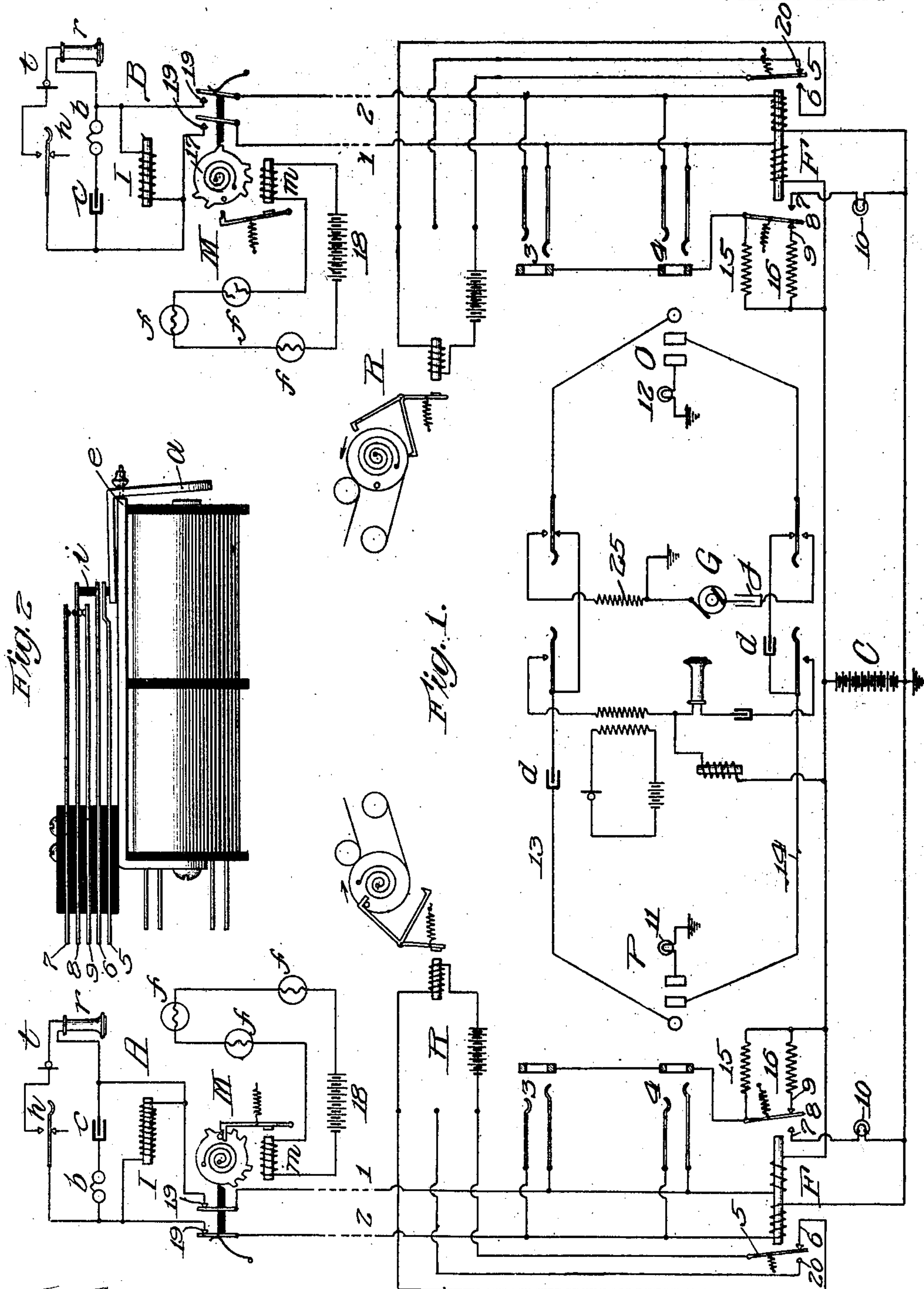


H. G. WEBSTER.

COMBINED TELEPHONE AND ALARM SYSTEM.

APPLICATION FILED JULY 11, 1904.

3 SHEETS—SHEET 1.



Witnesses:

Robert H. Veil
L. E. Connor.

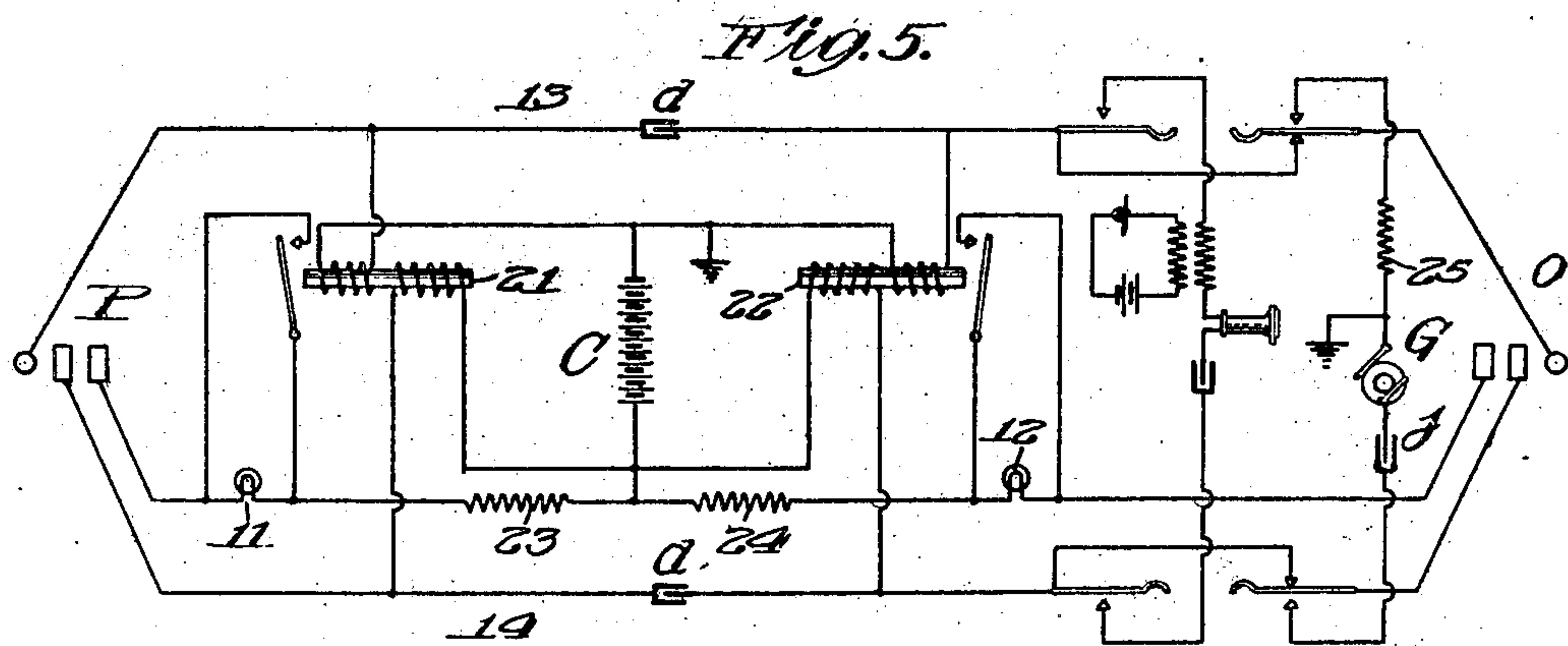
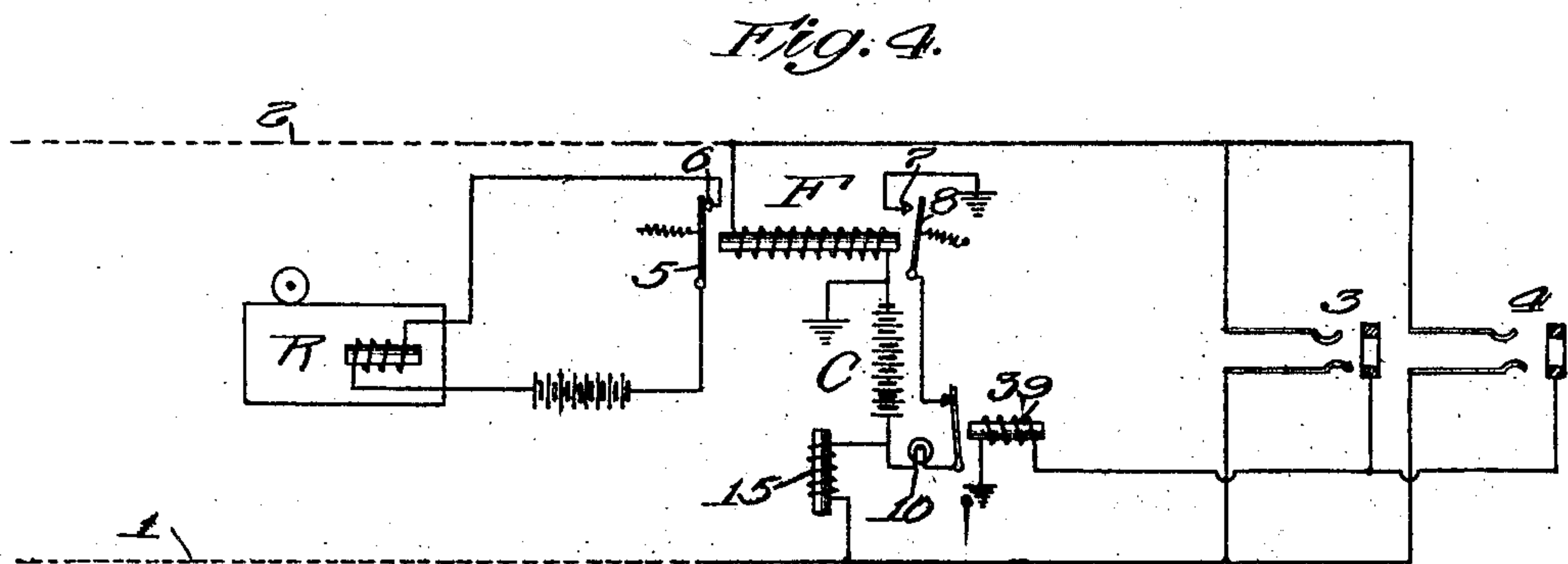
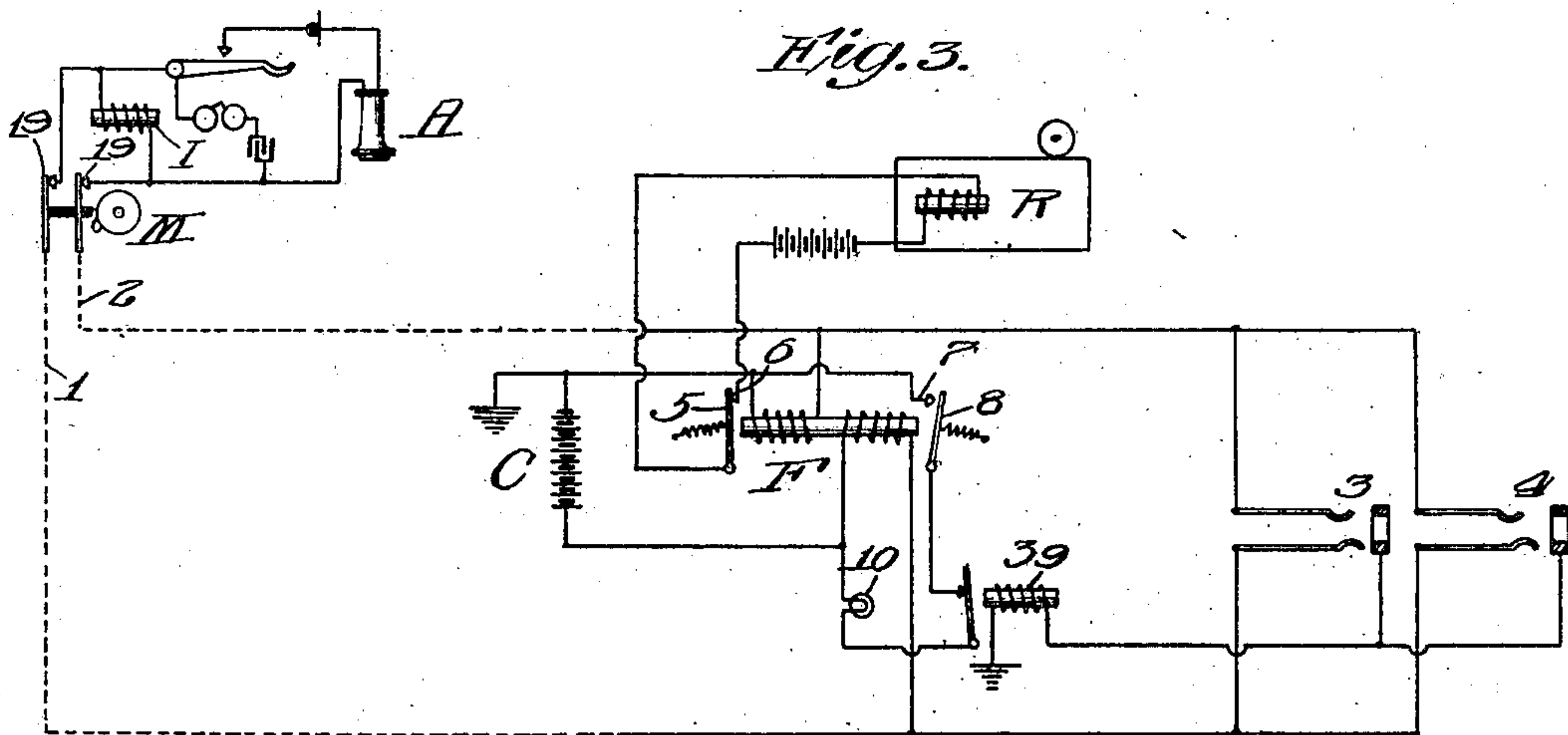
Inventor:

Harry G. Webster

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COMBINED TELEPHONE AND ALARM SYSTEM.

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3 SHEETS—SHEET 2.



Witnesses:

Robert H. Veir
L. E. Conroy

Inventor:

Harry G. Webster

No. 825,624.

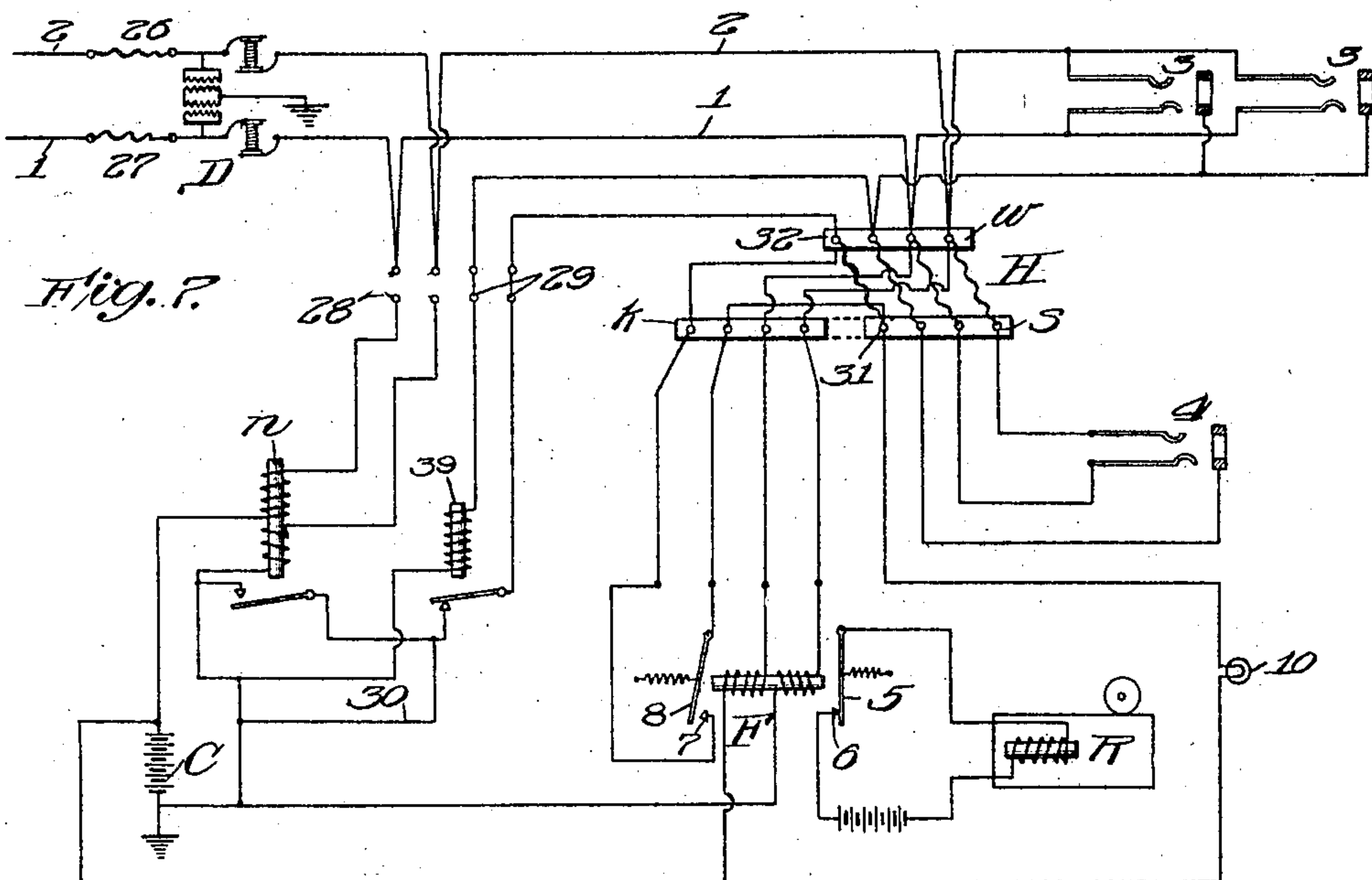
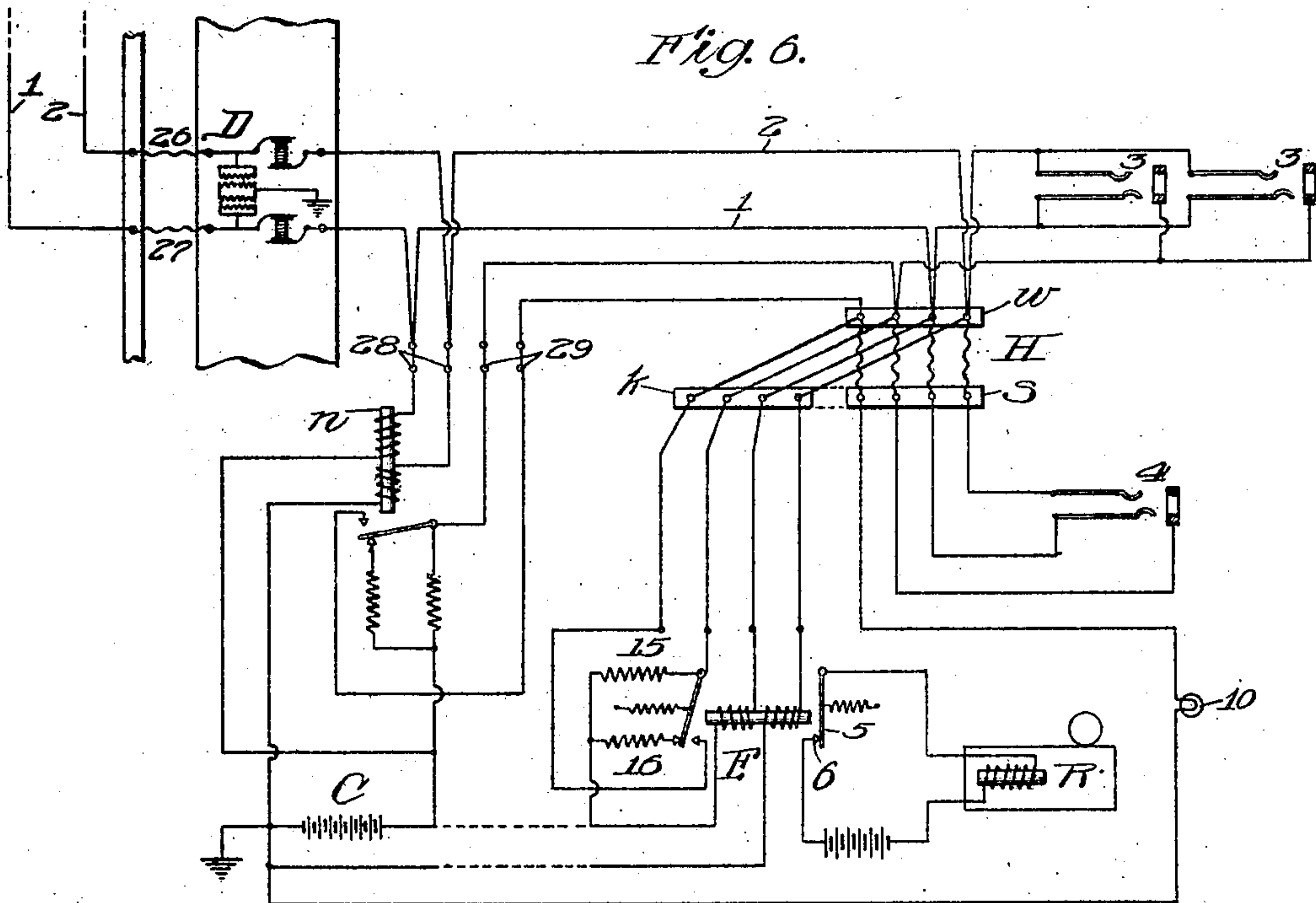
PATENTED JULY 10, 1906.

H. G. WEBSTER.

COMBINED TELEPHONE AND ALARM SYSTEM.

APPLICATION FILED JULY 11, 1904

3 SHEETS—SHEET 3.



Witnesses:

Robert H. Veir
L. E. Conroy.

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Harry G. Webster

UNITED STATES PATENT OFFICE.

HARRY G. WEBSTER, OF CHICAGO, ILLINOIS, ASSIGNOR TO MILO G. KELLOGG, OF CHICAGO, ILLINOIS.

COMBINED TELEPHONE AND ALARM SYSTEM.

No. 825,624.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed July 11, 1904. Serial No. 216,082.

To all whom it may concern:

Be it known that I, HARRY G. WEBSTER, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented a certain new and useful Improvement in a Combined Telephone and Alarm System, of which the following is a full, clear, and concise description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to systems in which telephone-circuits extending from a telephone-exchange to subscribers' stations are utilized for the transmission of special fire, burglar, or other alarm signals in addition to their ordinary telephonic use.

The object of my invention is to provide an improvement upon a system proposed heretofore in which the circuits are at all times available for the transmission of alarm-signals without regard to their telephonic use, in which any derangement of a circuit which would interfere with such signal is automatically indicated at the alarm-receiving station, in which there is no interference with telephonic conversation or signaling except upon the sending of an alarm-signal, and which is so arranged that it may be quickly and systematically embodied in any circuit of a telephone-exchange system without disturbing the permanent wiring of the exchange. In such a system it is necessary that there shall be no interference with the relay or other device normally under control of the subscriber and by means of which he signals the telephone operator in initiating a call, except when an alarm-signal is sent, in which case such interference may be disregarded. In said system this condition is provided for by the use of a relay or electromagnet separate and distinct from the telephone-relay associated with the line-circuit and controlling the alarm-receiving mechanism.

In accordance with my present invention the use of this extra relay or electromagnet is dispensed with, and the mechanism which controls the telephone calling-signal also serves to control the alarm-receiving apparatus, each in its proper manner.

In a preferred embodiment of my present invention in a central-battery telephone-exchange system the mechanism referred to consists of a special relay at the exchange

connected at all times with the line-circuit and central source of current. This relay is provided with two sets of contacts and is so arranged that a relatively weak current through its winding will actuate one set of contacts, while the passage of a relatively strong current will actuate both sets. Relays of this character are well known, as those having two armatures with spring-tension adjustment for each or having two armatures, one being of greater magnetic permeability than the other, or having a single armature arranged to assume two operative positions determined by the strength of the relay-magnet as distinguished from its normal position. The circuit of this relay is preferably normally closed through a high resistance and impedance in bridge of the line and includes the contacts of a make-and-break device controlled by the alarm-sending mechanism. This alarm-sending mechanism may be of the character of the ordinary district messenger-box released manually or automatically to break and make the normally closed circuit of the relay in a predetermined manner.

The alarm-receiving apparatus may consist of the ordinary telegraph-register or other responsive device in a local circuit controlled by those contacts of the relay which are actuated by either strength of current. The other set of relay-contacts controls the circuit of the calling-signal of the telephone-switchboard and is actuated only when the circuit of the relay is closed through a relatively low resistance, as by the removal of the subscriber's telephone from its hook-switch. It is evident that in the organization as thus outlined the operation of the alarm-receiving apparatus is determined by the interruption of current in the line-circuit by the alarm-sending device, whether this current be the relatively weak one which is normally present in the line or the relatively strong current which is present during the use of the telephone. It is also evident that the presence or absence of the weak current will have no influence upon the operation of the telephone calling-signal. It will also be seen that for commercial reasons only certain lines of a telephone system would ordinarily be arranged for transmitting alarm-signals and that such lines would be scattered throughout the exchange rather than

confined to any particular group. In order to avoid changing any of the permanent wiring of the exchange and to facilitate connection or changes for such special service, I therefore provide means by which the special relays and alarm-receiving apparatus may be assembled at any desired place and connected with any exchange line or lines by flexible jumper-wires.

I have illustrated my invention in the accompanying drawings, in which the alarm-sending apparatus M, the alarm-receiving apparatus R, and the special relay F are indicated in a conventional manner only, as I am not limited to any particular construction for these well-known instrumentalities.

Figure 1 shows two complete line-circuits with regular cord connecting apparatus as embodying my invention in that type of telephone systems in which the line or calling signal is controlled by a relay permanently connected with the line and in which the signal is effaced by being brought into shunt of the supervisory cord-signal upon the insertion of a connecting-plug. Fig. 2 indicates the mechanical structure of one form of the special relay F. Figs. 3 and 4 illustrate my invention in connection with that exchange system in which the local circuit of the calling-signal is interrupted by a relay operated over a third or local wire, Fig. 5 indicating the cord-circuit adapted for such a system. Figs. 6 and 7 illustrate arrangements of wires and terminals to provide for systematically associating any set of special alarm apparatus with any line of an exchange system.

Like characters refer to like parts in the several figures.

In Fig. 1 the subscribers' stations A and B are provided with the usual apparatus, adapted, preferably, for use with a central source of current-supply and comprising a receiver *r* and transmitter *t* in a circuit which stands normally open at the hook-switch *h*, the bell *b* and condenser *c* being in permanent bridge of the line. The limbs 1 and 2 of the line extend to the central office and are there connected to the jacks 3 4 and by means of the windings of the special relay F to the central battery C. The alarm-sending apparatus (indicated at M) may consist of any suitable mechanism adapted to control separable contacts included in either one or both of the line-limbs and may be released manually, mechanically, or, as indicated, by an electromagnet *m* in a local circuit with the thermostats or circuit-breakers *f*. The alarm-receiving apparatus consists of an ordinary telegraph-register or other responsive device in a circuit controlled by contacts 5 6 of relay F. The circuit of subscriber A is indicated as in its normal condition, the circuit of battery C and relay F being closed through the high resistance and impedance I. The relatively weak current existing in the circuit at this

time energizes the magnet of relay F sufficiently to attract its armature contact-piece 5, and thus maintain the circuit of the receiving device R; but on account of its stiffer adjustment the armature contact-piece 8 will not be attracted. It is evident that when the subscriber removes his telephone from its hook-switch a relatively strong current will then flow through the relay-windings, causing the actuation of contact 8 and the display of the signal 10; also, that the circuit of contacts 5 6 will still be maintained. The cord connecting apparatus being of the usual type, the insertion of answering-plug P will bring the low-resistance supervisory signal 11 into parallel circuit with line-signal 10 and in series with the relatively high resistance 15. This causes the effacement of the said line-signal by the practical short circuit established around it, and the high resistance 15 prevents the illumination of the supervisory signal 11. In completing a connection the operator tests and rings in the usual manner with the calling-plug O, and the supervisory signal 12 is displayed until the removal of the called subscriber's receiver. The relatively strong current which then results causes the contact-piece 8 to be attracted and the circuit through the low-resistance coil 16 to be broken, effacing the signal 12, and the conversational circuit is completed by means of the cord-strands 13 14 and condensers *d d*. The supervisory signal 11 or 12 will remain effaced until the subscriber replaces his receiver. The normal weak current then being of insufficient strength to cause the continued attraction of armature-contact 8, it will return to the normal position shown, causing the display of the supervisory signal in the well-known manner. It is thus seen that the weak current which is normally present in the circuit does not interfere with or control the display of the telephone-signals, but that they are alone controlled in response to the movement of the hook-switch by the strong current, which also serves to supply the subscriber's transmitter. The contacts 5 6 in the circuit of the alarm-receiving apparatus R are maintained closed by either strength of current, however, and are only separated after a complete interruption of current in the line, as determined by the operation of the alarm-sending apparatus. This apparatus is indicated at B as in operation. When the circuit of battery 18 is interrupted, as at *f* of line B, the magnet *m* is deenergized, the retraction of its armature releases the make-and-break device 17, and the line-circuit is opened and closed in a manner to produce a code-number or other desired indication at the alarm-receiving device R, controlled by the movements of armature-contact 5. This action on account of the inclusion of contacts 19 at a point intermediate of the relay F and impedance I is in-

dependent of the position of the subscriber's hook-switch. It is also evident that the relay F may be so constructed that its contacts 5 6 will not be actuated by the rapid alternations of the calling-generator G, as the condenser *j* in the generator-circuit prevents the current of battery C from taking that path to ground, and consequently an alarm-signal may be properly received even during the time when an operator is calling the subscriber. The contact 20 and its connected wire indicate that the receiving device R may be in a normally open circuit, if desired. It will be understood that the resistances 15 16 while shown separately may be wound upon the relay-core, if desired, by so arranging them as not to interfere with the magnetic action of the relay.

Fig. 2 shows an arrangement of the relay F, its armature *a*, rocking upon the knife-edge *e*, being shown completely retracted, as during the interruption of all current in the line by the separation of contacts 19. In this figure the contact-springs are numbered to correspond with the contact-pieces indicated in Fig. 1. When the normal weak current exists, the armature is attracted sufficiently to bring the forward end of spring 5 into contact with spring 6; but on account of the stiffness or tension of springs 6 and 8, which are united by the piece of insulation *i*, no further movement can take place until the relatively strong current is set up by the closing of the contacts of hook-switch *h*. The armature then becomes completely attracted, breaking contacts 8 9 and closing contacts 7 8, while still maintaining spring 5 in contact with spring 6, as previously described. The spring 5 has only slight tension and the armature *a* depends principally upon gravity for its complete retraction. Being sufficiently massive to be comparatively sluggish in its action, it is not controlled by the rapidly-alternating current used in calling a subscriber. While two separate windings are indicated, they are only necessary to balance the telephone-line, the operation of the relay being the same with a single winding, as indicated in Fig. 4.

Fig. 3 illustrates my invention as embodied in a telephone-exchange of that type in which the calling-signal is effaced by means of a relay under control of the telephone operator. In this figure the alarm-sending mechanism is indicated conventionally at M, the subscribers' apparatus at A, the alarm-receiving apparatus at R, and the special relay at F. In its operation this system differs from the system of Fig. 1 only in that the signal 10 is effaced by its circuit being opened at the contact of relay 39 when the operator inserts a connecting-plug into a jack 3 or 4.

Fig. 4 illustrates a modification of the last figure in which the relay F has a single winding and is connected between limb 2 of the

line and the grounded side of battery C, the line-limb 1 being connected to the live side of the battery through an impedance-coil 15. In this modification an accidental ground upon either line-limb of sufficiently low resistance to interfere with the operation of the alarm or telephone signals will short-circuit the relay F, and the prolonged separation of its contacts 5 6 will cause an indication of this condition of accidental ground at the alarm-receiving apparatus.

Fig. 5 shows well-known cord connecting apparatus for use with the systems of Figs. 3 and 4. It differs from that of Fig. 1 in that the circuits of the supervisory signals 11 or 12 are completed through the relays 39 upon the insertion of a plug, the signal being short-circuited to prevent its display by the action of relay 21 or 22 when the latter is energized by current flowing through the subscriber's transmitter and hook-switch contacts. In the system of these Figs. 3, 4, and 5, as in that of Fig. 1, the alarm-receiving apparatus is controlled by the action of contacts 5 and 6 of relay F. They are maintained in their normal position by the normal weak current flowing through impedance I or by the strong current set up in the use of the telephone and are only separated when the relay is deprived of all current by the opening of a line-limb at contacts 19 through the action of the alarm-sending mechanism or accidentally through interference with the circuit.

Fig. 6 indicates the arrangement of wires and terminals by which the special relay F and alarm-receiving apparatus may be associated with any line of the telephone-exchange illustrated in Fig. 1. The line-limbs 1 and 2 on entering the exchange are connected by flexible jumpers 26 and 27 with the protective devices D on the main distributing-rack. The permanent connections of all lines are thence to relay rack-terminals 28 and 29, intermediate distributing rack-terminals at *w*, and multiple jacks 3 3. Wires from the answering-jack 4 and its associated signal 10 are permanently wired to the intermediate rack-terminals at *s* and associated with the desired line in the well-known manner with flexible jumpers, as indicated by the wavy lines. The relay by which the subscriber ordinarily controls his line and supervisory signals is indicated at *n*, and it will be understood that this relay is used for all lines which have not the special apparatus. It is also understood that a number of special relays and alarm-receiving devices are to be so arranged that they may be associated with any desired line and from time to time changed to other lines, as occasion demands. In this feature of my invention the wires from the relay F are permanently connected to special terminals at *k* on the intermediate distributing-rack in the manner indicated, the relay F being located

at any convenient point, while the alarm-receiving apparatus R is at the alarm-receiving station, which may be outside of the telephone-exchange, if desired. When it is desired to equip any line-circuit for alarm service, the regular relay *n* of that line is disconnected at points 28 29, and the special relay F is connected by means of flexible jumpers running between the terminals *k* and *w* at the rack H, as indicated by the diagonal lines.

Fig. 7 indicates a similar arrangement for the system of Figs. 3 and 5. In this case the regular connections of relay *n* have been removed, as indicated at terminals 28, as has also the regular jumper indicated by the wavy line between terminals 31 and 32. The special connections for properly associating the relay F with the line-circuit are the short wire 30 and the four jumper-wires running from the terminals at *k* to terminals at *w* and 31, as indicated. It will be thus understood by those skilled in the art that the various combinations required in practice between alarm apparatus and telephone apparatus may be made in a speedy and workmanlike manner. It is to be understood that the several grounds indicated are or may be the exchange-return and also that the several batteries may be one and the same.

It is evident that my invention is not confined to the use of relay F, which controls the signal by means of local circuits associated with the armature-contacts, but that other well-known equivalent arrangements may be employed.

While I have particularly described my invention with regard to certain details of construction and arrangement, it is evident that many modifications might be made therein by those skilled in the art without departing from its spirit, and I therefore do not wish to be limited to the precise structures illustrated and described.

What I claim as new and novel, and desire to secure by Letters Patent of the United States, is—

1. A combined telephone and alarm system comprising a circuit extending from a substation to an exchange, means at the substation for producing different electrical variations in said circuit, telephone and alarm signals, an electromagnet at the exchange for controlling said signals responsive to certain variations in said circuit to actuate said telephone-signal and responsive to other variations to actuate said alarm-signal, and means at the substation and exchange for holding conversation over said circuit.

2. A combined telephone and alarm system comprising a circuit extending from a substation to an exchange, means for supplying a relatively small current to said circuit, telephone signaling means for increasing said relatively small current, alarm-signal-transmitting means for decreasing said rela-

tively small current, telephone and alarm signals, a single unitary means at the exchange for actuating said telephone-signal in response to the increased current in said circuit and for actuating said alarm-signal in response to said decreased current in said circuit, and means at the substation and exchange for holding conversation over said circuit.

3. A combined telephone and alarm system comprising a circuit extending from a substation to an exchange, means for supplying a relatively small current to said circuit, telephone signaling means for increasing said relatively small current, alarm-signal-transmitting means for decreasing said relatively small current, telephone and alarm signals, an electromagnet at the exchange for controlling said signals responsive to the increased current in said circuit to actuate said telephone-signal and responsive to said decreased current to actuate said alarm-signal, and means at the substation and exchange for holding conversation over said circuit.

4. A combined telephone and alarm system comprising a circuit extending from a substation to an exchange, means for supplying a relatively small current to said circuit, telephone signaling means for increasing said relatively small current, alarm-signal-transmitting means for interrupting said circuit, telephone and alarm signals, an electromagnet at the exchange for controlling said signals responsive to the increased current in said circuit to actuate said telephone-signal and responsive to said circuit interruptions to actuate said alarm-signal, and means at the substation and exchange for holding conversation over said circuit.

5. The combination of a telephone line-circuit, a subscriber's telephone, a high resistance and impedance, a source of current normally closed through said line-circuit and high resistance and impedance, mechanism intermediate of said source and said resistance and impedance adapted to interrupt the circuit of said source, mechanism controlled in the use of the telephone to complete a low-resistance shunt around said resistance and impedance, and an electromagnetic device in the line-circuit responsive to interruptions in said circuit to actuate an alarm-signal, and responsive to an increase of current in said circuit to actuate a telephone-signal, substantially as described.

6. The combination of a subscriber's telephone, a telephone-exchange, a line-circuit connecting the telephone with the exchange, means for normally maintaining a weak current in the line-circuit, means for increasing this current during the use of the telephone, and an electromagnetic device connected with the line-circuit and responsive to an interruption in the line-circuit to control a spe-

cial signal, and responsive to the increased current to control a telephone-signal at the exchange, substantially as described.

7. The combination of a subscriber's telephone, a telephone-exchange, a line-circuit connecting the telephone with the exchange, a special signal associated with the line, and an electromagnetic device connected with the line-circuit, responsive to a relatively strong current to control a telephone-signal at the exchange, and responsive to a relatively weak current to control the special signal, substantially as described.

8. A combined telephone and alarm system comprising a circuit extending from a substation to an exchange, a source of current included in said circuit, a relatively high resistance included in said circuit to cut down the current therein to a relatively small value, telephone signaling means for decreasing the said relatively high resistance in said circuit, thereby increasing the current therein, alarm-signal-transmitting means for decreasing said current of relatively small value, telephone and alarm signals and a single unitary means at the exchange for actuating said telephone-signal in response to the increased current in said circuit and for actuating said alarm-signal in response to said decreased current in said circuit.

9. A combined telephone and alarm system comprising a circuit extending from a substation to an exchange, a source of current included in said circuit, a relatively high resistance included in said circuit to cut down the current therein to a relatively

small value, telephone signaling means for decreasing the said relatively high resistance in said circuit, thereby increasing the current therein, alarm-signal-transmitting means for decreasing said current of relatively small value, telephone and alarm signals and an electromagnet at the exchange for controlling said signals responsive to the increased current in said circuit to actuate said telephone-signal and responsive to said decreased current to actuate said alarm-signal.

10. A combined telephone and alarm system comprising a circuit extending from a substation to an exchange, a source of current included in said circuit, a relatively high resistance included in said circuit to cut down the current therein to a relatively small value, telephone signaling means for decreasing the said relatively high resistance in said circuit, thereby increasing the current therein, alarm-signal-transmitting means for interrupting said circuit, telephone and alarm signals, and an electromagnet at the exchange for controlling said signal responsive to the increased current in said circuit to actuate said telephone-signal and responsive to said interruptions to actuate said alarm-signal.

In witness whereof I hereunto subscribe my name this 30th day of June, A. D. 1904.

HARRY G. WEBSTER.

Witnesses:

JULIA M. BRISTOL,
F. W. DUNBAR.