No. 621,346. Patented Mar. 21, 1899.

C. S. KAROLY.

AUTOMATIC TELEPHONE SWITCH.

(Application filed Nov. 9, 1897.)

(No Model.) 4 Sheets—Sheet 1.

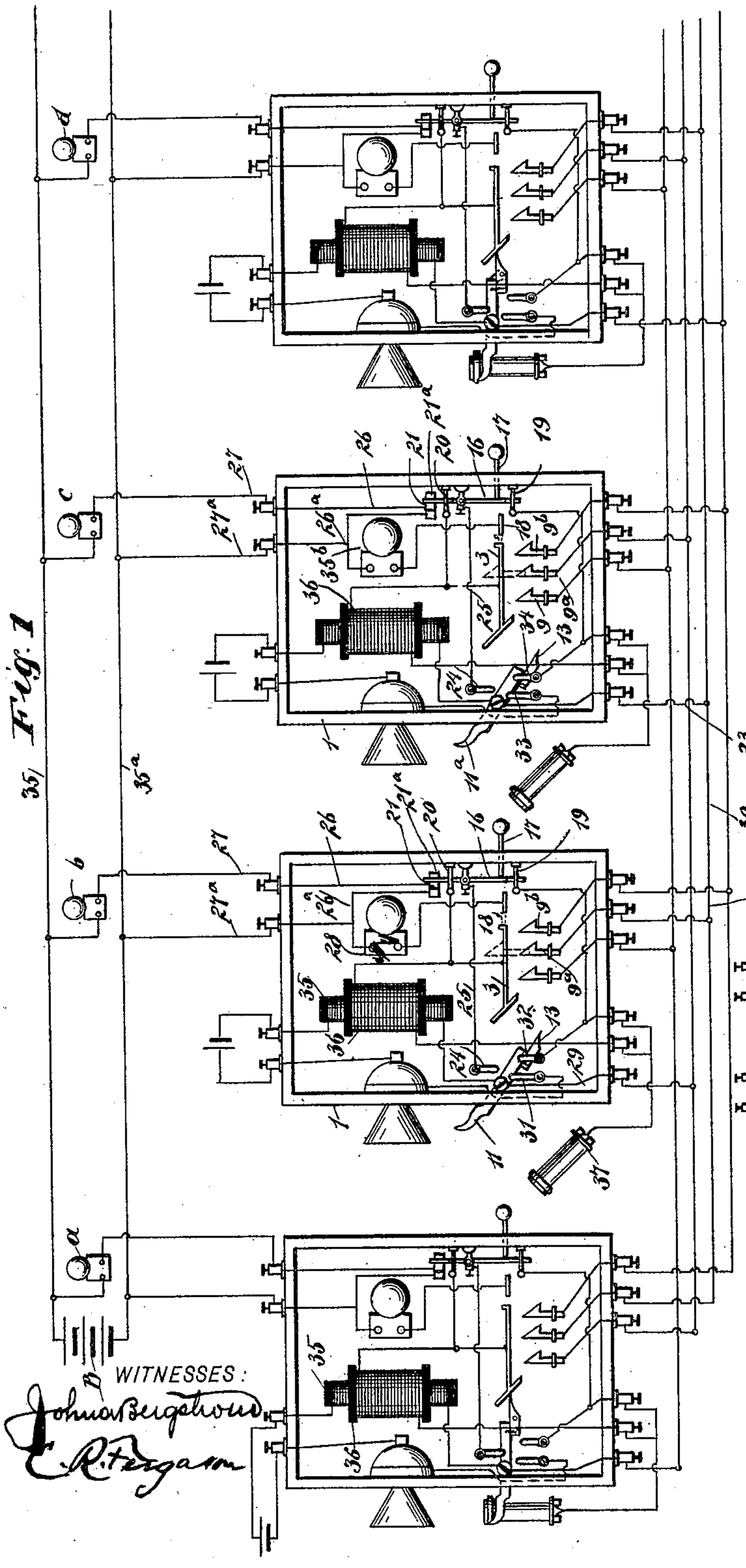


Fig. 1

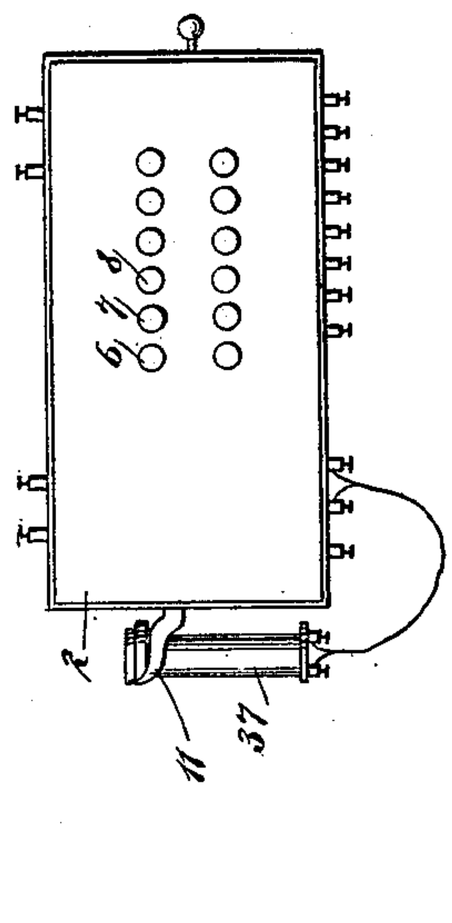


Fig. 3

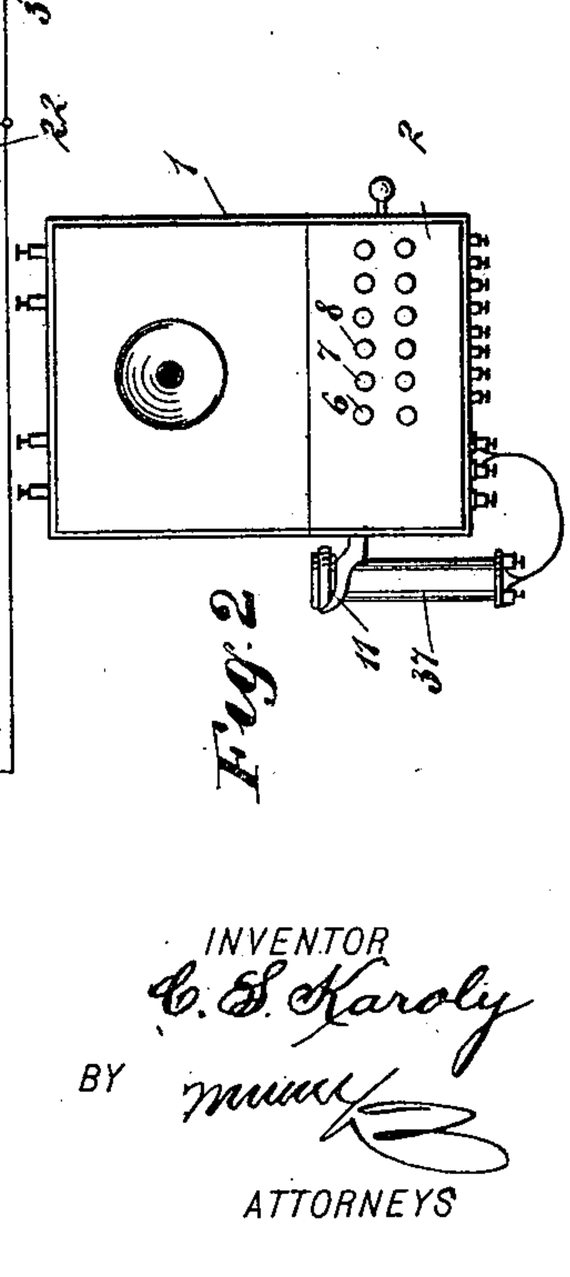


Fig. 2

WITNESSES:

John A. Bergstrom

E. R. Fergason

INVENTOR

C. S. Karoly

BY Munn & Co

ATTORNEYS

No. 621,346. Patented Mar. 21, 1899.

C. S. KAROLY.

AUTOMATIC TELEPHONE SWITCH.

(Application filed Nov. 9, 1897.)

(No Model.) 4 Sheets—Sheet 2.

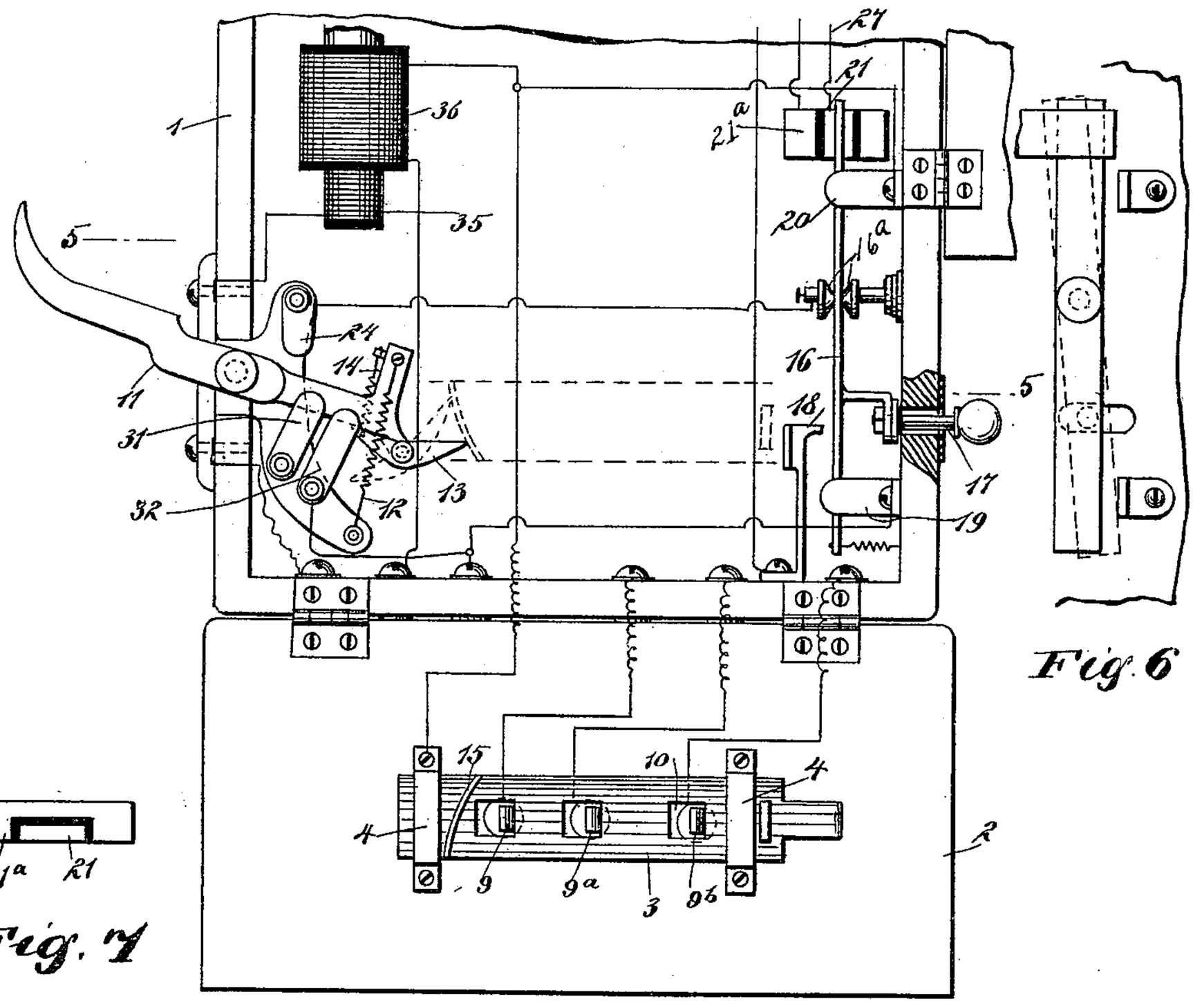


Fig. 6

Fig. 7

Fig. 4

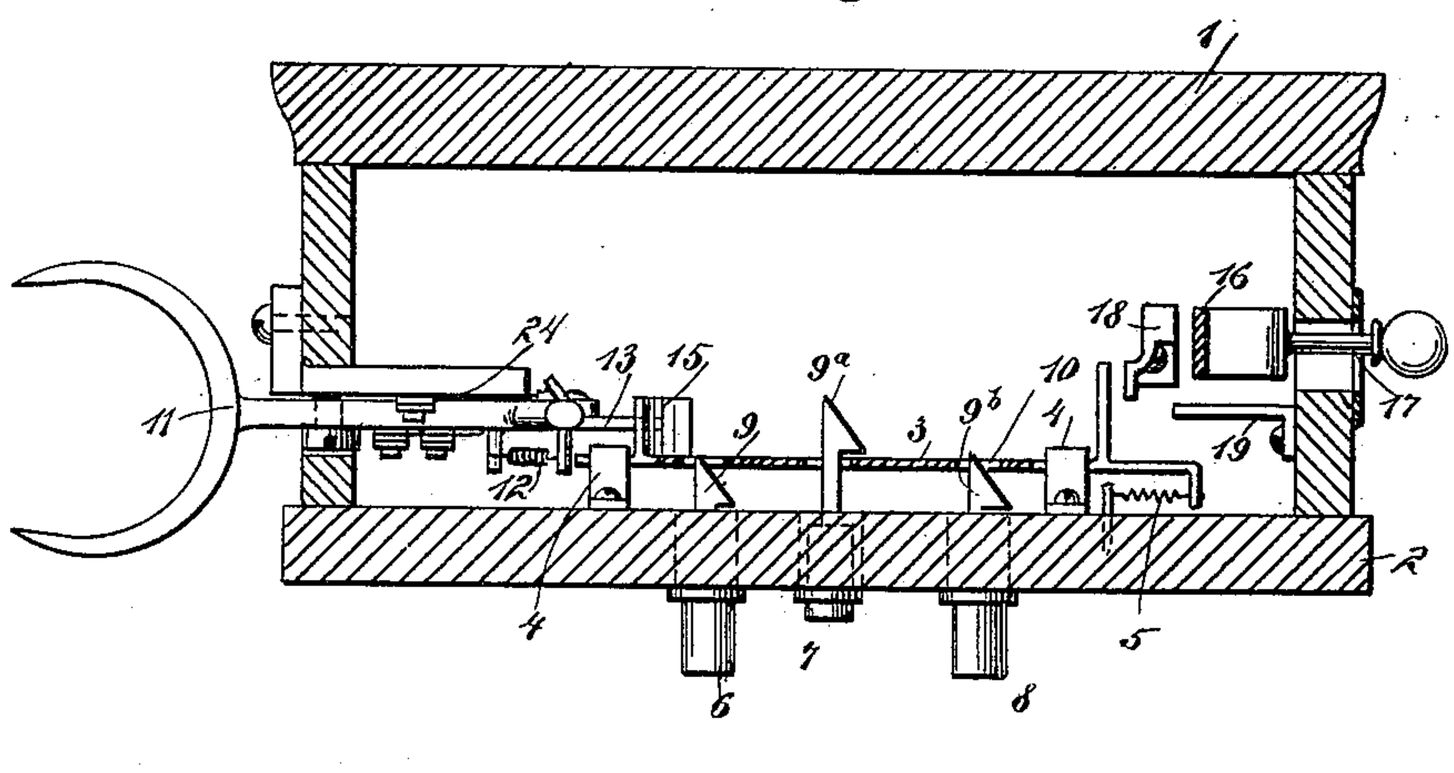


Fig. 5

WITNESSES:
John A. Bergstrom
C. R. Ferguson

INVENTOR
C. S. Karoly.
BY Munn & Co
ATTORNEYS.

No. 621,346. Patented Mar. 21, 1899.

C. S. KAROLY.

AUTOMATIC TELEPHONE SWITCH.

(Application filed Nov. 9, 1897.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 8

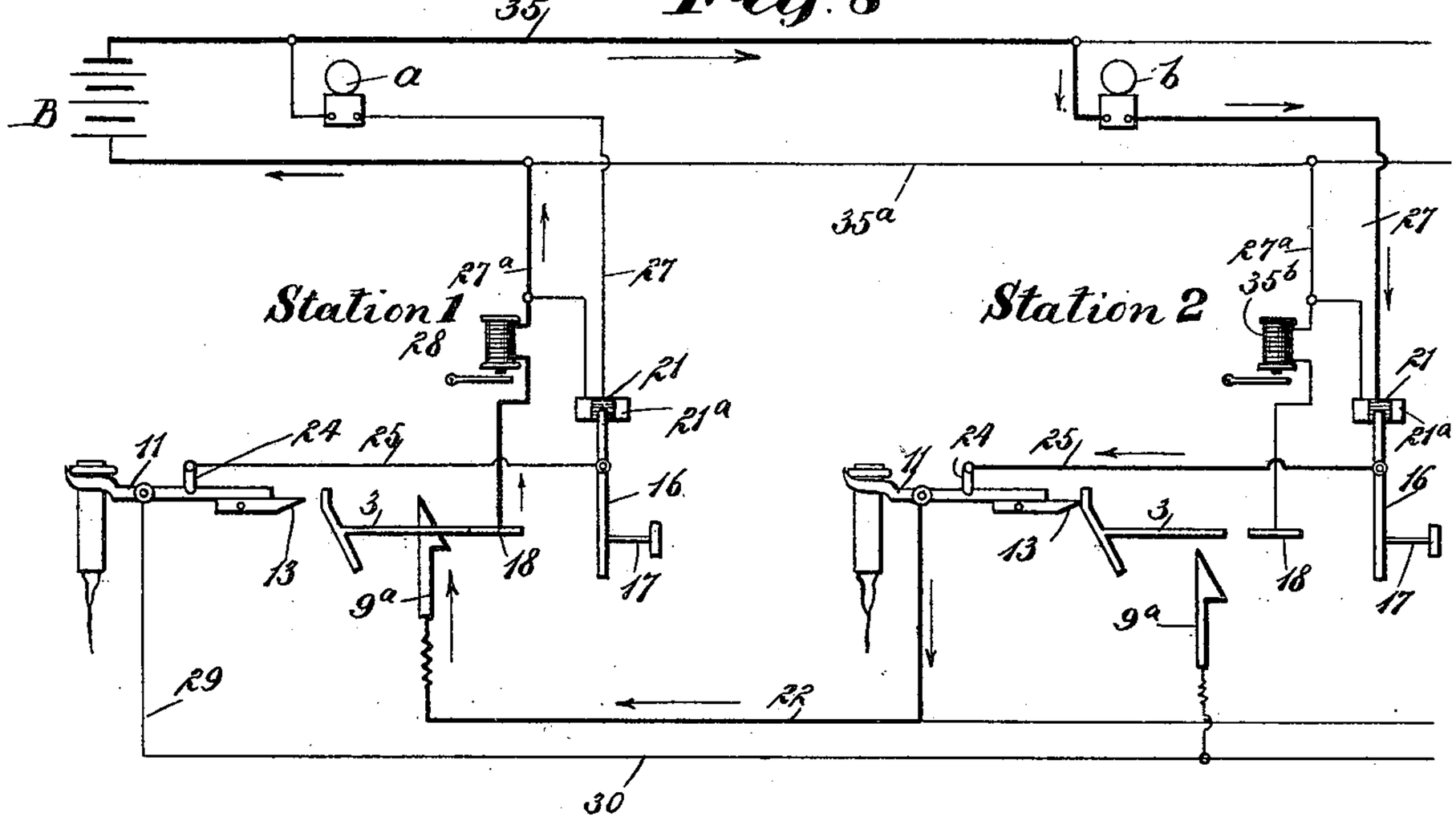
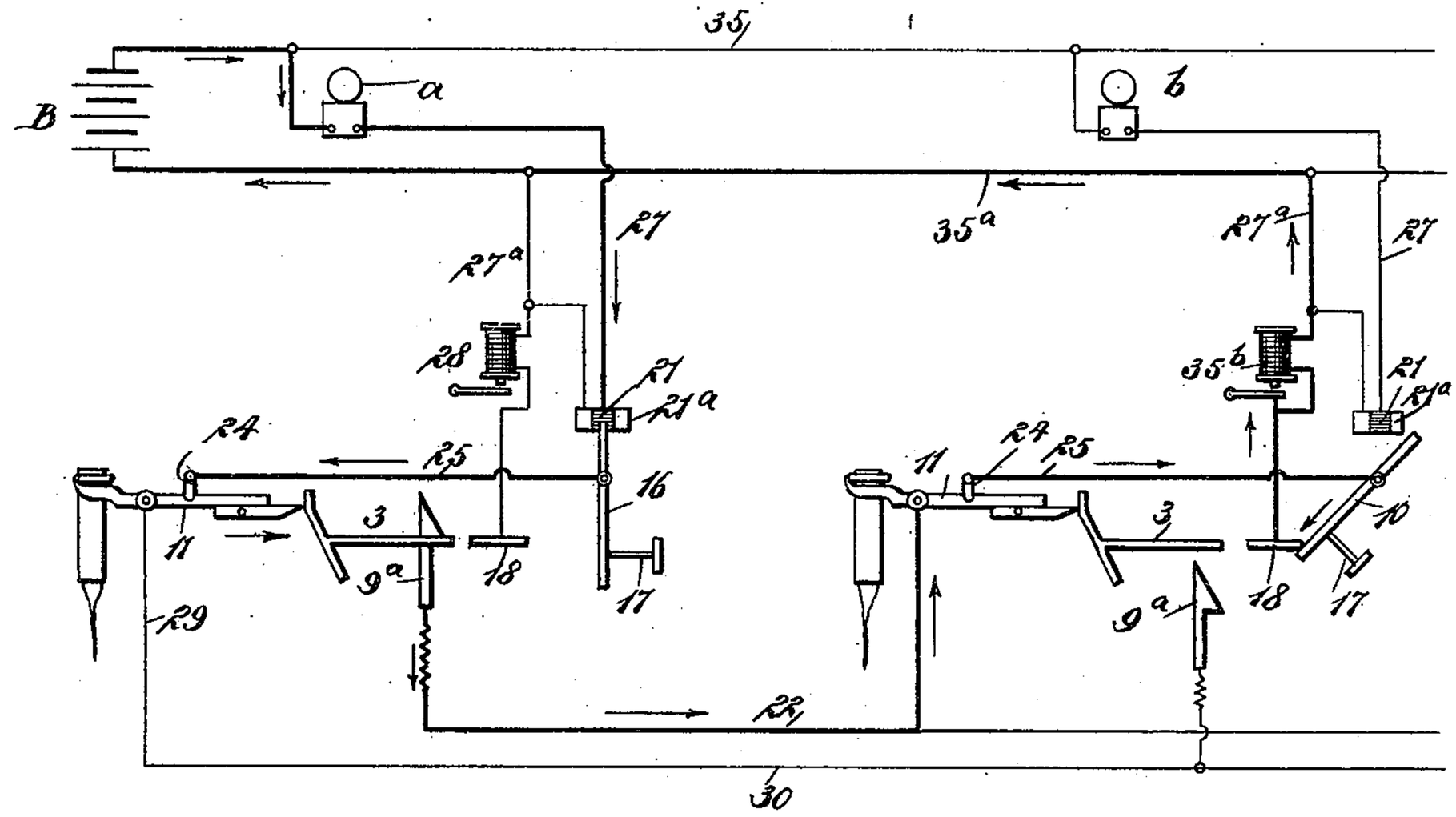


Fig. 9



WITNESSES:

John A. Brophy
C. R. Ferguson

INVENTOR
C. S. Karoly
BY Munn & Co
ATTORNEYS.

No. 621,346. Patented Mar. 21, 1899.

C. S. KAROLY.

AUTOMATIC TELEPHONE SWITCH.

(Application filed Nov. 9, 1897.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 10

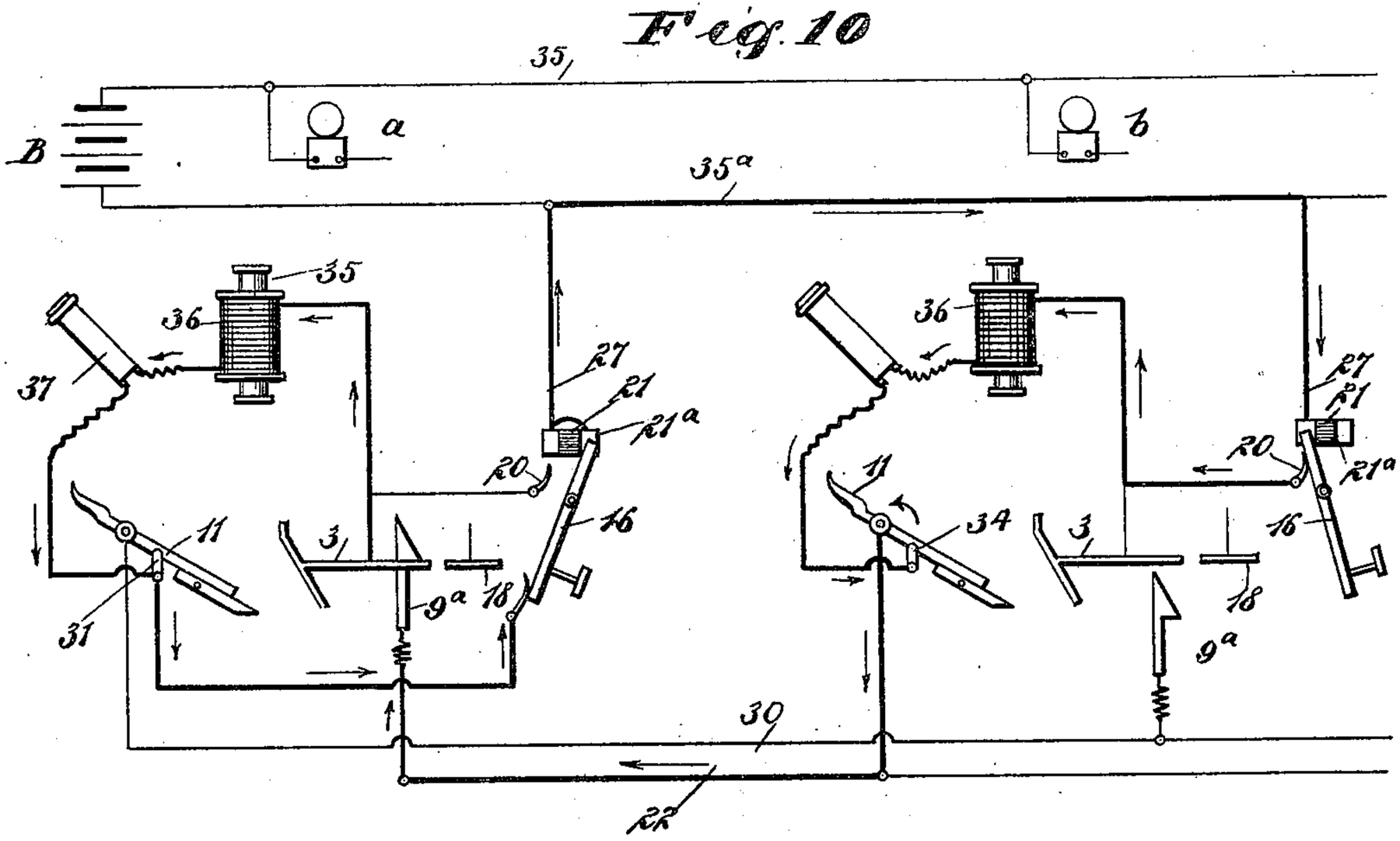
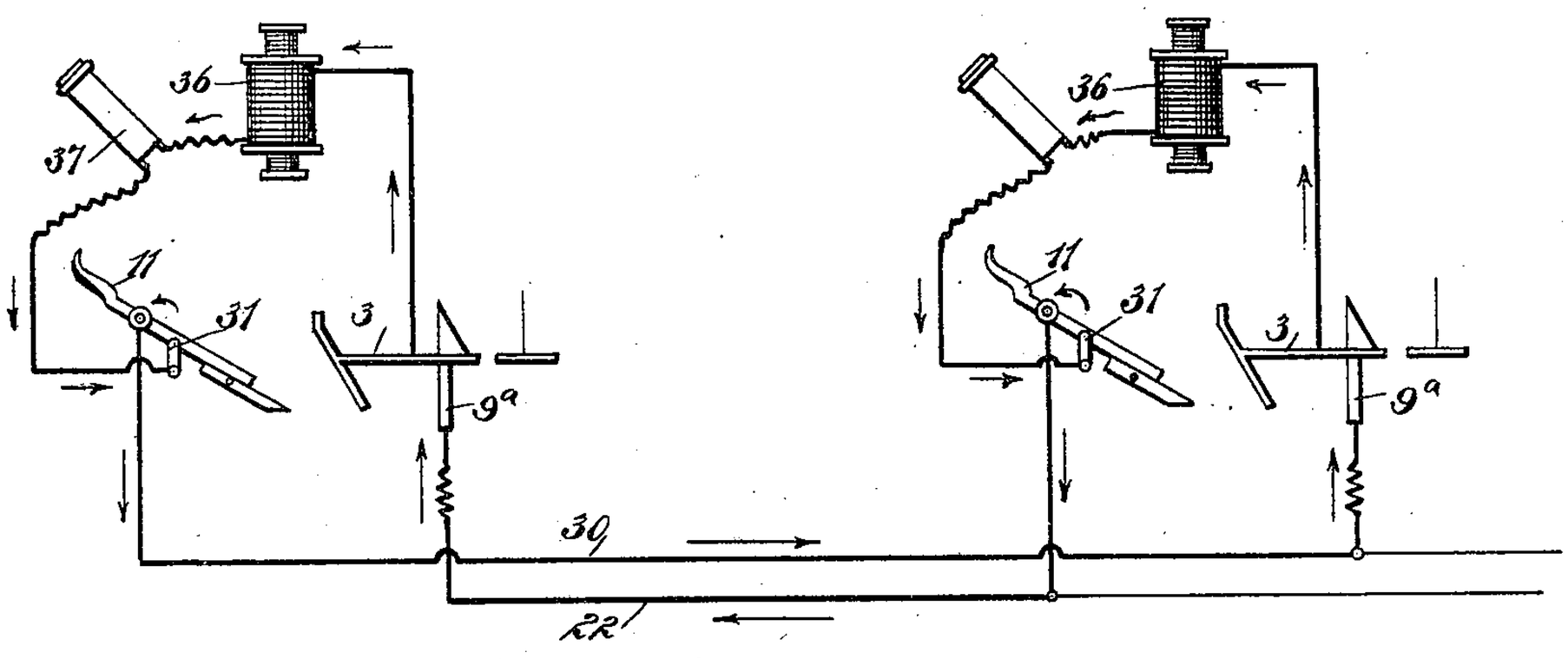


Fig. 11



WITNESSES:

John A. Bergstrom
C. R. Ferguson

INVENTOR
C. S. Karoly
BY Munn & Co
ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES S. KAROLY, OF AURORA, ILLINOIS.

AUTOMATIC TELEPHONE-SWITCH.

SPECIFICATION forming part of Letters Patent No. 621,346, dated March 21, 1899.

Application filed November 9, 1897. Serial No. 657,967. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. KAROLY, of Aurora, in the county of Kane and State of Illinois, have invented a new and Improved Automatic Telephone-Switch, of which the following is a full, clear, and exact description.

This invention relates to interior automatic telephone-switches; and the object is to provide a simple and reliable switch mechanism in which there is a complete metallic talking-circuit with only one-half the copper line usually required, and with which a call and return or answer call can be quickly made without the intervention of the central office, and whereby both parties may simultaneously and at once remove the two receivers from their hooks, thus saving transmitter exhaustion.

I will describe an automatic telephone-switch embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a diagrammatic view of a system of wiring and a series of telephones embodying my invention. Fig. 2 is a front elevation of a telephone-case in which the switch mechanism is also located. Fig. 3 is a front elevation of a case for containing the switch mechanism when the same is to be applied to telephones already installed. Fig. 4 shows the switch mechanism drawn on an enlarged scale. Fig. 5 is a section on the line 5 5 of Fig. 4. Fig. 6 is a front elevation of a shifting-switch employed. Fig. 7 is an edge view of a contact-block and plate employed. Fig. 8 is a diagrammatic view showing the arrangement of parts and the direction of the current while station 1 is calling station 2. Fig. 9 is a diagrammatic view showing the arrangement of parts and the direction of the current during the answering ring of station 2 to station 1. Fig. 10 shows the arrangement of parts and the direction of the current when the two telephones are in talking connection, and Fig. 11 is a diagrammatic view showing the connections for a complete metallic circuit between the two stations.

Referring to the drawings, 1 designates a telephone-case, in the lower portion of which the automatic switch mechanism is located. Mounted to move longitudinally on the door 2 of the case is what I term a "sliding" connector-plate 3. This connector-plate 3 slides through guideways 4 and is held yieldingly in its normal position by means of a spring 5, connected at one end to said plate and at the other end to a pin extended from the door 2.

Movable through the door 2 is a series of push-buttons 6 7 8. The buttons have contact-fingers 9 9^a 9^b on their inner ends, and these contact-fingers are made in the form of hooks at their inner ends and have one side inclined or beveled, as plainly indicated in the drawings. These beveled surfaces are designed to force the plate 3 longitudinally when a push-button is forced into it, and the end of a contact-finger is moved through an opening 10 in said plate. These contact-fingers 9, 9^a, and 9^b are in direct electrical connection with main circuit-wires, as will be hereinafter described.

Extended through an opening in one of the walls of the casing 1 is a pivoted receiver lever or hook 11. At its inner end within the casing this lever or hook has a spring connection 12 with a fixed part in the casing, and pivoted to said inner end of the lever is a tilting shoe 13, from the outer end of which a spring 14 extends upward to a connection with the lever 11. This tilting shoe is designed to move the plate 3 longitudinally to release any one of the contact-fingers 9 9^a 9^b that may be in engagement therewith and allow said contact-finger to be moved to its normal position by means of its spring. (Not shown.) Therefore when the receiver is removed from the lever 11 the spring 12 will tilt said lever downward to the position indicated in Fig. 4. During this downward movement the inner end of the shoe 13 will engage against a cam-surface 15 on the plate 3, and the inner end will swing upward against the resistance of the spring 14, as indicated in dotted lines in Fig. 4, without imparting motion to the plate 3. When the receiver, however, is placed upon the lever, its weight will tilt the outer end of said lever downward, and as the inner end moves upward the inner end of the shoe 13 will engage with the cam 15 and move the plate 3 slightly forward to release the contact-finger.

Mounted to swing in two planes on pivots 16^a in the casing 1 is a shifting-plate 16. This shifting-plate has a push-piece 17 extended outward through a slot in the wall of the casing, and the said plate is designed to be moved into engagement with a contact-plate 18, a contact-finger 19, a contact-finger 20, or a contact-block 21, having connection with the call-bell through wires 26 27. The block 21 is mounted vertically in but insulated from a contact-plate 21^a, which extends at both sides of the block and has connection with the main wire 35^a through wires 26^a and 27^a. The normal position of the plate 16 is on the plate 21. When shifted into connection with the plate 21^a, it will then be in connection with the wire 35^a and also with the alarm or buzzer 35^b.

In Fig. 1 I have shown four telephones, which may be designated in stations as *a*, *b*, *c*, and *d*. This view, Fig. 1, gives a double plan of the switch calling and talking circuits connected in working order, and to illustrate the operation two telephones only will be employed—that is, those at stations *b* and *c*. Assuming that *b* desires to call *c*, *b* will push the contact-finger 9^a into engagement with the plate 3. This will move said plate into engagement with the contact or calling battery terminal 18. Thus there is current contact between the plate and the finger 9^a with a main-line wire 22, which is connected with the instrument at station *c*—that is, it has a connection through a wire 23 with the receiver-lever 11^a of said instrument *c*. When the receiver is hung on the lever 11^a, the said lever will be in metallic contact with a contact-finger 24, through which the calling-circuit is led to call-bell *c* through the wire 25, shifting-plate 16, and thence through wires 26 and 27. From the bell *c* the current flows through a calling-battery B back to the starting-contact 18 of the instrument at station *b*. This circuit is plainly indicated by the heavy lines in Fig. 8. As will be observed, when the parts 3 and 18 are in contact the above-described calling-circuit is completed through a buzzer 28. This is pulsated by the vibrating bell at the station called—that is, the buzzer is connected single-stroke. When the armatures of vibrating bells open their circuits, the buzzer-armature drops by gravity from its magnet and has simultaneous pulsation with the bell called. Should the party at station *c* not answer the first ring or call from station *b*, the shifting-plate 16 at station *b* is to be pressed inward. This throws the calling-current through the wire 25 and contact 24 at the station *b*, thence through the fork or lever 11, thence through the shoe to the plate 3, to push-button 9^a, to main wire 22, to wire 23, to switch 11^a, to contact 24, by way of wire 25, to wires 26 27, to bell *c*, through calling-battery, through buzzer of station *b* back to the place of starting. This means for sending a second call, should the first one not be answered, obviates the necessity of hanging up the receiver or removing it from the ear and repeating the operations required for the call first given. Station *c* to answer ring of station *b* presses the lower end of the shifting-plate 16 inward, which breaks its contact with the wire 26; thus cutting out the local bell. This movement will put the plate 16 into engagement with the contact 18 at station *c*, and the plate 3 will be moved out of engagement with the contact 18 and in reach of the shoe 13. The current starts from said contact 18 through the plate 16, the wire 25, the contact 24, through the lever 11^a, thence to the wire 22, and thence to contact-finger 9^a of station *b*, thence through the plate 3 to the contact 24, by way of lever 11, then through wire 25, plate 16, and wire 27 to the bell of station *b*, and through the calling-battery back to the contact 18 of station *c*. This answering-circuit is shown by the heavy lines in Fig. 9. This completes the calling and answering. Both telephone-receivers are now to be taken off, which allows the lever 11 to move downward into engagement with the contact-fingers 31 and 32, and the lever 11^a moves downward into engagement with similar contact-fingers 33 and 34. This closes the local transmitter-circuit through the primary 35 of the induction-coil.

The secondary 36 of the induction-coil has one of its terminals in connection with the receiver 37 by way of the lever 11 and the contact 32. The lever 11 has broken its contact with the plate 3 and also with the contact 24. This completely cuts out the calling-circuit and throws in the talking-circuit, which is plainly indicated in Fig. 10, in the following manner: The plate 3 of station *b* is in connection with its induction-coil, and therefore this induction-coil is in working connection with the wire 22 through the finger 9^a, and this wire 22, as before stated, connects with the receiver hook or lever 11^a of station *c*, and this connects said line-wire 22 with the induction-coil of station *c* through the receiver of that station. To complete the temporary talking-circuit between the stations and between which the wire 22 is common to both stations, as is also the wire 35^a, a person at station *b* will shift the shifting-plate 16 into engagement with the contact 19, which has a wire connection with the switch-point 32. The party at station *c* will push the plate 16 into engagement with the contact 20, which is in connection with the open side of the induction-coil, which is in connection with the plate 3. The temporary talking-circuit is now as follows: Starting with the contact-finger 19 at station *b*, through the plate 16 to the contact-block 21^a, the wires 26^a 27^a to the wire 35^a, through the wire 35^a to the wires 27^a 26^a, thence to the contact 21^a of station *c*, through the wire connecting with the open side of the induction-coil 36 with the bell-circuit through contact 20. The current flows through the induction-coil, through the receiver to the

point 34, through the lever 11ª to the line 22 to the contact-finger 9ª at station *b*, through the plate 3, through induction-coil 36 and the receiver 37 back to the contact 19 or point of starting. Conversation can be completed through this circuit, if desired, which it will be noted is a common return-circuit; but should a complete metallic connection be desired, or an individual metallic circuit common to stations *b* and *c* only, as indicated in Fig. 11, calling-station *b* requests station *c* to throw in its contact-finger 9ª. On releasing the plate 16 of both instruments the primary circuit 35 is restored and complete metallic connection is had direct through lines 22 and 30. This circuit is traced as follows: Commencing with the terminal 32 in station *b*, the circuit is through the receiver, induction-coil, plate 3, finger 9ª, line 22 to station *c*, where it passes through the lever 11ª, contact-point 34, through the receiver, induction-coil, plate 3, finger 9ª, line 30, back to station *b*. When the receivers are restored to their levers, the circuit is restored by the shoe 13 moving the plate 3 and thus releasing the contact-fingers.

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

1. A telephone-switch, comprising a movable plate, a circuit of which said plate forms a part, a push-finger having connection with the telephone-wire and adapted for engagement with the said plate to close a circuit, a receiver-supporting lever in the circuit, and a shoe pivotally connected to said lever for engaging with the plate and moving said plate out of engagement with said push-finger, substantially as specified.

2. In a telephone, a switch comprising a longitudinally-movable plate having a series of openings, push-buttons carrying contact-fingers designed to be pushed through the openings to hold the plate in one position to close a circuit, a receiver-supporting lever comprised in the circuit, a shoe pivoted to the inner end of said lever, and a cam projection on the plate adapted to be engaged by said shoe to move the plate longitudinally and disengage it from a finger when said lever is moved downward by hanging the receiver thereon, substantially as specified.

3. In a telephone, a switch comprising a movable plate having openings, a series of contact-fingers each being normally in an electric circuit, the said contact-fingers having hook portions and inclined portions, the said inclined portions being adapted to pass through the openings to engage with a plate and move it to close a circuit, and means for automatically releasing said plate from a finger, substantially as specified.

4. In a telephone, a switch comprising a longitudinally-movable plate having a projection, a spring for moving said plate to its normal position, a contact-finger normally in connection with a line-wire and adapted to move the plate into circuit connection, a receiver-supporting lever, a spring for rocking said lever after removal of the receiver, and a shoe pivoted to the inner end of said lever and adapted to rock against the projection on the plate upon the downward movement of the inner end of said lever, and adapted to maintain a fixed position relatively to the latter as the inner end of said lever is moved upward and thus engage with a projection to move the plate longitudinally, substantially as specified.

5. In a telephone, a longitudinally-movable plate, a contact in connection with a line-wire and adapted to move the plate into circuit connection, a receiver-supporting lever adapted to disengage the plate from the contact, a swinging contact-plate normally in a talking-circuit, and means for moving the swinging plate into electrical connection with the longitudinally-movable plate, substantially as specified.

CHARLES S. KAROLY.

Witnesses:
THOMAS A. ELDEN,
H. E. KENT.