2 Sheets--Sheet 1.

S. J. BURRELL.

Printing-Telegraphs.

No. 157,787. Patented Dec. 15, 1874.

Fig: 1.

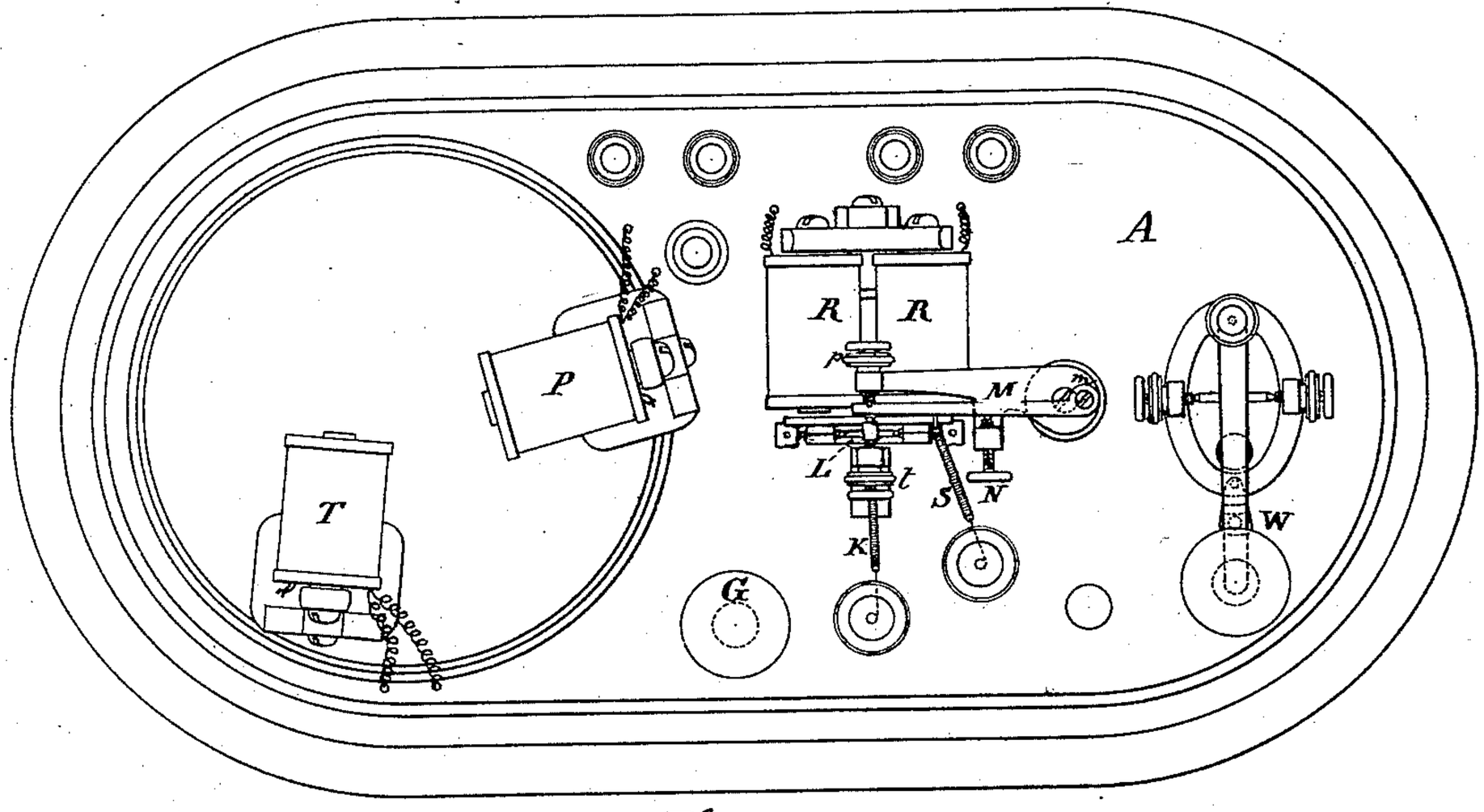
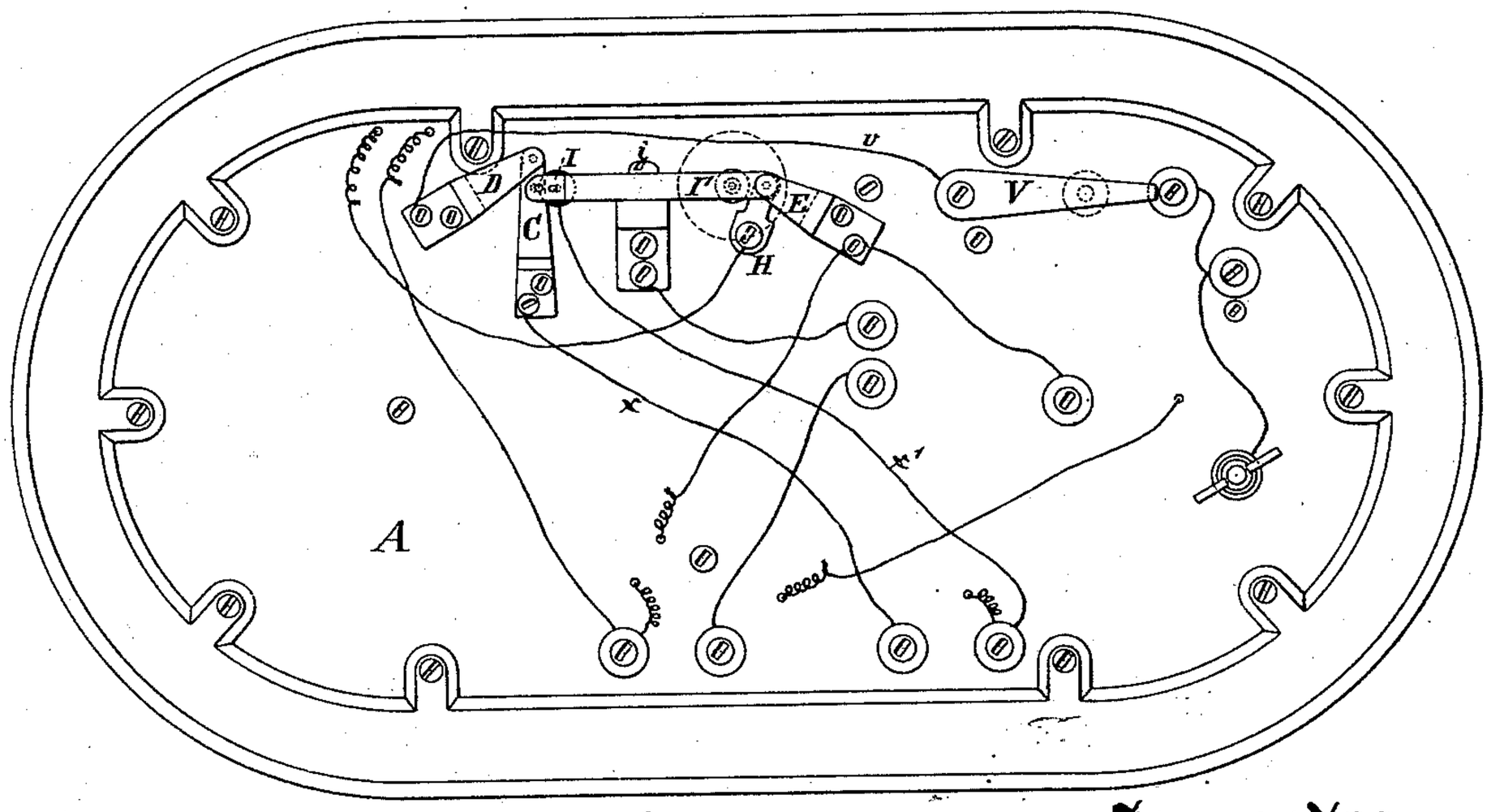


Fig: 2.

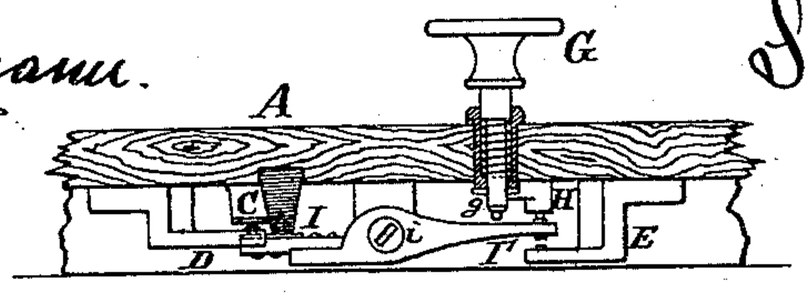


Witnesses:

Arnold Hornamn.

W. C. Dey.

Fig: 3.



Inventor:

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2 Sheets--Sheet 2.

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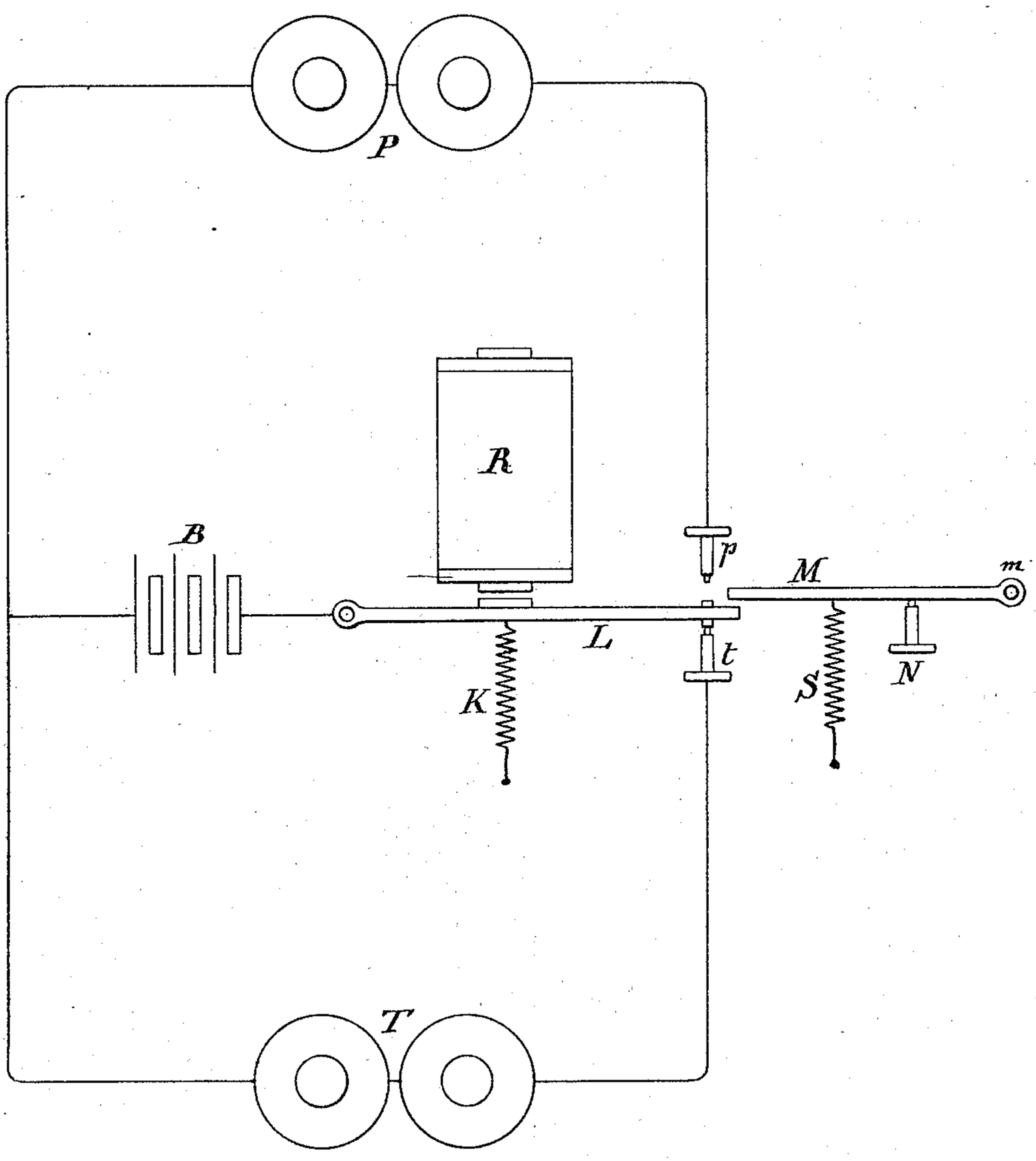
Fig: 4.



Witnesses:

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Inventor:

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THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

SAMUEL J. BURRELL, OF BROOKLYN, NEW YORK, ASSIGNOR TO TRUXTON BURRELL, OF SAME PLACE.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **157,787**, dated December 15, 1874; application filed February 23, 1874.

To all whom it may concern:

Be it known that I, SAMUEL J. BURRELL, of Brooklyn, Kings county, in the State of New York, have invented certain Improvements Relating to Telegraph-Instruments, of which the following is a specification:

The improved instrument is intended for use by parties not skilled in telegraphing, and for private or short lines.

It has long been practiced to divide the main battery into two sets of cells, (which may be nearly or exactly equal,) and to send over the same wire two strengths of galvanic current, according as one or both sets of cells are connected. By this means a different effect is produced by the strong current from that by the weak current. One set of cells is used nearly all the time to maintain, or seek to maintain, the ordinary strength of current, the breaking of which current acts through a suitable local battery to advance the type-wheel, and bring the desired letter opposite the paper. The other set of cells is used at intervals to add its force to the ordinary current on the main circuit, and induce an entirely different action, by so connecting the local batteries as to make the impression of that letter on the paper. Provisions have been made for correspondingly operating the type-wheel, and the impression apparatus at the sending-station, by causing the main current to pass always through the relay-magnet at each station, so that the operator who is sending a dispatch may know what is taking place at the other end of the line, with ordinary well-known provisions for adjusting the instruments at each end to a common starting-point in case of any derangement. I have discovered means whereby one strength alone is necessary to accomplish the end. I am thus able to dispense with the two sets of cells, and to operate successfully with one alone.

Instead of connecting the additional battery or set of cells, when it is desired to produce the impression at the distant end of the line, I simply cut out of the main circuit the helix or coil at the sending end. The same result is induced at the receiving end of the line by thus cutting out resistance, as would be induced by the addition of an extra battery or extra set of cells.

The effect which is experienced at the receiving end in either case is as follows: The relay-magnet is adjusted to close the local circuit through the type-wheel coil when the main circuit is broken, and a device is provided for closing the local circuit through the impression-coil when the force of the main circuit exceeds the usual amount.

As heretofore practiced, both strengths of current have been sent similarly through the relay-coil at each end of the line, and the local battery at each end of the line has been operated in a similar manner, and by precisely similar means—that is to say, through the current on the main line.

I operate similarly, through the relay-magnets, to adjust the type-wheels at each end of the line; but when the time arrives for inducing the impression, I cut out from the main circuit the relay-magnet at the sending-station. I provide separate means, connected with the impression button or knob, for inducing the impression at the sending-station.

I succeed in adjusting the type-wheels correctly at each end of the line, and inducing the impression promptly and strongly at each end of the line, with only about half the amount of main battery which is required for the above mode of operating, and the same amount as heretofore of local battery.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a plan view of the instrument. Fig. 2 is a view from below. Fig. 3 is a vertical section through a portion; and Fig. 4 is a diagram, showing the relation of the principal parts to each other, and to the local battery.

The figures represent the several parts, with so much of the other parts as is necessary to indicate their relation thereto.

Similar letters of reference indicate like parts in all the figures.

At the sending-station, as also at the receiv-

ing-station, is a relay, the same in principle as the ordinary Morse relay, with the addition of a special device for bringing the impression-magnet into action. A is the table or foundation-plate of the instrument, which instrument is the same at each end of the line.

The peculiar arrangement of the relay and local circuit will be clearly understood by reference to the drawings, and more particularly to the plan view or diagram, Fig. 4.

R represents the relay-magnet; T, the local magnet, which moves the type-wheel with a step-by-step motion, familiar to telegraphers; P, the local magnet, which gives the impression; and B, the local battery. L is the armature-lever of the relay, to which the current from the local battery is conducted. *p* is a platina-pointed screw, in connection with the magnet P; and *t* is a similar screw, in connection with the magnet T. M is a supplementary lever, pivoted at *m*, and held in contact with an adjustable screw-stop, N, by a delicately-adjustable spring, S. The lever M is struck by the armature-lever L, when it is moved by the magnet R, and is held by the stop N and the spring S under such conditions that it will prevent the lever L from making contact with the screw *p*, except by overcoming the tension of the spring S in addition to that of its own spring K.

The tension of the spring S, being so adjusted as to withstand the attraction of the relay-magnet R under the influence of the current on the main line, when that current is subjected to its ordinary resistance by being compelled to pass through the coil R at each end of the line, the armature-lever L will ordinarily stand resting against the supplementary lever M, and with its armature near, but not touching, the core of the magnet R.

When the lever finger-key W is manipulated, every vibration up or down causes the main circuit to be broken for the instant that the key is passing from the front to the rear contact, during which period the relay-lever L falls back under the action of its spring K, and, by touching the screw *t*, closes the local circuit through the type-wheel magnet T. This action being the same at each end of the line, the type-wheel at each end is operated, and the movements are repeated until each type-wheel is turned to the desired point to produce the impression. The knob G is depressed by the operator to a considerable distance, and induces four successive changes of conditions, with the general result of inducing the impression of the paper upon the type-wheel at each end of the line, and of preventing any disturbance of other parts. The knob G acts, through its stem *g*, on a lever, which is pivoted at *i*, and is divided by a rubber insulator into two parts, I and I′. The part I acts on the main circuit, while the part I′ performs subordinate functions relating to the apparatus at the sending-station.

When the knob G is depressed, it, by turning the lever I I′, induces a contact between the part I and the spring contact-piece C, and allows the current of the main line to switch across without being compelled to pass through the coil R. It allows the main current to traverse directly from the wire *x*, back through the wire *x′*, to the binder, connecting to the line-wire, without being compelled, as under ordinary conditions, to traverse the wire *v* through the break-spring V, the finger-lever key W, and relay-coil R, to reach the same binder. In other words, this contact of I′ with C leaves out of the circuit the coil R at the sending end, which, as usually made, is calculated to have a resistance equal to several miles of line-wire. This leaves on the main circuit, during this brief period, only the resistance due to the line-wire and the coil at the receiving end. The resistance of the earth-current is not usually reckoned. The further descent of the knob G, and the further turning of the lever I I′, lifts the spring-connection C out of contact with the contact-piece D, and thus forbids any of the current from moving through the coil R at the sending end.

I have found by experience that although a shorter way is provided for the current by the contact of I′ with C, still a portion moves through the coil R at the sending end, and it is better to entirely prevent this.

The consequence of both these changes is, that the diminished resistance to the main current induces a stronger action than usual of the relay-magnet R at the receiving-station, and has the effect to pull its armature-lever L with such force as to cause it to overcome the resistance not only of its own spring K, but also of the spring S, and thus to move over, carrying the intermediate lever L with it, until it is in contact with the platina-pointed screw *p*. This contact leads the local current of the receiving-station through its impression-coil, and induces the impression at the receiving-station.

While these principal operations have been effected by the isolated end I of the lever I I′ certain subordinate operations have been effected by the other end I′. These relate to the operator's own local battery, and result in securing a correct copy of what is being done and maintaining his type-wheel in correct adjustment.

When the knob G commenced to be effective to turn the lever I I′ around its center *i*, its first effect was to break the contact of the part I′ with the contact-piece H, so as to break the local circuit through the type-wheel magnet at the sending-station. Until the lever I I′ is allowed to return to its original position, the local current cannot be transmitted to the type-wheel magnet. This is important to prevent a movement of the type-wheel and a derangement of the adjustment, which would otherwise result from the falling back of the lever L on the depression of the knob G, and cutting out the coil R.

Then follow the steps described, which relate to the main current, and which are effected by the part I of the lever. The last step, in the further turning of the lever I I′, brings it into contact with the contact-piece E. This sends the local current of this (the sending-station) through its impression-coil P, and thereby induces an impression at this end of the line independent of, but exactly coinciding with, the impression which is being produced by different means at the receiving-station.

Many of the details may be varied within wide limits. Keys of a different style from the key W may be employed, if desired.

I claim as my invention—

1. The within-described method of operating telegraph-printing mechanism by cutting out the relay-magnet at the sending-station, so that the current is thereby strengthened, to render the printing mechanism operative at the receiving station or stations, as herein specified.

2. In combination with an electric circuit controlling the two operations of adjusting types and producing impressions, a resistance and means for cutting out the same at will, in order to perform one of the two operations, leaving the resistance in the circuit to perform the other, all substantially as herein specified.

3. In connection with an electric circuit controlling a printing mechanism, and with a resistance and means for cutting out the same at will, and means for causing such cutting out to produce the desired effect, the combination of a key or means, not only cutting out the resistance, but also breaking the connection, so that no portion of the current can move through the resistance, substantially as herein specified.

4. The lever I I′, forming the several contacts and breaks, so as to successively induce the operations of cutting off the connection of the local battery to the type-wheel magnet, cutting out the relay-coil of the main line, and closing the local circuit to the impression-magnet, as herein specified.

In testimony whereof I have hereunto set my hand this 19th day of February, 1874, in the presence of two subscribing witnesses.

SAML. J. BURRELL.

Witnesses:

WM. C. DEY,

ARNOLD HÖRMANN.