

(No Model.)

T. DE LOCKWOOD.
Telephone Switch Board.

Patented March 1, 1881.

No. 238,217.

Fig. 1.

Line.

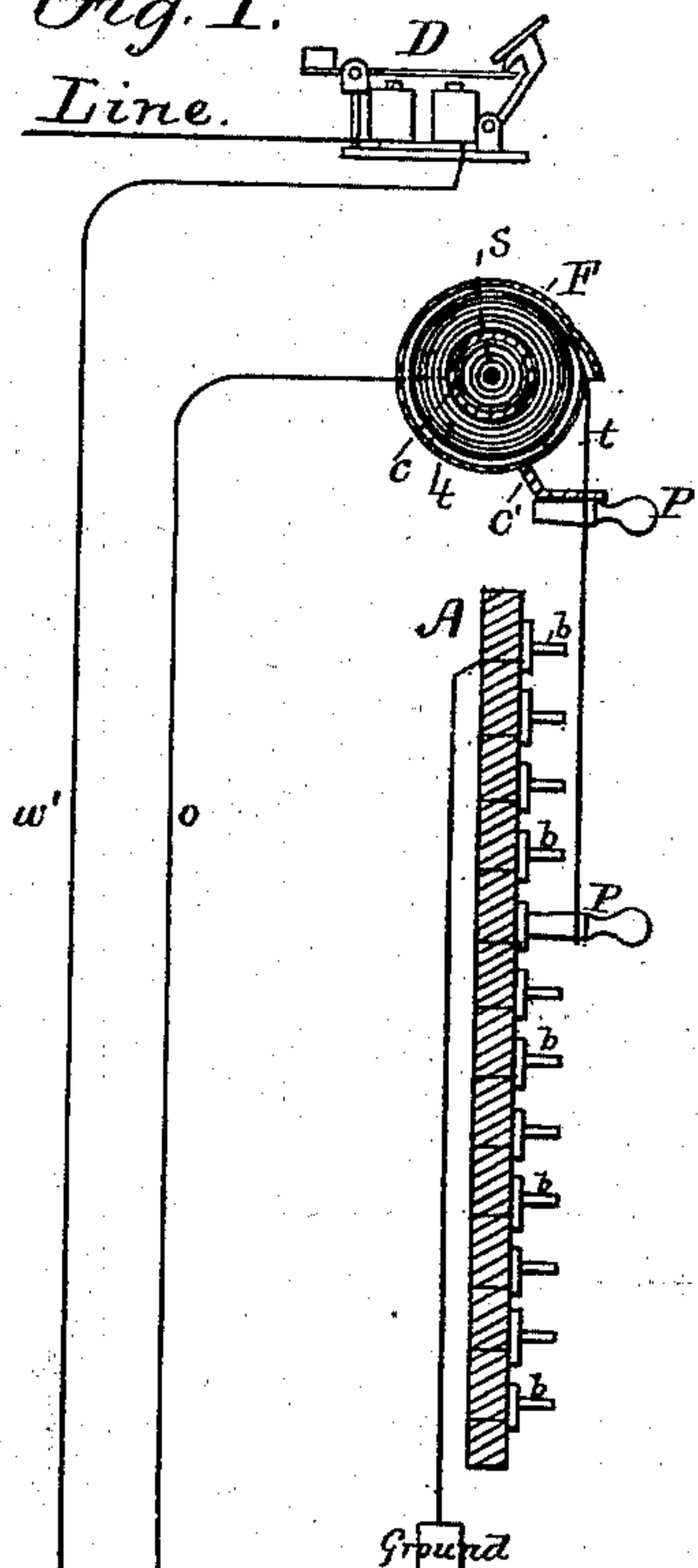


Fig. 2.

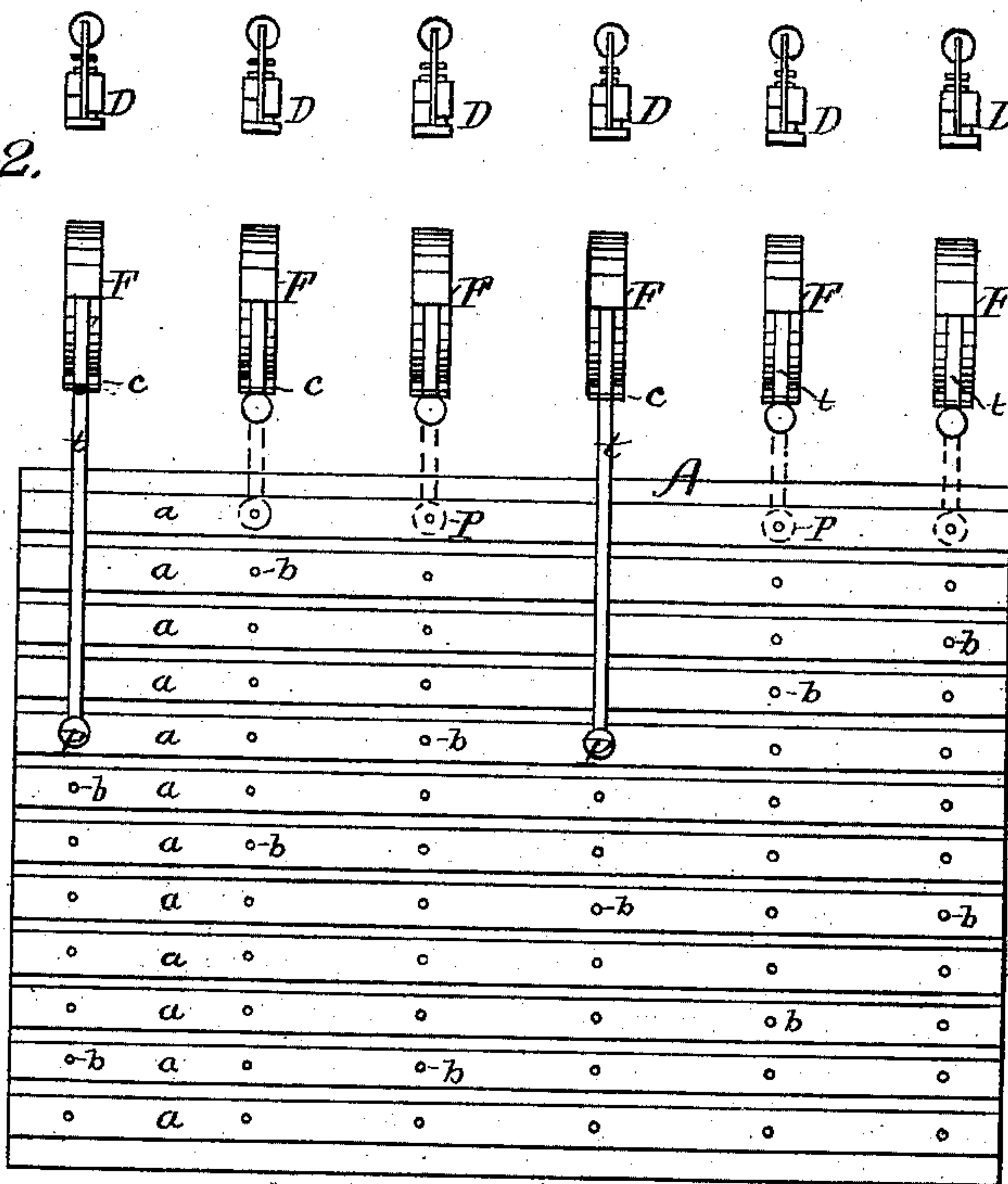


Fig. 3.

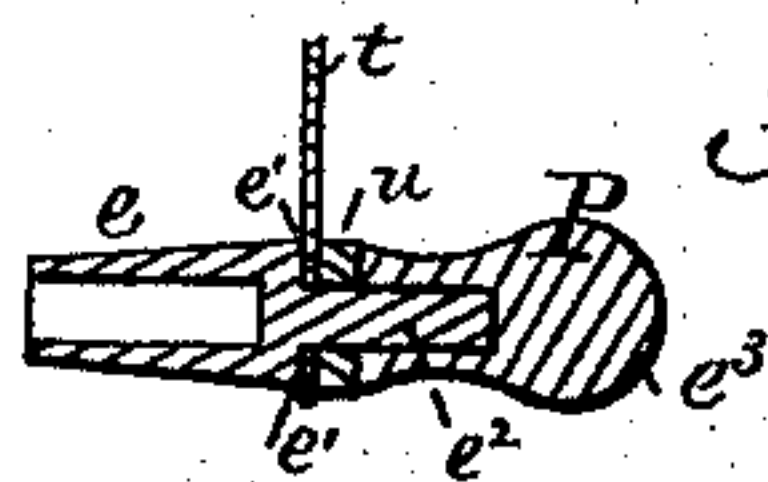
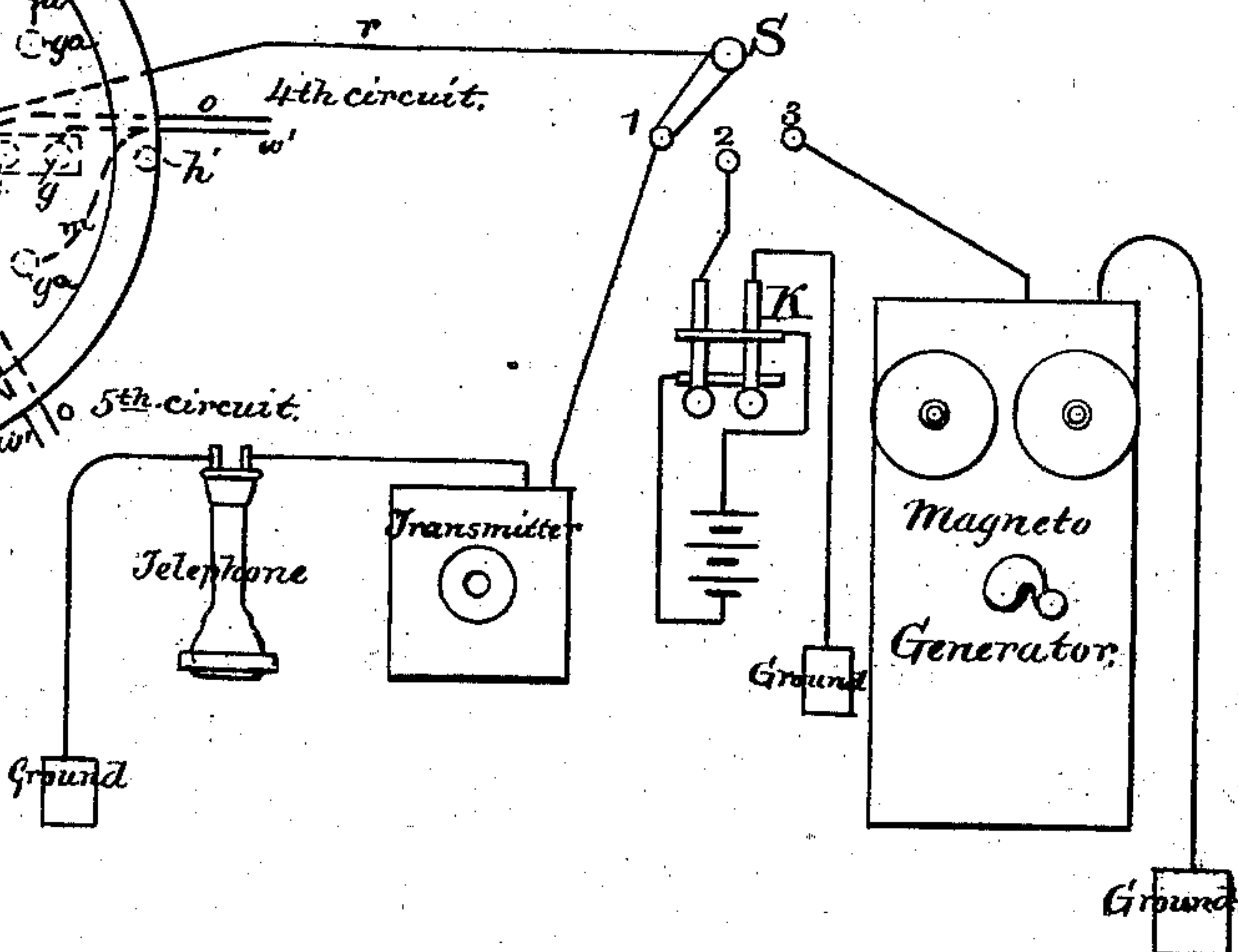
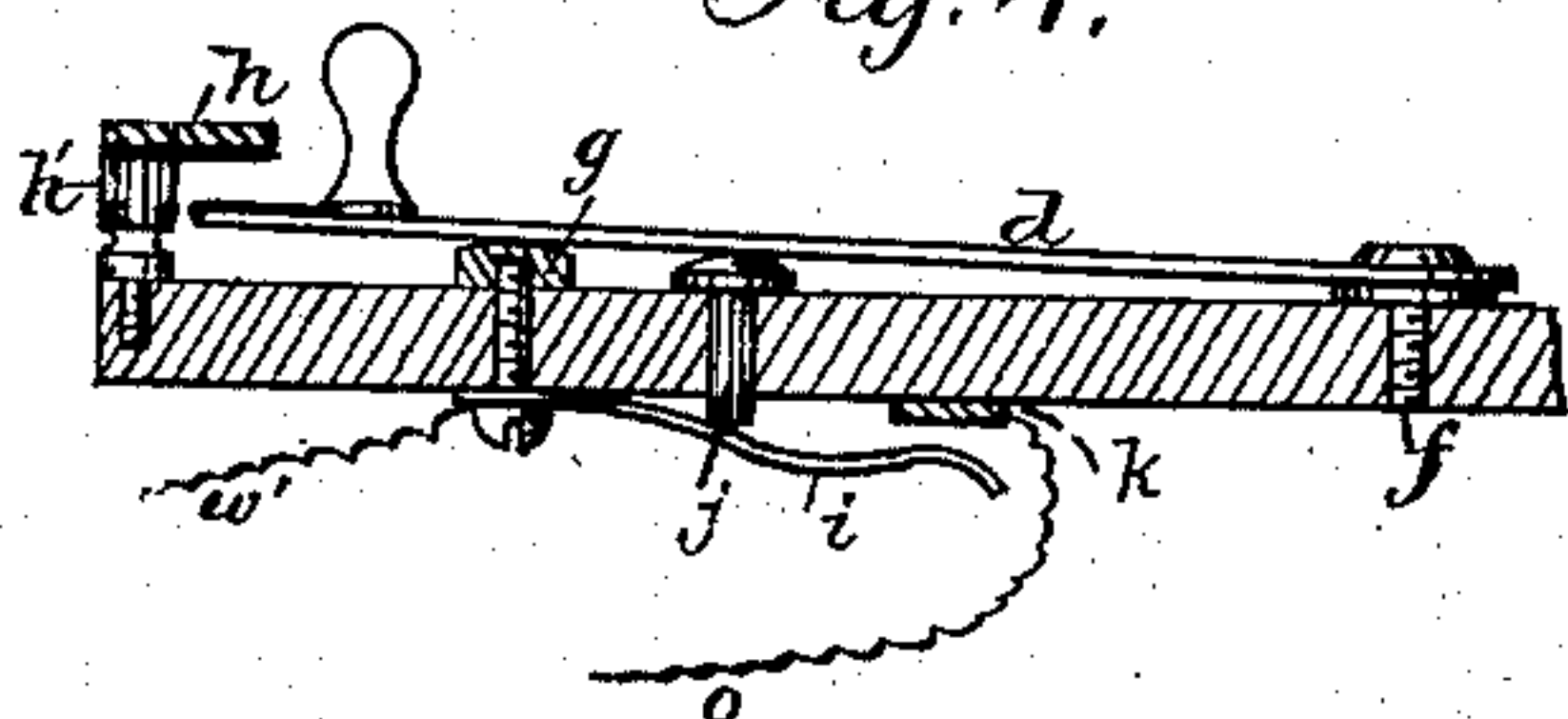


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

THOMAS DE LOCKWOOD, OF MALDEN, ASSIGNOR TO AMERICAN BELL TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

TELEPHONE SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 238,217, dated March 1, 1881.

Application filed August 21, 1880. (No model.)

To all whom it may concern:

Be it known that I, THOMAS DE LOCKWOOD, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain
5 Improvements in Telephone Switch-Boards, of which the following is a specification.

This invention relates to that class of telephone central-office switch-boards which are composed of a series of metallic strips, each
10 connected to or forming a part of one of the line-circuits, and a series of connecting-strips arranged substantially at right angles to the line-circuit strips and normally disconnected from the latter, each connecting-strip being
15 insulated from the others and adapted to connect any two of the line-circuit strips when engaged therewith by suitable plugs or other connecting devices.

Heretofore both the line-circuit strips and
20 the connecting-strips have been rigid and have been rigidly attached to a suitable board or frame, the line-circuit strips being in front of but not in contact with the connecting-strips, and provided with sliding or other plugs,
25 whereby each line-circuit strip can be connected with either of the connecting-strips. The network of strips involved by this construction is somewhat confusing, so that mistakes are liable to be made in making the de-
30 sired connections.

My invention has for its object, mainly, to obviate such confusion in a switch-board of the class above mentioned; and to this end it consists in the substitution, for the rigid line-
35 circuit strips heretofore used, of flexible strips, each supported at a point above the front of the switch-board, and permanently connected with or forming part of the line-circuits, and provided with a spring-impelled drum where-
40 by it is automatically removed from the front of the switch-board, and with a plug or device whereby it may be connected to either of the connecting-strips.

My invention also consists in certain other
45 improvements relating to switch-boards and central-office systems, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 shows a dia-
50 grammic sectional view of an arrangement of

my invention. Fig. 2 represents a front view of the switch-board, with the annunciators and spring-retracting flexible connecting bands or tapes in position. Fig. 3 represents an en-
larged section of the switch-plug. Fig. 4 rep- 55
resents an enlarged section on line *xx*, Fig. 1.

Like parts in all the figures are correspond-
ingly designated.

In the drawings, A represents a switch-
board composed of the usual backing of wood 60
or other insulating material, and provided with the usual rigid metallic connecting-strips *a*, and with line-circuit strips *t*, arranged sub-
stantially at right angles to the connecting-
strips when in operative position. The con- 65
necting-strips *a* are rigidly attached to the board A, as usual; but the line-circuit strips, instead of being rigid, are composed of flexi-
ble metal tapes, each secured at one end to a
rotary metallic drum, *c*, located above the 70
strips *a* and provided with a spring, *s*, ar-
ranged on a spindle and adapted to rotate the
drum *c*, so as to wind up the tape or strip at-
tached to it automatically, the operation of
each drum and its spring being similar to that 75
of an ordinary spring tape-measure, so that
the strips *t* are normally wound upon the drums
c, and thus elevated above the strips *a*. Each
drum *c* is inclosed by a metallic casing, F, of
any suitable form adapted to cover the coiled 80
portions of the strip *t*, and each casing is pro-
vided with a guard, *c'*, to limit the upward
movement of the strip *t*. Each strip *t* is elec-
trically connected to its line-circuit, as is usual
in switch-boards of this class, the connection 85
being through the drum *c*, the arbor on which
said drum rotates and the spring *s*, as shown
in Fig. 1, the drum and spring performing the
twofold function of automatically withdraw-
ing the strip from the front of the switch- 90
board and connecting it to the line circuit.
Each strip *t* is adapted to be secured to either
of the connecting-strips *a*, and to this end I
prefer to provide the strips *a* with outwardly-
projecting pins *b*, arranged in vertical rows in 95
line with the strips *t*, and provide the strips *t*
with plugs P, each having a socket adapted
to cover one of the pins *b*. Each plug P is
composed of a cylindrical piece hollow at one
end to form the socket, and turned down at 100

the other end to form a shoulder, e' , and a screw, e^2 . A hole is drilled or punched in the outer end of the strip t , through which the screw e^2 is passed, said strip being clamped against the shoulder e by a nut, n . The outer end of the plug is provided with a handle, e^3 . The plugs P normally rest upon the projecting pins p of the upper metal strip, a , which is the ground-strip, and always has a ground-connection.

By the employment of the flexible line-circuit strips and the means for automatically elevating the same I avoid the complication and confusion resulting from the employment of the crossed rigid strips and their connecting slides, plugs, or springs heretofore used, each line-circuit strip being removed from the face of the switch-board when not in use, and being adapted for use by simply pulling down its plug P to the desired point. The strips t are so located in such relation to the switch-board that when said strips are drawn down they will not touch one another; hence all crossing contacts are avoided. If desired, however, the strips may be suitably insulated.

B represents a circular switch arranged upon a base-board, which is preferably secured to an operator's table attached to and immediately in front of the switch-board.

d represents the metal lever of the switch, pivoted at f to swing freely in both directions.

h represents a back limit or stop-bar for the lever d , said bar being of annular form, concentric with the pivot f , and supported above the base-board by studs h' in such manner that the lever d can be swung freely under it and bear against its under surface when not pressed away from it. The lever d may be held normally against the bar h by its own resilience or by a suitable spring.

The switch is employed with any convenient number of circuits, six being shown in the present instance. Each circuit is composed of a line-wire entering the office through one of the usual annunciators D , a wire, w' , connecting the annunciator to a contact or button g on the switch-board, a wire, o , normally connected to the wire w' by a spring, i , and extending to one of the strips t , through the drums c and spring s , as described, and a wire, m , connecting the wire w' to a button, g^a , for a purpose hereinafter described. In each circuit is a pin-button, j , interposed between the spring i and the under side of the lever d . When the lever d is in its normal position the spring i connects the button g and plate k , but when the lever d is depressed the pin-button j separates the spring i from the plate k , as shown in Fig. 4. The plate k of each circuit is connected to the inner end of one of the strips t by a wire, o , so that the depression of the lever d over either of the pin-buttons j cuts out the strip t to which the plate k of the same circuit is connected. The pivoted end of the lever d is connected to the switch S by wire r , as shown, and by means of button 1 of said

switch the telephone and transmitter are put onto the line, by button 2 the battery and calling-keys are switched in, and by means of button 3 the magneto-generator is put to line.

Operation: Suppose a call to come into the office by line w' , entering through the first circuit. The operator, noticing the fall of the annunciator, turns the lever d to button g of the first circuit, presses it down and makes contact with said button, and at the same time depresses the spring i away from plate k , and turning switch S to button 1, puts the telephone and transmitter into line, thus making a circuit from line first, annunciator, wire w' , button g , lever d , transmitter, and telephone to ground, and ascertains the wants of the calling party. Suppose the line entering through the fourth circuit is wanted by said party. The operator then turns lever d to button g of the fourth circuit, depresses the lever to make contact with the said button, at the same time cutting out plate k of said circuit, turns the switch S to button 2, if a battery-circuit, or to button 3, if a magneto-circuit, using the calling-keys K in the first instance, and the magneto-generator in the last instance, to call up the desired party. When said party has been called the operator draws down the line-circuit strip t of the first circuit by means of the knob or handle of plug P , and pushes the plug onto the pin b , as shown, of a connecting-strip a , not in use, directly under said tape—say the fourth strip from the top—then draws down the strip t of the fourth circuit, places the plug on the pin on the fourth connecting-strip, and turns his lever to the button g of the fourth circuit, and turns the switch S to button 1. The two subscribers are thus placed in communication with each other, and the operator's telephone is in circuit, so that he can learn whether they are talking or not. When the lever d is pressed upon button g of the fourth circuit, which is electrically connected to button g^a of the same circuit by wire m , the telephone and transmitter are put in a branch circuit, so that the operator can hear, as described. Connections are thus made with any two circuits or lines in the least possible time and with the greatest ease and simplicity.

By the employment of the hollow plug a much longer bearing can be obtained than by the ordinary solid or split plug inserted into a hole in the connecting-strip, and the wear resulting from frequent use is materially decreased, there being no necessity of a tight fit of the plug on the pin, as the retractile power of the spring tends to draw the plug upward when placed on a pin, thus holding the plug against the pin with a yielding pressure, and securing perfect electrical contact with the same.

The employment of the pin-button j , interposed between the lever d and springs i , enables either of the line-circuits to be cut out from its ground connection by the same operation that connects such line-circuit with the

central office. This feature enhances the rapidity of operation, and I believe it to be novel.

A switch, arranged to swing freely in either direction, also adds to the quickness of operation as well as simplicity of construction.

There may be as many circuits on a single circular switch as can be conveniently worked by one operator.

I am aware that it is not new to combine with the terminal of a line an extension-cord or switch-connection, having an automatic take-up or spring-impelled drum; but I am not aware that a series of flexible line-circuit strips, provided with spring-impelled drums, and permanently connected with and forming parts of the line-circuits, have ever been employed in combination with connecting-strips, as herein described, the spring-impelled drums having the two-fold function before named.

I claim—

1. In a switch-board of the class herein described, the combination, with the fixed connecting-strips *a*, of the flexible suspended strips *t*, permanently connected with or forming parts of the line-circuits, each strip *t* being provided with a spring-impelled drum, whereby it is automatically removed from the front of the switch-board, and with a plug or device whereby it may be connected to either of the connecting-strips *a*, as set forth.

2. The flexible metallic strip *t*, combined

with the metallic spring-drum *F*, its arbor, a line-circuit, and a ground-switch, substantially as and for the purpose described.

3. The combination of a series of buttons or contacts, *g*, corresponding to the number of line-circuits and arranged in circular order, a spring switch-lever, pivoted at a point practically equidistant from the buttons or contacts, adapted to make contact with either of the same and normally disconnected from the buttons, and an annular bar concentric with the pivots of the lever and adapted to serve as a back stop for the same in any of the positions in which it may be placed, substantially as described.

4. In a central-office telephone system, comprising wires *w'* and *o*, springs *i*, plates *k*, and buttons *g* and *g'*, the lever *d* and pins *j*, adapted, by depression, to connect the line-circuit entering at each of said buttons with the central-office telephone and transmitter, and at the same time and by the same movement to cut out the previous earth-connection of the same line-circuit, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 19th day of August.

T. DE LOCKWOOD.

Witnesses:

W. C. TOMPKINS,
GEO. W. PIERCE.