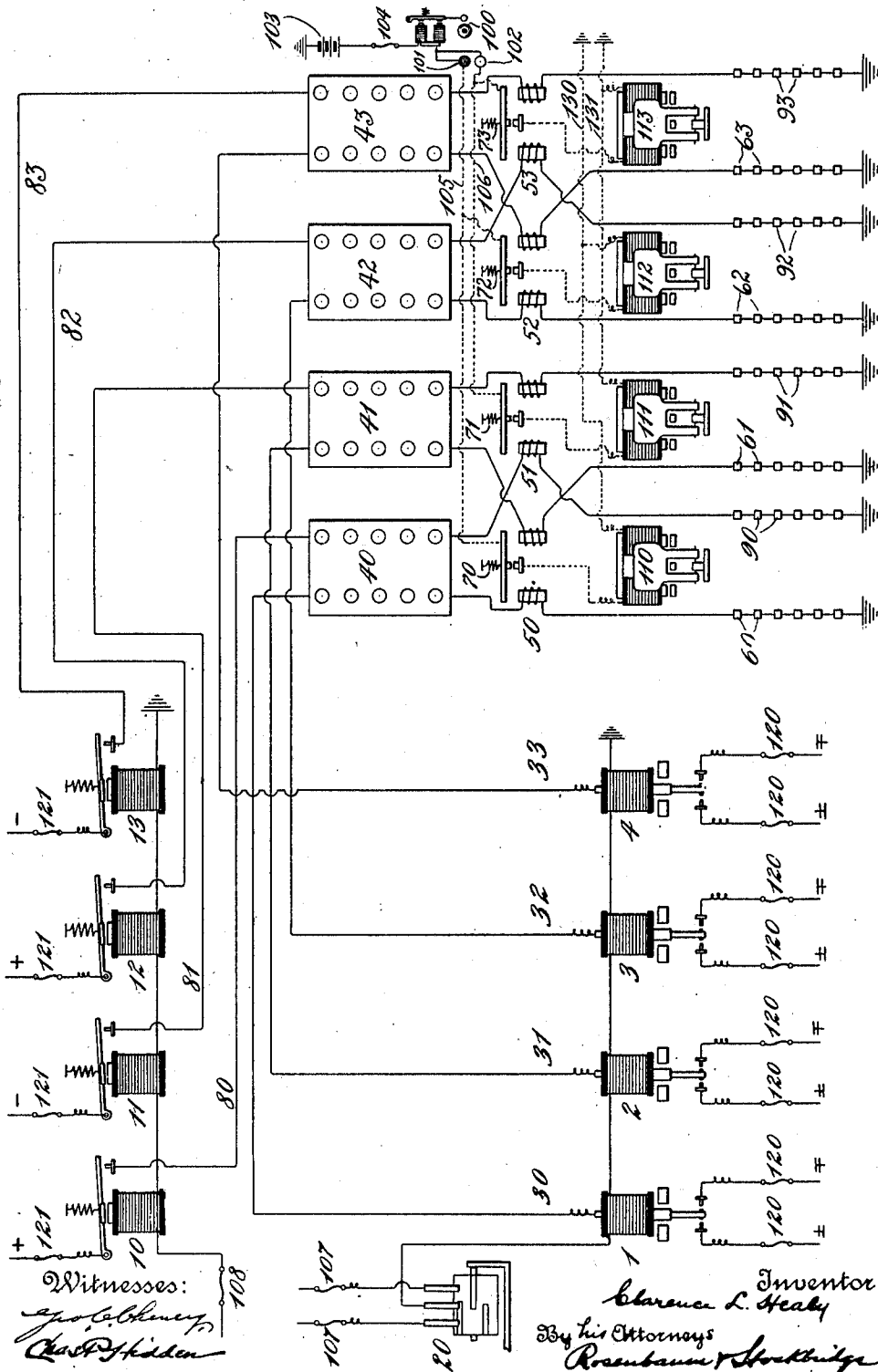


C. L. HEALY.
CIRCUIT TROUBLE INDICATOR.
APPLICATION FILED OCT. 12, 1910.

989,008.

Patented Apr. 11, 1911.



UNITED STATES PATENT OFFICE.

CLARENCE L. HEALY, OF CHATHAM, NEW JERSEY, ASSIGNOR TO NEW YORK QUOTATION COMPANY, A CORPORATION OF NEW YORK.

CIRCUIT TROUBLE-INDICATOR.

989,008.

Specification of Letters Patent.

Patented Apr. 11, 1911.

Application filed October 12, 1910. Serial No. 586,613.

To all whom it may concern:

Be it known that I, CLARENCE L. HEALY, a citizen of the United States, residing at Chatham, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Circuit Trouble-Indicators, of which the following is a full, clear, and exact description.

This invention relates to circuit indicators and more particularly to circuit indicators for printing telegraph circuits, and the like.

Printing telegraph receiving instruments are used for quoting prices of the various stock exchanges and are commonly known as "tickers". In operating a number of these tickers from one transmitter, they are preferably arranged in series in a circuit; there being usually from one to twenty-five tickers in such circuit; and there may, of course, be a number of circuits all operated from one large station. The tickers require either one or two wires to a circuit, according to the system used; and depending on whether the controlling of the type wheel and the printing parts is all done by means of one wire, or whether two wires are used; one controlling the platen, and a second, the type wheel. Such second wire may also be used to control the lateral shifting of said wheel; to permit it to print either letters or figures.

The particular construction of printing apparatus used forms no part of the present invention; so that only brief mention thereof need here be made. Proper service of these printers is very important from a business standpoint, any circuit impairment or interruption caused by, for example, the blowing of a relay fuse plug, wire opening, grounding or crossing between the wires must be promptly noticed, the trouble located and remedied as quickly as possible.

No satisfactory means has heretofore been employed for ascertaining quickly exactly where the trouble is in such a system. In some systems an extra ticker upon each circuit has been used; these guide tickers being constantly watched by an attendant, which, of course, entails considerable expense; in others an annunciator is placed in an escapement wire that normally has current flowing through it, to the end that a drop may be released to indicate circuit trouble in case such trouble is due to an open wire or the blowing of a fuse; but such an ar-

range ment obviously cannot be used in systems having a wire with current on only at the time of printing. A bad feature of any ordinary annunciator arrangement is that it requires a magnet in the circuit, and its armature necessarily vibrates during the time that alternations are being sent over the wire, resulting in magnetic retardation due to the extra magnet and also being further objectionable on account of the frequent dropping of the number plate when there is no actual opening of the circuit. The constant vibration of the armatures where a number of circuits are so operated, too, is annoying; and the results at best are poor.

To overcome the foregoing objections, and others, I have provided an accurate indicating system, which involves the following principle:—If one side of a differentially wound magnet be disposed in the printer circuit and the other side of such magnet be placed in a corresponding artificial line, and currents in the respective circuits are maintained equal at all times and the magnetic retardation is the same, the armature of such differentially wound magnet with its two coils connected separately in opposition, will not move either during the sending of reversals on the type or escapement controlling wire; or on the second wire, *i. e.*, the printing or shifting wire, where the current is on only at intervals. The armature will not be attracted as long as the circuit is in balance, and furthermore, no retardation will be offered to the currents passing over the line. The magnet, however, will be energized when any change in the current takes place on one side which does not occur on the other, whereby more or less current is caused to pass to one side alone, destroying the magnetic balance and promptly causing the armature to respond. This armature may close a local circuit containing any form of alarm or other indicator.

The accompanying drawing illustrates one embodiment of my invention, and the principle just referred to is involved in the operation of the mechanism therein shown.

Referring to the drawing wherein are diagrammatically indicated respectively circuit repeating relays 1, 2, 3, etc., such relays preferably being of the polar type; while a series of circuit repeating relays 10, 11, 12, etc., are shown above the respective polar relays. An alternating current from a trans-

mitter 20 is sent through the circuit repeating relays 1, 2, 3, etc., one such transmitter being used to repeat the reversals in each circuit operated. Current flowing through

5 No. 1 type circuit controlled by the polar relay designated 1, leaves said relay and passes thence through lead 30 to the line rheostat 40 through the left hand series of the adjusting coils thereof and from thence

10 to one side of the type differential relay 50; then on to the tickers 60 on this line, to ground. Instead of using an artificial circuit with its rheostat and other appliances necessary to reproduce the conditions in the

15 No. 1 circuit, such apparatus necessarily occupying considerable space as well as using double current and entailing needless expense, I have found that it is possible to use the type circuit for example controlled by

20 relay 2. This also results in reducing the number of relays by half and is possible by reason of the fact that all of the circuits are substantially balanced to carry the same amount of current; that is, the type lines

25 will all be substantially the same and correspondingly the printing lines will be substantially the same; although, of course, different from the type lines. We can hence use two type circuits, or two press or printing circuits or lines together; and whatever

30 difference there is in the magnetic retardation due to an unequal number of instruments on a particular line, can be balanced by adding an equal amount to the line adjusting rheostat 40, 41, etc., which pertains to such line. It is also possible to compensate for such line differences by varying very slightly the tension given to the spring

35 70, 71 or the like of the corresponding relay, 50, 51, etc. No. 2 type circuit starts from polar relay 2 and passes thence to the top of the line rheostat 41, thence through the adjusting coils thereof to the second or right hand side of relay 50, from whence it

40 returns and continues on to the type line of circuit No. 2 to effect the operation of the tickers 61.

The respective printing or shifting circuits start from their printing relays 10, 11, etc., and after passing over the corresponding

50 leads 80, 81, etc., and through the line balancing rheostats 40, 41, etc., upon the right hand sides thereof, traverse the respective windings of relays 51, 53, etc., and

55 from thence out to the press or printing lines 90, 91, 92, etc.; the evenly numbered relays 10, 12, etc., controlling evenly numbered press lines, and the odd numbered relays 11, etc., correspondingly controlling the

60 odd numbered press lines. Whenever there is any unbalancing of one of the circuits, let us say for example, upon the left hand side of one of the evenly numbered or type controlling relays, the cores of such relay become energized, the amount depending en-

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tirely upon the extent of lack of balance, and the relay armature is attracted and thereby closes the circuit containing an alarm bell 100, a red lamp 101, and the drop of the corresponding type annunciator 110, 112, etc.; this latter releasing its shutter and exposing the circuit number. A different colored lamp 102 is used for the press wires so that the attendant can see at a glance whether it is a type or a press wire that is

75 in trouble; while the annunciator indicates which particular group of type or press circuits are involved. The operator is then able to quickly test the two circuits, which constitute such group, for example No. 1

80 and No. 2 to ascertain which particular one is in trouble; and is therefore able to promptly restore it to normal condition if the trouble is caused by the blowing out of a fuse 120. If the trouble is out upon the line,

85 a wire-man may be immediately sent out; thus saving a delay which necessarily occurs under the former arrangements hereinbefore referred to.

In general, it will be noticed that in the

90 system of nomenclature used, all evenly numbered differentially wound magnets and annunciators are in type circuits, while uneven numbered magnets and annunciators are in printing circuit. To complete the

95 whole station equipment, type circuits 4, 5, etc., and printing circuits 13, etc., are coupled up in the above described manner. The respective leads 130 and 131, are connected in parallel with alternate annunciators in the

100 manner shown; such leads being further grounded. Current through the respective indicator circuits hence starts at the battery or other source of current 103, passes thence through the fuse 104, bell 100, lamp 101 or

105 102 and lead 105 or 106, as the case may be, to the armature of the particular relay involved, the corresponding annunciator and its lead 130 or 131, to ground and from thence back to the current source.

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Current for the type relays 1, 2, 3, etc., is delivered to the fuses 107 as direct current and is changed by the commutator 20 into alternating current, while current for the

115 printing relays 10, 11, 12, etc., is delivered from the circuit closer transmitter to fuse 108. The actuating alternating current for the type circuits is delivered at fuses 120, and the actuating current for the printing

120 circuits is correspondingly delivered at fuses 121. It will be observed also that the polarity of the respective connections to fuses 120 and 121 is alternated in the manner shown in order to balance the load upon the

125 dynamos.

What I claim, is:—

1. A printing telegraph circuit indicator comprising two normally balanced cooperating partial circuits, printing instruments

130 having operative parts in circuit respec-

tively with each of said partial circuits, and an electrically operated device coacting with said partial circuits for indicating a lack of balance of said partial circuits.

5 2. A printing telegraph circuit indicator comprising a plurality of cooperating, type-controlling, partial circuits, a plurality of cooperating, printing, partial circuits, and electrically operated devices coacting respec-
10 tively with said partial circuits for indicating circuit trouble in any of the same.

3. In combination with a plurality of printing telegraph partial circuits having relays and printing telegraph instruments
15 therein, means for indicating circuit trouble in any of said circuits, comprising an electrically operated device having a plurality of coils of conductive material, one of said coils being in circuit with one of said print-
20 ing telegraph partial circuits and another of said coils being in circuit with another of said partial circuits.

4. In combination with a plurality of printing telegraph partial circuits having relays and printing telegraph instruments
25 therein, means for indicating circuit trouble in any of said circuits, comprising an electrically operated device having a plurality of coils of conductive material, one of said
30 coils being in circuit with one of said printing telegraph partial circuits and another of said coils being in circuit with another of said partial circuits, said means further
35 comprising an auxiliary circuit.

5. In combination with a plurality of printing telegraph partial circuits having relays and printing telegraph instruments therein, means for indicating circuit trouble in any of said circuits, comprising an electri-

cally operated device having a plurality of 40 coils of conductive material, one of said coils being in circuit with one of said printing telegraph partial circuits and another of said coils being in circuit with another of said partial circuits, said means further com- 45
prising an auxiliary circuit, and a lamp in circuit therewith.

6. In combination with a plurality of printing telegraph partial circuits having relays and printing telegraph instruments 50 therein, means for indicating circuit trouble in any of said circuits, comprising an electrically operated device having a plurality of coils of conductive material, one of said coils being in circuit with one of said print- 55
ing telegraph partial circuits and another of said coils being in circuit with another of said partial circuits, said means further comprising an auxiliary circuit and sound producing mechanism in circuit therewith. 60

7. In combination with a printing telegraph partial circuit having a relay and a printing telegraph instrument therein, means for indicating circuit trouble in said circuit, comprising an electrically operated device 65
having a plurality of coils of conductive material, one of said coils being in said partial circuit, and a second partial circuit hav-
ing another of said coils therein, and means for normally balancing the currents in said 70
partial circuits.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

CLARENCE L. HEALY.

Witnesses:

WALDO M. CHAPIN,
WILLIAM C. LARY.