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PATENTED NOV. 14, 1905.

B. L. LAWTON.

PUSH BUTTON SWITCH MECHANISM FOR TELEPHONES.

APPLICATION FILED DEC. 5, 1904.

2 SHEETS--SHEET 1.

Fig. 1

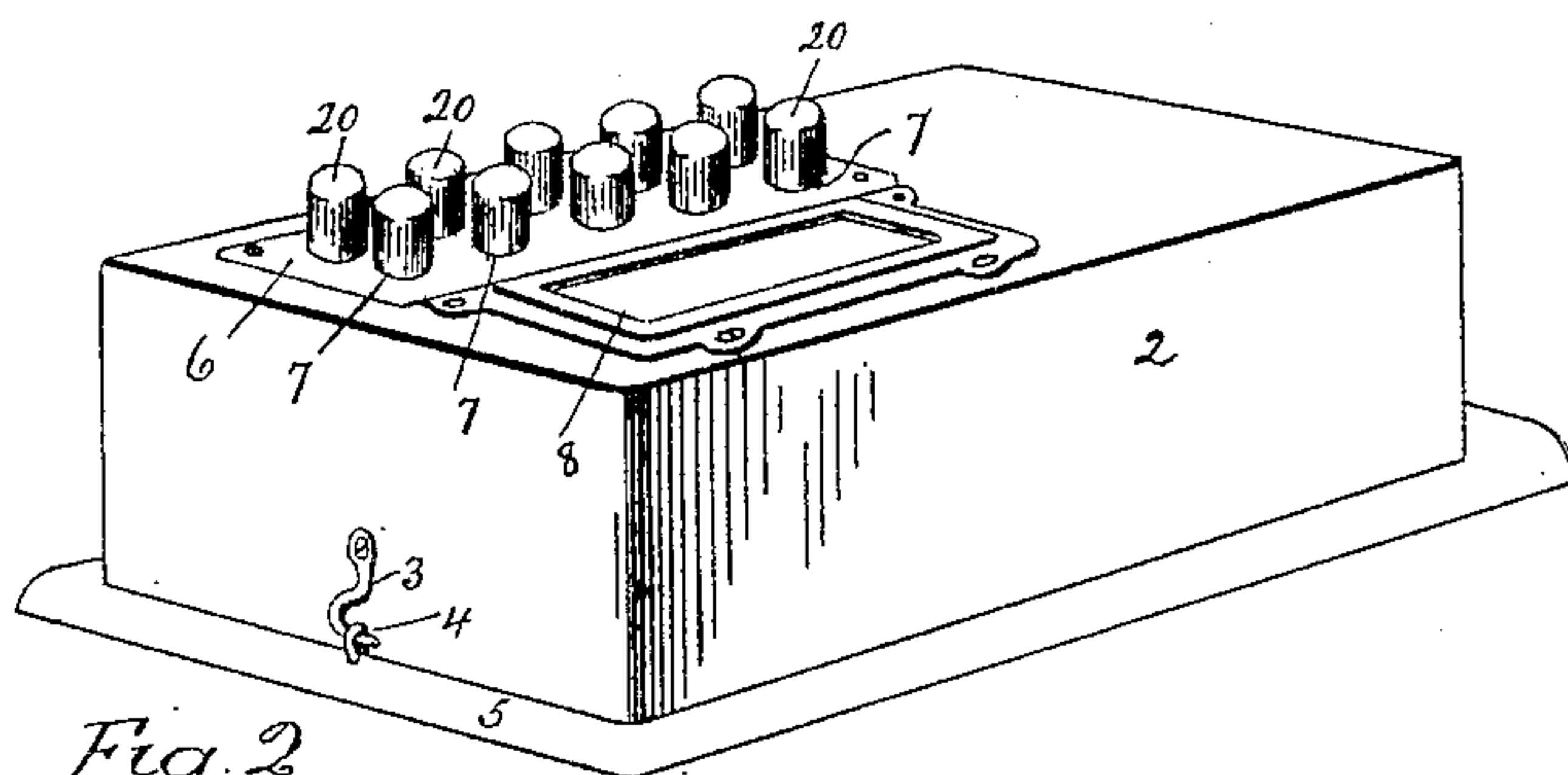
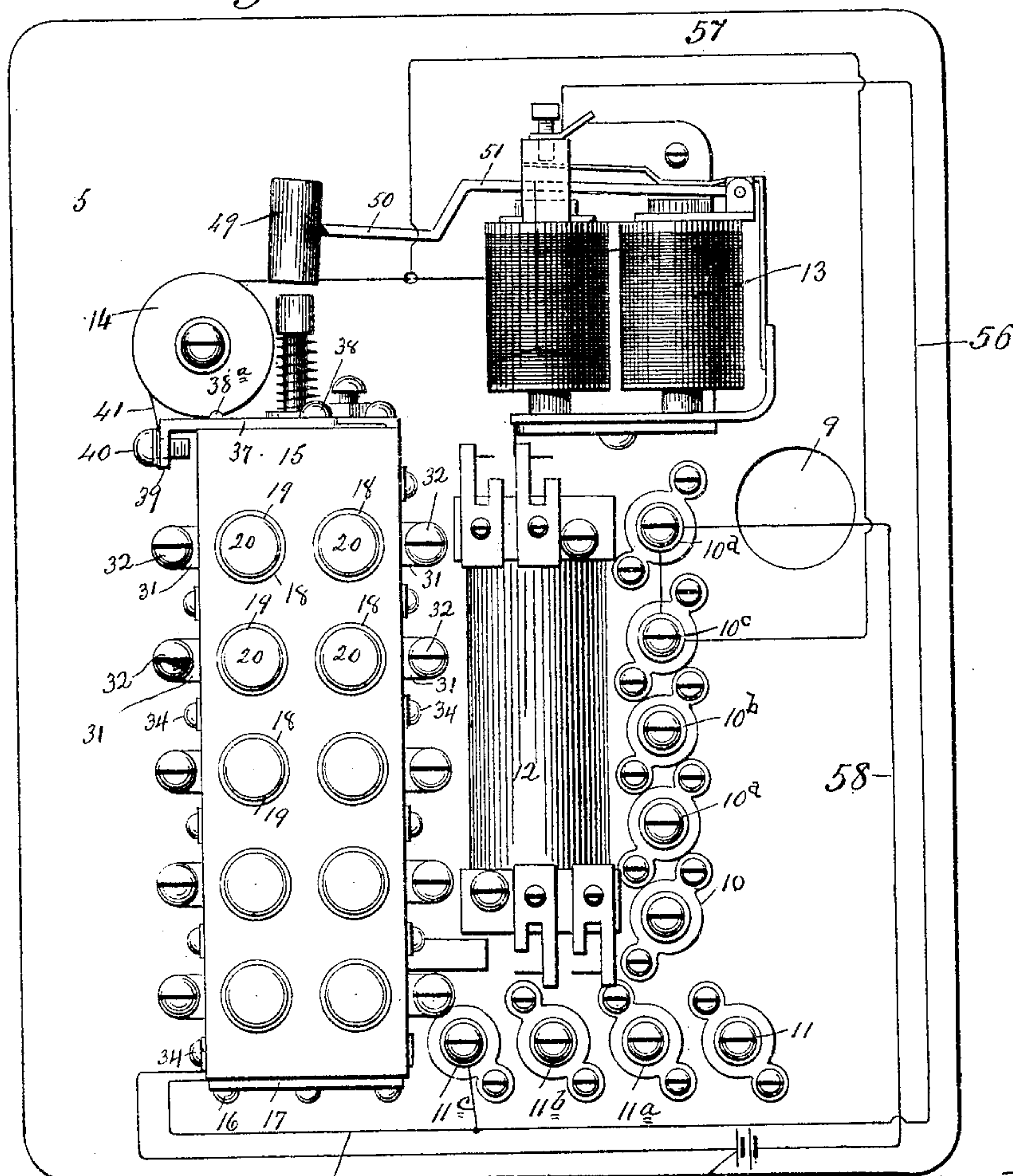


Fig. 2



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2 SHEETS--SHEET 2.

Fig. 3.

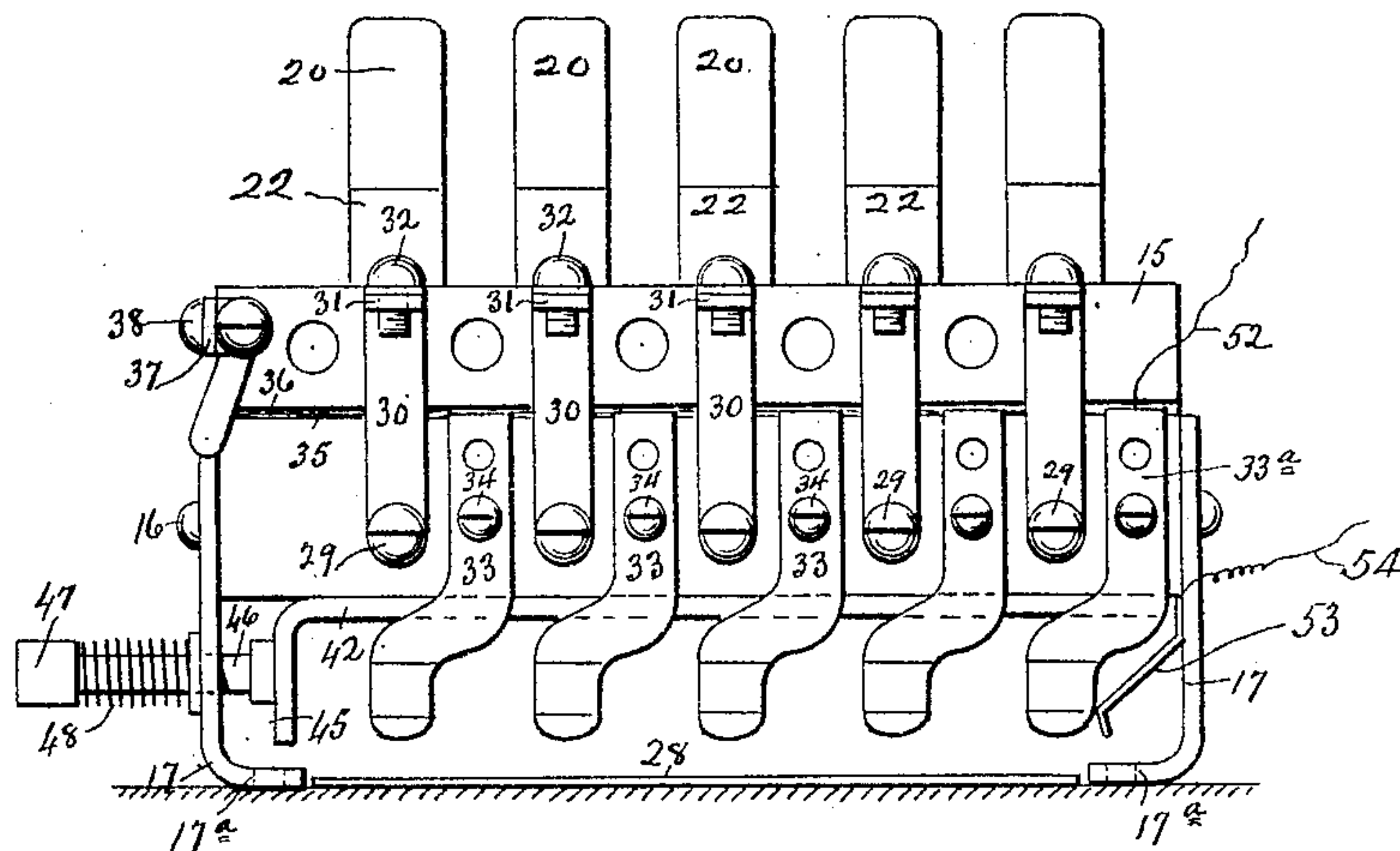


Fig. 4

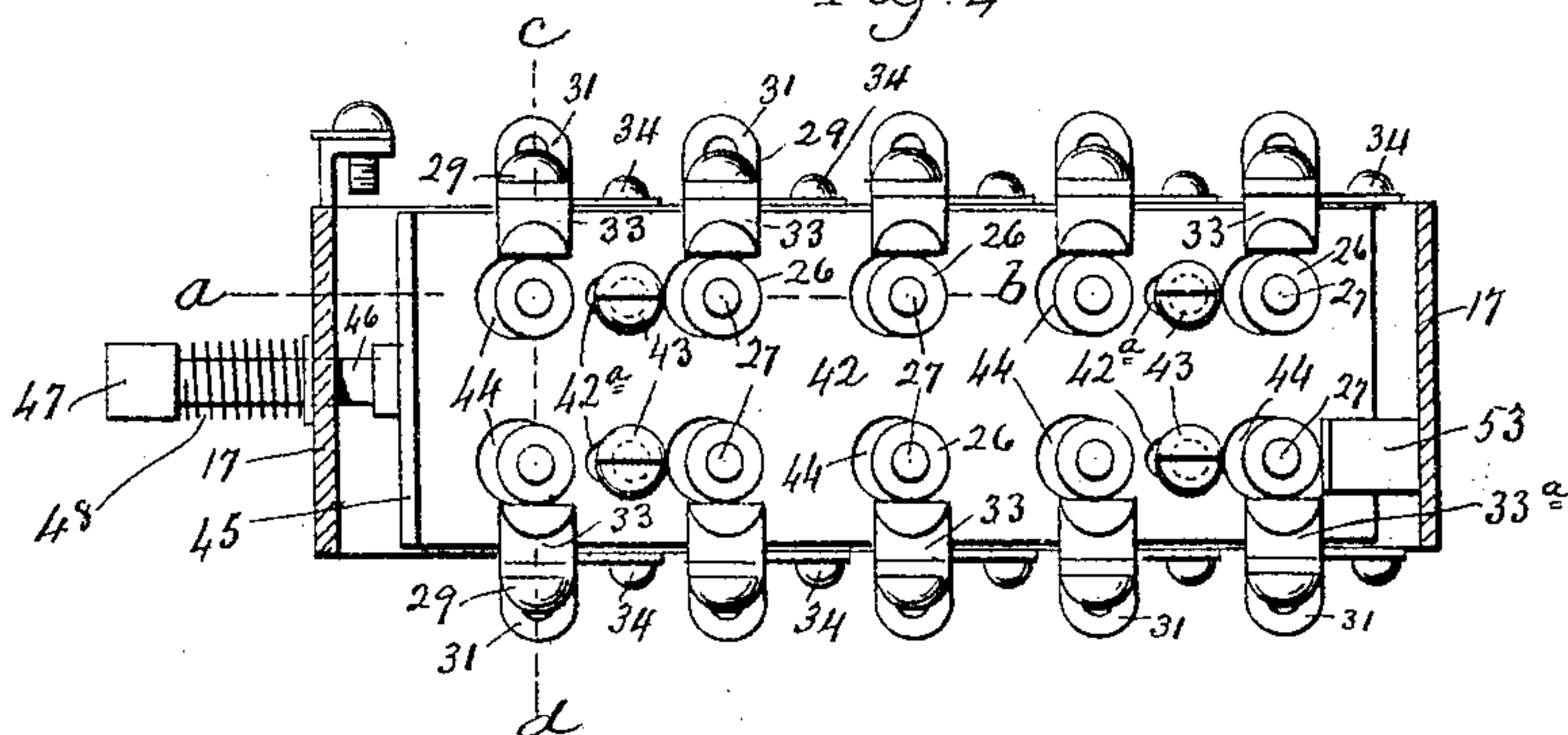


Fig. 5

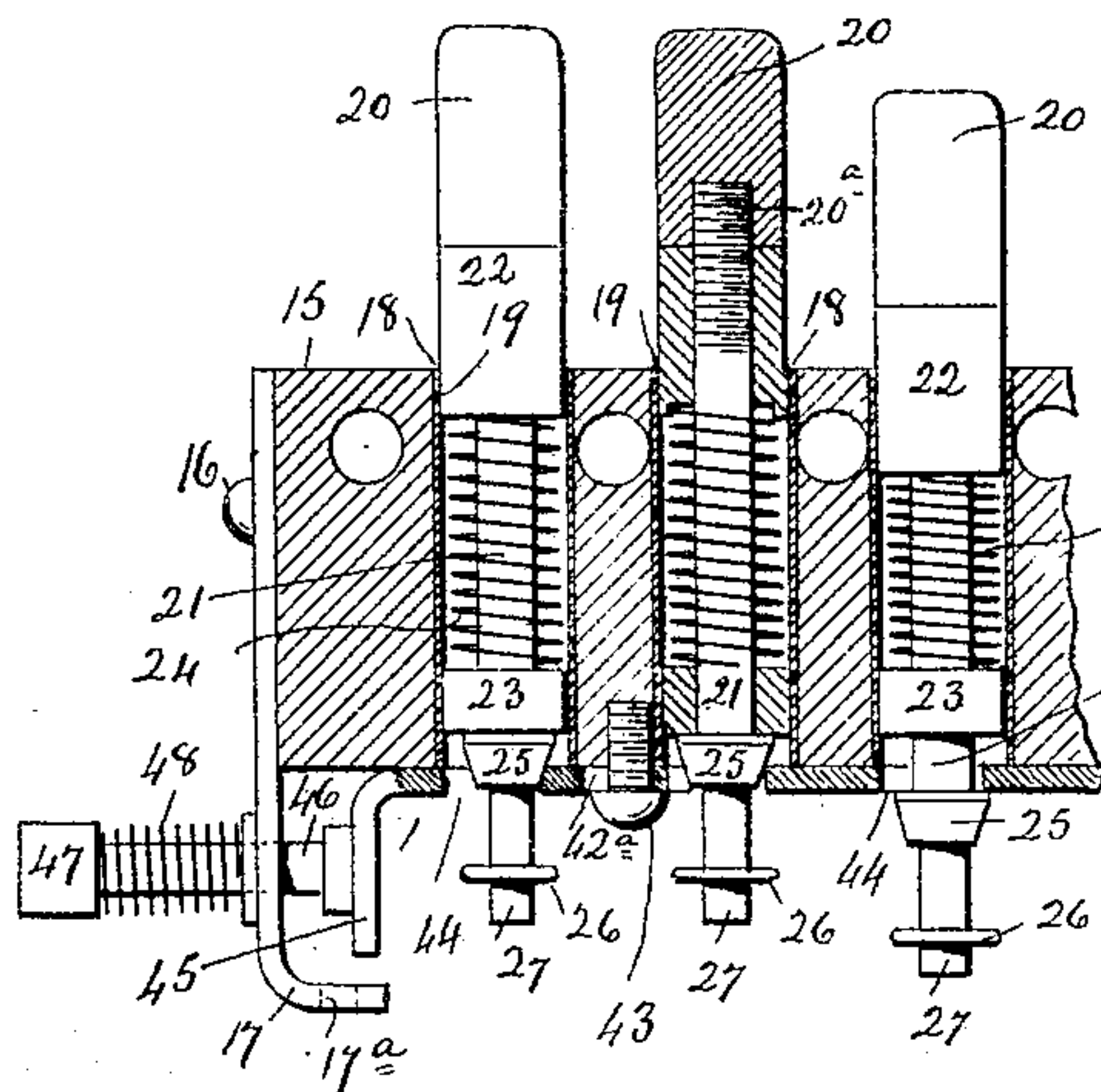
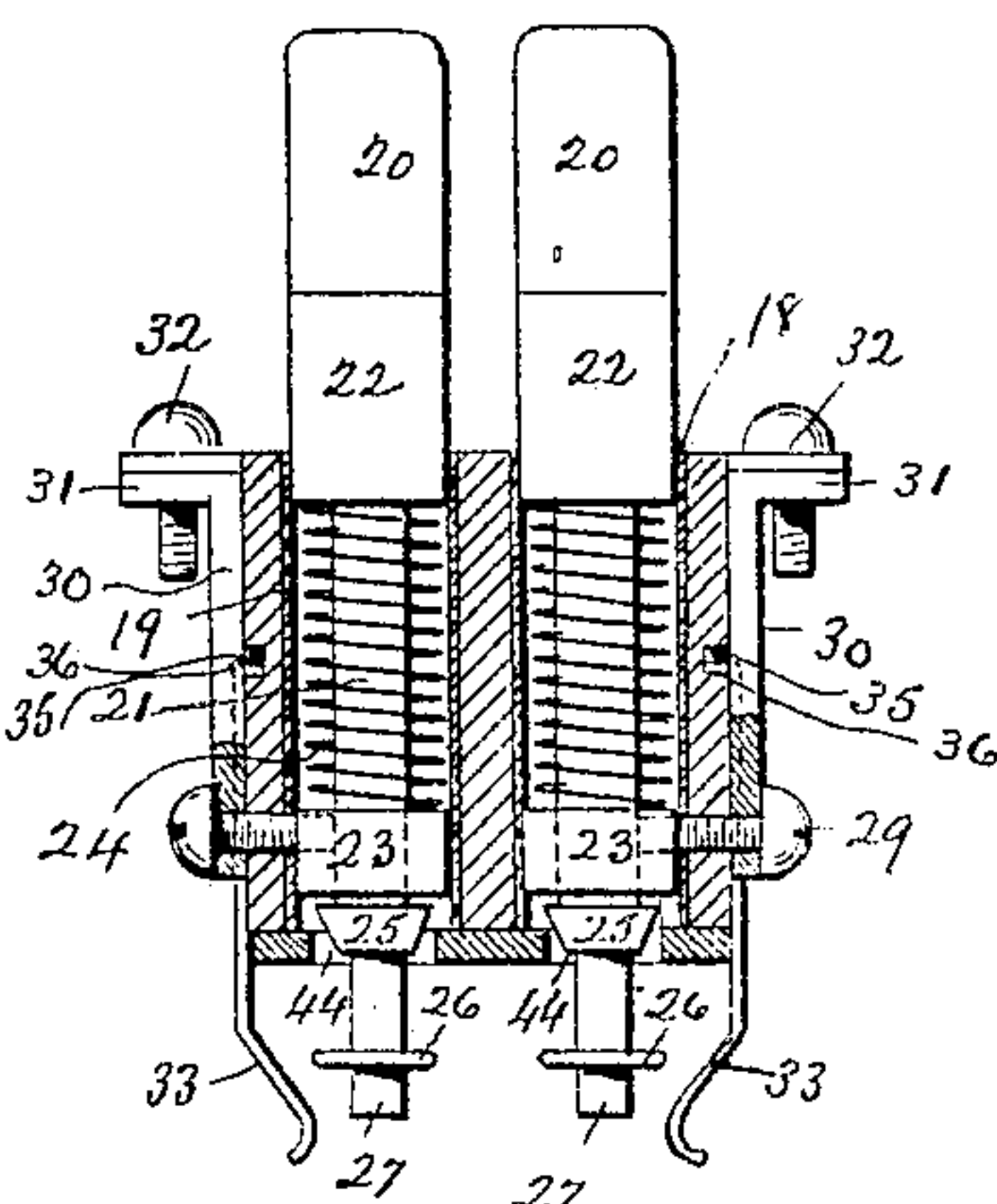


Fig. 6



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UNITED STATES PATENT OFFICE.

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PUSH-BUTTON SWITCH MECHANISM FOR TELEPHONES.

No. 804,742.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed December 5, 1904. Serial No. 235,448.

To all whom it may concern:

Be it known that I, BURTON LEONARD LAW-
TON, a citizen of the United States, residing
at Meriden, in the county of New Haven and
5 State of Connecticut, have invented a new
and useful Improvement in Push - Button
Switch Mechanisms for Telephones; and I do
hereby declare the following, when taken in
connection with the accompanying drawings
10 and the numerals of reference marked there-
on, to be a full, clear, and exact description of
the same, and which said drawings constitute
part of this specification, and represent, in—

Figure 1, a perspective view, on a reduced
15 scale, of a push-button switch mechanism con-
structed in accordance with my invention;
Fig. 2, a plan view of the mechanism with
the cover removed; Fig. 3, a detached view,
in side elevation, of the switch-block; Fig. 4,
20 a reverse plan view thereof with the brackets
at its ends shown in section; Fig. 5, a broken
view thereof, in vertical longitudinal section,
on the line *a b* of Fig. 4; Fig. 6, a view there-
of in transverse section on the line *c d* of Fig. 4.

25 My invention relates to an improvement in
switch mechanisms for telephones, the object
being to produce a simple, compact, and re-
liable push-button switch mechanism for in-
tercommunicating telephones or kindred uses.

30 With these ends in view my invention con-
sists in certain details of construction and
combinations of parts, as will be hereinafter
described, and pointed out in the claims.

As shown in Figs. 1 to 6, inclusive, I have
35 applied my invention to the construction of a
switch mechanism for a desk-telephone form-
ing one of an installation of eleven corre-
sponding instruments. This mechanism com-
prises a box 2, adapted to be secured by hooks
40 3 and eyes 4 to a base 5, which is solidly at-
tached to the top of a desk. The top of the
box is furnished with an escutcheon 6, having
ten push-button holes 7 symmetrically ar-
ranged in rows of five holes each. As shown,
45 the top of the box is also furnished with a
directory-plate 8 for the reception of a card
containing the desired reading matter. The
base is formed with a cable-hole 9, through
which the cable is led to the interior of the
50 box 2, the cable not being shown. In the
base 5 I mount five binding-posts 10 10^a 10^b 10^c

10^d of any approved construction, receiving
the flexible conductors (not shown) leading to
the desk-stand, (not shown,) which may be of
any approved construction and which com- 55
prises the usual receiver and transmitter.
The base 5 has also mounted in it four bind-
ing-posts 11, 11^a, 11^b, and 11^c, to which are
respectively connected in any convenient or-
der the "common return-wire," the "talk- 60
ing-battery wire," the "ringing-battery wire,"
and the "home-station wire," none of these
wires being shown. Upon the base 5 I also
locate an ordinary induction-coil 12, a call
mechanism 13, and a resistance-coil 14. The 65
features thus far described may be of any ap-
proved construction and arrangement. Above
the surface of the said base 5 I suspend a
switch-block 15, formed of hard rubber or
other equivalent insulating material and se- 70
cured by screws 16 entering its ends to and
between two corresponding brackets 17, hav-
ing their lower ends bent inward to form feet
which rest upon the said base 5, to which
they are secured by screws, (not shown,) but 75
passing upward through the base 5 from the
lower face thereof into screw-holes 17^a,
formed in the said feet. The said block 15
is formed with ten holes 18, arranged in two
series of five holes each and furnished near 80
their lower ends with bushings or thimbles
19. These bushings 19 respectively receive
composite plunger-like push-buttons, ten in
number and all alike. Each of these push-
buttons consists, as shown, of a cap or top 20, 85
made by preference of rubber and having a
threaded longitudinal bore 20^a adapting it to
be applied to the threaded upper end of a
plunger-stem 21, which also carries a short in-
ternally-threaded cylindrical metal body 22, 90
upon which the lower end of the cap 20 bears,
the said cap and body taking the wear of the
operation of the push-buttons in the thim-
bles 19.

The body 22 is made removable for the ap- 95
plication to the stem 21 of a contact-bushing
23 and of a spiral operating-spring 24, which
latter encircles the plunger-stem and is inter-
posed between the bushing 23 and the lower
end of the said body 22. The metal bodies 100
22 and the springs 24 of the push-buttons
secure for the bushings 23 and the contact-

buttons 25 what is known as a "spring-contact" (necessary in telephone work) as distinguished from a "sliding contact." The contact would be a simple sliding contact if it were not for the springs which make a positive contact and the metal bodies 22, which are virtually a part of the stems 21 carrying the contact-buttons 25. The lower portion of each plunger-stem is formed with a cone-like locking-button 25 and a washer-like contact-button 26, located below the same, the extreme lower end of the stem forming a contact-tip 27 for engagement with the ringing-plate 28, which is applied to the base 5 at a point directly under the block 15 and between the brackets 17 and is located in the ordinary "ringing-circuit." The said contact-bushing 23 forms a bearing for the lower end of the plunger-stem 21, an abutment for the lower end of the operating-spring 24, a stop coacting with the locking-button 25 to limit the upward movement of the plunger, and also an electric connection to the plunger, as will now be described. The stems 21 of the respective plungers pass downward through the said bushings 23, which are located near the lower ends of the holes 18 in the switch-block 15 and secured in place by means of contact-screws 29, passing through the lower ends of strap-like binding-posts 30, the upper ends of which are bent outward at a right angle to form lugs 31 for the reception of binding-screws 32, to which the line-wires run. There are ten of these strap-like binding-posts 30 and ten of these binding-screws 32 to correspond to the push-buttons. To the sides of the switch-block 15 I apply ten contact-springs 33—five on each side—arranged between the said binding-posts 30 and secured to the block by means of screws 34. The lower ends of these springs depend below the lower face of the switch-block 15 and are curved into position to be engaged by the washer-like contact-buttons 26 of the push-buttons when the same are in their intermediate depressed positions, as will be hereinafter described. The upper ends of the said contact-springs 33 are connected together by a common wire 35, let into a horizontal groove 36 in the side walls of the switch-block 15, this wire being connected at its forward end to a horizontal strap-like binding-post 37, secured to the forward end of the block 15 by means of a screw 38 and a pin 38^a, and at its outer end bent to form an arm 39, receiving a binding-screw 40, to which one end of the wire 41 of the resistance-coil 14 leads.

For the purpose of holding any one of the push-buttons in its intermediate depressed position I employ a reciprocating locking-plate 42, bearing against the lower face of the switch-block 15, to which it is secured so as to be longitudinally movable by means, as shown, of four retaining-screws 43, passing through a corresponding number of elongated slots 42^a,

formed in the plate. This plate 42 is formed with ten holes 44, each a little larger than the locking-buttons 25 of the push-buttons and arranged in conformity with the arrangement of the same. At one end the said plate is furnished with an arm 45, standing at a right angle to it and carrying a stud 46, which projects outward through the adjacent bracket 17, the projecting outer end of the stud 46 being furnished with a head or anvil 47, between which and the outer face of the said bracket I locate a light coiled spring 48, sufficient in power to move the plate 42 longitudinally into its normal position. Under this construction when any one of the push-buttons is pressed downward its cone-like locking-button 25 will be engaged with the wall of its complementary hole 44 in the locking-plate 42, whereby the plate will be moved longitudinally to permit the passage downward through the hole of the button, which is normally out of alignment with the hole. Just as soon, however, as the top of the button has passed entirely through the hole the said spring 48 will act to return the locking-plate into its normal position, so that when the spring 24 of the push-button acts to restore the same to its normal position a portion of the upper face of the locking-button 25 will be engaged with the lower face of the locking-plate at a point on one side of the hole, whereby the plate acts to lock the push-button in question in its intermediate depressed position, at which time its washer-like contact-button 26 is engaged with its complementary contact-spring 33. Now in case any other push-button is depressed its cone-like locking-button 25 will operate the locking-plate 42 to align its holes 44 with the locking-buttons 25 of the push-buttons, so that the previously-locked push-button will be immediately released. At the same time the push-button just depressed will be locked in its intermediate depressed position, and so on. If two or more push-buttons are simultaneously depressed, they will be simultaneously locked in the same manner, and if two or more buttons are locked they will be simultaneously released the next time one or more buttons are depressed. It will be seen, however, that when the push-buttons are manually released one button will of necessity be depressed and locked in its intermediate position by the locking-plate. In order to operate the locking-plate to release this button, so as to restore the instrument to its full normal condition, I employ means independent of all of the buttons for automatically operating the locking-plate to release the push-button or push-buttons that may be locked in their intermediate positions at the end of the last preceding use of the device. For this purpose I employ a hammer 49, arranged to strike light blows upon the anvil 47 aforesaid and carried by an arm 50, forming an extension of the armature 51 of the call mechanism 13. The hammer 49 does

not effect the unlocking movement of the locking-plate 42 by a single blow, but by a series of blows each of which moves the plate a trifle until it has been moved sufficiently to release the push-button or push-buttons engaged with it, after which the plate is returned to its normal position by its spring 48. Of course if the magnet of the call mechanism 13 is a strong magnet one blow of the hammer might be enough to unlock the plate. It is obvious, however, that instead of utilizing the call mechanism 13 to operate the locking-plate 42 in the manner described I might employ an independent magnet arranged to operate the plate by one or more blows. It will be understood that when the plate is moved by a series of blows every advance, however minute, made by the plate is held by the friction between it and the locking button or buttons engaged with it. The said spring, it may be explained, is not strong enough to prevent the cumulative action of the hammer 49, as described above, but only strong enough to move the locking-plate 42 when all of the push-buttons are in their released positions.

I have described the contact-springs 33 as being connected together by a common wire 35. In the construction shown, however, one of these springs, which for convenience I will specially designate 33^a, is not connected with the wire 35, but connected by a wire 52 with a local release-battery 55 of ordinary construction. A spring 53, Fig. 3, secured to the adjacent end of the switch-block 15, has its lower end arranged to be engaged by the contact-button 26 of the push-button coacting with the spring 33^a at the same time that the said spring 33^a is engaged by the said button. The spring 53 is connected by a wire 54 to the binding-post 11^c, Fig. 2, which is connected, as before explained, with the home-station wire. It should now be explained that the particular push-button which coacts with the contact-spring 33^a and the spring 53 is the button which is employed to establish a connection with the city exchange or any manual exchange. As the current used to call from the manual exchange is too weak to operate the magnet of the call mechanism 13 so as to effect the magnetic hammer movement of the locking-plate into its unlocked position, I employ in the manner described the spring 53, which is located in the circuit of the local release-battery 55, whereby an extra current is brought into play for effecting the unlocking movement of the locking-plate.

For clearness and convenience I have shown the local release-battery 55 and the circuit thereof in conjunction with Fig. 2. In this figure the wire 54 aforesaid is shown as leading from the spring 53 (which might aptly be termed the "local release-circuit spring") to the binding-post 11^c; but the connection of the spring 53 with the binding-post 11^c is for other purposes than for the energizing of the

call mechanism 13. A wire 56, connected with the said wire 54, leads thence to one side of the call mechanism 13, the other side of which is connected by a wire 57 to the binding-post 10^c, which in turn is connected, through the desk-telephone, which is not shown but which is of ordinary construction, to the binding-post 10^d, which is connected by a wire 58 with the local release-battery 55, which is in turn connected by the wire 52, before mentioned, with the spring 33^a. It will be now clearly understood that when the springs 33^a and 53 are brought into contact by the depression of their complementary push-button a circuit is closed through the local release-battery 55, which is thus thrown onto the call mechanism 13, the energization of which causes the hammer 49 to vibrate and effect the unlocking movement of the locking-plate 42, whereby the particular push-button now being considered is released.

The operation of the mechanism with regard to the feature just described is as follows: To talk with the city exchange or any manual exchange, the telephone-receiver is first removed from the desk-telephone, whereby the circuit between the binding-post 10^c and 10^d is broken. The particular push-button coacting with the spring 33^a and the special local release-battery spring 53 is then depressed and is at once engaged in its depressed position and held therein by the locking-plate 42. Now after the use of the telephone the receiver thereof is restored to its hook, whereby the binding-posts 10^c and 10^d are again connected and a circuit completed through the local release-battery 55, through the call mechanism 13 and through the springs 33^a and 53. The battery 55 now being cut into the call mechanism 13, the same is energized with sufficient power to operate the hammer 49 and automatically release the particular push-button referred to.

In view of the modifications suggested and of others which may obviously be made I would have it understood that I do not limit myself to the particular construction herein shown, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention. Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a push-button switch mechanism, the combination with a series of push-buttons, of a locking instrumentality for locking any one or more of the said buttons in their depressed or operating positions, and electrically-operated means for operating the said locking instrumentality in releasing any one or more of the buttons and so restoring the apparatus to normal.

2. The combination with a series of push-buttons, of a locking-plate for locking any one or more of the said buttons in their depressed

or operating positions, and electrically-operated means for moving the said locking-plate to cause it to release any button or buttons held in a depressed position by it.

5 3. In a push-button switch mechanism, the combination with a series of push-buttons, of a locking instrumentality for locking any one or more of them in depressed or operated position, and an electrically-operating hammer
10 for operating the said instrumentality in releasing any of the buttons held by it in depressed or operating position.

4. In a push-button switch mechanism, the combination with a series of push-buttons, of
15 a locking-plate for holding any one or more of them in their depressed positions, and an electrically-operated hammer operating upon the plate to move it to release any button or buttons held in depressed position by it.

20 5. In a push-button switch mechanism, the combination with a switch-block formed with holes, of insulated contact-bushings located within the said block at or near the lower ends
25 of the said holes, push-buttons located in the said holes and having their stems passed through the respective contact-bushings, contact-springs coacting with the respective push-buttons, and means for locking any one or
30 or more of the push-buttons in their depressed or operating positions in which they coact with the said contact-springs and for releasing the said buttons from their depressed positions.

6. In a push-button switch mechanism, the
35 combination with a switch-block having holes, of insulated contact-bushings located within the said block at or near the lower ends of the said holes, push-buttons the stems whereof pass through the said bushings and carry locking-
40 buttons and contact-buttons, contact-springs for direct electrical engagement by the said contact-buttons, and a movable locking instrumentality coacting with the locking-buttons for holding the push-buttons in their
45 depressed positions.

7. In a push-button switch mechanism, the combination with a switch-block having holes, of insulated contact-bushings located within
50 the said block at or near the lower ends of the said holes, push-buttons the stems of which pass through the said bushings, contact-buttons located upon the projecting ends of the said stems, contact-springs for direct electrical engagement with the contact-
55 buttons, and means for locking the push-buttons in their depressed or operating positions.

8. In a push-button mechanism, the combination with a switch-block, of a series of push-buttons mounted therein, a series of contact-
60 springs for engagement by the said buttons, a locking instrumentality coacting with all of the buttons for locking them in their depressed or operating positions in which they are held in contact with their complementary contact-
65 springs, and a contact-spring located in the

circuit of the local release-battery and arranged for being engaged by one of the push-buttons at the same time the same is engaged with its complementary contact-spring.

9. In a push-button switch mechanism, the
70 combination with a switch-block, of a series of push-buttons mounted therein and each having a locking-button and a contact-button, of a series of complementary contact-springs arranged to be engaged by the contact-buttons
75 of the push-buttons, a movable locking-plate coacting with the locking-buttons of the push-buttons for holding the same in their depressed positions in which they are engaged with their complementary contact-springs,
80 electrically-operated means for moving the said plate to release any one or more of the push-buttons after depression, and a spring located in the local release-circuit and arranged to be engaged by the contact-button
85 of one of the push-buttons when the contact-button thereof is engaged with its complementary contact-spring.

10. In a push-button switch mechanism, the combination with a switch-block having holes,
90 of insulated contact-bushings located within the said block at or near the inner ends of the said holes, push-buttons the stems of which pass through the said bushings, contact-springs for direct electrical engagement by
95 the said buttons, and a locking instrumentality coacting with all of the push-buttons for locking them in their depressed or operating positions in which they are held in contact with their complementary contact-springs. 100

11. In a push-button switch mechanism for telephones, the combination with a switch-block, of a series of push-buttons mounted therein and each comprising a stem, a spring,
105 a locking-button and a contact-button located below the same close to the lower end of the stem; a series of contact-bushings mounted in the said switch-block in position to have the stems of the push-buttons pass through
110 them, a series of contact-springs arranged in position to coact with the contact-buttons of the push-buttons, and a movable locking instrumentality coacting with the locking-buttons of the push-buttons for holding the same in their depressed positions in which they are
115 engaged with the said contact-springs, and an electrically-operated means for moving the said instrumentality to release any one or more of the said push-buttons after depression. 120

12. In a push-button switch mechanism, the combination with a switch-block having holes, of insulated contact-bushings located within
125 the block at or near the lower ends of the said holes, push-buttons each having a cylindrical metal body corresponding in diameter to the said holes, a stem carried by the said body, and a spring encircling the stem, the stems of the respective push-buttons passing through the said contact-bushings, and the springs of 130

the respective push-buttons being located within the said holes and encircling the said stems, contact-springs for direct electrical engagement by the said buttons, and a movable
5 locking instrumentality coacting with the push-buttons for holding the same in their depressed positions.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

BURTON LEONARD LAWTON.

Witnesses:

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E. C. WILCOX.