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WEBER, W. L.—Handy Electrical Dictionary; 224 pages; 32 illustrations; cloth, 25 cents.

WILKINSON, H. D.—Submarine Cable Laying and Repairing; $6.00 (revised edition, ready January 10, 1909).

YOUNG, J. ELTON.—Electrical Testing for Telegraph Engineers; $4.00.

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TELEGRAPH AGE.

PUBLISHED ON THE 1ST AND 16TH OF EACH MONTH AT $2.00 A YEAR.

Telegraph Age is the leading telegraph newspaper of the world. The technical side of the telegraph as well as a complete digest of telegraph news and information, is presented in each issue, and events discussed editorially, all in a manner to aid, instruct and interest every individual telegrapher. It is absolutely indispensable for those who desire to keep informed. Sample copies sent on application. Address J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

Book Review.

"Telegraphic Systems," by Arthur Crotch (J. B. Lippincott and Company, Philadelphia, 270 pp., 222 illustrations), a member of the engineer-in-chief's department of the British telegraphs, adds another volume to the works of this author, those preceding it being "Elementary Telegraphy and Telephony," "Telegraph Secondary Cell Installations" and "The Hughes and Baudot Telegraphs." In the present volume the author deals with his subject in the same plain and lucid manner that has marked his previous efforts. His aim has been to give a plain and concise description of the main systems in use in practical telegraphy. In the fourteen chapters comprised within the book, full consideration is given of batteries—primary and secondary; of universal battery working, duplex, diplex, quadruplex, automatic and multiplex telegraphy; the Hughes type-printing instrument, the Baudot system and the Murray type-printing telegraph are reviewed; there are also chapters on test and battery boxes, circuit concentration, repeaters, and submarine telegraphy, the closing chapter being devoted to wireless telegraphy. The volume is carefully indexed, is printed on good paper, the illustrations are well drawn, and the various subdivisions of a great subject are clearly presented. The price of the book is $2, and it will be sent to any address, carrying charges prepaid, on receipt of price. Address J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

TELEGRAPH AGE

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CONTENTS.

Some Points on Electricity—There's "Nothing New Under the Sun" 111
Recent Telegraph Patents. Personal. Superintendence of the Telegraph at Pekin Passes from Foreign Control..... 112
Arrangement of Call Circuits. Superintendent Black's Admonition to Managers 113
Postal, Executive Offices. Western Union, Executive Offices. The Cable 114
A Tribute to John R. Binns 115
Operator Binns' Story 116
Obituary 117
The Barclay Printing Telegraph System 118
The Employment of the Earth's Part of an Electric Circuit.. 120
Editorial—Canadian Subscriptions. Mr. Ward on the Cables. 123
Wireless Telegraphy and the Steamer Republic..... 124
Development in Wireless Telephony 125
The First International Conference of Telegraph Technicians.. 128
Music of the Telegraph..... 129
The Military Telegrapher in the Civil War..... 130
The United Fruit Company's Wireless System. Progress in Radio-Telegraphy 132
The Railroad. Train Despatching by Telephone..... 135
Serial Building Loan and Savings Institution Election and Statement Loan Association's Dinner..... 136
How One Thousand New York Telegraphers Obtained Homes. Postal Division Superintendent Lemon Honored 137
The First Automatic Repeater 138
L. E. Moores, Western Union Chief Operator at Cincinnati. The Question of Induction. When is a Boy Not a Boy? 139
Montreal Telegraph Company. Gold and Stock Telegraph Company Annual Election 140
Other New York News. American District Telegraph Company Report. The Morse Electric Club. Magnetic Club Election. Morse Mutual Benefit Association of Cincinnati. General Mention 141
Ball of the Boston Telegraphers Mutual Aid Associaton. New York, Western Union 142

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

There's "Nothing New Under the Sun."

PART I.

If we qualify the old assertion "There's nothing new under the Sun," by adding "except the harness," no truer words have probably ever been penned so far as they apply to the basic principles involved in the operation of our telegraph system.

Nearly every day a new mechanical device is added to the commercial world and a new industry is born, and some one is credited with having evolved something new, yet after all when we come to analyze the product the invention is usually found to be merely a new set of harness for an old servant wherewith we get additional returns out of something actually operated on some ancient and well known principle.

For instance, the rectifier, the selector, and even our great automatic page printing telegraph systems, are not new in regard to the principle of their respective operations except in a mechanical sense and in the nature of the final service performed. The service and the industry they create are alone new.

What kind of work does a chemical or a vapor rectifier perform that has not already been done daily by the brushes and commutators of a dynamo for many years past? Each, in a different manner, cause the two half waves of an alternating current to flow in the same direction. A dynamo, therefore, might just as fittingly be termed a rectifier as the former, yet the commutator is a very old acquaintance. The harness, however, is new, although the work is the same.

Again, what is a selector but a combination lock the holding lever of which is released when its mechanism is manipulated in a manner in accordance with some pre-arranged plan or setting? There is nothing new in that. We have opened bank safe locks in this manner by hand for many generations past.

But here, again, we find that the final services rendered by the selector is new, inasmuch as the latter enables us to unlock the combination from distant localities, something heretofore impossible. The employment of an electric current for this purpose is also new and the method offers a new field for its services.

Advancing a step further we find that the very word "selector" itself is applied to the selecting relays or other apparatus in the various printing telegraphic systems, which, by means of methodical combinations of long and short electric impulses, select such relays as will through their actions construct a metallic pathway to a desired letter type, again suggests the old principle involved in the bank safe.

Here, as in the previous illustrations, the style of the harness alone is changed. The work done by the current is the same, but the industry born, namely, the automatic operation of a typewriter, is new.

Now, the purpose of these illustrations is not to belittle the value of such achievements, for the reason that great intelligence as well as mechanical ingenuity are both required in order to first conceive new ideas and then construct such apparatus as may be necessary to bring about the desired results.

The point well worth noting, however, is that in the operation of electricity there is something analagous to the theme, rhyme and rythm, which runs all through a piece of music. If we learn the meter, etc., of the first few bars thoroughly the reading and execution of the remaining notes become greatly simplified, because we can in a measure anticipate much that follows by the normal "swing" that goes with the tune. Thus, in the art of acquiring rapid knowledge of electricity the knack lies principally in being able to quickly recognize old themes in the guise of basic principles and thus through anticipation of what should naturally follow along a certain line be

half prepared to grasp the meaning of any explanation or description we read in our lessons.

After these somewhat digressional remarks let us proceed to describe a few of the most recent time-saving devices, installed in some of our large telegraph offices, which will readily be recognized as old friends performing new tricks.

Everybody knows that the district call box system, for instance, is older than many readers of this article, yet when the little round call boxes containing the breakwheel and lever began to appear on the various tables of multiplex apparatus in the main offices, the operators working such wires believed they were in possession of something new. The boxes, however, were nothing different from the ordinary call box usually located in the office of the patron. In this case the respective positions of the call boxes and the registers are reversed, the main office retaining the signaling apparatus and the branch office the register.

The object of this installation is to avoid the delay in notifying a branch office to answer calls on a certain loop, which must necessarily occur when such notification is sent over a Morse call wire circuit. It is obvious that before a branch office could receive a wire message the traffic chief must first write out the message on a blank and carry it to the Morse call wire, where a further delay may result from being unable to raise the branch office promptly. Under the new arrangement, each operator working a duplex or quadruplex circuit in the main office, on which circuit branch office loops are also connected becomes a "watcher," and in case the branch office does not answer calls promptly, immediately rings such office in by means of the call box on his table, which registers that loop or circuit only.

Our larger branch offices, possessing as they do, a great many loops and other circuits can well afford to maintain a special call box system of this kind to the main office, where each operator becomes the constant guardian of a particular box. The services rendered by this manner of distributing the call boxes has proved very satisfactory indeed, notwithstanding that it is but a reversed order of locating the terminal apparatus of the old district call box system.

(To be continued.)

Recent Telegraph Patents.

A patent, No. 12,996, for telegraphy, has been reissued to Patrick B. Delany, of South Orange, N. J., assignor to Delany Telegraphic Transmitter Company, Augusta, Me. Original No. 877,555, dated January 28, 1908. A method of transmission consists in locally producing at a transmitting station short dot signals, simultaneously transmitting to a receiving station a long signal, whose length is determined by the number of dots and locally reconverting at the receiver the long signal into the same number of dots.

A patent, No. 908,868, for a means for closing an open telegraph circuit at a distant key, has been granted to C. B. Jewell, of La Junta, Colo. Avoids the time lost in running down "open keys" on train despatching lines. An extra switch and circuit and a high voltage extra battery are provided at the terminal office which when switched on to the line wire forces its current through the resistance around any open key, works the relay of the key and warns the forgetful operator that he has left his key open.

A patent, No., 909,198, for a combined telegraph relay and sounder has been awarded to A. J. Meyer, of Milwaukee, Wis. Increases the loudness of the sounder by providing a horn and box to increase the sound.

A patent, No. 909,511, for a quadruplex telegraph system has been taken out by C. J. App, of Lynchburg, Va. Reduces sparking at the pole changer by means of an artificial line.

A patent, No. 909,421, for a teiautograph has been secured by Charles F. Jenkins, of Washington, D. C. In combination with a transmitting instrument having electric distributing brushes attached to a writing stylus is a reproducing instrument for a number of stylus-actuating motors.

Personal.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, accompanied by Mrs. Vail, has returned from Europe, where he spent two months.

Mr. David Homer Bates, of New York, will deliver a lecture, entitled "Lincoln in the Telegraph Office," before the students of both the high schools at Scranton, Pa., on the morning of the hundredth anniversary of Lincoln's birthday, February 12.

Superintendence of the Telegraph at Pekin Passes from Foreign Control.

The diplomatic corps at Pekin, China, has made a strong collective representation to the Chinese government concerning the Board of Communications having usurped the full control of the Pekin telegraph office, which the Chinese government in 1901 agreed should be under foreign superintendence.

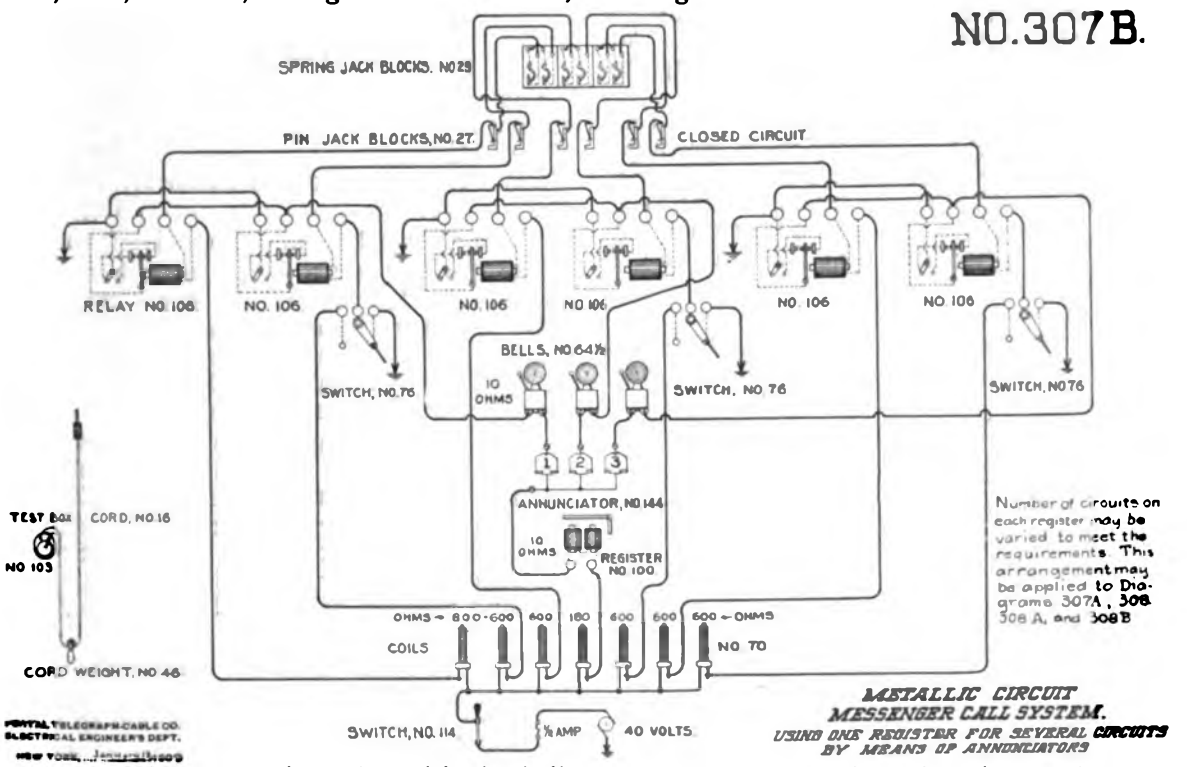
It appears that the Imperial telegraph administration, or the Board of Communications, with Chen-Pi at its head, took over exclusive control and supervision of all the telegraphic business to and from Pekin and dismissed the foreign superintendents immediately after Yuan-Shi-Kai, the most prominent member of the Grand Council, was turned out of office, and the act was an outcome of the readjustment of administrative matters following the decision to dispense with the services of this statesman. A Pekin despatch conveying this information called attention to the fact that the foreign legations in the Chinese capital in the case of an emergency would be dependent for communication with the outside world on the wireless telegraph apparatus established at the Italian legation.

Arrangement of Call Circuits.

BY JOHN F. SKIRROW.

(Associate Electrical Engineer, Postal Telegraph-Cable Company, New York.)

An arrangement often installed to reduce the number of call circuit registers in a large office is shown in the accompanying print. Several call circuits are connected in multiple with the same register, each, however, having its individual bell, and an annunciator drop in series with the bell. When a call is registered the annunciator of the particular circuit drops, indicating upon which circuit the call was made. Under this plan duplicate numbers can be used upon the same register and circuits can be split up so that troubles may be more quickly removed.



Superintendent Black's Admonition to Managers.

The January tariff sheet of the Postal Telegraph-Cable Company, bears on its first page an excellent engraving of William C. Black, superintendent at Denver, Colo., whose terse words of advice to managers on the subject of handling of traffic, are given space in the publication, are also reproduced here. They are as follows:

"Good service is the winning of a race against time.

"It takes time to do everything we do in the telegraph business. It takes time to count and check a message, and to sheet it takes more time.

"It takes time to send a telegram, and more time if you have to call.

"It takes time to receive a telegram.

"It takes time to enveuope it, and to give it to a messenger for delivery.

"It takes time to make the delivery—so that time figures in everything we do.

"Time is always an important factor in our service, and in a sense might be considered a competitor.

"The minute of time saved here and there makes the difference between good and bad service.

" 'Tis a fact, good service is the winning of a race against time. We are all in that race. Tell your messengers when they have telegrams to deliver they are in a race against time.

"In a race of this kind there are many relays. It is a relay race. Slow work on the part of one makes the fast work of all others go for naught, and frustrates the object of the sender, who never forgets that we fell down.

"Good service will win against the strongest competition, and to give good service each employé, with due regard to exactness, must be prompt—very prompt—in his work.

"The policy of the Postal company, as you know, is to advance as rapidly as possible efficient employés."

A telegraph official writes us that the January 1 issue was the most interesting telegraph paper he had ever received. "One thing that makes it particularly valuable," he said, "is the roster of telegraph and cable officials. I had occasion to refer to the paper three times in one day to obtain from its columns the full names of officials to whom I desired to write. This directory feature ought to be incorporated in the paper at least once each year, thus keeping the information it conveys well up to date."

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, has returned from a week's trip to Norfolk, Richmond, Baltimore, Washington and Pittsburg.

Mr. Charles C. Adams, vice-president, spent several days in West Virginia recently on business connected with the service.

Mr. W. H. Mathews, chief clerk of the complaint bureau, has been advanced to the position of chief clerk to Vice-President Charles C. Adams, vice H. Scrivens, promoted to be superintendent at Pittsburg.

At the annual meeting of the Lehigh Telegraph Company, held on January 16, at Macungie, Pa., the following directors were elected: Edward J. Nally, Charles C. Adams, Charles P. Bruch, T. L. Cuyler, Jr., Leona Lemon, J. A. McNichol, Jacob Erdman, Wm. B. Dunn and G. W. Dunn.

RESIGNATIONS AND APPOINTMENTS.

F. D. Haynes, manager at Oswego, N. Y., has been transferred to the Watertown, N. Y., management, vice A. B. St. Louis, resigned. L. A. Metzger succeeds Mr. Haynes at Oswego.

R. C. Humphrey, former night manager at Knoxville, Tenn., has been promoted to the position of night manager at Nashville, that state. Thomas Broderick, formerly chief operator of the Western Union at Augusta, Ga., succeeds Mr. Humphrey at Knoxville.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Thomas F. Clark, vice-president of the company, who has been ill with typhoid fever, is now convalescing, and is well on the way to recovery.

Mr. Charles F. Patterson, of New York, general manager of the American District Telegraph Company of New Jersey, left for California on January 16, to be absent about a month on business connected with the service of his company.

Mr. I. N. Miller, Jr., assistant general superintendent at San Francisco, who has been somewhat indisposed of late, is taking a vacation for the purpose of gaining much needed rest.

Mr. H. L. Waterbury, manager of the office at Saratoga Springs, N. Y., is one of the progressive business men of that place. During the past year he served with much acceptability as the president of its Business Men's Association. His address on retiring from office, in reviewing the work accomplished by the association during the past year, was referred to by the local press as being a very illuminating paper, and won for its author many words of praise.

RESIGNATIONS AND APPOINTMENTS.

Dr. P. E. Murray, manager at Atlanta, Ga., has resigned, to take charge of the medical department of an insurance company at the same point. He will leave the service of the telegraph company February 1, spend a vacation period in the West Indies, accompanied by Mrs. Murray, and will take up the duties of his new office in March.

John E. Scofield, former manager of the Atlanta office of the Postal Telegraph-Cable Company, will succeed Dr. Murray. Mr. Scofield has been for several years manager of the Bowden Lithia Water Company, which position he has resigned to accept the present tender.

The Cable.

Cable communication is interrupted January 28, with:

Venezuela .....Jan. 12, 1906
Madura Island (Dutch East Indies)..Feb. 3, 1908
Macao .....Aug. 29, 1908

Messages can be mailed from Hongkong.

The United States cable steamship Burnside left Seattle January 13 to repair the Alaskan cable, which is supposed to have been broken by the earthquake shock of January 11, about one hundred and seventy-five miles from Seattle, off the coast of Vancouver Island.

The Goole Shipbuilding and Repairing Company, of England, are building a new cable steamer for the West Coast of America Telegraph Company, which when ready will replace the "Retriever" at Callao, on the west coast of South America. The new vessel will be about the same size and tonnage as the old "Retriever," which was launched in 1878.

A special meeting of the stockholders of the Mexican Telegraph Company has been called for February 9, to vote on a proposition to increase the capital stock of the company by $2,000,000 to $5,000,000. The stockholders of the Central and South American Telegraph Company also will hold a meeting on February 9 to vote on enlarging the capital stock from $2,000,000 to $14,000,000.

Señor José de J. Paul, the Venezuelan special envoy, says that he will ask the French Cable Company, as a condition of a settlement of the controversy with Venezuela, to establish a continuous cable between La Guayra and Martinique. The present land line across San Domingo causes delays in the service. The company will also be asked to revise its tariff and to give up the Venezuelan coast cable, which was the principal cause of the conflict between the company and ex-President Castro. The accusation against the company was that the coast line was used to assist the Matos revolution. Señor Paul said that, as the Venezuelan government had not surrendered in principle regarding the fine of $5,000,000 imposed on the French Cable Company by the former president, the company appeared ready to make important concessions respecting the coast cable, which, he said, was of little benefit to the company and only valuable for the administrative and political purposes of Venezuela.

A Tribute to John R. Binns.

John R. Binns, the wireless operator on board the steamship Republic at the time of her disaster, received unusual honor from the floor of the House of Representatives, on January 25. By unanimous consent the House suspended business to listen to Congressman Boutell of Illinois, whose sentiments in reference to the Republic disaster and the part that Mr. Binns played in it were warmly applauded. Mr. Boutell said:

"Mr. Speaker, during the last two days we have been reminded once more of the perils that beset those 'that go down to the sea in ships, that do business in great waters.' The accident that befell the steamships Republic and Florida last Saturday found heroes ready for the heroic work demanded of officers, men and passengers.

"I believe that every one who read the accounts of the collision, the jeopardy in which the occupants of the two ships were placed and the way in which the news reached the rescuers felt that there was one silent actor in the tragedy whose name should be immortalized, the Marconi operator on the Republic who had the cool head and steady hand to send forth on the willing wings of the air the message of disaster that saved hundreds of lives and the message of deliverance that relieved thousands of anxious hearts. His name is John R. Binns. (Applause.) He is known to several members of this House."

Mr. Boutell read the following from a newspaper reference to Mr. Binns:

"Binns has given the world a splendid illustration of the heroism that dwells unseen in many who are doing the quiet, unnoticed tasks of life.

"Is it not an inspiration for all of us to feel that there are heroes for every emergency, and that in human life no danger is so great that some Jack Binns is not ready to face it?" (Applause.)

Mr. Binns is a native of England and is twenty-six years of age. He is an expert telegrapher and has been with the Marconi company for several years.

"Jack" Tattersall, the wireless operator on the Baltic, the steamer that brought the passengers of the wrecked Republic to New York, threw a vivid side light on the vast drama which culminated in the sinking of the Republic when he told the story of the wireless room. He sat at his key for fifty-two hours while the work of rescue was proceeding. He is a little, slim, red whiskered Englishman.

"Was I excited?" he said. "Yes, but only once, when the first message came from the Republic via Siasonsett and I realized it was the 'C. Q D.' I didn't wait for any steward, but bolted for the bridge with it as fast as I could.

"After that things just happened; I don't even remember their order. It was just hard work, being always on the alert.

"Five minutes after the Republic was struck her lights went out and the dynamos were out of business. After that Binns, her operator, had to rely on his accumulators. They won't send a spark much more than sixty miles, not more than eighty miles at the outside; and even at sixty miles they are very faint. The worst of it was having to send and get those Republic messages—matters of life and death, every one of them—while all the time the shore stations were jerking out flashes of desperate power.

"It was all I could do to decipher the faint messages from the Republic. They were just buzzes in my receiver for the first few hours, jammed out, as we say, by the powerful messages from the shore stations dinning and crackling in my ears. It's an awful nervous strain, striving, always striving, to get the message right when half a dozen gigantic batteries are jerking flashes to you at the same time, drowning each other out, pounding in your ears, making the night swarm with sparks before your eyes. That's what gets on a man's nerves; that's what makes you next to insane.

"I hardly knew what to do with the Republic signaling me, faintly, so faintly that I could not make out whether they were saying 'We are sinking' or 'All safe.' Sometimes I cursed Siasconsett and Wood's Hole. It made me furious that they couldn't realize they were spoiling my receiving. How could I take those flutters from the Republic's wires when they were crashing out their sparks powerful enough to travel two hundred miles?

"But all the time I kept calling 'Republic! Republic!' and telling them that we were coming to their aid. At last, when we were within forty miles of their position, I began to be able to make out words from the buzzes in the receiver—scattered, senseless syllables to begin with, then whole phrases and sentences. They gave me the position, and I answered that we were coming as fast as we could steam through the fog.

"'Listen for our horn and bombs,' I flashed.

"And we set off bombs and rockets, while our horn boomed monotonously all the time.

"Their flashes grew stronger and stronger, and when I started to send one or two private messages to shore, Binns was able to break in on me.

"'Do not send private messages,' he tapped. 'May have important message any minute.'

"So I refused to take private messages any longer. We crept on through the fog, feeling our way. Whenever we were about to send off a bomb or rocket I signaled the Republic. I told them, too, to listen for our submarine bell. Just after I had flashed them that we were setting off our last bomb, Binns replied that it had been heard. So we found them."

After the transfer of the Republic's passengers from the Florida to the Baltic, while Tattersall was sitting in his office, a man walked in to him and said: "Hello! You're Tattersall, aren't you? I am "Jack" Binns, the wireless operator on the Republic. We've had a good deal to say, and we've had some trouble saying it. How are you?" And then the two sat down for a talk.

Operator Binns' Story.

John R. Binns, the brave wireless telegraph operator on board the steamer Republic, who stuck manfully to his post through all the trying hours from the time that vessel was rammed by the Florida in the early morning of January 23, until final rescue came in response to his calls, furnishes a graphic story of his experiences. He said in part:

I had just turned in for a few hours after the previous day's work when the shock of the impact shook me out of my bunk. A crunching, ripping noise followed as the Florida's bows crumpled up on our side. The panels and side of our cabin fell in, one panel being smashed to splinters, but fortunately the wireless apparatus was unhurt and remained standing.

I had a fear, however, that the aerial wires between the masts might have been shaken down, so I hastily tested them, and most fortunately they were still intact.

Five minutes after the collision the lights all through the ship went out, and we were in total darkness. I tried to make my way to the bridge in order to report to the captain that my gear was all right, but, unable to make my way through the wreckage, I returned to my wrecked cabin. The dynamos being stopped, greatly handicapped the working distance of our station, but the accumulators were in good condition, and so I immediately sounded the "C. Q. D." signal, which announced to surrounding ships the peril of our position.

I gained the attention of our station at Siasconsett on Nantucket Island. This is the message flashed to A. H. Ginman, the operator there:

The Republic. We are shipwrecked. Stand by for Captain's message.

This was the answer that was immediately flashed back to us:

All right, old man. Where are you?

Captain Sealby then sent me this message for transmission:

Republic rammed by unknown steamer. Twenty-six miles southwest of Nantucket Lightship. Badly in need of immediate assistance, but no danger to life.

SEALBY.

Five minutes later Siasconsett informed me that he had sent for the revenue cutter Acushnet, then lying at Wood's Hole, and that it was to proceed to assist us. Word had also been sent to the steamships Baltic, La Lorraine and City of Everett. I was now working under extreme difficulties, as it was very dark. I had unfortunately broken the lever of my sending key just after the lights went out, but eventually managed all right by holding the broken lever with one hand and sending with the other.

Once more I got in communication with the Siasconsett station, and did my utmost to locate the Baltic. I could hear the Baltic's wireless signals as they were being flashed to shore, but my disabled spark was too weak to reach the Baltic's operator.

Just as the Florida returned to us the Baltic began to pick up my signals, and from then on I was kept busy notifying that ship of our position, and from that time forward it was a steady interchange of messages between Tattersall and Balfour, the Baltic's operators, and myself.

The passengers were successfully transferred to the Florida, and not a single mishap occurred to mar this perilous work.

About 2 o'clock I realized for the first time that I was hungry and Douglas, my steward, who had been running to and from the bridge all morning with messages for and from the Captain, was able to get a bite of food and a cup of coffee for me, which I devoured while sending and receiving messages.

Early in the afternoon the Lorraine was able to read us, and we began to give her steering directions, but it was very difficult for her navigator to find us on account of the blanket of fog that enveloped the sea. Darkness set in early, superinduced, of course by the thick weather. The most anxious hour of the day was at about 6 o'clock in the evening, when Captain Sealby heard, only faintly, the explosion of a bomb in the far distance. He at once communicated with me, and I made inquiries, learning that the Baltic had been exploding bombs in an effort to apprise us of her whereabouts. We, too, had been exploding bombs, but exhausted our supply, and from now on had nothing but our almost exhausted and fast-weakening wireless apparatus to which we could pin our hopes of rescue.

The Baltic then informed me that she had but a solitary bomb left, and arranged with us that this would be exploded at a certain moment. This was done, and as we heard the faint rumble there was no further doubt in our minds that the Baltic would soon find us as we tossed about, marooned, as it were, in the fog, and not knowing how long we could remain afloat. Captain Sealby took the direction from which the sound came, and so I was then able to give the Baltic Captain Sealby's orders as to what course the sister ship was to steer to reach us.

These steering directions Captain Sealby changed at times in accordance with the change of sound direction, and a little later we heard the Baltic's fog horn blowing faintly, and this increased in volume as she lessened the distance between us. Occasionally we fired rockets, but they could not be seen through the fog, although a little later the Baltic's siren was heard so plainly that we knew the ship was close by. Realizing this, Captain Sealby issued orders that the Baltic be told to proceed as carefully as possible, as she was now too close on our port side to be safe.

I had just communicated this message when I heard a cheer, and I at once realized that these sounds of rejoicing could not come from our

men, as only Captain Sealby, the officers, myself, and the crew were aboard our ship, and they were all busily engaged in standing by the boats. Looking aft through my splintered cabin, I made out the Baltic quite near the stern of our ship, the fog having again lifted somewhat. She was a blaze of light, and as I sat there in my little cabin the thought occurred to me that the most beautiful sight in the world is a ship at sea, especially when that ship is needed to supply a link between life and death. Time and again it occurred to me, as I worked away in feverish haste, a mere machine voicing the words of our gallant Captain who so heroically watched over the safety of those who had intrusted their lives to him, that the end was near; that it was only a question of how long the ship could withstand the wound that pierced her very vitals, and I had practicaliy resigned myself to the fate that every seafaring man has before him at some time in his career.

We were now apparently settling fast, and Captain Sealby sent this message to me for the Baltic:

Come to our leeward and take up our boats. Have Lorraine and Lucania convoy the Florida. Wireless now closed.

The Captain then sent word to me to come forward from my cabin as soon as I had sent the message off. Reporting to the Captain, I was told to take to the boats with the officers and the crew, who were about to be transferred to the Baltic. After a stiff pull we reached the Baltic, whose people gave the heartiest kind of a cheer as we came alongside.

The following morning, Sunday, the Baltic steamed back to the Republic, and Captain Sealby shouted across asking for volunteers to go and stand by the Republic. The officers, many sailors, myself, and others all went over, which, including the Captain, who had remained aboard all night, made thirty-eight of us all told. Arriving on board, I tested my wireless apparatus, found it to be all right, and so reported the same to the Captain, who at once made wireless inquiries for the tugs that had been sent to our assistance.

By this time the Furnessia had arrived and had been standing by; then the Florida came alongside of the Republic, remaining there as a safeguard for those of us left on our ship, and the Baltic took up her journey to New York with her tremendous burden of human freight.

After seeing the Baltic vanish from view, I bethought me of my wrecked cabin, and later, nailing up some blankets around the rent sides, I soon made it more habitable, and was able to keep sheltered from the chill air. Once more I was ready for business.

At about 4 o'clock Sunday afternoon we had shipped so much water that Captain Sealby decided to order the crew to the boats, and transfer them to the Gresham. I had put a box of cigarettes at my side, so that in case we left in a hurry I could snatch them up, but so unexpectedly did the order come that I forgot to take them, and, being somewhat addicted to the tobacco smoke, and with nothing to smoke, my pangs became more and more acute as night wore on. One of the officers then ordered me to the boat, Captain Sealby and Second Officer Williams remaining on the fast-settling Republic, where they stood calmly awaiting the end. When the Republic went down both men floated off on the water, from which they were rescued by boats from the revenue cutter.

Obituary.

Colonel W. L. Gross, aged sixty-eight years, an old-time telegrapher and a member of the United States Military Telegraph Corps during the Civil War, died of paralysis at Springfield, Ill., on January 17. Judge Gross was Grand Commander of Illinois Knights Templars. He was superintendent of the United States Military Telegraph during the Civil War in the Department of Ohio and later in the Department of the Gulf, and in March, 1865, he was breveted lieutenant-colonel for meritorious service. He was connected with the Western Union Telegraph Company for many years in the Southwest, following the close of the war. About twenty-five years ago he was elected circuit judge, and later was a member of the Illinois House of Representatives. When the tariff bureau of the Western Union Telegraph Company was organized in New York, in 1867, Colonel Gross was appointed its first superintendent.

H. C. Thomas, aged fifty years, a telegraph operator in the employ of the Postal Telegraph-Cable Company at Cleveland, Ohio, was killed on January 12, by accidentally falling down stairs, his neck being broken. Mr. Thomas was of an inventive turn of mind and formerly resided many years in the oil regions of Pennsylvania, where he amassed a fortune. Noting that crude oil flowing through the pipes of the tidewater pipe lines encrusted them with a sediment which in a short time completely blocked the flow of oil, he hit upon a solution which removed this sediment. The solution was placed upon the market. Then followed a long legal battle between Mr. Thomas and the oil company. The oil company, Mr. Thomas declared, was using his solution without giving him proper royalty. The lawsuit dragged through the courts for twelve years. It also consumed Mr. Thomas' fortune. The oil company won and Mr. Thomas was penniless. He then again turned his attention to telegraphy in order to support his family.

The Barclay Printing Telegraph System.

BY WILLIAM FINN.

(Part XVI.)

THE RECEIVING APPARATUS—CONTINUED.

THE PRINTER.

This apparatus consists essentially of an electical typewriting machine, adapted to be operated by current impulses transmitted from a distance, so that letters or other symbols may be printed in the proper order to form words and sentences. In place of the finger keys ordinarily used in typewriting instruments, a series of twenty-eight electro-magnets (known as letter magnets) are employed to set in motion the mechanism for operating the tumblers (one of which is represented by T in Fig. 56) by means of which the typewheel TW is rotated, and otherwise brought into position for printing the different characters.

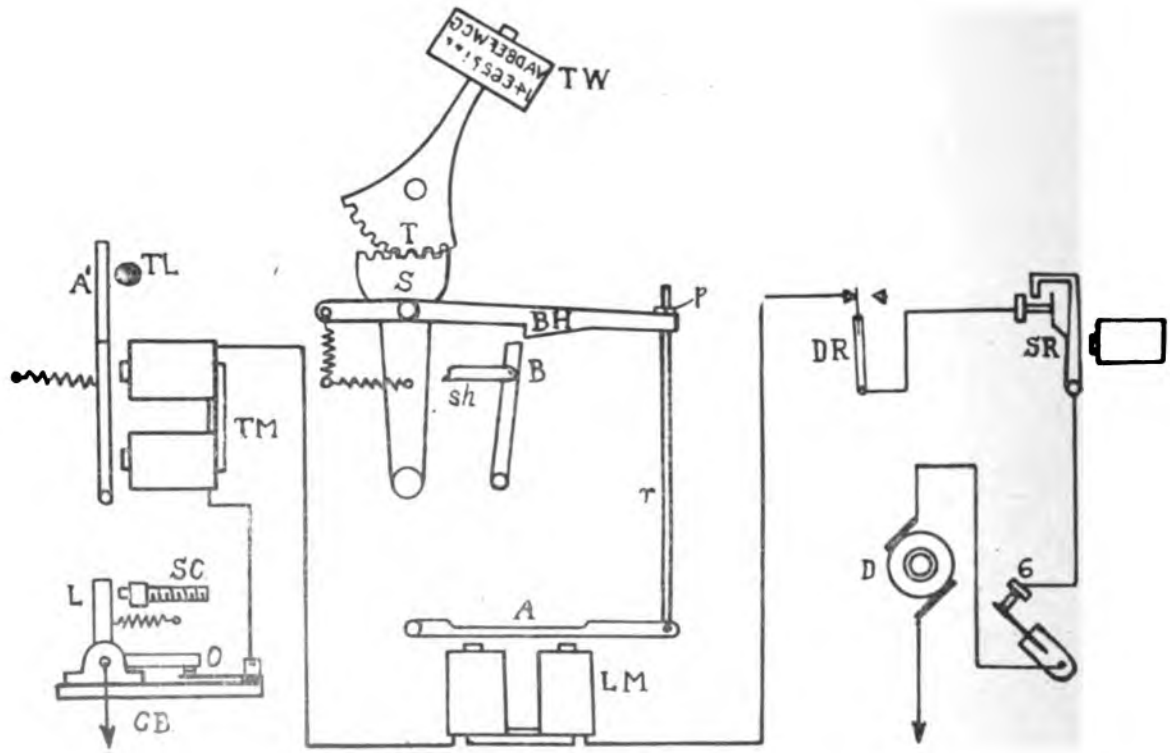


FIG. 56—LOCAL CIRCUIT OF THE LETTER, AND TRIP (OR SPACE) MAGNETS.

The manner of selecting any letter or other character magnet by some distinctive series of long and short current combinations has already been explained, and it now remains to briefly describe the method of bringing into action the various electrical appliances concerned in operating the paper-feed, the typeshift, carriage return, and trip or space magnets, as well as other accessories incidental to the printing operations.

As previously intimated, there are thirty-two spring contact points on the fifth distributing relay. Twenty-eight of these connect with the different electro-magnets representing letters, figures, or other characters; while the other four lead to branches or local circuits in which the paper-feed, typeshift, carriage return, and trip magnets are respectively located. One of the twenty-eight branch circuits is shown in Fig 56; D representing the dynamo, 6, the sixth sunflower contact, SR the sixth pulse relay points, DR a distributing relay point, LM a letter magnet, TM the trip or space magnet, and CB a mechanical circuit breaker. When the last pulse, or what has been termed the printing pulse, of the signaling series arrives, and a local current from dynamo D is caused to traverse this circuit, armature A of the letter magnet LM becomes attracted, and through the medium of the projecting point p, on the upper end of the pivoted rod r, pulls the bail hook BH down in front of the common bail B, to which a forward movement has just been imparted by the driving shaft sh, operated by the motor mechanism. As the bail B, under this impelling force presses onward, it carries with it the bail hook BH, as well as the segment S, on which the bail hook is pivoted. Tumbler T is also pivoted, as seen in the figure, and being in engagement with segment S, is thus given a sort of rocker movement, the upper, or typewheel end, turning to the left, and its lower end to the right. In this way the typewheel TW is rotated into any selected letter position, being at the same time urged towards, and finally brought into contact with the message blank, upon which the letter is then printed by the impact due to the momentum acquired. After the

blow has been struck, a series of retractile springs return the various parts of the affected mechanism to their normal positions.

THE TRIP MAGNET.

This magnet TM, Fig. 56 (also known as the "space" magnet) is connected in the common return wire of all the printer magnets, and operates on the last pulse of every character combination with the exception of the typeshift, paper-feed, and carriage return characters. The particular function of this device is to release one member of a clutch, so that it may engage with a companion member which is kept continually revolving by a small electric motor. This releasing action and closing of the clutch is brought about when the armature lever A' strikes the point TL, which represents one end of the trip lever, and which, under the impact of the blow, moves forward and effects the desired junction between the stationary and revolving parts of the clutch. While the clutch is rotating, a cam is operated in such a manner as to cause a "claw," or carriage feed lever, to move into engagement with the carriage rack, and by a lateral movement communicated to the lever to effect the necessary spacing between letters or words. Between the closure of the clutch mechanism and the operation of the letter magnets, a time interval of sufficient duration must elapse to enable the letter magnet to force the bail hook BH in the path of the advancing bail B, it being understood that the latter is brought into action by the energizing of the trip magnet TM, which occurs simultaneously with the magnetizing of the letter magnet, LM. This time interval is secured by applying a stronger tension to the retractile spring of the trip magnet, or by increasing the distance between its cores and armature. After the clutch has made one complete revolution, its two members are thrown out of engagement by a cam and lever, acting in a manner corresponding with that described in connection with the perforating machine in the July 16 issue of Telegraph Age.

The circuit breaker, CB, is placed in the common return of all the letter magnets for the purpose of opening the circuit when the carriage has reached a position on the extreme left of the machine equal to seventy-five letter spaces. This is done to prevent injury to that part of the typewriter which controls some of the typewheel movements, the idea being that when the end of a line has been reached the adjustable screw SC, which is attached to, and therefore travels with the carriage, will strike against the L-shaped piece L (which is fastened to the frame of the machine), and by thus breaking the circuit at O, prevent any of the letter magnets from being operated until after the carriage has been returned to its starting point.

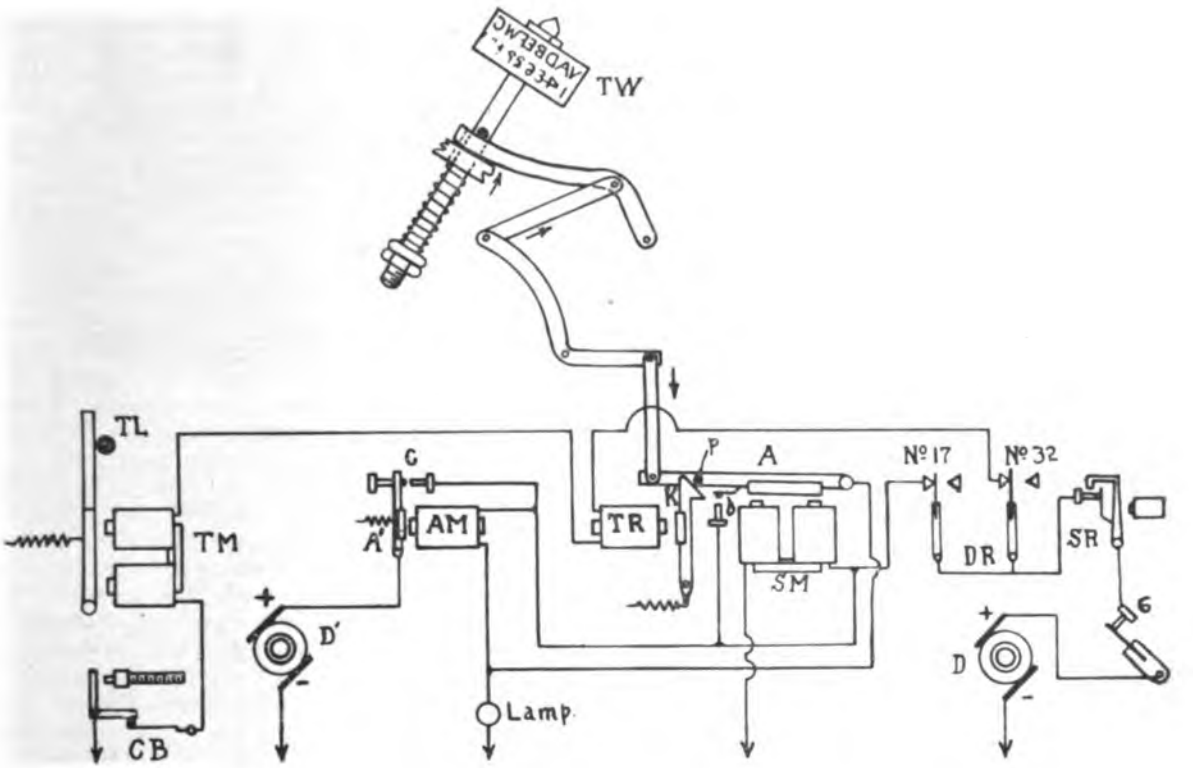


FIG. 57—THE TYPE-SHIFT AND TYPE-RELEASE LOCAL CIRCUIT CONNECTIONS.

THE TYPESHIFT.

The local circuit of the typeshift and type-release magnets is shown in Fig. 57. Current to operate these magnets is received from the sixth pulse points of the sunflower (6) and passes through the back contacts of SR and spring No.

17 of the fifth distributing relay, DR, on its way to the typeshift magnet SM, and via contact spring No. 32 into the circuit of the type-release magnet TR. As the time duration of the sixth pulse contact is not sufficient to enable the current flowing there-through to properly actuate the shift magnet SM, an auxiliary, or assist magnet, AM, is provided for the purpose of keeping the circuit of the shift magnet closed until the latter has fully completed its work of raising the typewheel. The method of doing this is as follows: The current, after passing through No. 17 spring contact, divides between the shift magnet SM and its assistant magnet AM, both of which, it will be noticed, are connected in multiple, and therefore energized at the same time. On account, however, of the time required to operate the typeshift, and the shortness of the sixth pulse current, the circuit of the shift magnet might open before its work was finished but for the fact that as soon as the armature A' of assist magnet AM reaches its front contact C, current from dynamo D' is sent through both the assist magnet and the shift magnet, keeping the latter energized until its armature has completed its stroke, even though the circuit be broken at the sixth pulse relay points. Meanwhile the typewheel has been raised to the position required for printing "upper case" characters, and remains secured in that position through the action of a locking device (designated by the catch K and pin p in the figure) until released by the type-release magnet TR, which operates on the "space" character combination consisting of three dots (...).

It will be seen that when in the course of its downward movement the typeshift armature A, makes contact with stop b, a shunt is established around the coils of the assist magnet AM, the armature of which then flies back and opens the circuit of the shift magnet SM, whose armature may then be unlocked by the subsequent releasing action on the part of TR.

THE TYPE RELEASE.

This magnet TR is placed in series with the trip magnet TM and circuit breaker CB, and, as previously stated, is operated by the "space" signal whenever it is necessary to change the type from upper to lower case characters. Although the type-release magnet is energized every time a space is made between words or groups, its armature simply vibrates without doing any work so long as the shift magnet armature A is in its normal or unattracted position. It is only after the latter has been attracted by the combination of pulses representing the "typeshift," and has brought the typewheel into the locked position for printing figures, that the "space" signal becomes effective by unlocking and releasing the typeshift armature, thereby bringing the typewheel back again to the letter position. In this connection it may be remarked that if at any time it should be desirable to print figure groups with spaces between them, it would be necessary to operate the typeshift at the beginning of each group, since the spacing between the groups would otherwise return the typewheel to the position for printing letters.

(To be continued.)

The Employment of the Earth as Part of an Electric Circuit.

In a paper presented before the International Congress of Applied Electricity at Marseilles, M. E. Brylinski reports on some results obtained by the Committee of Electricity, which investigated this subject under the auspices of the French Government. In telegraphy the earth has been used as a return circuit from the beginning, but when electricity began to be used for light and power purposes the Government forbade the employment of the earth as a return circuit, as serious disturbances in telegraph and telephone lines were often caused thereby. The object of the investigation was to find ways of avoiding these disturbances, as an enormous saving in copper and other line material would be effected and the difficulties of insulation greatly diminished, if the earth could be used as part of the circuit in power transmission, and longer transmission lines than are at present financially feasible could be established. The obstacles to be overcome in the solution of the problem are the preservation of the ground electrodes, effects of electrolysis, of electrostatic and electromagnetic induction and induction by the ground connections. The different questions are dealt with at length, and formulae for calculating the effects in advance are established on the basis of experiments carried out over a line between Lancey and Grenoble in 1907. This line is fourteen kilometers long and transmits simple alternating current at 11,000 volts and forty-two periods, the intensity being regulated to about thirty amperes. Parallel lines on which to observe the effects of induction were situated at distances of eight-and-one-half, 480 and 4,857 meters. On the latter line the effects of electromagnetic induction were inappreciable. However, the author states that the formulae laid down must be verified by experiments made with a line transmitting a larger quantity of energy, say about 100,000 kilowatts, before they can be considered as final.—Abstracted and translated from La Revue Electrique, Paris, December 15, by the Electrical Review and Western Electrician, of Chicago.

The annual report of the American Telephone and Telegraph Company, recently published, states that the company has now upwards of 4,000,000 telephone stations in the United States.

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Whose Splendid Merit Has Made It
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Please read the headline over again. Then its tremendous significance will dawn upon you. An Oliver Typewriter—the standard visible writer—the $100 machine—the most highly perfected typewriter on the market. *Yours for Seventeen cents a day!*

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Yours for Seventeen Cents a Day!

This certainly places a premium on *pennies!* It recognizes *honesty* as a *commercial asset*. Simply save the small change that now slips through your fingers—and own the magnificent New Model No. 5.

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The Standard Visible Writer

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The Oliver Typewriter Company feels safe in putting this new plan into effect because it banks on your *business honor*. Our confidence in *you* is born of our satisfactory dealings with *thousands* of telegraph operators in all parts of the world.

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FEBRUARY 1, 1909.

The Book Department of Telegraph Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Canadian Subscriptions.

In the issue of January 16 we took occasion to refer editorially to the anomalous position occupied by Rudolphe Lemieux, the Canadian Postmaster General, in his advocacy on the one hand of low cable rates, while to his opposition on the other is due the fact that postal charges on second class matter between the two countries has been advanced and remains at a figure amounting almost to prohibition, because of its excess. It is natural that so equivocal a situation, imposing hardships where freer conditions of postal interchange, in accord with modern ideas of progress, should prevail, should awaken a feeling of resentment expressed no less on one side than on the other of the border. The editorial in question seems to have touched a responsive chord, for since its appearance we have heard from numerous Canadian subscribers to Telegraph Age in approval of our words, and requesting to know how they might be of service in bringing influence to bear upon the Dominion post office authorities for a restoration of old rates.

Mr. Lemieux must evidently have recognized the reactionary position in which his administration is placed, because of its recent tender to American publications the right to send their editions in bulk by express or otherwise to several designated points in Canada, from which places they may be, if properly registered, accorded mailing privileges the same as afforded local Canadian journals.

Of all the propositions of "How not to do it," this formula which, without exception, in the history of international comity, furnishes a concrete example amply calculated to increase the gayety of nations. The utter ridiculousness of such a plan, the acceptance of which would make it necessary for every American paper circulating in Canada to practically establish a special bureau at the place, or places, selected for sub-distribution, would cause its rejection.

We urge our Canadian subscribers, between whom and ourselves no arbitrary rule of cleavage should be permitted, to write to their Postmaster General at Ottawa, in vigorous protest of this harsh postal ruling, which in effect imposes an added cost of fifty cents a year to each for his copy of Telegraph Age. Were the law abrogated it would react equally in favor of Canadian journals circulating in the United States. The Canadian people will find that a desire, if expressed on the part of their Postmaster General, for a restoration of former rates of postage between that country and our own, will be met more than half way by the American postal authorities, who have deplored the present schedule and who have always stood ready to restore former conditions. A vigorously voiced Canadian expression in this matter ought not to be without influence.

Mr. Ward on the Cables.

The review by George Gray Ward, vice-president and general manager of the Commercial Cable Company, in his recent letter addressed to the committee of foreign and insular trade of the New York Board of Trade and Transportation, covering the cable situation so far as recent criticisms are concerned, raised by agitators on that subject, who take their cue from a controversial movement started in England, furnishes an able rejoiner to the questions that have been advanced. Mr. Ward, whose expert knowledge entitles him to rank among the leading cable authorities of the world, makes it clear, in the first place, that the business men in New York and elsewhere, those who use the cables, do not so much desire cheaper cable rates *per se*, as they do efficient cable service. Of course no one is willing to be overcharged, or should be overcharged, but the cable companies are entitled to and must make their tolls commensurate with the service rendered, which is admittedly of a first class character. This is common business sense. Business men who use the cables, recognizing

this, overcome any question of high rates by making use of code words which at the same time enables them to preserve secrecy in their message transmissions. If the advocates of cheaper ocean telegraphy imagine for one moment that the business community will abandon these features in cabling, it may be declared that they are wofully in error.

Yet the use of code words employed in cabling appears, singularly enough, to be misunderstood by many who nevertheless stand ready to pass strictures on the cable. Mr. Ward's statement that twenty plain words could he expressed in a single arbitrary word of ten letters of prearranged meaning, as found in the average private code, for which the charge of but a single word is made, would appear to meet and dispose of all querulousness on this point. It is difficult to conceive of cheaper cabling. Persons desiring to take advantage of the cable for the transmission of ordinary correspondence, if, indeed any such there be, might obtain low rates, if they too would adopt the business man's expedient, and call into use any of the numerous public codes, some of which may be readily consulted free or obtained at low cost. It is preposterous for any one in the absence of all practical knowledge governing the cost of maintenance and the method of working of the cables, to urge the claim of employing an indefinite number of ordinary words in the sending of lengthy messages at a rate of charge so low in itself as to be fairly prohibitive.

An instance of our personal use of the cable and cipher code is offered in illustration of what Mr. Ward has to say on this subject. A few days since we were asked to cable a London house and requested to make use of a certain public cipher code. After framing our message, which consisted of about fifty words, we found we could condense it into five cable words. Nothing could more forcibly confirm Mr. Ward's utterances.

Wireless Telegraphy and the Steamer Republic.

Wireless telegraphy has had a crowning laurel placed upon its brow! The magnificent achievement accomplished through this means of communication by which the passengers and crew of the White Star Steamer Republic were rescued off Nantucket Island, on Saturday, January 23, is a signal victory of wireless telegraphy of which the scientific as well as the lay world may well be proud. Whatever limitations that system may have in transmission over land, its adaptation for communication across water spaces, between ship and shore, and ship and ship, has received such fresh and abundant demonstration, and under circumstances of such stress and urgent demand, as to afford a practical manifestation of the highest importance of the great inherent possibilities attaching to the system.

For it is probable that in the absence of radio-telegraphy, by which means assistance was readily and effectively summoned, the Republic would have buried her living freight at sea, and another ocean horror would have been recorded. The story of rescue, as told, relates how that numerous points on shore were promptly communicated with—that passing ocean liners within a radius of one hundred and fifty miles or more received the news of the dire strait of the injured ship, and how in response to the information borne to them through the night and heavy fog which prevailed, rescuing vessels quickly started out from port while others veered in their courses, all bent upon finding and affording succor to the sinking steamer. In all of its details —the distress signal of "C. Q. D" sent out by J. R. Binns, the brave wireless operator on board the Republic, the answering messages received from all sides announcing that help was coming, in fact was near at hand, and bidding those fearful of death to be of good cheer, presents not only a graphic and thrilling picture in itself, fraught with undescribable pathos, but reveals in new measure the practical workings of this newest system of telegraphy in being able to transform, happily, the conditions of ocean travel. If a vessel in distress happens to be near shore or near the lane of ocean travel, it can usually make its condition known to many possible rescuers. The one feature of ability to keep afloat several hours makes rescue fairly certain.

There is more urgency than ever before that drastic laws should be enacted by all governments compelling all vessels, particularly those engaged in carrying passengers, to be equipped with wireless telegraph outfits. Vessels which are not thus equipped should be regarded as a menace to navigation when on the high seas and all such should be denied clearance papers. The colliding steamer, the Florida, although a passenger carrying craft with over nine hundred passengers on board, did not have a wireless equipment, which was, we claim, the direct cause of the collision. Had both vessels carried wireless apparatus, the operators on each would have been able to have gauged the coming of the other. The intensity of the arriving electric waves on the receiving apparatus plainly and positively indicates the distance of the approaching vessels towards each other. The Republic's signals of warning, such as are sent out during the prevalence of heavy fog, were of course not received on the Florida, which was not equipped for the purpose. The lesson to be learned, therefore, by this disaster is that the Governments concerned should waste no time in insisting upon wireless equipments being placed on every sea-going vessel and the same being properly attested on the ship's papers issued to the vessel before leaving port.

Development in Wireless Telephony.*

BY WILLIAM MAVER, JR.

Wireless telephony is not altogether a new art. Over ten years ago Sir William H. Preece, in England, succeeded in transmitting speech without wires between the Skerries Lightship and the mainland of Anglesey, a distance of three miles across water. This was accomplished by the use of parallel wires stretched on poles along the shore of the island and the mainland. A telephone transmitter on one wire set up magnetic waves that were received by a telephone receiver in the other parallel wire. It was assumed in this experiment—it is more than an experiment, however, for the arrangement has been for years, and still is in practical operation—that magnetic induction through the air and electric conduction through the water assisted in the transmission of speech.

Another type of wireless telephony is that in which variations in the luminosity of a beam of light are caused to reproduce speech at a distance. This device, which in some measure, is analogous to the latest developments of wireless telephony by electro-magnetic waves, is due to Alexander Graham Bell, the inventor of the telephone.

In the operation of this device, Bell caused a ray of light to fall upon a small concave mirror carried on the center of a suitable diaphragm at the end of a mouthpiece. From this mirror the ray was reflected as a parallel beam of light, and fell upon a distant parabolic reflector, in the focus of which reflector was placed a selenium cell. It is well known that the electrical resistance of selenium varies in accordance with variations of light to which it may be subjected. This selenium cell is made a part of a circuit containing a telephone receiver and a small battery. When the reflected light from the mirror falls on the selenium cell it takes on a certain resistance and a steady current flows in the circuit, depending on the amount of the resistance. When, however, sounds are spoken into the mouthpiece of the transmitter, the vibrations of the mirror on the diaphragm cause variations in the luminosity of the beam of light and these variations in turn affect the selenium cell, causing variations in its resistance, and consequently variations in the current strength of the circuit, which react upon the telephone receiver and reproduce speech very clearly. But the distance to which speech has been transmitted by this device is rather short—about 300 or 400 feet.

Subsequently, Simon, of Germany, discovered that if the resistance of the circuit of an arc light be disturbed by the introduction of a telephone transmitter in the circuit, the arc itself will reproduce speech spoken into the transmitter. The assumed explanation of this phenomenon is that it is due to rapid variations of the volume of the vapor of the arc caused by the variations of the current strength due to the vibrations of the transmitter when spoken into; the corresponding variations in the vapor of the arc setting up sound waves in the air. This is termed the speaking arc phenomenon. The following further explanation of or analogy to this phenomenon may be offered. The explanation of a thunder clap is that it is due to the rapid expansion and contraction of the air due to the lightning discharge. Analogously, we may consider the effect of the microphone transmitter upon the arc to be the production of minute changes of temperature in the arc that in turn cause condensations and rarefactions of the surrounding air corresponding to sound waves which we may regard as miniature thunder claps and which, occurring as they do in response to the vibrations of the transmitter, due to the voice, are recognized by us as articulate speech.

Following Simon's discovery, Bell and Hayes found that the electric arc itself could be used as a transmitter of speech. Their method consists in placing the arc light in the center of a parabolic reflector. A telephone transmitter placed across the terminals of the arc light causes variations in its light which, although not visible to the eye, can be detected by a suitable detector in the focus of a parabolic reflector; this in turn reproducing speech in a telephone receiver. (Described at length in author's "Wireless Telegraphy.")

This idea was advanced a long step by M. E. Ruhmer, of Berlin, who utilized a sensitive selenium cell in the center of the receiving parabolic reflector and succeeded in transmitting speech due to the variations (caused by a microphone transmitter) in the intensity of a search light, to a distance of about ten miles. Some of the selenium cells used by Ruhmer have a resistance in the dark of about 25000 ohms, which drops to about 1500 ohms in the light.

In all of these systems of wireless telephony it will be observed that speech is transmitted by modifying the ether waves that constitute light. Systems of this kind, however successful they might be in actual operation, would obviously be limited as to distance of transmission by the actual distance at which light is visible under the best atmospheric conditions, about thirty miles, and in times of fog and thick weather, this distance would be largely reduced.

Early workers in this field quickly recognized that if it were feasible to modify the electro-magnetic waves used in wireless telegraphy, a wireless telephone system might be developed that would be operative at distances, perhaps, approximating to that of wireless telegraphy, and that would not be limited in its operation by smoke, fog or other somewhat similar atmospheric conditions.

But the difficulty in thus utilizing electric waves has been that the waves set up by

* A paper read at the Montreal Convention of the Association of Railway Telegraph Superintendents.

the spark in wireless telegraphy are highly intermittent and are very quickly damped. Assume, for example, that an alternating current generator or the interruptor of an induction coil, giving an alternating current of say, eighty cycles per second, is employed as the source of current supply in wireless telegraph. These alternations, by charging the oscillator circuit, may give rise to a frequency of, say, 800,000 cycles per second in the aerial wire. Unfortunately, however, owing to the damping of the oscillations, due to heat loss and the loss due to radiating energy in the shape of electric waves, these oscillations die out very rapidly and last for only a very small fraction of a second, and in consequence of this effect there is a comparatively long interval between the spark discharges (nearly one-ninetieth of a second) during which time no electric waves are radiated. In wireless telegraphy these pauses or breaks, or rather the beginnings of the new discharges, are observable in the telephone receiver as a tone or buzz which is broken into dots and dashes by the Morse key. Therefore, inasmuch as many of the tones, or overtones, that compose articulate speech consist of vibrations of 5000 to 8000 per second, it is clear that many of these tones would be lost during the pause between the spark discharges, which, of course, would conduce to inarticulate speech. Furthermore, obviously the noises in the telephone, due to the intermittent nature of the spark discharges, would prevent the successful transmission of speech.

To obviate this difficulty, a number of inventors have directed their energies toward the design of a machine generator that would deliver a smooth alternating current of very high frequency, but until somewhat recently, not with very marked success, the irregularity of the machines making the reception of speech difficult. Mr. Fessenden has lately devised a machine generator giving an output of two volts and a frequency of 80,000 cycles per second at a speed of 8340 revolutions per minute. With this machine as the source of current supply, Mr. Fessenden reports that he has succeeded in transmitting speech between Long Island and Brent Rock (near Boston), a distance of about two hundred miles.

Another method entirely different from the machine method, of obtaining sustained oscillations, is that due to Mr. Duddell's discovery of the singing arc. The principle of this discovery is that when an arc lamp, fed by a direct current of about two hundred and fifty volts, is shunted with a suitable capacity, and an inductance, alternating currents of a frequency of 40000 per second are established in the shunt circuit. Mr. Duddell's explanation of this phenomenon is that at the moment when the shunt circuit is completed a current flows from the arc into the condenser circuit, which decreases the current flowing in the arc. This causes an increase in the difference of potential between the terminals of the arc, causing still more current to flow in the condenser circuit and raising its potential above the normal voltage of the arc. In consequence the condenser begins to discharge back into the arc, increasing the current in the arc and reducing the potential difference between the terminals. The condenser now discharges too much and the reverse process is set up and sustained or continuous oscillations are in this way maintained in the shunt circuit.

Owing to the comparatively high frequency and the smoothness of these sustained oscillations, the telephone receiver will not, by reason of its electrical inertia, respond to them. Hence, if sustained oscillations, whether generated by a machine or by the arc, are to be utilized in wireless telegraphy some method of breaking the continuity of the waves has to be adopted, practically as, in certain other telegraph systems, a continuous current is broken by a buzzer and is heard in the telephone as a tone. Furthermore, while the telephone will not respond to the high frequency continuous oscillations of the Duddell arc, if the amplitude of the oscillations be varied to a degree that comes within range of the receptivity of the telephone receiver, as, for example, by speaking into a microphone transmitter placed in the aerial or in the oscillation circuit, the telephone receiver will respond and reproduce the speech spoken at the transmitter, practically as speech is reproduced by varying the amplitude of the waves of a beam of light in the cases mentioned.

So long however, as the oscillations of the singing arc were limited to about 40000 per second, but little practical use could be made of it owing chiefly to the weak magnetic effects at comparatively low frequencies, and the consequent inability to radiate wave energy of much power. Fortunately, it was discovered by Poulsen, the inventor of the telegraphone, that if the singing arc is placed in an atmosphere of hydrogen or other gas of high heat conducting qualities, the frequency of the oscillations are increased to a remarkable degree, namely, in some cases to 500,000 cycles per second and over. It was also found that by burning the arc in nitrogen gas, compressed air or in steam, the frequency of the arc oscillator is much increased. The flame from an alcohol lamp placed under the arc also has this effect.

The electrodes of the oscillating arc consist of a solid carbon (negative) and a copper tube (positive). The copper electrode is cooled by a stream of water passing through it; Poulsen having found that this cooling of the metal electrode increases the efficiency of the arc as a generator of oscillations. The capacity used in some experimental installations is quite small, being about .02 microfarads, but information as to the exact proportions of capacity and inductance employed in practice are not at present procurable. The arc requires for its proper operation in producing oscillations in the shunt circuit, a current

of certain strength and a certain length of arc. For instance, Poulsen has found that with a difference of potential of two hundred and twenty volts at the arc it ceases to set up oscillations when the current falls below six amperes, with a water cooled positive electrode, or below four amperes with a non-cooled electrode.

The discovery of the oscillating arc opened the way for the use of these sustained oscillations in wireless telephony, and Poulsen and the Telefunken Wireless Company in Europe, and De Forest in this country, have made considerable progress in telephoning to a distance by modifications of this arrangement of the singing arc.

When the oscillating arc is employed the inductance is made part of a transformer, the secondary of which is in the aerial wire circuit. De Forest modifies the oscillations by placing a microphone transmitter directly in the aerial wire. Poulsen modifies the oscillations by means of a microphone transmitter inductively connected with the supply or feed circuit of the arc. Fessenden modifies the oscillations set up by the machine generator by means of a microphone transmitter in the generator circuit: the generator and transmitter being connected in the aerial circuit.

A detector such as is employed in wireless telegraphy, is availed of in wireless telephony. Fessenden and Poulsen use the electrolytic, or liquid barreter, or a thermo electric couple as detectors, while De Forest utilizes the audion, all in combination, of course, with a telephone receiver in a local circuit.

The Telefunken Company in Germany, experimenting with wireless telephony, employ the singing arc burning in air with a water cooled copper electrode. It having been found that with the arc burning in air the frequency of the oscillations is increased by putting a number of arcs in series, the Telefunken Company place six of the arcs in series on a two hundred and twenty volt supply circuit, and twelve arcs on a four hundred and forty volt supply circuit.

Reports of these experiments place the speaking distances at about twenty-five miles. These and other experimenters in wireless telephony in which the arc oscillator is employed, indicate that considerable difficulty is met with in maintaining a uniform tone of the voice in the telephone; the words being received in alternately low and high tones, rendering speech indistinct and very hard to understand. This is doubtless due to irregularities in the operation of the arc.

In connection with the wireless telephone experiments thus far made by Mr. Fessenden, between Brent Rock, Mass., and a station in the vicinity of New York City, it is reported that speech has been transmitted with an expenditure of only two hundred watts, less than one-third of a horse-power. On this basis, Mr. Fessenden concludes that with a mast six hundred feet high and an expenditure of ten volts it will be possible to telephone between America and Europe without wires.

It may be noted that Mr. Fessenden has in operation a wireless duplex telephone system in which he employs an inductance and capacity to balance, as in wire telegraphy, but, of course, no resistance.

A great advantage to be obtained by sustained oscillations, both in wireless telegraphy and telephony, is that the property of resonance may be more fully availed of than with more or less intermittent oscillations. In some respects, however, perhaps, sustained oscillations and the better resonance gained thereby may be of more utility for wireless telegraph purposes than wireless telephony, especially as regards increased distance of transmission. This appears obvious if it be considered that in both wireless telegraphy and wireless telephony the receiving apparatus is practically the same. In wireless telegraphy, however, the full effect of the radiated waves from maximum to zero is available, whereas only a comparatively small portion of the received wave energy, namely, the modifications of the wave energy due to the action of the microphone transmitter (about five per cent. of the total energy, it has been estimated), is available in wireless telephony. Improvements in the direction of more powerful transmitters whereby a large percentage of variations in the amplitude of the waves may be obtained, are now to be looked for. It is stated that Fessenden expects to perfect a transmitter capable of producing a variation of twenty-five or fifty per cent.

As the writer remarked in the opening words of his paper on "Wireless Telegraphy," read before the association last year, "wireless telephony, if only available for a comparatively short distance, obviously could be installed to advantage in the officer's room of every ship that floats ocean, lake, river or harbor," because of the fact that it requires no specially trained operator. But it was, of course, assumed that the apparatus would be considerably less complicated than that in use in wireless telegraphy. At present this is not the case, and the amount of expertness necessary to properly manipulate the present apparatus is, rather, beyond that now possessed by the ordinary ship's officer.

Still, wireless telephony may now be said to have arrived at a point of practical utility, although, of course, as previously intimated, it is still susceptible of much improvement in many directions.

Telephoning without wires has the advantage over wire or cable telephony that it does not have to contend with the static capacity of the conductor. When, therefore, the necessary improvements in this art have been made it is perhaps, not beyond bounds to expect that the claims now made by certain enthusiastic inventors, as to transatlantic wireless telephony, and which in some quarters are considered visionary, may be ultimately realized.

The First International Conference of Telegraph Technicians.

The First International Conference of Telegraph and Telephone Technicians was held at Budapest, Hungary, in September, 1908, the deliberations lasting ten days. Austria was represented by twelve delegates; Bulgaria, one; Denmark, one; France, three; Germany, twelve; Great Britain, three; Holland, two; Hungary, twenty-five; Italy, three; Roumania, three; Servia, three; Sweden, two, and Turkey, two. The standing regulations of the Conference were discussed and adopted. The following points were included: First, the president of the Conference shall be the senior technical officer of the administration convoking the Conference; second, a vice-president shall be elected by each Conference; third, the only questions admitted to the deliberations of the Conference shall be those associated with the technical aspect of the telegraph and telephone services: resolutions modifying this regulation are not in order; fourth, a bureau shall be elected at the first sitting, and shall be responsible for the preparation and issue of a *proces-verbal* of each sitting, which shall contain the title of each lecture and the debates thereon. The full text of the lectures shall appear as an appendix to the *proces-verbal.*

Major O'Meara, head of the British telegraphs, was unanimously elected to the position of vice-president, and the bureau was elected and constituted as follows: Chief, M. Hollos; editors, M. Gutzmann, M. Sandor, M. Hill, M. Mirabelli, M. Vidic, M. Fodor, M. de Komarnicki.

The following lectures were delivered and discussed: Dr. Mirabelli (Italy).—"Methods of Overcoming Disturbances of Telegraph Working Caused by Electrical Traction Systems;" Major O'Meara (Great Britain).—"The Main Telegraph Cable System of the British Isles;" M. Bazille (France).—"Types of Subterranean Cables Employed in France" (given by M. Hollos in M. Bazille's absence); Dr. Strecker (Germany).—"The Provision of Current for Telegraph and Telephone Purposes by Means of Secondary Batteries;" Mr. Purves (Great Britain).—"Telegraph Inter-Communication and Concentration Switching, and the Applications of the Central Battery System to Telegraph Working;" M. Bela Gati (Hungary).—"The Measurement of Line Constants by means of the Barretter;" M. Kraatz (Germany).—"Machine and Multiplex Telegraph Systems;" M. Bazille (France).—"Baudot Telegraph System;" M. Hollos (Hungary).—"Comparative Results of New Telegraph Systems;" M. Montinari (Italy).—"Improvements in Apparatus for Closed Circuit Telegraph Working."

At the closing sitting, on September 29, MM. Barth and Strecker proposed the formation of a committee for the regulation of the next Conference. Among other resolutions the following were adopted: The International Conference of Telegraph Technicians at Budapest, 1908, institutes a committee for the management of the next Conference; The place of meeting of the committee is Budapest; The Conference shall prescribe to the committee certain subjects to be studied, and the committee shall designate at least two of its members to deal specially with each subject, and prepare it for treatment at the next Conference.

The following members of committee were elected:

Hungary.—M. Kolossvary, president. Austria.—M. Karl Barth von Wehrenalp. Bavaria.—M. Stegmann. Bulgaria.—M. Rousseff. Denmark.—M. Krarup. France.—M. Estaunie. Germany.—Dr. Strecker. Great Britain.—Major O'Meara. Holland.—M. Collette. Hungary.—M. Vater, M. Hollos. Italy.—Dr. Mirabelli. Roumania.—M. Radacovitch. Russia.—M. Evangoulow. Servia.—M. Petrovitch. Sweden.—M. Rydin. Turkey.—M. Ferid. Wurttemberg.—M. Ritter.

After election the committee unanimously co-opted as additional members: Professor di Pirro (Italy), and M. Breisig (Germany).

One of the subjects referred to the committee for special study was the best means of avoiding damage or interference to telegraph and telephone circuits by power circuits.

It was decided that the next Conference should be held in 1910 at a place and date to be determined by the committee later, and that the locality should be announced at least six months in advance of the time of meeting.

On September 25 the delegates to the Conference were conveyed by special train to Puspokladany, where the Hungarian administration has recently established an impregnation plant for creosoting telegraph poles. Until recently untreated timber was used exclusively. An extensive study of creosoting methods was made before the plant was erected, and the whole, including the arrangements for handling and stacking the timber, is exceedingly up-to-date and efficient. Native Hungarian timber is exclusively used.

Among the papers read at the Conference, one by Dr. E. Mirabelli, of Rome, on the "Method of Overcoming Disturbances of Telegraph Working Caused by Electrical Traction Systems," is of interest. In an abstract printed in the Post Office Electrical Engineers' Journal, London, is the following:

The author gives details showing the rapid increase of electrical traction systems, and proceeds to describe disturbances of telegraphic circuits experienced in the neighborhood of such systems in Italy. He has conducted special experiments in connection with circuits following the route of the Valtelina Electric Railway between Lecco and Chiavenna, a distance of one hundred and ten kilometers. The power transmission is three-phase at 15,000 volts, and the conductors follow closely the route of the railway. Ten sub-stations are placed at intervals of about ten kilometers, and in these the current is transformed to 3,000

volts, three-phase, and fed to the electric trains by two conductors ninety centimeters apart, the rails constituting the third conductor. Generally the same supports carry both the primary and secondary power circuits.

He mentions also another railway—Milan to Porto Ceresio—with three-phase transmission at 13,000 volts transformed to six hundred and fifty volts continuous for the train service, which is fed by a central rail. The three-phase supply mains follow the line at a distance of ten to thirty meters. This system has caused no disturbance to the telegraph circuits which run alongside the railway.

Several experiments with the circuits adjacent to the Valtelina Railway are described in detail. The main disturbance was found to be due to induction from the two service conductors forming elements of the 3000 volt secondary three-phase system fed to the trains. There was little disturbance due to leakage, except when heavy trains were running in positions close to the sub-stations. Differences of earth potential exceeding five volts between sub-stations were noted. The total interference rendered telegraphic communication quite impossible, and the only practicable cure was to double the wires for the whole length adjacent to the railway, and insert a repeater at each end. Even then the insulation of the lines had to be very carefully maintained to avoid disturbance. Trials of closed circuit working with fairly high current were therefore made, and found to ameliorate the conditions considerably. It was, in fact, found possible to withdraw the repeaters at one end, and simply to earth the second wire at that point. The circuits are now working in this way with fair success.

The alternatives suggested for further trial and consideration are: (1), The application of condensers and inductive resistances in the telegraph circuits in order to separate the currents of different natures; (2) doubling the aërial telegraphic wires wholly or in part; (3) laying underground cables along the railway for loop working; (4) arranging that power services shall use continuous current at low voltage in the secondary circuits or three-phase secondary currents, fed to the motors by symmetrically placed conductors. The Italian administration is continuing experiments on the subject.

In the ensuing discussion Professor di Pirro, Rome, laid down the lines on which such investigations might most profitably be conducted. He hoped to be able to furnish the next Conference with the results of his personal experiments and deductions.

Monsieur Barth, Vienna, and Dr. Strecker, Berlin, dwelt upon the importance of the matter, and proposed that it should be one of the subjects referred to the committee for special study and fuller discussion at the next Conference. This was agreed to.

Another paper read at the Conference was one by Major W. A. J. O'Meara, the head of the British telegraphs, under the title of the "Main Telegraph Cable System of the British Isles," of which The Post Office Electrical Engineers' Journal of London, also furnishes a brief abstract, as follows:

Major O'Meara gave a historical sketch of the development of underground telegraph cable working in Great Britain from the earliest days to the present time, of which he presented interesting plans. Financial, engineering, and traffic statistics with reference to the projects now in course of execution were furnished, together with complete descriptions of the materials used, the methods of planning and organizing the work, the operations of trenching, constructing manholes and joint-boxes, erecting test-pillars, cable laying, jointing and testing. The various types of cable utilized, composite and otherwise, were fully described and illustrated, together with tools and special appliances. Schedules of faults were appended, giving their nature and cause and the methods of dealing with them. The methods of eliminating inductive disturbances from wire to wire and of connecting the conductors for loop and superimposed working were also exhaustively treated. Working speeds were analyzed and illustrated.

Music of the Telegraph.

Every one has put his ear to a telegraph pole to hear the wires hum, and most people have assumed that the wind was entirely responsible for the sound. So it is, in many cases, but often the note is heard where not the slightest movement of the air is perceptible. A recent French investigator, says an exchange, tells us that the sound in this case is due to the expansion and contraction of the wires from variations of temperature. As the wires are not perfectly uniform, they rub against the insulators, making a slight noise, which is amplified by the pole acting as a sounding board. Another investigator is sure that the sounds are due to electric waves, but he fails to explain how ordinary telegraph wires should be able to serve as wave detectors and in what way the electric waves are transformed into sound waves. The other theory seems more probable.

Some curious stories are told of this telegraph wire music. In Siberia the bears think that it is the buzzing of bees and would tear down the poles to look for honey if the constructors did not pile great stones about them to prevent this. In France, on the south side of the forest of Fontainebleau, the telegraph sounds are regarded as presaging rain. This is because the south wind in this region brings rain, and the forest shuts off the north wind. In some districts the noise is popularly supposed to be due to the passage of messages, but it is hardly necessary to say that there is no evidence to support this view.

The Military Telegrapher in the Civil War.

PART XIII.

Samuel H. Edwards was a well known military telegrapher during the Civil War, and participated actively in events covering the latter half of that great conflict. He was a man of fine intelligence, and while properly mindful of the seriousness of the occupation that called him to the front, never failed to take in the humor of the situation as it frequently presented itself to him. Mr. Edwards died in Brooklyn nearly thirty years ago, widely mourned by a large circle of acquaintances by whom he was held in high esteem, possessing the qualities that combine to produce the gentleman.

In writing to Colonel William R. Plum, the historian of the United States Military Telegraph Corps, when the latter was gathering data for his history of the military telegraphers, Mr. Edwards in a letter from New York in September, 1878, said:

"I entered the United States Military Telegraph service about April 1, 1863. My first assignment was in the War Department office where I remained two or three weeks, during which time I continually pestered our worthy superintendent, David H. Bates, to be allowed to go to the front. Yielding to my importunities, he at last consented, and about the first of May I started for Falmouth, Va., via Acquia Creek, on the steamboat John Brooks, which many will remember as a familiar object in New York Harbor. Disembarking from the vessel in the evening I completed my journey by train, which consisted of two cattle and three box cars, to which Thomas Dolan, now night manager of the Western Union Telegraph Company, New York, conducted me. There being no room in the interior of the cars, I was perforce compelled to clamber to the roof where, wrapped in a blanket, I prepared to make the best of the situation for the next few hours during the run to Falmouth. You may be sure that it was not a sleeping berth that I occupied. Sparks from the engine flew in all directions, a kind of pyrotechnic display occasionally lodging in my hair and setting it on fire. It must be admitted that this was a peculiar experience, one calculated to impress a new beginner that a state of war was—well, different from that of peace.

"Falmouth was reached about midnight, and rather tired and stiff from the effects of my unusual roost, I immediately sought out and reported to my friend Harper Caldwell, who was chief operator, and his assistant, Joe Pierce, both of whom are now dead. They soon had me under blankets, with the 'downy' earth for a bed, and, tired as I was, I was soon in slumberland. The next morning, in company with William K. DeWitte, I was sent to General John Sedgwick's headquarters at Banks Ford, near Fredericksburg, and here 'the front' was revealed to my mind, and body, too, in all its force and glory. Here there was service a-plenty. About May 2 or 3, the date being that of the Battle of Fredericksburg Heights, pontoons were used to transport the army over the river. The battle was a hard one. During the engagement quite a rivalry arose between the much vaunted Myers field telegraph system and that of our own. DeWitte was stationed at the pontoon crossing, and I was in the woods about an eighth of a mile back, with General Sedgwick, at headquarters. Close beside each of us a Myers man was placed. I asked DeWitte to give those fellows a taste of what we could do; and he did. We beat them so badly that that one day's fight settled the Myers' system, as far as General Sedgwick was concerned, and from that time I never saw it in active service again.

"During the second day's fight (I think the day our forces retired), I was sunstruck, or had a fit of some kind, and lost my senses for a while. I can only account for it by remembering a ten-pounder passing over my head with such a whiz that it must have produced a numbness that lasted two days and one night. When I 'woke up,' or 'came to,' I found that I had bitten my tongue in the center, and so ignorant was I of the cause I asked De Witte, by note, what had happened to me that my tongue was so swollen. He could not tell me, only that as the shell passed over my head I dropped. They thought I had 'stopped it,' and were glad to know that I had my wind yet.

"Following the battle I was ordered to report at General Franz Siegel's headquarters at Stafford Court House. I rode thither on a sorrel horse that the orderly, who was my escort, denominated Secretary Chase. Here I remained two or three weeks living in a deserted mansion. I had nothing much to do, as the army was then lying still. A division or two would be telegraphed for occasionally to go to some point distant to help on earthworks, but there was no fighting in that vicinity. The telegraph line was cut several times by bushwhackers. On one occasion I remember the line being down, Repairer William McIntosh, who is now superintendent, I think, went to the point of breakage, and on arriving back told me that some of Siegel's men had cut the line and 'were using the wire for pot handles.' Ten-Eyck Fonda, Ed. A. Hall (now dead), were with me at this point. I well recollect a dish that our 'Susie' used to serve up to us—the only time in my life that I ever ate baked shad stuffed with beans. Once or twice a week we would be treated to this food. The shad, the finest in the world, were taken from the Potomac River at Hope Landing.

"Ed. Hall and myself left Stafford Court House about June 5 to join the Fifth Army Corps, which was camped at Berhia Church. I remember riding through the whole Eleventh Corps on the way to reach our destination, and heard many a shout as we rode along, "Let the telegraphers through. They'll get us into a fight and out of it, too!' The men as a general thing relied on the

telegraph for help and were always ready to render the operators service. Later in the month I went to Centreville, there becoming attached to General W. S. Hancock's corps, which soon moved to Thoroughfare Gap, a beautiful spot. As we were about to leave this place General Hancock recollected that he wished to get some farther information or instructions from Gainesville, and having said 'good-bye' to the last office and let the wire go down the hillside, General Hancock asked me if I could not go to a point half a mile below camp and there try to regain the circuit, that he wanted 'one more word' with another officer. I told him I would try; that if the ground wire at Gainesville was imperfect I might make them hear me, though I did not like the looks of the 'Johnnies' in the woods beyond. He told me to go and do what I could and that his men would 'cover me.' I went, made an effort to establish communication, but the ground was 'too good.' I could get nothing at all. Had I succeeded in getting the circuit, I was to wave my cap and a force would be sent to get the line in a good place for the general. But I did not wave, and as I left the spot the 'Johnnies' opened fire on me, which was returned by our men. I truly never felt so grateful in my life, not that I was yet alive, but in the thought that General Hancock thought enough of my life to shield me. The tears came, I couldn't stop them; and when the general said, 'You've got lots of grit for a civilian,' I felt more grateful than before.

"After this came the grand race northward between the Confederate forces under General Lee and the Union army, the latter hastening to overtake and check the advance of the former into Pennsylvania. Then followed the tremendous battle at Gettysburg, from the disastrous effects of which the Southern army never recovered. We reached Gettysburg, if my memory serves me correctly, on July 3. There were no telegraph lines up, and no time to build them, for we were too much hurried. All orders were conveyed by orderlies from the commanding general. It was an awful time. I remember seeing General Daniel E. Sickles hit with a shell. Ed. Hall and myself were close to him. The general showed great personal bravery, was calm, cool and collected, and when his leg was shot away, hanging only by his clothing, I heard him ask for a cigar. After the battle and while the troops were resting, Hall and myself went by horse to Taneytown, Md., and thence by train to Baltimore, reporting there at General Schenck's headquarters, expecting to be ordered to Washington. We received instructions, however, from Major Eckert to go to Hanover, Pa., a point seventeen miles north of Gettysburg, and there open an office, using the wire of the railroad company to Baltimore, which was there run into General Schenck's headquarters and connected with the wire running to the War Department at Washington.

"I remember we arrived at Hanover about five a. m. by special train tendered by Superintendent Du Barry (I think) of the York and Harrisburgh Railroad. We tried to get into the depot where the wires led in, but the huge protecting padlocks were too much for our strength. With the assurance that comes with having the United States Government at one's back, we broke open a rear window and soon clambered into the station. When in the act of attaching the instrument to the wire, the superintendent of the road, a Mr. Eichelberger (I shall never forget him), came running into the depot accompanied by fifteen or twenty men, demanding in a loud voice, 'By what authority do you break into this depot?' I showed him one of our United States military telegraph envelopes and that settled the matter. Hanover was then the end of the telegraph line. The Confederate troops had torn down that part of it running towards Gettysburg, but we soon had it rebuilt with scraps of stove pipe wire mounted on old bottle heads, etc., placed in crotches of trees. I started on foot to Gettysburg, going up the track to see how much line was left, and found it nearly all down. We put it up, as stated, until we came to a bridge spanning a little stream near Gettysburg. There the wire had shrunk so because of fire (the bridge having been partially burned by Confederate troops), that we were unable to join it or find scraps enough to make it meet by some five or six feet. Something had to be done. On one side of the stream I saw some old sodawater bottles. These I secured, and propping them up on an iron rail managed to establish connection sufficiently with headquarters to tell of the condition and get men and material out to repair the line.

"On August 1 we were stationed at Warrenton Junction, Va., resting quietly. At this time Paymaster A. B. Chandler made us happy by his coming. We were always glad to see his honest, pleasant face. I find by letters to my wife that Surgeon Giles, the post surgeon, supplied us very liberally with ice and lemons, and that we were used very nicely during our stay there. On August 20, 1863, at this place I passed the anniversary of my twenty-first year."

(To be continued.)

Mr. E. E. McClintock, superintendent of the Mountain Telegraph Company, Denver, Colo., in a recent letter to the editor of this paper stated: "I consider Telegraph Age a publication that is essential to every one connected with the telegraph service, and it will afford me great pleasure to say a good word or do anything that will boost its circulation."

Every telegrapher who loves his profession, who is determined to master its technicalities, and thus insure for himself the confidence and respect of his official superiors and place himself in the direct line of promotion, should subscribe for and become a careful reader of Telegraph Age.

The United Fruit Company's Wireless System.

The United Fruit Company maintains a number of wireless telegraph stations, which, together with the operators in charge, are as follows: New Orleans, W. F. Wilcox; Port Limon, Costa Rica, C. L. Pitcher; Bocas del Toro, Republic of Panama, G. A. Perry; Bluefields, Nicaragua, S. F. Barager; Rama, Nicaragua, D. R. McLain; Swan Island, located off the Nicaraguan coast, and belonging to the United States, A. F. Parkhurst; besides a high power station now under construction, and which will probably be in operation about March, 1909, at Cape San Antonio, Cuba. The New Orleans station will also be equipped with high power apparatus. On the completion of the four high power stations, that is, those at New Orleans, Cape San Antonio, Swan Island and Port Limon, the United Fruit Company proposes to handle their messages, now being transmitted by cable, between Central America and the United States. After the completion of the stations named, practically the entire fleet of the United Fruit Company's steamships will be equipped with wireless apparatus. P. F. Geagan, formerly with the United States Navy, at Washington, has been appointed chief operator of the United Fruit Company's system, with headquarters at New Orleans. M. Musgrave, superintendent, is at present dividing his time between the United States and Cuba, rushing the installation of the high power stations as rapidly as possible.

Progress in Radio-Telegraphy.

In the engineering supplement of the London Times, for December 23, Mr. J. Erskine Murray presents a most interesting summary of present progress in radio-telegraphy. He calls particular attention to the substantial foundation for the mathematical theory of transmission of electric waves along the earth's surface, which has been laid by Dr. Zanneck. Many theorems of importance in practical telegraphy have been developed as a result. Thus the difference in ease of transmission over sea and land, respectively, has been accounted for, not only by difference in resistance, but also from the difference in their dielectric constants. The rate of absorption of the wave, and the consequent inclination of the lines of force to the earth's surface, can be approximately calculated when the wave-length and the materials of the soil and sub-soil are known.

Dr. Zenneck's theory indicates that in long-distance transmission the energy received has traveled through the upper region of the atmosphere. An interesting commentary on this theory is the still outstanding problem which has not been solved—that is, the fact observed by Fessenden that, though the absorption of a wave increases with its wave-length until it reaches about 2,500 meters, a further increase of wave-length causes a rapid decrease of the absorption, so that for a wave-length of 3,750 meters the absorption, even during the day, is very slight indeed. There appear to be two possible explanations: The first is that with very long waves the curve in which the energy travels may not stand so high as with shorter waves, and therefore may not enter the conductive upper layers of the atmosphere, thus avoiding absorption; the second is that the longer waves may actually resonate to some of the natural periods of the earth considered as a whole. If the second be true, there ought to be a rapid increase in the energy radiated by the transmitter as its wave-length is increased to the point of resonance. If the first be correct, no such rapid increase will be observed.

The work of Bellini and Tosi in developing a system of directive wireless telegraphy is commented upon as a most interesting application of theory to practice. It is known that the energy diagram of the radiation from a nearly closed aerial, forming an equilateral triangle, in a vertical plane, is approximately a horizontal figure 8—that is, a maximum radiation backward and forward, and zero in both lateral directions. The radiation in the forward loop is, however, in opposite phase to that in the backward. Thus, by adding a vertical aerial whose radiation is in phase with the forward radiation of the closed aerial, the latter is strengthened, while the backward radiation is annulled. The diagram is thus reduced to one loop, with the sending station at the end of its longest axis. In practice two nearly closed aerials in the form of equilateral triangles in vertical planes at right angles to one another are used, in addition to the straight vertical aerial. Each has a helix at the center of its base line, which serves as the secondary of a transformer, of which the primary is a third helix, movable about a vertical axis at right angles to its length. The axes of the secondary helices are fixed in the planes of the aerials to which they are respectively connected, and are thus at right angles to one another. Thus the action of the primary induces currents in them whose relative magnitudes vary with the direction in which the primary axis lies. The resultant radiation from the aerial system is thus the same as if one closed aerial used alone has been rotated into the line of the primary. No movement of the actual aerial conductors is necessary in order to alter the direction of radiation, and the great mechanical convenience of this arrangement is obvious. It is also possible to determine the direction from which radiation is arriving from a transmitting station, and the system should be of immense utility to stations where it is important there should be no rearward radiation, as, for instance, in military operations. —Electrical Review and Western Electrician.

The Railroad.

The Louisville and Nashville Railroad Company will begin at once the installation of telephones for train despatching purposes.

Mr. Avery P. Eckert, well known in telegraph and railroad circles, has engaged on his own account in the railroad and electrical supply business at the Hudson Terminal Building, 50 Church street, New York.

The management of the Santa Fe Railroad has decided to operate its entire main line from Chicago to the Pacific Coast by telephone instead of by telegraph. Arrangements are being made for the change as rapidly as the work can be conveniently done. Contracts have been let for the installation of the telephone wires between Emporia and Kansas City, a distance of two hundred and five miles. The company is now operating its trains between Emporia and Newton, a distance of seventy-three miles by the new system. As soon as the installation to Kansas City is completed the work of putting in the necessary apparatus between Kansas City and Chicago, a distance of four hundred and fifty-four miles, will be begun. The substitution of the telephone for the telegraph will cost the company at least $2,000,000, but the saving which will be effected will more than offset this expenditure.

Mr. E. Parsons, who has been in the employ of the Illinois Central Railroad Company, at Chicago, since July, 1893, has severed his connection with that company and has accepted the position of sales manager of the Sandwich Electric Company of Sandwich, Ill., and will have entire charge of that department of the company. Mr. Parsons has had a wide experience in railroad work, having been employed in various capacities on several of the large western railroads during the past twenty years. Since June, 1903, he has been assistant superintendent of telegraph for the Illinois Central Railroad Company, with headquarters at Chicago. His experience has been such as to make him entirely familiar with all branches of telegraph and telephone work, and to teach him to realize the possibilities of the telephone in connection with train despatching. He has been an active member of the Association of Railway Telegraph Superintendents since 1903, and has served as a member of the Topics Committee for three years. It was chiefly through his efforts that so large a number of papers were presented at the Atlantic City and Montreal conventions.

An elaborate report has been submitted to congress by the block signal and train control board of the Interstate Commerce Commission. During the last year the board examined the specifications of three hundred and seventy-one devices, two hundred and forty-eight of these being block signal cab signals or automatic train stopping devices. Only twelve of the devices were considered to possess sufficient merit to warrant the board in authorizing the inventors to establish a working installation with a view to conducting tests at the government's expense. In its invitation of the telegraph block system, the board finds that many of the block signal men in the United States are lacking in training and in experience. In some cases there was evidence of the excessive use of intoxicants. In its investigation in Europe the board found that the signal men as a rule are better trained than those in America and that the system is operated under a stricter personal supervision. So far as the safety devices themselves are concerned, it is believed by the board that little is to be learned by American railway managers from a study of European railways. The report says that telephones recently have been extensively introduced in lieu of the telegraph in block signaling, and it has been found that they operate admirably.

Train Despatching by Telephone.

While the disposition is everywhere manifest among the railroad systems of this country to change the method of transmitting train orders from the telegraph to the telephone, the initial cost of so doing is so heavy as frequently to cause tardy action in the matter, if not, indeed, to postpone all proceedings indefinitely until possibly a more propitious time. In fact the question of expense enters so largely into the proposition, as to persuade many superintendents of railroad telegraph to hesitate to recommend to general managers such substitution, for the additional circuits to be created made necessary in consequence, must be constructed of copper wire, a commodity exceedingly high in price. A superintendent recently in discussing the matter with us quoted the following figures as the cost of a telephone equipment for an additional circuit over but a single division of his road: Copper wire, $95,000, while for the selectors and other equipment, and installation of same, an additional $8,000 or $9,000 would be required, altogether representing an immediate outlay of over $100,000. At a time when expenditures are being carefully scrutinized, and kept within the narrowest limits, so large a charge as $100,000 for a matter that is regarded by many as being yet in an experimental stage, it has been deemed wise to at least defer incurring. The excessive cost of the copper wire, so out of proportion to the remaining and comparatively modest charge for the telephonic equipment, is regarded as the extravagant item in the proposed changes. Yet it cannot be denied that the railroads which have adopted the telephone for train despatching in place of the telegraph, have found the later mode of operation not only more satisfactory, but as a matter of fact so much more economical than the former as to warrant the change, the saving effected thereby already showing a satisfactory return on the original cost.

Serial Building Loan and Savings Institution Election and Statement.

At the annual election of officers and directors of the Serial Building Loan and Savings Institution, held in the office of the corporation, at 195 Broadway, New York, on January 19, the following ticket was elected: J. C. Barclay, president; J. R. Beard, vice-president; E. S. Butterfield, treasurer; E. F. Howell, secretary; J. B. Sabine and A. J. Schem, attorneys; directors, T. A. McCammon, G. W. Blanchard, E. E. Brannin, J. T. Laidlaw, M. S. Cohen, W. H. Jackson, J. F. Nathan, T. M. Brennan, J. B. Taltavall, C. A. Kilfoyle, F. D. Giles, M. J. O'Leary, F. J. Scherrer, W. J. Quinn and M. W. Rayens.

The forty-eighth semi-annual statement of the Serial Building Loan and Savings Institution for the six months ended December 31, 1908, was as follows:

ASSETS.

Cash on hand	$ 4,507 70
Mortgages	440,475 54
Stock loans	8,560 00
Real Estate	15,935 55
Land contracts	8,899 42
Advances to members	2,432 10
	$480,810 31

LIABILITIES.

Installments	$265,230 00
Credited earnings	60,325 13
Juvenile Savings	410 78
Matured shares	43,000 00
Full paid shares	35,700 00
Borrowed money	34,634 22
Due on loans	4,500 00
Contingent fund	23,000 00
Undivided earnings	14,010 18
	$480,810 31

ELECTRIC BUILDING LOAN AND SAVINGS ASSOCIATION ELECTION AND STATEMENT.

The annual election for officers and directors of the Electric Building Loan and Savings Association, was held at its office, 253 Broadway, New York, on January 8, and resulted as follows: J. J. Whalen, president; J. R. Beard, vice-president; E. S. Butterfield, treasurer; E. F. Howell, secretary; J. B. Sabine and A. J. Schem, attorneys; directors, M. J. O'Leary, G. R. Schnitgen, M. W. Rayens, P. O. Purcell, G. W. Blanchard, E. P. Tully, M. S. Cohen, W. B. Dunn, W. H. Jackson, C. F. Leonard, T. E. Fleming, W. J. McNickle, F. E. McKiernan, and F. C. Leubuscher.

The thirty-sixth semi-annual statement of the Electric Building Loan and Savings Association for the six months ended December 31, 1908, is appended:

ASSETS.

Cash on hand	$ 645 30
Mortgages	34,900 63
Stock loans	275 00
Land contracts	2,172 62
Advances to members	64 34
	$38,057 89

LIABILITIES.

Subscriptions	$35,986 92
Contingent fund	1,308 75
Undivided earnings	762 22
	$38,057 89

Loan Association's Dinner.

The officers and directors of the Serial Building Loan and Savings Institution and of the Electric Building Loan and Savings Association, held their annual dinner at the Astor House, New York, on the evening of January 21. Mr. James R. Beard, vice-president, presided in the absence of President John C. Barclay, who was prevented from attending by illness. Following the dinner there was a general discussion of the affairs of these corporations. A committee was appointed to devise means to further increase the usefulness of the associations. It was proposed that members of the telegraph profession residing in all parts of the country be communicated with and requested to co-operate with their New York brothers and participate in the advantages offered by these savings and loan associations. For twenty-five years the Serial Building Loan and Savings Institution has been a secure repository for the savings of New York and other operators, on which it has paid regularly five per cent. interest on all deposits, and it has enabled those desiring homes to secure the same on easy payments.

It was decided that hereafter loans be made at flat six per cent. without a premium. It is the conviction of the officers that with the present economical management they can continue to pay five per cent. dividends and add something every year to the legal reserve or contingent fund. This contingent fund, which now amounts to $25,000, is the guaranty of the stability of the institution.

Resolutions were also passed commending the work of the publicity bureau of the New York State League of Co-operative Savings and Loan Associations. Mr. E. E. Brannin, a director, was highly commended for his successful efforts in bringing in new members during the past year.

Those present included J. R. Beard, E. S. Butterfield, E. F. Howell, J. B. Sabine, T. A. McCammon, G. W. Blanchard, E. E. Brannin, J. T. Laidlaw, M. S. Cohen, W. H. Jackson, T. M. Brennan, J. B. Taltavall, C. A. Kilfoyle, F. D. Giles, M. J. O'Leary, F. J. Scherrer, W. J. Quinn, M. W. Rayens, G. R. Schnitgen, W. B. Dunn, T. E. Fleming and Edward Reynolds.

How One Thousand New York Telegraphers Obtained Homes.

Mr. Martin S. Cohen, a real estate expert of New York City, and for many years a well-known director in loan associations, had an article in the New York American of January 3, from which we take the following:

"Building loan associations in the vicinity of New York were organized on a different principle from those of other communities. A number of men knowing each other well, or meeting frequently in their trades or professions, would get together and organize a building loan association. They found that they could save their own money, safeguard and invest it in building homes for themselves. They would lend the money thus brought into the common treasury to the members that they knew, and they so had not only the ordinary real estate security, but had the additional security of the man behind the loan. His character, his standing among his fellows, the amount of money he could earn, are all factors that influence the board of directors of the building loan associations in making loans.

"The strongest and best managed of these institutions are those that are organized on the old guild plan. The members know their officers and directors and, meeting them in their business dealings, so get a better measure of the character and stability of the management than would be possible in any other manner.

"The oldest of the associations of this character in the Borough of Manhattan is the Serial Building Loan and Savings Institution. It was organized by telegraphers in 1885, and its first year's business amounted to $22,000. To-day its assets exceed $500,000, and the total expense of conducting the business, including its salaries, is less than $4,000 a year. In this system the telegraph operators were encouraged in their undertaking by higher officials in the telegraph companies.

"The character of this institution has changed but little since its organization, and while, of course, it numbers among its membership many others than telegraphers, two-thirds of its business is still being conducted for this class in the community.

"There are about 1,100 mortgage loans and it has enabled that many members to own their own homes. Within twelve years these members have been able to pay off the mortgage, and to-day these homes testify to the soundness of the business methods and the thrift inculcated and cultivated by building loan associations."

Postal Division Superintendent Lemon Honored.

The high regard in which Division Superintendent Leona Lemon is held by the Postal employes of the Third District, of which he was formerly superintendent, was unmistakably manifested on the occasion of his departure from Philadelphia to his new headquarters in New York City, when, on behalf of the several hundred employes of the district, Manager C. E. Diehl, of Harrisburg, presented him with a handsome hall clock, one of the finest specimens of the clock-maker's art to be found in the country.

As Mr. Lemon was ushered into the room and found himself surrounded by an assemblage of fifty employes, representing every branch of the service, managerial, operating, accounting, line and messenger, his surprise and astonishment were unbounded. Silently scanning the faces of the men who had been associated with him for the past seven years, hoping, no doubt, by that means to discover the meaning of it all, he remained standing, awaiting some sign of enlightenment.

Mr. Diehl, in presenting the clock, recalled the "time" when, more than twenty-five years ago, he had been indirectly responsible for the beginning of Mr. Lemon's telegraphic career, by reason of having recommended him for the managership of the Altoona, Pa., office. He recited how, from that "time" on, Mr. Lemon's course had been steadily upward, and expressed the hope that "time" would prove this newly-bestowed honor to be only another milestone along that course. Proceeding further, he spoke of the fine business showing that was being made by the Third District under the wise and able direction of Superintendent Lemon, and dwelt particularly upon the marked personal interest that Mr. Lemon had always shown in the welfare of his employes, to partially reciprocate which, he said, it was then and there purposed to give him a "good time," and added that in the future he would always know where to look for more good "time." In closing, Mr. Diehl stated that in design this clock was like other clocks, but, unlike other clocks, it was built of far different material, its elements being the summed-up affection and regard of every employe in the district.

Throughout the course of these remarks Mr. Lemon's face betrayed great emotion, and at their conclusion he remained silent for some time. Recovering himself, however, and with quavering voice, he expressed his deeply-felt appreciation of the token and of the spirit which prompted it. He agreed that the district was one of the most prosperous in the entire Postal organization, but that it was only through the faithfulness and fidelity of every employe in it that this was so, and urged that the same faithful support be given to his successor, Superintendent Charles E. Bagley. Leaving a city nearly always means the severance of some friendships, he said, but he assured his auditors that no matter how far away from Philadelphia and the Third District his duties carried him, he would always look back upon the period spent there as the happiest in his life.

Mrs. Lemon, who, with Master "Lee" Lemon, was present on the occasion, was then tendered a beautiful bouquet of American Beauty roses, and was as much surprised at her gift as the superintendent had been with his.

THE FIRST AUTOMATIC REPEATER.

BY STEPHEN DUDLEY FIELD.

(Electrical Engineer, Stockbridge, Mass.)

Just to add a word to the historical part of that most interesting discussion on "The First Automatic Repeater," which appeared in the January 16 issue of Telegraph Age, allow me to state that according to Shaffner, the first telegraph repeater was introduced by Ezra Cornell, and called the Cornell switch. From the description given this was evidently the original Button repeater subsequently attributed to Wood.

According to the same authority the first "automatic" repeater was "proposed" and introduced by Colonel John J. Speed, Jr. The arrangement shown has been reinvented in all parts of the country. Shaffner refers to it as being "obsolete" in 1859. See Shaffner's Telegraph Manual, pages 494-495, published in 1859.

Again, while considering "history:" The first "telephonic" train despatching was commenced on the Clay Street Hill Railroad in the city or San Francisco, during the summer of 1878, and continued, save during the earthquake holiday, to the present time.

Mr. James J. Clark sends this communication:

In reading the communication from Mr. George F. Milliken, of repeater fame, in the January 16 issue of Telegraph Age, it would seem to be his opinion that the Clark repeater was not a successful repeater and could not be placed among the first practical repeaters.

Now, I have been claiming that the Clark repeater was the first successful closed circuit automatic repeater and I feel that I have a right to this claim. Mr. Milliken also places the Hicks repeater as among the unsuccessful devices of this class.

The Clark repeater and the Hicks repeater were both in use in Mr. Milliken's office in Boston, and I believe they were there at the time I was negotiating the sale of the Clark repeater to the American Telegraph Company, because these repeaters were in much discussion at that time. This was before the advent of Mr. Milliken's contrivance.

Mr. Livingston, secretary of the American company, and I, met Colonel Lefferts at his home by appointment, and we three went together to the shops of the company and there met Mr. George M. Phelps, the manager of the shops, and we talked repeater. I claimed that the Clark repeater was the first to use a holding magnet and that although Mr. Hicks placed his magnet on a different side of the relay lever from the Clark, and the fact that his magnet was closed when the Clark was open, and vice versa, Mr. Hicks' idea could not properly be called an invention but was a consequence of its being so placed. This was generally conceded and I think it was pretty well understood that the Hicks was an infringement of the Clark.

Mr. Milliken has much to say about the spring contact points used in his device to allow the holding magnet to become charged or discharged before the main circuit was broken through the relay. Now he uses precisely the same device of spring contact first used in the Clark repeater, without any difference.

The Clark and Hicks repeaters were both used in his office, one with holder magnet on one side the relay lever, and the other on the other side of the lever. This gave a good opportunity to study the repeaters and no doubt led Mr. Milliken to make a change with the relay lever so it would not be burdened with an extra armature, which was a betterment to the Clark repeater. I think I can see a good deal of George M. Phelps in the make-up of this device, but I would not call this inventing a repeater. Mr. Milliken did not invent a repeater. He uses the Clark holding magnet, the same wire circuits, broken and closed on spring contact points and all other parts of the Clark repeater. The only change he made was in the relay lever, which was of Phelps make-up, and is entirely mechanical, and I don't think he could call this inventing a repeater. I do not.

I claim that the Clark repeater was a successful repeater and was used successfully for years.

The telegraphers "73" dinner at the Hotel Manhattan, New York, on November 27, 1908, in honor of Andrew Carnegie, upon the occasion of his seventy-third birthday, at which Colonel Robert C. Clowry presided, was a notable affair, as many who were present will attest. A verbatim account of the dinner has been published in pamphet form by David Homer Bates, chairman of the committee of arrangements, a brochure covering more than thirty pages. It is handsomely gotten up, well printed on excellent paper, and constitutes a souvenir of an eventful function that all who were present, as well as those who were unable to attend, will doubtless be glad to possess.

The International Association of Municipal Electricians which held its thirteenth annual convention in August, 1908, at Detroit, Mich., has had the proceedings of that occasion compiled and published in book form, the work being performed by the secretary of the association, Frank P. Foster, of Corning, New York. This volume of more than 140 pages, furnishes a verbatim report of all that occurred, including the several papers that were read and discussed. Altogether the work is a credit to the association and to the industry and fidelity of its author.

L. E. Moores, Western Union Chief Operator at Cincinnati.

The recent appointment of Lawrence E. Moores as chief operator of the Western Union Telegraph Company at Cincinnati, Ohio, to succeed J. P. McCabe, resigned, advances to that position a man who has well earned promotion. Mr. Moores will reach his fiftieth birthday on June 20th next, having been born on that date in 1859 at Dayton, O. He began his telegraph career in 1875 as an operator for the Louisville and Nashville Railroad, at Edgefield Junction, Tenn., afterwards serving in the same capacity the Louisville, Paducah and South Western Railroad (now a division of the Illinois Central), later becoming a car accountant of the same. He then entererd the service of the Pittsburg, Fort Wayne and Chicago Railroad at Fort Wayne, Ind., as an operator and despatcher. In 1879 he became an operator in Louisville, first for the Western Union

LAWRENCE E. MOORES,
Chief Operator Western Union Telegraph Company,
Cincinnati O.

Telegraph Company and then with the American Union Telegraph Company. From December, 1881, to the fall of 1885 he was in the employ of the Western Union at Cincinnati, resigning to accept the night managership of the Baltimore and Ohio Telegraph Company at Louisville. The merging of that company with the Western Union in 1887 caused Mr. Moores to return to Cincinnati, there to re-enter the employ of the latter company. Here he has since remained, filling most acceptably the positions of all night chief and assistant chief operator, from which he now advances to the place of chief operator. Mr. Moores has received merited recognition, for in all that he has done he has shown painstaking and conscientious effort.

This sketch would be unfinished if it did not include the statement that for more than twenty years Mr. Moores has successfully represented Telegraph Age in Western Union circles in the Queen City, where he has made a most efficient agent.

The Question of Induction.

Elsewhere in this issue reference is made to a highly important problem in telegraph engineering, the perplexities of which are fully recognized, and the endeavor to find a solution of which is engaging the very serious attention of telegraph interests. We allude to the necessity that exists of overcoming the action of induction by which telegraph and telephone lines running parallel to high tension wires and single phase trolley systems, are impaired or rendered useless altogether. These sources of trouble are multiplying as modern agencies of electrical transportation are extended and become more complex. The question involved is one of much gravity, threatening the integrity of telegraph transmission itself. Not only is the matter receiving attention here at home, but the telegraph interests of the world are equally alive to its importance, and energetic steps are being taken by the telegraph departments of the governments of England, France, Germany, Italy, and other countries to see what can be done to meet and overcome the trouble. At the International Conference of Telegraph and Telephone Technicians, held at Budapest, Hungary, in September last, this question was the most important subject that came up for discussion. It resulted in a committee being appointed to investigate the difficulties presenting themselves, to examine into the causes and if possible to suggest a remedy, a report to be submitted at the next convention.

"When Is a Boy Not a Boy?"

When is a boy not a boy? The answer, according to former District Attorney James W. Ridgway, of Brooklyn, is: "When he has whiskers."

This answer is engaging the attention of Magistrate Naumer, and much depends on the way he finally regards it. An action was started the other day against the Postal Telegraph-Cable Company for employing Frank O'Donnell, a messenger boy, who, it is said, is under fourteen years of age. He worked evenings. When the boy appeared in court he admitted that he had passed himself off for sixteen years. He is five feet and two inches tall and wears a fine black mustache, which he said he possessed when he was employed. Mr. Ridgway, who appeared for the defendant, said the appearance of the boy was enough to deceive any one, and he pointed to the mustache.

"That is only down," protested the inspector who made the complaint.

"If it pleases the court," responded Mr. Ridgway, solemnly, "it is more than down on that boy's face. It rises to the majesty of mature hair —in fact, to whiskers."

The magistrate said he would give the question his mature consideration.

Gold and Stock Life Insurance Association Annual Meeting.

The thirty-first annual meeting of the Gold and Stock Life Insurance Association was held in the Western Union Building, New York, January 18, and was well attended.

G. W. E. Atkins, the president, in his report showed that all claims have been promptly paid, and that the net assets were increased during the year by nearly $2,000. The report of Treasurer Lewis Dresdner showed gross assets of $20,374.12, from which deducting $4,100 in process of monthly payments to beneficiaries, leaves net assets of $16,274.12. Secretary W. J. Dealy in his report showed a membership of 1,139 at the close of the year.

The old board of officers were re-elected as follows: George W. E. Atkins, president; Gardner Irving, vice-president; W. J. Dealy, secretary; Lewis Dresdner, treasurer; executive committee, G. W. E. Atkins, Gardner Irving, Herbert Smith, Lewis Dresdner, W. J. Dealy, Michael Breslin, Charles Shirley, T. A. McCammon and Albert J. Driver; auditing committee, M. J. O'Leary, F. J. Nurnberg and J. J. Fredrick.

Montreal Telegraph Company Statement.

The balance sheet of the Montreal Telegraph Company as of December 31, last, shows:

Assets—Telegraph lines, $1,625,890; telegraph cables, $33,487; telegraph offices and equipment, $212,500; real estate, $279,947; total, $2,151,824; cash, accounts receivable, bonds and other securities and real estate not included in agreement with the Great North Western Telegraph Company, $141,672; grand total, $2,293,496.

Liabilities—Shareholders' capital, $2,000,000; excess in value of property operated by the Great North Western Telegraph Company over shareholders' capital, $151,824; total, $2,151,824; dividends, $41,744; contingent fund, $139,728; total, $141,672; grand total, $2,293,496.

The company's property in the foregoing statement, valued at $2,151,824, is operated and maintained by the Great North Western Telegraph Company of Canada. Its operation and maintenance is also guaranteed by the Western Union Telegraph Company of New York, under an agreement with this company for 97 years from July 1, 1881, which also guarantees payment of dividends. Out of the revenue (8 per cent., guaranteed on the company's capital) derived from the operation of the company's property by the Great North Western Telegraph Company, dividends have been paid to Montreal Telegraph shareholders during the year just closed, amounting to $160,000. There also was paid a bonus of $5,000 out of investment in contingent fund.

The New Postal Office at Nashville.

The new office of the Postal Telegraph-Cable Company at Nashville, Tenn., located in the Noel Block, at the corner of Third avenue and Church street, just across the street from the old location, of which previous mention was made in these columns on October 1, 1908, was occupied by the company on the closing day of the year just past. In every respect the new office is fully up to the standard of excellence in finish and equipment, maintained by the Postal company, and the occupation of these handsome new quarters, made necessary by the rapid increase of business at the Tennessee capital, reflects most creditably on Postal management in general, and particularly so in this case to Superintendent C. B. Arrington, who has his headquarters here, and to Mr. A. P. Martin, the manager of the office. The business department, operating room and the apportionment for the messenger force, occupy space on the extensive first floor of the building, while above, in the second story, are two private offices, devoted to the needs of Mr. Arrington.

Besides Mr. Arrington and Mr. Martin, already mentioned, the staff of this office comprises the following: P. B. Lee, cashier; S. E. Elliott, chief operator; R. C. Humphreys, night manager; C. W. Beasley, D. P. O'Connor, K. C. Bedford, T. M. Carsey and B. W. Martin, operators; J. W. Sona, delivery clerk; R. L. Baskette, Jr., night clerk and collector; Miss Lavinia Taylor, telephone clerk; Miss Mabel Bridges, counter clerk, and O. W. Barfield, lineman.

The office also requires the services of twenty messengers.

Single-Phase Railroading and Telephones.

Some apprehension has been felt by telegraph and telephone men, who have feared that the spread of the single-phase electric railway would interfere with the safety of telegraph and telephone service by induced currents. It is a fact that single-phase electrification affects telegraph and telephone systems whose wires run parallel with the railroad and close to it. On an eastern railroad system it is said that a correction has been found for this disturbance which has proved to be simple and not too expensive. Briefly described, it consists of what are called compensating transformers, whose secondaries are a part of the telegraph or telephone wires and whose primaries receive their voltage from pilot wires strung on the same cross-arms as those bearing the telegraph and telephone wires and thus having by induction the same voltage as the telegraph and telephone wires. The transformer secondary voltage is nearly equal and opposite to the induced voltage on the telegraph and telephone wires and thus constantly compensates for it throughout all ranges of induction due to the single-phase wires. If no obstacles in the working out of the details of this plan are encountered, it will be valuable in removing what at first was considered a great drawback to the use of the single-phase railway.

New York Items.

Mr. George W. Hickey, the well-known old-timer, of New York, has engaged in the coal business, and is located at 8-10-12 Sackett street, near Hamilton Ferry, Brooklyn. His friends in the service, who are legion, wish him abundant success, and many of them, doubtless, will see that their anthracite business is in future routed through his office.

The United Press Associations, of New York, has removed its offices from 13 Park Row to more commodious quarters on the third floor of the remodeled World building.

About a year ago five expert telegraph operators reached this country from South Africa, where the telegraph was undergoing a season of unprecedented dullness. The services of these gentlemen, together with many others, were dispensed with. Those who sought positions in this country found employment as follows: H. A. Oxenham, with the Commercial Cable Company, at 20 Broad street, New York; J. R. Milne and W. J. Hoy, both with the Central and South American Telegraph Company, at Lima, Peru; A. F. Whitehouse, with the Marconi Wireless Telegraph Company, at their station located at Heath Point, Anticosta Island, and J. R. Irwin, with the Marconi Company, at their station at Siasconsett, Mass.

Mr. W. O. Snyder, former secretary of the Stock, Grain and Provision Company, of Jersey City, N. J., and a well-known old time telegrapher, will sail in a few days for Havana, Cuba, whither he goes for the benefit of his health, and where he will remain indefinitely. He will be accompanied by Mrs. Snyder.

American District Telegraph Company Report.

The annual report of the American District Telegraph Company (of New York) for the year ended December 31, 1908, is as follows: Capital stock, $3,844,700.

BUSINESS OF THE YEAR.

Revenue, all sources	$586,065.89	$492,896.06	$93,169.83
Expenses, all classes	507,037.07	424,789.61	82,247.46
Net revenue	$79,028.82	$68,106.45	$10,922.37

The directors of the company, elected January 21, are: Robert C. Clowry, John H. Cahill, Jefferson B. Conley, James B. Curtis, W. C. Humstone, Wauhope Lynn, C. F. Patterson, Geo. H. Prentiss, William Shirden, Joseph Q Taylor, Henry C. Vance, Philip V. R. Van Wyck and Clement I. Walker.

The officers elected January 21, are: Robert C. Clowry, president; Philip V. R. Van Wyck, vice-president; Eugene A. Gurnee, treasurer, and J. C. Willever, secretary and assistant treasurer.

The Morse Electric Club.

The second annual meeting of the Morse Electric Club occurred at 195 Broadway on the afternoon of Wednesday, January 13. The officers elected last year were again chosen. These are: J. B. Van Every, president; J. C. Barclay and B. Brooks, vice-presidents; F. J. Scherrer, secretary, and R. J. Murphy, treasurer. The directors are: Gardner Irving, M. H. Kerner, M. J. O'Leary, John A. Hill, P. J. Casey and A. G. Saylor. It was decided to hold a dinner on the evening of Saturday, February 27, at the Hotel Savoy, Fifth avenue and Fifty-ninth street, New York.

Magnetic Club Election.

At the annual meeting of the Magnetic Club for the election of officers for the ensuing year, held on January 14, at 253 Broadway, the following ticket was elected: Charles P. Bruch, president; Marston R. Cockey, first vice-president; B. M. Downs, second vice-president; D. W. McAneeny, third vice-president; Theo. L. Cuyler, Jr., fourth vice-president; W. H. Mathews, secretary; Joseph J. Cardona, treasurer. Governors are: J. J. Whalen, E. P. Tully, Isaac Smith, John Costelloe, W. H. Baker, E. B. Pillsbury, F. E. McKiernan and Charles Shirley.

The constitution was amended so that any person may be admitted as an honorary member by a majority vote of the persons present at any annual meeting of the club, but not more than three honorary members shall be elected in any one year. Three names were added to the honorary membership list at this meeting, namely, Francis W. Jones, Thomas A. Edison and Colonel A. B. Chandler.

Morse Mutual Benefit Association of Cincinnati.

The annual dinner and election of officers of the Morse Mutual Benefit Association of Cincinnati, O., was held at the Palace Hotel, that city, on January 9. Of the one hundred and twenty-five telegraphers who are members of the association, sixty-nine were present.

The following officers were elected: President, William H. Keer; vice-president, W. J. Connolly; secretary, J. F. Colligan; treasurer, Frank Minning; executive committee, A. L. Buchanan, B. C. Chenal, J. N. Jacob, C. W. Popp, G. H. Minning, J. E. Neville and G. A. Stulz; auditing committee, W. E. Dunham, Hiram Bryant and H. E. Beyring.

J. F. Colligan, who was re-elected secretary, has held that position for nineteen years, and Frank Minning has been an officer of the association for fourteen years.

General Mention.

In a memoriam of Captain George Marion Farnham, of Chicago, who died on July 28, 1908, issued in a printed sheet by the Military Order of the Loyal Legion of the United States, commandery of the State of Illinois, of which he was a member, an affectionate tribute was paid to the manly qualities, the war record and the civil career of their deceased companion. Mr. Farn-

ham, who early in life was a telegrapher, became a member of the Society of the United States Military Telegraph Corps in August, 1886, and by his comrades in that organization was held in the highest esteem, and his passing away caused a widespread feeling of regret among those who, like himself, served the Government in the Civil War in its military telegraph service.

Ball of the Boston Telegraphers' Mutual Aid Association.

The Telegraphers' Mutual Aid Association, of Boston, held its thirty-first annual ball at Odd Fellows' Hall, that city, on the evening of Friday, January 29. The attendance was large and the affair was declared to be one of the most successful in the long series. It was conducted under the management of the following:

James J. J. Benelisha, floor marshal; P. J. Molloy, assistant floor marshal; A. V. Mann, floor director; F. J. Fitzgibbon and M. J. Sullivan, floor directors. Committee of arrangements, T. F. Clark, D. Carter, E. J. Smullen, J. H. Driscoll, C. L. Mooney, J. A. Coughlan, P. J. Molloy, F. M. Kelleher, F. J. Flynn, L. J. Malone, J. J. Hannon, S. E. Fitzgibbon, T. B. Melville, J. R. McLean, J. J. Flaherty, M. Egan, J. R. Hennessy, W. J. Mahoney, A. E. Russell, T. J. Falvey, J. A. Molloy, C. B. Parmenter, W. H. Sullivan, J. H. Cloney, W. T. Sheridan, J. H. Sullivan, W. J. Ryan and D. J. Cornell.

NEW YORK WESTERN UNION.

M. T. Herrington, formerly of this office, died on January 20, at Binghamton, N. Y.

Miss Kate Hodge, of this office, was married, January 25 to Mr. Arthur Harry.

An unusually severe sleet storm on January 24, completely prostrated the telegraph facilities over a large area in Canada. Montreal was entirely cut off, telegraphically, from the remainder of the world for a period of twenty-four hours.

The annual report of the Serial Building Loan and Savings Institution, of 195 Broadway, New York, recently made public, is the very best ever issued by this corporation. It reveals strength of resources, reflecting wise and conservative management such as to encourage and convince favorably all who would deal with this old and tried concern. Inquiries by letter will receive prompt attention.

Advertising will be accepted to appear in this column at the rate of twenty-five cents a line, estimating eight words to the line.

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Great North Western Telegraph Co. of Canada, Geo. D. Perry, purchasing agent, Toronto, Ont.

North American Telegraph Co., H. A. Tuttle, general manager and purchasing agent, Minneapolis, Minn.

Postal Telegraph-Cable Co., Executive Offices, 253 Broadway, New York; purchasing agent, W. D. Francis, 14 Desbrosses St., New York.

Postal Telegraph-Cable Co. of Texas, S. M. English, general manager and purchasing agent, Dallas, Tex.

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CATALOGUE OF BOOKS ON THE TELEGRAPH.

ABERNETHY, J. P.—The Modern Service of Commercial and Railway Telegraphy, in Theory and Practice, including the Railway Station and Express Service; arranged in Questions and Answers; $2.00.

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Book Review.

"Telegraphic Systems," by Arthur Crotch (J. B. Lippincott and Company, Philadelphia, 270 pp., 222 illustrations), a member of the engineer-in-chief's department of the British telegraphs, adds another volume to the works of this author, those preceding it being "Elementary Telegraphy and Telephony," "Telegraph Secondary Cell Installations" and "The Hughes and Baudot Telegraphs." In the present volume the author deals with his subject in the same plain and lucid manner that has marked his previous efforts. His aim has been to give a plain and concise description of the main systems in use in practical telegraphy. In the fourteen chapters comprised within the book, full consideration is given of batteries—primary and secondary; of universal battery working, duplex, diplex, quadruplex, automatic and multiplex telegraphy; the Hughes type-printing instrument, the Baudot system and the Murray type-printing telegraph are reviewed; there are also chapters on test and battery boxes, circuit concentrator, repeaters, and submarine telegraphy, the closing chapter being devoted to wireless telegraphy. The volume is carefully indexed, is printed on good paper, the illustrations are well drawn, and the various subdivisions of a great subject are clearly presented. The price of the book is $2, and it will be sent to any address, carrying charges prepaid, on receipt of price. Address J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

TELEGRAPH AGE

No. 4. NEW YORK, FEBRUARY 16, 1909. Twenty-sixth Year.

CONTENTS.

Some Points on Electricity—"Nothing New Under the Sun".. 143
Recent Telegraph Patents. Shortening the Telegram..... 144
The Barclay Printing Telegraph System..... 145
Mr. Edison and the Quadruplex..... 145
Personal. Postal Executive Offices. Western Union, Executive Offices 147
The Morse Electric Club. The Cable. The New Postal Office at San Francisco..... 148
Radio-Telegraphy 149
Pension Legislation Relative to United States Military Telegraphers. Government Preliminary Telegraph Report..... 150
President Lincoln's Telegram to General Pope. The Mysteries of Lightning. Henniker-Heaton's Opinion of the British Telegraph Service 151
Topics of the Telegraph. Is Mars Talking Again?..... 152
Editorial—The Telephone as an Auxiliary Feeder. The Influence of Mr. Binns on Wireless Telegraph Legislation... 155
Cotton Futures in the South. The Late Otis E. Wood..... 156
The Telegraph Force of Chicago Forty Years Ago..... 157
French Letter Telegrams..... 159
The Military Telegrapher in the Civil War..... 160
College Man's Value as Harriman Sees It..... 162
On the Handling of Leased Wires..... 163
Long-Distance Telegraphy. Leased Wire and Cable Service for Munsey's Newspapers..... 164
Progress in Submarine Bell Signaling..... 165
The First Automatic Repeater..... 166
Obituary 167
The Railroad. A. I. E. E. Anniversary Dinner..... 169
The Baudot Telegraph System. Comparative Results of New Telegraph Systems..... 170
Letters from Our Agents. Denver Items. Philadelphia, Postal. New York, Western Union..... 173
Other New York News. United Press Now in New Headquarters 174

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

"Nothing New Under the Sun."

(PART II.)

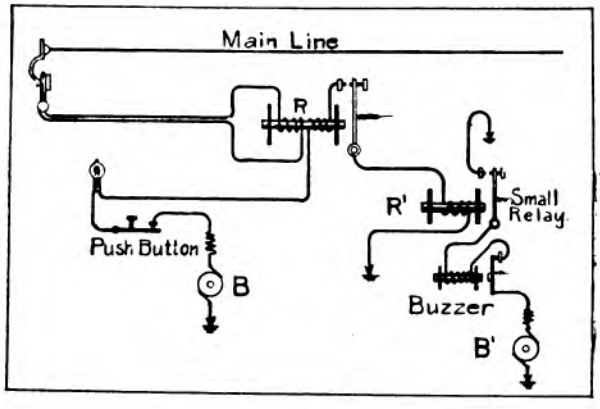
Another economical method of arranging apparatus recently introduced in some of our large telegraph offices is made possible by pressing our old friend, the small electric bulb, or signal lamp, into service in a somewhat new field. The arrangement, also, not only greatly reduces the area of desk space usually required for the occupation of the relays and sounders for a given number of circuits, but minimizes the number of operators required to look after them.

It is well known that one of the most difficult tasks a traffic chief has to contend with is to avoid delay in answering calls on way or pony circuits, which latter even when systematically combined in a central locality necessarily occupy considerable table room where each complete set of instruments occupies the usual allotted space. The consequence is that some of the calls most distant from where the one or more skirmish operators assigned to those circuits happen to be sitting at the time, are not always heard promptly.

The new arrangement minimizes all such possibilities due to this source, as it places the operators in such a position of responsibility that nothing less than wilful negligence would prevent them from hearing, or rather, "seeing," the calls, regardless of the distance. The manner in which this is accomplished is as follows:

A long table is assigned for the accommodation of a number of way wire circuits or short "pony" wires, to broker and other branch offices. Along the center of this table is extended a board or shelf about one foot high and about the same in width. On this shelf, side by side, and close together are placed the relays for the various circuits. No sounders are required for these relays, as will be apparent later. It will be seen that by this arrangement a great many circuits may be confined into a very small space.

These relays are of the ordinary pattern, except that the back and front contact points are reversed, and a small electric bulb lamp is connected to the former. When the circuit remains open the lamp gives a constant glow. While the relay is in active operation of course the light is intermittent. A continuous glow, therefore, signifies that the wire is open and requires the



attention of the chief operator. Intermittent lights signify activity in the circuits, and as the circuits usually assigned to these desks are almost invariably pony wires where the branch office works with no one but the main office, every light, therefore, is practically a "call," and as the bulbs are on the level with the operator's eyes the signals are sure to be seen.

As previously stated, there are no sounders connected with the main line relays on the shelf, but there are three or four ordinary Morse sets on the lower table, one for each operator assigned to the combination, to which is attached a flexible cord ending in a wedge. When an idle operator "sees" a call he simply inserts the wedge for his Morse set in the spring-jack connected with the main line circuit of the relay

showing such light and answers the call, after which he cuts out and watches for others. Operators are thus not required to move around from one point to another, as the mere insertion of their cords in the springjack bring the "calling" circuit to them. For this reason comparatively few operators can properly cover a great many small circuits.

Another recent innovation of the flash light bulb for signaling purposes is the method shown in the accompanying diagram. It is a modification of the old "Hurd Jigger" arrangement of buzzers and "drop" operated by an increment of current caused by the broker or branch office temporarily grounding the line conductor. Unlike the original method, however, the buzzers and signal lamps are not all located centrally in a board by itself, where one or more attendants are required to look after them and notify the different wire chiefs by means of check boys before action can be taken. In the present system each small red signal lamp protrudes through a small orifice made in the main wire switchboard just below the springjack of the broker circuit. As these lamps and holders are purposely made long and slim, the bulb may be quickly removed and replaced underneath any other main line springjack in case the original wire is changed, as may be the case when patches are made. It is obvious, therefore, that when a red light appears the wire chief requires no other information to tell him which circuit demands his attention, nor does he have to wait for the delivery of a wire notice to learn that fact. Hence, not only has time been saved, but the services of watchers and office messengers has been dispensed with.

Of course a broker could signal a wire chief by grounding the conductor and lighting up the regular resistance lamps on the switchboard, as is often done. But that is a very unsatisfactory method, because in order to keep the lamp lit he must allow his ground wire to remain on. This is decidedly bad for both the conductor and the instruments. In the new method a permanent light and buzz is maintained until the wire chief at the main office breaks the circuit by means of a push-button, and it requires but one tap or ground contact at the broker office to accomplish this, after which the main line conductor is free and normal.

If the reader will glance at the diagram he will see that the bulbs are not lighted by the main line current, as is the case with the main battery resistance lamps, the former being in a local circuit. The operation of the new system is as follows:

R represents a long cylinder-shaped relay possessing two separate coils wound around a common core, one for the main line current and the other for a local battery current. The main line coil is connected in the main line circuit at the board by means of the usual cord and wedge. As this coil is not wound very high and the tension of the spring is purposely made quite strong, the normal current flowing in the broker circuit will not close the contact points of the relay. Hence, the companion coil containing the red bulb, push-button, auxiliary relay and a strong local battery remains open, but the moment the broker increases the current in the main line wire by touching the latter with his "ground," the contact points of relay R close and remain closed till released regardless of whether the broker lifts his ground wire or not.

It will be seen that when the contact points are closed local battery B finds a completed circuit through the signal lamp, one coil of relay R and the coil of the small relay R^1 to a ground. The volume of current flowing in this local circuit being normally much greater than the usual main line current, magnetizes the core of relay R very strongly and thus holds the lever fast to its front stop. The bulb, therefore, continues to glow until the push-button is depressed and thus breaks the circuit. In addition to the bulb a buzzer is included in the arrangement, and is connected as shown in the diagram. The two small cylinder-shaped relays and buzzer for each outht require but little space room and are usually grouped together in a central or convenient spot behind the main wire switchboard.

Recent Telegraph Patents.

A patent, No. 909,877, for telegraphy, has been awarded to Thomas A. Edison, of Llewellyn Park, Orange, N. J. Improvement in quadruplex relays in which the neutral relay is so designed as to be unaffected by reversals of current. A series of rectifiers is disposed between the relay and the circuit so as to cause all of the currents to pass through the relay in the same direction.

A patent No. 911,384, for a keyboard telegraphic transmitter, has been awarded to P. B. Delany, of South Orange, N. J. Provides a friction drive for causing the contact maker to travel over its contacts when the key is depressed. The drive consists of wheels whose axes are out of line and between which the traveling bar carrying the contact maker is disposed.

The patent recently granted to C. J. App, of Lynchburg, Va., recorded in our February 1 issue, to improve the working of a quadruplex system, is designed to simplify the quadruplex by eliminating the proportional rheostat. Sparking at the pole changer is taken care of by introducing a series of air gaps between the pole changer points during reversals by a very efficient, yet simple, mechanical construction of that instrument.

The Barclay Printing Telegraph System.

BY WILLIAM FINN.

(Part XVII.)

THE RECEIVING APPARATUS CONTINUED.

THE PAPER FEED.

For feeding the paper—that is for line spacing—an electro-magnet FM, Fig. 58, is provided. Its armature A is connected through an adjustable link AL with one end of a pivoted lever L, whose other end is linked with the line-space bail B. The latter carries at one end a pawl p, which engages the ratchet wheel RW whenever magnet FM becomes energized, and thus rotates the platen P to line space.

The local circuit of the feed magnet is shown in the figure, current for operating the mechanism being furnished by dynamo D upon the closure of the sunflower point 6, which occurs at the end of the distinctive series of line pulses representing the "line feed" combination. As the work to be done by the feed magnet requires an interval of time somewhat greater than the duration of the sixth pulse contact, an auxiliary magnet AM is caused to render assistance by prolonging the current flow through the feed magnet, so that the latter may remain energized—regardless of any opening at the sixth pulse points—until its work has been duly accomplished. The manner of effecting this will be apparent from the diagram, for just as soon as the assist magnet AM (which is in multiple with the feed magnet FM) becomes magnetized by the passage through its coils of the last, or printing pulse of the signaling series, a local current from dynamo D' flows through the points b, a, and enters the coils of both AM and FM, keeping the latter energized until the end of its armature stroke. By that time, spring s of armature A, will have been brought against the contact C, and a shunt thereby formed around the coils of AM. The latter will then be demagnetized, and allow the armature to fly open, thus stopping the current flow through the feed magnet, and releasing its armature so as to be ready to respond to the next call. The principle of operation, it will be observed, is precisely identical with that described in connection with the working of the typeshift magnet, which, it will be remembered, is also provided with an assist magnet.

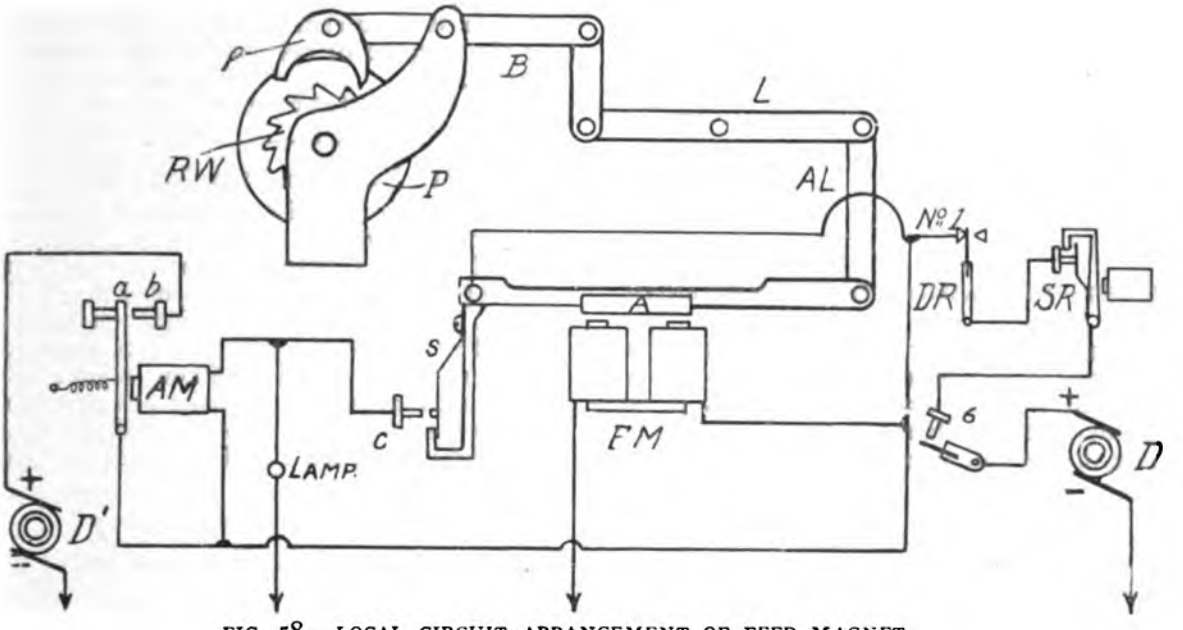


FIG. 58.—LOCAL CIRCUIT ARRANGEMENT OF FEED MAGNET.

THE CARRIAGE RETURN.

A perspective view of the carriage return mechanism is shown in Fig. 59. CR represents the magnet provided for returning the carriage to the right hand, or starting position. This is accomplished through the lever arrangement shown in the figure which, upon the attraction of armature A, swings the leather-faced wheel LW into frictional engagement with the metal wheel MW, which is kept continuously rotating by the motor mechanism. The wheel LW is mounted on a horizontal shaft having a bevel gear BG that meshes into a companion gear CG mounted on the vertical shaft sh. At the upper end of this shaft is a toothed wheel W which engages the carriage rack R, and revolves in an anti-clockwise direction in returning the carriage to starting position. Upon reaching that position the friction wheels become disengaged, and the carriage is again free to move forward to the left, in accord with the step by step movement imparted to it by the operation of the carriage feed lever, which, as previously intimated, effects the necessary spacing of the letters or words.

In Fig. 60 is shown the arrangement of the carriage return circuit, current for which is derived from dynamo D, and passes by way of the

sixth pulse sunflower contact (6), sixth pulse relay points, and distributing relay points No. 2, into the carriage return magnet CR. In series therewith, is a circuit-breaker CB', adapted to open the circuit at the moment the carriage has been fully returned to its starting position, at which point the attachment SC (which travels

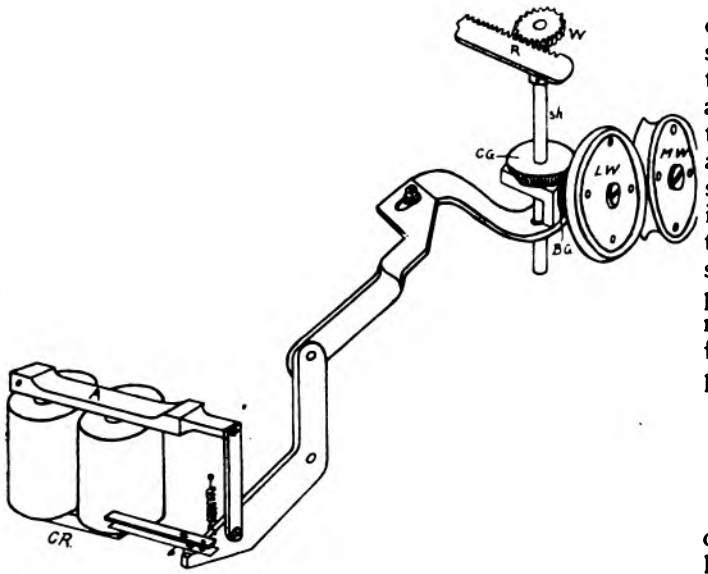


FIG. 59.—THE CARRIAGE RETURN MECHANISM.

with the carriage) strikes against the circuit breaking lever and opens its contact points at O. This opening of the circuit is necessary in order to de-energize the CR magnet, and permit its armature to rise and re-establish the circuit of the sixth pulse relay SR, which had been previously broken at the contact points a, b, of the CR magnet for a purpose that will be understood from the following consideration. It is important that during the interval occupied by the carriage in returning to its extreme right hand position, a current flow should be steadily maintained through the coils of the CR magnet, to ensure the latter completing its work before the restoring circuit has been established by the operation of the sixth pulse relay. With that object in view, the circuit of the latter is normally completed through the points a, b, of CR, but is immediately opened when the CR magnet becomes energized, and causes lever L, in its downward movement to strike against the flexible spring b, thus breaking the connection between it and the upper stationary contact a. As a result thereof, the current traversing the coils of SR is arrested before its armature spring s, breaks contact with its back stop C, through which current continues to flow into the CR magnet until the armature of the latter is released. At that moment the circuit of the sixth pulse relay is again completed through the points a, b, thus energizing, and permitting that relay to send current into the "restoring" circuit for the purpose of resetting the distributing apparatus.

(To be continued.)

Mr. Edison and the Quadruplex.

Mr. Thomas A. Edison, the noted inventor, has once more delved into matters telegraphic. He has taken out a patent for an improvement in quadruplex working. In the operation of the neutral relay he utilizes the function of a rectifier. The rectifier he uses presents a perfect insulation of one polarity without appreciably resisting currents of the opposite polarity. In this manner he is enabled, it is claimed, to eliminate the "kicks" that have so long made the neutral relay an instrument of torture to the telegraph operator.

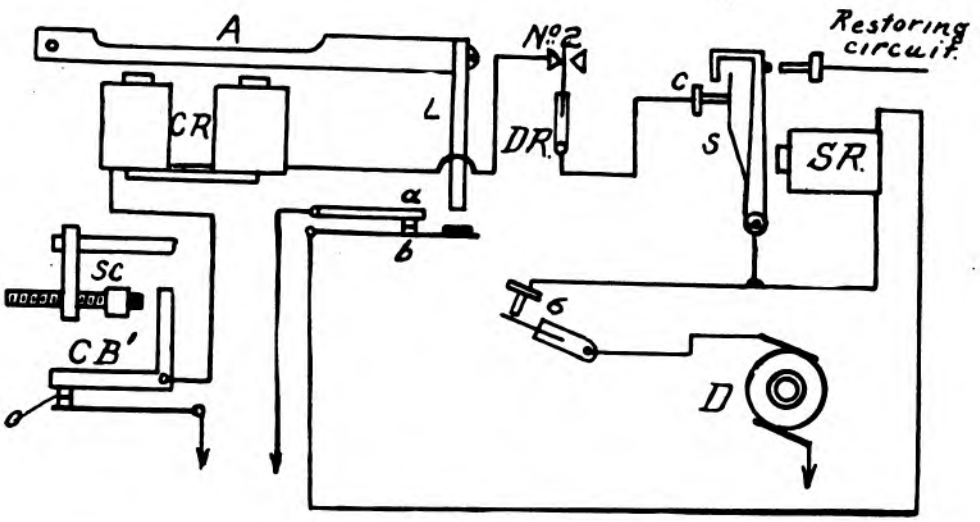


FIG. 60.—LOCAL CIRCUIT OF CARRIAGE RETURN.

Personal.

Mr. Isaac McMichael, vice-president and general manager of the Great North Western Telegraph Company, Toronto, Ont., is spending a vacation at his orange grove in Florida.

Mr. Donald Robertson, secretary of the governmental telegraph and telephone department, Wellington, New Zealand, passed through Canada last week, on his way to Germany. His visit is one of pleasure.

Mr. Frank C. Mason, formerly, and for over twenty years, superintendent of police telegraphs in Brooklyn, N. Y., and who is living in retirement on his farm at Washington Mills, N. Y., is in the city, where he expects to remain until March, before returning to his country home.

Mr. James Bertram, secretary to Andrew Carnegie for many years past, is, like his employer, an old time telegrapher. Mr. Bertram, before entering the service of Mr. Carnegie, many years ago, was an operator in Edinburgh, Scotland, as well as in South Africa. He is well known to many of the Old Timers of New York.

Leslie's Weekly for February 4, contains excellent engravings of a number of telegraph people much talked about in these days. Wireless telegraph operators, J. R. Binns, of the ill-fated Republic, and H. J. Tattersall, of the steamer Baltic, received prominent mention. A lengthy article entitled, "Lincoln As He Was Day by Day," written by David Homer Bates, is included among the contributions. This article is illustrated by photo engravings of Brigadier-General Thomas T. Eckert, Charles A. Tinker, Colonel W. B. Wilson, Colonel Albert B. Chandler and Major A. E. H. Johnson, as well as a picture of Mr. Bates himself.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Edward J. Nally, vice-president and general manager, and Edward B. Pillsbury, general superintendent, are visiting various points in the New England States, having in view the interest of the service.

Mr. Minor M. Davis, electrical engineer, and S. B. Haig, superintendent of traffic, are absent in the South on an extensive trip undertaken in behalf of company interests.

The February tariff sheet has for its frontispiece an engraving of Arthur L. Edgecomb, superintendent of the company at Boston. In a reference made below the picture attention is called over the initials of "E. J. N." to a recent circular issued by Mr. Edgecomb, addressed to the managers of his district, which embraces numerous important maxims, thoughtfully designed to guide business procedure, a reprint of which appears in the brochure.

The Mutual Savings and Investment Association, made up of employes of this and allied companies, was organized in New York, on February 3. The basis of organization is practically the same as that of the association in Chicago, which was established under the direction of Edward J. Nally more than two years ago. The following were named as members of the finance committee: E. S. Butterfield, E. B. Pillsbury, Charles Shirley and Frank E. McKiernan. Mr. E. Reynolds was elected treasurer, and ex-officio a member of the finance committee, H. F. Hawkins being appointed secretary. The membership is limited to 150. The object of the association, expressed in its title, is for the purpose of encouraging thrift and saving on the part of its members. The plan is to create and maintain a fund by monthly contributions of a stated amount, such funds to be invested in real estate, stocks, bonds, mortgages, or otherwise, as may be determined for mutual benefit. The scope of such an association is large and the success of the Chicago enterprise has been such as to warrant the undertaking of an organization of this character in a large center like New York.

RESIGNATIONS AND APPOINTMENTS.

Mr. W. A. Logan, special agent of the Postal Telegraph-Cable Company of Texas, at Dallas, has accepted the position of manager at Oklahoma City, Okla., the office of special agent having been abolished. Joseph Coffer, the former manager at Oklahoma City, has returned to Muskogee to assume the management of the office at that point.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. C. H. Bristol, general superintendent of construction, has returned from an extended inspection trip which took him as far west as the Pacific Coast.

Assistant Superintendent Herbert Smith, accompanied by his younger daughter, sailed February 3, on the steamship Mauretania for England for a short vacation.

The Barclay printing telegraph system exchanged on February 2, on the Omaha and Chicago-Kansas City circuit, 1,863 messages.

The annual meeting of the American District Telegraph Company of New Jersey, occurred at the office of the corporation in Jersey City, N. J., on February 9. The following directors were elected: Robert C. Clowry, George J. Gould, G. H. Fearons, J. C. Barclay, Belvidere Brooks, G. W. E. Atkins, H. D. Estabrook, Henry A. Bishop and Thomas F. Clark. The officers elected were: Robert C. Clowry, president; George H. Fearons, vice-president; I. B. Ferguson, secretary, and A. R. Brewer, treasurer.

RESIGNATIONS AND APPOINTMENTS.

Mr. S. L. Burts, general inspector of the Southern division of the company, due to a desire to be relieved from extended travel, has been appointed manager of the Atlanta, Ga., office, vice J. E. Scofield, recently appointed to fill that vacancy caused by the resignation of Dr. P. E.

Murray, resigned to become medical director of an insurance company. Mr. Scofield is general manager of the Bowden Lithia Water Company, which concern refused to accept his resignation, thus preventing him from accepting the managership of the Atlanta office. Mr. W. B. Powell, manager of the Macon, Ga., office, has been advanced to the position of general inspector of the Southern division, with headquarters at Atlanta, vice S. L. Burts.

The Morse Electric Club.

The dinner of the Morse Electric Club will take place on Saturday evening, February 27, at the Hotel Savoy, New York. The club will have as its guest Mr. W. C. Brown, lately elected to the presidency of the New York Central lines. Mr. Brown began his career as a telegraph operator and the club is to be congratulated on being able to entertain on this occasion one who has risen from the key to the topmost round of the railroad ladder. Mr. Brown is not prone to accept public dinner invitations, but this telegraphic affair probably appealed to him with peculiar interest, inasmuch as it will afford him an opportunity to meet in a social way many of his old telegraph friends and acquaintances. It is expected that a number of telegraph officials will be present at the dinner to greet Mr. Brown. After dinner addresses will be made by H. D. Estabrook, Melville E. Stone and others.

The Cable.

Cable communication is interrupted February 12, with:

Venezuela .....Jan. 12, 1906
Madura Island (Dutch East Indies) Feb. 3, 1908
Macao .....Aug. 29, 1908

Messages can be mailed from Hongkong.

At the special meeting of the stockholders of the Mexican Telegraph Company, held on February 9, it was voted to increase the capital stock of the company from $3,000,000 to $5,000,000. On the same date the stockholders of the Central and South American Telegraph Company voted to enlarge the capital stock from $12,000,000 to $14,000,000.

The cable steamer Relay, belonging to the Central and South American Telegraph Company, which sailed from New York, December 16 last, with nearly fifty miles of four conductor cable manufactured by the Kerite Insulated Wire and Cable Company, for the Central and South American Telegraph Company, to be laid on the ground between Colon and Panama as a substitute for aerial wires, sailed from Colon on her return to New York, on February 8. This cable, which is heavily armored, and weighs 7¾ tons to the mile, has been successfully laid between Colon and Panama by the Central and South American Telegraph Company's general manager, Robert L. McCann, who returned to New York on the Relay. The company's office at 64 Broad street, New York, now works direct with Panama through this cable, which is laid along the route of the Panama Railroad, and when the great dams are completed about twenty-eight miles of the cable will be submerged.

The staff of the Commercial Cable Company at Hazel Hill, N. S., celebrated, on January 25, the one hundred and fiftieth birthday of Robert Burns, by a smoking concert. About seventy guests were present, including a number from Canso, all of whom were made welcome by Mr. F. B. Gerrard, the superintendent of the cable company, who presided on the occasion. A fine musical programme was rendered.

The cable steamer "Mackay-Bennett," belonging to the Commercial Cable Company, has finished her extensive overhauling and repairs which she has been undergoing for some weeks past in dry dock at New York, and is again back at her station at Halifax, N. S. She has been continued as a first-class ship according to Lloyd's special survey. The Mackay-Bennett was one of the first steamers to be equipped with a wireless telegraph outfit.

The New Postal Office at San Francisco.

The Postal Telegraph-Cable Company's main office at San Francisco was moved on January 17, to the new Postal Telegraph Building, on the northeast corner of Bush and Battery streets. The change was made without a hitch under the direction of General Superintendent J. G. Blake and Division Electrical Engineer H. C. Shaw.

The new office, which is replete with every convenience for patrons and comfort for employes, is equipped with up-to-date apparatus throughout. The various departments are connected by pneumatic tubes for the prompt interchange of messages and correspondence.

This new office takes rank among the best equipped and most modern in the telegraph service. Its location and plans were personally supervised by E. J. Nally, vice-president and general manager of the company.

F. E. Patrick, former traffic chief of the Barclay department of the St. Louis Western Union office, who resigned last fall to retire to his farm in Arkansas, has once again returned to the service of his former company at St. Louis.

Mr. H. H. Matlock, a well-known old-time and military telegrapher, a resident of Springfield, Ill., is spending the winter months at Thomasville, Ga.

Radio-Telegraphy.

President Roosevelt, on February 8, sent the following message to the Congress, urging compulsory wireless telegraph installation on ocean passenger-carrying steamships:

Your attention is invited to recent events which have conclusively demonstrated the great value of radio-telegraphy, popularly known as wireless telegraphy, as an instrumentality for the preservation of life at sea.

While the honor of the first practical application of the scientific principles involved may belong to another country, it is gratifying to know that our inventors have been quick to seize upon and develop the idea, and that several systems of approved scientific merit and commercial practicability have been put into operation in the United States.

Furthermore, through the liberality of Congress and the intelligence and industry of the Navy Department our Atlantic, Gulf and Pacific coasts are equipped with a chain of shore stations, designed primarily for the national defence, but capable of receiving and transmitting messages by any of the systems of wireless telegraphy now in general use. Even our distant insular territories and Alaska are so equipped.

So far as our own country is concerned, steps have thus been taken effectually to prevent the establishment of a monopoly in the practical use of the new applied art.

I deem it highly desirable that the Congress before adjournment should enact a law requiring within reasonable limitations, as determined by what the government of the United States has already done and by what prudent and progressive ship owners have already found practicable, that all ocean going steamships carrying considerable numbers of passengers on routes where wireless installations would be useful should be required to carry efficient radio-telegraphic installations and competent operators. The subject is now under consideration by the Congress, and I am advised that legislation to effect the same general purpose is also under consideration abroad.

Our interest in its enactment is keen on account of the great number of steerage as well as cabin passengers who annually arrive at and depart from our ports. What we have already done along practical business lines warrants the United States in being first among nations to enact a statute requiring the use of this safeguard of human life.

The United Wireless Telegraph Company of New York are having their manufacturing facilities taxed to their utmost capacity in filling contracts for wireless equipments for various coastwise and transatlantic steamship service. The Royal Mail Steam Packet Company, with sailings for Southampton, via the West Indies, has had all of its steamers equipped with United Wireless apparatus. This makes four lines of transatlantic steamers that now carry United Wireless outfits. The company has contracted to deliver twelve equipments at once and about forty installations during the next thirty days. The United Fruit Company's passenger steamers, Admiral Schley, Admiral Dewey and Admiral Farragut, have also been equipped with apparatus of this company.

When J. R. Binns, the wireless telegraph operator on the steamer Republic, reported to the Marconi Wireless Telegraph Company, Limited, at their head office in London, on February 8, he was presented with a gold watch and chain by the directors of the company, as a recognition of his services at the time of the disaster by collision between the steamers Republic and Florida. Mr. Binns was also honored by being extended the freedom of his native city of Peterborough on his arrival there to spend the vacation granted him by his company.

Bids were opened on January 28, in Washington, for the long-distance wireless telegraph plant. The Telefunken Wireless Telegraph Company, of Philadelphia, offered to construct and equip the Washington station for $168,850. The National Electric Signaling Company, of Pittsburg, proposed to build the tower for $108,000 and to build and equip it for $182,600. The bids of the Marconi Wireless Telegraph Company ranged from $249,295 to $361,094; the Massie Wireless Telegraph Company, of Providence, $300,000. The Radio-Telephone Company, of New York, bid only on the construction of the tower, which they offered to build for $52,950. Four bids submitted by the Stone Telephone and Telegraph Company, of Boston, ranged from $100,000 to $275,000.

The United Wireless Telegraph Company, New York, has made public the following balance sheet, dated November 30, 1908:

ASSETS.	1908.	1907.
Good will and patent rights	$5,005,100	$500,000
Treasury stock, preferred and common	5,310,410	6,659,110
Stocks and bonds, other wireless co.'s	14,128,610	12,459,263
Factory and equipment	25,997	23,405
Stations, boats and equipment	502,942	229,988
Furniture and fixtures	3,975	4,085
Cash accounts, receipts, inventories, etc.	294,183	241,612
Total	$25,272,219	$20,117,463
LIABILITIES.		
Capital stock	$20,000,000	$20,000,000
Bills and accounts payable	15,556	117,463
Surplus	5,256,662	.....
Total	$25,272,219	$20,117,463

The items of patents and patent rights include patents and patent rights in wireless telegraphy, wireless telephony and the fog-phone. The item of stocks and bonds includes stock that gives the company control of the International Telegraph Construction Company and its factory, patents, etc. The item of factories and equipments includes the factories at Jersey City and Seattle.

Pension Legislation Relative to United States Military Telegraphers.

SOCIETY OF THE UNITED STATES MILITARY TELEGRAPH CORPS.

NEW YORK, FEBRUARY 13, 1909.

TO THE MEMBERS OF THE SOCIETY:

There are at this time three bills in the National House of Representatives and two in the United States Senate, all looking to establishing the military telegraph operator on the same plane as all other constituent elements in the United States Army. Two of these bills in the House and one in the Senate aim to give a military status to the members of the corps while the other bill in both House and Senate, accepting the Act of January 26, 1897, as a recognition of the military status of the telegraphers provides for pensioning them the same as any other soldiers of the rank and file who served in the Civil War. In the House of Representatives the bills are in the keeping of Captain John A. T. Hull, Chairman of the Committee on Military Affairs, and Hon. Cyrus A. Sulloway, Chairman of the Committee on Invalid Pensions. Neither of these gentlemen is opposed to according the bare justice which the military telegrapher asks, but both stand upon technical procedure. Captain Hull thinks that Mr. Sulloway should act and Mr. Sulloway thinks Captain Hull should act. It has been suggested that these two gentlemen get together upon a common ground of procedure, and Chairman Hull has written to say that he would call upon Chairman Sulloway with that object in view, but no results have thus far been reported.

The Senate in a former Congress passed unanimously the same bill which is now before Mr. Sulloway's committee, and it is unfair to assume that it would negative itself by refusing to pass it again. In this session of the Sixtieth Congress petitions for establishing the status of the military operator and giving him the same advantages of the laws as are applicable to other soldiers, have been presented by forty-five Congressmen from twenty-three States, and twenty-three Senators from seventeen States. These petitions were signed by many thousand prominent citizens in all the walks of life. The great "bugbear" the Committee on Rules, which the partisan press has labored to prejudice the mind of the public against, does not antagonize the justice of our claim; some of its members in accord with the policy of the Government are opposed to the extension of the pension laws but do not oppose our claim in particular.

These gentlemen do not seem to see that we were actually in the military service under the command of the President of the United States as Commander in Chief, and they classify us with railroad engineers, conductors and brakemen, teamsters, quarter master clerks, and other civilian employes. They overlook the fact that the telegraph operator was declared to be a member of the military family after the war was over (Act of January 26, 1897), while the purely civilian employes have not been so honored. In addition to that erroneous assumption of our status the objection is urged that we were paid a larger monthly stipend than the private soldier, and that we were contract employes. As to the first objection there is no reason why we should not have received greater pay than the private soldier, because we rendered a skilled service and our positions were similar to those of staff officers whose pay was even greater than ours, and because the private received local and government bounties, quarters, rations and transportation, which we did not and which would overtop our pay.

The contract objection seems puerile. Of course we were under contract, but in the same sense as an enlisted man or commissioned officer. We were under a military contract in times of war. It was not a civil contract requiring the consent of both parties for its annulment, but it was a contract based upon the will of the sovereign power as exercised by Abraham Lincoln as Commander in Chief, and could only be dissolved by him. The very nature of our occupation was military, and by it we were subject to the articles of war. The service we rendered could not have been so rendered within the lines of an army actively engaged in hostilities, by a mere civil contract.

WILLIAM BENDER WILSON.

By the President,
DAVID HOMER BATES, Secretary.

Government Preliminary Telegraph Report.

In the preliminary report on telegraphs, issued by the Census Bureau, of which S. N. D. North is director, the statistics furnished, which are exclusive of Alaska, Hawaii, Philippine Islands and Porto Rico, relate to the years ending December 31, 1907 and 1902. The totals include reports of commercial land telegraph companies owned and operated within the United States, and of domestic ocean cable companies operating from the United States, but do not include telegraph lines operated by railway companies.

	1907.	1902.	Per cent. of increase
Number of systems or companies	25	25	0.0
Miles of single wire (exclusive of ocean cable)	1,577,961	1,318,350	19.7
Nautical miles of ocean cable	46,301	16,677	177.7
Messages, total number	103,794,076	91,655,287	13.2
Total income	$51,583,868	$40,930,038	26.0
Total expenses (including taxes, interest, and fixed charges)	$41,879,613	$30,948,034	35.3
Total cost of construction and equipment (including real estate)	$210,045,959	$161,679,570	29.9
Capitalization:			
Capital stock authorized, par value	$161,603,900	$123,233,075	31.1
Capital stock outstanding, par value	$155,080,575	$117,053,525	32.5
Dividends on stock	$7,477,083	$6,256,603	19.5
Bonds authorized, par value	$83,004,000	$49,803,000	66.4
Bonds outstanding, par value	$65,204,000	$45,803,000	42.1
Interest on bonds	$2,651,511	$1,940,150	36.0
Total par value stock and bonds outstanding	$220,293,575	$162,946,525	35.2
Employes and wages:			
Average number	28,034	27,627	1.5
Total salaries and wages	$17,868,249	$15,039,073	18.4

President Lincoln's Telegram to General Pope.

BY CHARLES A. TINKER.

I read with interest the letters of operators of the United States Military Telegraph written to Comrade Plum years ago, when he was engaged in compiling the data for his admirable history of the corps in the Civil War, and which he is permitting you to publish in Telegraph Age at random, that we may all read at this late date.

Many of the writers I have never met, or had personal knowledge of, but their letters recall to my mind many others whom I did know, and incidents of the service with which I was also familiar.

As much of the subject matter is the making of history, it seems important that essential errors which conflict with the facts already recorded should be corrected. As an instance I refer to the letter of H. P. Jones, quoted in the "Age" of January 16, in which he relates his recollection of an incident in connection with President Lincoln's receipt of the long message from St. Paul, Minn., giving the names of the three hundred or more Indians who were condemned to death for participating in the massacres in 1862. (A detailed account of the transmission of this message was published in Telegraph Age May 16, 1907.) His version would impress the reader that the President rebuked General Pope for his apparent extravagance by quickly wiring him this curt reply to "hereafter forward such messages by mail."

I am sure that no one who knew President Lincoln, even casually, would believe that such an implied censure could emanate from his kindly and appreciative nature to discourage an officer, or civilian, who conscientiously communicated with him in the line of duty.

It is not strange, however, that the writer fifteen years after the occurrence should have reflected the impression left upon his mind by the incident rather than the real import of the message, and failed to quote its text correctly. This is what the president did say:

"Executive Mansion, Washington.
"Nov. 10, 1862.

"Major-General Pope,
"St. Paul, Minn.:

"Your despatch giving the names of 300 Indians condemned to death is received. Please forward as soon as possible the full and complete record of their convictions; and if the record does not fully indicate the more guilty and influential of the culprits, please have a careful statement made on these points and forward to me. Send all by mail.

"(Signed) A. Lincoln."

Brooklyn, N. Y., January 23, 1909.

The Mysteries of Lightning.

Mr. D. S. Carpenter, in the Electrical World, contributes some very interesting speculations regarding the genesis of lightning and the sources of some of its striking peculiarities. Commenting on the subject editorially, that journal says in part:

"So little is known regarding the nature and sources of atmospheric electricity that every such suggestion is helpful. It remains to-day almost as much a mystery as in the far gone years when the skinclad Norseman heard in the storm the mighty blows of Thor's hammer. From the theoretical standpoint the greatest difficulty is presented by the constitution of a thundercloud, consisting as it does of discrete charged bodies distributed in a partially insulating vaporous medium of unknown condition of ionization. It is a condition that almost defies analysis, and it is certainly extremely difficult to form any definite physical conception of the laws of surface charge in a volume so constituted. It would be indeed interesting to consider whether the ordinary laws of static charge which tacitly assume a homogeneous surface conducting sheet hold at all for a charged cloud in their usual sense. If they do, is such a condition stable or is it the condition precedent to immediate discharge? Sometimes one notes discharge between clouds in the form of a brilliant sheaf of discharges looking quite like a photograph of the volley of sparks from an inductorium, while again there may be an apparently single tremendous discharge sometimes accompanied by induced discharges between other clouds. This diversity of phenomena suggests very forcibly a great diversity in the precedent electrical conditions."

Henniker-Heaton's Opinion of the British Telegraph Service.

That indefatigable postal reformer, Henniker-Heaton, says the New York Sun, regards the British telegraph system in the matter of perfect and prompt despatch and reception of telegrams as the most efficient in the world. In a letter to Sir Alfred Jones, the president of the Liverpool Chamber of Commerce, he says that the vexatious delays so often complained about could be remedied at once if the foreign Governments and officials could be made to sharpen up their departments.

"Foreign telegraph officials," he says, "from the Grand Imperial Director to the telegraph messenger, are too indolent for words to describe. If I had my way I would draft into all foreign capitals British officials to show the foreigners how to conduct postal and telegraph business."

Mr. Henniker-Heaton then describes how he spent one day recently at the London Central Telegraph Office wiring to each European capital. In one minute, he says, he had replies from Berlin, Rome, Vienna and Budapest.

Even with Teheran and Constantinople he got direct instantaneous telegraphic communication, and so he concludes that "a more efficient, a more perfect direct service, there is not in this world."

Topics of the Telegraph.

A shock has come to the nerves of a Minneapolis woman because the telegraph, as alleged, said that her husband was "dying," instead of "drinking," phrases whether intermixed or considered in their rightful relations, when regarded as defining a specific condition, are not, it must be admitted, without painful meaning. It appears that Pat, the husband aforesaid, is addicted to the excessive use of liquor, a habit which unfortunately so gained control of him as to cause him to go on a prolonged spree. Then it was that the wife, in the desire to inform a near relative of circumstances so distressing, and gain assistance in a time of such a lapse of moral turpitude on the part of the husband, telegraphed to her brother-in-law, the husband's brother, to come at once. It was an easy lapse on the part of the telegraph to send the word "dying" instead of "drinking," which at any rate is what was claimed that that unfortunate medium of transmission was guilty of doing. Perhaps the weather was foggy like the condition of the subject referred to in the telegram, hence the failure. Be that as it may, however, when the message was received it was declared to have read: "Pat is dying; come at once." The announcement was positive, and there doubtless arose at once in the mind of the brother, visions of a wake, that according to tradition and the dictates of the society in which his family moved, made it proper that the event of death should be commemorated by this form of celebration. What more natural then than for him to notify relatives at a number of points, one even at the distant city of Fall River, Mass., of the misfortune that had befallen them, bidding all hasten to Minneapolis.

It need hardly be said that Pat, who in the meantime had recovered from his excesses, was much surprised to have the relatives come pouring in several days later. When the mistake was discovered the wife says she had to pay all the expenses of her indignant guests, amounting to $160.80. For this amount she brings suit against the telegraph company, together with an extra thousand dollars estimated to be the equivalent of the damage sustained to her nerves.

A Des Moines, Iowa, citizen had, we are informed, the misfortune recently to fall over a pile of telephone poles. The inference to be drawn from this statement is that the telephone poles were placed where they should not have been. It is left to the imagination to conceive that the aforesaid citizen was endeavoring to find his way at a time after dark. Conjecture might readily call to mind many reasons that would cause a citizen of any town to stumble upon obstructions placed in his way. The information, however, conveying the news of this specific and singular mishap, is strangely silent regarding the circumstances governing this peculiar happening, a fact which reflects seriously upon the fitness of whoever is responsible for the distribution of news at that always interesting Iowan city. All we are told in connection with the untoward event is that the injured citizen, nursing his wounds and his wrath at the same time, confident that punishment should descend on something or somebody for the indignity placed upon him, has implored the aid of the law to obtain redress, and has accordingly brought suit against one of the telegraph companies, placing damages at the bargain figure of just $730. All poles look alike to the denizens of Iowa!

Is Mars Talking Again?

Wireless operators on Mount Wilson, in California, says a report from that state, have been puzzled of late by messages of much greater strength than it is possible for them to receive from the station at Los Angeles, where the nearest powerful instruments are located. They find that the waves increase in intensity as they ascend the mountain. Also they are non-plussed by two other remarkable facts. The code used by the mysterious sender is unknown to them, being neither Morse, Continental, nor any makeshift that can be gathered from a familiar system, and apparently the same message is being sent over and over again, as if some one were calling or attracting attention to the existence of a wireless plant not accounted for in the world's system. Some daring hypothetist has conjectured, or hazarded the theory that the strange messages came from the planet Mars. Laying aside the problem of distance, which transcends all the calculations of our wireless experts, the theory presents some half-plausible suggestions.

Mars is the favorite planet used for illustration by those who believe that the earth is not the only heavenly body inhabited by man. According to the advocates of this proposition the race populating Mars is older than man, owing to the more rapid development of the planet; consequently its men are more highly developed than ours intellectually. If such a race exists—and no one can say that it does not—it probably discovered wireless telegraphy thousands of years ago and long since perfected the science and is able to send messages through great distances. Assuming that this speculation is correct in its conclusions, Mars should have been calling the earth long before our electric telegraph was dreamed of and, if messages can be sent through the thin medium lying in infinite space, these calls of inquiry and greeting may have been knocking at our doors all these years, waiting to be received. The theory is at least tantalizing and compelling. Assuming that it is all so, eventual success would depend upon the ability of the two races to get together upon a common language and alphabet. Such an enterprise would present vast obstacles, but not any that would be insuperable.

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Please read the headline over again. Then its tremendous significance will dawn upon you. An Oliver Typewriter—the standard visible writer—the $100 machine—the most highly perfected typewriter on the market. *Yours for Seventeen cents a day!*

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Write for Special Easy Payment Proposition or see the nearest Oliver Agent.

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FEBRUARY 16, 1909.

The Book Department of Telegraph Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Vermont has passed a public utilities bill which in effect places the telegraph and telephone operating within its borders, under state regulation.

The Telephone as an Auxiliary Feeder.

While the telegraph has in numerous instances been superceded by the telephone, forced to give way to the encroachments of its younger competitive agent in much of the short haul business, there is nevertheless a way in which, as we view it, the services of the latter might well be utilized to promote very considerably and very directly the interests of the older system. It is an arrangement, too, that would contribute very materially to the convenience of numerous would-be patrons of the telegraph those living somewhat remote therefrom few in any single given place, perhaps, yet in the aggregate amounting to a large number, and from whom a very considerable revenue might be derived. We allude to the plan of using telephone lines as feeders to the telegraph main line. Many such connecting mediums, if proper publicity of the fact was maintained might, it seems to us, be profitably made use of. The additional facilities thus afforded would provide accommodation for many now practically denied the use of the telegraph. We believe that if a comprehensive plan of this character were very generally adopted throughout the country the practice of utilizing auxiliary telephone feeders to the telegraph would become very popular.

The Influence of Mr. Binns on Wireless Telegraph Legislation

It is well to recognize individual heroism wherever displayed, and the world loves a brave man. John R. Binns, the wireless telegraph operator on board the steamer Republic, because he kept his head, was expert in the practise of his profession, and was brave, sticking manfully to the post of duty which was likewise one of danger, performed acts which without question saved the lives of many, if not all, who were associated with him on the ill-fated steamer. For if the disaster which befel the Republic early in the morning of January 23, had gone unheralded, dire calamity would have followed. The part played by Binns in this realistic drama of the sea has so unmistakably proclaimed his manly qualities, that a generous world, quick to recognize merit, has broadly acclaimed his name and deed.

It is an unusual thing to suspend in Congress the business of a nation, in order to bear testimony to specific personal worth; for the legislature of the State of New York to give expression to its admiration for a courageous act; for the New York Produce Exchange and other institutions to officially take notice of an unusual occurrence, no matter how meritorious; for the French Chamber of Deputies to vote a gold medal to Mr. Binns for the valuable service he rendered to humanity—all of which and more was done. There is greater danger that the brave telegrapher may lose his head because of public eulogy, than he was when called upon to face sudden peril. Let us hope to the contrary, however, for the recipient of all the praise and attention bestowed has earned in full measure the adulation that has been his.

But the act of Mr. Binns, and because of it the averting of dreadful calamity of loss of life by drowning, has served to bring the question of wireless telegraphy itself, so graphically to the forefront as to engage the attention of governments and of people to the vast utilities inherent in the system as a means of safeguarding navigation, in securing communication between ship and ship, and ship and shore, so frequently adverted to in these columns. Additional emphasis has been placed upon the advantages possessed by wireless in the startling object lesson so vivid in portrayal, recently enacted. This is not lost upon the President himself, for in a message to Congress he urges that all ocean going steamships carrying consider-

able numbers of passengers, be equipped with efficient wireless outfits.

It is no wonder that what has so long been obvious to the scientific understanding should now find lodgment and practical expression in the less acute lay mind. The introduction in Congress of a bill by Representative James F. Burke, of Pittsburg, Pa., making compulsory under certain conditions the equipping of practically all passenger vessels with wireless telegraphy, is a move demanded alike by considerations affecting humanity and commercialism. Mr. Burke's bill has, we understand, received amendment since its first introduction, following a larger knowledge of the subject by its framer, so that now all vessels carrying passengers on the Atlantic and Pacific oceans, including coastwise traffic, as well as that on the Great Lakes, are affected by the provisions of the new measure.

This is good as far as it goes, but it does not go far enough. Unless the law be made to apply equally to the freighter, that is ships engaged both in the regular and tramp service, and which outnumber by far those employed as passenger carriers, the fact that passenger vessels only may be compelled to adopt wireless telegraphy as a necessary part of their equipment, is likely to again invite disaster similar to that which resulted in the sinking of the Republic. If the Florida, which rammed the Republic, had been fitted with wireless the collision between the two vessels would not probably have occurred, for the reason, as explained in this journal February 1, that the operators on both steamers would have been able to have detected the approach of the other through the varying intensity and operation of the electric air waves.

While a bill governing the employment of wireless telegraphy on the water is essential to modern requirements, there is need that careful consideration should be given to every detail of its applicability. The situation urgently demands on the part of our lawmakers that a positive knowledge of the general principles involved in wireless telegraphy, not necessarily the full technique of the subject, should be attentively regarded. With a compulsory wireless telegraph outfit on all ships, and with the additional installation of the submarine bell signal, a larger element of safety, embracing all that human ingenuity has thus far devised, would afford additional protection to all those who "go down to the sea in ships." The action of Mr. Binns has excited a far-reaching and beneficial influence.

Cotton Futures in the South.

There is an old and familiar saying that "chickens come home to roost." No better illustration of this homely truism can be found than that observed in the working of the anti-option laws forbidding dealing in cotton futures in the great cotton growing state of Texas and elsewhere in the South. It was held by the growers of the white staple, on which the prosperity of the South is very largely dependent, that the evil of the bucket shop, in the foul operations of which they were unable to distinguish from the legitimate brokerage office, was correlative with that of intrastate speculation in their particular product. Legislation to suppress the one was also invoked to stop the other. The law was drastic and it accomplished its purpose. As the telegraph was said by the Farmers' Union, the powerful organization instrumental in securing the legislation referred to, to be accessory to the declared evils of speculation, the cancelling of contracts for leased wires followed, and numerous operators found themselves out of employment in consequence. While this was undeniably a blow for the telegraph the legitimate side of speculative business received the hardest hit. The active pulse of commerce in the sections affected has felt a paralyzing influence. Prices of cotton have fallen off enormously and growers have been the sufferers in consequence, all the advantages of the changed situation accruing to the spinners. The chickens are roosting, and now a demand is heard that the self-invoked law, declared now to be a blunder, shall be repealed. The bucket shop is gone, and if the legitimate banker and broker at the South, the responsible local dealer, be permitted to resume his legitimate business incident to the buying and selling of the cotton crop, a larger measure of prosperity will visit the Southland, in which the telegraph will again resume its proper functions. There is a wide difference between gambling and speculation. The latter holds its proper place in the legitimate business of this world.

The Late Otis E. Wood.

The recent death at Etna, near Ithaca, New York, his old home, of Otis E. Wood, the former well-known, old time telegrapher, at the age of seventy-seven years, referred to in these columns in the January 16 issue, brings to mind much that is interesting in the early history of Mr. Wood in connection with the telegraph, with which he became identified when but a mere lad, being engaged in telegraph line construction as early as 1846, in connection with Ezra Cornell, his brother-in-law. He afterwards became manager of the first telegraph office at Buffalo, subsequently, and before he reached his twenty-first birthday, being appointed superintendent of the New York, Albany and Buffalo Telegraph Company, probably the youngest man ever holding a similar position. Mr. Wood showed much aptitude for the profession and speedily learned to read by sound, in those days an accomplishment possessed by but few. In this connection it is related of him by George B. Prescott, in his work, "Electricity and the Electric Telegraph:" "The first time we saw any one read in this manner, was in the winter of 1846-7, in New York, by Mr. Otis E. Wood, at Harlem Bridge. No trick of legerdemain has ever been able to excite so much interest in our mind as this."

The Telegraph Force of Chicago Forty Years Ago.

The enormous growth and development of the telegraph in this country, in very many ways far exceeding that attained in any other land, while a subject of interesting study and of profitable consideration from a commercial point of view, presents in the vast personnel employed another aspect of progress and change, one treasured with sentiment and wide diversity of reminiscent thought. Nothing brings more clearly to mind the conception of progress than that instituted by comparison. The Western Union Telegraph Company, for instance, has at this time in its employ in Chicago, probably three thousand persons. When to this great number is added those identified with the Postal Telegraph-Cable Company, say, fifteen hundred more, besides others in the railroad service and those operating private wires, it is safe to say that fully six thousand five hundred persons depend upon the telegraph in the great Western metropolis for a means of livelihood. This immense multitude is in startling contrast with the force deemed necessary to conduct the telegraph business in that city in 1860, just forty years ago, for at that time about one hundred persons only were so employed. It is difficult to realize that such a change has been wrought in two score years in a form of industry, such as the telegraph, that, comparatively speaking, has narrower limitations than many others that have likewise expanded by leaps and bounds.

Forty years ago the country had but lately emerged from the great conflict of the Civil War, in which the telegraph, then in its infancy, so to speak, had played so important a part. Chicago in 1860 had less than 300,000 inhabitants. When we revert to the names of those who constituted the telegraph force of that year in that city, and which are published herewith, only telegraphers with long and active memories will be able to recall all the names mentioned. As one scans the list, hesitation and perplexity naturally rises in the mind in the attempt to follow out the future of those so registered. Some must be checked off as having passed on to the great hereafter, a few remain, others are recognized as being located elsewhere, while of others all trace is lost, they seemingly having dropped into complete oblivion, and we wonder and ask the question of where they may be.

Here are the names of the Chicago telegraphers referred to as comprising all so engaged in 1860, arranged for the sake of convenience in alphabetical order:

F. E. Angell, Josie C. Adams, C. V. Andrews, D. S. Anderson, W. H. Bagge, Thomas Barnard, C. B. Baldwin, Paul Byrne, A. Boughan, E. B. Bennett, N. D. Boyd, M. G. Chettle, J. N. Crittenton, Aug. Curry, C. Catlin, R. W. Chapman, G. W. Cunningham, C. L. Drieslein, W. H. Dolbear, J. F. Farrell, Geo. W. Felton, John P. Fowler, L. B. Firman, D. S. Foote, J. J. Guthridge, Helen Giddings, F. D. Giles, W. J. Gredle, Charles H. Haskins, superintendent of the Pacific and Atlantic Telegraph Company, G. W. Huddleston, C. E. Husted, Addie M. Hobbs, C. W. Jones, B. C. Keeler, F. S. Kent, S. G. Lynch, T. J. Lynch, C. H. Lithgow, W. C. Long, J. O. Mason, S. C. Mason, J. H. Modbury, F. E. Merrill, H. C. Maynard, C. B. Morgan, R. H. Myers, R. C. Minor, J. N. Neeley, Anne Nixon, J. E. Pettit, H. W. Plum, A. F. Plank, Charles H. Patch, E. Payson Porter, L. Penoyer, M. F. Prentice, R. Park, J. E. Phelps, L. D. Parker, Joe Quinn, R. C. Rankin, M. Rousseau, S. L. Robinson, G. F. Richardson, Sophia L. Redrup, E. J. Rudd, John J. Ryan, Anson Stager, general superintendent, Western Union Telegraph Company; F. C. Swain, chief operator, Western Union Telegraph Company; A. E. Shape, W. H. Sisson, C. H. Summers, C. S. Soule, Geo. B. Simpson, G. A. Singer, C. G. Sholes, F. W. Singer, L. C. Springer, A. M. Sill, Emma Staunton, Fred Shumway, Daniel C. Sweet, F. C. Stewart, H. B. Thornton, Mrs. Tillotson, Joseph Trainor, F. G. Valcureux, C. B. Vanpelt, T. L. A. Valiquet, C. Waterman, J. J. S. Wilson, district superintendent, Western Union Telegraph Company; Eddie Wilson, J. C. Wilson, C. E. Wilkinson, W. M. Willis, L. E. Warner, E. P. Whitford, A. Yetter, D. L. York, George C. York.

Like Rip Van Winkle returning to his native village after his prolonged sleep of years in the mountains, the Old Timer revisiting Chicago today, after an absence of forty years, would be apt to stare and look about him in bewilderment at the changed physical condition of the city itself. In seeking the telegraph offices where they formerly stood, the Western Union at Washington and Lasalle streets; the Atlantic and Pacific, on Washington street, near the then Board of Trade, and the Pacific and Atlantic, at 91 Clark street, he would find new and strange buildings devoted to other purposes standing in place of the old. Entering the splendid structures now devoted to the modern necessities of the Western Union and Postal telegraph companies, all astir with their great activities, Old Timer scarcely knowing whither to look, might search almost in vain for a face that was familiar to him of some one whom he knew forty years ago. He might well almost give up his quest in despair.

In scrutinizing the list of names, the first, that of Fred E. Angell, familiarly known as Ed. Angell by his friends, pleasantly recalls one of the most genial and companionable of men, a gentleman, refined, alert, intelligent. Old Timer would find David S. Anderson, who at the earlier date mentioned, a young fellow then, and a comparatively new comer, still in telegraph harness, a fact especially gratifying, and tending to establish a kind of foothold by which during the glad-hand-grasp of renewal of old acquaintance might enable the Old Timer to pause and brush the cobwebs of uncertainty spun by time from before his eyes, get his bearings, so to speak, in order to enable him to proceed with a greater de-

gree of courage further in his tour of investigation. Mr. Anderson would tell him that he now holds the responsible position of manager of the Western Union office at the Board of Trade, and if he himself did not say so, doubtless the information would be forthcoming from others, that Mr. Anderson was a man keenly alive and loyal to company interests, active and thorough in all that he did.

Old Timer would look in vain for Robert W. Chapman, who was book-keeper for the Western Union Telegraph Company forty years ago. Yet he would be told that Mr. Chapman continued to hold that position until about 1902, when he was transferred to the main office in New York, where he now is at the head of the book-keeping department, conducting its affairs with singular success, in which he has introduced business methods originating with himself, growing out of a ripe experience and based upon the peculiar requirements of the intricate service. J. Newton Crittenton was one of Chicago's fine operators. After serving his country with distinction throughout the Civil War, he located in the Lake City, where his subsequent telegraph career was long and honorable. He died in 1905. L. B. Firman, another of the former brilliant coterie of operators, attained considerable distinction as an inventor, his inventions eventually yielding him a handsome income. He entered the electrical business, in which he was successful. His death occurred about a year ago. To locate Frank D. Giles, Old Timer would have to call at the main office of the Western Union in New York, where he would find the object of his search now occupying the position of assistant chief operator. In the early days, as now, Mr. Giles possessed skill, enterprise and good sense. After a period of service at Chicago he went to the Far West where he remained for many years.

Charles H. Haskins in 1869 was the superintendent of the Pacific and Atlantic Telegraph Company. He afterwards won distinction in his career in the general electrical field, both as an author, and as an electrical engineer, gaining a reputation that was national. G. W. Huddleston, who was well remembered by Old Timer, was, he learned, now engaged as a broker and dealer in investment securities in London, England. Mr Huddleston was well known in the early seventies, being rated as a "gilt edged" operator.

Still another, a member of the old Western Union force, was W. C. Long, who in late years became actively identified with the Commercial Telegraphers' Union of America, for sometime editing the official journal of that organization. Since his retirement from the Union, about a year ago, he has sought a livelihood in other fields of endeavor. S. C. Mason, whose name also appears in the list, was an accomplished operator who subsequently, became the chief clerk of Colonel Robert C. Clowry, now president and general manager of the Western Union Telegraph Company, New York, when that official was a resident of the West. Until a year ago, and for the previous fifteen years, Mr. Mason acted as storekeeper of the Western Union company at its extensive supply department in Chicago.

H. C. Maynard, another well known name, was night chief of the Western Union office, being advanced to chief operator in the late seventies. While a stern disciplinarian, his administration was a successful one and was extended over many years.

No one, forty years ago, was held in higher esteem in the telegraph world than James E. Pettit. He served with much credit as a military telegrapher throughout the Civil War, and as a member of the staff attached to the Western Union occupied numerous positions of responsibility. When the Postal Telegraph-Cable Company first opened an office in Chicago in the middle eighties, Mr. Pettit was offered the position of chief operator, a place he held until failing health compelled his retirement about a year ago. For over a quarter of a century he was the secretary of the Society of the United States Military Telegraph Corps.

E. Payson Porter, a telegrapher of expert ability had been a member of the Western Union force for many years previous to the time specified. It was in that office, in 1868, that Mr. Porter first introduced the typewriter for the reception of messages. His machine was the second of the kind ever manufactured and was made by the inventor of the typewriter, Sholes, of Milwaukee. The machine, while crude, embraced the essentials of its modern development. From this initial recognition of the adaptability of the typewriter for telegraphic purpose, the use of the instrument has now become well nigh universal in telegraph operating rooms. At seventy-four years of age, well-preserved, with the same kindly personality that has always distinguished him, Mr. Porter is still doing excellent work as an operator in the New York "195" office of the Western Union Telegraph Company. Another well known telegrapher, who was regarded as an adornment to the profession, was L. D. Parker, with a service of many years to his credit. He served in the army as a military telegrapher during the first two years of the Civil War. Returning to Western Union employ at Chicago, he rose to be assistant superintendent of the company, afterwards becoming assistant general superintendent of the Mutual Union Telegraph Company at that point, and later general superintendent of the Postal Telegraph-Cable Company, also at the same place. The death of Mr. Parker occurred in 1901.

In 1869, General Anson Stager was general superintendent of the Western Union Telegraph Company at Chicago. An accomplished executive, he had previously earned his military title by especially meritorious service as the head of the United States Military Telegraph, at the War Department, Washington, during the Civil War.

General Stager died in Chicago, March 26, 1885. Charles H. Summers, who at the time of which we write, was the electrician of the Western Union Office, soon after this developed into one of the foremost electrical and telegraph engineers of the country, and at the time of his death, just ten years ago, was at the head of the electrical department of the western division of that company. The chief operator of the Western Union office was F. C. Swain. He was a gentleman of much dignity and polish, and managed the affairs of the company coming under his jurisdiction with much ability.

Another whom memory holds in pleasant recollection is Colonel J. J. S. Wilson, at that time district superintendent of the Western Union company. He continued to serve in this position for some ten or twelve years until the company passed from the control of the Vanderbilt interests to those of Jay Gould. Colonel Wilson died in 1900. His son, C. H. Wilson, who first became an office boy, then an operator in Western Union employ, is now the general superintendent and a director of the American Telephone and Telegraph Company, with headquarters in New York.

It will create a smile, perhaps, on the part of many to know that the night force of the Western Union Telegraph Company in 1869, at Chicago, consisted of but seven persons.

The telegraph in its early days drew to its employ as a rule a superior class of operators, frequently young men of gentle breeding, and of fine intelligence, who were proud of the association, and who gave to the business in which they were engaged the best of thought, of purpose and conscientious effort. The rewards for such service have been many. The office at Chicago in 1869 and immediately thereafter, was typical in its personnel of that which existed elsewhere. In referring, as we have done, in reminiscent mood to its force of forty years ago, and in tracing the subsequent history of some of its members, dealing with the names which come most readily to mind, it is felt that the list has been but partially covered, a review that might profitably be continued at another time.

French Letter Telegrams.

Consul-General Horace Lee Washington, of Marseilles, advises that after some delay in the date first understood an innovation in the French postal service was inaugurated on December 7, when from certain offices in France and Corsica, letter telegrams paid in advance were transmitted by wire during the night at the rate of 1 centime (1-5 of a cent) the word. No messages are forwarded at a charge of less tan 50 centimes (10 cents). The messages are sent out as mail matter by the early deliveries. He further says:

Although messages are only forwarded during the night after nine o'clock, they may be deposited after seven in the evening, and at the designated offices, which are open until midnight, up to eleven o'clock. They are received up to midnight at offices which are open all night. The following cities will have the service until midnight: Paris, Bordeaux, Boulogne-sur-Mer, Brest, Calais, Cherbourg, Le Havre, Lille, Lyon, Marseilles, Montpellier, Nancy, Nice, Roubaix, Toulouse and Tourcoing, the principal offices of which are open until midnight, and at the minor offices until eleven o'clock.

The following cities will have the service only until eleven o'clock: Agen, Aix-en-Provence, Ajaccio, Amiens, Angers, Arras, Avignon, Bastia, Bayonne, Besancon, Beziers, Biarritz, Boulogne-sur-Seine, Caen, Cambrai, Cannes, Carcassonne, Cette, Chalons-sur-Marne, Clermont-Ferrand, Dijon, Dieppe, Douai, Dunkerque, Elbeuf, Grenoble, Laval, Levallois-Perret, Limoges, Lorient, Macon, Le Mans, Montauban, Monte Carlo, Nantes, Narbonne, Neuilly-sur-Seine, Nimes, Orleans, Pau, Perpignan, Rheims, Rennes, Rochefort, Rouen, Saint Etienne, Saint Nazaire, Saint Quentin, Toulon, Tours, Troyes, Valence, Valenciennes and Versailles.

The letter telegram is an experiment, and its continuation will depend upon the extent the public avails itself of this opportunity. Considering the low rate provided, and the immense convenience to business interests that admits of lengthy messages being sent at the close of a business day and received early the morning following at points two or more days distant perhaps by ordinary mail facilities, as is the case when letters are sent from Corsica to Paris, and twenty hours when sent from the southeastern section to the capital.

Between cities not on a main line connection much practical convenience will result, since the length of time required by ordinary postal service across even comparatively small distances in France not directly connected is often too great to admit of a letter mailed at night reaching its destination on the morning of the following day. It is estimated that an appreciable portion of the patronage will come in this way. The interest demonstrated generally by business men and their impatience at the delay that followed the first official intimation as to the date of the inauguration of this experiment indicate that there is every prospect of financial return that will warrant this method being decreed a permanent service.

Mr. F. E. McAllister, of the Northern Pacific Railroad Company, at Fargo, N. D., in a recent letter extending his subscription for another year, pays this tribute to the worth of this publication: "The past year has marked a wonderful broadening of the magazine. Its articles are profoundly interesting, comprehensive and intelligent. It has kept pace with the great innovations in railroad telegraphy and telephone despatching in admirable manner, and its articles are so timely and so thorough that it is a pleasure for a man to keep abreast of his profession through its medium."

The Military Telegrapher in the Civil War.

PART XIII—CONCLUDED.

The letter of Samuel H. Edwards recounting the part performed by him in the military telegraph service during the Civil War, written to Colonel William R. Plum, the historian of the United States Military Telegraph Corps, under date of September, 1878, begun in the preceding issue, that of February 1, is herewith concluded:

"It was about September 25, 1865, that Ed. A. Hall and myself were ordered from Warrenton Junction, Va., where we had been stationed for some time, to Catletts, Va. We began our journey by taking passage on a working train, but our progress was soon stopped owing to the fact that the railroad tracks had been torn up. We then applied to a German Brigadier General, whose name I have forgotten, for horses, with which to continue our journey, but as none could be supplied, we waited all day hoping to be provided with some other means of transportation. None being forthcoming, and in the meantime having suffered the loss of our blankets by theft, we finally started to walk back to Warrenton Junction, through deep mud, each carrying his instruments and other "baggage," the latter consisting of a pair of boots, a clean shirt and stockings. It was a weary tramp, and when at length we reached Warrenton Junction foot-sore and tired, we were forthwith placed under arrest, the charge being disobedience of orders in not going to Catletts. In response to our appeal, Major Thomas T. Eckert, who was always mindful of the welfare of his telegraphers, soon came to our rescue. We were released, horses furnished us, and soon we were once again en route to Catletts, this time having no difficulty in reaching our destination. McCandless, one of the line repairers, and a great wit, by the way, made a pencil sketch of Hall and myself as we 'appeared before, during and after arrest,' a cartoon that caused much merriment.

"During October the army made alternate movements backwards and forwards, the rebels showing great activity in destroying railroad tracks and telegraph lines. By the latter part of November, by which time we had had sleet and snow, winter quarters were established at Bealton, provision being made for the telegraphers in a specially constructed house containing three rooms, in which we were made very comfortable. About this time a carload of army supplies came to our station, containing among other things, about a dozen barrels of whiskey. Although the car was locked and under guard some of the soldiers who had been helping unload during the day, remembered the location of the barrels, which they managed to tap by means of a long bit, boring through the car bottom and so into the barrel. The theft was discovered in the morning, but in the meantime some of the boys had made the most of their opportunity.

"General Meade had now crossed the Rappahanock and was pushing on for Culpepper Court House, and constant skirmishing followed, bushwhackers and guerillas hung about and annoyed us on every side. A laughable incident, and one attended with much danger, yet which illustrated the restlessness of many serving in the war, occurred, to which I will refer. Chase Taylor was an engineer for the United States military railroad, operating over the Orange and Alexandria Railroad. While passing through Mechanicsville, I think it was, he was fired at by bushwhackers. Shutting off steam he climbed back on to the wood piled up in his tender, and with an imprecation of 'You d—d rebels,' he pelted them with chunks of wood in return for their bullets. Of course it was foolhardy, but he escaped injury while several of his assailants were squarely hit and with sufficient force to cause them to yell with pain and anger. Taylor was a brave fellow and subsequently rendered the Government much excellent service calling for an exhibition of nerve, courage and good judgment. Our duties as telegraph operators kept us fairly busy, for the wires were pretty constantly in use, yet after all we had considerable leisure time. I recall a lot of refugee women coming into camp, and asking in mournful and distressed tones: 'What are you-uns coming among we-uns for? We-uns hain't done nothin' to you-uns.' They did not seem to be able to understand the issues of the war. We got up an entertainment for these people, the carrying out the programme of which, during their brief stay, served to break the monotony of our camp life.

"About Christmas time the Spanish itch broke out in camp. Nearly everybody was affected by this distressing malady, and it became necessary for a number of us, myself included, to go to Washington for treatment. Recovering from this disorder, I worked as an operator in the War Department for a while, returning to my old headquarters at Bealton in the following February. In the latter part of March I was ordered to General U. S. Grant's headquarters at Culpepper Court House. At midnight, May 3, the 5th Army Corps, commanded by General G. K. Warren, to which I was attached, began its forward movement. Major Eckert had each corps furnished with a two-horse wagon in which supplies were carried for the military telegraphers, usually three in number. Two men were the regular contingent, the third was liable to be called upon to do duty elsewhere—possibly at a brigade headquarters within the same corps. From the fourth until the eleventh of May we were on the march, arriving on the latter date at Spottsylvania Court House, the entire distance being marked by constant battling, day and night. Wires would be strung from the general headquarters of the Army of the Potomac, connecting with the different corps headquarters. We used fine annealed signal wire of seven strands, covered with flexible rubber. A flat reel from which

the wire was unwound, would be strapped to the back of a pack mule, the men following with slender pike poles, forked at the top to receive the wire. Frequently when woods and other timber was convenient, the wire would be slung up into a tree. Misfortune overtook us in the matter of supplies, for as we approached Spottsylvania Court House the wagon trains were cut off, and 'hard tack' reduced to a powder from being long carried in a bag, which on numerous occasions had served for a pillow or cushion, was our only food resource for several days. During the march referred to we fought in the Wilderness and at Chancellorsville, at both places wires being temporarily strung for the purpose of conveying a few orders to General Warren, directing him to move portions of his forces in different directions to the support of General W. S. Hancock.

"It was at this time that the colored troops first made their appearance in the Army of the Potomac, they being under the command of General A. E. Burnside. They made an excellent showing, and appeared to be a steady body of men, but met with fearful disaster shortly after, when, on June 30, so many lost their lives at the explosion of the mine under Fort Hell, as it was called. It was a horrible sight to see the men mowed down the way they were. A day or two before the explosion the cry was 'hell next;' afterwards it was said to be 'hell, indeed.' The Johnnies had well named the fort, and said 'all hell couldn't take it.'

"At Spottsylvania we were camped on the Beverly plantation, on whicr stood a large farmhouse, in one of the capacious rooms of which we established our telegraph office. The dwelling offered a conspicuous mark for the enemy and right nobly did they shell it for two consecutive days, cutting through it many times, and frequently breaking down the telegraph wire. I recollect tossing up a cent with Ed. Hall and George Henderson (the former now dead, and the latter located somewhere in North Carolina), once after a shell had broken the line, to decide who should go out and tie up the break. Afterwards, when the wire was cut, an occurrence of increasing frequency, we three would take turns in rushing out and splicing it. On such occasions, before attempting the serious work demanded, the one going out would say to the others: "If my body stops a shell send my things home." Shortly after this I was sent to open a side telegraph office for General Warren, who desired to open up communication with a distant brigade, and three orderlies were detailed to accompany me. Once outside the picket lines, we missed our way, and approaching too close to the rebel lines, were fired upon, but managed to effect our escape, and to reach our destination in safety.

"All through May, in the advance on Richmond, the fighting was continuous and terrific, the military telegraphers being constantly in the thickest of it, and everywhere exposed to all the hardships and dangers of warfare, sharing all perils equally with soldiers who carried the musket. On May 31, 1864, we camped on the plantation of a Mrs. Vias, twenty miles from Richmond, and opened up telegraph headquarters in a house located on the property. June 5 found us still on the move, performing fatiguing night marches, finding a resting place at Bethesda church. At this place we erected a line of wire, which, after an hour or two was shot down, to be re-erected and further extended to the extreme front, only again to have it cut down, taken possession of by the enemy and returned to us shot from out of the cannon's mouth. The wire would come whirling through the air, frequently wrapping itself about a bush or tree encountered on the way. We joked about the matter during the day, facetiously asking each other why the Johnnies did not send an operator along with the wire—Dode Moreland, for instance, captured a short time before, or one of our repairers (whose name I forget) so that his services might be utilized to restore the wire to working order.

"These events occurred in the Chickahominy Swamp, where the water was simply dreadful. The men, hot, dusty and wearied, frequently suffering from wounds, would scrape the scum from off the surface in order to get a drop of moisture with which to wet their parched lips, although cautioned against so doing by the army surgeons. It was at this point that many were stricken with the swamp fever, numbers of them fatally so. On June 8, when near Cold Harbor, we operators reached a point where General Warren wished us to open communication again. We could not get ground, the earth being exceedingly dry, and we found great difficulty in getting even a 'dot' from General Meade's headquarters. All difficulty was overcome shortly after, however, by means of a few buckets of water brought from a distance. By June 15 we had crossed the James River, on pontoons, and had built a line of telegraph to Charles City Court House. From this place we moved to a point near Petersburg, establishing our camp on the Avery plantation, and opening telegraph headquarters first in front of, and after a day or so inside of the beautiful Avery mansion. Here preparations were made for a long siege. I remember just before reaching this position, and during a very hot engagement, of squatting on the ground under an apple tree, with my instrument placed on a cartridge box and reading some instructions to General Warren sent from General Meade. Bullets were whizzing all around us, shells were bursting overhead, when a minnie ball struck close to our feet. General Warren drew his sword, dug the missle out of the earth, and with the sententious remark: 'A close one; I'll save it,' slipped the ball into his coat pocket. Shot and shell fairly rained upon us here, and as I look back upon the scene, I can scarce credit the fact that both the General and myself were not killed. I have now in my possession, as mementoes of other similar occasions,

a piece of shell that cut away a portion of the tail of my horse, and a musket ball that passed between Ed. Hall and myself, and within two feet of both of us.

"On the 4th of July, 1864, Paymaster A. B. Chandler being ill, Major Eckert himself came down in his stead, both to see us and to pay us off. The military telegraphers had in the Major a warm friend, and it did us good to see the pleasant face of a man whom we held in such high esteem. Both he and Mr. Chandler were, and are yet, men to respect and fairly love.

"While stationed in the Avery house, I became seriously ill on July 20, with the swamp fever. Five days later my condition becoming much worse, I was removed on a bed to army headquarters. Here I was advised by Surgeon McNally (who is now dead) to go home, unless I wanted to leave my bones on Virginia soil. I was carried to City Point, and there placed on the hurricane deck of the steamer John Brooks, with my blankets under me. I was a forlorn individual, indeed, and it almost looked as though I had been abandoned to die. On reaching Fortress Monroe, my friend William J. Dealy, God bless him! who is now the manager of the Atlantic and Pacific Telegraph Company, at New York, came on board, hunted me out from among the many other sick and disabled men, and while the steamer lay at the fort, tarrying only for about twenty minutes, he did what he could to alleviate my condition. Among other acts of the good samaritan performed, he forced between my clenched teeth some peach juice, which refreshed and stimulated me, and for which I was duly thankful. I reached Washington July 30, and a week later was brought to my home in New York, as many thought, to die. Careful nursing, however, brought me through, and by the middle of September I was ready to return, and accept the position of chief operator of the Army of the Potomac telegraph lines, which had been offered to me by Major Eckert. Sickness in my mother's family, however, prevented an acceptance of the kind offer, and my career as a military telegraph operator was over.

"I would like to mention in this connection, and in affectionate remembrance, the names of O. H. Dorrance and William Mackintosh, both of whom were at Alexandria, Va., in 1864. They were men whom our boys at the front relied on for the receipt of dainty bits, so acceptable in a strenuous campaign, such as oysters forwarded by the gallon; of pies and other good things without number; of the care they exercised in forwarding our letters to us, and in providing postage stamps, etc. In fact, it seems as if every one in the profession in the rear remembered us poor devils at the front, and was anxious to do something to promote our welfare. All that they did for us was fully appreciated."

College Man's Value as Harriman Sees It.

Edward H. Harriman, railroad owner and financier, has written for the Yale Daily News his views on college training as preparation for railroading. He said in part:

"The question which you have asked me, 'Is college education an essential or even a valuable preparation for a man who expects to enter railroading?' is a hard one to answer, and my answer is both yes and no. A college education will be a great help if the man in going through college has kept the foundations of high school learning firmly fixed. On the other hand, if he has neglected his handwriting and forgotten his arithmetic in higher mathematics, nothing could be worse for him.

"The high school boy has the advantage in that all the first essentials of good work in railroading are at his fingers' ends. For instance, take the making of a simple statement. A statement should be like a picture, something that can be taken in at a glance. A high school boy will draw such a statement with perfect accuracy and clearness, while a young college graduate will draw it in such a way that it is a puzzling scrawl.

"Thus college education is in the beginning a real disadvantage, and I have found that in every case the high school boy does better work than the college man for the first few years. However, as soon as the college man has got back to first principles he will go ahead much faster than his less educated rival. His mind is, naturally, better developed and more capable of grasping the fine points of the business. On the other hand, the high school boy, being younger, is more adaptable and has not in most cases the irregular habits of the college man.

"No matter how well educated a man may be, he must start in railroading at the very bottom. A railroad man has no fixed home. He is like a naval officer always at sea, and, moreover, he is always working to the limit of his endurance. It is the hardest life I know, and yet one of the most pleasant. It cultivates an insight. It teaches a knowledge of men, and in this way is the best training for any profession.

"'Pull' can never carry a man far in railroading. It is hard work and application that count.

"My advice to the college man expecting to enter railroading and hoping to have an easy life is —don't, but to the man who does not mind the hardest kind of work, who will not quit under early disappointments and who wishes to have the most interesting sort of a career it is, by all means —do."

It is reported, says the London Electrical Review, that official trials are about to be made between London and Paris of the Pollak-Virag high speed telegraphic system.

On the Handling of Leased Wires.*

BY D. B. GRANDY, OF ST. LOUIS.

During the winter of 1867-8 the Franklin Telegraph Company, by which I was then employed, leased a wire between New York and Philadelphia to Harrison Brothers, a firm of sugar refiners. This was the first wire leased to a private firm, so far as I have been able to learn, in this country. In the early seventies, after the quadruplex had come into general use on the Western Union lines, wires began to be leased to brokers by that company. One side of a quadruplex was used with a half set of repeaters, as a rule, for this service. The use of leased wires has steadily increased since that time, until to-day the revenue from that source forms a very large percentage of the earnings of both the telegraph companies, as well as by the telephone company by which we are employed.

A leased wire between New York and St. Louis costs the lessee somewhere around $20,000 per annum. For this large outlay he expects, and is entitled to receive, the very best possible service. That kind of service can only be given by close attention on the part of repeater operators and co-operation by wire chiefs having the handling of the wires so leased. This attention is necessary from the moment the wire goes up, until it is taken down. By "close attention" I do not mean roosting on one leased wire all day, or an unreasonable length of time, but going from one wire to another, especially those having repeaters, noting how the distant terminals are coming and passing, and making any necessary changes in adjustment to insure satisfactory service, without interrupting the working of the wire. Get this work in in advance of the complaint which will surely come, if it is not thus forestalled.

On a long leased wire some part of it is likely to be subjected to changing weather conditions at any time. A sudden deluge of rain, the closing down of a heavy fog, or a fall of wet snow at some point, may cause so much escape that new adjustments are necessary. If this is between us and the next repeater station, it is up to us to find it out and change our adjustment to meet the changed conditions before the subscriber has time to get in his kick. If it is beyond the next repeater station, it is up to us to notify him to "pull up," or get after the next repeater station beyond. And it is up to both, and to all repeater stations, to be on the watch for just such changes, and to do the needful before the complaint comes in from the subscriber. This is not always done. In fact, it is my observation that the complaint too often gets in first and is what prompts attention to the repeaters.

Again: The repeater operator should not content himself with listening for a few words on a lease. He should listen long enough to be reasonably sure that it is working well. In cases of intermittent swings, or other wire trouble, the period of watching must, of course, be longer. In case such trouble is known or suspected to be in the repeater section nearest to us, another wire should be substituted if possible.

Another point which does not seem to be fully appreciated by some repeater operators is that service on leased wires should never be interrupted unless absolutely necessary. Nothing can be more aggravating to the subscriber than to have his circuit taken, even for a few seconds, during business hours. Such an interruption may mean, at times, great gain or loss to him, and is naturally resented. The practice of repeater operators taking the circuit on leased wires during active business hours and consuming several minutes of the subscriber's time in "lining up," "writing from the east side," "writing from the west side," etc., is not necessary. The extra relay and sounder on each side of the repeater set is put there so that he may know at all times just how the sending is passing through his repeater.

The importance of time in making leased wires good in cases of failure does not seem to be fully appreciated by all wire chiefs, even in the large offices. Of course, there are unavoidable delays at times, as for instance, when patches have to be made at points where there is no wire chief, and the work has to be done by inexperienced persons. But every effort should be made to restore service as soon as possible.

Another point: Whenever a fault develops which appears to be, or is suspected to be, in your repeater set, the time of the subscriber should never be wasted in trying to locate it, but the wire should be changed to another set at once. The defect, if in the set, can be tested out later. I have known leases to be cancelled because of persistence in "monkeying" with a repeater set while in service, trying to find out why it didn't work satisfactorily.

The increasing use of the duplex emphasizes the importance of repeater operators and all of the wire chief's force making themselves thoroughly familiar with the theory and practice of the duplex.

It is well for all who have the handling of leased wires to try to keep on the most friendly terms with the operators who work them, especially those of home subscribers. A subscriber's operator can do much, if so inclined, to prejudice his employer against our service. The employer will naturally accept his operator's statement as to the quality of the service given. For this reason, as well as on general principles, any friction or antagonism should be carefully avoided. As a rule the best men in the ranks of the telegraphers are in the leased wire service, and their friendship is well worth cultivating, aside from the matter of policy involved.

I may say, in conclusion, that a repeater operator, even if he has only two or three leased wires to look after, has no sinecure, if he does justice to his job.

*A paper read before the Bell Society of St. Louis.

Long-Distance Telegraphy.

Side by side with the advances made in wireless telegraphy systems there has been progress also with the older methods of telegraphic transmission. Certain notable achievements have been recorded from time to time in line telegraphy over long distances, but all that has been hitherto done has been eclipsed by the introduction of direct telegraphic working between London and Karachi remarks the London Times, a total distance of 5,532 miles, which establishes a world's record for long-distance telegraphy.

The credit for this is due to the Indo-European Telegraph Department of the India office, working in conjunction with the Indo-European Telegraph Company (Limited). Direct Wheatstone working over the line of this company between London and Teheran has been in operation since the beginning of 1903, but until a comparatively recent date there was no land line between Teheran and Karachi. For the last forty years communication with Karachi has been carried out by means of a land line between Teheran and Bushire on the Persian Gulf, and thence by cable to Karachi. Before 1903 it had been necessary to have two re-transmissions of messages between London and Teheran: at Emden in Germany and at Odessa in South Russia.

The introduction of Wheatstone working was due to the fact that the increase in traffic over this line to the east made it impossible any longer to employ Morse working with advantage. The first installation, which was over the section between Odessa and Teheran, was made in 1897; and, experience having shown that signals could be satisfactorily transmitted in both directions with a considerable increase in the speed of working, it became necessary to apply Wheatstone working to other portions of this line. The result was that the section between Odessa and Emden was also equipped with the Wheatstone improved system, which led to direct working between Teheran and Emden. Before relay stations could be introduced on the Emden-London section of the line it was necessary to demonstrate to the English and German postal authorities that this innovation would not interfere with the working of other conductors. Experiments were carried out, with the result that the necessary official permission was obtained from the postal authorities of both countries, and Wheatstone working was introduced over the whole length of line between London and Teheran, a distance of 3,748 miles, which at that time constituted a record in direct transmission. At the same time direct communication was established between Teheran and Manchester and Liverpool. The relays employed on this section are of the Post Office standard pattern, manufactured by Messrs. Siemens Brothers, with certain modifications suggested by the experience of the Indo-European Company. The total number of automatic relay stations between London and Teheran is ten, and any differences which exist between them are due to the particular requirements of the various sections which have been equipped. It has to be remembered that the line, with the exception of two hundred miles of cable between England and Germany, is entirely a land line, and passes through almost every variety of country between the German seaboard and Persia, and is exposed to risks of all conditions. Its maintenance in a condition to permit continuous uninterrupted working is, therefore, no light task and calls for unceasing vigilance.

The land line between Teheran and Karachi, which has a length of 1,584 miles, has been constructed by the Indo-European Department of the India office under the direction of the chief of that department. The route taken is through Kerman and Central Persia, along the frontier of Beluchistan, and through Indian Beluchistan to Karachi; and the line was only put in operation on November 5, 1907. After a short period of experimental working it was decided that direct transmission over the whole system was capable of accomplishment; and automatic transmission stations were established at Kerman and at Panjgur, in Indian Beluchistan, with, of course, the addition of a relay station at Teheran itself. This section of the line actually belongs to the Government of Persia, but it is leased to the Indian Government, and is worked by the telegraphic department of the India Office. The line has been carried through a great deal of difficult country, but singularly few interruptions have occurred, a result due no doubt to the current superstition in Persia that the telegraph is employed for the personal convenience of the Shah, which effectually prevents that mischievous damage to the line which might otherwise take place. The benefit of what has now been done has been lately felt, messages having passed daily between England and Karachi, without the necessity for intermediate handling.

An official demonstration of the working of the system was given on January 23, by the Indo-European Telegraph Company.

Leased Wire and Cable Service for Munsey's Newspapers.

Frank A. Munsey has installed leased wires connecting his publications in Washington, Baltimore and Philadelphia and his headquarters in the Flatiron Building, New York. These lines will be used for a special daily and Sunday news service and also to keep the publisher posted on what is going on at these points.

Another feature recently added by Mr. Munsey is a cable service with his London office for the purpose of handling European and Continental news for his daily papers.

Progress in Submarine Bell Signaling.

A good deal has been achieved in the direction of protecting shipping by means of submarine bell signaling, says the London Times Engineering Supplement. Everything points to the fact that important extensions in the direction of providing bell signaling stations are likely to take ace in the near future, lighthouse authorities in this country and abroad—as well as shipping interests—having been greatly impressed by the successful working of existing installations. The bells at present employed in this system of signaling have been considerably improved as the result of careful tests carried out by lighthouse authorities, and it should be noted that in evolving the latest form of bell the engineering staff of Trinity House have given this subject considerable attention. The form of the apparatus used in this system of submarine signaling naturally varies according to the purpose to which it is to be applied. Three forms of bells are now employed—the electric bell, operated by an electric current from the shore; the pneumatic bell, which is employed in lightships or at the end of a pier; and the bell buoy, which is operated by the action of the waves.

As illustrating the extension of the system, it may be stated that over one hundred submarine bells have now been placed in position. Of these fifty-three have been fixed within United States waters, both the western and eastern shores being thus protected, while Canada has now twelve bells in service. In the case of England, where the Mersey Docks and Harbor Board took the initiative in equipping the Bar and Northwest lightships, there are now ten bells in service. The lightships equipped by Trinity House include the Outer Dowsing, the Tongue, East Goodwin, Royal Sovereign and the Nab. The bell buoy fitted near the latter lightship off Spithead for experimental purposes a year ago has, it is stated, given very satisfactory results in service, and it is probable that the Trinity House authorities will order additional installations in connection with bell buoys in British waters. The Irish Lights Commissioners are also moving in the matter, and have under consideration installations for the Kish and other lightships. In all over five hundred ships are now equipped with the receiving apparatus, these ships being mostly engaged in the transatlantic trade, where, as is evident from what is here stated, the provision of submarine bells has reached its greatest development. The northern coast of Europe is also fairly well protected, Germany having installed ten bells, France six, the Netherlands seven, and Denmark, Sweden and Spain one each.

British railway companies running steamship service are alive to the importance of submarine signaling, and the London and North-Western Railway, in conjunction with Trinity House, is interested in a scheme for putting a bell down at Holyhead, in which case the London and North-Western Railway Company proposes to equip with receiving apparatus fifteen of the vessels running in the Holyhead service. The London and South-Western Railway has in contemplation the equipment of vessels running between Southampton and Havre, following the placing of two bells at the latter port. Developments are also in progress with a view to giving protection to shipping running to Mediterranean and eastern ports. A bell has already been ordered for Tarifa, in the Straits of Gibraltar, and it is in contemplation to place a second bell at Europa Point, in which case the other side of the Straits would be equipped with two bells, one probably at Tangier and the other at Cape Spartel. The Spanish and Portuguese governments will watch the working of the bell at Tarifa, and if that gives satisfactory results will establish bell stations, among other points at Vigo and Cape Ortegal, Cape Roca, the Burlings, Leixoes and Cape St. Vincent. Ushant is now about to be equipped, so that the French, Spanish and Portuguese coast will then possess fairly adequate protection. In the Far East, the Japanese authorities are beginning to move, and the Chinese government intends to place a bell at the mouth of the Yangtse-kiang. Steps are also being taken to equip the South American coasts, the governments of Brazil, Argentina and Uruguay having interested themselves in the matter.

Another important application of submarine bell signaling relates to inter-ship communication, and tests in connection with submarines have been carried out by practically all the governments interested. The problem to be solved is an important one, as hitherto there has been practically no means by which a submerged vessel could communicate with other ships. In this case both the sending and the receiving apparatus is employed, and although the authorities are naturally reticent as to what has actually been done, it is known that the trials carried out by the British Admiralty and by the Navy Board of the United States have given satisfactory results. It should be possible, as experiments have shown, to employ the Morse code for signaling between submarine vessels. It should be noted that a distinctive character is given to the signals sent by submarine bell installations, so that bells may be easily identified. In some cases the number of the lightship is repeated on the bell signal, the only exception to this rule being the bell buoys, which are operated by the action of the waves. In addition to equipping its lightships with submarine bells, the Trinity House authorities are also employing wireless telegraphy for communication between lightships and the shore. Six lightships in all are now fitted with such plant, including the Sunk lightship, the Tongue, and the Cross Sand, and three lightships on the Goodwins.

[A practical illustration of the advantages afforded by the submarine bell signaling system was observed at the time of the collision at sea between the steamers Republic and Florida.]

The First Automatic Repeater.

BY GEORGE F. MILLIKEN.

My statement as published in Telegraph Age of January 16, directly controverts the claims of Mr. Clark, as published in the February 1 issue, regarding the construction and operation of the Milliken repeater, leaving but little room for further discussion on my part, without repeating the substance of that communication.

There are, however, some points in Mr. Clark's article of the February 1 issue to which I will refer briefly. The Clark and Hicks repeaters were not both in use at the same time at the Boston office, as Mr. Clark implies, but separately and on trial. The statement of Mr. Clark that I was undoubtedly led "To make a change with the relay lever so it would not be burdened with an extra armature," seems absurd in the light of my previous article on this point; and, again, quoting his statement, "The only change he made was in the relay lever," is another absurdity.

In making these statements, as elsewhere in his article, Mr. Clark utterly ignores the essential feature of adjustable retardation employed in the Milliken repeater, and assumes the only advantage to be in the elimination of the extra armature lever, entirely independent of the relay done by the adjustable retractile spring of the armature lever, entirel yindependent of the relay magnet or its armature adjustment, this construction being a different proposition and having nothing to do with the incidental elimination of extra weight.

In regard to the use of spring contacts, if Mr. Clark means just what he says, namely, that the device of a spring contact was first used in the Clark repeater, he claims too much. This device was used at the Boston office years before the Clark repeater was invented, as an attachment to the back of a telegraph key for the purpose of sending press reports on two circuits at the same time (perhaps this makes a little more history).

It seems to be a necessary, and furthermore, too easy a way of closing a second circuit, one of them being a dead stop contact, to be dignified by the word invention. That this device as employed in the Milliken repeater is of no special consequence (although favorable to its action) is shown in the transmission of matter with contacts reversed as stated in my previous communication.

Lastly, Mr. Clark's little insinuation regarding Mr. Phelps' connection with the repeater makes it necessary for me to state that the original Milliken repeater was made under my supervision by Charles Williams, Jr., of Boston, the business of which concern was later absorbed by the Western Electric Company. This repeater was sent to Portland, Me., to be put in service, and after a thorough trial in all weathers, and a favorable report having been made of results, it was sent to G. M. Phelps of New York, (at that time manufacturing all telegraph apparatus for the American Telegraph Company), to be duplicated, and a new set was made by him for the Boston office, with no change whatever from the original, except as regards certain characteristics of workmanship peculiar to all Phelps instruments.

Later the original set was returned to Portland and was in use a great many years. More recently Mr. George C. Maynard, of Washington, D. C., wanted it for the Smithsonian Institution, but it had then gone the way of all repeaters eventually, good or bad, into the junk heap.

Boston, February 2, 1909.

EDITOR TELEGRAPH AGE:

I note in recent issues of Telegraph Age that a controversy has arisen in regard to the priority of invention and use of automatic repeaters on Morse telegraph lines. Having an intimate knowledge of the genesis and use of the first form of the Hicks repeater (the "walking-beam" pattern), I would say that this repeater was first put into use at the Western Union office in Cleveland in the summer or early autumn of 1857. I had charge of it in use between Buffalo on the East, and Chicago and Detroit on the West. It worked satisfactorily and was used largely for Associated Press reports.

During Christmas week, 1857, I went to Cincinnati to install the second set that was ever in use. There may have been repeaters in use, in the East, at this time, or prior thereto, but I have no knowledge of it. If Mr. Hicks received a patent for the invention, I presume it was in 1857, as it was "the talk of the office" that he had done so, and had sold it to the Western Union company.

I continued in charge of the repeater in Cleveland until I left for Leavenworth, Kansas, November 1, 1859. As I was then located almost at the "jumping off place" of telegraph lines, I had no further experience with repeaters until March, 1866, when I went to Cincinnati, where I found that the "walking beam" style had been superseded by the so-called "Hicks-Milliken" extra local interlocking style. Of the arrangement between Messrs. Hicks and Milliken I have no knowledge. Nor have I any knowledge of any form beng used on Western Union wires in the West except the two forms named, down to the time of my retiring from the service in 1892.

GEORGE T. WILLIAMS.

Cleveland, O., February 5, 1909.

A well-known telegraph executive, who had occasion to visit the Minister of Posts and Telegraphs of Japan on business, related that he found that official quite familiar with telegraphic affairs in America. When asked how it was he was so thoroughly posted, the Japanese dignitary stated that he read Telegraph Age, and pointed to a number of the papers stacked on his desk arranged for ready reference.

Obituary.

Albert C. Stebbins, an old time telegrapher, died at Waterville, N. Y., on January 23, aged sixty-eight years.

Arthur F. P. Conant, aged fifty-eight years, an expert telegrapher, who for several years past had been conducting a brokerage business at Orange, Mass., died on January 14.

Joseph F. Carwood, aged sixty-three years, for thirty-two years manager of the Western Union Telegraph Company, at Marshall, Mich., died at that place on January 23.

W. C. Barron, aged sixty-two years, an old time telegrapher, and a member of the United States Military Telegraph Corps, during the Civil War, died at Woodstock, Va., on January 15.

Charles Gottliebsen, Jr., whose home was in New York, twenty-four years of age, wireless operator on the revenue cutter Acushnet, stationed at Wood's Hole, Mass., was drowned while skating on February 7. He had served four years in the navy.

Charles S. Cutler, a forty-niner of the telegraph, for many years a resident of Buffalo, N. Y., for a period of which time he was cashier of the Western Union Telegraph Company, previously having held the position of manager of the same interests at Albany, died on February 2, at the home of his son, in Brooklyn, N. Y.

Howell Sigler, aged fifty-eight years, for twenty-six years chief operator of the Western Union Telegraph Company at Fort Worth, Tex., died on February 1. Mr. Sigler, it is said, was an operator at the front during the construction of the Union Pacific Railroad, and was present when the golden spike was driven, connecting the East and the West, and which marked the completion of the road. He was afterwards private operator for the late Jay Gould, when the latter was associated with James Fisk. He was at one time chief operator at Memphis, Tenn., and held the position at that place during the yellow fever scourge of 1878, sticking to his post until he, too, was stricken down.

Philip Duesner, aged sixty-eight years, an old-time military telegrapher, died at Kokomo, Ind., on January 12. He began his telegraph career with the Western Union Telegraph Company as a messenger boy at Evansville, Ind. A year or two later he graduated as an operator. He attained his majority about the time of the breaking out of the Civil War, when he at once entered the United States military telegraph service, and served with fidelity during that long struggle. After hostilities had ceased he returned to the Western Union service, being appointed manager at Kokomo, Ind., which position he held at the time of his death.

The Railroad.

Mr. J. G. Jennings, superintendent of telegraph of the Rock Island system, Chicago, finds it profitable to visit division points of his road to demonstrate the usefulness of the telephone for train despatching to railroad employes interested in the subject, who are called together for the purpose.

Mr. F. T. Wilbur, formerly superintendent of manual block operation on the Illinois Central Railroad, with headquarters in Chicago, has been promoted to the position of assistant superintendent of telegraph of lines west of the Ohio river, with headquarters in Chicago. Mr Wilbur succeeds E. Parsons, who has resigned to accept the position of sales manager of the Sandwich Electric Company, Sandwich, Ill.

John G. Waddell, aged forty-six years, died at New Orleans, on January 25. He was a well-known and efficient telegrapher, having been associated with commercial and railroad telegraph circles throughout the South for many years, at one time being superintendent of telegraph of the Houston and Texas Central Railroad. At the time of his death he was employed by the Postal Telegraph Cable Company.

The first suit brought by the Government against a railroad for violation of the Federal law regulating the time service of train despatchers was begun at Chicago, February 2, against the Atchison, Topeka and Santa Fe Railroad. Seven violations are charged, and if found guilty fines aggregating $3,500 may be imposed. The suits were brought by direction of Attorney-General Bonaparte, and according to District-Attorney Sims, of Chicago, they will be followed by suits against other railroads believed to be violating the same law. The charges are based on conditions existing at Corwith, Ill. There the Santa Fe employs train despatchers from 6.30 A. M. until 6.30 P. M., with a rest of three hours after the first six hours' work. The law requires a continuous service of nine hours. This litigation will be watched with interest by railroad officials generally.

Charles P. Adams, superintendent of telegraph of the Southern Railway system, at Washington, D. C., died very suddenly on February 9, as the result of a stroke of apoplexy. The announcement of Mr. Adams' sudden death came as a decided shock to his host of friends and fellow officials. Mr. Adams was born in Somerset County, Md., on May 5, 1860. He entered the service of the Baltimore and Ohio Railroad Company, in 1873, as a messenger; was promoted to be an operator, later becoming chief operator in the commercial department. He was afterwards advanced to the position of a division operator of the railroad. Resigning from the Baltimore and Ohio Railroad in 1894, he accepted the position of superintendent of telegraph of the Great Northern Railway at St. Paul, Minn. This post he occupied until 1900, when he went to a similar place with the Central Railroad of New Jersey, being stationed at New York. This he held until October, 1902, when he accepted the superintendency of telegraph of the Chicago, Rock Island and Pacific Railroad, with headquarters at Chicago. He was appointed superintendent of telegraph of the Southern system on June 1, 1904.

Mr. Adams' funeral on February 11, at Washington, was largely attended by superintendents of railway telegraph, gathered from all parts of the country.

An Improved Galvanizing Process.

A new method of treating metals with zinc for protection against corrosion by a process known as sherardizing, or dry galvanizing, is engaging much favorable attention because of the excellent results that have been achieved in its application. While differing from the electric and hot-dipping systems of galvanizing, it practically fulfills the same object of covering iron, steel and other articles with a coating of zinc in order to render them rust proof. This process which is an English invention utilizes the zinc dust gathered from the sweepings of the flues of spelter or zinc furnaces, and possesses not only the advantage of cheapness, comparatively considered, but the further fact, it is said, of furnishing a product more durable and finished in appearance than that by any other known process. The tests demanded by telegraph and telephone companies in respect to their fittings in order to meet the required measurement of standard adopted by those companies, have, it is stated, not only been successfully complied with, but even have reached results superior to those obtained by the older methods. The entire screw bolt, such as are used in fastening cross arms to poles, are successfully treated by this process, the zinc covering being equally distributed over every part, including the screw end, something that cannot be accomplished by the ordinary process of galvanizing. All who may be interested are referred to the United States Sherardizing Company, of New Castle, Pa., the owners of the American patents. Samples may be inspected on exhibition at Patterson Brothers, 27 Park Row, New York.

A. I. E. E. Anniversary Dinner.

The American Institute of Electrical Engineers will celebrate the completion of its first quarter of a century with an anniversary dinner at the Hotel Astor, New York, on March 11. The annual dinners of the Institute have always been extremely successful, while the historical character of this affair promises to make the occasion more than usually interesting. President Ferguson has appointed Mr. T. C. Martin chairman of the Dinner Committee; the other members are as follows: T. Beran, M. Coster, M. M. Davis, H. A. Foster, G. A. Hamilton, R. T. Lozier, W. McClellan, F. A. Muschenheim, H. W. Pope, C. W. Price, F. A. Scheffler, E. A. Sperry, A. Spies, A. Williams and G. H. Guy.

The Baudot Telegraph System.*

BY M. BAZILLE, OF PARIS.

This is mainly a description of the diverse conditions of traffic, etc., that can be met by the Baudot system in some of its special adaptations. These are divided into five categories: First, between two stations served by one wire; service as double, triple, quadruple, or sextuple, the number of channels in each direction being grouped according to requirements; second, three stations A, B, C, grouped on one wire; double echelon, transmissions A to B: A to C; double echelon, complete, transmissions A to B; A to C, B to C; triple echelon, transmissions A to B (2); A to C; triple echelon, complete, transmissions A to B (2); A to C, B to C; triple echelon, complete, special, transmissions A to B (2); B to C (2); A to C; quadruple, double echelon, transmissions A to B (2); A to C (2); quadruple, triple echelon, transmissions A to B (2); A to C (2); B to C; third, repeater installations on two-station lines from 1150 to 1200 kilometers for double Baudot; 950 to 1000 kilometers for triple, 750 to 800 kilometers for quadruple, and 550 to 600 kilometers for sextuple Baudot; the rectified retransmission effected by the new design of Baudot repeater is described; fourth, installations serving three stations with re-transmission at the intermediate station. In this category are described amplifications of the conditions in category (2), necessitated by the presence of the repeater at the intermediate station. The greatest development mentioned is quadruple, quadruple on a forked circuit with re-transmissions at the intermediate station B, and comprising eight transmissions—A to C (2), A to D (2), B to C (2), B to D (2); fifth, installations for underground lines. In general two wires are used for the same apparatus set, one for transmission in each direction. This permits of repetition at intervals of about 150 kilometers, by the simple insertion of a relay in each line.

Communications serving two stations: double—four simultaneous transmissions; double and triple conjoint—four or six simultaneous transmissions.

Communications serving three stations: double echelon complete, six simultaneous transmissions; double and triple echelon complete, six or eight simultaneous transmissions.

Although two wires were until recently considered absolutely necessary for subterranean working, they are now found to be necessary only on long lines. This was demonstrated by experiments which practice has since confirmed.

Mr. Bazille also discusses operating conditions, and the output of the Baudot apparatus as compared with that of the Hughes.

*An abstract of a paper read at the International Conference of Telegraph and Telephone Technicians at Budapest, Hungary, in September, 1908. Printed by the Post Office Electrical Engineers' Journal, of London.

Comparative Results of New Telegraph Systems.

At the first International Conference of Telegraph and Telephone Technicians, held at Budapest, Hungary, in September, 1908, among numerous other papers read on that occasion, one by J. Hollós, of that city, entitled "Comparative Results of New Telegraph Systems," aroused much interest. The Post Office Electrical Engineers' Journal, of London, prints an abstract of the same as follows:

M. Hollós refers to the large number of new telegraph systems recently invented, the Rowland, Pollak-Virag, Murray, Siemens-Halske, etc., and asks the reason why, in spite of this enormous output, these ingenious and excellent devices are not more widely used in practical telegraphy. It is evident that the ideal system of telegraphy must be one which will adapt itself without excessive delay on the one hand, or waste of personnel on the other, to a greatly fluctuating load.

The output of various systems per hour may be taken as follows:

(1) Morse Simplex	1,500	words,	or	in proportion of	1
(2) Morse Duplex. . . .	2,700	"	"	"	1.8
(3) Hughes Simplex . . .	3,600	"	"	"	2.4
(4) Hughes Duplex. . . .	5,760	"	"	"	3.84
(5) Baudot Quadruple . .	5,760	"	"	"	3.84
(6) Rowland Octoplex . .	20,000	"	"	"	13.33
(7) Murray Duplex . . .	22,000	"	"	"	14.66
(8) Siemens-Halske . . .	24,000	"	"	"	16.00
(9) Pollak-Virag	50,000	"	"	"	33.33

But these are figures only. They show that under perfect conditions so many words can be transmitted, but they do not represent telegraph traffic. M. Hollós proceeds to discuss the practical bearings of the matter and various pros and cons in connection with machine telegraphs, multiplex telegraphs, and direct hand-worked wires. He tabulates the relative cost of various systems as follows: the figures are based on a distance of 600 kilometers and on a traffic of 60,000 words in ten hours each day.

These figures do not profess to be absolutely correct, but M. Hollós thinks the information they give is very instructive, and goes far to explain why so many of these brilliant and ingenious inventions have failed to find favor, and why so many circuits continue to be worked by the Morse manual system. As a multiplex telegraph he favors the principle adopted by M. Mercadier, which permits of the use of varying members of ordinary manual sets on the same wire according to the fluctuation of requirements. He thinks that the future belongs to a system which will combine this great flexibility with the use of keyboard transmitters and type-printing receivers.

Major O'Meara furnished the Conference with the following information associated with the subject of Monsieur Hollós communication:

COMPARISON OF THE MURRAY, WHEATSTONE, BAUDOT, HUGHES AND MORSE QUADRUPLEX SYSTEMS.

In order to determine the value of the Murray automatic system as compared with other systems in use by the English Post Office, it was necessary to ascertain by an actual trial, under uniform conditions, the output, working expenses, and

other particulars of each system under review. For this purpose returns were taken of the working of each system during a period of two consecutive weeks between the hours of 11 a. m. and 4 p. m. when the traffic is at a maximum. Only experienced operators were employed during the experiments so as to eliminate, as far as possible, the personal factor. The results of the trials have been tabulated and are furnished for the information of the Conference.

Item.	1 Hughes Simplex. Cost		2 Hughes Duplex. Cost		3 Baudot Quadruplex. Cost	
	fcs.	%	fcs.	%	fcs.	%
(1) Line . . .	57,600	50.8	38,300	47.9	38,400	37.9
(2) Apparatus. .	7,500	6.7	8,416	9.7	29,000	28.7
(3) Personnel (per annum)	48,200	42.5	33,800	42.4	33,800	33.4
Totals . . .	113,300	100	80,616	100	101,200	100

Item.	4 Rowland Octoplex. Cost		5 Murray Duplex. Cost		6 Siemens Halske. Cost		7 Pollak Virag. Cost	
	fcs.	%	fcs.	%	fcs.	%	fcs.	%
(1) Line . . .	21,600	27.6	21,600	24.9	21,600	24.1	43,200	39.3
(2) Apparatus. .	10,700	13.7	11,640	13.4	14,490	16.1	14,040	12.4
(3) Personnel (per annum)	46,000	58.7	53,700	61.7	53,700	59.8	53,700	48.3
Totals . . .	78,300	100	86,940	100	89,790	100	110,940	100

For the Hughes and quadruplex systems figures were selected from existing returns of the best fortnight's working on record.

The Murray system is in use only between London and Dublin, and the Baudot system only between London and Paris. It was, therefore, considered desirable to make the Wheatstone experiments between London and Dublin. The quadruplex trials had previously been made on a London-Dublin circuit and the Hughes on a London-Glasgow circuit.

The traffic conditions between London and Paris differ considerably from those existing between London and Dublin. Between the English and French capitals the stream of traffic available enables the operators engaged in the test to be kept constantly employed, but between London and Dublin one high-speed circuit will comfortably carry all the work and frequently have idle periods.

As several circuits between London and Paris are fully engaged, any delay which may arise cannot be imputed to a particular circuit; and on the other hand the absence of delay on any particular circuit cannot be solely credited to that circuit, since the expeditious transmission of the traffic is dependent on the satisfactory working of all the circuits.

Between London and Dublin there are four duplex Morse circuits, but the whole of the work was generally disposed of upon a single test circuit, which was worked for one fortnight by the Murray system and for another fortnight by the Wheatstone system.

It was ascertained that the "circuit delay" with the Murray system, that is, the average period from the time the message was placed at the circuit for transmission to the time that the same message was printed or written up at the distant station, was very nearly the same as that with the Wheatstone system. In the case of the Baudot the delay was erratic, but for the reasons already explained it would perhaps be unfair to compare it with the Wheatstone or Murray.

With regard to the output of each circuit the steady flow of traffic which was always available for the Baudot test circuit during the trial gave it a considerable advantage over the other two systems, on which the stream was by no means continuous. Therefore a comparison of actual output with the Baudot would scarcely be fair, but an attempt has been made to allow for this factor in the tabulated results by showing also the total amount of work that could have been disposed of if the test circuit had worked continuously.

The speed of the Murray* was limited by the speed of the receiving apparatus, and this was about ninety-five words per minute, as a maximum, duplex. The Wheatstone circuit could have been worked up to about two hundred and fifty words per minute duplex, but as the traffic was not sufficient to justify this speed a speed of one hundred and eighty-eight words per minute was used throughout the test. The carrying capacity of the Wheatstone circuit, so far as the line is concerned, could therefore have been increased about twenty-five per cent. on the figures shown in column 12, schedule A. The cost for staff would, however, have been correspondingly increased.

It will be seen that the Murray output per operator per hour worked out at thirty-one per cent. higher than the Wheatstone, and the Morse quadruplex at forty-six per cent. higher than the Wheatstone, but in the last mentioned case the strain on the operators is great.

The Murray circuit could not at times carry the whole of the London-Dublin traffic without incurring excessive delay, and additional wires worked by Morse sounder were then brought into use. Three wires were available for this purpose and for occasions when the Murray set stopped for adjustment or on account of apparatus defects, but it is thought that the cost of working and maintaining these wires cannot properly be debited to the Murray system. On the other hand, in comparing the value of a Murray circuit with that of a Wheatstone circuit between two centers, it would perhaps be fair to take into consideration the fact that stoppages of the former are more frequent and of much longer duration than is the case with the Wheatstone system, and that a larger proportion of expensive spare apparatus is therefore required.

* It is stated that while the results of the trials were satisfactory to Donald Murray, the inventor of the Murray system, it has been pointed out that the Murray apparatus used on the occasion in question, was old and more or less out of date. It is claimed that the improved Murray automatic apparatus can give from 25 to 50 per cent. better results, and instead of being limited in speed to 95 words a minute like the apparatus with which the trial was made, the speed of the new apparatus is at least 150 words a minute in each direction duplex. As the report points out, the Baudot figures cannot fairly, it is claimed, be compared with the Murray figures, especially as the Murray automatic system is essentially a long-distance system, and the Baudot is not.

Schedule A.

Return showing the actual amount of traffic dealt with during special experiments covering a period of a fortnight between the hours of 11 a. m. and 4 p. m. Mondays to Fridays, and 11 a. m. to 2 p. m. Saturdays, on the undermentioned systems:

Wheatstone Duplex	between	London and Dublin.
Murray Automatic	'	London and Dublin.
Quadruplex	'	London and Dublin.
Baudot 4-arm	'	London and Paris.
Hughes Duplex	'	London and Glasgow.

System.	Circuit.	Period of return fortnight ending	Actual number of messages dealt with.	Average number of words per message, including preamble.	Equivalent number of messages calculated on a basis of 21 words per message.	Number of messages per operator per hour calculated on a basis of 21 words per mes.	Sum of idle periods of line due to: Line interruptions (hours)	No traffic (hours)	Total time (hours)	Expressed as a percentage of whole period.	Calculated maximum output of 21-word messages, assuming no line interruption and sufficient traffic to occupy the wire.
1	2	3	4	5	6	7	8	9	10	11	12
Wheatstone	TS—Dublin	April 11, 1908	12,239	21	12,239	27.2	.2	21	21.2	37.8%	*19,695
Murray	"	May 16, 1908	12,994	21	12,994	35.7	1.0	6.1	7.1	12.6%	14,880
Quadruplex	"	Oct. 27, 1906	8,946	21	8,946	39.9	.6	No record	.6	1.0%	9,035
Baudot	TSF—Paris	April 11, 1908	17,426	18.4	15,268	45.3	1.0	1.0	2.0	3.%	15,833
Hughes	TS—Glasgow	Feb. 29, 1908	6,380	21.8	6,623	29.5	Nil	Nil	Nil	—	6,623

* At speed of 188 words per minute. At 250 words per minute possible output would have been 26,190 messages.

Schedule B.

Schedule showing the actual cost incurred by the different systems, at the London end of the circuit only, in dealing with the traffic represented in Schedule A.

System.	Circuit.	Period of return, Mondays to Fridays, 11 a.m. to 4 p.m. Saturdays, 11 a.m. to 2 p.m., fortnight ending	Total number of messages calculated on a basis of 21 words per message.	No. of operator hours. at circuit.	No. of operator hours. Away from circuit.	—Cost of staff— TS mean of scale 44s. (11d. per operator hour).	TSF mean of scale (48s. 6d.) (11.62d. per operator hour).	Establishment, etc., charges; 12 per cent. on columns 7 and 8.	Cost of slip.	Engineering costs from Schedule D.	Total cost per fortnight at the London end.	Cost per 1000 messages at 21 words each.
1	2	3	4	5	6	7	8	9	10	11	12	13
						£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Wheatstone	TS—Dublin	April 11, 1908	12,239	408	—	18 14 0	—	2 4 10	0 15 7	0 10 10	24 8 3	1 19 11
Murray	"	May 16, 1908	12,994	364	42	1 18 6		0 4 8				
Quadruplex	"	Oct. 27, 1906	8,946	224	—	16 13 8	—	2 0 0	1 15 0	8 3 0	28 11 8	2 4 0
Baudot	TSF—Paris	April 11, 1908	15,268	336	—	10 5 4	—	1 4 7	Nil	0 4 1	11 14 0	1 6 1
Hughes	TS—Glasgow	Feb. 29, 1908	6,623	224	—	—	16 5 4	1 19 0	0 3 5	5 2 10	23 10 7	1 10 9
					—	10 5 4	—	1 4 7	0 1 9	7 8	12 19 4	1 19 1

Schedule C.

Statement of Engineering Costs.

System.	Life in years (n.).	—Capital cost.— Cost of apparatus, leads, etc.	Royalties (outright payment).	Interest on Capital (2) and (3) at 3 per cent. per annum.	Cost of maintenance.	Sinking Fund at 3 per cent. per annum for n. years. (See columns 1, 2 and 3.	Establishment charges 15 per cent. on columns 4, 5 and 6.	Contingencies 2½ per cent. on columns 4, 5, 6 and 7.	Total annual expenditure.	Cost per fortnight.	Cost per day.
	1	2	3	4	5	6	7	8	9	10	11
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Murray . . .	8	1020 0 0	600 0 0	48 12 0	144 0 0	167 0 8	53 18 11	10 6 0½	423 18 4½	16 6 1	1 7 2
Baudot. . .	12	768 0 0	—	23 11 7	148 0 0	55 7 7	34 0 10	6 10 6	267 10 6	10 5 9	0 17 2
Hughes . .	13	330 0 0	—	9 18 9	30 0 0	21 2 8	9 3 1	1 15 1	71 18 10	2 15 4	0 4 7
Wheatstone .	13	184 0 0	—	5 10 5	6 14 0	11 15 8	3 12 0	0 13 9	28 5 10	1 1 9	0 1 10
Quadruplex .	17	72 0 0	—	2 3 3	3 12 0	3 6 2	1 7 3	0 5 2	10 13 10	0 8 3	0 0 8
Duplex. . .	15	61 0 0	—	1 13 4	0 16 11	3 5 7	0 17 5	0 3 4	6 16 7	0 5 3	0 0 5

The Royalty included on the basis of the ten years which the patent still has to run.

LETTERS FROM OUR AGENTS.

DENVER, COLO., ITEMS.

POSTAL.

The recent storms east caused Denver to be suddenly converted into a very important relay point for a few days, working our force to its utmost capacity.

Miss Edna S. Bergen, who has been employed here for the past three years, left on February 1, for Detroit, Mich., where she expects in future to make her home.

T. E. Yates, who was a health-seeker in Colorado for two years or more, and who was employed here for one year, died at his home in Whitney, Ala., on January 23.

Miss Leota B. Miles has taken up a desert claim half-way between Denver and Colorado Springs. This land is soon to be put under irrigation.

Recent additions to the force here are: H. Danise, from the cable company, New York; R. H. Davis, from the brokerage firm of Paul Work and Co., and C. F. Deem.

On the regular force we have: E. W. Ganley and M. J. Gorman, on Chicago bonus, days; T. M. Pritchett, El Paso bonus, days, and W. T. Ellis, Kansas City bonus, days.

Other members are: C. C. Hanes, D. A. Summers, J. Q. Adams (News), G. W. Williams, E. S. Tapp, Miss L. B. Miles, Miss Irla N. Funk, B. F. Fitzsimmons, T. E. Gargan, J. Wassinger, J. G. Oberlander, J. P. Coady, W. E. Morris (Republican), and Gus Martinson, extra.

C. H. Jett is night chief; W. E. Stimson, traffic chief; H. Van Camp, assistant traffic chief; E. Cox, chief operator.

Logan and Bryan, brokers, have recently added two new wires to their already large leased wire service. One of these is a duplex. Denver to Butte, the other a telephone circuit extending to Kansas City.

The personnel of the office is: W. R. Wilson, manager; Louis Muller, assistant manager; Fred W. Wessell, J. J. Doyle, George Ayres, S. E. Fisher, C. S. Gurnsey, J. E. McElroy and Charles Smith. Mr. Smith lost his sight a few years ago, and having been a faithful employe of Logan and Bryan for several years previous, a place was provided for him. He works the New York stock wire, a circuit on which no breaking is allowed.

Herman C. Emrich was recently transferred to Los Angeles; R. M. Stokley to Spokane, Wash., and C. S. Lawrence to Butte, Mont., as chief operator, together with Bernard J. McLoughlin.

THE ASSOCIATED PRESS.

The operating room and correspondent's office of The Associated Press is undergoing some changes, and when finished will be one of the most up-to-date operating rooms west of New York.

The personnel of the office is: A. W. Copp, correspondent; George R. Allen, chief operator; A. A. McDonnell, night chief; E. A. McManus, Fred Boutts, B. L. Henshaw, Roger Fison and David Grant.

Mr. Copp is accounted one of the best Associated Press representatives in the West, and comes to Denver qualified in every way for the responsible position he occupies. George R. Allen needs no introduction to the telegraph fraternity, having occupied the responsible position of chief operator for The Associated Press in New York. Mr. Allen has been relieved of the duties of telegraphing and is free to exercise a general supervision of the office.

PHILADELPHIA, POSTAL.

Minor M. Davis, electrical engineer; F. E. d'Humy, assistant electrical engineer, and S. B. Haig, superintendent of traffic, all of New York, were recent visitors at this office.

Mr. L. V. Lewis, engineer of the Rowland system, who was absent for a week, because of illness, has returned.

Mr. Morris Ruberg, an operator of the main office, has been appointed assistant Rowland engineer, vice W. G. Fluharty, transferred.

Louis Engel, for many years in telegraph employ, but at present with the Philadelphia and Reading Railway Company, has been appointed agent, at Clementon, N. J.

Another successful meeting was held recently at the Pennsylvania Railroad Annex assembly rooms, under the auspices of the Pennsylvania Railroad telegraph department. Dr. Paul R. Heyl, of the Boy's High School, delivered a fine address on alternating currents, with a brief outline of the different terms used. Mr. Wm. A. Lindsay, of the Western Electric Company, spoke on transposition, which he illustrated very interestingly. Another feature of the afternoon's meeting was the demonstration of the Gill selector by Mr. Edwin R. Gill, the inventor, of New York. A complete outfit was installed for this purpose.

The meeting was very interesting and instructive. At its close a booklet, entitled "Utility of Wires," published by the telegraph department of the Pennsylvania Railroad Company, was presented as a souvenir of the occasion to each person in attendance. The next meeting of like character will be held on February 27.

NEW YORK, WESTERN UNION.

D. J. Willis, a veteran of the night force, and for more than twenty-five years identified with this company, died on February 1. Mr. Willis was born at Rochester, N. Y., in 1838, and entered the telegraph service in that city in 1853, on the lines of the New York, Albany and Buffalo Telegraph Company. He worked in Buffalo, Chicago, and in other cities. His remains were taken to Rochester for interment. He is survived by two daughters.

Miss S. G. Crans, for many years employed in the Commercial News Department, died on February 3. The interment was at Shamokin, Pa.

Miss Gladys Jones, of this department, was married to Mr. Weems, of the Commercial News Department, on January 30.

Miss A. Forson, formerly of this office, was married to Mr. H. M. Heffner, assistant chief operator of the Commercial News Department, on February 1.

OTHER NEW YORK NEWS.

Assessment No. 488 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of E. B. Croxford, at Cleveland, O.; J. H. Schuckhart, at Salida, Colo.; George V. Rand, at Wolfville, N. S.; T. C. Devine, at Roxbury, Mass., and C. W. Hudon, at Payne, O.

Mrs. Brant, wife of the late John Brant, secretary of the Old Time Telegraphers' and Historial Association, will sail for Naples, Italy, on the steamer Carmania, leaving New York on March 6. Mrs. Brant was booked to sail on the ill-fated Republic on the same date.

United Press Now in New Headquarters.

The United Press Association, New York, is now settled in its new suite of offices on the third floor of the World Building, where it occupies four large rooms.

The moving was without special incident, says the Fourth Estate, as everything had been prepared in advance. When the time came the telegraph companies were notified and they at once made connections with the cables running into the new offices.

The arrangement of the editor, operators and other employes in the news department is the result of a carefully thought-out plan of Clayton D. Lee, the secretary. In the center of the room assigned to them the editor has his desk and around him are grouped the rewrite men. In his rear is another and larger desk for the filing men, where the editor can deliver or receive the copy by merely turning in his chair.

Directly in front of the file men are the operators, to whom the copy is passed, thus allowing the story to have gone through the various departments without one man having to leave his position. The arrangement of the telegraph instruments and paraphernalia is also well planned. Nearly all new and up-to-date equipment, much of which has been made to order, has been installed.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, was recently referred to in one of the daily papers of New York as one of the most successful organizations of the kind, and its prudent and economical management complimented. Although generously sustained by telegraphers, for whom it was originally established, it should have a larger clientele among the fraternity, and asks their accounts.

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North American Telegraph Co., H. A. Tuttle, general manager and purchasing agent, Minneapolis, Minn.

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