a large number of persons

who will be unable to open the envelope of a telegraph message without alarm and apprehension.

Those who advocated the transfer to the Government, contemplated a radical change in this respect. They proposed, by the establishment of a low, uniform, and very simple tariff; and by bringing the wires close to the population: to popularise telegraphs in this country, to put the use of the telegraph within the reach of everyone, and to make that, which had hitherto mainly served the purposes of the wealthy and the speculative, minister to all the necessities of social and domestic life.

On the introduction of such a system as this, it was absolutely necessary that the Post Office should set itself against favouritism of any kind, and that it should determine strictly in order of receipt, and without any reference to their real or supposed importance or to the wishes of the senders.

Applications have been made to the Department for the establishment of a differential tariff, with a low rate for ordinary and a high rate for special messages, but it is clear that no such differential tariff is possible. If it were once admitted that a message called special, and for which 5s. was paid, ought to go before a message called ordinary, and on which but a shilling was paid, then it would be impossible to contend that a message on which a guinea was paid should not have a priority over a message on which 5s. was paid.

If the principle of strict rotation were once abandoned, the chief use of the telegraph would fall to the rich, or to those whose wants, for the time being, made them as lavish as rich.

In bad weather, when the wires were working ill generally, some companies would take care to keep a fair communication between important towns, even though by so doing they damage a larger number of less important towns. As a matter of course the Post Office has endeavoured to deal with all parts of the country equally, to leave those wires undisturbed which were unaffected by weather, and to let those districts whose lines of communication were affected bear for a time the misfortune which had fallen upon them.

Such a course as that pursued by the Post Office is fair, and for the benefit of the community ; but it was not to be expected that this course would commend itself to those whose interests were affected by it. When the Post Office undertook, by the establishment of a low tariff, and by the extension of the wires into outlying districts, to bring about a large increase of messages, the department was bound, as far as possible, to take care that the extension of the means of transmission had kept pace with the extension of the business, so that those who had hitherto chiefly used the telegraph should suffer no loss of accommodation.

On the whole, then, the transfer to the Government involved these practical difficulties :—

- (a) Having undertaken, by the establishment of a low tariff and the erection of feeders to the main lines, to swell the traffic on those main lines, it was absolutely necessary that the means of communication on the main lines should be extended and improved.
- (b) Having undertaken to effect a separation between the commercial system and the railway system, it was absolutely necessary to supply the railways with a large mileage of wires, 5,000 or 6,000 miles, in substitution of those wires of which there had been a joint user ; to provide fresh instruments in lieu of those left at the railway stations, and to take care that the Railway Companies were provided with the proper force for working the wires which were left to them.
- (c) Having taken over the staff of the several Companies, it was necessary to amalgamate into one force men who had hitherto regarded each other as rivals ; and who had, in many cases, worked on totally opposite plans, and with different instruments. Further, it was necessary to amalgamate this combined force with the employés of the Government department, and to assimilate practices so

much at variance with each other, as those of a public office, and commercial Companies.

It was provided by the Telegraphs Act, 1868, that unless another Act were passed in that or the next session of Parliament, putting at the disposal of the Postmaster-General such moneys as should be requisite for carrying into effect the objects and purposes of 1868, the provisions contained in the last-named Act should be null and void.

From this it followed that, as a matter of course, until the Money Bill was passed, the Post Office could make no other preparations than preparations on paper, for the work which it had to do.

In the winter of 1868-9 grave doubts were raised by a writer in the *Edinburgh Review*, and by some other writers in the public prints, as to the bargain with the Telegraph Companies, which had been sanctioned by the Act of 1868. It was for some time doubtful whether the Money Bill would be introduced. Nor was it possible for the Government to come to a decision on the subject until the result of the arbitrations and negotiations under the Act of 1868 was known. It was not until July, 1869, that the Money Bill was introduced. When it was introduced it met with some opposition, both in Committee and in the House; and it was not until August 9th that it became law. Up to that time the Post Office could

not spend one shilling for its undertaking ; and could not invite a tender for materials, even though such materials might require months of preparation ; and could not get the advice, or the assistance of practical officers of the Telegraph Companies ; who, though their advice and assistance were indispensable to the Post Office, were bound in the interests of their employers to withhold them so long as the issue of the long-pending proceedings was doubtful.

The Post Office was heavily in debt to public expectation, and under strong pressure to mount the new system without delay. The plans of the department were complete, so far as completion was possible at that time ; but for the effectual completion of the work a large amount of outdoor work was required, at a time when the autumn was at hand, and the winter fast coming on. Further, the stores required for the work could not be obtained with sufficient rapidity ; to have obtained them in sufficient quantities at the time it required them, the department ought to have been in a position to order them six months before ; consequently the difficulties which had to be overcome were very great.

As soon as the Money Bill was passed, the department began vigorously to erect the additional wires required for the completion of its scheme ; to rearrange such of the telegraph-offices as it designed to keep, and to fit up such post-offices as it designed to

open for telegraph business ; to arrange for the redistribution of the old staff, and for the training of additional staff ; to prepare uniform codes and regulations in lieu of the codes and regulations of the Companies ; and to carry out the amalgamation by degrees, wherever gradual amalgamation was practicable.

Great as were the exertions of the Post Office Department, nothing less would have sufficed to enable it to keep pace with the growth of its business. In the first week after the transfer the number of messages (exclusive of news messages) forwarded from all stations was 128,872 ; in the week ending the 31st of March the number had risen to 160,775 ; the average weekly number in thirteen weeks to 30th of June, 177,410 ; the average number in thirteen weeks to 30th September was 200,787. In the week ending 31st December, which is usually considered the worst week in the year for telegraphic work, the number was 144,041, or nearly 16,000 messages in excess of the number with which they started. In the first nine months after the telegraphs came into the hands of the Government the number of messages forwarded was no less than 7,563,015.

In 1872 they had increased to 12,479,000, and in 1873 to 15,535,000.

It must be added that the cost of the acquisition and extension of the telegraphs has exceeded nine

millions sterling, a sum far beyond the original estimate.

PRIVATE TELEGRAPHS.

SIDE by side with the impetus given to ordinary public telegraphing by the increase of facilities and the lowering of the rates consequent upon the acquisition of the system by the Post Office, private telegraphs have shown a remarkable development during the past seven years. In 1870, when the Post Office took over the business of the "Universal Private" and other telegraph companies, the aggregate rentals derived from the letting out of private wires amounted to a trifle under £21,000. In the year 1873-4 they had reached very nearly double that amount, while at the close of the last financial year as much as £59,000 was placed to the credit of the telegraph revenue from this source. At the close of the year, not far short of 1,700 private wire contracts were in operation, representing a total of 5,700 miles of wire and 4,855 separate instruments. These figures compare with a total of 732 contracts, 2,525 miles of wire, and 1,773 instruments on the 31st of March, 1870; the increase in the number of instruments being on a larger scale than that of either contracts, or miles of wire. The largest increase of mileage was in the year 1872-3, when a very con-

siderable extension of the system of Police wires in London was carried out.

Private telegraphs are of various kinds, variously constructed, and variously worked. Thus, the Post Office undertakes to construct and afterwards maintain, upon the payment of a fixed annual rental, a line of private wire between the place of business, or residence of a firm, or private individual, and a postal telegraph office ; or between two, or more places of business, or residences, except where it may be desired to have a line of private telegraphs between two towns which are already connected by means of the public postal wires. In such cases, the Post Office provides a line of private wires between the place of business, and the head telegraph office at each town at the ordinary rental, with an extra payment for clerks' services ; the service between the two towns being performed over the public wires, at the ordinary charge for inland telegrams. In London, the rate per mile for a private wire carried over house, or under ground is £8, and on the roads it is £6. In other parts of the kingdom the rates are respectively £7 and £5. For wires carried under water there are special rates according to circumstances. The *minimum* charge in all cases is for one mile, advancing beyond that distance by quarter-miles ; any less distance than a quarter-mile being counted as such. The Department, however, reserves to itself the right to vary these rates in special circum-

stances. The instruments used are of various kinds, and may either be rented from the Post Office or provided by the renter himself. Perhaps the most common form of private wire instruments is that known as the Alphabetical, or "A B C," consisting of a communicator, an indicator, and a bell. This form of instrument is most common, because least difficult to work; and, therefore, more easily mastered by elderly persons, and the uninitiated generally, than the more complex forms. In reality it represents, as its name implies, the "A B C," of the telegraphic system. The turning of a handle by which the current is generated, and the depression of one, or other of a series of keys or "stops," each representing a letter of the alphabet, or a figure; actuates a needle, or pointer on the indicator at the distant end, which literally spells out the words letter by letter just as they might be spelled out by the schoolboy on the blackboard aided by the teacher and pointer. The process may seem to be slow at first sight, but it is not so in reality, as many as twenty or even thirty words a minute being quite within the compass of an expert operator, of whom there are many even in the simple "A B C." A bell in circuit with the communicator serves to call attention when a message is about to be sent, one turn of the handle at the distant end being sufficient to arouse the most phlegmatic of hall porters, or the most inattentive of office boys. The other forms of apparatus in use on private wires, are the

Single Needle and the Printer, each of which, like the "A B C," is a kind of pointer instrument, but it points to arbitrary signs, representing the letters of the alphabet instead of the letters themselves, and is, therefore, much more difficult of manipulation than the "A B C." Still, as this form of instrument is in use at most of the smaller post-offices, and very generally on railways, where the telegraph operators are not very highly skilled, it would seem to be not very difficult of manipulation with ordinary skill and a little practice. The Printer, or "Morse," as it is usually called, also deals in arbitrary signs, but it possesses this advantage over either the "A B C" or Single Needle—that it leaves a record on a strip of paper, which may be translated at leisure, or referred to at any future time. It requires, however, greatly superior skill to work compared with either of the other two instruments mentioned, although it is capable in expert hands of producing much more rapid and satisfactory results. The price to the renter of a private wire of each of these forms of apparatus, if purchased from the Post Office, is £25 for the "A B C" and Printer, and £7 10s. for the Single Needle—one battery being included in the case of the two last-mentioned forms. If rented from the department, a set of "A B C" apparatus, composed of communicator, indicator, and bell, costs £6 per annum; a Single Needle and battery costs £3; and a Printer and battery, including the

supply of paper riband, costs £10 per annum. If the apparatus be the property of the renter, the "A B C" form is charged at the rate of £3 10s.; the Single Needle at the rate of £2 10s.; and the Printer at the rate of £7 10s. per annum, including maintenance, repairs, and renewals, which are also included when the apparatus is rented from the department.

In addition to the work of ordinary private telegraphing, the Post Office also provides the means for distributing the Greenwich time-current either twice a day, at 10 and 1 o'clock, or hourly, through the day. The latter arrangement appears to be applicable to London only, and may be secured within a radius of two miles from the General Post Office, including the use of the necessary wire, for a payment of £15 per annum. For any distance over two miles, the same rate, added to the private wire rate for the wire over the extra distance, is chargeable. In the country the 10 o'clock current, including the rental and maintenance of a private wire from the local head postal telegraph office to the renter's house, or place of business, will be supplied at an annual rental, varying from £12, where the wire is only a quarter of a mile in length, to £17, where it is one mile in length. If the private wire exceeds one mile in length, the ordinary tariff rate will be charged, in addition to £10 for the signal. The rate for the one o'clock current varies from £27, where the private wire is only a

quarter of a mile in length, to £32 where it is one mile in length; and if the wire exceeds the last-mentioned distance, the ordinary tariff rate will be charged, in addition to £25 for the signal. The very considerable difference between these two rates is due, we imagine, to the fact that whereas at 10 o'clock in the morning the ordinary postal wires are tolerably free for the passage of the current, they have to be cleared, so to speak, in order to admit of its passage at the later and more busy hour. For watch and clock makers in remote parts of the country these daily time signals must be of immense value; while it seems more than probable that the time guns which are fired daily at several of the northern seaports, are actuated through the agency of the postal private wire system.

The various uses of private telegraphy may be very readily conceived. The merchant requires hourly communication between his counting-house in the city, and his manufactory in the suburbs; the banker between his head office, and branches; the dock company between its wharves, and offices; the wholesale house in the city with its retail establishment at the east, or west end; gas and water companies between their respective offices, and reservoirs; Watling-street with Scotland-yard and the hundred and one other points whence the alarm of fire may come at any moment; the Editor with the Parliamentary reporters' gallery; and, indeed, everybody with everybody else,

where time is of importance, and distance has to be bridged over. Nor is it in the field of commerce alone that the private telegraph is found in operation. The nobleman or squire whose seat is remote from the din of forges, or the smoke of factories, may luxuriously have his wire "laid on" to the nearest post-office, and send, or receive his telegrams, at his own sweet will; either by his own hand, or by the hands of his servants. He saves not only the time which would be occupied in walking to and fro between his residence and the telegraph office, but the "porterage" which would be chargeable on all messages delivered to him beyond a given distance. He may have a wire to his stables or the "home farm," and, in fact, may give his orders as readily from his library or study as from the back of the hack which carries him daily across his broad acres. There is, indeed, no limit to the operations of the private telegraph, and the introduction of the telephone will probably give an impetus to this kind of business which its early promoters little dreamt of.

The Post Office, although probably the largest, is not the only contractor for the erection and maintenance of private telegraphs throughout the country. Several private agencies, notably in London and Glasgow, exist for the transaction of business of this kind, it being no part of the Government monopoly of public telegraphing to exclude competition in this less

ambitious, although apparently highly remunerative field. With its vast resources, however, and its means of bringing private and public lines of telegraph into ready communication, the Post Office must always secure the largest amount of private telegraph business; and it is gratifying to know that almost the only branch of the Government service which goes in search of "fresh woods and pastures new" has prospered during the past year, notwithstanding the continued depression in all branches of trade and commerce.

The Exchange Telegraph—an American idea, we believe—reports stock and share quotations to a large number of customers, almost every minute during 'Change, using for the purpose a self-starting, recording apparatus, which prints the figures in the clearest type. And, talking of America, we are reminded that New York lawyers and stockbrokers hold conversations with each other in their several offices as readily as if they were *vis-à-vis* in Wall Street. In England, where we manage these things more surely, if more slowly, it is gratifying to find that the revenue derived from private telegraphs has almost doubled itself in the short space of seven years, and continues to increase steadily. More can hardly be said of the ordinary telegraph revenue.

POST OFFICE TELEGRAPHS.

To 31st March, 1877.

Length of wire (miles)	113,333	
Number of messages in year	21,726,143	
" offices (post-office)	3,739	} 5,375
" " (railway stations) 1,636		
Receipts	£1,313,157	
Expenditure	£1,108,918	
Of which £21,103 has been expended on the construction of new lines.		
Estimated average number of words transmitted weekly for the press . . .	4,984,851	

REUTER'S TELEGRAMS.

FOR a long time, when the newspaper reading world were looking for continental news, they were obliged to look for such information under the head, "Reuter's Telegrams," and they naturally asked who or what this "Reuter" was—an individual, an institution, or a myth? If only a man, by what extraordinary organization does he manage to gather up, every night, a summary of events over the entire continent, and to place the news before us at the breakfast-table?

These were questions frequently asked some years ago, but in more recent times Mr. Reuter has publicly proved his individuality by the engagement entered into between himself, and the Shah of Persia on the occasion of that potentate's visit to England. Indeed it was asked at that time who Mr. Reuter was, and it came out in some of the newspapers that when he first made his appearance in London he was regarded as a mysterious man, more especially by the editors of newspapers. He was invariably about the newspaper offices, always well dressed, remarkably polite, and always in the possession of news that could be had from no other source. He only wanted his "leettle telegram" published, and he made no conditions for being remunerated. He was at first received with a great amount of shyness, but as it was found that the news which he offered was always correct, and in anticipation of every other source, he became a necessity. In fact, Mr. Reuter's history is like that of all courageous and energetic men, who, seizing upon a new idea, work it persistently and silently, until one fine morning, from comparative obscurity, they suddenly find their names famous. The practical success of the first working telegraph on the continent—that between Berlin and Aix-la-Chapelle in 1849—convinced Mr. Reuter, in common with every thinking man on the continent, that a new era in newspaper correspondence had arisen, and he

determined to avail himself of its facilities for his own and the public advantage. The first office for the furtherance of telegraphic communication was opened at Aix-la-Chapelle, an admirable spot, lying so conveniently between the east and west of Europe. This office formed the first centre of that organization which has since gathered up into the hands of one man, for all general and public purposes, the scattered electric wires of the world, as Dr. Wynter very expressly puts it. In order to correct breaks in the most direct line of transmitting news, he had to supplement the wire with contrivances of his own, so as to insure priority of information. Thus, the better to gain time in the journey between Aix-la-Chapelle and Brussels, he employed a service of carrier pigeons. By this means, on this distance alone, he was enabled to anticipate the mail train between the two places by six or eight hours. In order to secure regularity and safeness in transmission, each message was despatched by three different pigeons, which made the passage from Brussels to Aix-la-Chapelle in an average period of one hour. When the telegraphic line was extended from Aix-la-Chapelle to Quievrain, on the Belgio-French frontier, and the French Government extended their line from Paris to Valenciennes, there remained a gap of only five miles in the line between the French and Prussian capitals, but insignificant as this space was, the delay thereby occasioned was

enormous. To obviate this, relays of saddled horses were always kept in readiness to forward despatches between the two points.

As line after line was opened in succession, each was made subservient to his system, and when the cable between Dover and Calais was successfully laid in 1851, Mr. Reuter, who had become a naturalized subject of Her Majesty, transferred his office to London, which thenceforth was put in connection with the principal continental cities. Up to this time, Mr. Reuter confined his attention to the conveyance of commercial despatches, but it now struck him that the time had arrived for making the telegraph the handmaid of the press. As we have already said, in this attempt he met with but little encouragement, until the 9th of February, 1859, on which the Emperor of the French made his famous speech, threatening Austria through her ambassador. His ominous words were uttered at 1 p.m. in the Tuileries, and at 2 p.m. the speech was published in a third edition of the *Times*, shaking the Stock Exchange to its foundation. The news was supplied through Mr. Reuter's system, and as one success followed after another, his news became an absolute necessity to any paper having a character for giving the earliest information.

Mr. Reuter's business grew to such large dimensions, that a few years ago a Company was established to carry it on, he still continuing the management. The

Company has proved a success, and its shares command a premium in the market.

INSIDE A TELEGRAPH OFFICE.

CLICK, click, go the needles as we enter. Here we see the iron tongues of the telegraph wagging, and talking as fast as a tea-table full of old maids. London is holding communication with Manchester. Plymouth is listening attentively to a long story, and every now and then intimates by a slight movement, that he perfectly understands. But there is one speaker whose nimble tongue seems to be saying important things by the stir around him—that is the *Hague* whispering underneath the North Sea the news he has heard an hour ago from Vienna of a great victory just gained by the Turks. We are witness to a series of conversations carried on with all corners of the island, and between the metropolis of the world, and every capital of northern, and central Europe; as intimately as though the speakers were bending their heads over the dinner-table, and talking confidentially to the host. And by what agency is this extraordinary conversation carried on? All that the visitor sees is a number of little mahogany-cases, very similar to those of American clocks, each having

a dial with two lozenge-shaped needles working by pivots, which hang, when at rest, perpendicularly upon it. Two dependent handles, situated at the base of this instrument, which the operator grasps and moves from side to side at his will, suffice to make and break the currents, or reverse them, and consequently to deflect the needles either to the right or left. Two little stops of ivory are placed about half-an-inch apart, on either side of the needle, to prevent it deflecting too much, and to check all vibration. It is the sound of the iron tongue striking against these stops that makes the clicking, and to this the telegraphists are sensitively alive. In the early days of telegraphy the operator's attention, at all the stations, was drawn to the instrument, by the sudden ringing of an alarm, which was effected by the agency of an electro magnet; but the horrid din it occasioned became insupportable to persons in constant attendance, and this part of the instrument was soon given up, the clicking of the needle being found quite sufficient to draw his attention to the arrival or passing of a message. We say *or passing* of a message, because when a communication is made, as, for instance, between London and Edinburgh, the needles of all the telegraph stations are simultaneously deflected, but the attendant has only to take notice of what is going on when a special signal is made to his particular locality, informing him that *he*

is spoken with. A story is told of a certain somnolent station clerk, who, in order to enjoy his nap, trained his terrier to scratch and awaken him, at the first sound of the clicking needles.*

CIPHERING IN TELEGRAPHY.

VERBAL ciphers or abbreviations are much in use among mercantile houses. This is practised more for the sake of economy than secrecy, although the latter purpose is also attained. The firm and its correspondents have a key in which are tabulated a number of single words, each of which expresses a phrase or sentence, such as is of frequent occurrence in these communications. The following example of such a commercial despatch is given by an American author. The despatch to be sent consisted of sixty-eight words, as follows :—

“Flour market for fair and common brands of western is lower, with moderate demand for home trade and export. Sales 8,000 bbls. Genessee at 5 dollars 12. Wheat prime, in fair demand, market firm, common description dull, with a downward tendency, sales 4,000 bushels at 1 dollar 10. Corn, foreign news unsettled the market, no sales of importance

* Sir F. B. HEAD, Bart.

made. The only sale made was 2,500 bushels at 67 c."

This despatch, when converted into the verbal cipher, was expressed in nine words, as follows:—

"Bad, came aft keen dark ache lain fault adapt."

TELEGRAPHIC ERRORS.

AMONG other uses of the Rhyming Dictionary,* and one that will most commend it to commercial men, is the assistance it affords in deciphering errors in telegrams. All merchants having business relations with America, or the Far East, use Telegraph Codes; so arranged that each word in their Telegrams represents a whole sentence. Frequently, however, these words are so mutilated in transmission as to be almost unrecognizable. As a rule there is not much difficulty in finding the proper word if the ciphers (or symbolical words) in the code are alphabetically arranged, unless the first letters in it have been altered or lost. It is especially in the latter case that this work will be found useful, and every merchant who receives Telegrams of importance should obtain a copy, and insert in their places such proper names or unusual words as he may

* Walker's Rhyming Dictionary. Revised by Dr. Longmuir.

be likely to receive in his Telegrams, if he does not find them already printed.

An instance of not uncommon word-mutilation may be added to show the value of the book for the purpose above-mentioned. In a Telegram received, a word appears as "Sterturn." The merchant goes through the usual course of looking down his Code for any word like this, which will make sense in connection with the remainder of the message, and after wasting an hour or more in trying to decipher the true meaning is compelled to return the Telegram to the Telegraph Company for repetition.

Probably in the course of the following day he receives the amended message, showing that the word originally despatched was "Overturn," meaning "*Sell-to-arrive 1,000 bales Tinnivelly Cotton at 5 $\frac{3}{4}$ pence per pound.*" By this time, however, the London price has declined to 5 $\frac{1}{2}$ d. per pound, so that he must either run the risk of holding the cotton in a falling market, or submit to an immediate loss of £300 on the previous day's quotation. Now had this merchant referred to this book under the letter N for words ending "erturn," he would at once have found the word "Overturn," and saved some hundreds of pounds.

We may explain that such an error as the above is not unfrequently caused by incorrect reading of the "Morse" alphabet; the letters *St* being expressed in "Morse" by --- — and the letter *V* by --- —, the

initial "O" was either lost or very likely attached to the end of the previous word.

Thousands of instances of errors and consequent heavy losses might be given, but no Merchant or Banker requires to be told of them, as they are of almost daily occurrence.

As a further assistance in deciphering badly transmitted messages, we append the Morse Alphabet, as used on almost every telegraph wire throughout the world, and a list of the more common errors occurring in Telegrams.

COMMON ERRORS IN TELEGRAPHY.

Letters.	Morse Signs.	Separated would be	Confound in Transmission with	Confound in Writing with
A	--	et.	U.R.T.N.	u.n.d.H.o.
B	----	ts.tia.teee.tel.ni.nee.de.	D.	I.C.h.t.f.R.
C	-----	nn.nto.ke.tr.tao.sen.tete.	W.G.F.P.K.B.	b.l.e.i.o.
D	---	tl.tee.ne.	B.L.N.	a.L.
E	-		T.	c.i.G.o.r.
F	----	no.in.te.er.sen.ecto.	C.L.P.E.W.	H.l.b.J.
G	---	me.in.tte.	W.C.M.P.Z.Y.J.L.O.	E.q.y.z.
H	----	eeee.eel.iiee.so.	S.N.	L.n.A.b.F.I.K.p.
I	--	ee.	S.T.	ce.v.J.
J	-----	vt.am.att.eo.emt.eum.ett.	Y.G.P.Q.W.O.	I.f.
K	---	nt.ta.tel.	C.M.	R.H.h.
L	----	re.a.lace.ed.ene.eti.eteo.	D.P.F.W.	h.l.b.C.f.S.D.p.
M	---	tt.	G.W.O.K.	n.w.
N	--	te.	B.D.A.T.H.U.V.	r.v.a.n.h.m.
O	-----	mt.tm.ttt.	G.W.J.M.P.Q.	ea.v.C.Q.
P	-----	we.an.ate.cg.eme.etnette.	C.F.G.J.O.L.Q.W.	h.L.R.
Q	-----	gt.ma.met.tk.tnt.tta.ttot.	J.O.P.	g.O.y.
R	---	aa.en.ete.	E.C.N.A.F.V.	e.P.R.v.E.n.
S	---	le.el.eee.	H.I.A.	L.T.

COMMON ERRORS IN TELEGRAPHY.				
Letters.	Morse Signs.	Separated would be	Confound in Transmission with	Confound in Writing with
T	—	i	A.N.E.L	b.I.S.
U	---	it.ca.eet.	A.N.V.	a.n.v.
V	----	st.is.let.en.cit.eca.eeet.	U.R.N.W.	P.r.o.l.n.u.
W	-----	at.em.ett.	P.G.F.J.M.V.C.O.	m.
X	-----	dt.na.net.tit.tu.tea.teeet.		y.
Y	-----	kt.nm.ntt.tw.tat.tem.tett.	G.J.	g.q.x.
Z	-----	ge.mi.mee.td.tne.tti.ttea.	G.	g.
1	-----			
2	-----			
3	-----			
4	-----			
5	-----			
6	-----			
7	-----			
8	-----			
9	-----			
0	-----			

VARIETIES OF TELEGRAPHIC MESSAGES.

THE mixture of subjects which the clerks in rapid succession read from their needles, is most curious. "We have," says Mr. Walker, "ordered a turbot, and also a coffin; a dinner, and a physician; a monthly nurse, and a shooting jacket; a special engine, and a chain cable; an officer's uniform, and some Wenham-lake ice; a clergyman, and a counsellor's wig; a royal standard, and a hamper of wine; and so on."

Passing over the black leather bag which some one appears to leave in some train every day, passengers have recovered luggage of most miscellaneous character by means of the telegraph. In the trains have been left a pair of spectacles, and a pig; an umbrella, and *Layard's Nineveh*; a purse, and a barrel of oysters; a great-coat, and a baby; and boxes and trunks, *et id genus omne*, without number.

CATASTROPHES AVERTED BY THE TELEGRAPH.

AMONG the serious railway accidents which might have been, or actually were prevented by the telegraph, the following have been mentioned :—

In a storm, the wind blew a first-class carriage, which stood in an open shed at a second-class station, and putting it in motion upon a very level line, sent it flying with accelerated speed to the terminal station. No telegraph at that time existed to warn either the intermediate or terminal stations of the event and the approaching danger. The vehicle was actually blown over twenty-one miles of railway, but the trip it thus took occurring fortunately at an hour of the night when little business was going on, it came to a stand-still without any calamitous result.

On New Year's Day, 1850, a catastrophe, which it

is fearful to contemplate, was averted by the aid of the telegraph. A collision had occurred to an empty train at Gravesend ; and the driver having leaped from his engine, the latter started alone at full speed to London. Notice was immediately given by telegraph to London and other stations ; and while the line was kept clear, an engine and other arrangements were prepared as a buttress to receive the runaway. The superintendent of the railway also started down the line on an engine, and, on passing the runaway, he reversed his engine and had it transferred at the next crossing to the up line, so as to be in the rear of the fugitive ; he then started in chase, and on overtaking the other, he ran into it with speed, and the driver of his engine took possession of the fugitive, and all danger was at an end. Twelve stations were passed in safety : it passed Woolwich at fifteen miles an hour : it was within a couple of miles of London before it was arrested. Had its approach been unknown, the mere money value of the damage it would have caused might have equalled the cost of the whole line of telegraphs.

As a contrast to this, an engine, some months previously, started from New Cross towards London. The Brighton Company had then no telegraphs ; and, its approach could not be made known. Providentially, the arrival platform was clear ; it ran in, carrying the fixed buffer before it, and knocked down,

with frightful violence, the wall of the parcel booking office.

A NOVEL MEETING AND A GOOD SUGGESTION.

SOME years ago the *employés* of the American Telegraph Company's lines between Boston and Calais, Maine, held a meeting by telegraph, after the business of the line was concluded for the day, to take action upon the resignation of Mr. A. F. Woodman, superintendent.

Thirty-three offices were represented, scattered over a circuit of seven hundred miles. Speeches were made by Messrs. Palmer and Milliken of Boston, Hayes of Great Falls, Smith of Portland, Bedlow of Bangor, Black of Calais, and others. Each speaker wrote with his key what he had to say, and all the offices upon the line received his remarks at the same moment, thus annihilating time and space, and bringing the different parties, in effect, as near to each other as though they were in the same room, although actually separated by hundreds of miles.

After passing appropriate resolutions, the meeting was adjourned in great harmony and kindly feeling, having been in session about an hour.

An account of the above meeting having been published in the newspapers, *Punch* made the

following humorous suggestions for the application of a similar system to the House of Commons :—

“ Now, why could not our Parliamentary proceedings be conducted in an equally silent manner? Do you think Cobden would unwind his many miles of Manchester yarns without an audience? Do you fancy Spooner would go raving for hours if there was not a soul present to hear him rave? And is it likely that Gladstone, even, with all his love of talking, would talk incessantly when all that his eloquence could possibly bring round was a dial? Now an electric Parliament would remedy all the evils that verbiage at present inflicts on the patience of the nation. A member of Parliament would be able to attend to his legislative duties without leaving his country seat. The entire business of St. Stephen's might be conducted in a telegraph office. The whole parliamentary paraphernalia, with its numerous bundles of rods and sticks, might be cut down into a Speaker. That worthy functionary would sit in the middle of his office, like a forewoman in a milliner's workshop, watching the numerous needles flying assiduously around him. When the work was done, he would collect the stuff and report the result. The threads of various arguments would run into his hands, and it would befit him to sort them. His decisions would be final, and justly so, as he would always have the debates at his

finger-ends. The Prime Minister and Prince Albert might look in every quarter of an hour to see that the Speaker had not fallen asleep.

“Under our improved plan, one great benefit would undoubtedly be gained. There would be no noise! All zoological exhibitions would be effectually closed. Your Parliamentary cocks, donkeys, and laughing hyænas would be peremptorily shut up, like their wooden prototypes in a boy's Noah's Ark. Really, we see no obstacle in the way of an Electric Parliament. It would, to a great extent, cure the absurd mania for talking, and, moreover, we do not think the speeches then would be half so wire-drawn as they are now. Besides, every little Demosthenes, who at present is not reported, or else snubbed under the obscure cognomen of the ‘Hon. Member,’ would have the satisfaction of knowing that his speech had gone to the length, at all events, of *one* line, and, if he were at some distant post, it might run to the extent of four or five lines, according to the number of wires on the different telegraphs; whilst your Drummonds and Osbornes, as they indulged in their electric facetiæ, might flatter themselves with the belief that they were fairly convulsing the Poles with laughter.”

PERSONS UNQUALIFIED FOR TELEGRAPHY.

THERE are many persons who seem totally incapable of acquiring a knowledge of the art of telegraphing sufficient for practical use, while others, and especially young persons, will acquire it, even in the short space of a fortnight, sufficiently to transmit, and receive despatches, with considerable facility.

A ludicrous example of this lack of ability to operate this simple apparatus came to our knowledge some time ago.

A middle-aged man employed upon an American railway as station-master and telegraph-operator; found great difficulty, after two years' experience, in working the instrument, and this inability extended to his reading, as well as his transmitting, despatches. Upon one occasion he rushed out of his office in a great state of excitement, and informed the guard of a train which had just arrived at his station, that he had that moment received a message stating that "the ——— train had broken both driving wheels, and was badly smashed up. No more trains must pass until further orders."

The conductor, who was able to read the telegraphic characters, went to the instrument, and, drawing out the paper, read the following despatch:—"Ask the conductor of the Boston train to examine carefully

the connecting-rods of both driving wheels, and if not in good condition to await orders.

The conductor having made the examination in company with the engineer, and found all right, gave the order for the train to move on, to the infinite astonishment of the *soi-disant* operator, who never was able to find out why the conductor had the temerity to order the train to proceed under such grave circumstances.

In the same village where this *reliable* operator is employed there is another telegraph office, where the ordinary telegraph business is done; and whenever our friend receives a call upon his instrument, he gives the signal to proceed, and, after receiving the despatch, takes it to the operator at the other office to have it translated to him.

Not long since, he rushed into the office with a strip of telegraph paper in his hand, and cried out, "I want you to read this for me, quick! I expect there's some awful accident on the road, the operator rattled away so fast when he sent it."

The friendly neighbour took the paper, but, to the dismay of the nervous visitor, found that a large piece had been torn off by a dog, who was attracted by its singular appearance as it streamed behind him while he rushed along, and the part which remained contained only these words:—"Good morning, uncle Ben. When are you—" The dog had swallowed the rest!

MR. BENNETT'S EMPLOYMENT OF THE TELEGRAPH.

THE late Mr. Bennett, of the *New York Herald*, was known as the most enterprising man that the newspaper world had ever produced, and he was the first New York editor who had important speeches reported, though delivered at hundreds of miles distance. He seized upon the telegraph as soon as it was established, and sometimes incurred very heavy expenses in getting exclusive or the earliest information.

When the Prince of Wales was expected at Niagara Falls, Mr. Bennett instructed his reporter to secure the telegraph. This could only be done by keeping it at work, on the principle of "first come first served;" but there was nothing to report. The reporter was at the end of his story, and asked what he should do? "Send on the Book of Proverbs," was Mr. Bennett's answer. The Book of Proverbs concluded, the reporter said by way of postscript, "No sign of the Prince—what next?" "Give us Ecclesiastes," was the answer; and the operators were kept at their long and unusual Scripture lesson, at a heavy price, until the cannon thundered, and the long-expected heir of England's throne came in sight of the great cataract.

BREVITY IN TELEGRAPHIC DESPATCHES.

THE despatches which pass over a line in the course of a year, if collected together, would present a very curious and interesting volume of correspondence. The price of transmission for a message depending upon the number of words which it contains, of course renders the construction of it necessarily as brief as possible. Most despatches are contained in less than ten words (exclusive of address and signature, which are not charged for), and it is surprising how much matter is frequently contained in this small number. Among the best examples of brevity which we have met with, however, are the two following :

A lady, in a neighbouring city, desirous of ascertaining when her husband would return home, sent him a message making the inquiry ; to which he responded, that important business detained him, and that he could not leave for some days.

The lady immediately replied by sending him another despatch couched in the following laconic manner :—

“ To F. C. P.—Despatch received,

“ Deuteronomy xxiv. 5.

(Signed)

“ KATE.”

The gentleman to whom the despatch was addressed, upon referring to the passage of Scripture quoted, obtained the following lengthy and suggestive epistle :—

“ When a man hath taken a new wife, he shall not go out to war, *neither shall he be charged with any business* ; but he shall be free at home one year, and shall cheer up his wife which he hath taken.”

The second example is the reply sent to a person in a distant city, who, having committed some offence against the laws, was desirous of ascertaining if it would be prudent for him to return. He therefore telegraphed in the following style :—

“ New York,

“ To B. C. M.,—Philadelphia,

“ Is everything O. K. ?

“ D. T. M.”

To which he obtained the following brief reply :—

“ Philadelphia,

“ To D. T. M.,—New York,

“ Proverbs, chap. xxvii. 12.

“ B. C. M.”

Upon reference to the passage indicated, the inquiring individual obtained the following valuable advice, which, it is to be presumed, he followed :—

“A prudent man foreseeth the evil, and *hideth himself*; but the simple pass on, and are punished!”

AN IMPROVED SPEECH.

DURING the Presidential campaign of Daniel Webster, he, as a matter of course, made a great many speeches. One made at Albany, New York, was particularly good, and abounded in short, pithy, Saxon sentences, many of which were in the form of interrogatories. In order to do full justice to the speech before it was transmitted through the wires to the various country papers, the chief of the operative department of the telegraph, took occasion to punctuate it, as he read it to the copyist, and whenever an interrogatory occurred, repeated the word “question,”—meaning, of course, for the copyist to make the sign “?” at the end of the sentence.

Judge, however, of the surprise and horror of the chief next morning, when the country newspapers, as they arrived by post, were found embellished with the word “(question)” printed in full at the end of nearly every sentence.

READING TELEGRAPH SIGNALS BY SOUND.

WE shall not pretend to say to whom is entitled the credit of having first discovered the idea of reading telegraphic signals by sound, instead of by motions of the needle, and the many other methods now in use ; and if we could, it would be a matter of no importance, for no one, with the " very smallest " ear for tune and time, could be within hearing of a Morse Register for twenty-four hours, without being aware of its peculiar adaptability for this use.

" The first time, however, " says Mr. G. B. Prescott (the superintendent of the Electric Telegraph Lines of the United States, 1860), " we saw any one read in this manner was in the winter of 1846-7, in New York. The lines were broken, and Mr. D. E. Wood and myself were sent out to repair them. Mr. Wood carried a small electro-magnet in his hand, and when we reached Harlem Bridge, he disconnected the line wire, and attached it to one end of the helix-wire ; and then, uncoiling a dozen or two feet of iron-wire, dropped one end of it in the river, and with the other commenced tapping upon the other extremity of the helix-wire. To our infinite astonishment, we saw the lever fly backward and forward ; and presently, when he had stopped writing, he received a reply from the office in New York. He gave us the questions and answers as

he received and sent them, and although we have several thousand times accomplished the same feat, the conversation and the occurrence are still indelibly fixed on our memory.

“No trick of legerdemain, performed by the most successful necromancer, has ever been able to excite so much interest in our mind as this.”

TELEGRAPHY IN EUROPE IN 1875.

THE Statistics published by the International Telegraph Office at Berne with regard to telegraphic matters in the year 1875 are not without interest, although they are somewhat late in making their appearance. As we have been disappointed in England at finding that the profits of our Telegraph Service are not yet sufficient to pay the interest on the large capital raised to acquire the business of the old telegraph companies, and to develop the system; it is some consolation to find that our neighbours are in a much less satisfactory position than ourselves.

Out of 16 European States whose transactions are brought under our notice, there are 10 in which the gross earnings of the telegraph system were insufficient to cover the working expenses. Arranged in the order of the per-centage of deficiency, these ten States

are, Denmark, Norway, Belgium, Germany, Austria-Hungary, Greece, Portugal, Holland, Roumania, and Spain. In the case of the three States first mentioned the deficiency is less than 15 per cent. ; for the remainder it ranges up to 38 per cent. Of the (telegraphically speaking) more prosperous States, Sweden shows a profit of 6 per cent. ; Switzerland of 12 per cent. ; France of 18 per cent. ; Russia of 19 per cent. ; England and Italy of 25 per cent. each.

As regards extent of business, England is *facile princeps*. The number of paid inland messages transmitted by this country in 1875 was (in round numbers) 18½ millions ; by Germany, 8½ millions ; by France 7 millions ; by Austria-Hungary, 4½ millions ; by Italy, 4½ millions ; by Russia, 3¼ millions ; by Switzerland, 2 millions ; by Belgium, 2 millions ; by Holland, 1½ million. None of the other states had more than a million inland messages.

Comparing the number of inland messages with the populations of the respective countries, we find that for every 100 inhabitants there were transmitted in Switzerland, 77 messages ; in England, 58 ; in Holland, 38 ; in Belgium, 36 ; in Norway, 27 ; in Denmark, 22 ; in France and Germany, 19 ; in Italy, 16 ; in Austria-Hungary, 12 ; and in Russia, 3·7. It is scarcely necessary to remark that a large proportion of the Swiss inland messages are forwarded by people who are not inhabitants of the country.

Turning to the numbers of telegraph offices open for the use of the public, we find that Switzerland heads the list with an office for every 2,664 inhabitants. Here again the circumstances of Switzerland are altogether exceptional—many of the offices being at hotels and only used during the tourist season. England ranks next with an office for every 5,640 inhabitants. Among the other States we find the number of inhabitants to each office to be as follows:—In France, 8,463; in Germany, 7,980; in Austria-Hungary, 11,556; in Italy, 15,522; and in Russia, 50,188. Holland, strangely enough, appears, if the figures can be trusted, to have the least liberal provision of offices among all the European States, having only one office to every 115,449 inhabitants.

In making a comparison between different countries as regards the average expenditure per message transmitted, it must be remembered that this cost is considerably affected by the cost of the territory of each particular State. Other things being equal, the working expenses will be higher in a country in which the average distance traversed by a message is 250 miles than in one where the average is only 25 miles. Accordingly, we find Russia at the top of the list in this respect with an average expenditure of 3s. 2d. per message. Among the medium-sized States the cost per message is—in Spain, 2s. 4 $\frac{3}{4}$ d.; in Austria-Hungary, 1s. 5 $\frac{3}{4}$ d.; in Norway, 1s. 4 $\frac{1}{2}$ d.; in Germany,

1s. 0 $\frac{3}{4}$ d. ; in France, 1s. ; in England, 11 $\frac{1}{2}$ d. ; in Italy, 10 $\frac{1}{4}$ d. Of the smaller States, Roumania, with an average of 1s. 8 $\frac{3}{4}$ d., comes out the least favourably, while the most cheaply worked systems show the following average rates of expenditure per message—viz., Holland, 10 $\frac{1}{4}$ d. ; Denmark, 8 $\frac{3}{4}$ d. ; Belgium and Switzerland, 5 $\frac{3}{4}$ d. each.

It is gratifying to see that our own country compares favourably with other countries of the same class, as regards economy of management. Italy has nominally a lower rate of expenditure, but it will be found that the things compared are not identical. In the first place, the ordinary message in Italy is a message of 15 words ; in England it is a message of 20 words with addresses free—equal in all to about 30 words. Secondly, it appears from the notes appended to the Statistical tables that in enumerating the messages transmitted in the United Kingdom, no account has been taken of two classes of messages which have been included in the returns of other States—viz., messages transmitted for the Press—which alone comprise more matter than the whole of the Italian traffic—and messages transmitted in the service of the Telegraph Department. If proper allowance was made for these omissions it would probably be found that the average working cost per message is really lower in England than in Italy.*

* *The Times.*

GERMANY'S SHARE IN THE DEVELOPMENT OF
THE TELEGRAPH.

THE first article in the December 1, 1877 number of the Berlin "Archiv für Post und Telegraphie" is entitled "Germany's Share in the Development of the Telegraph." It urges that the article on "Telegraphic Progress" which appeared in *The Times* of November 22, is written in too insular a spirit, and that while the claims of certain Englishmen and Americans are set forth, the work of the scientific men of other nations has not been duly recognized. The progress of the telegraph has been an international work even from its earliest stages, and to claim as *The Times* article has claimed that all the discoveries up to 1843 were due to English genius is not a fair representation of facts. It recognizes that Le Sage's name is just mentioned, but indicates that his work is too lightly passed over, and draws attention to the fact, that many important names associated with work on which telegraphic progress is founded, are altogether omitted. There are, it says, not a few Germans who have made themselves worthy to be prominently mentioned, as there are also philosophers of other nations. For example, without the discovery of galvanism the present science of telegraphy would have been an impossibility, and with this discovery the

names of the Italian philosophers, Galvani and Volta, are closely bound up, while the discovery of the principle of the galvanometer is due to Ørsted, a Dane, almost simultaneously with Schweiger and Poggendorf. The invention of the galvanometer was the first step towards the needle telegraph, and the honour of first seeing the application of this is due to the French *savant* Ampere. The laws of the strength of currents, without which apparatus could not be rationally constructed, were first worked at in 1825 by the distinguished German Ohm, which led to the discoveries in 1845 by Kirchoff. Then came the "epoch making" labours of the Göttingen Professors Gauss and Weber. These facts the German writer considers are sufficient to show that it is an "arrogant assumption" on the part of the English writer to claim the earliest stages of the invention, and development of the telegraph, as purely English. When the British Association appointed a committee to report on suitable units as the standard of electrical resistance, there were four names suggested for them—an Ohm, a Volt, a Weber, and a Faraday—so that here there were recognized one Englishman, one Italian, and two Germans. The article goes on to point out, that the constant battery is due to Becquerel and Daniell, and the discovery of the earth currents, and the application to the telegraph is due to Stenheil. The first idea for the employment of galvanic currents

for telegraphic signals originated with Sæmmering. He showed how the chymical decomposing property of the currents could be made to indicate letters (as Le Sage had with frictional electricity), and exhibited his "water decomposition telegraph" at an Academy meeting in 1809. He may be regarded as the real founder of our present telegraphic knowledge, as he was the first to recognize the possibility of employing galvanic electricity to convey signals to a distance. The needle telegraph came as the next step—the deduction from the galvanometer; and here the Prussian Schilling, with his submarine wire, must be named, as well as Gauss and Weber (1833). Fothergill Cook, who is named in *The Times* article in connexion with Wheatstone as inventor of the needle telegraph, was in 1835 at Heidelberg studying wax modelling for the museum of the University of Durham, when he accidentally saw an instrument that belonged to Muncke, with which it was possible to telegraph from one room to another. He took up the idea and worked it out with Wheatstone, but he cannot claim the invention. Siemens, Von Chauvin, Halske, and Elund are mentioned in connexion with the development of duplex and quadruplex telegraphy, but the writer has omitted to mention the name of Edison which, perhaps, should take the place of the names of Prescott and Jerritt Smith. The comments of the German writer, prejudiced as they are, usefully draw

attention to the fact that a good international history of the telegraph has still to be written.

RATHER AWKWARD.

“WE are requested by Reuter's Telegram Company to correct an erroneous announcement made in their Brisbane telegram of the 2nd inst., published on the 5th inst., stating that ‘Lady Kennedy had given birth to twins, the eldest being a son.’ The company explain that the message they received contained the words ‘Governor of Queensland *twins first son.*’ Being, however, subsequently informed that Sir Arthur Kennedy was unmarried, and that there must be some mistake, a telegraphic repetition was at once demanded. It has been received to-day (11th inst.), and shows that the words really telegraphed by Reuter's agent were, ‘Governor Queensland *turns first sod,*’ alluding to the Maryborough Gympic Railway in course of construction. The words in italics were mutilated by the telegraph in transmission from Australia, and reaching the company in the form mentioned above, gave rise to the mistake.”*

* *The Times*, March 12th, 1878.

PART III.

THE TELEPHONE

AND

PHONOGRAPH.



PART III.

THE TELEPHONE.

THE success which has attended the experiments with the Telephone, performed in this country by Professor Graham Bell within the past few months, in the transmission of articulate and musical sounds through tens and hundreds of miles of space, has roused universal attention to the latest, and, in some respects, most marvellous of modern scientific inventions. Scarcely a day passes in which one or more of our daily newspapers do not contain paragraphs relating to some new development or application of this extraordinary instrument. Now, we are told, the Telephone is in active practical operation over six hundred miles of Chinese territory ; and, again, that in Persia intelligible speech has been sent by its means over a wire five hundred miles in length. It may naturally excite surprise to learn that these two Oriental nations are in advance of Europe and

America in their adoption and working of the Telephone. And this is not all, for a question has just been raised as to whether the principle of the Telephone may not have been known in the East before it was discovered in Europe or America. With regard to this latter point, however, the evidence seems at present to be far from satisfactory. In a recently-published letter, Mr. William Chappell records a conversation he had with Captain C. H. A. Gower, of the Madras Staff Corps, in which that officer asserted that the Telephone was now in use in Burmah. "Seeing a native boy," writes Mr. Chappell, "holding something to his ear, and then taking it down to his mouth, Captain Gower's curiosity induced him to ascertain what the boy was holding. It was something so like the 'Eton Telephone' that, at my request, Captain Gower wrote down an account, giving me permission to make it known. His letter is dated January 13th. Referring to my paper in the *Athenæum*, he says: 'It has recalled to my mind a fact, viz., that the Burmans are well acquainted with the use of the Telephone. More than a year ago I found them using one in the town where I was then living, Maoobin, near Rangoon. The apparatus consisted of two short lengths of bamboo; one end of each was closed with strong paper, and the two were connected by a piece of strong cotton passing through the paper, retained in its place by a knot at each end. I

ascertained by experiment that this simple apparatus answered perfectly for a distance of 100 yards, sounds being conveyed without any apparent loss. The lowest whisper was heard quite distinctly." It is clear enough from this description that the Burman "Telephone" is quite as primitive an instrument as those sold for a copper or two during the past few months at the corners of the streets in London, and in several of our large provincial towns. That this simple contrivance has little or nothing to do with the Telephone need hardly be stated; but it may remind many persons of an experiment popular with British, and possibly also with Burmese boys, by which the ticking of a watch laid upon the one end of a long log of wood can be distinctly heard at the other by placing the ear close to it. It is to the application of electricity in the conveyance of sound that the marvellous performances of the Telephone are mainly due, and, in this respect, there is no evidence that any Oriental nation has excelled, or even equalled, the achievements of European and American savants. But in addition to the power of transmitting articulate speech, the tones of the human voice, and musical sounds, to any distance to which the necessary wires have been extended, which is claimed for the Telephone, it is asserted that by means of the most recent adaptation of the Phonograph, or Telephon-autograph, a message of any length can be

spoken on to a plate of metal, that plate be sent by post or otherwise to any part of the world, and the message respoken in the very voice of the sender, any time after the plate reaches its destination.

There is generally a good deal of dubiety and controversy in regard to important points connected with the history of most scientific inventions, and to this rule the Telephone is no exception. No complete narrative of the various stages of scientific discovery that have led up to the present position of the art of transmitting sound through space has yet been written, and it is clear that many of the principles involved are, as yet, only at best empirically, and not scientifically understood, even by the ablest of the electricians who have made a special study of the subject. As has already been indicated, the application of electricity to the conveyance of sound is merely the last step that has been taken to render that force useful to mankind. But before this object could be attained, much had to be accomplished, both in regard to the production and manipulation of electric currents, and to the analysis of vocal and musical sounds.

No adequate idea of the working of the Telephone can be formed by any one who is ignorant of the leading principles of the science of electro-magnetism. That the "loadstone," which is now recognized to be one of the ores of iron, and is called magnetite by

our mineralogists, possesses the power of attracting iron, and lifting a mass many times its own weight, was known from a very remote antiquity. In this ore, 72.5 per cent. of its weight consists of iron combined with oxygen; whereas in another ore, called hematite, there is but 70 per cent. of iron. This difference of $2\frac{1}{2}$ per cent. of iron is enough to make the difference between a magnetically inert mineral and one which may be able to lift a mass of iron many times its own weight. All magnetite, however, does not possess the property called magnetism. It is rare that large masses of it, such as the mountains of Lapland and the iron-mines of Sweden, display this power; and the most powerful natural magnets are found in Siberia, and in the Hartz mountains of northern Germany.

A discovery made by Professor Oersted of Copenhagen, in 1820, that if a properly balanced magnetic needle be placed immediately under and parallel with a wire along which a current of electricity is passing, that end of the needle which is situated next to the negative side of the battery immediately moves to the west; while if the needle is placed parallel to, and over the wire, the same pole moves to the east, led to the identification of magnetism and electricity. By this means a vast field of research was opened up, which was shortly occupied by such ardent and able investigators as Faraday, Ampère, and Schweyzer.

After a series of experiments it was permanently established that the neutral condition of bodies susceptible of magnetism is disturbed by the electrical current, and that the magnetism acquires extraordinary power when the current of electricity is made to circulate a number of times round the bar acted upon. A further step in advance was accomplished in 1825, when William Sturgeon of Woolwich discovered that if a copper wire is wound round a piece of soft iron, and a current of electricity sent through the wire, the soft iron becomes a magnet, but retains its magnetism only while the current of electricity is passing through the coil. The magnetism produced in this way is called electro-magnetism, and the iron so wound is called an electro-magnet. A further improvement was made in this process in 1830, by Professor Henry, of Princetown, New Jersey, who insulated the wire by covering it with silk, and, thereby, was the first to produce a very powerful magnet. The power of the electro-magnet is far greater than that of any permanent magnet. Mr. Joule, the celebrated physical philosopher, has, by skilful arrangement of the coils, produced electro-magnets capable of attracting and supporting thirty-five hundred times their own weight, or one hundred and forty times the proportionate load of Sir Isaac Newton's ring-magnet, which was a small loadstone weighing three grains, that had the power of lifting

seven hundred and fifty grains, or two hundred and fifty times its own weight. The power of imparting and withdrawing electro-magnetic force explains the whole mystery of telegraphic communication. For example, the teeth of a wheel may be attracted in succession, and so a rotatory motion produced; and it is evident that as the electric force may be transmitted through wires for any distance, a wheel or other apparatus at the extreme end of the line may be made to act sympathetically with a similar apparatus at the home end, by means of those transmitted "jerks," or alternate currents and stoppages. The fact that the earth itself, as is tolerably well known, is a huge electro-magnet with currents of electricity perpetually flowing round it, and having its poles, or the neighbourhood of its poles or ends at the axis of rotation,—the familiar north and south poles,—explains why one end of the magnetised steel of the mariner's compass always points to the north.

In some respects electricity differs from magnetism, although electricity induces magnetism, in the manner that has already been described. On this point Professor A. E. Dolbear, of Tuft's College, Massachusetts, United States, says—"We can come to but one conclusion, that both electricity and magnetism are but forms of motion; electricity being a form of motion in ordinary matter, for it cannot be made to pass through a vacuum, while magnetism must be a form

of motion induced in the ether, for it is as effective in a vacuum as out of it ; electricity always needing some material conductor, magnetism needing it no more than do radiant heat and light."

After it was discovered that through the electro-magnet broken currents of electricity could be sent through wires of great length, attempts were soon made to transmit signals by means of the alphabet. Electric shocks were reproduced at a distance of a mile or two by Wollaston in 1747, and by Franklin the year after. In 1799 Don Francisco Salva and Senor Batancourt sent similar messages by telegraph from Madrid to Aranjuez, a distance of about six-and-twenty miles, and shortly afterwards they suggested the substitution of the voltaic pile for frictional electricity. About the year 1810 Ampère proposed that the electro-magnet should be applied to the transmission of telegraphic signals, but his suggestion involved the use of thirty needles and sixty independent wires. Steinheil of Gottingen, in 1837, made a great advance upon all his predecessors in the construction of a practically useful telegraph. He used a wire twelve miles in length at the end of which signals were produced upon a series of bells of different tones that were readily intelligible to a cultivated ear ; and the same deflections that produced the sounds were also made to mark a ribbon of paper moved at a uniform, steady rate with ink

lines and dots. About this time careful experiments were being made both in England and America which soon led to the invention of a system of telegraphing, similar, in many respects, to that now generally employed. A brief summary of the future history of the electric telegraph is all that is necessary to our present purpose. It was in June 1837 that the late Sir Charles Wheatstone and Mr. Cooke took out their patent in England, and in October of the same year Professor Morse, of New York, secured a patent in the United States. Towards the close of the year 1838 the telegraph was for the first time practically brought into use in England, on the Great Western Railway, between Paddington and West Drayton; and Morse's system was first practically applied in 1844, between Washington and Baltimore.

A word or two on the modes of transmitting messages by Telegraph, adopted by several inventors, may help our readers to understand the working of the Telephone and the Telephone-autograph, the Telephone being in reality nothing else than a Speaking Telegraph. There is, indeed, considerable similarity in the method of working both instruments. From a recent publication of much merit, the following passages have been extracted :—

“At first Messrs. Wheatstone and Cooke employed five magnetic needles, and either five or six wires, with a peculiar keyboard, on which were arranged the

letters of the alphabet. After a time only one needle was employed, different letters being designated by the deflection of the needle to the right or to the left, one or more times, in either or both directions, the swinging of the needle being checked by small pins fixed on the dial, so that the motions were rendered precise and clear. Operators accustomed to the work do not require the lettered dials for reading the movements of the needle, and some can even read off a message transmitted at the rate of 100 letters a minute. This, however, is a remarkable feat both of transmission and reading; and the ordinary rate at which messages are sent is about 24 words a minute.

“The Morse system is very different. At the sending end is a voltaic battery, at the receiving end an electro-magnet, which, when the current passes, attracts an ‘armature,’ or piece of soft iron placed at the pole, by which, according to the duration of the current, dots or lines are marked with a steel point upon a moving slip of paper. At the sending end is an apparatus known as ‘the key,’ consisting of a small lever with a button at the end, on pressing which two platinum wires are brought into contact, and the shock is transmitted; but when the pressure is removed, a spring lifts the lever, separates the wires, and breaks the circuit. The paper on which the message is to be recorded, is carried between two rollers moved by clockwork. In one of these rollers

is a groove, into which the steel point presses the paper. When successive blows are struck on the key at the sending end, closing and opening the circuit quickly, corresponding dots appear on the paper; but, if the key be pressed down for a longer or shorter time, keeping the circuit closed, a continuous line of any desired length may be produced on the paper. Every letter of the English alphabet and every numeral has a sign; and there are also marks of punctuation. We need not give the entire alphabet, the signs for the first five letters being sufficient to exemplify the system:—

A — — , B — — — — , C — — — — , D — — — — , E — — — — ,
F — — — — .

“The word ‘Victoria’ thus transmitted would appear on the slip of paper at the receiving end in this fashion:—

--- — | -- | --- | — | -- | --- | -- | —

“We have inserted dividing lines between the letters for the sake of clearness, but they are not practically used. The skilled operator with the Morse instrument can read off the message as it arrives without looking at the marks on the paper, simply by listening to the ‘click’ which is made every time the circuit is completed or broken, and we are told ‘practice has taught him to rely on the evidence of his ears with as much confidence as one less accustomed to the work would trust his eyes;’ that is, his

cultivated ear enables him to estimate so correctly the length of the currents as indicated by the clicks that he knows what letters are being impressed on the paper."

Before proceeding to a description of the different Telephones that have been invented up to the present moment, it will be necessary to say a few words on the subject of sound, and thereby complete our survey of the three factors,—electricity, magnetism, and sound,—that are involved in Telephony.

"If," says Professor Dolbear, "I strike my pencil upon the table, I hear a snap that appears to the ear to be simultaneous with the stroke : if, however, I see a man upon a somewhat distant hill strike a tree with an axe, the sound does not reach me until some appreciable time has passed ; and it is noted, that, the farther away the place where a so-called sound originates, the longer time does it take to reach any listener. Hence sound has in air a certain velocity which has been very accurately measured, and found to be 1,093 feet per second when the temperature of the air is at the freezing point of water. As the temperature increases, the velocity of sound will increase a little more than one foot for every Fahrenheit degree ; so that at 60 degrees the velocity is 1,125 feet per second. This is the velocity in air. In water the velocity is about four times greater, in steel sixteen times, in pine-wood about ten times.

“If a person stands at a distance of fifteen or twenty rods from a cannon that is fired, he will first see the flash, then the cloud of smoke that rushes from the cannon’s mouth, then the ground will be felt to tremble, and lastly the sound will reach his ear at the same time that a strong puff of air will be felt. This puff of air is the sound wave itself, travelling at the rate of eleven hundred feet or more per second. At the instant of explosion of the gunpowder, the air in front of the cannon is very much compressed; and this compression at once begins to move outwards in every direction, so as to be a kind of a spherical shell of air constantly increasing in diameter; and, whenever it reaches an ear, the sound is perceived. Whenever such a sound-wave strikes upon a solid surface, as upon a cliff or a building, it is turned back, and the reflected wave may be heard; in which case we call it an echo. When a cannon is fired, we generally hear the sound repeated, so that it apparently lasts for a second or more; but when, as in the first case, we hear the sound of a pencil struck upon the table, but a single short report is noticed, and this, as may be supposed, consists of a single wave of condensed air.”

From the same writer we take the following on the limits of audibility: “Numerous experiments have been made to determine the limits of audible sounds; and here it is found that there is a very great differ-

ence in individuals in their ability to perceive sounds. Helmholtz states that about twenty-three vibrations per second is the fewest in number that can be heard as continuous sound; if they are fewer in number than that, the vibrations are heard as separate distinct noises, as when one knocks upon a door four or five times a second. If one could knock evenly twenty-three times per second, he would be making a continuous musical sound of a very low pitch. But this limit of twenty-three is not the limit for all: some can hear a continuous sound with as few as sixteen or eighteen vibrations per second, while others are as far above the medium as this is below it. The limits of sound in musical instruments are about all included in the range of a 7-octave pianoforte from F to F, say from forty-two to 5,460 vibrations per second. But this high number is not anywhere near the upper limit of audible sounds for man.

“Very many of the familiar sounds of insects, such as crickets and mosquitoes, have a much higher pitch. Helmholtz puts this upper limit at 38,000 vibrations per second, and Despraetz at 36,850. The discrepancy of results is due solely to the marked difference in individuals as to acoustic perception.”

The author we have just quoted also supplies us with these interesting remarks: “We may roughly divide all bodies into two classes, as to their relations to sound,—such as re-enforce it, and such as distribute

it: the first depending upon the form of the body, as related to a particular sound; the second independent of form, and responding to all orders of vibrations. Air, wood, and metals belong to this latter class. The common toy-string telegraph, or *lovers' telegraph*, is an example of this class. Two tin boxes are connected by a string passing through the middle of the bottom of each. When the string is stretched, and a person speaks in one box, what is said can be heard by an ear applied at the other. If the speaking-tubes be made about four inches in diameter, and about four inches deep, they are capable of doing much more service than is generally supposed to be possible. I know of two lines, one of five hundred feet and the other of a thousand feet in length, over which one can talk, and be heard with distinctness. In the line of a thousand feet, the end of the tube is made of sheepskin tightly stretched, and the line is made of No. 8 cotton thread. The greater the tension, the better is the sound transmitted. The thread is supported at intervals by running through a loop on the ends of cords not less than three feet long, attached to supports. The thread pierces the membrane, and is attached to a small button which is in contact with the membrane. Wind and rain affect this line disadvantageously. The other line of five hundred feet, between a passenger and a freight depôt, has the tube end covered with stretched calfskin. Instead of thread,

a copper relay wire is employed (any small uninsulated wire will do as well). This permits a good tension, and is unaffected by the weather. One may stand in front of it about three feet, and converse with ease, and in an ordinary tone. The wire is supported in loops of string, as in the other."

Helmholtz, the great German physicist, who has, perhaps, done more than any other man, living or dead, in the analysis and synthesis of sound, found it necessary in some of his experiments to maintain the vibrations of a tuning-fork for a considerable time. The means by which he effected this are thus briefly explained by Professor Dolbear: "By placing a short electro-magnet between the prongs of the fork, and affixing a platinum point at the end of one prong in such a manner, that, as the prong descended in its vibration, the platinum point dipped into a small cup of mercury that completed the circuit. When the prong receded, it was of course withdrawn from the mercury, and the current was broken. As it is not possible for a tuning-fork to vibrate in more than one period, such an arrangement would evidently make and break the current as many times per second as the fork vibrated. When, therefore, such an interruptor is inserted in the circuit with the click rod on its resonant box, the latter must give out just such a sound as the fork is giving. With such a device, it is possible to reproduce at almost any distance in a

telegraphic circuit, a sound of a given pitch. It is therefore a true telephone."

There are a good many of the details of the early history of the true Telephone—*i.e.*, the instrument for the transmission of sound by means of electro-magnetism—that remain to be settled; but much is known, and the story is highly interesting. Although it is contended by many savants that Wheatstone's researches on the *transmission* of sound differ radically from the modern electro-magnetic *reproduction* of sound, it may safely be asserted that the learned and able electrician's acoustic discoveries and musical inventions,—which were chiefly made between the years 1825 and 1835,—contributed greatly to the progress of the art. Another important step was the discovery made in 1837, by Professor C. G. Page, of Salem, Massachusetts,—whose paper on "The Production of Galvanic Music" is well known and much appreciated by all students of the branch of science to which it belongs,—that when a bar of iron, say a foot or more in length, and half-an-inch or more in diameter, which has been made a temporary magnet through being acted upon by an electric current, loses its magnetism through the current from the battery being broken, it emits a single *click*. This is occasioned by a molecular movement which results in a *change of length* of the bar. When it is made a magnet it elongates about $\frac{1}{25000}$ th of its length; and

when it loses its magnetism it *suddenly* regains its original length; and this change is accompanied by the sound. Professor Page also invented a device for breaking such a circuit of magnetism more than fifteen or sixteen times per second, and thereby succeeded in transmitting a continuous sound with a pitch depending upon the number of clicks per second.

There is some dispute among scientific men as to the exact share that Sir Charles Wheatstone had in the development of the Telephone. In a letter to the *Times* the other day, Mr. A. Scott says:—"Wheatstone's experiments had nothing to do with electricity, but consisted of what we know as the conveyance of sound by mechanical vibration," such as is seen in the familiar toy Telephone. We, however, believe that this is an under-estimate altogether of Wheatstone's position. The account written by Mr. William Chappell of an exhibition given by that savant before the Royal Society on the 26th November, 1840, at which he was himself present, asserts that—"knowing already the transmissibility of delicate musical sounds through rods, it was an easy step for him to convey the tick of a clock through wire in his electro-magnetic clock." This he described as "an instrument . . . which shall indicate the time and beat dead sounds audibly." An amusing story is told in connection with this invention.

An eminent foreign performer on the violoncello came to England, bringing a letter of introduction to Wheatstone. He left the letter at the house, and appointed to call at a particular hour on the following day. Wheatstone was at home to receive him, and, thinking to surprise and amuse his visitor, hung a violoncello on the wall of the passage, having a rod behind it to connect it with another, which was to be played from within when he entered the hall. The guest turned in every direction to find whence the sounds came, and, at last, approaching the violoncello hanging on the wall, and, having satisfied himself that they proceeded from it, although there was neither hand nor bow to play upon it, he rushed out of the house in affright, and would never enter it again! Wheatstone also made the invention a source of domestic amusement, by fitting up a lyre in a small boudoir, connecting it by a rod through the ceiling with a pianoforte in the room above, and his daughter was wont to amuse friends by playing unseen on the piano by means of the apparatus below.

Referring to the exhibition on the 26th November, 1840, Mr. Chappell says:—"Having seen a huge coil of wire in the well of the staircase on entering Somerset House on that evening, after I had attended the meeting of the Society of Antiquaries, I went up to the library and tea-room of the Royal Society to learn what had been going on. Wheatstone pointed

out to me a clock-face in the room. It was perfectly transparent, and had hands, but every one could see that there were no works within it. Yet the hands moved, and the clock-face ticked most audibly. He took me out on the staircase to hear the perfect simultaneity and the equal force of the tick with that of the clock in the hall below. It was the sound of that clock which had been conveyed through a coil of wire of some miles in length to the clock-face in the library on high. The sound above and the sound below were in perfect unison, and of absolute equality in force as well as of pitch. As this was the first electric clock, so Wheatstone was the first to employ the electric wire for the transmission of sounds, as well as to transmit them by rods without the use of electricity. After him, it became so much a matter of common sense that other kinds of sounds could be conveyed with or without the electric wire, that the Telephone has always appeared to me as the useful application of a well-known principle, rather than as an absolute novelty."

On the 10th of May, 1855, a similar exhibition to that just described took place before Her Majesty the Queen, at the Polytechnic Institution, of which the only account that has been reproduced is that given by Mr. C. K. Salaman, in a letter to the *Choir* :—

"1. Lecture by J. H. Pepper, Esq., on Professor Wheatstone's experiments on the transmission of

musical sounds to distant places, illustrated by a Telephone concert, in which sounds of various instruments pass inaudible through an intermediate hall, and are reproduced in the lecture room, unchanged in their qualities and intensities.

"2. A series of ancient keyed stringed instruments, including virginals, harpsichords, &c., will be performed on, and explained by Mr. Salaman.

"3. Ruhmkorff's coil will be kindly explained by Dr. Faraday, F.R.S.

"4. The stereoscope and pseudoscope will be kindly explained by Professor Wheatstone, F.R.S."

To this Mr. Salaman adds :—

"The small theatre of the Institution was turned into an elegantly-furnished saloon, for the use of the Queen, Prince Albert, the Duke of Saxe-Coburg Gotha, and suite. The Royal party occupied state chairs in the centre of the theatre. The platform was almost filled with specimens of virginals, harpsichords, and spinets, of various ages and forms, besides which was an ordinary harp, to the sounding-board of which a thin wooden rod of great length was attached. This communicated with an apartment at the lowest part of the Institution, in which were placed the instrumentalists, who performed some orchestral pieces of music, which were distinctly heard in the theatre above. Professor Pepper explained briefly to Her Majesty the principle upon

which sounds were transmitted through wood, and also showed successfully some experiments with tuning-forks."

In 1861 Professor Reis, of Friedrichsdorf, near Homburg, Germany, succeeded in constructing an apparatus, the distinctive feature of which was a stretched membrane vibrating to a particular pitch or note. By his instrument a melody could be reproduced at a distance with distinctness, but the sounds were low, and they had besides a tin-trumpet quality. Of this apparatus Professor Barrett said, in a lecture recently delivered:—"The first Telephone was of a most primitive nature. The originating instrument was a bung of a beer barrel hollowed out, and the cone formed in this way was closed with the skin of a German sausage, which did service as a membrane. To this was fixed with a drop of sealing-wax a little strip of platinum, representing the hammer of the ear, and which 'made' or 'broke' the electric circuit, precisely as in the instruments of a later date. The receiving instrument was a knitting-needle surrounded with a coil of wire and placed on a violin to serve as a sounding-board."

Mr. Thomas A. Edison, of Manlowe Park, New Jersey, U.S.A., an eminent engineer, whose name has now become famous throughout the world as the inventor of the Phonograph or Phonautograph,—of which we shall give an account further on,—con-

structed a Telephone which, we understand, only attained a limited measure of success. Reis's apparatus was greatly improved about the same date by Mr. Elisha Gray, of Chicago. His apparatus, which has been called a Telephonic Piano, because it can only transmit the sounds of that instrument, conveyed the playing of a performer at Philadelphia to an audience at New York, a distance of ninety miles. In the spring of 1877, several public performances were held in America with this instrument. During one of these the apparatus transmitted the music from Chicago to Milwaukie, eighty-seven miles distant, the tunes played being, "The Last Rose of Summer," "Yankee Doodle," "The Sweet By-and-by," and "Home, Sweet Home." At another performance the distance accomplished was 284 miles, from Chicago to Detroit.

A writer on these performances in *Chambers's Journal*, says that "two instruments are required, a transmitter and a receiver. There is a keyboard of two octaves (available, therefore, only for simple melodies), a tuning-bar, an electro-magnet, and an electric circuit. The play on the keys with the fingers produces vibrations, thuds, molecular movements, in rhythmical succession; these are transmitted by the electric wire to the receiving apparatus at the other end. This receiving apparatus is a large sounding-box, on which is mounted an electro-magnet. The

box intensifies the sounds by its sonorousness, through the medium of the slight touches which the magnetised iron gives to the box at every expansion or elongation which the electro-magnetism gives it. Delicate experiments have shown that there is a minute difference in the length of a bar of iron when magnetised and demagnetised, and Mr. Gray appears to have taken advantage of this property in causing his magnetised bar to give a succession of taps to the resonant box."

It was at the great Centennial Exhibition held at Philadelphia in the autumn of 1876, that the Telephone invented by Professor Alexander Graham Bell was first publicly shown, and at the same time its inventor first gave a public exhibition of its powers. Reis's apparatus, which is essentially and radically different from the Telephone of Mr. Bell, was also on view at the same time in the Centennial Exhibition. The testimony borne to the value of Mr. Bell's invention by the celebrated physicist Sir William Thomson and others in their official report, immediately roused the interest of nearly the whole population of Europe in the Telephone, and ever since that interest has steadily and rapidly increased. An extract from that document may very appropriately precede an account of Mr. Bell's labours in this field, and a description of his apparatus:

"Mr. Alexander Graham Bell exhibits an apparatus

by which he has achieved *a result of transcendent scientific interest*—a transmission of spoken words by electric currents through a telegraph wire. To obtain this result, Mr. Bell perceived that he must produce a variation of strength of current as nearly as may be in exact proportion to the velocity of a particle of air moved by the sound; and he invented a method of doing so—a piece of iron attached to a membrane, and then moved to and fro in the neighbourhood of an electro-magnet—which proved perfectly successful. The battery and wire of this electro-magnet are in circuit with the telegraph wire and the wire of another electro-magnet at the receiving station. The second electro-magnet has a solid bar of iron for core, which is connected at one end by a thick disc of iron to an iron tube surrounding the coil and bar. The free circular end of the tube constitutes one pole of the electro-magnet, and the adjacent free end of the bar core the other. A thin, circular iron disc held pressed against the end of the tube by the electro-magnetic attraction, and free to vibrate through a small space without touching the central pole, constitutes the sounder by which the electric effect is reconverted into sound. With my ear pressed against the disc, I heard it speak distinctly several sentences. . . . I need scarcely say I was astonished and delighted. So were others, including some judges of our group, who witnessed the experiments, and verified with

their own ears the electric transmission of speech. This, *perhaps the greatest marvel hitherto achieved by the electric telegraph*, has been obtained by appliances of quite a homespun and rudimentary character. *With somewhat more advanced plans and more powerful apparatus, we may confidently expect that Mr. Bell will give us the means of making voice and spoken words audible through the electric wire to an ear hundreds of miles distant."*

On his return to England from the Centennial Exhibition at Philadelphia, Sir William Thomson declared that the telephone there exhibited by Professor Bell was "the greatest by far of all the marvels of the electric telegraph." According to Professor Dolbear, this instrument "was the first speaking Telephone that was ever constructed," but it was not a practicable instrument. Many sounds were not reproduced at all, and, according to the report of the judges, "one needed to shout himself hoarse in order that he might be heard at all." It has several times been stated of late that this gentleman claims to have been the first inventor of the speaking Telephone in which magneto-electric currents were used; and in the lecture delivered by Professor Bell before the Society of Telegraphic Engineers, at a meeting held in Great George Street, Westminster, on the 31st October, 1877, occurs a sentence in which he says that that gentleman "not only claims to have discovered the

magneto-electric Telephone, but I understand charges me with having obtained the idea from him through the medium of a mutual friend." There can be no doubt that Professor Dolbear claims the independent invention of a magneto-electric Telegraphone, for he states in a recently-published pamphlet that he constructed his telephonic apparatus "without the slightest knowledge of the mechanism which Professor Bell had used."

Professor Alexander Graham Bell is the son of Mr. Alexander Melville Bell—for many years a teacher of elocution in the metropolis of Scotland, and who made a wide reputation in this country through the invention of the system known as "visible speech,"—and was born at Edinburgh in 1847. About the year 1873 Professor Bell went to Montreal, Canada, with his father, and was there employed for some time in teaching deaf mutes to speak, by means of his father's system of "visible speech." It may be explained that deaf mutes are mute because of their deafness, and not from any defect in their vocal organs; and Mr. Bell's system teaches them through the eye how to use the vocal organs in uttering language, and how to read what another person is saying by the motions of the lips. So successful were Mr. Bell's labours that he was appointed to teach his system in a large school for mutes at Boston, and this post was shortly after transferred to his son, through whose efforts it is said that

there are now in America some three thousand deaf mutes who can speak almost as well as those who hear. This wonderful achievement led to Mr. Graham Bell's appointment as Professor of "Vocal Physiology" in the University of Boston, in 1873. The researches into acoustics and sound, a love for which had descended to him from his grandfather as well as his father, undoubtedly paved the way in some measure to his discovery of "one of the most interesting of the scientific inventions made in this century, or that has ever been made in the history of science."

Of Professor Bell's earlier efforts to conceive and produce a practicable telephonic apparatus, he gives us some account in his lecture before the Society of Telegraphic Engineers, from which we have already made a quotation. "Many of those present," he said, "may recollect the invention by my father of a means of representing, in a wonderfully accurate manner, the positions of the vocal organs in forming sounds. Together we carried on quite a number of experiments, seeking to discover the correct mechanism of English and foreign elements of speech, and I remember especially an investigation in which we were engaged concerning the musical relations of vowel sounds. When vowel sounds are whispered, each vowel seems to possess a particular pitch of its own, and by whispering certain vowels in succession, a musical scale can be distinctly perceived. Our aim

was to determine the natural pitch of each vowel ; but unexpected difficulties made their appearance, for many of the vowels seemed to possess a double pitch—one due, probably to the resonance of the air in the mouth, and the other to the resonance of the air contained in the cavity behind the tongue, comprehending the pharynx and larynx. I hit upon an expedient for determining the pitch which at that time I thought to be original with myself. It consisted in vibrating a tuning-fork in front of the mouth while the positions of the vocal organs for the various vowel sounds were silently taken. It was found that each vowel position caused the reinforcement of some particular fork or forks. I wrote an account of these researches to Mr. Alex. J. Ellis of London. In reply he informed me that the experiments related had already been performed by Helmholtz, and in a much more perfect manner than I had done. Indeed, he said that Helmholtz had not only analyzed the vowel sounds into their constituent musical elements, but had actually performed the synthesis of them. He had succeeded in producing, artificially, certain of the vowel sounds by causing tuning-forks of different pitch to vibrate simultaneously by means of an electric current. . . . While reflecting upon the possibilities of the production of sound by electrical means, it struck me that the principle of vibrating a tuning-fork by the intermittent attraction of an electro-magnet might be

applied to the electrical production of music. I imagined to myself a series of tuning-forks of different pitches, arranged to vibrate automatically in the manner shown by Helmholtz, each fork interrupting at every vibration a voltaic current ; and the thought occurred, 'Why should not the depression of a key like that of the piano direct the interrupted current from any one of these forks, through a telegraph wire, to a series of electro-magnets operating the strings of a piano or other musical instrument, in which case a person might play the tuning-fork piano in one place and the music be audible from the electro-magnetic piano in a distant city?' The more I reflected upon this arrangement the more feasible did it seem to me ; indeed, I saw no reason why the depression of a number of keys at the tuning-fork end of the circuit should not be followed by the audible production of a full chord from the piano in the distant city, each tuning-fork affecting at the receiving end that string of the piano with which it was in unison. At this time the interest which I felt in electricity led me to study the various systems of telegraphy in use in this country and in America. I was much struck with the simplicity of the Morse alphabet, and with the fact that it could be read by sound. Instead of having the dots and dashes recorded upon paper, the operators were in the habit of observing the duration of the click of the instruments, and in this way were

enabled to distinguish by ear the various signals. It struck me that in a similar manner the duration of a musical note might be made to represent the dot or dash of the telegraph code, so that a person might operate one of the keys of the tuning-fork piano referred to above, and the duration of the sound proceeding from the corresponding string of the distant piano be observed by an operator stationed there. It seemed to me that in this way a number of distinct telegraph messages might be sent simultaneously from the tuning-fork piano to the other end of the circuit, by operators each manipulating a different key of the instrument. These messages would be read by operators stationed at the distant piano, each receiving operator listening for signals of a certain definite pitch, and ignoring all others. In this way could be accomplished the simultaneous transmission of a number of telegraphic messages along a single wire, the number being limited only by the delicacy of the listener's ear. The idea of increasing the carrying power of the telegraph wire in this way took complete possession of my mind, and it was this practical end that I had in view when I commenced my researches in electric telephony."

In this same discourse Professor Bell goes on to relate the course of his studies regarding the acoustic effects produced by magnetization which were carefully studied by Marrian, Beatson, Gassiot, De La

Rive, Manteucci, Guillemin, Werthem, Wartmann, Jannier, Joule, Laborde, Legat, Ries, Poggendorf, De Moncel, Delezenne, and others. He then states that for several years his attention was almost exclusively directed to the production of an instrument for making and breaking a voltaic current with extreme rapidity, to take the place of the transmitting tuning-fork used in Helmholtz's researches, and proceeds to describe one of the best of the instruments he devised. Of the second form of articulating telephone, by which he was then producing undulatory electricity, for the purpose of conveying musical tones, he gives the following interesting account :—"It was attached to one pole of an electro-magnet, and magnetized by means of a battery current. A current being passed through the coils of the magnet, this piece of iron became magnetic, and a rod attached to one pole would of course become magnetic also, as if attached to a permanent magnet, so that, on vibrating this rod in any way whatever, the battery current was put in operation, and the corresponding rod at the other end thrown into vibration. I, therefore, took this apparatus, and instead of clamping the rod firmly, it was attached loosely to one extremity of the magnet, and the other end was attached to a stretched membrane of goldbeater's skin ; and the same at the other end. The idea was that on speaking to this membrane, it would be thrown into vibration, and cause the vibra-

tion of the piece of iron, that in fact the iron would follow the motion of the membrane, that is, of the particles of air; it would, therefore, induce an undulatory current of electricity the intensity of which would vary with the motion, and at the other end the intensity of the magnetic attraction would vary in a similar way; so that the piece of iron at the other end, being attracted and repelled in a varying manner, would be thrown into vibration, copying the motion of the first, and it in turn would cause the motion of a second stretched membrane, which would move the air in the neighbourhood, and we should thus have a sound produced. The idea was, that not only would the two pieces of iron vibrate together, but the form of the vibration would be the same, so that on speaking in the neighbourhood of one membrane we should have a fac-simile of the sound produced at the other end. The apparatus was constructed, but the results were rather unsatisfactory. My friend, Mr. Thomas Watson, who assisted me, however, asserted that he could hear a very faint sound proceed from the second membrane when I spoke in the neighbourhood of the first. Encouraged by this fact I varied the apparatus in a number of ways, and eventually produced three distinct forms of apparatus, which were exhibited at the Centennial Exhibition. I came to the conclusion that this piece of iron was probably rather too heavy to be set in vibration by the membrane, and I there-

fore made it as light as possible ; in fact, I took a piece of steel spring, only about the size of the pole of the electro-magnet itself, and glued it to the centre of the membrane. Upon constructing two of these instruments, there was no mistake at all that articulate speech was produced ; but it was of a very imperfect nature. When a person spoke or sung into one of these instruments, you could distinctly hear the tones of the speaker's voice at the other end, and could recognize that there was articulation there, and when you knew the sentence that was uttered, you could recognize the articulation, and it seemed strange that you could not understand what it was at first. The vowel sounds seemed to be copied very fairly, but the consonant sounds were entirely alike."

It was an instrument like this that Mr. Bell sent to the Centennial Exhibition at Philadelphia, and it need hardly be said that he was surprised as well as gratified at the enthusiastic encomiums pronounced upon it by Sir Wm. Thomson and the other judges who signed the official report that has already been cited. Encouraged by this verdict, Professor Bell persevered in his experiments, and on the 9th October, 1876, the first conversation ever carried on over a telegraphic wire took place. At both ends of a telegraph wire extending from the office of the Walworth Manufacturing Company at Boston to their factory in Cambridge-port, a distance of about two miles, telephones

were placed ; and the articulation transmitted through the wire, which was at first faint and indistinct, after a time became quite loud and intelligible. On February 12th of the following year, a public exhibition of Bell's Telephone was given in Salem, eighteen miles from Boston, before an audience of 500 persons. Mr. Bell was posted at the Salem end of the town, and Mr. Watson, with assistance, at the Boston end. At the latter town a telephonic organ was put in operation, which played "Should auld acquaintance be forgot" and "Yankee Doodle," to the delight and astonishment of the audience in Salem. Next Professor Bell asked Mr. Watson for a song, and "Auld Lang Syne" was transmitted back to him almost instantly by wire. In the course of the proceedings a speech was delivered by Mr. Watson which was distinctly heard thirty-four feet from the instrument that received it, and the applause of the audience in Salem at the close of the experiments was at once acknowledged by Mr. Watson in Boston. It is said that the results of these experiments were "telephoned" to the *Boston Guide*, and that the despatches are the first ever sent to the press by this novel agency.

From an account of Bell's telephone published in the *Times* before the close of last year, we learn that now more than 500 houses in New England hold telephonic communication, and more than 6,000 Telephones are in operation in the United States. Gentlemen in

their libraries give orders to clerks in their offices, fire-brigades have called the Telephone into requisition, and it is used extensively in the mines of Pennsylvania, Nevada, and California. In fact, the invention has passed out of the region of speculation, and ingenious minds are constantly finding new work for it to do. Its application in diving is an accomplished fact. The size of the Telephone-box is of no consequence, and a complete instrument may be made not larger than the palm of the hand. This is easily attached to the diver's armour in a way to allow him at any time to speak with his assistants above. In the same article from which we have just quoted, it is said that during certain experiments made at a mine near Liverpool, since the arrival of Professor Bell in this country, Sir William Thomson gave a short lecture on the Telephone to a double audience—one being in the mine and the other in the office—expressing his amazement at the great improvement which the instrument had undergone since first tested by him at Philadelphia in the presence of the Emperor of Brazil.

With regard to the power of the Telephone, Professor Bell says, at the close of the lecture he delivered before the Society of Arts on the 30th November last year :—

“Of course the question will naturally arise, how far can it be possible to use the instruments? That as yet we do not know. The limit has not been

found. In laboratory experiments no difficulty has been found in using an apparatus of this construction through a circuit equivalent to 6,000 miles. In this instrument we have a powerful compound permanent magnet. The longest actual wire I have been able to experiment upon has been 258 miles in length, and no difficulty was experienced so long as the other parallel wires were not in operation. The instrument is wonderfully sensitive to inductive influences, and when you use a wire upon the poles with other wires you have the benefit of the other messages that are passing along the other wires on the Telephone. However, means have been discovered very recently by which the inductive influence of other wires can be overcome and neutralised, so that I hope we may have the instrument in use upon circuits of all lengths.

“I do not know that there are any other points that I should like to mention to you to-night, excepting a new application that is shown here to a diving apparatus. Inside the diver's helmet you place a Telephone of convenient structure, and in the place of using a separate telegraph wire, we use the wire that is coiled up inside the breathing pipe. In every breathing pipe of course there must be a coil of wire, in order to withstand the pressure of the water, and that wire we find can be used for the purposes of the Telephone, so that the wire inside this pipe is connected with the Telephone inside the diver's helmet,

and the earth connection is simply made by attaching the other wire to the helmet itself, which is in contact, outside, with the salt water. I had the pleasure of conversing with a diver yesterday, with perfect success, at Messrs. Siebe and Gorman's, in a tank. He heard every word I said, and I was able to understand every word he said ; and when I told him to come up, by word of mouth, he obeyed me. I do not know that there are any other points of interest to you, but I shall be very happy to attempt to answer any questions that may be put."

Among the most noteworthy experiments that have taken place in this country with Bell's Telephone, is that which occurred on Monday evening, the 14th of January, 1878, when Professor Bell and Colonel Reynolds were presented to the Queen, at Osborne House, Isle of Wight, and exhibited the Telephone, being assisted by Mr. C. Wolleston. Professor Bell explained the mechanism of his invention, and then held Telephonic communication with Osborne Cottage, the residence of Sir Thomas Biddulph. Her Majesty conversed with Sir Thomas and Lady Biddulph, and later Miss Kate Field, who was at Osborne Cottage, sang "Kathleen Mavourneen," for which Her Majesty returned thanks telephonically through the Duke of Connaught. Miss Field afterwards sang Shakespeare's "Cuckoo Song" and "Comin' thro' the Rye," and delivered the epilogue

to *As You Like It*, all of which were heard distinctly. The applause which followed came through the Telephone. The Princess Beatrice, the Hon. Mrs. Ponsonby, and others conversed with Osborne Cottage, sometimes through a circuit of one, three, and five persons. As the evening wore on telephonic connection was established between Osborne House and Cowes, Southampton, and London. At Cowes, where Major Webber, of the Royal Engineers, superintended the line, a quartet of tonic-sol-fa singers sang several part songs, which produced an admirable effect, and the Duke of Connaught talked for several minutes with Major Webber. Attention was then turned to Southampton, where Mr. W. H. Preece, of the Post-office, talked as fluently with Professor Bell and Colonel Reynolds as though he were in the next room. A bugle in Southampton sounded the retreat with startling distinctness; and, lastly, came the tones of an organ from London, in charge of Mr. Wilmot. Cheering and laughing in London were heard, the distance being 80 miles. The experiments lasted from half-past nine until nearly midnight. Her Majesty, the Princess Beatrice, the Duke of Connaught, and the entire Royal household evinced the greatest interest. On the following morning, Professor Bell made very successful experiments between Cowes, Osborne House, and Osborne Cottage, at which the Princess Beatrice, the Duke of Connaught,

the Duke of Richmond, Lord John Manners, Lord Ripon, Lady Biddulph, Lady Cowell, Sir John Cowell, and others assisted.

The following correspondence has since passed between Sir Thomas Biddulph and Professor Bell :—

“ OSBORNE, *January 16th, 1878.*

“ My Dear Sir,—I hope you are aware how much gratified and surprised the Queen was at the exhibition of the Telephone here on Monday evening. Her Majesty desires me to express her thanks to you, and the ladies and gentlemen who were associated with you on the occasion. The Queen would like, if there is no reason against it, to purchase the two instruments still here, with the wires attached. Perhaps you will be so kind as to let me know, and when the sum due shall be paid. With many thanks,

“ I am, my dear Sir,

“ Very faithfully yours,

“ THOS. BIDDULPH.”

Professor Bell returned this answer :—

“ 57, WEST. CROMWELL ROAD, KENSINGTON,

“ *January 18th.*

“ Dear Sir,—I feel highly honoured by the gratification expressed by Her Majesty, and by her desire to possess the Telephones. The instruments at present at Osborne are merely supplied for ordinary com-

mercial purposes, and it will afford me much pleasure to be permitted to offer to the Queen a set of Telephones made expressly for Her Majesty's use.

"Your obedient servant,

"ALEXANDER GRAHAM BELL."

A portion of the debate in the House of Commons and of the Parliamentary Summary was transmitted by means of the Telephone, through the ordinary telegraphic wires from the gallery of the House of Commons to the office of the *Daily News*, in Bouverie Street, Fleet Street, and published in that journal on Wednesday, the 23rd of January, 1878.

We also see it announced that the Persian Ambassador has sent several messages by Telephone to the Shah. The distance between London and Teheran (about 2,500 miles) is, we believe, the greatest distance yet achieved in actual communication.

THE PHONOGRAPH.

Wonderful as are the achievements of the Telephone, however, another instrument recently invented must be pronounced to be equally, if not more, wonderful. This is the Phonograph, Phonautograph, or Tele-Phonograph, devised by Mr. Edison, of New Jersey, by which the voice can be impressed on a thin slip of metal, and sent to any part of the world,

where, on its arrival, the sounds may be again reproduced. From an account of this amazing invention, published in the *Times* on the 15th of January last, we take the following description of this instrument :—

“ The Phonograph is composed of three parts mainly—namely, a receiving, a recording, and a transmitting apparatus. The receiving apparatus consists of a curved tube, one end of which is fitted with a mouth-piece, for the convenience of speaking into it. The other end is about two inches in diameter, and is closed in with a disc or diaphragm of exceedingly thin metal, capable of being thrust slightly outwards or vibrated upon gentle pressure being applied to it from within the tube. To the centre of this diaphragm—which forms a right angle with the horizon—is fixed a small blunt steel pin, which, of course, partakes of the vibratory motion of the diaphragm. This arrangement is carried on a table, and is fitted by a set screw, by means of which it can be adjusted relatively to the second part of the apparatus—the recorder. This is a brass cylinder, about four inches in length and four inches in diameter, cut with a continuous V groove from one end to the other, so that it in effect represents a large screw. Measuring along the cylinder from one end to the other, there are ten of these grooves to the inch, or about forty in the whole length. The total length of this continuous groove, or screw-thread, is about forty-two feet—that

is to say, that would be the length of the groove if it were stretched out in a straight line. This cylinder is mounted on a horizontal axis or shaft carried in bearings at either end, and having its circumferential face presented to the steel point of the receiving apparatus. The shaft is prolonged for four inches or so beyond the ends of the cylinder, and one of the prolongations is cut with a screw-thread, and works in a screwed bearing. This end terminates in a handle; and as this is turned round the cylinder is not only revolved, but, by means of the screwed spindle, is caused to travel its whole length in front of the steel point, either backwards or forwards.

“We now see that if the pointer be set in the groove in the cylinder at its commencement, and the handle turned, the groove would be traversed over the point from beginning to end, or, conversely, the point would always be presented to the groove. A voice speaking in the receiver would produce waves of sound which would cause the point to enter to greater or less depths into this groove, according to the degree of intensity given to the pressure upon the diaphragm set up by the vibrations of the sound produced. This, of course, of itself would mean nothing; but in order to arrest and preserve these sound-pressures, a sheet of tinfoil is interposed, the foil being inelastic and well adapted for receiving impressions. This sheet is placed around the cylinder and its edges lightly

fastened together by mouth-glue, forming an endless band, and held on the cylinder at the edges by the india-rubber rings. If a person now speaks into the receiving tube and the handle of the cylinder be turned, it will be seen that the vibrations of the pointer will be impressed upon that portion of the tinfoil over the hollow groove and retained by it. These impressions will be more or less deeply marked according to the modulations and inflexions of the speaker's voice. We have now a message verbally imprinted upon a slip of metal. Sound has, in fact, been converted into visible form, and we have now to translate that message by reconverting it into sound. We are about, in effect, to hear our own voice speaking from a machine the words which have just fallen from our lips. To do this we require the third portion of Mr. Edison's apparatus—the transmitter.

“This consists of what may be called a conical metal drum, having its larger end open, the smaller end, which is about two inches in diameter, being covered with paper, which is stretched taut as is the parchment of a drum-head. Just in front of this paper diaphragm is a light flat steel spring, held in a vertical position and terminating in a blunt steel point projecting from it, and corresponding with that on the diaphragm of the receiver. The spring is connected with the paper diaphragm of the transmitter by means of a silken thread, which is placed just

sufficiently in tension to cause the outer face of the diaphragm to assume a slightly convex form. This apparatus is placed on the opposite side of the cylinder to the receiver. Having set the latter apparatus back from the cylinder, and having, by turning the handle in a reverse direction, set the cylinder back to what we may term the zero point, the transmitting apparatus is advanced towards the cylinder by means of a set screw until the steel point rests without absolute pressure in the first indentation made by the point of the receiver. If now the handle be turned at the same speed as it was when the message was being recorded, the steel point will follow the line of impression and will vibrate in periods corresponding to the impressions previously produced on the foil by the point of the receiving apparatus. Vibrations of the requisite number and depth being thus communicated to the upper diaphragm, there will be produced precisely the same sounds that in the first instance were required to produce the impressions formed on the tinfoil. Thus the words of the speaker will be heard issuing from the conical drum in his own voice, tinged, however, with a slight metallic or mechanical tone. If the cylinder be revolved more slowly than when the message was being recorded, the voice assumes a bass tone; if more quickly, the message is given with a childish treble. These variations occur according as the vibrations are more or less frequent.

“Such is the apparatus, and it promises to be one of the most remarkable of the recent marvels of science. The machine we have described is the first Mr. Edison has made, but he is now constructing one to be set in motion by clockwork, the cylinder being sixteen inches long. In the present machine, for recording a long message, as soon as one strip of the tinfoil is filled it is removed and replaced by others until the communication has been completed. In using the machine for the purpose of correspondence, the metal strips are removed from the cylinder and sent to the person with whom the speaker desires to correspond, and who must possess a machine similar to that used by the sender. The person receiving the strips places them in turn on the cylinder of his apparatus, applies the transmitter, and puts the cylinder in motion, when he hears his friend's voice speaking to him from the indented metal. And he can repeat the contents of the missive as often as he pleases until he has worn the metal through. The sender can make an indefinite number of copies of his communication by taking a plaster of Paris cast of the original strip and rubbing off impressions from it on a clean sheet of foil. It will thus be seen, as we stated at the commencement of this article, that the voices of those who have left us, either for ever or for a season only, can be heard talking with us if we so desire it. The invention has been so recently and so quickly developed into exist-

ence by Mr. Edison that he himself can hardly say what its practical value is or will prove to be. Numerous applications suggest themselves, but beyond those to which we have alluded it is difficult to say with precision how they would work out in practice. In cases of depositions it might be of the highest importance to have oral evidence mechanically reproduced in a court of justice. Authors, too, may perhaps be saved the trouble of writing their compositions."

It is believed that, owing in some measure to the heavy royalty added to the price of the instrument in England, the Telephone is not making way in this country so rapidly as in America and Germany. We have already said something regarding its extension in the United States, and we learn that it is being quickly and widely adopted in Germany, where there is no patent. There is a firm in Berlin at the present moment who occupy some 100 men exclusively in the manufacture of Telephones. Prince Bismarck's study in his residence at Varzin, Pomerania, is connected with the Chancellor's office at Berlin, 230 miles distant, by telephone. Referring to this fact, a recent writer says :—"The wire along which the Chancellor speaks is an ordinary air-line erected on posts, and when we consider the state secrets which may pass over it any day, and how easily they could be tapped by another telephone, one is tempted to become an

eavesdropper to the great statesman's momentous utterances."

Whether the time is at hand when our Sims Reeves, Madame Nilssons, Joachims, Arabella Goddards, and other great singers and instrumentalists will be heard performing simultaneously in all the capitals and provincial towns of Europe, by means of the Telephone, remains to be seen, but such a result does not seem so plainly impossible, certainly, as it did a very few years ago. What the phonograph may yet accomplish, in addition to the marvellous wonders it already performs, seems to defy the descriptive powers of the most imaginative of mankind. "What will be thought," asks a recent writer on this instrument, "of a piece of mechanism by means of *which a message of any length can be spoken on to a plate of metal, that plate sent by post to any part of the world, and the message absolutely respoken in the very voice of the sender, purely by mechanical agency?* What, too, shall be said of a mere machine by means of which the old familiar voice of one who is no longer with us on earth can be heard speaking to us in the very tones and measure to which our ears were once accustomed?"

FINIS



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