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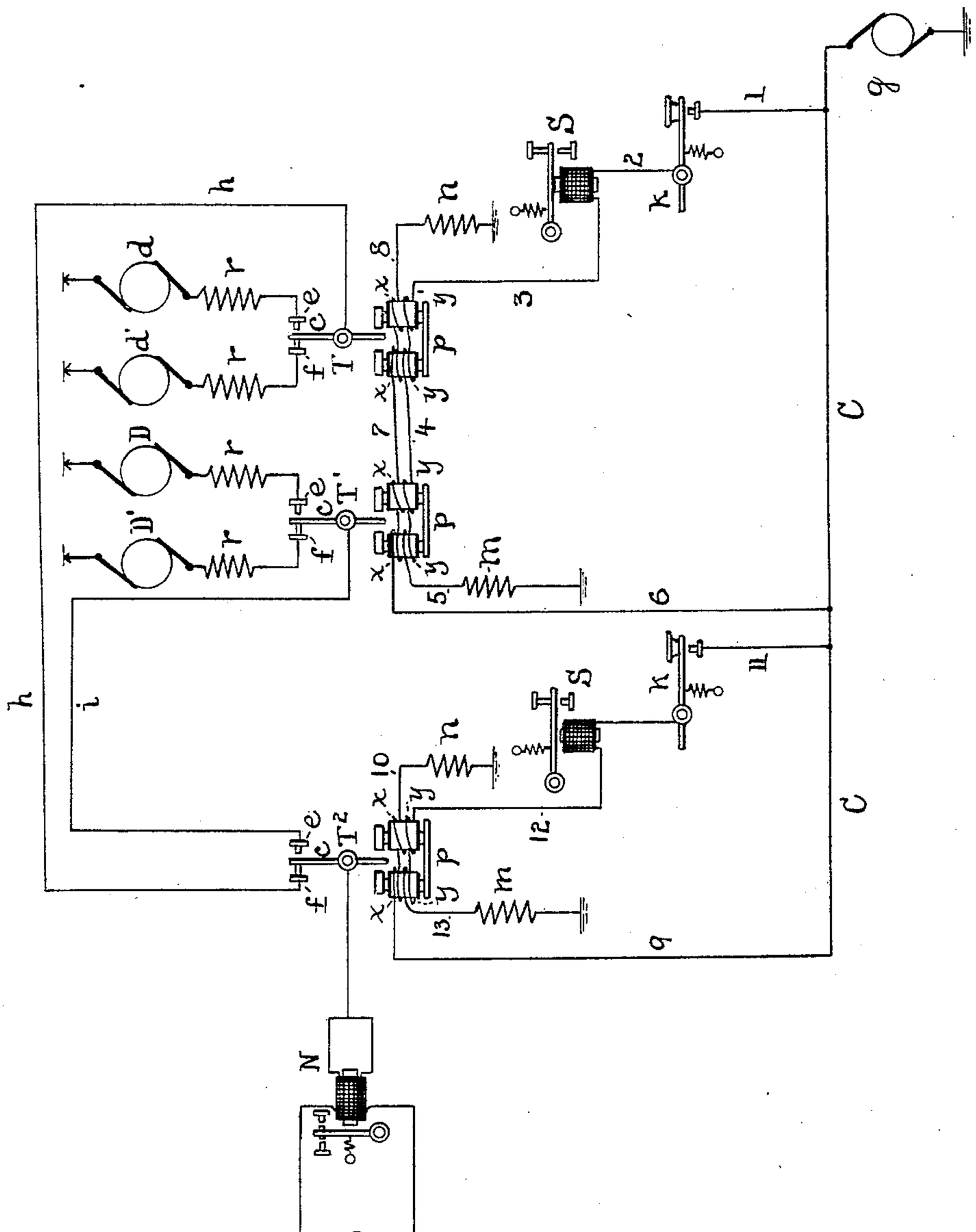
W. A. HOUGHTALING.

TRANSMITTER FOR MULTIPLE TELEGRAPHS.

(Application filed Dec. 22, 1898.)

(No Model.)



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TRANSMITTER FOR MULTIPLE TELEGRAPHS.

SPECIFICATION forming part of Letters Patent No. 620,778, dated March 7, 1899.

Application filed December 22, 1898. Serial No. 699,993. (No model.)

To all whom it may concern:

Be it known that I, WALTER A. HOUGHTALING, a citizen of the United States, and a resident of New York, (Brooklyn,) in the county of Kings, State of New York, have invented certain new and useful Improvements in Transmitters for Multiple Telegraphs, of which the following is a specification.

My invention is an improvement in the transmitting instruments employed in duplex and diplex apparatus in the Morse system of telegraphy.

The objects of my invention are to provide a transmitter which shall operate quicker in passing from one contact or limit to the other, to produce each contact with the same force or energy, to avoid the necessity for adjustment of a retracting device, to shorten the interval of no current on the line when changing from one polarity to another, and to eliminate the sparks at the manually-operated circuit-breaker due to the so-called "extra" current.

I provide a transmitter having a movable contact and two fixed contacts. The movable contact is operated by a polarized electromagnet. This magnet has two coil-windings upon its cores and is supplied from a single generator of electricity, the connection between the coils and the generator being separate branch conductors offering an ohmic resistance which is much greater in one branch than in the other. I prefer to employ double the resistance in one conductor, as I thus secure a greatly-increased strength of current for the operating-margin in the other conductor. The first branch is permanently closed. The second branch contains a circuit-breaker and an indicating instrument, the circuit-breaker being a Morse key or an electromagnetic circuit-breaker operated from another circuit, the indicating instrument being the means of informing the transmitting operator of the character of his work.

The accompanying drawing illustrates my invention.

L is the main line.

R is a polarized receiving-relay, and N is a neutral receiving-relay, both being differentially wound.

A is the artificial line containing the rheostat R*h*.

D and D′ and *d* and *d*′ are sources of electricity of suitable strength and polarity for connection with the main line under the control of suitable transmitting instruments.

T, T′, and T² are transmitting instruments, the first two operating to vary the polarity of current sent to the main line and the latter determining the strength of such current. As the construction is identical in each case, I will describe the transmitter T.

c is a movable contact. *e* and *f* are fixed contacts. These are connected with the generators *d* and *d*′, respectively, through fixed artificial resistances *r*. *c* is connected with the main line through the branch *h*. The movement of *c* is controlled by a polarized electromagnet *p* of well-known construction, having upon its cores two coil-windings *x* and *y*.

g is a local source of electricity for operating the transmitters. One pole is grounded or connected to a return-circuit, while the other is connected to the conductor C. Coil *x* of the polarized relay *p* is in the branch conductor 6 7 8, which contains a fixed artificial resistance *n*, let us say, of three hundred ohms. The other coil *y* of the magnet *p* is in the branch conductor 1 2 3 4 5, with a fixed artificial resistance *m* of, say, one hundred and fifty ohms. In this branch is also included a circuit-breaker, which may be a Morse key *k*, and an indicating instrument, which may be a Morse sounder, like S. It will be noticed that the source of electricity *g* is connected with the coils *x* and *y* in the reverse direction, and the coils being wound in the same direction an opposing magnetic effect will be exerted by the two branches upon the cores of the polarized magnet *p*. Of course this result might be attained by winding the coils *x* and *y* in the reverse directions and then connecting *g* to the coils in a manner to produce the same opposing magnetic effect. The ohmic resistance of these two branches is approximately in the ratio of two to one; but the electromagnetic inductive effect due to the windings upon the coils of the magnet is equal and opposite. It follows that the strength of current in the branch 1 2 3 would be double that in the branch 6 7 8. When the key *k* is open, magnet *p* is polarized, let us say, in a negative sense with a

strength of current of one unit. Upon closing *k* a strength of current flows in the circuit 1 2 of two units exerted in a positive sense. This overcomes the negative strength of one and establishes a positive strength of one. The position of the movable contact *c* is changed, and the change is made more rapidly than is possible in any electromagnetic instrument neutral in its character or in one operating in one direction by the retractile force of a spring. The force exerted in both directions is due to the same magnetic energy—that is, either a positive or a negative strength of one unit, as I have described it.

With this arrangement of transmitter I am enabled to make the movable contact extremely light, and the extent of its excursion from one limit to the other is hardly perceptible to the eye. It results from this that the time of changing contacts is more limited, thus shortening the interval of no current during reversals. Another feature of importance is the elimination of the spark at the circuit-breaker *k*. The electromagnetic induction of the coil *x* is neutralized by that of the coil *y*, thus obviating the clogging and sparking at the contact-points of *k*.

The movable contact *c* of the transmitter T′ is connected to the main line by the branch circuit *i*, and both branches *h* and *i* are connected and disconnected with the main line L by the movement of the contact *c* of the transmitter T^2. I have shown the transmitter T^2 with the two coils *x* and *y* upon the cores of the magnet *p*, the coil *x* being in branch circuit 9 10, while the coil *y* is in the branch 11 12, substantially as described with respect to the transmitter T.

It is to be understood that in the operation of the apparatus shown a diplex arrangement of Morse apparatus patented to Francis W. Jones is used for illustration, the transmitters T and T′ operating as a single instrument to produce reversals of the current for one set of signals and the transmitter T^2 operating to vary the strength of current for another set of signals. My improved arrangement of transmitter, however, is equally applicable to any of the known key systems.

What I claim, and desire to secure by Letters Patent, is—

1. The combination in a telegraph-transmitter of a movable contact, a fixed contact, suitable electrical connections for said contacts with the main line and with a source of electricity, respectively; a polarized magnet for controlling said movable contact having two coil-windings in separate branch circuits, a local source of electricity supplying both branches and a circuit-breaker in one of said branches, substantially as described.

2. The combination in a telegraph-transmitter of a movable contact, a pair of fixed contacts, suitable electrical connections for said contact with the main line and with a source of electricity, respectively; a polarized magnet for controlling said movable contact having two coil-windings, a source of electricity, separate branch conductors connected to said source and to said coils, respectively, to produce opposing magnetic effects, and a circuit-breaker in one of said branches.

3. The combination in a telegraph-transmitter of a movable contact, a pair of fixed contacts, suitable electrical connections for said contacts with the main line, and source of electricity, respectively; a polarized electromagnet to control said movable contact, two coil-windings for said magnet, two branch conductors of respectively different ohmic resistance, a single source of electricity with which and said coils, said conductors, are connected, respectively; to produce opposing magnetic effects, and a circuit-breaker in the circuit of lower resistance.

4. The combination in a telegraph-transmitter of a movable contact, a pair of fixed contacts, suitable electrical connections for said contacts with the main line and source of electricity, respectively; a polarized electromagnet to control said movable contact, two coil-windings for said magnet, two branch conductors of respectively different ohmic resistance, a single source of electricity with which and said coils, said conductors are connected, respectively, to produce opposing magnetic effects, a circuit-breaker and an indicating instrument in the branch circuit of lower resistance.

WALTER A. HOUGHTALING.

Witnesses:
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