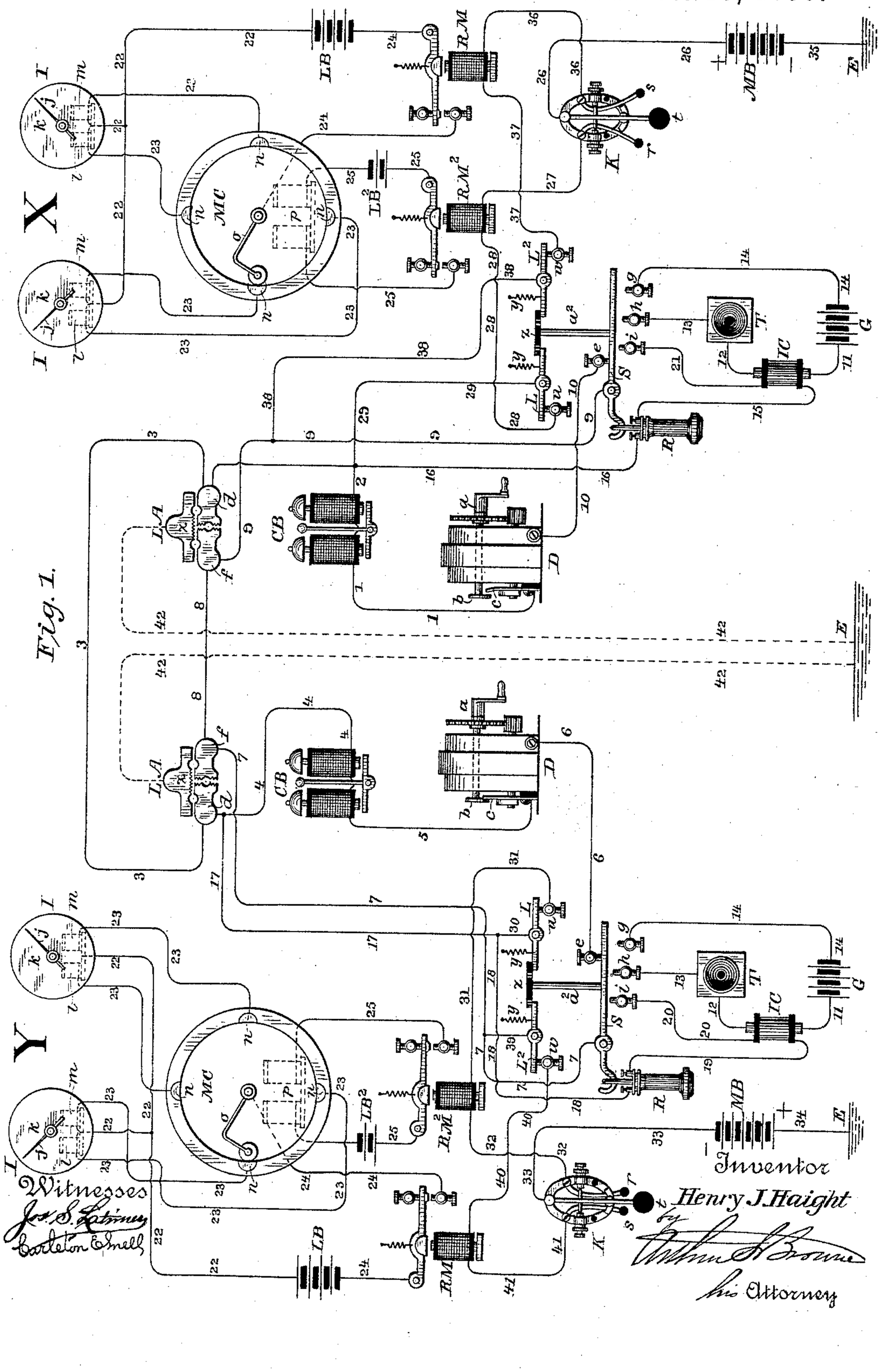
(No Model.) 2 Sheets—Sheet 1.

H. J. HAIGHT.

COMBINED ELECTRIC INDICATING AND TELEPHONE SYSTEM.

No. 442,883. Patented Dec. 16, 1890.



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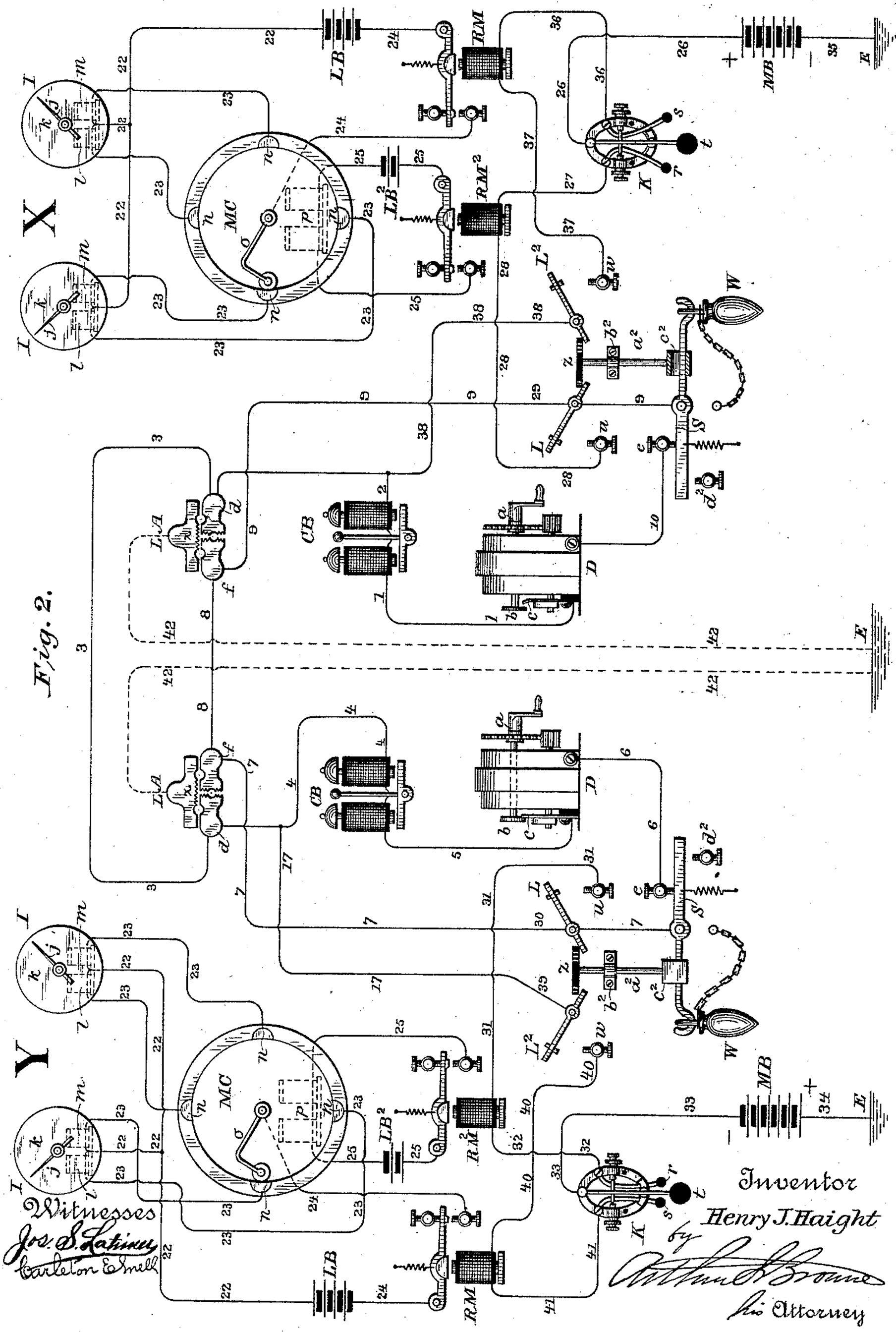

Fig. 2.

Witnesses
Jos. S. Latimer
Carleton Snell

Inventor
Henry J. Haight
by Arthur B. Browne
his Attorney

UNITED STATES PATENT OFFICE.

HENRY J. HAIGHT, OF NEW YORK, N. Y.

COMBINED ELECTRIC INDICATING AND TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 442,883, dated December 16, 1890.

Application filed May 9, 1890. Serial No. 351,132. (No model.)

To all whom it may concern:

Be it known that I, HENRY JANSEN HAIGHT, of the city, county, and State of New York, have invented a new and Improved Combined Electric Indicating and Telephone System, of which the following is a specification.

Hitherto electric indicating systems have been devised and used for the intertransmission between a plurality of stations of information capable of being rendered intelligible through the movement of the indices of electric indicating-instruments. For example, such systems have been used for the transmission from a central station to a plurality of receiving-stations of stock-quotations, meteorological indications, and the like. In such systems a number of electric indicating-instruments are employed at each station, each having a suitable scale for the indication of a particular character of information, and each having an index capable of movement in either direction, which on being moved by electric impulses designates, in connection with the scale, the information transmitted from the central station. In the indicating system to which the present invention relates all of the indicating-instruments at each station are electrically connected to a circuit-closing instrument, the movable circuit-arm of which determines the indicating-instrument which for the time being is in electric communication with the central station. All of the circuit-closing instruments at all of the stations are arranged in series and are in electric communication with the central station. Accordingly, there are two circuits connecting the several stations with the central station—the circuit-closing-instrument circuit and the indicating-instrument circuit. Systems of the general character here referred to are set forth and described in applications for Letters Patent of the United States filed by me May 3, 1888, Serial No. 272,748; November 29, 1889, Serial No. 331,925, and March 14, 1890, Serial No. 343,842. Now, in the use of such indicating-instruments it becomes desirable and often necessary to communicate between the various stations for other purposes than for the transmission of the usual indications for which the system is established. The instruments at one or more stations may get out of order, requiring the services of a person from the central office for their repair. Switches may be left open which should be kept closed, or communication for purposes foreign to the particular indications usually transmitted may be desired. To enable such communication to be had, the present invention combines with an electric indicating system of the character referred to an electric signaling system, with which a telephone system is also preferably combined.

The improved combined indicating signaling and telephone system is illustrated in the accompanying drawings, wherein—

Figure 1 is a diagram illustrating a combined signaling, telephone, and indicating system; and Fig. 2 is a diagram illustrating a combined signaling and indicating system only.

Referring first to Fig. 1, there will first be described the signaling and telephone instruments and circuits, which in most respects, as shown, are such as are adopted in an ordinary telephone system.

In Fig. 1 there are shown, for the purposes of illustration, the instruments at two stations and their connecting-circuits, one station X representing a transmitting-station from which signals, messages, or indications are sent, and the other station Y representing a receiving-station. The two stations are equipped with the same instruments, so that a description of the instruments at one station will suffice for both stations.

D is a dynamo-electric machine for generating a current for ringing the call-bells CB. As usual, the operating-shaft *a* of the dynamo carries a circuit-breaker *b*, co-operating with a spring-contact *c* for opening the shunt-circuit when the dynamo is in use.

LA is the lightning-arrester; T, the telephone-transmitter; R, the telephone-receiver; G, the generator for the transmitter-circuit; IC, the induction-coil in the telephone-line circuit, and S the suspension-switch on which the telephone-receiver R is normally hung.

Signaling-circuit.—When a signal is to be sent from station X, the handle of the operating-shaft *a* of the dynamo at the transmitting-station is pushed in (thus breaking the shunt-circuit) and is turned, generating an

electric current. The current passes from one pole of the dynamo through wire 1 to the call-bell CB at the transmitting-station, thence through wire 2 to the circuit-plate *d* of the lightning-arrester LA at the transmitting-station, thence through line-wire 3 to the circuit-plate *d* of the lightning-arrester LA at the receiving-station Y, thence through wire 4 to the call-bell CB at the receiving-station, thence through wire 5 to the spring-contact *c* of the dynamo D at the receiving-station, thence through the circuit-breaker *b* to the metal of which the dynamo is made, thence from the metal of the dynamo through wire 6 to the contact *e*, with which the suspension-switch S is in electric communication as long as the telephone-receiver is hung thereon, thence to the suspension-switch S at the receiving-station, thence through wire 7 to the other circuit-plate *f* of the lightning-arrester LA at the receiving-station, thence through a return-line wire 8 to the circuit-plate *f* of the lightning-arrester LA at the transmitting-station X, thence through wire 9 to the suspension-switch S at the transmitting-station, thence to the contact *e*, with which the suspension-switch is in normal electric communication so long as the telephone-receiver is hung thereon, and thence through wire 10 to the opposite pole of the dynamo D at the transmitting-station, thus completing the circuit and ringing the bells at both stations. This circuit is the same as usual in telephone systems with one exception. Usually the return-wire 8 is replaced by a ground-connection; but in the present instance, since the two line-wires are preferably and usually employed for the indicating system, the second line-wire is utilized as a return-wire for the signaling-circuit and also for the telephone-circuit, as will hereinafter appear.

Telephone-transmitter circuit. — The call having been given, the receivers R are removed from the suspension-switches S, each of which drops so as to break connection with the contact *e* and to make electric connection with the contacts *g h i*. Speaking in the transmitter T at the transmitting-station X causes the proper variations in an electric current, which starts from one pole of battery G and passes through wire 11, induction-coil IC, wire 12, transmitter T, wire 13, contact *h*, suspension-switch S, contact *g*, and wire 14 back to the other pole of the battery.

Telephone-receiver circuit.—The induction-coil IC at the transmitting-station X is the electric generator for this circuit. The electric current passes from the induction-coil IC at the transmitting-station X through wire 15 to the receiver R at the same station, thence through wire 16 to the circuit-plate *d* of the lightning-arrester LA at the transmitting-station, thence through line-wire 3 to the circuit-plate *d* of the lightning-arrester at the receiving-station Y, thence through wire 17 and wire 18 to the telephone-receiver R at the receiving-station, thence through wire 19 to the induction-coil IC at the receiving-station, thence through wire 20 and contact *i* to the suspension-switch S at the receiving-station, thence through wire 7, lightning-arrester plate *f*, return-wire 8, lightning-arrester plate *f*, and wire 9 to the suspension-switch S at the transmitting-station, and thence through contact *i* and wire 21 to the induction-coil IC at the transmitting-station, thus conveying the words spoken into the transmitter at the transmitting-station to the receiver at the receiving-station. These described telephone-circuits contain in themselves no novelty and differ from the ordinary telephone-circuits only in having a return-wire in place of the usual ground-connection.

It becomes necessary now to describe the instruments and circuits employed in the indicating system. There are employed at each station an instrument MC, called by me a "multiple-circuit closer," and a plurality of electric indicating-instruments I. Each indicating-instrument I is an instrument of well-known character and construction, having an index *j*, which is capable of a step-by-step movement in either direction and which co-operates with a suitable graduated dial *k* to indicate the information for which it is furnished. The index *j* is moved in opposite directions by means of two electro-magnets *l m* and suitable well-known intervening mechanism. There are at each station as many of the indicating-instruments as circumstances require; but only two are shown for the purposes of illustration. All of the magnets *l m* of all the indicating-instruments at one station are electrically connected by wire 22 with one pole of an electric generator LB. Each of these electro-magnets is connected by a separate and independent wire 23 with a fixed electrode *n* of the multiple-circuit closer MC. No novelty is here claimed for the multiple-circuit closer. Its object is to bring the magnets *l m* successively into the circuit of the generator LB. To this end it is provided with a circuit-closing arm *o*, which is in communication with the generator LB by a wire 24. This circuit-closing arm *o* is given a step-by-step movement in a single direction, so that it may be brought into contact with the several electrodes *n*. Whenever the circuit-closing arm *o* is at rest one of the indicating-magnets *l m* of one of the instruments is in circuit with the generator LB. Opening and closing this circuit will accordingly demagnetize and magnetize the particular magnet *l m* which is in circuit, and consequently move the particular index *j* forward or back, as the case may be. This circuit is controlled by the movable armature of an indicating-circuit relay-magnet RM. The step-by-step movement of the circuit-closing arm *o* is effected by means of an electro-magnet *p* and suitable intervening mechanism of any well-known character. The magnet *p* is by pref-

erence located in a local circuit 25, having a local battery LB^2 and controlled by the movable armature of a circuit-closing relay-magnet RM^2. These indicating-instruments and their circuits as thus far described are not here claimed, not being new in this application.

The particular instruments and circuits here shown constitute the subject-matter of my applications hereinbefore referred to.

The present invention relates to the circuit-connections between the indicating and circuit-closing relay-magnets RM and RM^2 of the several stations in the system, whereby the desired information may be simultaneously indicated at the several stations, and the circuit-connections may be assimilated to those of the signaling and telephone circuits.

Multiple-circuit-closer circuit.—To properly transmit indications, it is necessary that the circuit-closing arms *o* of the multiple-circuit closers MC at the several stations should work in unison. The relay-magnets RM^2 ultimately control the movements of the arms *o*, so that if these relay-magnets operate in unison the arms *o* will do likewise. Consequenly the relay-magnets RM^2 are arranged in an electric circuit in series. This circuit includes a main generator MB, preferably one at each station. From one pole of the battery MB at the transmitting-station X a wire 26 leads to a Morse key K. This key is substantially the same as an ordinary Morse key, except that it has two switches *r s* instead of one. Both of these switches *r s* at the transmitting-station are normally open and at the receiving-stations they are normally closed, and the lever *t* at the receiving-stations is normally locked down, so that the circuits through both switches *r s* at the receiving-stations are normally closed. To place the relay-magnets RM^2 in circuit the switch *r* of the key at the transmitting-station is closed. From this switch the current passes through wire 27 to the relay-magnet RM^2 at the transmitting-station X, thence through wire 28 to a contact *u* and a lever L, thence through wire 29 to the circuit-plate *d* of the lightning-arrester LA at the transmitting-station thence through line-wire 3 to plate *d* of the lightning-arrester LA at the receiving-station Y, thence through wire 17 and wire 30 to a lever L at the receiving-station, thence through contact *u* and wire 31 to the circuit-closer relay-magnet RM^2 at the receiving-station, thence through wire 32 to the switch *r* of the key K at the receiving-station, thence through wire 33 to generator MB, thence through wire 34 to earth E, and thence through wire 35 to the opposite pole of the generator MB at the transmitting-station, thus completing the circuit. Manipulation of the lever *t* of the key K at the main station will thus operate the magnets RM^2 at the several stations simultaneously and consequently move the arms *o* of the several multiple-circuit closers in unison, and hence the corresponding magnets of corresponding indicating-instruments at the several stations will be in their respective local circuit at any moment of time.

Indicating-circuit.—The proper indicating-instruments at the several stations having been determined by the multiple-circuit closers, their indices are moved in unison by the simultaneous operation of the indicating-relays RM at the several stations. These relays are located in series in an electric circuit which starts from one pole of the generator MB at the transmitting-station X, from which the current passes through wire 26 to the key K at the transmitting-station, thence through switch *s* (which is now closed, the other switch *r* being now open) and wire 36 to relay-magnet RM at the transmitting-station, thence through wire 37 and contact *w* to lever L^2 at the transmitting-station, thence through wire 38 and wire 9 to circuit-plate *f* of the lightning-arrester LA at the transmitting-station, thence through wire 8 (which in the signaling and telephone circuits was the return-wire) to plate *f* of the lightning-arrester at the receiving-station Y, thence through wires 7 and 39 to lever L^2 at the receiving-station, thence through contact *w* and wire 40 to the indicating-relay RM at the receiving-station, thence through wire 41 to the switch *s* of key K at the receiving-station, and thence through wire 33, generator MB, wire 34, earth, and wire 35 to the opposite pole of the generator MB at the transmitting-station, thus completing the circuit. Manipulation of lever *t* of the key K at the transmitting-station will consequently simultaneously operate the several relays RM, and hence operate the corresponding indicating-instruments at the several stations in unison. The earth-plates *x* of the lightning-arresters LA are connected by wires 42 with the earth. It will be observed that all of the instruments are protected by the lightning-arresters. All the connections between the indicating-instruments and the signaling and telephone instruments are made under the protection of the lightning-arresters. The return connection for the circuit-closer and indicating circuits is made through the earth. A wire connection could be used, if desired or necessary. The suspension-switch S and its contacts may be of any known and approved construction. Mere conventional contacts are shown for the purposes of illustration.

It is desirable when the telephone-circuits are in use that the indicating-circuits should be entirely cut out. For this reason the levers L L^2 and their contacts *u w* are employed. Normally the levers L L^2 are in electric contact with the contacts *u w*, being held thereagainst by springs *y y*, (or by weighting one end of each lever, as shown in Fig. 2.) The adjacent ends of the levers L L^2 (the contacts being made at their outer ends) abut against the under side of a disk *z*, of insulating material, carried on the end of a stem a^2,

which is connected with the suspension-switch S, preferably in the manner shown in Fig. 2. As there shown, the stem a^2 moves longitudinally in a guide b^2, and has at its lower end a sleeve c^2, through which the suspension-switch extends. In Fig. 1, when the telephone-receiver R is removed from the hook end of the suspension-switch, the weighted end of the suspension-switch swings down, thus depressing the stem a^2 and its disk z, which in turn lifts the levers L L^2 from their contacts u w, and consequently breaks the indicating-circuits. Thus the indicating and signaling circuits are broken by the suspension-switch when the telephones are in use. When not in use, the signaling and indicating circuits are always ready for operation from the transmitting-station.

Although the combined indicating, signaling, and telephone system has been described only in connection with two stations and sending information in one direction, the extension of the system to a larger number of stations and the transmission of information in the opposite direction will be readily understood without further description.

In Fig. 2 certain modifications are illustrated. The telephone-circuits are omitted, so that only a signaling and indicating system is shown. In this system the signaling-circuit is normally operative and the indicating-circuits are rendered normally inoperative by the suspension-switch. Consequently the attendants at the receiving-stations must be called up before indications can be transmitted. For maintaining the suspension-switch in its normal position a weight W is used. When the weight W is removed, the levers L L^2 make contact with the contacts u w. A back-stop d^2 is employed to limit the movement of the suspension-switch.

Slight modifications are shown in the circuits to indicate that they may be altered in immaterial respects. For example, the circuit-closer relay-magnets RM^2 are connected through the return-wire 8, and the indicating-relays RM are connected through the line-wire 3, instead of vice versa, as in Fig. 1. This change is effected by running wire 38 from lever L^2 to plate d of the lightning-arrester at station X, by running wire 39 from lever L^2 to plate d at station Y, by running wire 29 from lever L to plate f at station X, and by running wire 30 from lever L to plate f at station Y; also, the circuits are slightly modified by connecting the suspension-switches S and lever L by wires 7 and 9, so that wire 29 coincides with wire 9, and wire 30 coincides with wire 7. In all other respects the circuit-connections in Fig. 2 are identical with those in Fig. 1, and the operations of the circuits in both figures are identical.

I claim as my invention—

1. An electric signaling-circuit including signaling devices, an electric generator, a line-wire, and a return-wire, in combination with electric indicating-circuits, said indicating-circuits being two in number, viz: first, a multiple-circuit-closer circuit including electric means, such as relay-magnets, for operating multiple-circuit-closing instruments, an electric generator, means for opening and closing said circuits for operating said relay-magnets, and a line-wire, and, second, an indicating-instrument circuit including electric means, such as relay-magnets, for operating electric indicating-instruments, an electric generator, means for opening and closing said circuit, and a line-wire independent of the line-wire of said multiple-circuit-closer circuit, the line-wire of one of said two indicating-circuits being the same as the line-wire of said signaling-circuit, and the line-wire of the other indicating-circuit being the same as the return-wire of said signaling-circuit, substantially as set forth.

2. An electric signaling-circuit including signaling devices, an electric generator, a line-wire, and a return-wire, and an electric telephone-circuit including telephonic instruments, their current-generators, and the same line and return wires as the signaling-circuit, in combination with electric indicating-circuits, said indicating-circuits being two in number, viz: first, a multiple-circuit-closer circuit including electric means, such as relay-magnets, for operating multiple-circuit-closing instruments, an electric generator, means for opening and closing said circuits for operating said relay-magnets, and a line-wire, and, second, an indicating-instrument circuit including electric means, such as relay-magnets, for operating electric indicating-instruments, an electric generator, means for opening and closing said circuit, and a line-wire independent of the line-wire of said multiple-circuit-closer circuit, the line-wire of one of said two indicating-circuits being the same as the line-wire of said signaling and telephone circuits, and the line-wire of the other indicating-circuit being the same as the return-wire of said signaling and telephone circuits, substantially as set forth.

3. Electric signaling, telephonic, and indicating circuits having line and return wires in common, and having separate electric generators and telephonic, signaling, and indicating instruments, in combination with a lightning-arrester at each station, each lightning-arrester being common to all of said circuits and being interposed between the line and return wires and all of the telephonic, signaling, and indicating instruments at each station, substantially as set forth.

4. A suspension-switch, its contacts, and electric circuits including said switch and contacts, in combination with an electric circuit controlled by said switch but not including it, said circuit including an electrode or contact and a lever co-operating therewith, said lever being moved by said switch, substantially as set forth.

5. The suspension-switch S, stem a^2, having insulated head z, and sleeve c^2, through which said switch extends, in combination with levers L L^2, operated upon by said head z, and electrodes or contacts u w, co-operating with said levers, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY J. HAIGHT.

Witnesses:
ARTHUR S. BROWNE,
GEO. R. BYINGTON.