

(No Model.)

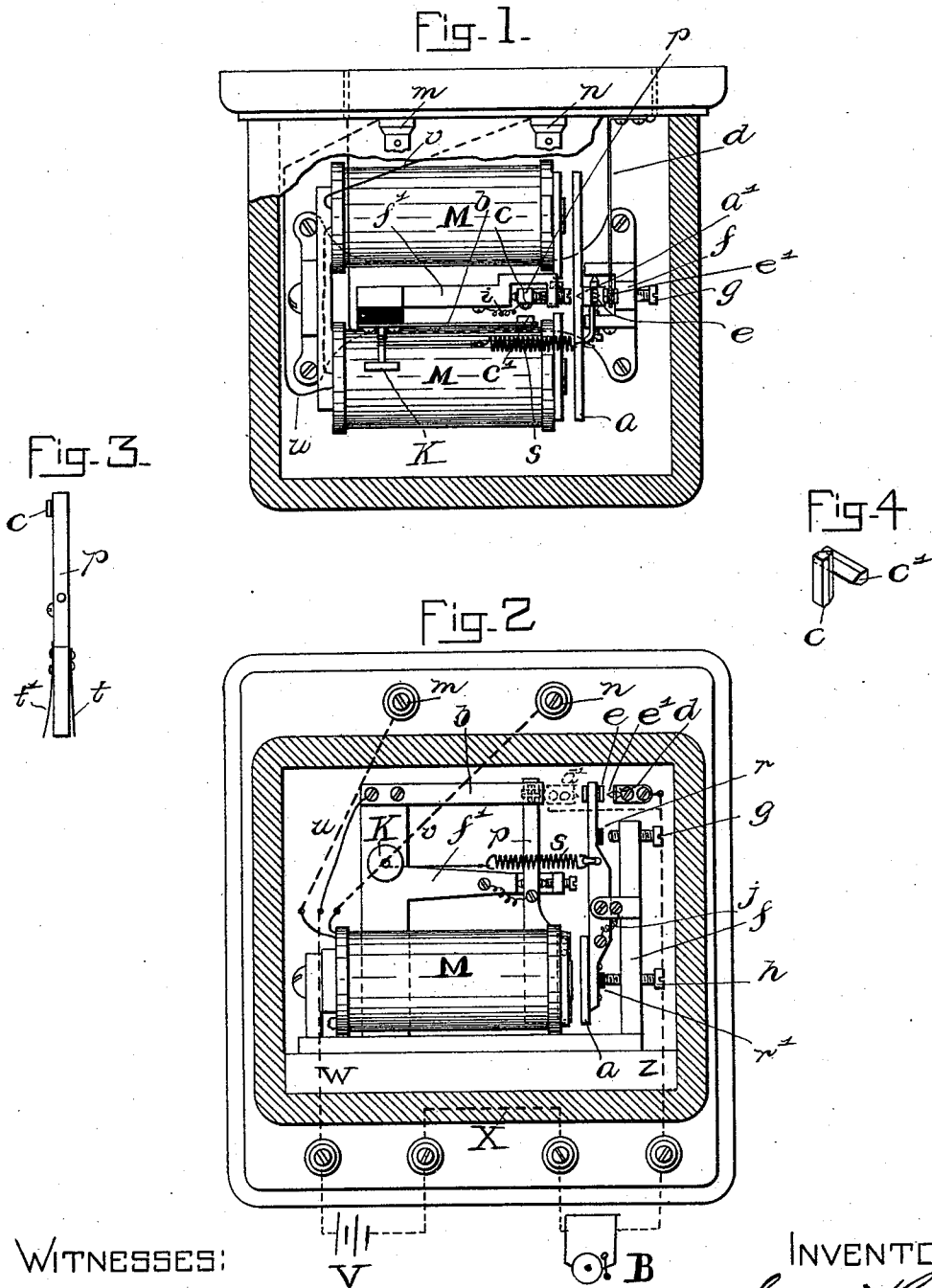
3 Sheets—Sheet 1.

J. H. CARY.

SIGNALING APPARATUS FOR TELEPHONE EXCHANGE SYSTEMS.

No. 529,894.

Patented Nov. 27, 1894.



WITNESSES:
A. S. Harrison.
J. P. Davis.

INVENTOR:
James H. Cary.

(No Model.)

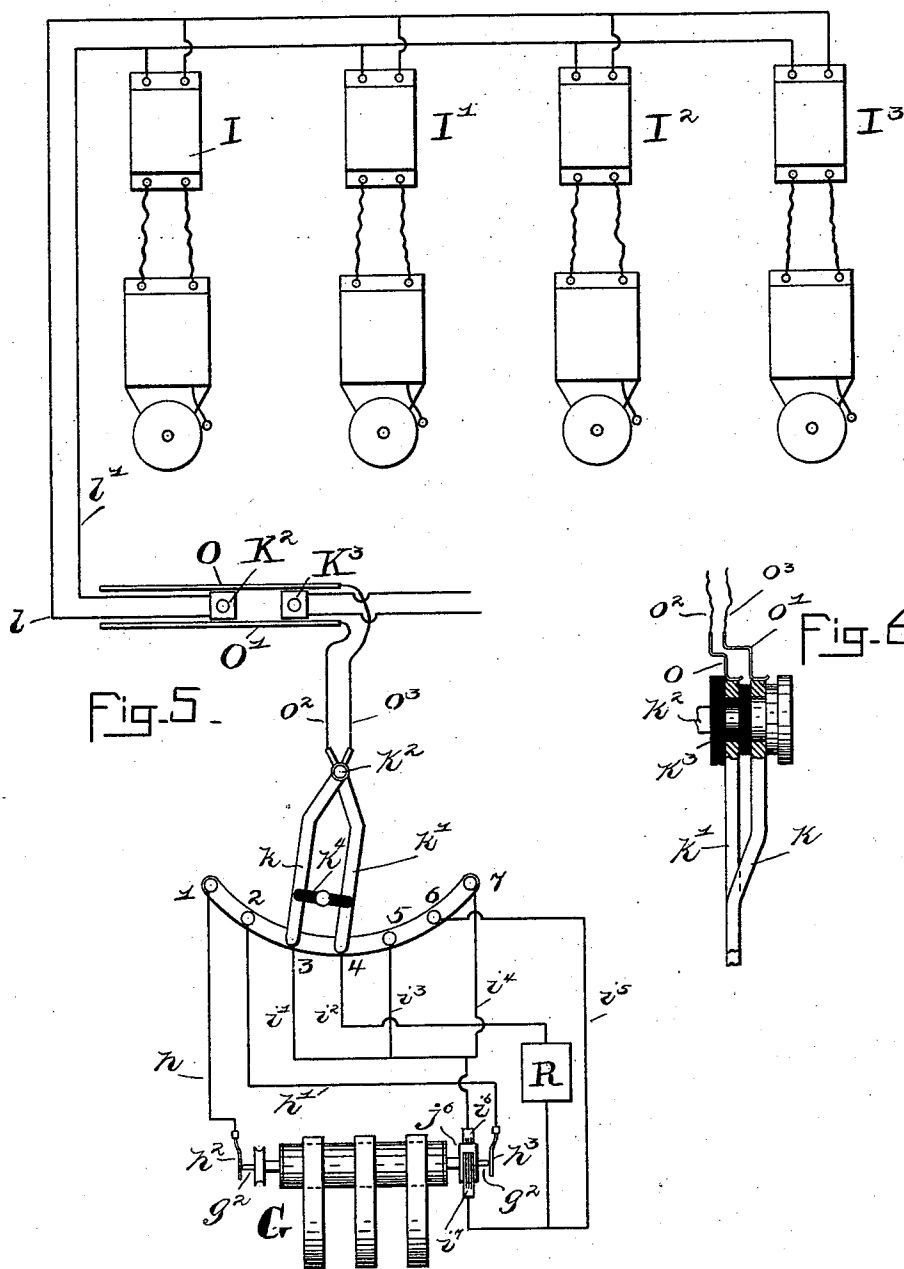
3 Sheets—Sheet 2.

J. H. CARY.

SIGNALING APPARATUS FOR TELEPHONE EXCHANGE SYSTEMS.

No. 529,894.

Patented Nov. 27, 1894.



WITNESSES:

A. D. Hanson.
J. P. Davis.

INVENTOR:

James H. Cary.

(No Model.)

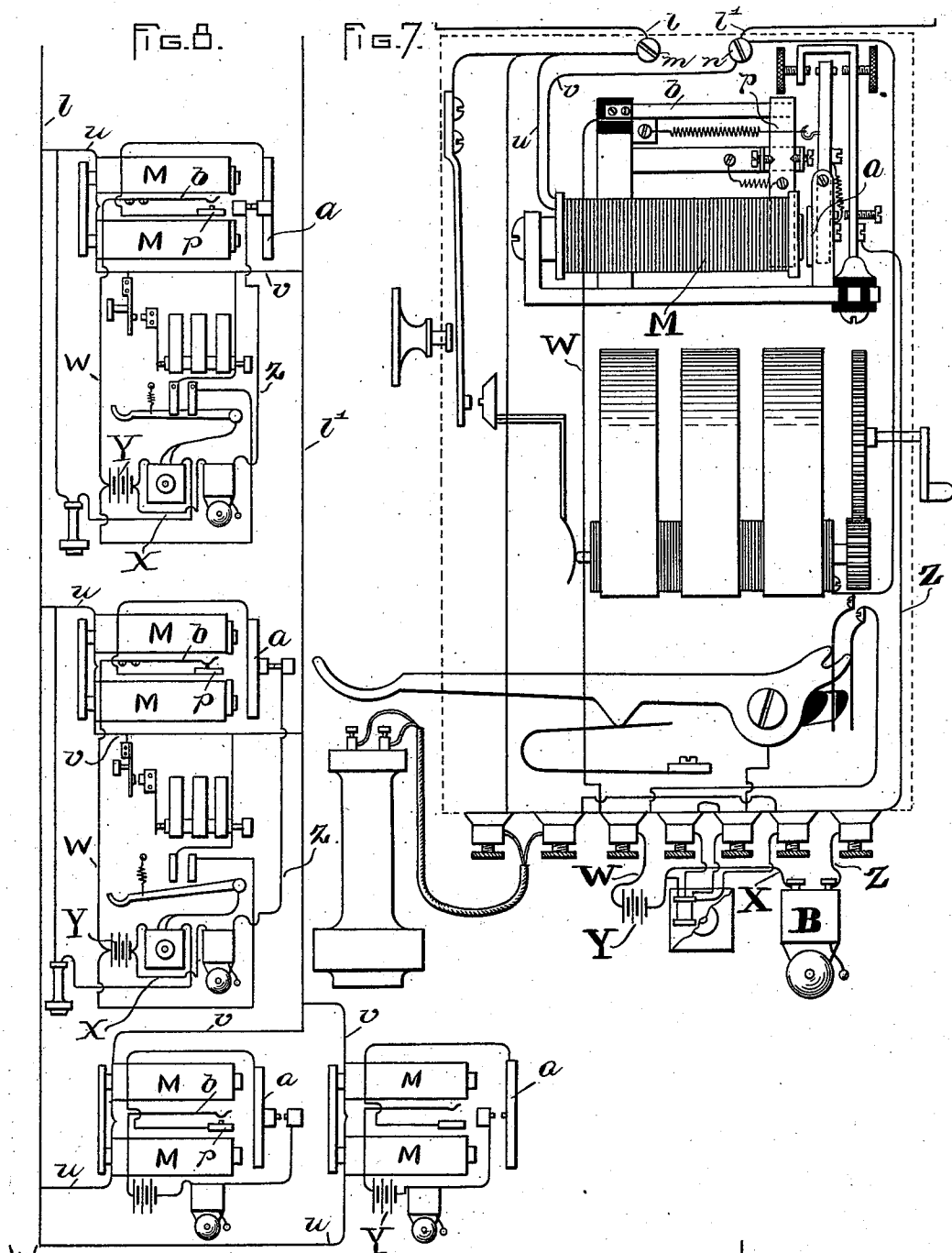
3 Sheets—Sheet 3.

J. H. CARY.

SIGNALING APPARATUS FOR TELEPHONE EXCHANGE SYSTEMS.

No. 529,894.

Patented Nov. 27, 1894.



WITNESSES:

Arthur H. Abell.
J. Davis.

INVENTOR:

James H. Cary

UNITED STATES PATENT OFFICE.

JAMES H. CARY, OF MALDEN, ASSIGNOR OF ONE-HALF TO LUTHER P. BRYANT, OF NORTHAMPTON, MASSACHUSETTS.

SIGNALING APPARATUS FOR TELEPHONE-EXCHANGE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 529,894, dated November 27, 1894.

Application filed March 17, 1894. Serial No. 504,047. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. CARY, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Signaling Apparatus for Telephone-Exchange Systems, of which the following is a specification.

This invention relates to signaling apparatus for use in telephone systems where a number of sub-stations are located on one line radiating from a central operating station.

My invention has for its object to provide a system of calling any particular sub-station without signaling any other sub-station on the line, by the employment of magneto or voltaic currents, varying in quality or in direction or polarity, whereby the different parts of the mechanism at the sub-stations are operated to effect the desired results. I employ at the central station magneto or dynamo machines or batteries, which may be operated with keys to send currents of given polarity and strength to the line, to cause the operation of the appropriate mechanism at the several sub-stations, to respond to the particular current for which each particular mechanism is adapted.

In my Letters Patent dated July 17, 1883, I describe and illustrate a form of the generator combined with keys for producing the desired result. I also in Letters Patent dated January 6, 1885, have described in detail with illustrations a type of apparatus to be used at the sub-stations, and it will be seen that in the apparatus shown in this patent I arrange signals at the sub-stations in series.

An improvement in the present system consists in arranging them in multiple, to secure the proper operation of which the electro-magnets in each instrument at the sub-stations will be wound at high resistance.

My invention also contemplates an improved switchboard adapted to control currents as used in connection with the ordinary switchboard of the telephone exchange, and also an arrangement of circuits whereby the signaling apparatus may be connected with the telephone apparatus in ordinary use at

the subscriber's station, so that the transmitter battery in use at such sub-stations may be utilized to operate the signal bell by being properly connected through the signaling apparatus at each sub-station.

Referring to the accompanying drawings which illustrate an embodiment of the invention,—Figure 1 represents a plan view of the relay or individualizing apparatus. Fig. 2 represents an upright or side view of the same, with a diagram of the local circuit. Fig. 3 represents a detail of the polarized magnet. Fig. 4 represents a detail of the knife-edged contact. Fig. 5 is a diagram of switch and connections to power generator and switchboard, thence to the several sub-stations on the line. Fig. 6 represents a sectional detail of the switch. Fig. 7 shows the arrangement of circuits from the local battery to the local circuit of the relay, and thence to the signal bell. Fig. 8 is a diagram showing circuits through a number of stations.

Referring first to Figs. 1 to 4, the letters *f* and *f'* designate vertical and horizontal bars of the supporting frame of the relay; *M*, electro-magnets supported by the frame and connected with the line by wires, *u* and *v*, and binding-posts, *m* and *n*, said magnets being wound at high resistance; *a*, an armature extending across the ends of the magnets, and supported by an arm, *a'*, pivoted to the vertical bar, *f*; *s*, a retroacting spring connected with said arm, *a'*; *K*, an adjusting screw to regulate the tension of said spring; *r* and *r'*, soft rubber pads on the arm, *a'*, and designed to impinge against the screws, *g* and *h*, and prevent a click in the operation of the apparatus; *d*, a spring projecting from the back of the casing and having a knife-edge contact *e'* for engagement with a similar contact, *e*, on the arm, *a'*; *p*, a polarized armature pivoted to the bar, *f'*, and depending between the magnets; *b*, a spring secured to the frame and extending out past the upper part of the polarized armature; *c* and *c'*, knife-edged contacts fastened to the spring and armature respectively; *t* and *t'*, non-magnetic springs fastened on opposite sides of the armature, *p*, and designed to prevent the lat-

ter remaining in contact with the pole-pieces of the electro-magnets after the actuating current has ceased to flow.

Fine wires, *i* and *j* are employed to secure perfect electrical connection between the armatures, *a*, and *p*, and the frame.

Wires, *W*, *Y*, and *Z*, complete the local circuit through the local battery *V*, and call-bell, *B*.

The method of operation is to send a current of given polarity and strength to line, which will enter through binding-posts, *m* and *n*, passing through electro-magnet *M*, which will influence the armatures, *a* and *p*, according to the character of the current employed. For instance, a current of relatively high potential will attract the armature, *a*, thus throwing the arm, *a'*, with contact point *e* into contact with *e'*, and if it is of, say, positive polarity, it will also attract the polarized armature so that the points *c* and *c'* also come in contact. This will complete a local circuit from the battery through the wire *W*, spring *b*, armature *p*, frame *f*, armature bar *a'*, spring *d*, wire *Z*, bell *B*, wire *X*, thence to battery.

Should it be desired to ring a bell with lower potential current, the connection of wire *Z* would be changed from its position on spring *d* to connect with spring in position, as *d'* (see broken lines in Fig. 2), which would thus allow the circuit to remain closed between spring *d'* and the contact arm *a'*, while the polarized armature would still be actuated by the current of proper polarity, thus again completing the circuit substantially as before.

In order to reverse the polarity at the substations, it will simply be necessary to reverse the line wires at the binding-posts, *m* and *n*, thus giving two more instruments of the same character as the first two, only to be operated by currents of opposite polarity.

Referring next to Fig. 5, which shows switchboard apparatus for bringing into action any one of a number of instruments, *I*, *I'*, *I''*, *I'''*, designate a number of instruments at substations, their relays being connected in multiple with a magneto-generator or dynamo, *G*, at the central station. 1, 2, 3, 4, 5, 6, and 7 designate contact buttons of a switchboard, two of which buttons, 1 and 2, are shown as connected by wires *h*, and *h'*, with contact springs, *h''* and *h'''*, bearing against the ends of the armature journals, *g''*. Other wires, *i'*, *i''*, *i'''*, *i''''*, connect the other buttons with brushes, *i''* and *i'''*, of the commutator, *j''*, resistance, *R*, being shown as interposed in one connection. A pair of bars, *k* and *k'*, are pivoted concentrically on a stud, *k''*, and insulated from each other by washers, *k'''*, and connected by an insulated bar, *k''''*, so that they shall move together and maintain their proper relative positions. These bars constitute a switch, and are designed to connect any two adjacent buttons of the switchboard. Contact springs, *o* and *o'*, engage the hubs of the switch bars, and wires, *o''* and *o'''* connect said

springs with ringing bars, *O* and *O'*. *K''* and *K'''* designate ringing keys for connecting said ringing bars with the line-wires, *l* and *l'*.

When the switch is placed in the proper position, the current passes through the wires, *o* and *o'*, and the ringing bars, *O* and *O'*, upon the depression of the keys, *K''* and *K'''*, to the line wires, *l* and *l'*, and thence to the substation instruments.

When the switch bars are on buttons 1 and 2, an alternating current is sent to line, which rings a magneto bell of the ordinary type in general use; when on 3 and 4, a continuous current is sent to line, whose strength would be reduced by the interposition of the resistance, *R*; when on 4 and 5, a current of the same strength but opposite polarity would be sent to line; when on 5 and 6, the full strength of the current is sent to line of, say, positive polarity; and when on 6 and 7, of the same strength and negative polarity. The wires *i'*, *i''*, *i'''*, and *i''''* may be connected with the poles of a battery instead of with commutator-brushes on the dynamo, and the same results accomplished.

In Fig. 7 a diagram of the connections between a local battery, relay and call-bell is shown, reference letters corresponding with those employed in the other figures being used. The usual connections with the transmitter and receiver are also shown.

In Fig. 8 a diagrammatic view is shown of a number of stations, reference letters being employed to correspond with those used in the other figures.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a telephone signaling system, the combination of a plurality of relays connected with the line and adapted to be rendered operative to close a local circuit by currents of different character, a dynamo, a switchboard two of whose contacts are connected with the journals of the dynamo-armature and the others with a generator, which may be the dynamo or a battery, whereby currents of different polarity and character can be obtained by connecting different contacts, and a switch-piece designed to electrically connect different pairs of said contacts whereby such currents may be sent to line as desired.

2. In a telephone signaling system, the combination of a plurality of instruments whose signal-operating circuits are adapted to be closed by currents of varying character and different polarity sent to line, a dynamo, a switchboard having a series of contacts, electrical connections between a pair of said contacts and the journals of the dynamo-armature, electrical connections between other pairs of said contacts and the commutator of the dynamo, resistance interposed in one or more of said connections, and a switch composed of two arms or bars insulated from each other and separately connected with the line,

said arms or bars adapted to connect different pairs of the switchboard contacts to obtain the current desired to send to line.

3. In a telephone signaling apparatus, the
5 combination of a transmitter battery, a local circuit connected therewith, a call - bell in said circuit, and a relay controlling the local circuit and connected with the line.

In testimony whereof I have signed my name to this specification, in the presence of 10 two subscribing witnesses, this 26th day of February, A. D. 1894.

JAMES H. CARY.

Witnesses:

A. D. HARRISON,
F. P. DAVIS,