

W. H. KIRNAN.

SIGNAL SYSTEM.

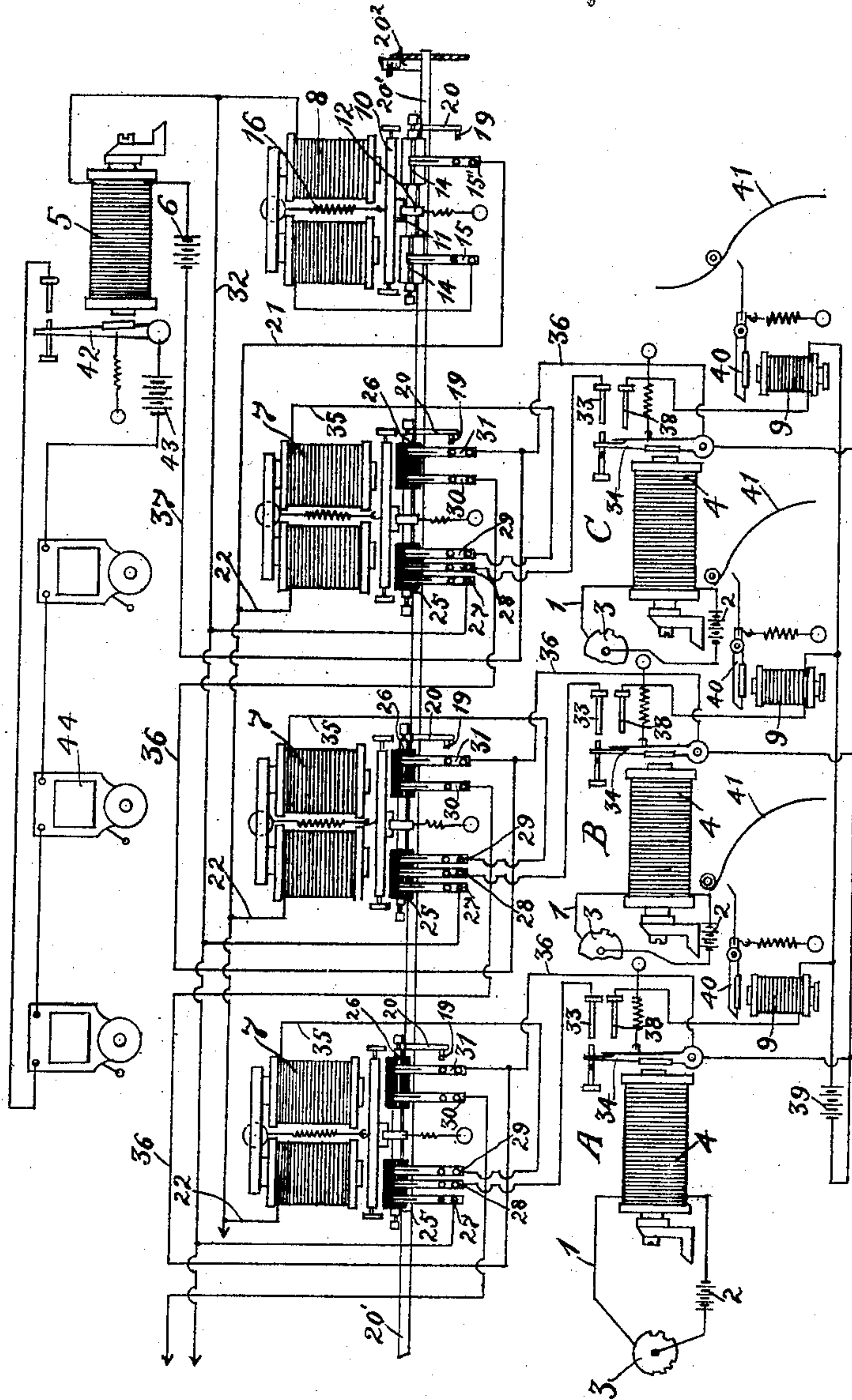
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924,670.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

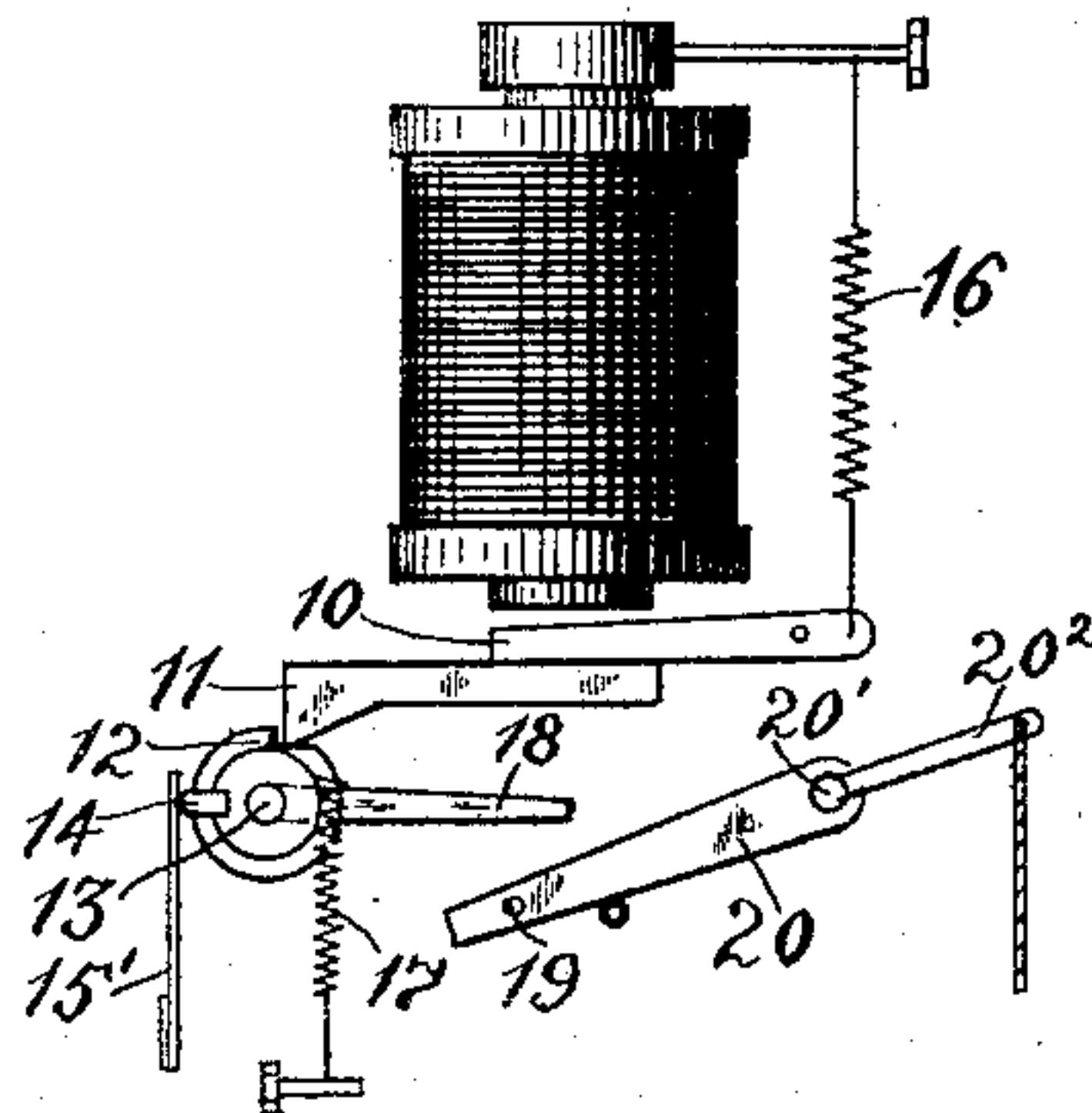


Fig. 3.

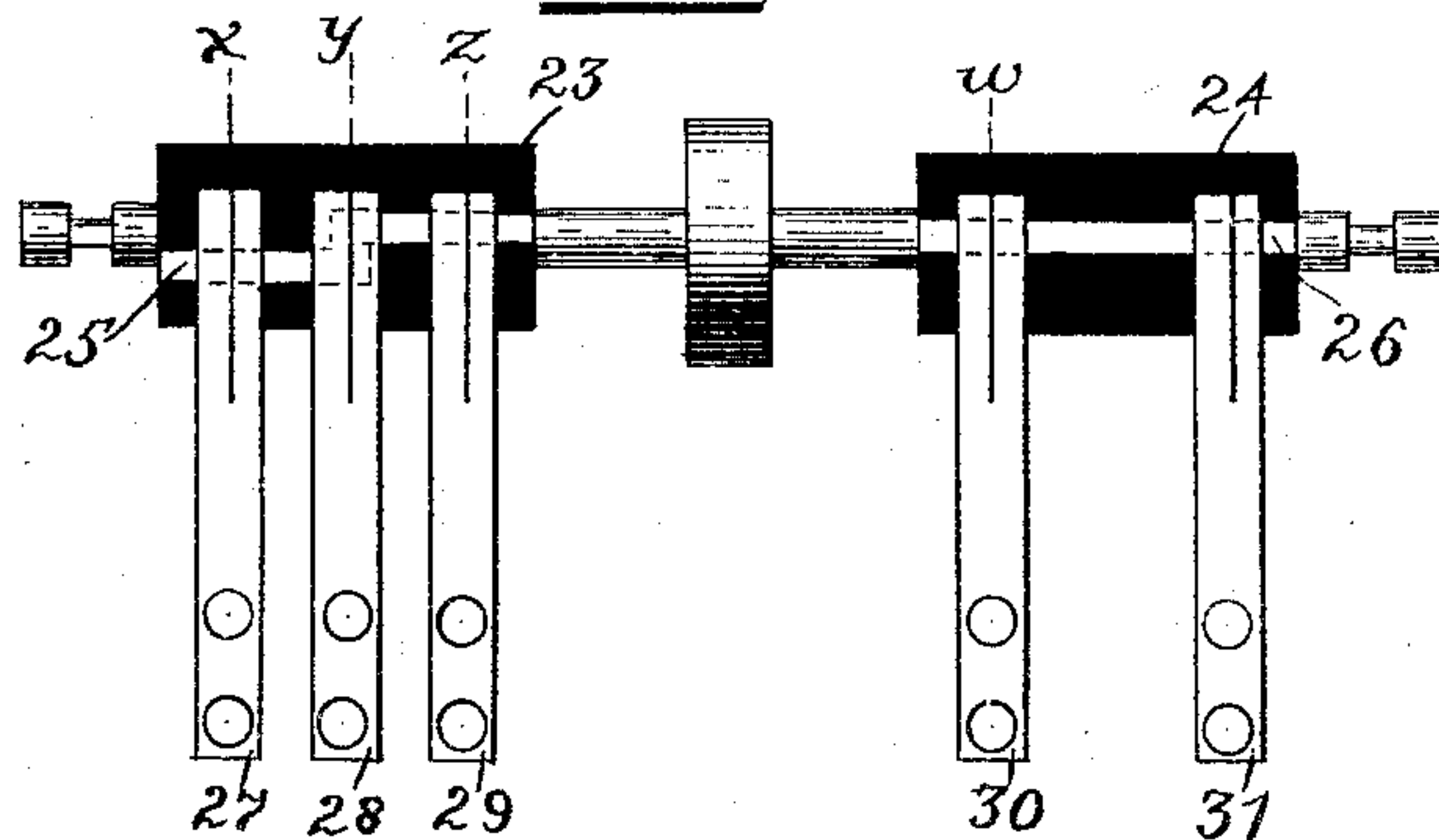
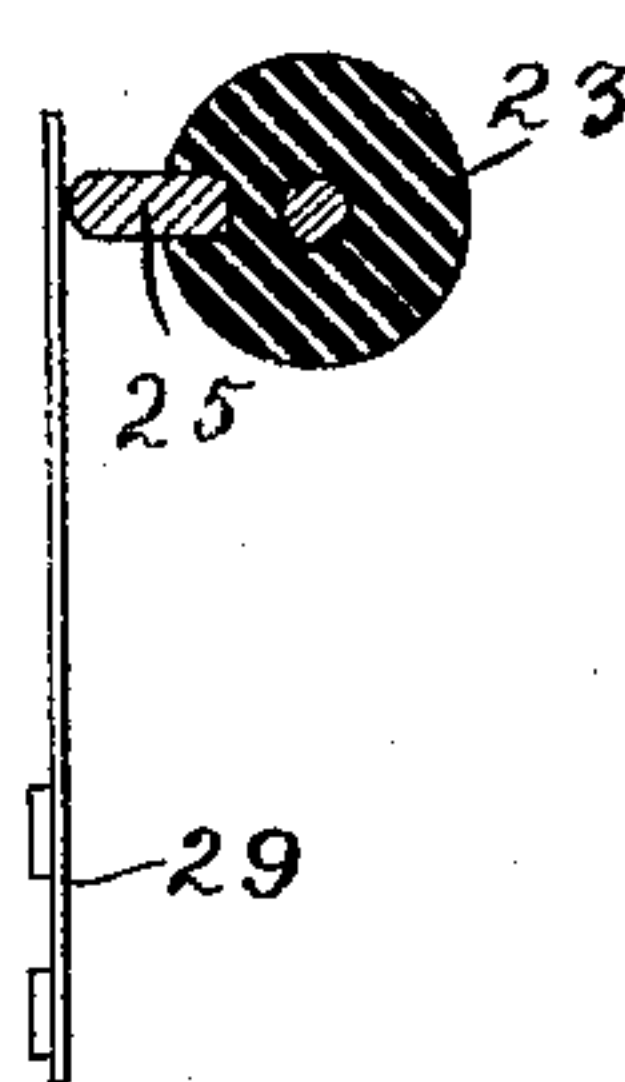
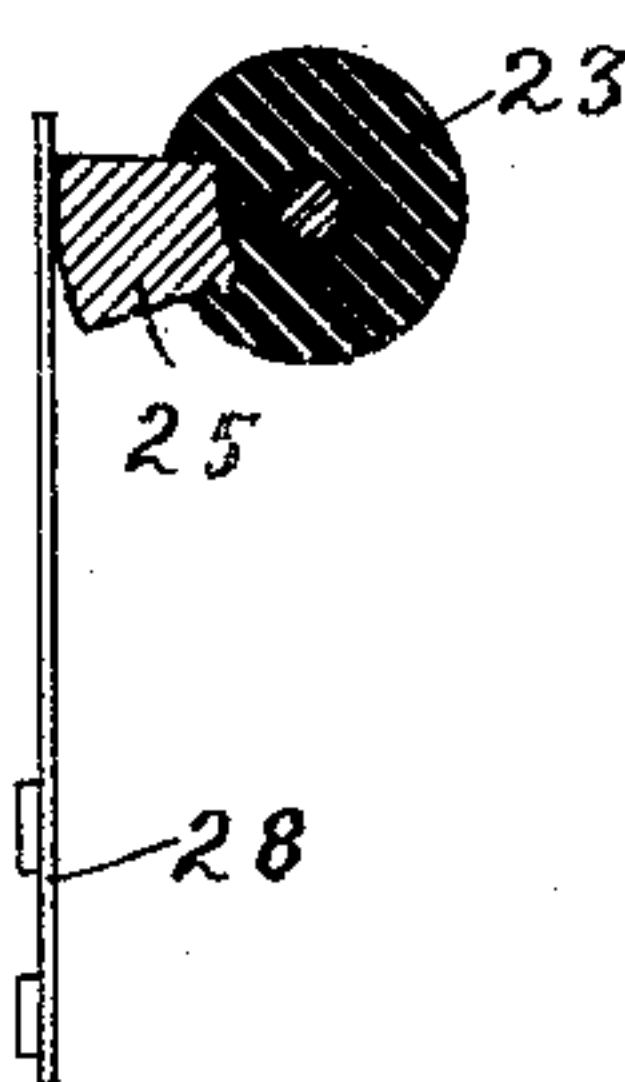
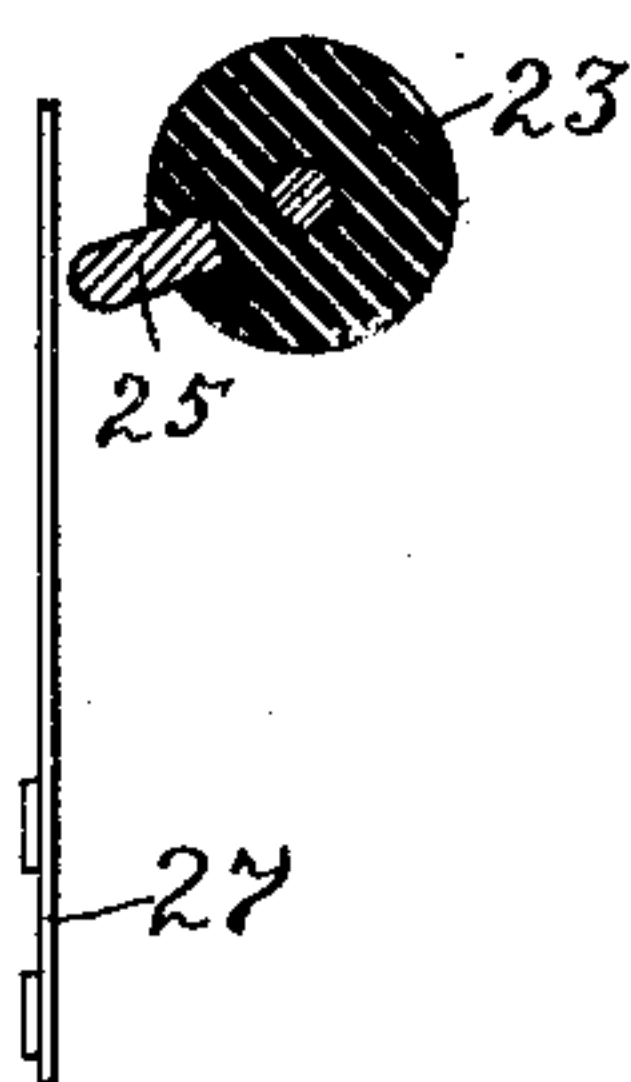


Fig. 4.

Fig. 5.

Fig. 6.



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SIGNAL SYSTEM.

No. 924,670.

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To all whom it may concern:

Be it known that I, WILLIAM H. KIRNAN, a citizen of the United States, residing at Bayonne, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Signal Systems, of which the following is a full, clear, and exact description.

My invention relates to an improved signal system, and has for its object to provide a system in which all mechanical devices for locking, unlocking or mechanically controlling transmitting devices are dispensed with, and in which the control is effected solely by changes in the electric continuity of the various circuits.

My invention further has for its object to provide a system by which the signals can be transmitted at a very high speed, so that the speed of transmission shall be dependent solely upon the speed of the street boxes.

A further object of my invention is to make a perfect non-interfering central office system, which will permit the use of an unlimited number of individual or box circuits leading to the central office, and in which but one signal will be re-transmitted from the central station without regard to whether one or all of the street box circuits are actuated and without regard to the number of street box circuits which may begin operating at exactly the same time.

A further object of my invention is to prevent absolutely the mutilation of one signal by another or the confusion of a signal which is being automatically transmitted from the central station, no matter how slow or how fast the street boxes may operate, or at what time they begin to operate.

A further object is to so simplify the system that positive and rapid operation is assured.

Another object of my invention is to provide a system in which the street circuit relays shall be free to act at all times and in which signals sent in through them will be recorded whether or no such signals are re-transmitted from the central station, and in which one and only one of such street circuit relays will receive record and re-transmit whenever one or more of said street circuit relays is actuated.

The following is a description of my invention, reference being had to the accompanying drawings, in which—

Figure 1 shows a diagram of my system.

Fig. 2 shows a side elevation of the master controller and also of the local controller. Fig. 3 is a detail of the local controller showing certain commutating devices. Fig. 4 is a detail showing a section of the commutating cylinder on the line $x-x$, Fig. 3. Fig. 5 is a detail showing a section of the commutator cylinder on the line $y-y$, Fig. 3. Fig. 6 is a detail showing a section of the commutator cylinder on the line $z-z$, Fig. 3. Fig. 6 also shows the same construction that would appear in a section on the line $w-w$, Fig. 3.

Referring more particularly to the drawings, 1—1—1 represent local street circuits having batteries 2 and street alarm boxes 3 therein, corresponding to three sections A, B C.

4 are street circuit relays having magnets in series with their respective alarm boxes and batteries, and an armature and contacts or local points controlled thereby.

5 is a transmission relay in series with a battery or other source of current 6 and adapted to be actuated by any one of the street circuit relays 4, the local points of said relays being connected in multiple to the circuit through the relay 5 and source of current 6.

7—7—7 are local circuit-controllers, belonging respectively to the sections A, B, C, and each of which is actuated by its corresponding street circuit relay 4 and acts to break the electrical connection between the transmitting relay 5 and any street circuit relay which is more remote than the street circuit relay first actuated, as well as the more remote street circuit relay of two street circuit relays which are simultaneously actuated.

8 is a master controller which breaks the normal circuit through all of the local controllers whenever any of the street circuit relays 4 is actuated.

9 are local recorders which record signals sent in to the respective street circuit relays, independently of whether said signals are transmitted by said street circuit relays to the transmitting relay 5.

The master controller 8 consists of an electro-magnet having an armature carrying a pawl 11, which engages a notched disk 12 mounted on the commutator shaft 13. The commutator shaft 13 carries two electrically connected projections 14, which normally engage two springs 15 15'. The

armature 10 is normally retracted from its magnet by a spring 16. A spring 17 tends to move the commutator so as to disengage the projections 14 from the springs 15 and will disengage them whenever the armature 10 is raised so as to cause the pawl 11 to become disengaged from the notched disk 12. The commutator is provided with an arm 18 adapted to be engaged by the pin 19 on the lever 20, so that whenever the lever 20 is moved upward, the commutator will be restored to normal position so as to enable the detent 11 to reengage the notch 12. The springs 15 15' are in series with the electro-magnet of the master controller 8 and also with a conductor 21, to which the magnets of the local circuit controllers 7—7—7 are connected in multiple by conductors 22. These local circuit controllers are the same in construction as the master controller with the exception of their commutators and the brushes bearing thereon. The commutators of the local circuit controllers are shown in enlarged detail in Fig. 3, and consist of two insulating portions 23—24, one of which has an offset conducting member 25, while the other has a straight conducting projection 26.

27, 28 and 29 are three brushes adapted to engage with the offset projecting conductor 25 in such manner that when the commutator is in normal position, brushes 28 and 29 engage with the member 25, and when the commutator is in abnormal position, brushes 27 and 28 engage with the conductor 25. The proportions are such that when the conductor 25 is passing from normal to abnormal position, the brush 27 makes engagement with the member 25 before the brush 29 breaks its engagement therewith.

30 and 31 are two brushes which engage the member 26 when the commutator is in normal position and are electrically connected thereby. When the commutator is in abnormal position, the brushes 30 and 31 are disengaged from the conducting member 26 and therefore the electrical connection between them is dis-established.

The brushes 27 are connected in multiple to a conductor 32, and complete one leg of an alternative return circuit from the battery 6 when the circuit through the master controller 8 is broken at the brushes 15 15', and when the local circuit controllers 7 have moved to abnormal position. The brushes 28 are connected to local points or contacts 33 respectively of the street circuit relays, which contacts are engaged by the armatures 34 of the street circuit relays 4 when those relays are deenergized. The boxes 3 are closed circuit boxes, so that the relays 4 are normally energized. The brushes 29 are connected to the terminals 35 of the local circuit controllers 7 so as to

be in series with the windings of the magnets of those controllers and the multiple connections 22. The brushes 30 are connected by the conductors 36 and the commutator members 26 so as to be in series with one another and the brushes 31. The brush 31 nearest to the battery 6 is connected thereto by a conductor 37, so that when the parts are in normal position the transmitting relay 5, battery 6 and brushes 30 and 31 on all the local controlling apparatus are in series with one another and also with the windings of the master controller 8 and the commutator brushes 15 15', to one of which brushes 15 the magnets of all the local circuit controllers 7 are connected in multiple.

When the parts are in normal position, the initial circuit, starting with the armature 34, is as follows: armature 34, conductor 36, conductor 37, battery 6, transmitting relay 5, windings of master controller 8, brushes 15—15', conductor 21, and thence through the windings of the several local circuit controllers in multiple, the circuit through any one local circuit controller being as follows: conductor 22, windings of local controller 7, conductor 35, brush 29, commutator member 25, brush 28 and contact 33. When the magnet of any relay 4 is deenergized, so that the armature 34 makes engagement with the contact 33, the circuit just stated through the master controller and the corresponding local controller, is closed, and the transmission relay 5, the master controller 8 and corresponding local controller 7 all become energized. The master controller and the energized local controller thereupon draw up their armatures, causing their pawls to release their respective commutators, whereupon the commutator of the master controller is shifted by the spring 17 so as to interrupt the electrical connection between the brushes 15—15' and the commutator of the energized local circuit controller is shifted so as to interrupt the electrical connection between the brushes 30 and 31 and also so as to interrupt the electrical connection between the brushes 28 and 29 and establish an electrical connection between the brushes 27 and 28. When the commutators of the master controller and one of the local controllers have shifted so as to be in abnormal position as just stated, the circuit from the armature 34 is an alternative or substitute circuit, and is as follows: armature 34, conductor 36, conductor 37, battery 6, transmitting relay 5, conductor 32, brush 27, brush 28, contact 33. In this way it will be seen that both the windings of the master controller and the local circuit controller have been cut out of circuit and a direct circuit established between one of the local points of the street circuit relays 4 and the transmitting relay 5. Assuming the relay 4 of section B to be actuated at a time when

the system as a whole is in normal condition, the first action is to cause the transmitter relay 5 to become energized and also to cause the master controller and the local circuit controller of section B to become energized and shift their commutators, so as to change the circuits from the normal circuits above described to the abnormal condition above described. When the circuits are in abnormal condition above described, on account of the operation of the street relay 4 of section B, the signal being transmitted by that relay cannot be interrupted or interfered with by either of the other relays 4, since the circuit in which are included the armature 34 and contact 33 of the street relay 4 of section C is interrupted by reason of the break in the circuit at the brushes 15 15'. The street circuit relay 4 of section A cannot interfere, because the circuit, including its armature 34 and contact 33, is interrupted by reason of the break in the electric continuity between the brushes 30 and 31 of the local controller of section B. The action of the relay of section B can, therefore, not be interfered with by the action of any other relay. If two street boxes were pulled simultaneously, so that two street relays 4 became deenergized simultaneously, the result would be that the two local circuit controllers corresponding to the two actuated relays 4, would be energized and actuated as well as the master controller 8. The street circuit relay 4 which is nearest the battery 6 would, however, take control, the more remote street circuit relay being cut out of action by the breaking of the electrical continuity of the brushes 30 and 31 of the energized local circuit controller which is nearest to the source of current 6. If a signal is being sent in through a remote street circuit relay 4 and an alarm box on the circuit of a relay 4 which is nearer to the battery 6 should be pulled and actuated so that the armature 34 of the nearer street circuit relay 4 engages its contact 33 repeatedly, the more remote street circuit relay 4 would still maintain its control and not be interfered with by the nearer street circuit relay because the circuit in which the armature 34 and contact 33 of the nearer street circuit relay are included is broken at the brushes 15 and 15' of the master controller.

It is to be noted that the armatures 34 are always free to move and that they will be actuated by the corresponding street alarm circuits, which are in operation whether they act to control the transmitting relay 5 or not. In order to record any signals which may be sent in from any street circuit, without regard to whether they are transmitted to the relay magnet 5 or not, I provide a second contact 38 which is in series with the recording magnets 9. These recording magnets are connected in multiple to one terminal of

the battery 39, to whose other terminal the armatures 34 are connected in multiple. The recording magnets 9 are provided with the ordinary printing mechanism 40 for recording the signals upon the tape 41. The transmitting magnet 5 actuates an armature 42 so as to open and close a circuit through the battery 43 and alarm mechanism 44 in the ordinary manner.

The commutators of the master controller and the local circuit controllers are all independently mounted and each is provided with an arm 18, which is engaged for re-setting, by a pin 19 on a lever 20. These levers 20 are all rigidly connected to a shaft 20', which is actuated by depressing the arms 20' so as to re-set all the controllers simultaneously.

My system, on account of the elimination of all interlocking apparatus, and on account of the fact that relays without other mechanical devices are used in transmitting signals, can be operated to transmit signals accurately at a very rapid rate. Moreover, since the windings of the controller relating to any circuit which is in use are entirely cut out, all sources of resistance and induction between the street relay and the transmitting relay, except in so far as any conductor necessarily possesses such characteristics, is entirely eliminated. The circuits other than that in use are so interrupted that it is impossible for the signal being sent to be interfered with in any way.

The apparatus is simple and positive in its action, and there is little liability of its getting out of order. Its speed, simplicity and positive action necessarily result from the arrangement described and shown.

Various modifications can be made in my embodiment of the invention without departing from the spirit thereof, the form which I have shown and described being the form at present preferred by me.

What I claim is:

1. In a signal system, the combination of a plurality of street circuit relays, a circuit controlled thereby, a plurality of local circuit controllers actuated by the corresponding street circuit relays, respectively, each local circuit controller when actuated by its street circuit relay disconnecting the contacts of other street circuit relays from said circuit.

2. In a signal system, the combination of a plurality of street circuit relays, a circuit controlled thereby, a plurality of local circuit controllers actuated by the corresponding street circuit relays respectively, and a master controller actuated by each of said street circuit relays and controlling the circuits through the windings of said local circuit controller.

3. In a signal system, the combination of a plurality of street circuit relays, a circuit controlled thereby, a plurality of local cir-

cuit controllers actuated by the corresponding street circuit relays, each circuit controller when actuated by its street circuit relay disconnecting the contacts of other street circuit relays from said circuit and a master controller actuated by each of said street circuit relays and controlling the circuits through the windings of said local circuit controller.

4. In a signal system, the combination of a plurality of street circuit relays having local points connected in multiple, a circuit controlled thereby, a plurality of local circuit controllers having windings in multiple to said circuit and in series with said local points respectively, each of the local circuit controllers being actuated by a corresponding street circuit relay and acting when actuated to disconnect the contacts of other street circuit relays from said circuit.

5. In a signal system, the combination of a plurality of street circuit relays, a circuit controlled thereby, a plurality of local circuit controllers having windings in multiple to said circuit, each of the local circuit controllers being actuated by a corresponding street circuit relay and acting when actuated to disconnect the contacts of other street circuit relays from said circuits, and a master controller having windings to which the windings of the local circuit controllers are connected in multiple, said master controller having circuit breaking means in series with its winding and the circuit controlled by said street circuit relays.

6. In a signal system, the combination of a plurality of street circuit relays, a circuit controlled thereby, a plurality of local circuit controllers actuated by the corresponding street circuit relays, each local circuit controller when actuated by its street circuit relay disconnecting the contacts of other street circuit relays from said circuit and establishing an alternative circuit under the control of the local street relay which is actuated.

7. In a signal system, the combination of a plurality of street circuit relays, a circuit controlled thereby, a master controller having windings in said circuit, contacts controlled by said master controller, a plurality of local circuit controllers connected in multiple with each other and in series with said contacts, said local circuit controllers being each in series with the contacts of one of said street circuit relays and means for establishing an alternative circuit around one local circuit controller and the master controller whenever said local circuit controller is actuated by the street circuit relays.

8. In a signal system, the combination of a plurality of street circuit relays, a circuit controlled thereby, a master controller having windings in said circuit, contacts controlled by said master controller, a plurality

of local circuit controllers connected in multiple with each other and in series with said contacts, said local circuit controllers being each in series with the contacts of one of said street circuit relays and means for establishing an alternative circuit around one local circuit controller and the master controller whenever said local circuit controller is actuated by its street circuit relay and means for causing the local circuit controller so actuated to break the circuit through its windings.

9. In a signal system, the combination of a source of current, a transmitting relay in series therewith, a master controller also in series therewith, a plurality of local circuit controllers in multiple with each other and in series with said transmitting relay, means actuated by said master controller for breaking the circuit between said circuit controllers and said transmitting relay.

10. In a signal system, the combination of a source of current, a transmitting relay in series therewith, a master controller also in series therewith, a plurality of local circuit controllers in multiple with each other and in series with said transmitting relay, street circuit relays corresponding to said local circuit controllers, means actuated by said master controller for breaking the circuit between said circuit controllers and said transmitting relay and means actuated by said local circuit controllers for changing the circuit of any local circuit controller whose street circuit relay is actuated.

11. In a signal system, the combination of a source of current, a transmitting relay in series therewith, a master controller also in series therewith, a plurality of local circuit controllers in multiple with each other and in series with said transmitting relay, street circuit relays corresponding to said local circuit controllers, means actuated by said master controller for breaking the circuit between said circuit controllers and said transmitting relay and means actuated by said local circuit controllers, first actuated for changing the circuit of any local circuit controller whose street circuit relay is actuated, and means actuated by such actuated local circuit controller for interrupting the circuit through other local circuit controllers and said source of current.

12. In an alarm system, the combination of a transmission circuit, a plurality of local circuits connected in multiple thereto, a plurality of street circuit relays controlling said local circuits, a plurality of electromagnetic recording devices each corresponding to one of said street circuit relays and circuits, a plurality of circuits for said electromagnetic recording devices controlled respectively by said street circuit relays.

13. In an alarm signal system, the combination of a transmission relay, a battery in

series therewith, conductors leading therefrom forming a plurality of normally open circuits, street circuit relays having normally closed circuits each when deenergized adapted to close one of said local circuits, local circuit controllers in each of said local circuits and a master controller to which said local circuit controllers are connected in multiple, said master controller when energized breaking the circuit through said local controllers, and each of said local controllers when energized breaking the circuit through it and also other local circuit controllers and establishing an alternative circuit around its own windings.

14. In an alarm signal apparatus, the combination of a transmitting relay, a battery in series therewith, a master controller in series with said battery and said relay, circuit breaking devices controlled by said master controller, which when said master controller is actuated break the circuit therethrough, a plurality of local circuit controllers in multiple with each other and in series with said circuit breaking devices, each local circuit controller having circuit breaking devices in series with said battery.

15. In an alarm signal apparatus, the combination of a transmitting relay, a battery in series therewith, a master controller in series with said battery and said relay, circuit breaking devices controlled by said master controller, which when said master controller is actuated break the circuit therethrough, a plurality of local circuit controllers in multiple with each other and in series with said circuit breaking devices, each local circuit controller having circuit breaking devices in series with said battery and circuit breaking devices in series with its own windings.

16. In an alarm signal apparatus, the combination of a transmitting relay, a battery in series therewith, a master controller in series with said battery and said relay, circuit breaking devices controlled by said master controller, which when said master controller is actuated break the circuit therethrough, a plurality of local circuit controllers in multiple with each other and in series with said circuit breaking devices, each local circuit controller having circuit breaking devices in series with said battery and means for establishing an alternative circuit around its own windings to the transmitting relay.

17. In an alarm signal apparatus, the combination of a transmitting relay, a battery in series therewith, a master controller in series with said battery and said relay, circuit breaking devices controlled by said master controller, which when said master con-

troller is actuated break the circuit therethrough, a plurality of local circuit controllers in multiple with each other and in series with said circuit breaking devices, each local circuit controller having circuit breaking devices in series with said battery and means for establishing an alternative circuit around its own windings and also around a master controller.

18. In an alarm signal apparatus, the combination of a transmitting relay, a battery in series therewith, a master controller in series with said battery and said relay, circuit breaking devices controlled by said master controller, which when said master controller is actuated break the circuit therethrough, a plurality of local circuit controllers in multiple with each other and in series with said circuit breaking devices each local circuit controller having circuit breaking devices in series with said battery and means for establishing an alternative circuit around its own windings and also around a master controller, and means for breaking a circuit through its own windings.

19. In a signal system, the combination of a transmitting relay, a source of current and a master controller in series with one another, a plurality of street circuit relays, a plurality of branch circuits connecting pairs of contacts of said street circuit relays in multiple with one another and in series with said transmitting relay, source of current and master controller, producing a plurality of initial circuits, local circuit-controllers in said branch circuits, and means for establishing an alternative circuit around any one of said local circuit-controllers when such local circuit-controller is actuated.

20. In a signal system, the combination of a transmitting relay, a source of current and a master controller in series with one another, a plurality of street circuit relays, a plurality of branch circuits connecting pairs of contacts of said street circuit relays in multiple with one another and in series with said transmitting relay, source of current and master controller, producing a plurality of initial circuits, local circuit-controllers in said branch circuits, and means for establishing an alternative circuit around any one of said local circuit-controllers when such local circuit-controller is actuated, said means breaking the initial circuit but establishing the alternative circuit before the initial circuit is broken.

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Witnesses:

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