No. 886,338. PATENTED MAY 5, 1908.

J. C. BARCLAY.

PRINTING TELEGRAPH.

APPLICATION FILED AUG. 15, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

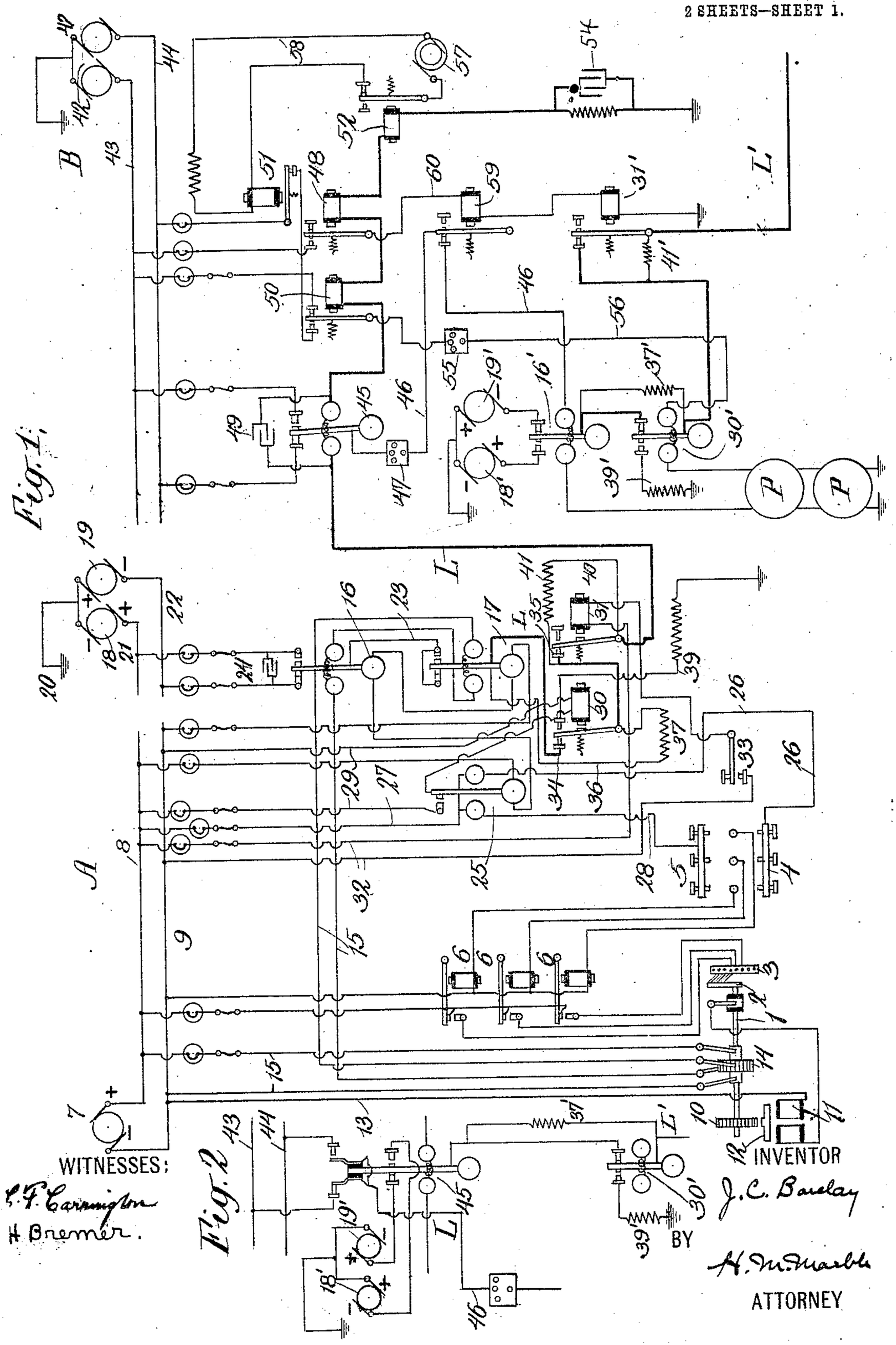


Fig. 2.

WITNESSES:

F. F. Carrington

H. Bremer.

INVENTOR

J. C. Barclay

BY

H. M. Marble

ATTORNEY

No. 886,338. PATENTED MAY 5, 1908.

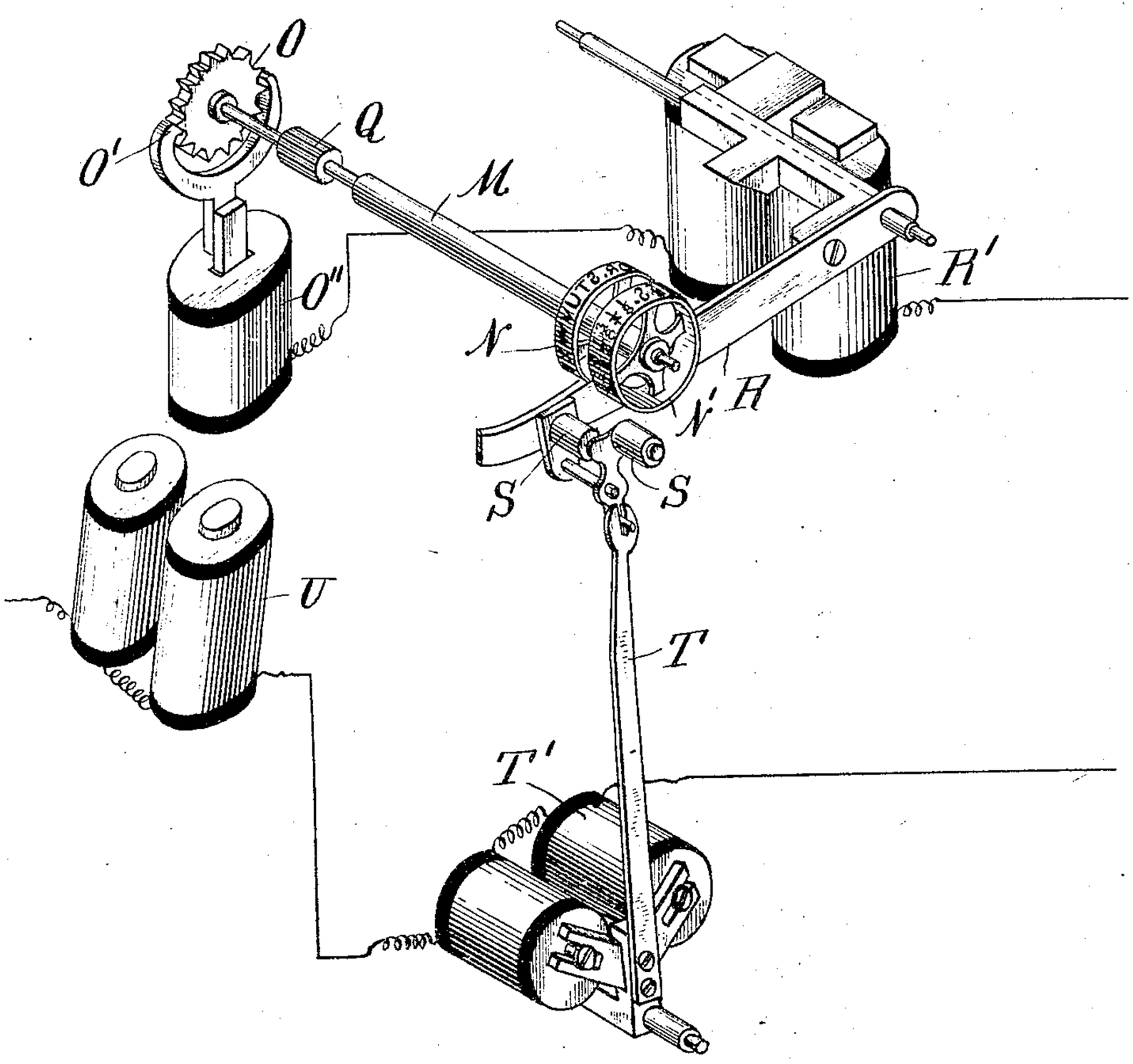
J. C. BARCLAY.

PRINTING TELEGRAPH.

APPLICATION FILED AUG. 15, 1905.

2 SHEETS—SHEET 2.

Fig. 3.



WITNESSES:

Leo Hauerstein

Harry Goss

INVENTOR

John C Barclay

BY

H. McMarble

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. BARCLAY, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PRINTING-TELEGRAPH.

No. 886,338. Specification of Letters Patent. Patented May 5, 1908.

Application filed August 15, 1905. Serial No. 274,251.

To all whom it may concern:

Be it known that I, JOHN C. BARCLAY, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Printing-Telegraphs; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in printing telegraph systems, and particularly to what are known as "stock-ticker" systems, and my invention consists in the combination, with means for operating a "two-wire" ticker or printer circuit from a distant transmitter by means of a single line circuit, of repeating means whereby the signals transmitted through such single line circuit may be repeated into a further line circuit for operating tickers or printers at still another point.

The invention herein described comprises an improvement upon, and an extension of, the system illustrated and described in my application for Letters Patent, filed April 22, 1905, Sr. No. 256,867.

The objects of my invention are, to permit a single transmitter and single line circuit, or, more properly, a consecutive series of single line circuits, to control and effect the operation of multiple wire printers at a plurality of points; to permit repetition of signals from one line circuit of such a system to another; to permit the use of simple and reliable apparatus; and generally to make the system simple, reliable, easily to adjust, and inexpensive.

In the accompanying drawings, Figure 1 indicates diagrammatically one embodiment of my invention, Fig. 2 shows similarly an alternative arrangement of a portion of the repeating transmitter; and Fig. 3 is a diagrammatic perspective illustrating diagrammatically the essential features of a "two-wire" ticker such as referred to herein.

I will describe my invention with particular reference to the "two-wire" printing telegraph illustrated and described in U. S. Letters Patent to Phelps, No. 726,566, dated April 28, 1903. The printing instrument shown in said patent is of the general stock-ticker type, comprising two type-wheels mounted on a common shaft and driven by a spring-motor, their rotation being controlled by an escapement-magnet and escapement mechanism controlled thereby. Said printer also comprises a press magnet in the same circuit with the escapement magnet and arranged to be operated by a prolonged pulse in said circuit; and said printer further comprises a shift magnet and a spring-winding magnet, both located in the same circuit, which is separate and distinct from the circuit of the escapement and press magnets; the spring-winding magnet being operated by periodic current pulses in said second circuit, independent of their direction, and the shift magnet being operated by reversal of direction in current in said second circuit. In the present system, as in that of my aforesaid application Sr. No. 256,867, the various signals from the transmitter are transmitted through a single line circuit to translating mechanism, by which the signals for the operation of the escapement and press magnets of the printer or printers are transmitted through the corresponding local circuit, and the signals for the operation of the shift magnets are transmitted through their corresponding local circuits; and in connection with this translating mechanism I provide repeating devices whereby the signals which operate the translating mechanism are repeated into another line circuit to operate similar translating mechanism at still another point, and so on.

The employment of single line circuits extending from a transmitting point to a plurality of points at which tickers are to be operated, in connection with repeating appliances for repeating from one such line circuit into another, renders it economically practicable to operate circuits of printing telegraphs or "tickers" at a plurality of localities from a single distant city or locality. For example, by the system herein described I may operate ticker circuits in the cities of Philadelphia, Baltimore, Washington, Richmond, etc., from a single transmitter located in New York, repeating from Philadelphia to Baltimore, again repeating from Baltimore to Washington, and again repeating from Washington to Richmond; and so on.

In the accompanying drawing I illustrate one embodiment of my said invention diagrammatically, the system illustrated being that of my said prior application Sr. No. 256,867, with the addition of repeating ap-

pliances. Said drawing shows diagrammatically, at A, the transmitting apparatus and circuits, and at B the translating and repeating apparatus and circuits, together with a series of printers controlled by the translating apparatus; the two stations, A and B, being connected by a line wire L, which may be of considerable length, as may line wire L′, connecting station B with a further station, not shown.

The various parts of the transmitting mechanism are illustrated diagrammatically only, as the construction of these parts is well understood, and I do not illustrate the construction of the receiving printers as these are fully illustrated and described in the said Phelps patent No. 726,566.

Referring first to the transmitting apparatus, at A, 1 designates a revoluble shaft, driven in any suitable or customary manner, and 2 designates the rotary contact arm of a sunflower 3, said arm being carried by shaft 1.

4 and 5 designate the two banks of keys of a suitable keyboard, only three keys of each bank being shown, though it will be understood that in practice there will be a much greater number. The keys of both banks are shown arranged to make contact, when depressed, with a common row of contact points located between the banks of keys.

6, 6, 6 designate neutral relays each electrically connected to and controlled by a corresponding key of bank 4 and also by a corresponding key of bank 5; the contact point of each relay 6 being connected to a corresponding contact segment of sunflower 3. Obviously, the arrangement is such that when a key of either bank is depressed the corresponding relay 6 is energized and the circuit in the corresponding sunflower segment is completed. In the said Phelps patent above mentioned, the transmitter keys are connected in circuit with their corresponding sunflower segments directly; but in practice it is preferable to cause the keys to operate relays controlling the circuits of the sunflower segments, as here shown.

7 designates a generator supplying current for local purposes, and 8 and 9 designate positive and negative current leads therefor.

10 designates a ratchet wheel on shaft 1, 11 a stop magnet, and 12 the armature of said magnet, adapted, when the magnet is energized, to engage said ratchet wheel and arrest the rotation of shaft 1. Said magnet is in a local circuit 13 passing from current lead 9 through magnet 11, to the rotating arm 2 of the sunflower and thence, when said arm makes contact with a sunflower segment the circuit of which is completed by the corresponding relay 6, through such sunflower segment and relay contact to current lead 8. It follows, therefore, that when one of the transmitter keys, of either bank, is depressed, as soon as the sunflower contact arm makes contact with the sunflower segment corresponding to that key, stop magnet 11 is energized, and the rotation of shaft 1 is stopped until said key is released.

Shaft 1 carries a commutator, 14, of well-known construction, the brushes of which commutator are included in a circuit 15 passing from current lead 9 through the commutator and the magnets of two polar relays 16 and 17 back through the commutator to current lead 8. This commutator reverses the direction of the current in circuit 15, as shaft 1 rotates, causing the armatures of relays 16 and 17 to vibrate back and forth.

Numerals 18 and 19 designate two similar generators, for supplying current to the line, having unlike brushes connected to ground at 20, their other brushes being connected through wires 21 and 22 to opposing contact stops of relay 16. The armature of this relay is connected by wire 23 to the two contact stops of relay 17; and the armature of said latter relay is connected, through means hereinafter described, to the line circuit L. Since the armatures of relays 16 and 17 are vibrating back and forth rapidly while transmitter shaft 1 is rotating, generators 18 and 19 are connected to the line alternately, and thus the current in the line is reversed rapidly while shaft 1 is rotating. So far as the alternate connection of the two generators 18 and 19 to the line is concerned, a single polar relay might be used; but it is found that by employing two relays, arranged as shown, and by connecting a condenser 24 across the stops of relay 16, as shown, the sparking at the contact points and brushes may be reduced greatly.

Numeral 25 designates a polar relay employed for effecting the operation of the shifting devices of the receiving printers. A circuit 26 passes from a universal contact bar of the bank of keys 4 through one of the two opposed magnets of this relay to wire 27 and thence to current lead 8. This circuit will be completed whenever one of the keys 4 is depressed. A similar circuit 28 passes from a universal contact bar of the bank of keys 5 to the other of the said two opposed magnets of relay 25 and thence to wire 27 and so to current lead 8. This circuit will be completed when any one of the keys of bank 5 is depressed. Relay 25 controls the circuit 29 from current lead 8 through the contact of said relay to the magnet of a relay 30, which may be termed the "shift relay", and thence back to current lead 9. This circuit is broken when circuit 26 is complete but is closed when circuit 28 is complete. Another relay 31, termed the "repeat relay", is in a circuit 32 which passes from current lead 8 to the magnet of relay 31 and thence to a repeat key 33, arranged when operated to close said circuit, and back to current lead 9.

A line circuit L passes from the armature of relay 17 to the back stop 34 of shift relay 30 and thence through the armature of said relay to the back stop 35 of repeat relay 31, and thence through the armature of relay 31 to the translating apparatus of station B. There is a shunt connection 36 from the armature of relay 17 to the armature of shift relay 30, this shunt connection containing a resistance 37 of, in practice, about 400 ohms. Because of this shunt connection, the line circuit is complete so far as relay 30 is concerned, whether the armature of said relay be in contact with its rear or with its front stop; though when said armature of relay 30 is in contact with its front stop the resistance 37 is in circuit, and therefore the line current is weakened. The front stop 38 of relay 30 is connected to a leak 39, the resistance of which is in practice about 1,550 ohms; and this leak coöperates with the resistance 37 in shunt 36 to reduce the line current when the armature of shift relay 30 is in contact with its front stop. Repeat relay 31 is provided with a shunt connection 40 between its back stop and its armature, said shunt connection containing a very high resistance 41, which in practice is about 12,000 ohms. Therefore when the magnet of the repeat relay is energized the line circuit is not broken at said relay, but the resistance of the circuit is increased so enormously that the effect is very nearly the same as it would be if the circuit were broken. It is preferable to introduce a high resistance by the operation of the repeat relay, rather than to break the circuit, in order to hold stationary the armature of relay 45 of the translating apparatus.

Referring now to the circuits and instruments of the translating apparatus at station B, current for such apparatus is supplied by local generators 42 and current leads 43 and 44. The line wire L is connected to a polar relay 45, the stops of which are connected to the two current leads and the armature of which is connected to a circuit 46 passing through a rheostat 47 to the armature of a relay 59 termed the "local repeat relay". Said circuit passes from the back stop of relay 59, through the magnets of one of the repeating transmitting relays, 16′, and thence through the printers or "tickers" P at station B, said circuit in practice passing through the escapement and press magnets of the printers (not shown) and serving to control the rotation of the type wheels and the operation of the press arms thereof. Said circuit is hereinafter termed the "printing circuit". It will be noted that relay 45 repeats into circuit 46 the current reversals produced in the line circuit by transmitting relays 16 and 17. A condenser 49 is shunted around the magnets of relay 45.

The line circuit L passes from the magnets of relay 45 through the magnet of a neutral relay 50, termed the "local shift relay", and through magnets of relays 48 and 52, hereinafter mentioned, to ground; the ground connection including a shunted condenser 54, as shown. Shift relay 50 is so adjusted that when the armature of relay 30 is against its back stop, and the current in the line circuit L is relatively strong, the armature of said shift relay 50 is in contact with its front stop, and a circuit 56 is completed from current lead 43 through the shift relay contact and through a regulating rheostat 55, the magnet of repeating shift relay 30′, and through the printers or "tickers" at station B. In practice this circuit 56 works the shifting and spring-winding mechanisms of said printers, and is hereinafter termed the "shift circuit".

The operation of the shift mechanisms of the several printers is accomplished by reversing the direction of the current in this circuit 56, which reversal occurs when relay 30 is energized, so that resistance 37 is included in the line circuit and the leak 39 is connected to said line circuit. When this occurs, the strength of the line circuit is so reduced that the armature of relay 50 is pulled back, and circuit 56 is connected to the opposite current lead, 44. When relay 30 is again energized and cuts resistance 37 out of the line circuit and disconnects the leak 39, the armature of relay 50 is again attracted, and the direction of current in circuit 56 is again reversed, thus operating again the shift mechanism of the printers.

Local relay 48 is so adjusted that it operates only when the current in the line falls nearly to zero, as is the case when, through the operation of the repeat key 33, the very high resistance 41 is included in the line circuit. When this occurs, the armature of relay 48 falls back and closes a local circuit 60 from one of the current leads, 43 and 44, through the magnet of local repeat relay 59 and through the magnet of repeating relay 31′ of the repeating apparatus of outgoing line L′. The operation of relay 59 due to the closing of circuit 60 breaks momentarily, the printing circuit 46 of the tickers at station B, without affecting relay 16′, however, and upon the release of the repeat key 33, and the resulting cutting of resistance 41 out of the line circuit L and the attraction of the armature of relay 48 and deënergization of the magnet of relay 59, circuit 46 is again completed and the press magnets of the several tickers are caused to effect another printing of the character last printed, in the well-known way.

Relays 16′, 30′, and 31′, above mentioned, constitute, with their respective circuits, the repeating apparatus for repeating into line circuit L′ the signals transmitted through line circuit L to effect the operation of the printers; and said relays correspond, in general, to relays 16, 30 and 31, respectively, of

station A. The stops of relay 16′ are connected to current leads of a generating set 18′—19′, and the armature of this relay is connected to that stop of relay 30′ with which the armature of said relay 30′ is in contact when the magnet of local shift relay 50 is energized. The armature of relay 30′ is connected to the back stop of relay 31′, and the armature of relay 31′ is connected to the outgoing line, L′. A resistance 37′ is shunted across from the armature of relay 16′ to the armature of relay 30′, and the stop of relay 30′ opposite to that stop to which the armature of relay 16′ is connected, is grounded through a resistance leak 39′. Relay 16′ repeats into circuit L′ the reversals in circuit L which operate relay 45. When, through the operation of shift relay 30, the strength of the current in circuit L is reduced, and relay 50 is operated, reversing the direction of current in the local shift circuit 56, this reversal operates relay 30′, breaking the shunt through its armature by which resistance 37′ is rendered ineffective normally, and connecting leak 39′ to circuit L′, so reducing the strength of current in circuit L′ to correspond to the reduction of current strength in circuit L. Similarly, when by the operation of relay 30 the strength of current in circuit L is restored to full value, relay 30′ is also operated and the strength of current in circuit L′ is restored to full value. When, by the operation of relay 31, the strength of the current in line L has been reduced to such extent as to operate relay 48, the magnet of relay 31′ is energized, and thereby the high resistance 41′ is thrown into line L′ thus similarly reducing the strength of current in circuit L′. It will be seen, therefore, that relays 16′, 30′, and 31′, with their circuits, constitute a complete repeater for repeating into circuit L′ all of the current fluctuations and reversal of circuit L, so that if translating apparatus and tickers such as are located at station B be located at the distant end of line L′, the same will be operated just as the corresponding apparatus and tickers at station B are operated. It will also be seen that by locating at the distant end of station B, repeating devices such as relays 16′, 30′, and 31′, and corresponding circuits, signals may be repeated into still another line circuit, and so on, through a number of line circuits and translating and repeating apparatus. Since relay 16′ merely repeats the operation of relay 45, it is obvious that the latter relay might be provided with two separate sets of contact points, one for the local ticker circuit and the other for line circuit L′, and thereby some complication may be saved. This is illustrated in Fig. 2. The principal reason for employing separate generating sets for the local ticker circuit and for the line circuit is that a higher potential is customarily employed in said latter circuit than in the local ticker circuit.

The printers or tickers of the type referred to herein are customarily provided with spring-winding mechanism operated by successive current pulses in the shift circuit 56. Various means may be employed for producing such successive pulses. I have illustrated one such means, comprising an alternating current generator 57 in a local circuit 58 controlled by line relay 52 and controlling a relay 51. The retractile spring of relay 52 is so adjusted that circuit 58 is complete only when the strength of the line current is reduced owing to the presence in said circuit of resistance 37 or resistance 41; such resistances being in circuit, in practice, sufficiently often for the purpose, and some complication being avoided by having the spring-winding device operate with one direction of current only in circuit 56. When circuit 58 is complete, the operation of generator 57 causes the vibration of the armature of relay 51, causing the alternate breaking and completion of circuit 56 without changing the polarity of the current in said circuit, and therefore without affecting the shift mechanism of the printers P.

Fig. 3 shows the essentials of one of the many forms of two-wire tickers which may be used in my system. In said drawings, M designates the main or type wheel shaft, N and N′ designate type wheels thereon, O an escapement wheel, O′ an escapement anchor and O″ a magnet for such anchor. Q designates a pinion on said shaft through which the shaft may be driven from a motor not shown. R designates a press arm operated by magnet R′ and carrying pads S and S′ mounted to be shifted alternatively into operative position by the shifting arm T operated by shift magnet T′. U is a magnet for winding a spring motor, not shown, for driving the type wheel shaft. As shown, type wheel magnet T′ and spring winding magnet U are in the same circuit, which is circuit 56 of Fig. 1; and the escapement magnet C″ and press magnet R′ are in another circuit, which is the circuit 46 of Fig. 1.

What I claim is:—

1. A printing telegraph system comprising in combination a line circuit, one or more multi-circuit printers comprising printing and shift mechanisms each having independent controlling means, printing and shift circuits for said printers, a transmitter for said printers comprising means for producing a pulsating current in such line circuit and for prolonging the pulses therein at will, and comprising also means for producing another class of signals in said line circuit, and a translating apparatus separate and distant from said transmitter and printers, but connected with said transmitter through said line cir-

cuit, and comprising means operated by said pulsatory current and the prolongation of pulses therein, controlling the printing circuit of said printers and comprising also means operated by the other class of signals in said line circuit for controlling the shift circuit of said printers, a second line circuit and repeating transmitting means operated by said translating apparatus and arranged to repeat into said second line circuit the signals of said first line circuit.

2. In a printing telegraph system, the combination of a transmitter, translating apparatus and a connecting line circuit, said translating apparatus comprising means operated by one class of signals in said line circuit for operating printing mechanism in a printer, and further comprising means controlled by another class of signals in the line circuit for operating shift mechanism of a printer, and further comprising means operated by a third class of signals in said line circuit for causing repetition of the character last printed, a second line circuit and repeating transmitting means operated by said translating apparatus and arranged to repeat into said second line circuit the signals of said first line circuit.

3. In a printing telegraph system, the combination of a transmitter, translating apparatus, a connecting line circuit, and printing and shift circuits for a printer controlled by said printing apparatus, said translating apparatus comprising means operated by one class of signals in said line circuit for producing an alternating current in such printing circuit and for prolonging one pulse of such current at will, said translating apparatus further comprising means controlled by another class of signals in the line circuit for controlling said shift circuit, and further comprising means controlled by a third class of signals in the line circuit for transmitting through such printing circuit an additional pulse of the same direction as the preceding pulse, a second line circuit and repeating transmitting means operated by said translating apparatus and arranged to repeat into said second line circuit the signals of said first line circuit.

4. In a printing telegraph system, the combination with a line circuit, and a transmitter comprising means for transmitting an alternating current and for prolonging one of the current pulses at will, and further comprising means for reducing at will the strength of the line current, of translating apparatus comprising a line polar relay in such line circuit arranged to repeat the alternations in such circuit into a local printer circuit, and a line neutral shift relay, in the same line circuit, operated by increase and decrease of line current strength, and controlling a local printer shift circuit, a second line circuit and repeating transmitting means operated by said translating apparatus and arranged to repeat into said second line circuit the signals of said first line circuit.

5. In a printing telegraph system, the combination with a line circuit, and a transmitter comprising means for transmitting an alternating current and for prolonging one of the current pulses at will, and further comprising two independent means for reducing the strength of the line current, one to a greater extent than the other, of translating apparatus comprising a line polar relay in such line circuit arranged to repeat the alternations in such circuit into a local printer circuit, and comprising further line neutral shift and repeat relays, the repeat relay operated by a relatively great decrease in strength of the line current and arranged by its operation to transmit through the local printer circuit controlled by said line polar relay an additional prolonged current pulse of the same polarity as the preceding pulse, the shift relay operated by a relatively smaller decrease in strength of the line current and controlling a local printer shift circuit, a second line circuit and repeating transmitting means operated by said translating apparatus and arranged to repeat into said second line circuit the signals of said first line circuit.

6. A printing telegraph system comprising in combination a line circuit, a transmitter comprising means for producing a pulsatory current in such line circuit and for prolonging the pulses therein at will, and comprising also means for producing another class of signals in said line circuit, a translating apparatus separate and distant from said transmitter but connected therewith through said line circuit, one or more multi-circuit printers and local circuits for operating the same controlled by said translating apparatus, a second line circuit and repeating transmitting relays operated by said translating apparatus and arranged to repeat into said second line circuit, the signals of said first line circuit.

7. A printing telegraph system comprising in combination a line circuit, a transmitter comprising means for producing a pulsatory current in such line circuit and for prolonging the pulses therein at will, and comprising also means for producing another class of signals in said line circuit, a translating apparatus separate and distant from said transmitter but connected therewith through said line circuit and comprising a line polar relay in such line circuit and a line neutral shift relay in the same line circuit, operated by increase and decrease of line current strength, one or more multi-circuit printers and local circuit therefor by said line polar relay and line neutral shift relay, a second line circuit, and repeating transmitting means operated by said translating apparatus and arranged

to repeat into said second line circuit the signals of said first line circuit, comprising a pole changing transmitting relay controlled by said line polar relay and a neutral relay controlled by said line neutral shift relay and provided with means controlling the strength of current in the second line circuit.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN C. BARCLAY.

Witnesses:
B. STEIN,
C. A. VAN BRUNT.