

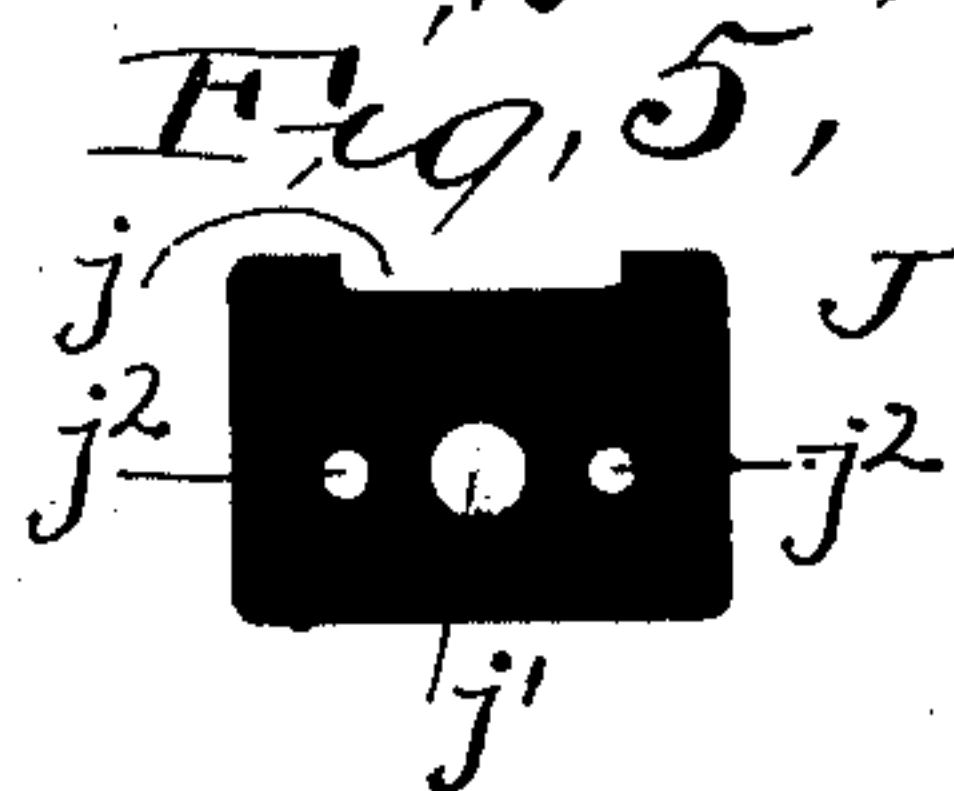
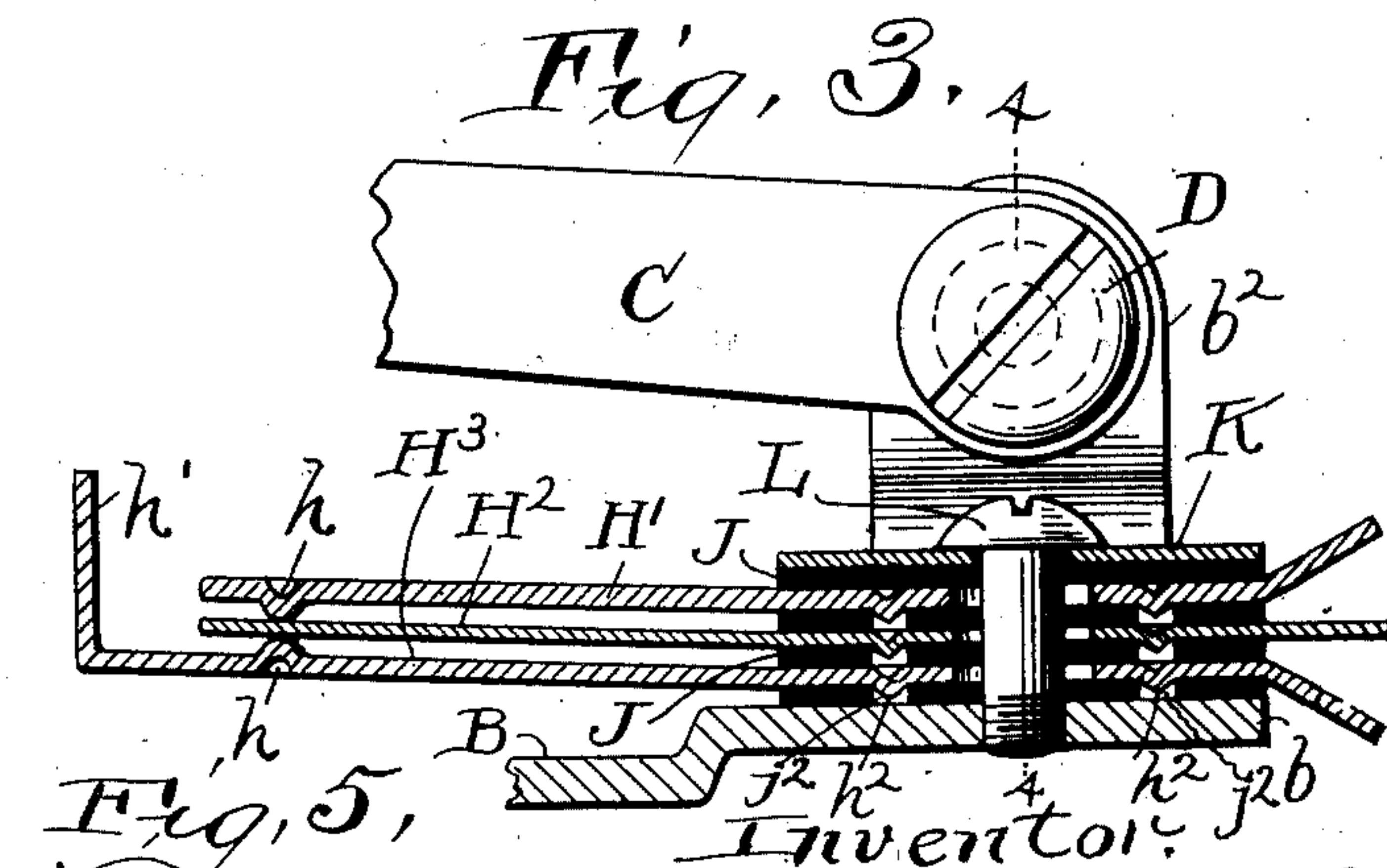
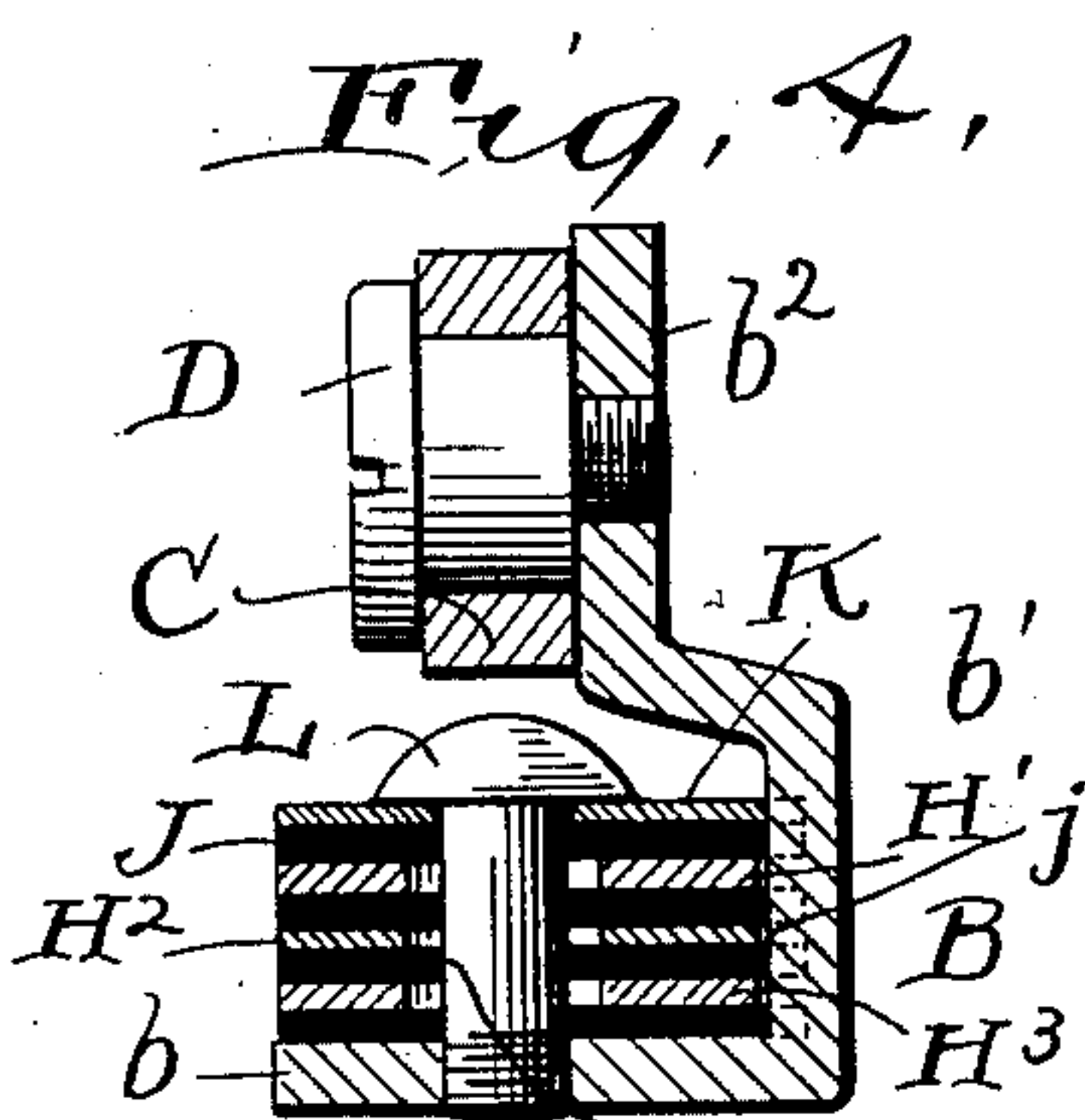
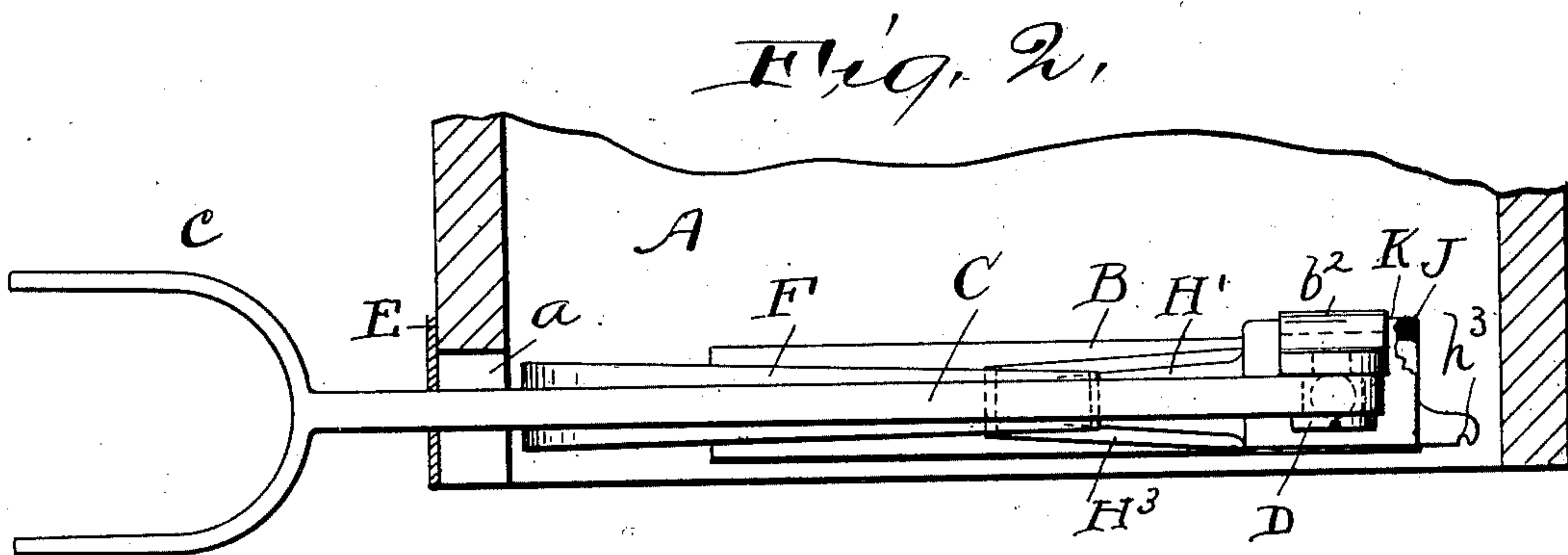
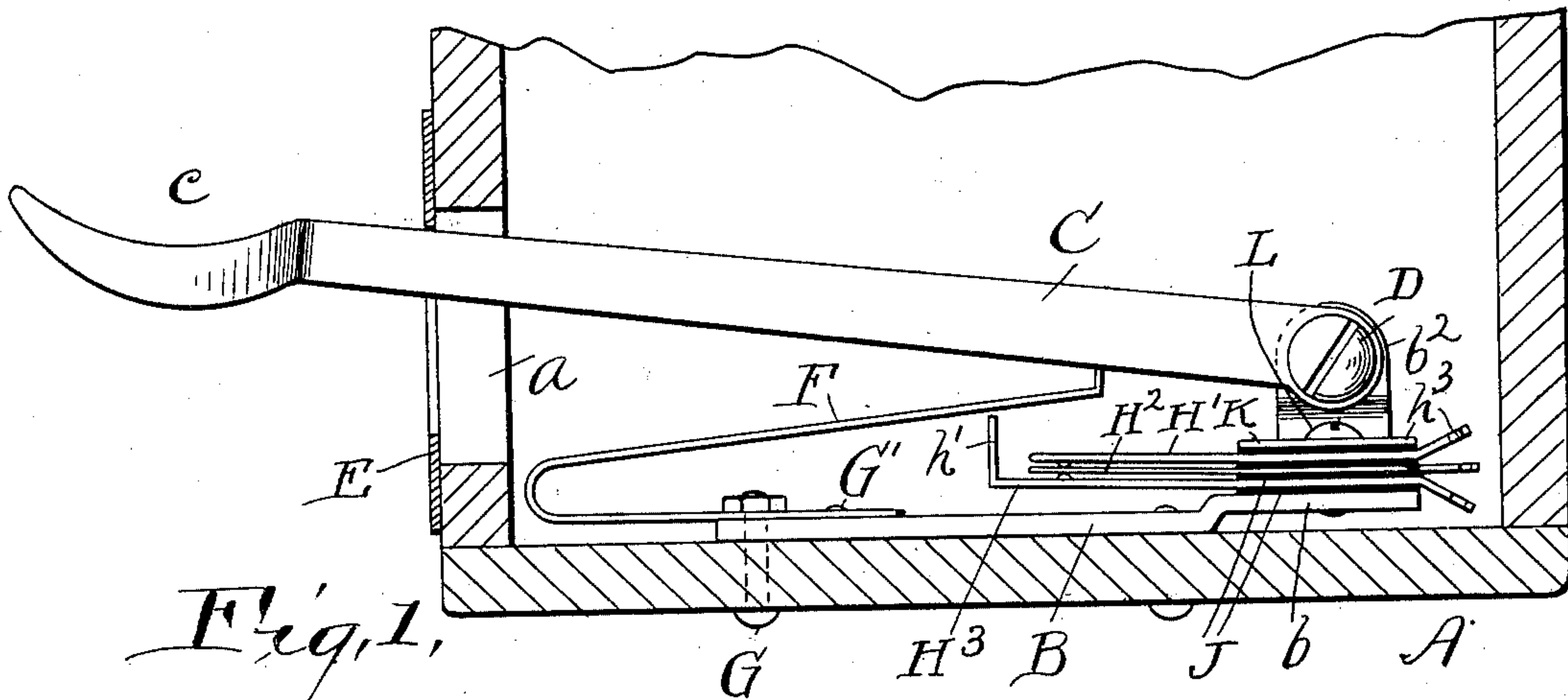
No. 660,818.

Patented Oct. 30, 1900.

C. H. NORTH.
ELECTRIC SWITCH.

(Application filed Nov. 15, 1899.)

(No Model.)



Witnesses, j'
E. B. Gilchrist
P. E. Knowlton

Inventor:
Charles H. North,
By his Attorneys,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

CHARLES H. NORTH, OF CLEVELAND, OHIO, ASSIGNOR TO THE NORTH
ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 660,818, dated October 30, 1900.

Application filed November 15, 1899. Serial No. 737,047. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. NORTH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Electric Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to electric switches primarily adapted for use in a subscriber's telephone and operated by the removal of the telephone-receiver from the hook-arm. I relieve the hook-arm from all electric coöperation with the switch, while allowing it to mechanically operate the switch, and thus the free movement of the lever on its pivot does not interfere with an excellent electrical connection.

The present invention is particularly concerned with the switch contact members and the means for insulatingly supporting them. It may be best summarized, however, as consisting of the combinations of parts hereinafter shown and described, and definitely set out in the claims.

The drawings clearly disclose my invention.

Figure 1 is a side elevation thereof, being a section through the telephone frame or box.

Fig. 2 is a plan of the same. Fig. 3 is an enlarged side elevation of the switch proper. Fig. 4 is a vertical section on the line 4 4 of Fig. 3. Fig. 5 is a detail view in plan of one of the insulating-plates used in the switch.

Referring to the parts by letters, A represents the box or other part of the telephone-frame. B is a plate suitably secured thereto, which near its end is offset upward, as at *b*. From the rear side of the portion *b* rises the integral standard *b'*, the end portion *b²* of which is offset forward to come more nearly over the medial line of the plate B. This standard carries the telephone-hook C, which is pivoted to the portion *b²* by the screw-bolt D and extends at its outer end through an opening *a* in the box and through a slot in the guide-plate E, secured thereto, and carries at its extreme end the usual hook *c* for carrying the telephone-receiver.

F represents a leaf-spring which is secured to the plate B and the box by suitable means,

as the peg *G'* and the bolt *G*. The nut of the latter provides a convenient connection for an electric wire, for which the spring acts as a terminal. This spring is bent on itself, as shown, and has its free end engaging with the under side of the lever C, which, owing to the offset position of the portion *b²* of the standard, lies directly over the medial line of the plate B and the spring F. The spring F is of sufficient force to maintain the lever C elevated when it is unencumbered by the telephone-receiver; but the weight of the receiver on the hook counteracts the force of the spring, and thus depresses the hook and the spring F. When depressed, the spring engages with the switch-terminal *H³*, as hereinafter more fully explained.

In the specific switch shown the desire is to have three electric terminals normally out of contact with each other and one of them connected with the fourth terminal, which is the spring F, but the three coming into joint contact and the spring passing out of contact when the lever C is raised by the removal of the receiver. The arrangement of the connections from the switch-terminals is not part of this invention, and they may be for either a closed or open circuit system, as desired. By way of illustration it will be readily understood that if the spring is a terminal from the bell and the switch member it engages a terminal of a line-wire and the other two switch members are terminals, one of the primary circuit of an induction-transmitter and the other jointly of the other end of the primary and of the secondary circuit, the proper connections for subscribers' telephone service on the open-circuit system may be established.

Three switch-terminals grouped into a bank are designated, respectively, *H'* *H²* *H³*. These terminals are each insulated from the others and are made of spring metal. The intermediate terminal *H²* tends to spring away from the terminal *H'*, while the lower terminal *H³*, which is stronger than the intermediate one, normally tends to move toward the plate *H'*, and thus not only comes into contact with the plate *H²*, but moves the latter into contact with the plate *H'*. This position of the parts will be clearly seen from Fig. 3. A

suitable dent or depression h is made in two outside plates toward the intermediate one to establish an accurate connection.

The extreme end of the plate H^3 is bent up at h' and lies beneath the spring F in such position that when the hook C is elevated the spring F rises above the highest position of the plate H^3 and out of contact with it, whereby the plate H^3 exerts its whole force in maintaining a closed contact between the three plates H' H^2 H^3 . When, however, the receiver is on the hook, its weight depresses the latter, and this depresses the free end of the spring F , which engages with the upturned end h' of the switch member H^3 and moves it downward, freeing it from the plate H^2 , whereupon the latter by its own resilience springs away from the plate H' . Thus when the receiver is on the hook all three of the switch-terminals H' H^2 H^3 are out of contact with each other, but H^3 is in contact with the spring F , whereas when the receiver is removed all three come into contact with each other, but out of contact with the spring.

The switch members H' H^2 H^3 are insulatingly supported as follows: A series of plates J , of mica or other insulating material, are provided, which are of a general rectangular shape, but have a notch j in one edge and have also the central hole j' and two recesses j^2 , which are preferably smaller holes on opposite sides of the central hole. These plates are placed above and below each of the switch-terminals—that is, the terminals are sandwiched in between them. Each of the terminal plates has extending from it a pair of projections or prongs h^2 , (preferably made by integral dents,) which when the parts are in place take into the recesses j^2 in the plates J below them, whereby they are locked to those plates.

A protecting-plate K is placed on the uppermost insulating-plate J , and this composite structure of alternate metallic and insulating plates stands on the projecting portion b of the base-plate, with the standard b' occupying the notches j , and a screw-bolt L passes through the whole into the plate B . The switch-plates do not extend backward as far as the notch j in the insulating-plates, and the holes j' in the insulating-pieces are substantially the same size as the diameter of the bolt L , while the holes through the switch-plates are considerably larger. Thus the bolt L and standard b' determine the position of the insulating-plates, while the interlocking holes j^2 and prongs h^2 prevent displacement of the switch-plates, while at the same time the switch-plates are each out of contact with the bolt L , as well as with the other parts of the support.

Beyond the support for the switch-plates they are extended sufficiently for the proper wires to be secured to them. Thus near this end of each plate is a notch h^3 to hold the wire which is twisted around the plate, while

for the more convenient securing of these wires the two outer plates H' and H^3 are bent at an angle at these extreme ends to allow more room between the plates.

Having described my invention, I claim—

1. A plurality of switch members having alined open holes, insulating-plates sandwiched between the switch members and having smaller alined holes substantially concentric with those of the switch members, a binding-bolt extending through said holes in the switch members and insulating-plates and engaging the insulating-plates but out of contact with the switch members, and interlocking means carried directly by the insulating-plates and switch members whereby the bolt locks the insulating-plates and the insulating-plates themselves lock the switch members thus obviating insulating-bushings around the bolt within the holes of the switch members, substantially as described.

2. A base-plate having an upwardly-extending arm, a plurality of switch members having alining holes, a plurality of insulating-plates sandwiched therebetween, having smaller holes concentric with those of said switch members and also notches in their edges taking about said arm, said switch members and plates carrying interlocking means, a bolt fitting snugly through the alined holes of said insulating-plates but not touching said switch members, substantially as described.

3. In an electric switch, in combination, a hook-lever, a plurality of switch members, said switch members being resilient and certain members tending to separate from their adjacent members, there being an outer member tending with greater force to crowd the others into contact, and means operated by said lever for controlling said outer member, substantially as described.

4. A hook-lever, a leaf-spring which may hold it elevated and is an electric terminal, two resilient switch members tending to separate from each other, a third resilient switch member which tends to cause said other two switch members to contact with each other, said third member lying contiguous to said leaf-spring whereby the depression of said hook-lever makes contact between said spring and said third resilient member moving the latter and thereby opening contact between said other two switch members, substantially as described.

5. In combination, a pivoted arm C , a spring adapted to elevate the same, the three switch members H' H^2 H^3 normally adapted to contact with each other but the intermediate member H^2 having a tendency to move out of contact with the member H' when the member H^3 is moved away from said intermediate member, said member H^3 having a projecting end which is adapted to be engaged when the arm is depressed, whereby the depression of the arm disconnects the three switch mem-

bers from each other whereas its elevation allows their connection, substantially as described.

5 6. In a telephone-switch, in combination, the hook-arm C, the spring F bearing against said arm and tending to elevate it and also forming a switch-terminal, at least three other switch members arranged in a bank and tending to spring into contact with each other by
10 reason of an outer member of the bank tending to congregate the members against the weaker force of an intermediate member tending to segregate them, said outer member extending into proximity to said spring F but
15 out of contact therewith when the hook-arm is elevated but adapted to be engaged thereby when the hook-arm is depressed and thus moved out of engagement with the next member, substantially as described.

20 7. In a telephone-switch, in combination,

a base-plate B, a standard rising therefrom, a hook-arm C pivoted to the standard, a leaf-spring F secured to the base-plate and bearing on the under side of the hook-arm and tending to elevate it, a plurality of switch
25 members arranged in a bank and insulatively supported on said base, said members tending to contact with each other, the lower one of said members extending beneath said spring and out of engagement therewith when
30 the hook-arm is elevated but in engagement therewith and out of engagement with the members above it in the bank when the hook-arm is depressed, substantially as described.

In testimony whereof I hereunto affix my
signature in the presence of two witnesses.

CHARLES H. NORTH.

Witnesses:

E. B. GILCHRIST,
ALBERT H. BATES.