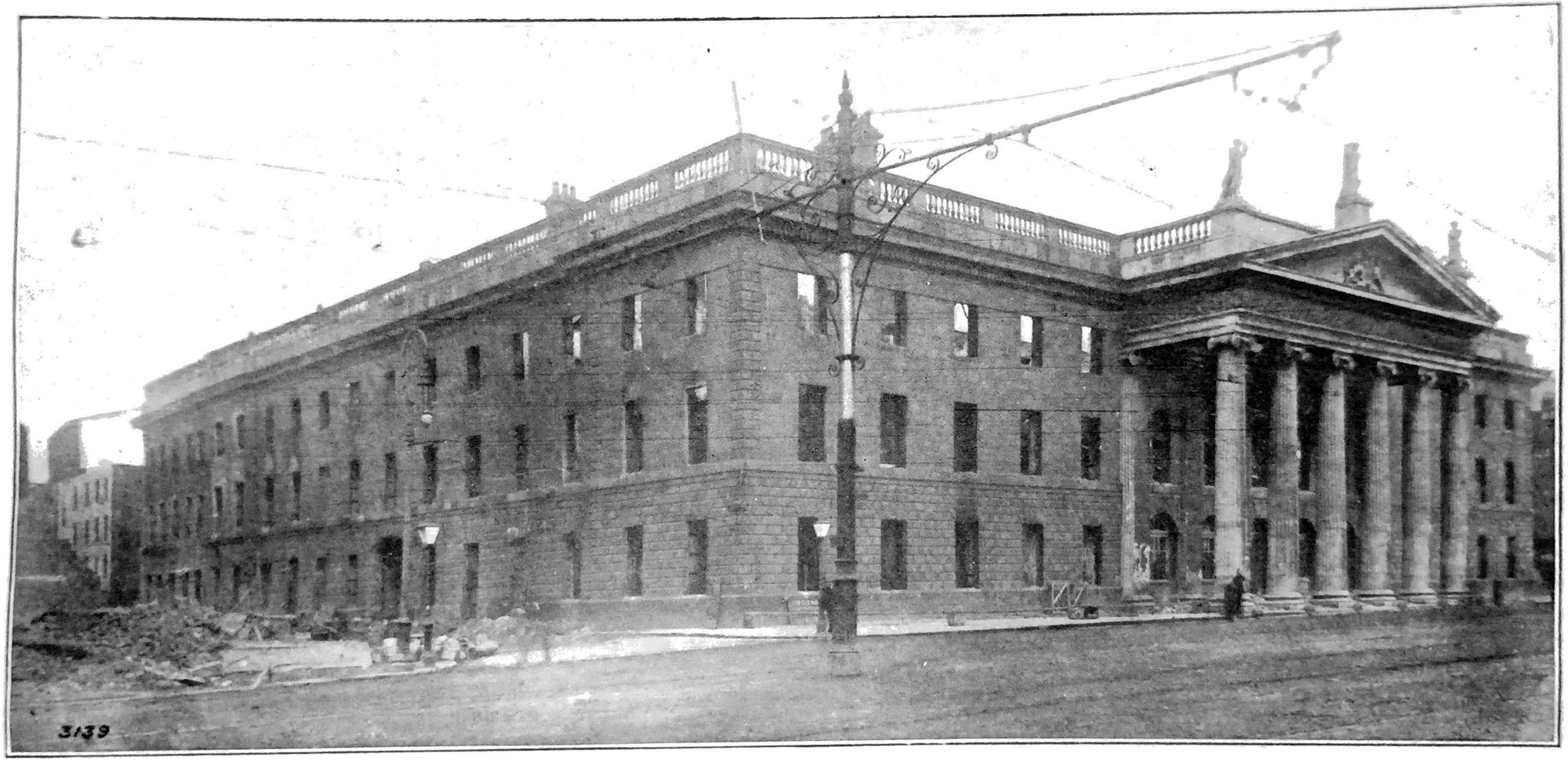
THE POST OFFICE ELECTRICAL ENGINEERS' JOURNAL

THE INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS

VOL. 9 PART 2 JULY 1916

ADVERTISEMENT INDEX
see page xii.



GENERAL POST OFFICE, DUBLIN. SOUTH-EAST CORNER. 7 A.M., MAY 12TH, 1916.

THE
Post Office Electrical Engineers' Journal

IRISH REBELLION, 1916.

E. GOMERSALL, A.M.I.E.E.,
Superintending Engineer.

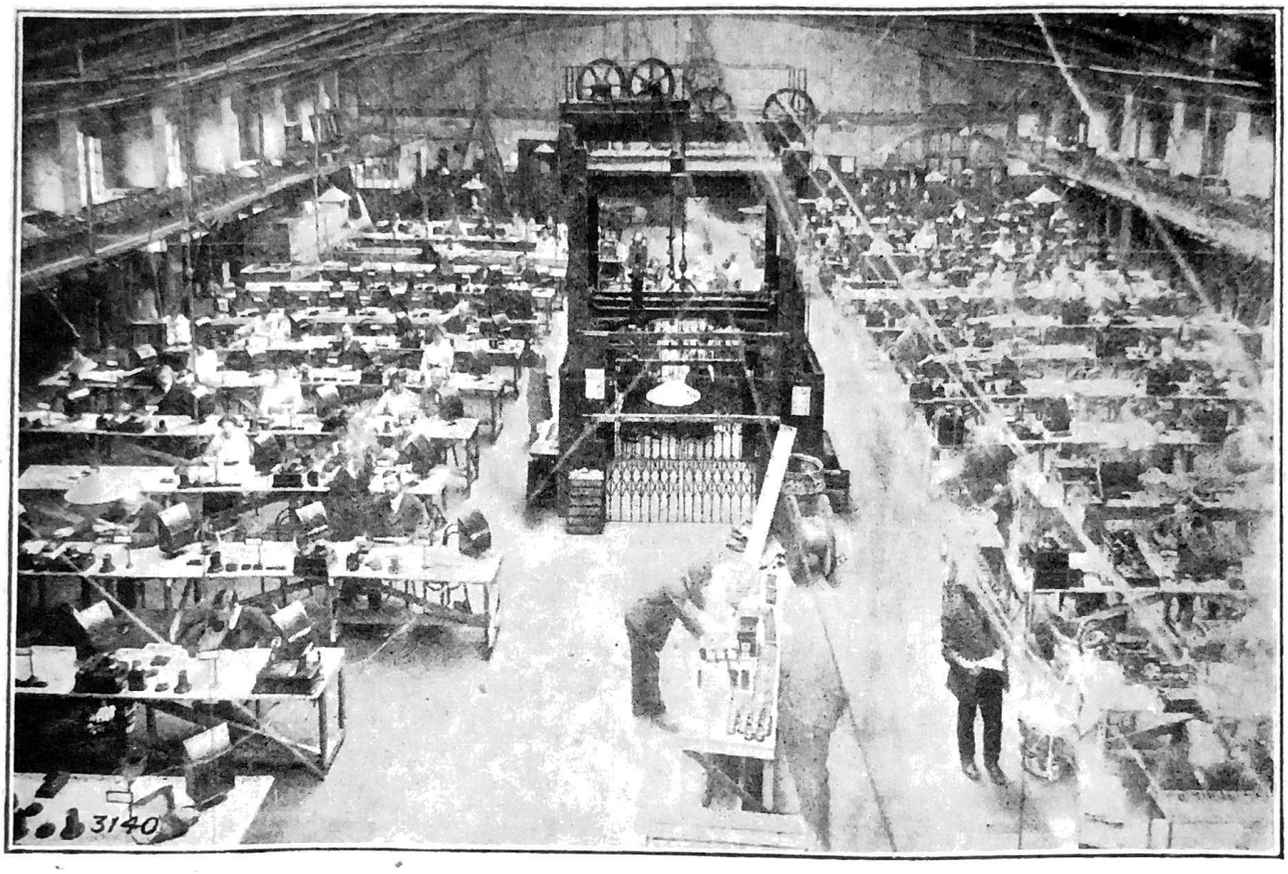
MANY readers of the JOURNAL will be interested to learn how the telegraph and telephone service was carried on during the recent troubles, and at the request of the Board of Editors I have prepared the following notes. The principal Post Office buildings in Dublin were the General Post Office in Sackville Street, the Telephone Exchange, 700 yards away on the south side of the river, and the Parcels Office near Amiens Street Station, 1000 yards east of the Post Office. The General Post Office building accommodated the Public Office, Telegraph Instrument Room, Trunk Telephone Exchange, Sorting Offices, and the clerical offices of the Secretary, Controller (Postal), Controller (Telegraphs), and, in addition, a part of the Accountant's Staff. The local exchange at Crown Alley is a magneto-call auto-clear exchange with over 4000 subscribers. The Superintending Engineer's Office is located at Aldborough House in the same buildings as the Controller of Stores Office and the Stores Depots.

The equipment of the telegraph instrument room included 4 fast-speed duplex repeaters, 4 forked repeaters, 11 duplex Wheatstone, 11 D.C. Sx sets, 13 quadruplex, 26 D.C.S., 25 C.B. sounder, 1 concentrator 60-line, 1 concentrator 40-line, 5 Gells, and, of course, the miscellaneous apparatus, typewriters, etc., required in a present-day telegraph instrument room. The Trunk Telephone Exchange consisted of 6 trunk positions, a local and concentrator switch, 20 phonogram sets, and the usual miscellaneous equipment.

There was a standard carrying 20 wires on the roof of the Post Office, but the bulk of the wires were brought to the building underground in the following paper core cables :

50/20, 100/20, 30/40, 38/40, 96/40, 8/100 + 26/40 + 52/40 and two cables 8/100 + 52/20.

Secondary cells were used for telegraph working, and primary batteries for telephone trunk purposes. The batteries, charging machine, three pneumatic pumps and motors, and a compressor and pump for Creed working were in the basement. The whole of the buildings were heated by hot water, the heating chamber with three



I.—New Telegraph Instrument Room, Dublin. 3 p.m., May 11th, 1916.

boilers and accelerator being in the basement. Much had been done in recent years to make the Dublin Post Office an entirely modern building with up-to-date appliances. A conveyor had been completed in the sorting office, there were two electric lifts in the building, and a bag-cleaning machine had recently been brought into operation.

The General Post Office had been in process of enlargement since 1904. The work had been divided into three sections. The first and second sections had been completed in 1912, and the third section may be said to have been completed on March 6th this year, when the new public office was opened, a spacious, ornate, and well-furnished office.

The rebels took possession of the Post Office soon after noon on Easter Monday and quickly expelled the staff, including an engi-

neering officer who was on duty. Within a couple of hours a circuit to London was joined up at an intermediate point; thus telegraphic communication with the outer world was promptly restored, and as a matter of fact has been continuously maintained. The local telephone exchange received no attention from the rebels until after the arrival of the military guard which had been asked for by different officers immediately they heard the Post Office had been seized. Matters developed very rapidly, and some of the details which have appeared in the papers will be fresh in mind.

The engineering staff passed through a very trying and dangerous ordeal. Telegraphic and trunk telephonic communication was essential for military purposes. New telephone circuits had to be provided for military purposes, and the local telephone system had to be maintained. Many members of the staff could not leave the vicinity of their homes. Many of those who could were unable to reach their normal places of duty; but before Monday midnight supervising officers and men were concentrated at three points in the outskirts, including certain officers who had been despatched from Belfast immediately the fact of the rebellion was known there, and men were in attendance at the Dublin Exchange. These arrangements continued until Tuesday, May 2nd, after which it gradually became possible to operate without the same extreme risk.

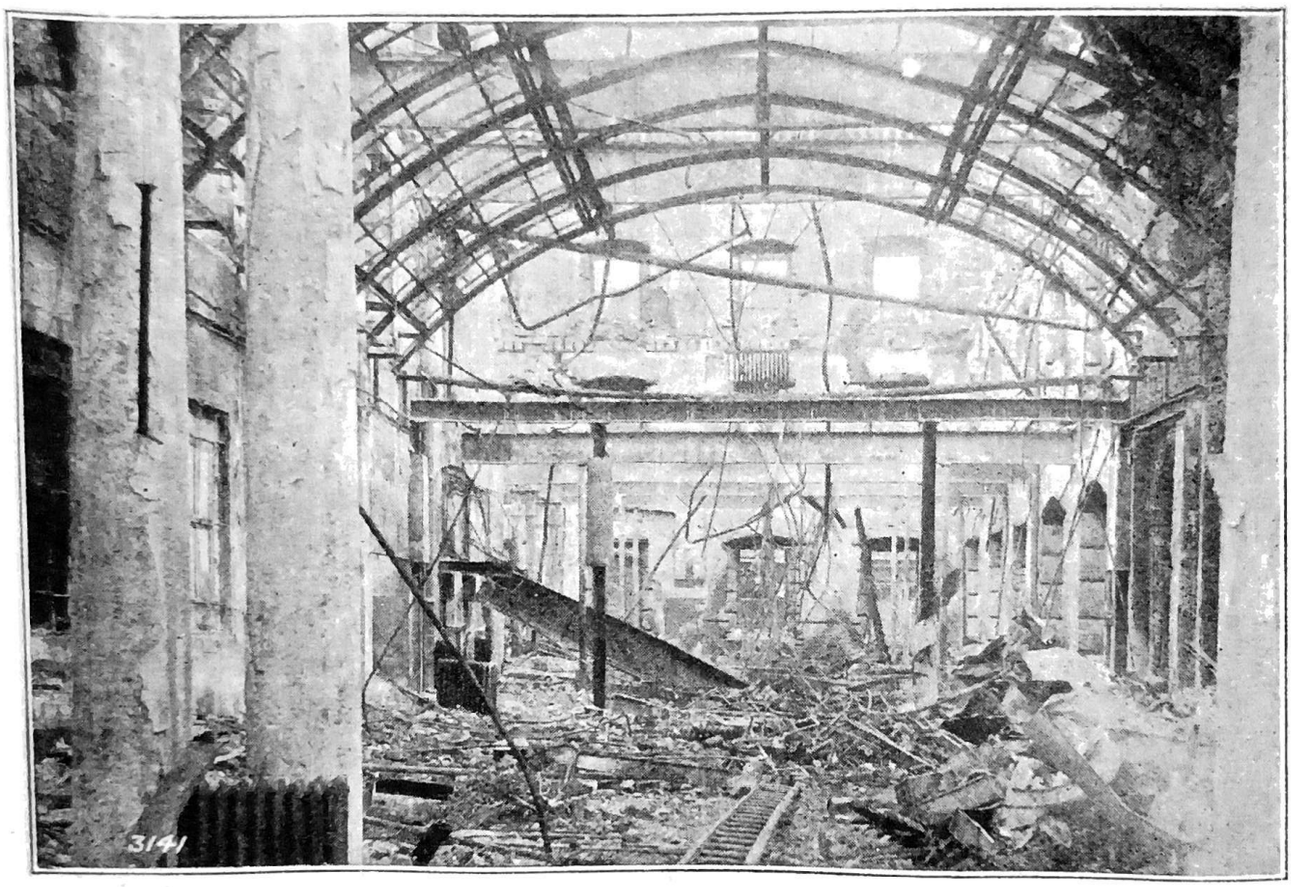
On Monday night, at 11 p.m., when trunk telephonic communication was urgently needed, several men were sent by motor cycle and side car, supplied by the Chief Engineer, Irish Command, to points several miles outside Dublin. After midnight one important circuit was cut into on very high poles and diverted by means of subscribers' circuits into an exchange which happily was still in communication with the main exchange. The next morning the main line was damaged by the rebels. Linemen who went after the fault were threatened by the rebels and fired upon. The military headquarters were informed of the locality in which the rebels were, and in the evening it was possible to make good the wires. On the next morning, Wednesday, the rebels cut down the line again some miles further away from Dublin. Other trunks were extended to the local exchange under similar conditions of danger and difficulty.

In the meantime, additional telegraph circuits were being joined up. During the fighting three temporary telegraph offices were installed at different points, and, in addition, cross-channel wires were joined up at two other places. Telegraphic communication with Great Britain, and with all the most important places in Ireland, was thus restored, and it was maintained throughout the operations although the wires were strictly reserved for military and official purposes. Similtaneously with the rising in Dublin the lines had been cut down at a large number of places—evidently a charac-

teristic feature of the operations of the rebels—and the restoration of communication from these temporary offices had necessarily to be preceded by making good the external plant.

A general idea of the damage which was done will be gained from the following statement:

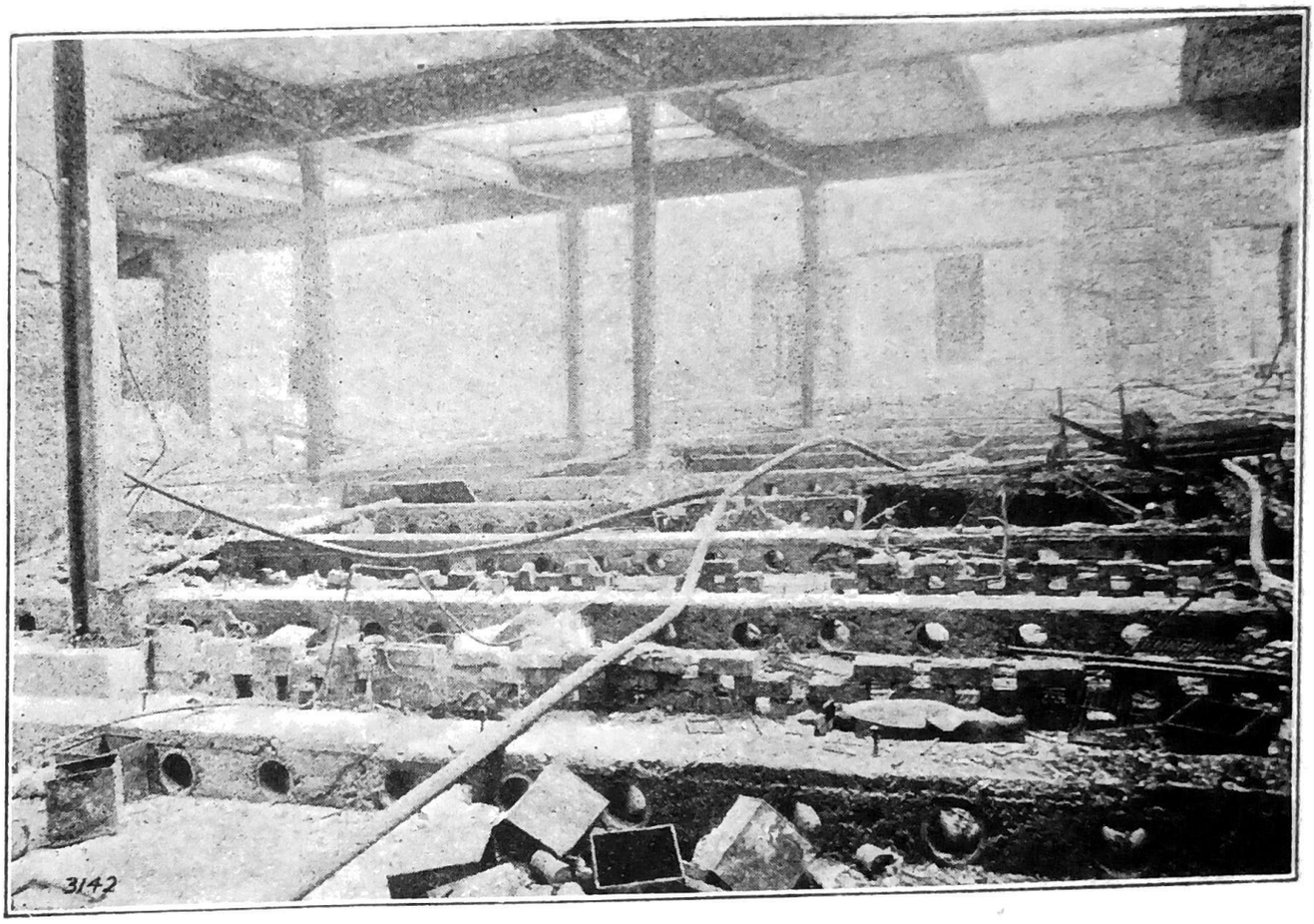
Nearly all the main lines in the vicinity of Dublin were cut, generally in two or three places. The method adopted was to chop down two or three, sometimes more poles, and to cut the wires. At many places telegraph and telephone instruments were removed from the offices and smashed to pieces in the road; block and electric



2.—Public Office, G.P.O, Dublin. The Returned Letter Office and Telegraph Instrument Room were above it. May 4th, 1916.

train staff instruments and telegraph and telephone apparatus in signal boxes were battered and destroyed. I can name over sixty places where telegraph and telephone lines were cut, excluding plant inside the Dublin City and suburbs. It may be convenient if I here mention other damage done during the operations in Dublin. When the work of diverting the telegraph wires to a new office was begun it was discovered that the rebels had cut most of the underground telegraph and trunk telephone cables. I hold a cheap tenon saw, found in a manhole where the cables had been cut. It was evidently quite new, and though not of Post Office pattern, it served the purpose. Eleven cables were maliciously cut, fourteen aerial cables and four D.P. cables were damaged by gunfire, two distribution poles were

burned down; and, in addition, numerous overhead routes were brought down during the military operations and by the succeeding fires, and wires, stays, etc., were damaged in very large numbers by bullets. Of many interesting cases I might mention one in which a bullet passed through a 75 ft. stout pole, 3 ft. above the ground, through the protection pipe, and lodged in the cable. The fault in this cable was not traced without difficulty! Sixty subscribers' instruments were maliciously damaged, and 250 subscribers' telephones and sixteen private branch exchanges were burnt out or disappeared in ruined buildings.



3.—General Sorting Office, Dublin.

The provision of additional circuits for military purposes was a matter of much difficulty, and unusual methods had to be employed. It was necessary to commandeer a large number of subscribers' circuits and extend them elsewhere, and in some cases line plant had to be taken down and apparatus removed from subscribers' premises, that being the only method possible of meeting the requirements.

The provision and maintenance of the circuits during the rebellion was both difficult and dangerous—difficult inasmuch as it was necessary to find lines which were intact to replace others shot down, and dangerous because zones of fire had to be crossed and the work had to be done where firing was in progress. Much of the

firing was from house-tops. A connected narrative of events would require more space than is available, and perhaps I could best give an idea of the conditions by a few short notes:-

(1) A lineman, cycling along a line after a fault, was instructed by rebels to turn back and was fired upon, the bullet striking the front number plate of the machine.

(2) A lineman carrying telegraph apparatus, required urgently, was refused permission to pass by a military officer. He insisted that he must pass, although firing was going on and a wounded man was brought from the thoroughfare along which he had to pass. He was allowed to proceed at his own risk and got through safely, although a man was shot dead a few yards from him.

(3) Two officers who went to repair an important telephone rendered assistance to a dying man under fire, repaired the telephone, brought doctor, priest and ambulance, and returned safely.

(4) Continuous attendance was given at the main exchange throughout the rebellion, and day and night attendance for periods at other exchanges. Some officers were continuously in attendance nine days. Cross connecting work, etc., in the test room at night had to be done with lights out. Many unusual duties had to be performed in the exchange, which was practically under siege, including operating duty at a trying time. These officers now have expert knowledge how to put a building into a state of defence, how to prepare for a fire which seems to be approaching, and they ought to be able to give the weight of a sandbag with accuracy!

(5) Engineering officers were compelled to remain in a temporary telegraph office for several days at a stretch except for occasional short and risky journeys to fetch apparatus, etc.

(6) A light engine, with improvised protection, was used in searching for faults on important wires in areas where firing was proceeding.

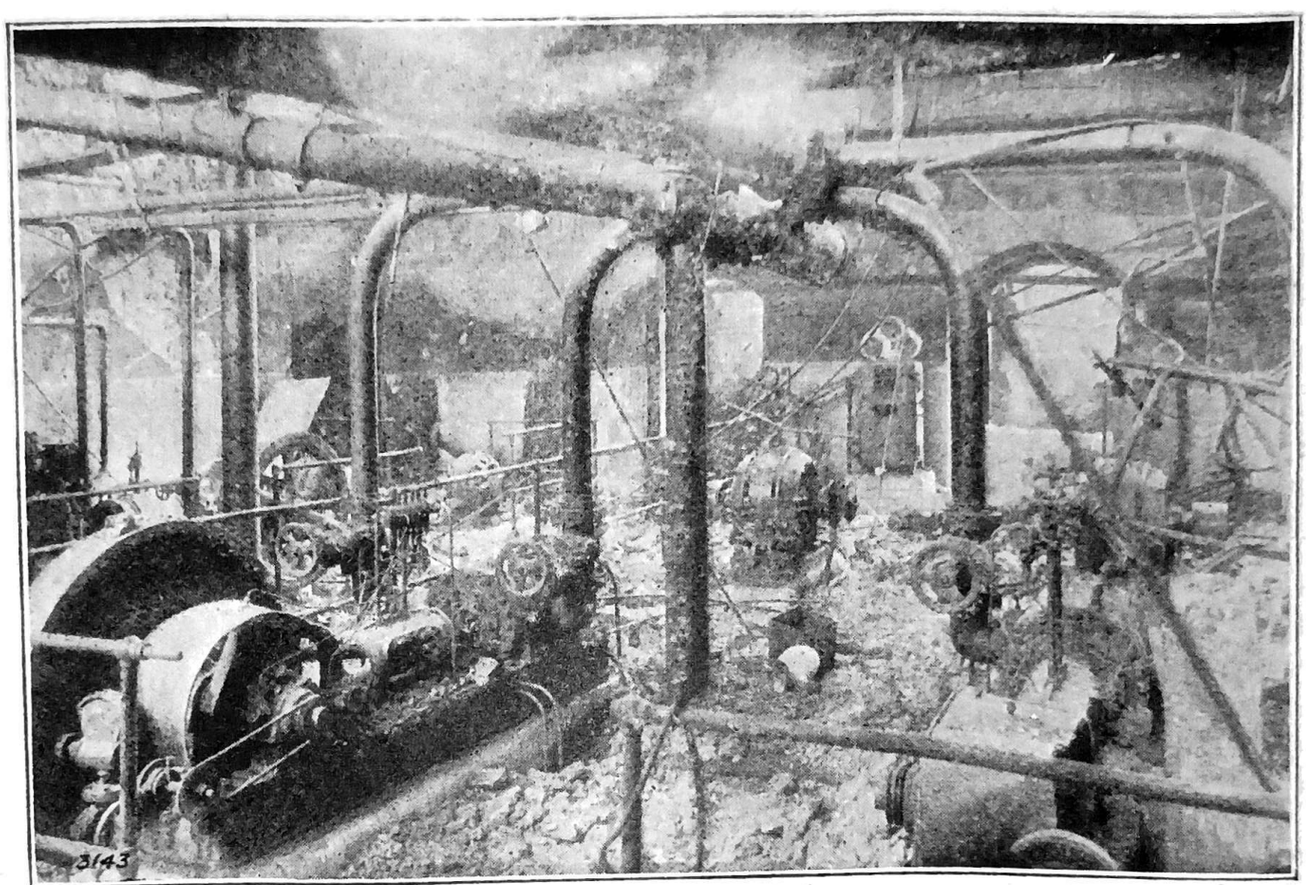
(7) Initiative was shown by certain officers, who obtained military guards, gathered a few men, and on special trains travelled towards Dublin picking up and repairing broken wires.

These are a few instances illustrating the character of the risk which was run. Every day the engineering officers experienced the uncomfortable nearness of bullets, and, either when they were at work or were making their way to places where work had to be done, frequently saw the bullets find a mark.

On Tuesday, May 2nd, it became possible to ascertain the extent of the damage, to approach the Post Office, and gradually to organise the work of restoration. The magnitude of the task was soon apparent. It was clear that a new telegraph office would have to be installed, and that this work would have to proceed simultaneously with the repair of cables and wires, the diversion of the wires to a new office, the diversion of trunk telephone circuits to the

local exchange, and the restoration of the block signal and telegraph wires on the railways and of the damaged local telephone exchange circuits.

The cables at the Post Office passed through an external chamber at the north-east corner of the building, from which they were carried along an area to an internal chamber under the portico. Only the shell of the building remained, and in places the *débris* was still burning and the surrounding ground was extremely hot. The Fire Brigade was called to cool the *débris* in the ruins adjacent to the external chamber, and at 5 p.m. it was possible



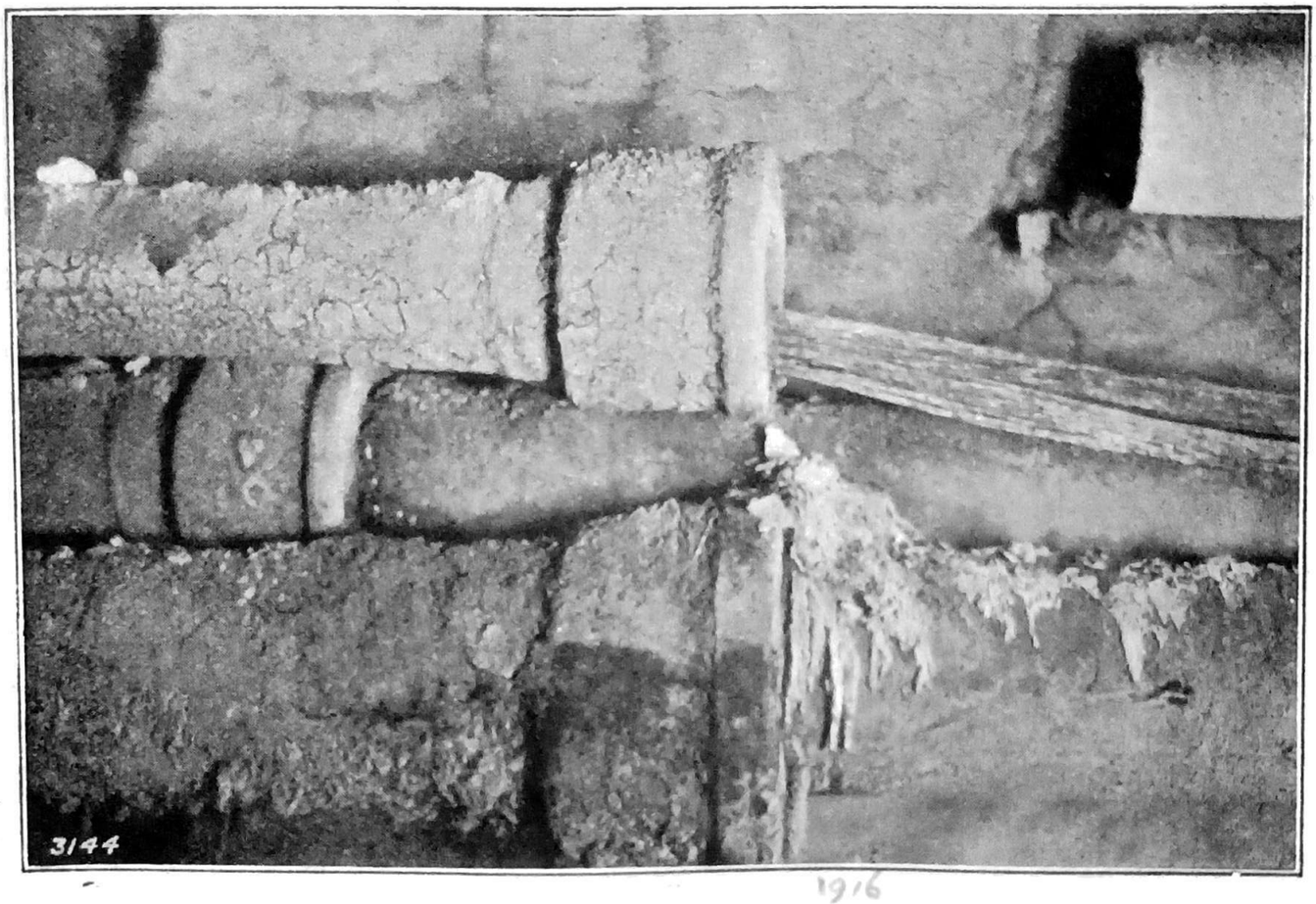
1916

4.—Pneumatic Power Room, G.P.O., Dublin. A Heavy Arched Brick Floor fell on this Room the day after the Photograph was taken.

to enter the manhole. The cables and cable connection boxes there were found intact, and, the internal chamber being inaccessible, the work of proving the wires, in preparation for the diversions, was immediately started. On Wednesday, May 3rd, it was finally decided that a new telegraph office should be installed on the upper floor of the parcel office at Amiens Street, pending the reconstruction of the G.P.O. On the afternoon of that day requisitions were sent by telegraph to the Engineer-in-Chief for the necessary apparatus. The construction of the tables by Board of Works carpenters was begun in the parcel office the following morning after the removal of the parcel baskets. The first consignment of apparatus arrived on Friday evening, May 5th, and the new

instrument room was brought into use on Tuesday, May 9th. Meanwhile, the smaller temporary telegraph offices had been kept working, but on Thursday, May 11th, all the wires had been diverted to the new instrument room.

With much difficulty 160 of the 208 72-ampère hour cells were recovered from the basement of the G.P.O.—they had been very hot and were full of *débris* from the ceiling, but they appeared to be useable. They were carted to Amiens Street and there cleaned and set up. Heavy gauge cable was recovered also, and temporary arrangements were made for charging the cells. Meanwhile, the



5.—Pipes and Cables in area of G.P.O., Dublin. The Lead Sheath of the Cables inside the Pipes was melted, and in many Places ran out at the Pipe-joints.

construction of the tables, the fitting of the apparatus, the diversion of the cables (including the laying of two pipes across five pairs of rails and two railway platforms and drawing in new cables), the provision of phonogram lines, and the wiring of the instrument room proceeded night and day. Two thousand primary cells were set up on the galleries shown in the photograph, as the secondary cells had not sufficient capacity and might not prove satisfactory.

The character of the trouble necessarily meant that only as the work proceeded would the full extent of the difficulties come to light, and cable after cable proved to have been cut by the rebels. The test-frame arrived on Sunday—it had gone astray and was found at the bottom of the hold of a ship! The weather was cold

and very wet. In spite of all difficulties, however, the new installation was completed as stated above.

Two new sets of 126 ampère hour secondary cells were set up ten days later, and the primary batteries have been made spare. The lead-covered cables were carried on the under side of the galleries and fed down to the distribution cases on the tables. The spacing of the instruments and the method of wiring is from start to finish on standard lines for permanent work.

I have selected a few photographs illustrating the damage to the G.P.O. The telegraph instrument room and trunk room on the top floor extended over the whole front of the building—over the public office. The offices of the Secretary and other controlling officers in the building were destroyed with all the records, as were the sorting offices and all other rooms in the building. The illustration given of part of the sorting office is characteristic of the remainder of the ground floor. The photograph of the public office illustrates what remains of the valuable plant in the instrument room and trunk room. I had hopes of recovering much of the power plant which was in the basement, but the first floor gave way the day after the photograph was taken. The photograph of the melted cable sheath is an indication of the heat in the area, which was well removed from combustible material and did not form a flue for the fire. The sheath of the cable was melted in the pipes, and at most places all that remained in the pipes was bare copper wire. The internal chamber was found locked, when it became accessible, and the frame was undamaged. The heating boilers are undamaged and will be recovered. Some cable, one or two motors, a large number of radiators, some electric light distribution boxes, and some electric light fittings, conduit, etc., have been or are being recovered, but otherwise the whole of the valuable plant which was installed in the G.P.O. has either disappeared or is recoverable only as scrap.

The office of the Dublin West Sectional Engineer in Sackville Street was totally destroyed. Aldborough House was held by a military guard. Some rooms were damaged and there were casualties in the building, but the offices fortunately escaped severe damage.

A new sorting office has been opened at Rotunda Skating Rink, a building in Marlborough Street is to be used as a supplementary parcels office, and the Sackville Hall is to be fitted for the Secretary's staff and for a temporary public office. A lighting scheme has been put in hand and partially brought into use at the new sorting office, and other requirements are being met as they arise.

The Ireland District had had two severe trials since the beginning of 1915. In February that year very serious damage was done by a gale. In November, 1915, another gale, which was followed by others in December, caused widespread devastation. The repairs

were completed in the week before Easter. But the dangerous and difficult work which the staff has had to face since Easter Monday, 1916, is, I think, without precedent in the United Kingdom, and it is due to the staff that, with the most intimate personal knowledge of the circumstances and of the men, I should express my admiration for their courage and devotion to duty during the rebellion, and for their untiring efforts and splendid work in connection with the restoration of the telegraph and telephone service in Ireland.

GRIMSBY AUTOMATIC EXCHANGE.

By F. McMorrough, A.M.I.E.E.,
Sectional Engineer, Lincoln.

A description of the new Siemens' automatic exchange at Grimsby will probably be of interest to readers of the Journal, inasmuch as that exchange differs considerably in many respects from the other Post Office automatic exchanges at present working.

(1) Before proceeding to describe the Grimsby exchange it will be advantageous to consider first one or two of the elementary principles of automatic working as exemplified in the case of a 100-line exchange. Let us assume for the moment what will be explained later, viz., that we have at our disposal a means of sending impulses, consisting of a make and break of current, from the subscriber's telephone; that these impulses correspond to the digits in the number of the wanted subscriber and can effect a vertical movement for the tens, and a horizontal movement for the units; that we have also a searcher or wiper working into a connector to which all the 100 subscribers' lines are joined; also that an "engaged test" exists, as well as a means of ringing the wanted subscriber, and of severing the connection at the proper time.

(2) 1 shows the principle of a connector switch. Each of the 100 pairs of tags represents the termination of one of the 100 lines which we have assumed for our exchange. The peculiar order of the numbers requires attention. Owing to the impossibility of producing an effect by sending out "no" impulses, the figure 0 has to be signalled by dialling 10 impulses, and the 0 must, therefore, follow the 9. This accounts for figures up to 9 being in the top row, and for each multiple of 10 being at the right-hand extremity of the horizontal row, instead of the left-hand side as we should expect.

(3) Each subscriber's line ends in the wipers of a connector, but is also teed into its proper place on the connector itself. In a 100-line exchange there will be 100 connectors, and the lines bearing the same number on each of them will be connected in multiple. It