

(No Model.)

J. G. SMITH.
TELEPHONE SYSTEM.

No. 563,084.

Patented June 30, 1896.

Fig. 1.

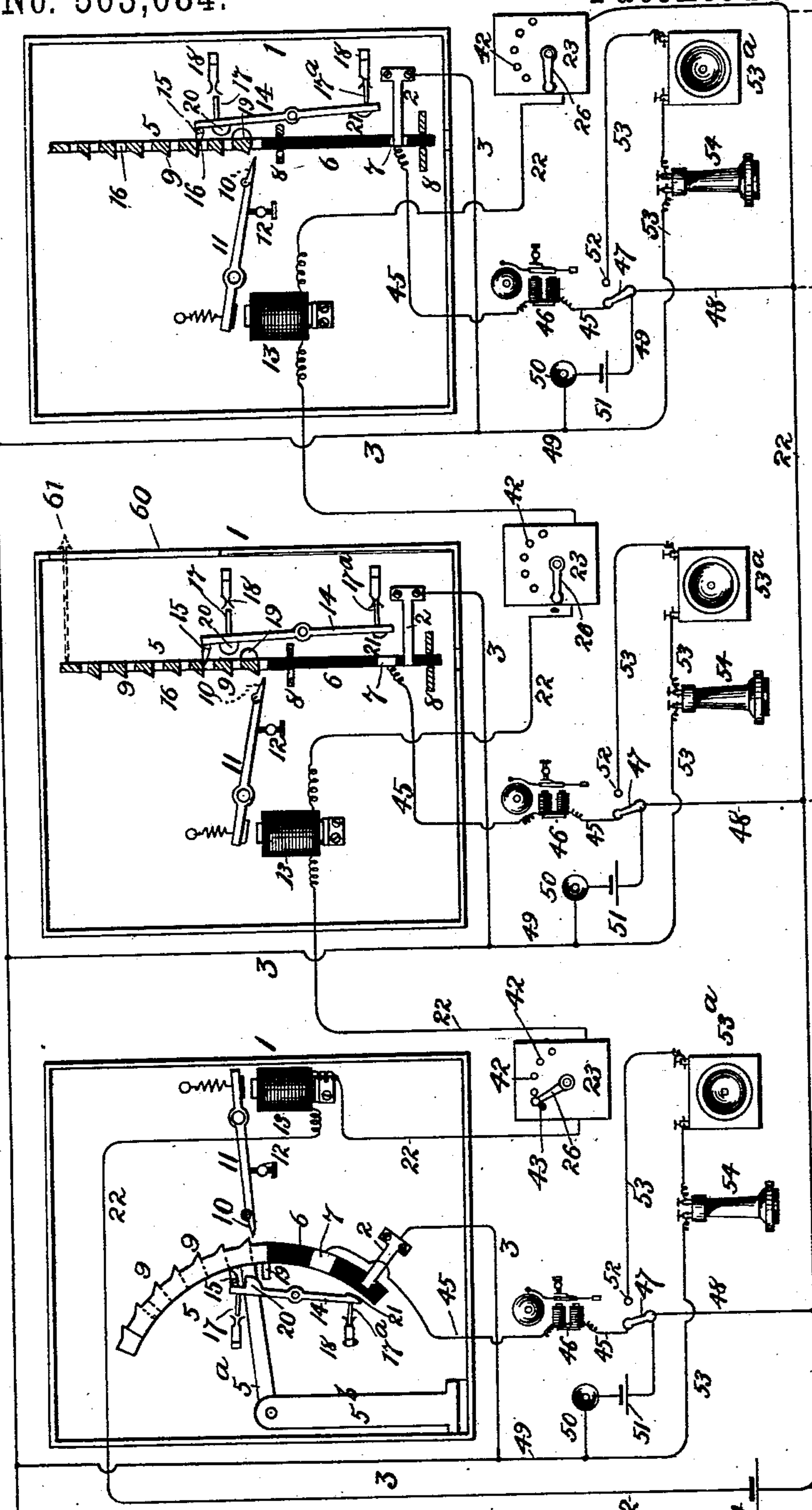
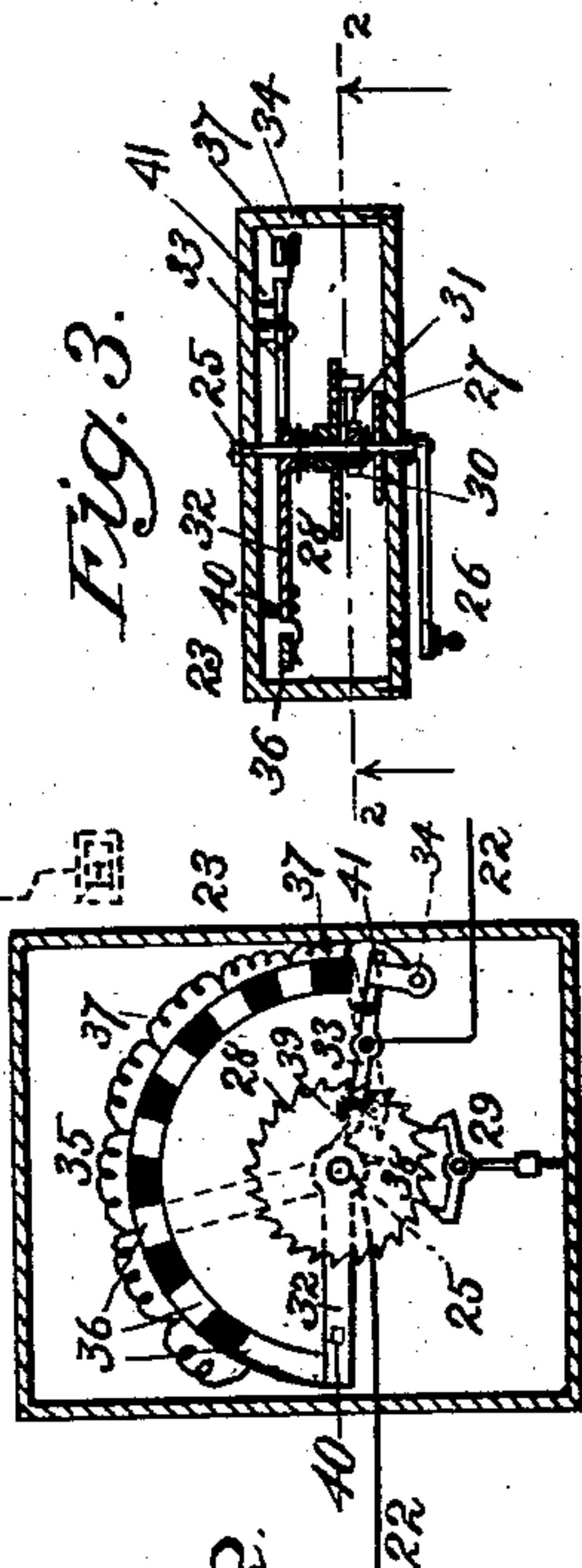


Fig. 3.



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JAMES G. SMITH, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ROBERT G. VASSAR, OF SAME PLACE.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 563,084, dated June 30, 1896.

Application filed August 6, 1894. Serial No. 519,520. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. SMITH, a resident of the city, county, and State of New York, have invented certain new and useful
5 Improvements in Telephone Systems, of which the following is a specification.

My invention relates to improvements in telephone systems, and more particularly to that class wherein several stations are located
10 on the same circuit; and the invention has for its object to permit a person at any station on a circuit to call another station on the circuit without at the same time calling others, and also to enable telephonic communication to be made between stations.
15

The invention consists in the novel details of improvement that will be more fully hereinafter set forth, and then pointed out in the claims.

20 Reference is to be had to the accompanying drawings, forming part hereof, where in—

Figure 1 is a diagrammatic view of my improved system, showing the circuit-regulating devices. Fig. 2 is a vertical section on the
25 plane of the line 2 2 in Fig. 3 of the mechanism used for operating the devices for establishing the circuit between two stations for calling purposes, and Fig. 3 is a sectional
30 plan view thereof.

My improved system embraces a circuit for the telephones, a circuit having mechanisms for establishing connection between any two stations including operating devices for actuating the said mechanisms to close the circuit
35 between any two stations for signaling, and devices to permit a person at one station to signal to another station, after the circuit has been established between said stations, and to then so close the line as to properly
40 place the telephones in circuit to enable communication to be had.

The circuits I contemplate using may either be closed metallic circuits or grounded circuits, according to the nature of the work to be done, or as found most convenient or desirable.
45

In the accompanying drawings I have illustrated a main telephone-circuit in which a
50 number of stations may be included, the devices shown for establishing the circuit from one station to another station, to per-

mit one party to signal to another, being as follows:

1 indicates a suitable box having a contact 55 2 in circuit with a conductor 3, connected with a line-wire 4, which may be an open wire, if desired. Any suitable number of stations, each having a box 1, may be utilized in the circuit 4, the devices shown being proportioned for five stations, Fig. 1 showing three
60 stations, each having a box 1, together with a switch, push-button, and receivers and transmitters, as hereinafter set forth.

Within each box 1 suitable devices are located for closing the circuit through wires 3 4, between any two boxes, to enable a party at one station to signal to another station. For this purpose I have shown the following arrangement: 5 is a rod or bar adapted to move
65 longitudinally, said bar having an insulated portion 6. On each bar 5 is a contact 7, adapted to engage contact 2. The contacts 7 in the series of boxes 1 on a circuit are so arranged that only one contact 7 will be in engagement with its contact 2 at a time, as shown
75 in Fig. 1. The bars 5 in a series of boxes 1 are moved synchronously step by step, and in order to permit a person at one station to signal to another station, through the medium of
80 said bars, the following arrangement is shown:

At the center and right-hand side of Fig. 1 the bars 5 are shown carried in suitable guides 8, so as to have up-and-down movement, and at the left in said figure the bar 5
85 is shown in the arc of a circle, and carried by an arm 5^a, pivoted on a support 5^b (or otherwise) in the box 1; but either form may be used in all the boxes. The bars 5 are shown provided with a series of teeth 9, adapted to
90 be engaged by a pawl 10, pivoted on an armature-lever 11, hung in the box 1, a screw-stop 12 being shown provided to regulate the movement of the lever 11. The armature-lever 11 is operated by a magnet 13 to raise the bar 5
95 step by step.

14 is a stop-lever or dog adapted to keep the bar 5 from descending until the proper time, so that when released the bar 5 will descend by gravity. The stop-lever or dog
100 14 is shown centrally pivoted in the box 1, and provided with a pawl 15, adapted to enter sockets or recesses 16 in the bar 5 to hold up said bar, as shown. The bar 14 is normally

held in certain positions by means of pins 17 17^a, adapted to enter spring-clips 18, so that when the pin 17^a is in clip 18 the pawl 15 will be in position to hold up bar 5, and
 5 when pin 17 is in a clip 18 the bar 5 will be allowed to descend. The movement of the stop-lever or dog 14 to release the bar 5 is effected by a projection 19 on bar 5, which encounters a projection 20 on stop-lever or
 10 dog 14, when bar 5 rises, so as to move pawl 15 out of engagement with notches 16, and allow bar 5 to descend, the clip 18 holding it in this position by engaging pin 17. When bar 5 reaches its lowest position, the projec-
 15 tion 19 will encounter a projection 21 on stop-lever or dog 14, which has been moved forward by the turning of lever or dog 14, so as to restore the pawl 15 to the normal position to hold up bar 5. Thus the devices for hold-
 20 ing up and releasing the bar 5 are operated by the movement of said bar.

The bars 5 in all the boxes 1 move uniformly and all come to rest simultaneously when the bar 5 at the station desired has
 25 brought the corresponding contact 7 into engagement with the contact 2 of the box 1 belonging to the said desired station. This operation is effected as follows: Each mag-
 30 net 13 is connected with a conductor 22, that leads to the mechanism of a box 23 at each station on a circuit. The circuit 22 may be a closed metallic circuit, as shown in full
 lines, or the terminals from the last boxes on a circuit may be grounded, as in dotted lines.
 35 24 is a battery in the circuit 22.

A suitable make-and-break mechanism is located in each box 23 to send the desired pulsations through magnets 13, and to accom-
 40 plish the desired result I have shown devices arranged as follows: In each box 23 is jour-
 naled a shaft 25, having a handle 26, by which it is operated. 27 is a spring connected with
 the shaft and with the box 23 for turning the shaft to make and break the circuit when
 45 the shaft has been released. The shaft 25 carries an escapement-wheel 28, engaged by a pallet 29, to regulate the speed of rotation of said shaft. The shaft 25 also carries a
 50 ratchet-wheel 30, adapted to be engaged by a pawl 31, pivotally carried by the wheel 28, and so arranged that as the handle 26 is turned to the right the spring 27 will be wound and the
 ratchet 30 will slip under the pawl, but when the handle 26 is released it will turn to the
 55 left and carry the escapement-wheel 28 with it to regulate the turning of said shaft; but of course other suitable devices could be provided for the purpose, if desired.

The arrangement of the mechanism in the
 60 box 23 is such that when the handle 26 is first moved to the right the circuit through con-
 ductor 22 will be broken and not reestablished until handle 26 has been moved to its fullest extent to the right. For this purpose
 65 I connect one terminal of conductor 22 to the shaft 25, or to an arm or contact 32, carried thereby, and the other terminal to a rock-

lever 33, pivoted in the box 23. The lever 33 is normally in engagement with a contact 34, from which a wire 35 leads to a series of con-
 70 tacts 36, separated by insulated material 37, so that the arm 32 can make contact inter-
 mittently with the contacts 36. The arm 32 has a toe 38, adapted to engage a spring-
 pressed pawl 39 on lever 33, so that when the
 75 arm 32 is first turned to the right it will move the lever 33 from engagement with the con-
 tact 34 and place it against the first piece of insulation 37, whereby the circuit through 22
 will be broken in the box that is being oper-
 80 ated, so that should handle 26 slip or not be moved far enough no current will be sent
 through line 22 to interfere with the proper relative movements of bars 5. When, how-
 ever, the handle 26, and thus the arm 32, have
 85 been moved fully to the right, a pin 40 on arm 32 will encounter a pin 41 on lever 33 and
 move said lever back from the dotted position shown in Fig. 2 to the position of engagement
 with contact 34. As the arm 32 next moves
 90 to the left it will close the circuit step by step through contacts 36 and wire 35, whereby
 pulsations will be sent through magnets 13 to move the bars 5 to bring the desired contacts
 7 and 2 into engagement to make connection
 95 with the call-bell at the desired station.

On the face or side of each box 23 are a series of holes 42, adapted to receive a pin 43 to stop the rotation of handle 26 at the de-
 100 sired point on any box 23. The positions of the holes 42 are such that when a pin 43 stops
 a handle 26 the arm 32 will be in engagement with a piece of insulation 37, so that the cir-
 105 cuit 22 will be broken, excepting when the arm 26 is in the normal position of rest, as at
 the right in Fig. 1, when the arm 32 will en-
 gage a contact 36, as in Fig. 2, to normally close the circuit 22.

The contact 7 on the bar 5 in each box 1 is connected with a call-bell mechanism 46, lo-
 110 cated at each station. The wire 45 leads from the bell 46 to a contact upon which a switch
 47 normally rests. This switch 47 is connected permanently with a wire 48, which leads to
 the return-wire of the circuit 22, or to ground,
 115 as shown by dotted lines in Fig. 1. From switch 47 a wire 49 extends to the wire 3, a
 normally-open push-button 50 and battery 51 being included in said wire, as shown, so that
 when the circuit has been closed through 7 2,
 120 a call can be sent from one station to another over the main-line wire 4 by pressing button
 50 of the former station to ring bell 46 of the latter station.

The telephone connections are as follows:
 125 52 is a contact adapted to be engaged by switch 47, from which contact a wire 53 leads to a
 telephone-transmitter 53^a of suitable construction, (such as a magneto,) the line 53 pass-
 130 ing thence to a telephone-receiver 54, thence to the wire 49 for connection with wire 3. To
 place the telephones in circuit the respective switches 47 of the two communicating sta-
 tions will be turned to engage contacts 52,

thereby breaking the circuit through the bells 46.

In order to indicate when the boxes 1 are being used, a suitable indicator may be connected with each box that will be operated by the bar 5. Such a device is shown on the central box in Fig. 1, wherein the box 1 has a slot 60, through which a pointer 61 projects, said pointer being carried by the bar 5, so as to move up and down therewith. When the pointer is at the lowest position, the line will be clear, but when said pointer has risen then it will be understood that the line is being used.

The operation of the entire system is as follows: Suppose a person at one station desires to communicate with a person at another station. In Fig. 1 the parts are so arranged that the station at the left is in circuit with the station on the right. The person at the left-hand station first turns the handle 26 to the extreme right and places a pin or plug 43 in the hole 42 on box 23, corresponding to the number of the station to be called. When the handle 26 is released, it turns to the left, so that each time the arm 32 engages a contact 36 a pulsation will be sent through circuit 22 and magnets 13 to raise all bars 5 one step. When the handle 26 encounters the stop 43, the arm 32 will pass upon a piece of insulation 37 and break the circuit through 22, while at the same time the contacts 7 2 in the box 1 at the station desired will be in engagement, as at the right in Fig. 1, whereby the circuit will be established from the calling-station through the bell at the called station, as follows: from the push-button 50 at the left in Fig. 1 through wire 3 4 3 to contact 2 at the right, thence through contact 7, wire 45, bell 46, switch 47, wire 48, to wire 22, or to ground. If wire 22 is used for the return, then the circuit is closed therethrough to wire 48 at the left, thence through battery 51 to the push-button 50. The push-button at the left now being operated rings the bell at the called station. The parties at both stations then turn their respective switches 47 to engage contacts 52, whereby the circuit will be closed through the respective telephones, as follows: from contact 52 at the left through wire 53, transmitter 53^a, receiver 54, wire 53 to wire 49 and 3, thence by wire 4 to wire 3 at the station on the right, to the wire 53, the receiver and transmitter to contact 52, switch 47, and wire 48, and from thence either to ground or by the return-wire 22 to the wire 48 at the station on the left, to switch 47 and back to contact 52. Thus the telephone-circuit between two stations is established by the mere turning of the switches. When the parties have finished talking, the party who called the other will remove the pin 43 from the hole 42 in his box 23, and thus allow the arm 26 to return to zero, whereupon the bars 5 will all be raised until the projection 19 engages the projection 20, and thus moves back lever or dog 14 to release bars 5, whereupon said bars will de-

scend by gravity to their normal positions, the levers or dogs 14 being also restored, so as to be in position to again sustain bars 5 as they next rise.

From the foregoing it will be understood that the other stations are precluded from interfering with two stations that are connected because in that case the circuit is broken through line 22, at 32 37, so that no other box 23 can be used until the line is cleared.

In this application I do not claim, in a selective-telephone system, a single line on which is placed a telephone and a single line on which are placed an impulse-transmitting instrument and a selecting instrument at each of the stations, means operated by each of the selectors in response to impulses from any one of the transmitting instruments over the selector-line, to thereby bring into circuit and connect the communicating telephones with each other; nor do I claim in a selective-telephone system the combination, with two or more telephone-circuits, of a single line upon which is placed a telephone and a single line upon which are placed an impulse-transmitting instrument and a selecting instrument at each of the stations, means operated by each of the selecting instruments in response to impulses from the transmitter over the selector-line to call up any one of the stations, and means operated by the telephone-switches to connect the communicating telephones with each other.

Having now described my invention, what I claim is—

1. A telephone system having a plurality of stations, comprising a main line, a signaling instrument in each station to be connected with said main line, a push-button or circuit-closer and battery in each station connected with said main line, telephone instruments in each station also connected with said main line, and another separate operating-line, electrically-operating devices located on said line at each station for closing the circuit of said first-mentioned line through the corresponding signaling instruments, means at each station for sending a current to operate said electrically-operating devices to connect the corresponding signaling instrument with its main line, and a switch in each station for disconnecting the corresponding signaling instrument from the first-mentioned line and to connect the corresponding telephone instruments to said main line.

2. A telephone system having a plurality of stations comprising a main through-line, a local normally open circuit in each station connected with said main line and having signaling devices, a contact for said local circuit, a switch 47 normally engaged therewith, another local normally open circuit in each station connected with said main line and having telephoning devices, a contact 52 located on said last-mentioned local circuit, the switch 47 being adapted to engage said contact and to break the circuit of the signaling devices,

said switch being connected to ground or a return-wire, a line connecting the switch 47 with the main line and having a battery and push-button, mechanisms in each station for establishing the circuit through its signaling devices, and a separate through-circuit having devices in each station for operating said mechanisms to close any of said local signaling-instrument circuits.

10 3. A circuit-closing mechanism, comprising a bar having a contact, an armature-lever and magnet arranged to operate said bar, a lever or dog to sustain said bar, means for releasing said lever or dog from said bar, projections carried by said lever or dog, and clips to engage and hold said projections to retain the lever or dog in either position it is placed by the sliding bar, substantially as described.

15 4. In a circuit-closing device, a series of stationary contacts connected by a wire, an arm to engage them, a wire electrically connected with said arm, and a make-and-break device also connected with a wire and operated by said arm to first break and then restore the circuit through said contacts while said arm moves in one direction, substantially as described.

20 5. In a circuit-closing device, a series of stationary contacts connected by a wire, an arm to engage them, a wire electrically connected with said arm, a lever for connection with the wire that is connected with said contacts and arranged to be operated by said arm to break

and then make the circuit through said wire and contacts while said arm moves in one direction, substantially as described. 35

6. In a circuit-closing device, a series of contacts, a wire connecting them, a contact 34 connected with said wire, a lever for connection with a wire and adapted to engage said contact 34, and an arm 32 adapted to engage said contacts and arranged to operate said lever to make and break connection with said contact 34, substantially as described. 40

7. The combination of a series of contacts having insulation between them, and a wire connecting said contacts, with another contact 34, a lever for connection with a wire and adapted to engage contact 34, an arm 32 to engage said contacts and having a toe to operate said lever, a wire connected with said arm, and means to regulate the movement of said arm, substantially as described. 50

8. The combination of a series of contacts, a wire connecting them, a contact 34 connected with said wire, a lever 33 having a pin 41, and a pawl 39, an arm 32, having pin 40, and adapted to engage said series of contacts, and having a toe 38 to engage pawl 39, and means for operating said arm and for stopping its rotation when desired, substantially as described. 55 60

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Witnesses:

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