2 Sheets—Sheet 1.

G. W. COY.

Switch for Telephone Exchanges.

No. 224,653. **Patented Feb. 17, 1880.**

fig. 1

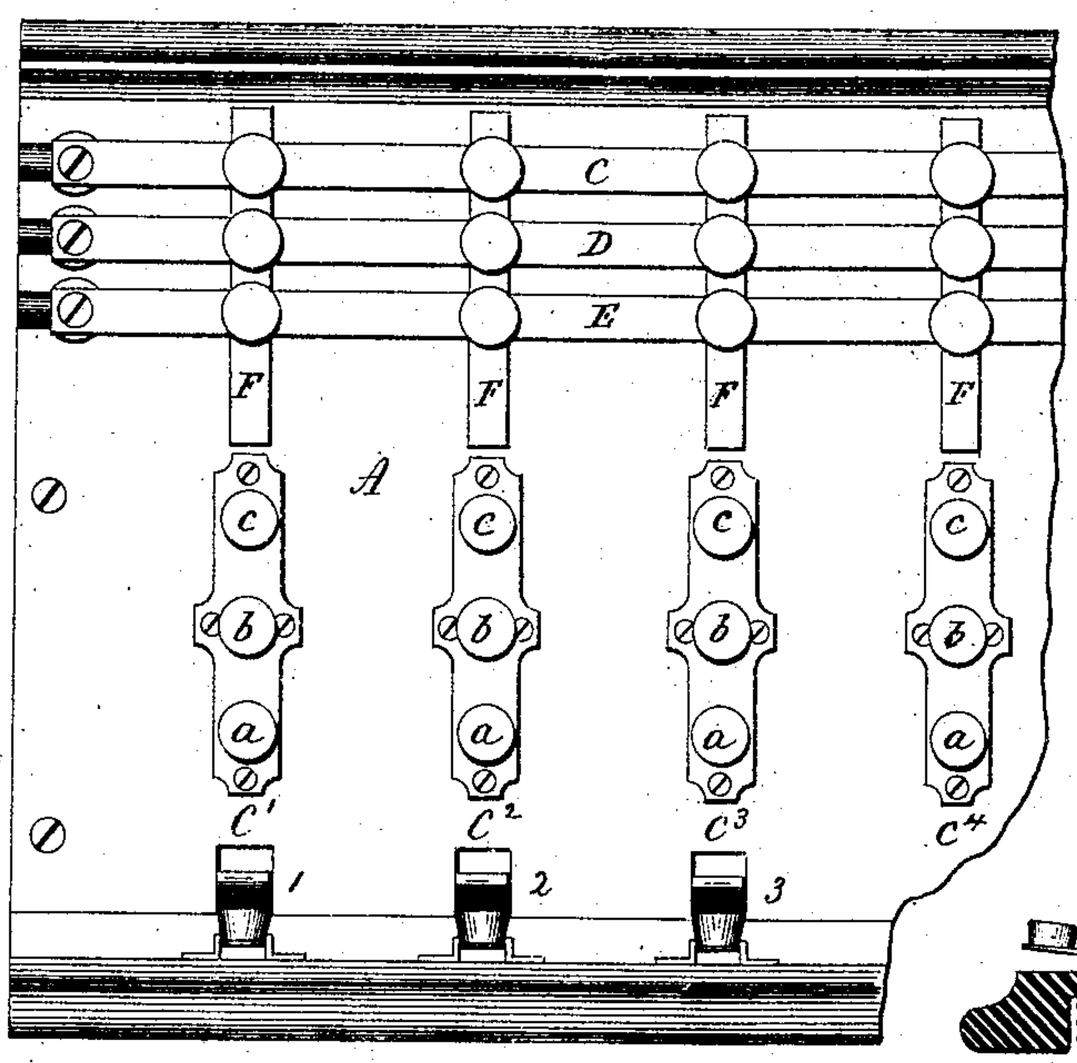


fig. 2

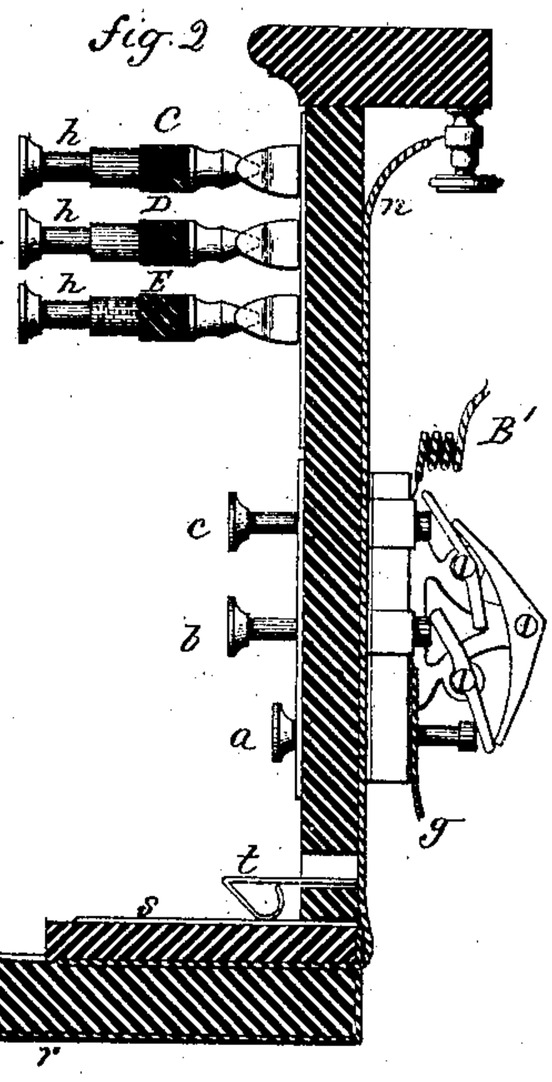


fig. 3

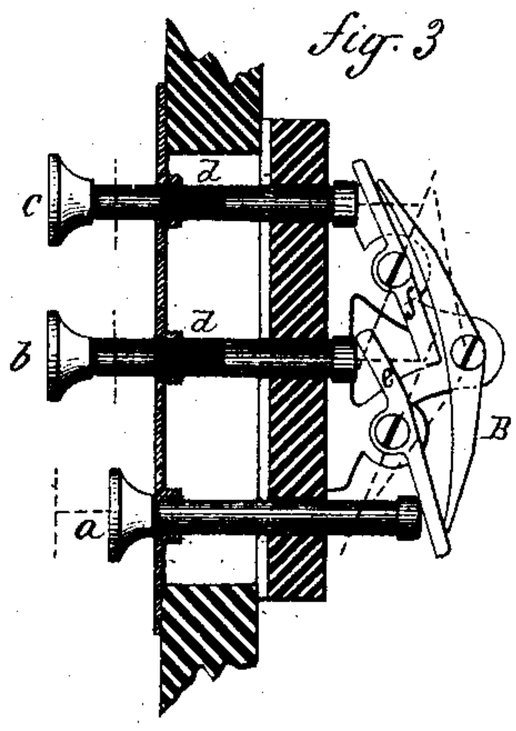


fig. 4

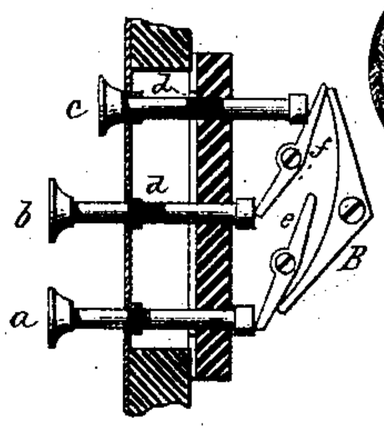


fig. 6

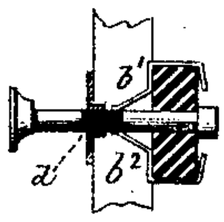
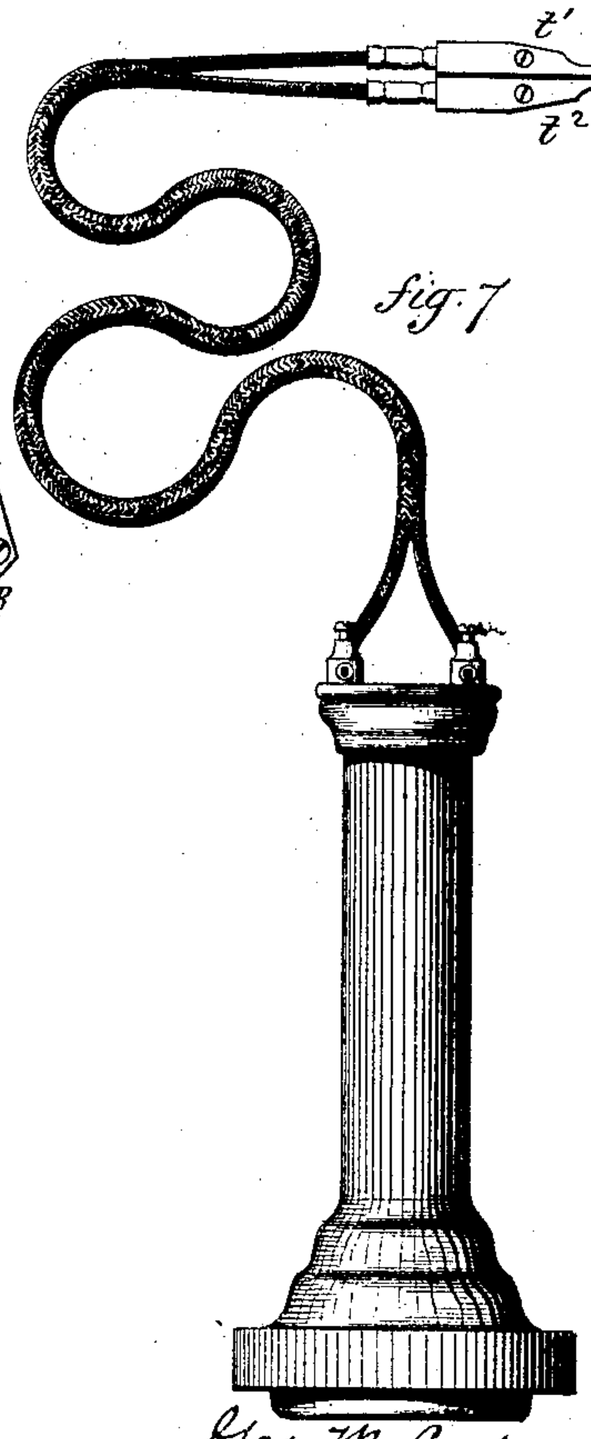


fig. 7



Witnesses.

J. H. Shumway.

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By Atty.

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2 Sheets—Sheet 2.

G. W. COY.

Switch for Telephone Exchanges.

No. 224,653. **Patented Feb. 17, 1880.**

fig. 4

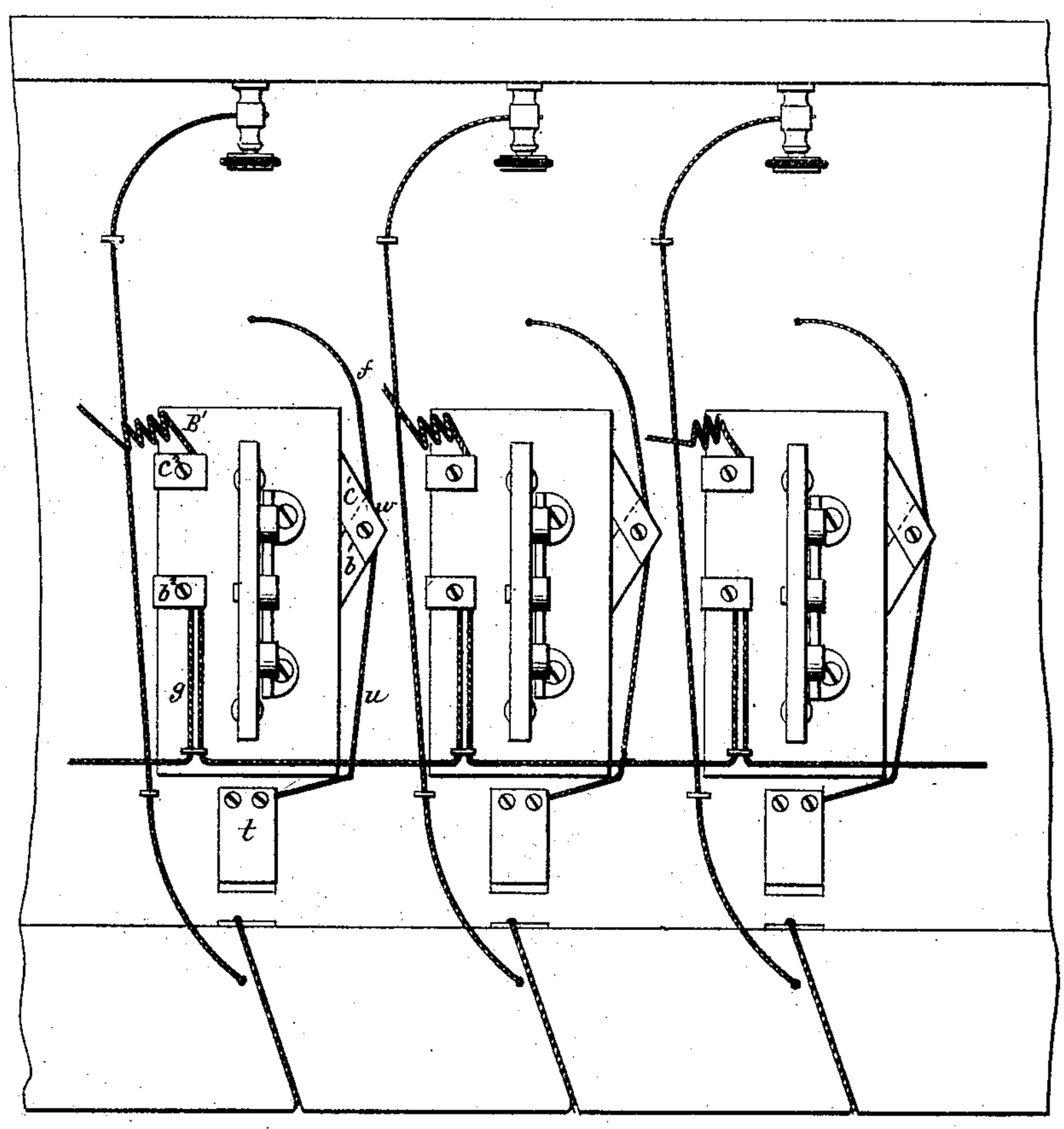
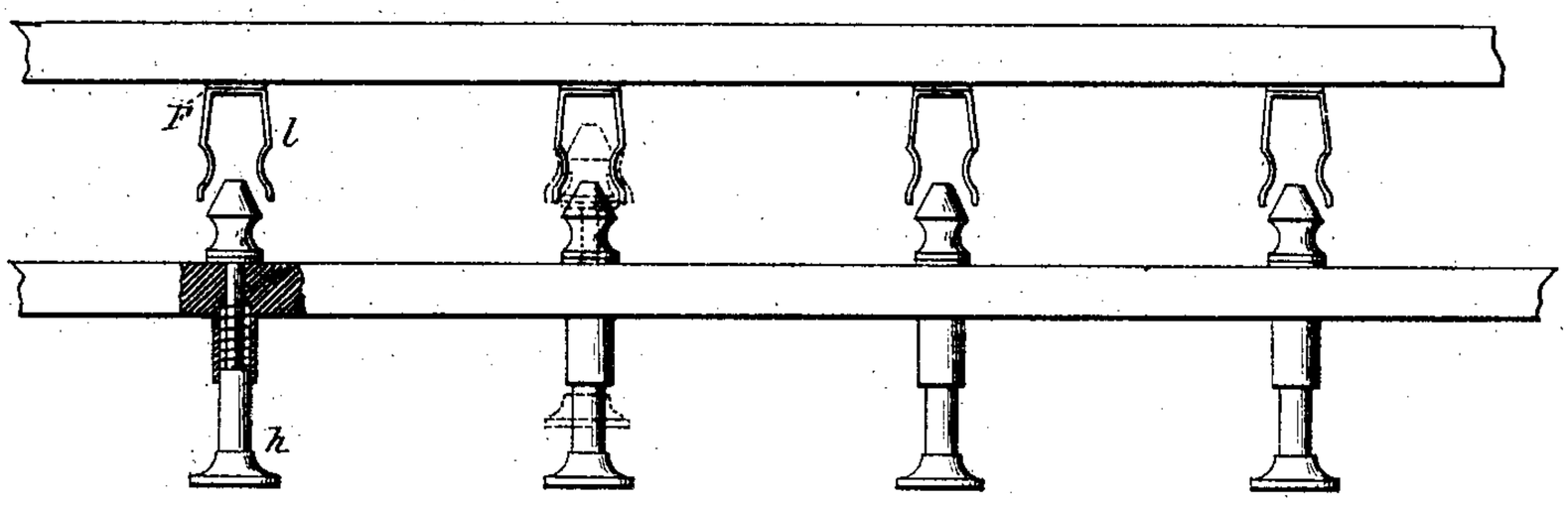


fig. 5



Witnesses.

J. H. Shumway

Jos. C. Earle

Geo. W. Coy.

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UNITED STATES PATENT OFFICE.

GEORGE W. COY, OF NEW HAVEN, CONNECTICUT.

SWITCH FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 224,653, dated February 17, 1880.

Application filed May 26, 1879.

To all whom it may concern:

Be it known that I, GEORGE W. COY, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Electric Switches; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, 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, front view; Fig. 2, sectional end view; Figs. 3, 4, 5, and 6, detached views; Fig. 7, the telephone as fitted for use; Fig. 8, rear view.

This invention relates to an improvement in electric switches designed with special reference to communication by telephone where several instruments are arranged upon the same circuit or several circuits centering at a single point, the object being to receive a call from one instrument at the central office for communication with a second instrument, and so as to call that instrument, and then put the two in communication; and the invention consists in the construction, as hereinafter described, and particularly recited in the claims.

A represents the switch-board, on which are keys 1, 2, 3, and so on, more or less, according to the number of circuits or lines. Corresponding to each line are the switch-spindles *a b c*, each terminating in a conveniently-shaped knob in front. The two spindles *b* and *c* are each provided with an insulator, *d*, over a part of their length, for the purpose hereinafter described. At the inner or rear end of the spindles there are arranged three levers, *e*, *f*, and B. The one, *e*, is hung intermediately between the two spindles *a b*, and so that each of the said spindles will be in line with the respective arms of the said lever *e*. The other lever, *f*, is hung at a point intermediate between the two spindles *b c*, and so that the said spindles will be in line with the corresponding end of the said lever *f*. The lever B is hung centrally between the two spindles *a c*, so that one of its arms will ride upon the lower arm of the lever *e* and its other arm upon the upper arm of the lever *f*, as seen in Fig. 4. In this condition the spindle *c* stands at its extreme inward position and the spindles *b a* at their outward position, and which is the normal condition of the spindles. Now, if spindle *b* be pushed in, it will force the spindle *c* out, or if the spindle *a* be pushed in, it will, through the lever B, force the spindle *c* outward. Either one of the three spindles being in, pushing in either of the other two will force that one out—that is to say, only one of the spindles can be in its inward position at the same time. Above these spindles are one or more bars, C D E, each provided with a spindle, *h*, for each circuit, or corresponding to the respective series of spindles *a b c*. Below and on the board, in line with each series of spindles *a b c*, is a metallic plate, F, with a coupling, *l*, projecting from it toward each spindle *h*, as seen in Fig. 5, and the inner ends of the spindle *h* are constructed so that when forced inward they will make a connection with the coupling, as seen in Fig. 5, but when drawn out are free and away from the coupling. This coupling *l* is best made of elastic metal, and the end of the spindle conical shape, as shown, so as to be forced between the end of the coupling, but may be otherwise formed.

The line-wire *n* comes to the board, and comes directly into connection with the key of that line shown as 1, Fig. 2. From the button under the key a wire, *p*, runs to the battery, and from the bridge *m* runs a second wire, *r*, to a metallic plate, *s*, and on this rests an elastic metallic plate or jaw, *t*, which extends through the board; and on the back a wire, *u*, runs from the jaw *t* to a point, *w*, where branches *b'* and *c'* lead, respectively, to make connection with either of the spindles *b c*. These connections *b' c'* are made from strips of metal turned inward against the respective spindles, as seen in Fig. 6. In the opposite side of the spindles *b c* similar strips b^2 c^2 lead outward. From the one, b^2, runs the ground-wire *g*, and from the other, c^2, the battery-wire B'. From the point *w* a wire, *f*, runs into connection with the metallic plate F, on which are the couplings *l*, to make connection with the spindle *h* and their respective bars.

It will be observed that from the bridge through the plate *s* and jaw *t* to the point *w* the circuit is substantially the same as if the wire ran direct without the interposition of the plate *s* and jaw *t*.

The position of the strips *b'* and b^2 relative

to the spindles *b* and *c* is such that when the spindle is out the ends of those strips rest upon the insulator *d*, but when the spindle *b* is in then they come in contact with the metal of that spindle and make ground-connection, or when the spindle *c* is in it applies the battery, and the line is ready for a call.

The use of the elastic jaw *t* and plate *s* is to enable the person in attendance to apply a telephone, introducing it to either circuit with which he wishes to communicate; but instead of the jaw and plate a telephone may be applied to each circuit.

In Fig. 7 the telephone is shown as fitted for introduction between the jaw *t* and plate *s*. The two wires of the telephone terminate in wedge-shape metal tips t' and t^2, with an insulator between. Then the operator forces this wedge-shape tip between the jaw and plate, and thereby makes connection through the telephone, and is enabled with this single telephone to communicate through either of the circuits to which he may apply it.

The operation of the switch is as follows: The upper spindles, *c*, are all in, the battery branches thereby being applied to every circuit, each circuit having a bell or other signal at the office, which indicates a call to the office on that circuit. Now, suppose a call to come from the first circuit, c'. The operator pushes in the spindle *b* on that circuit, which throws off the battery and puts on the ground. He then places his telephone into connection with that circuit, and receives communication from the person calling, saying, for instance, that he wishes to communicate with a certain person, whom the operator ascertains to be on circuit c^3. He then pushes in the spindle *a* of the circuit c', as in Fig. 3, throwing off both battery and ground; then pushes in the spindle *b* of the circuit c^3, and with the key of circuit c^3 gives the signal required to call that particular person, and introduces his telephone to the same circuit. The person answering, the operator gives the information that communication is open for him with the person who called. He then presses in the spindle *a*, taking off both battery and ground, and at the same time presses in the spindle *h* of the respective circuits c' and c^3, making the communication between the two circuits on the bar on which are the spindles *h*. Then, when the parties have completed their communication, the operator pushes in the battery-spindle *c* and draws out the circuit-spindles *h*, leaving the lines ready for another call.

The object of employing several bars, C D E, is that different circuits may be in use at the same time—as, for instance, suppose the first and third are in use, as before described, a call comes from the second circuit to communicate with the fourth, a second bar would be used for connecting those circuits, and two other circuits would take a third bar, and so on. The circuit-spindles *h* are each provided with a spring, as noted in Fig. 2, the tendency of which is to hold the spindles outward and prevent accidental connection of the circuits.

It will be observed that communication is made from the main wire through the key to the switch-board. Hence, when the key is depressed to take it away from the bridge *m* and make connection with the button below, the switch-board is cut off from the main wire *n*.

The advantage of this arrangement is as follows: Supposing the switch-board to be longer than will allow the operator to reach over its extent, and that a call has come to him from one of the extreme circuits. Having received the call, he presses in the lower spindle to disconnect both battery and ground. Then, having made the connection with the bar above, he proceeds to call on the desired circuit, which may be at the other extreme. Having made the call and the connection above with the same bar, he finds that the called party is not responding. He then applies the key to make a recall on that party. Now, if the connection were through the switch-board to the keys, as is usual in such switches, the call made on this second circuit would also pass through the bar to the first circuit and make the call upon that circuit also, which would at once create confusion, unless the two parties should have the same signal; but because of the connection in each circuit being made through the key and bridge, it follows that depressing the key from the bridge cuts off the switch-board, and the signal is made by the contact of the key with the button, the current passing out through the key directly to the main wire. Hence the call may be made on any one circuit notwithstanding that circuit may be in connection with one or more other circuits, and that call not extend beyond the circuit on which it is made.

The lower spindle, *a*, and the levers which connect the several spindles *a b c* may be dispensed with, and yet the switch-board be fully operative. In that case, however, the operator must work the spindles *b c* independently of each other—that is, pushing in or pulling out, as occasion may require.

I claim—

1. The switch-spindles *a b c*, combined with a system of levers, substantially as described, whereby the pressing in of one throws out either of the others which may happen to be in, substantially as and for the purpose described.

2. The combination of the spindles *a b c*, two of which are provided with insulators with metallic connections, respectively, with the battery and ground, whereby either the battery or ground may be applied or both cut off, substantially as described.

3. The combination of the two spindles *b c*, arranged to cut off or apply, respectively, the ground or battery on one circuit, combined with other series of like spindles on other independent circuits, and a bar, C, with couplings, arranged to place either one of said circuits

in connection with another of said circuits through said bar, substantially as described.

4. The combination of the two spindles *b c*, arranged to cut off or apply, respectively, the ground or battery on one circuit, combined with other series of like spindles on other independent circuits, and two or more bars, C D E, each provided with couplings arranged to place two or more of said circuits in connection with two or more other circuits through said bars, substantially as described.

5. In a switch-board substantially such as described, the combination of several keys, each on an independent circuit, and each key in direct connection with its particular wire and corresponding bridges connected to the other wires, whereby communication from one wire to another with which it may be placed in connection must be made through the keys and bridge to the wire of the respective wire, and each of said keys free to signal through its own wire without communicating such signal to the other wire with which it is in connection, substantially as described.

GEORGE W. COY.

Witnesses:
JOS. C. EARLE,
J. H. SHUMWAY.