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PATENTED JULY 23, 1907.

H. L. KNIGHT.
RINGING AND LISTENING KEY.

APPLICATION FILED JAN. 10, 1906.

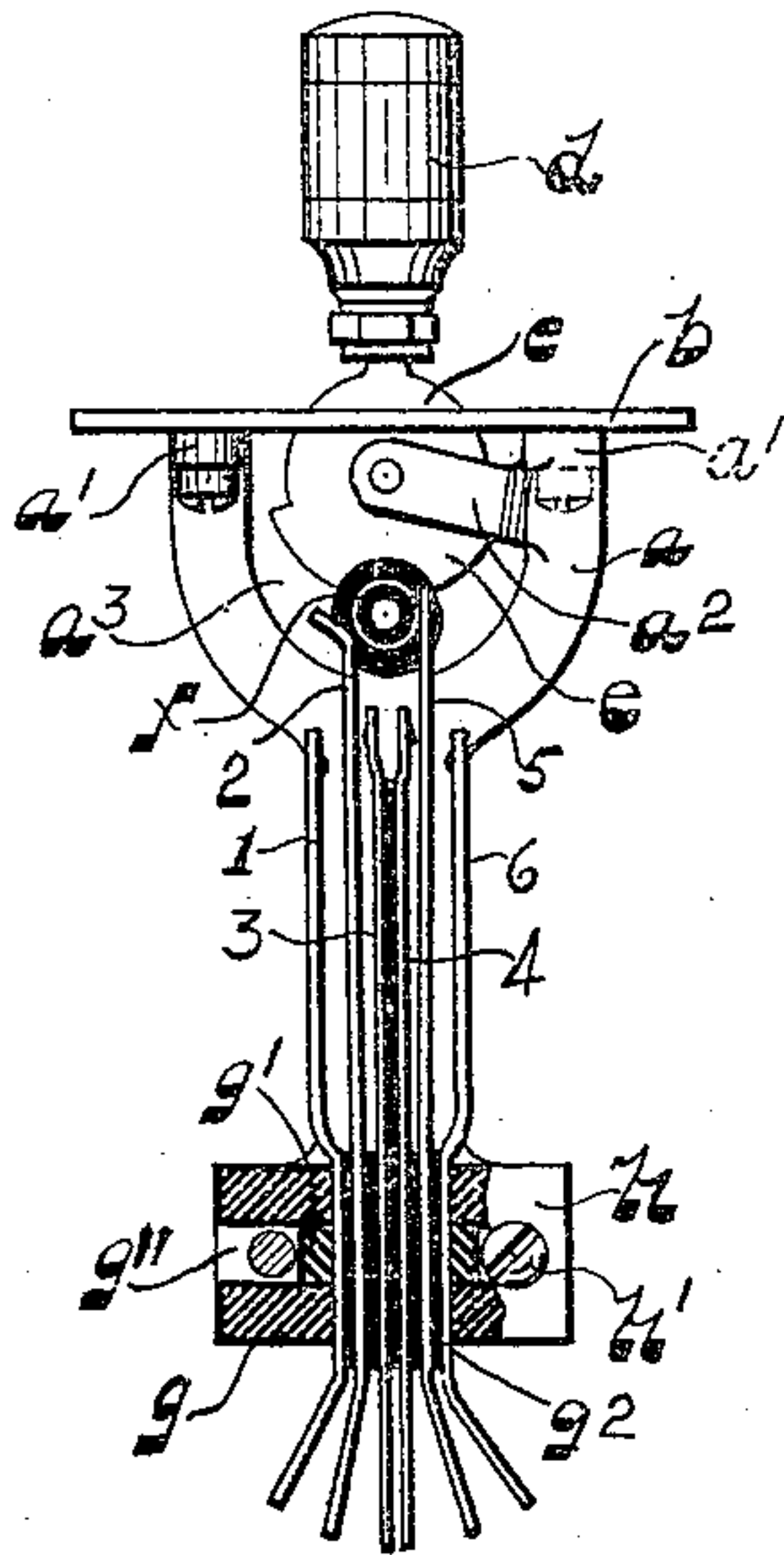


Fig. 1.

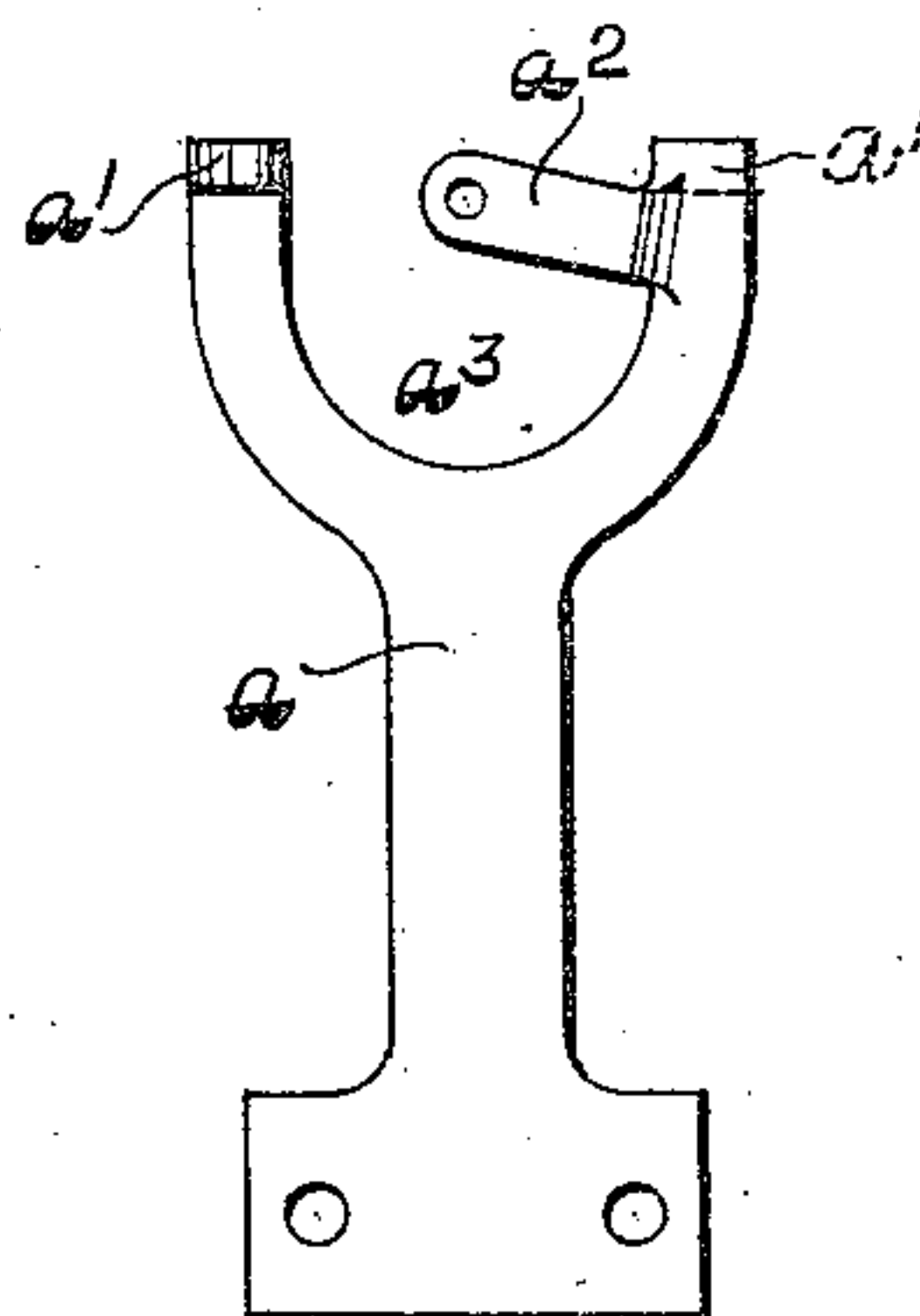


Fig. 3.

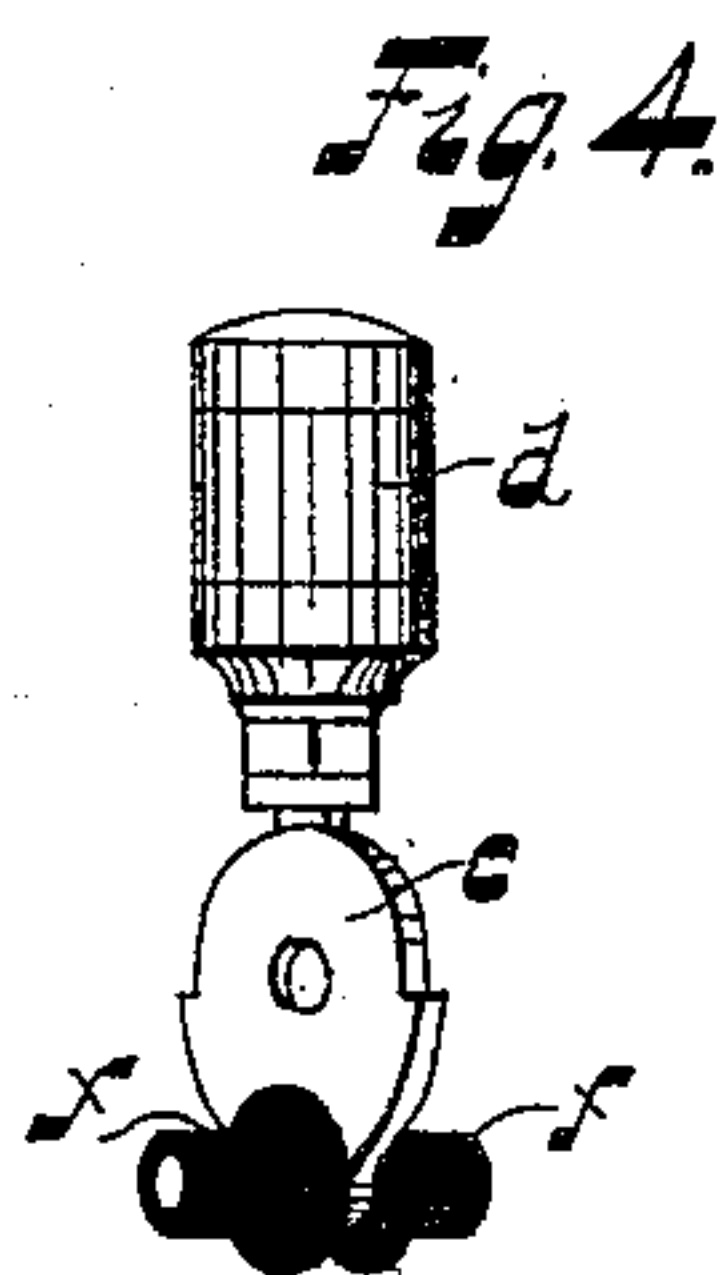


Fig. 4.

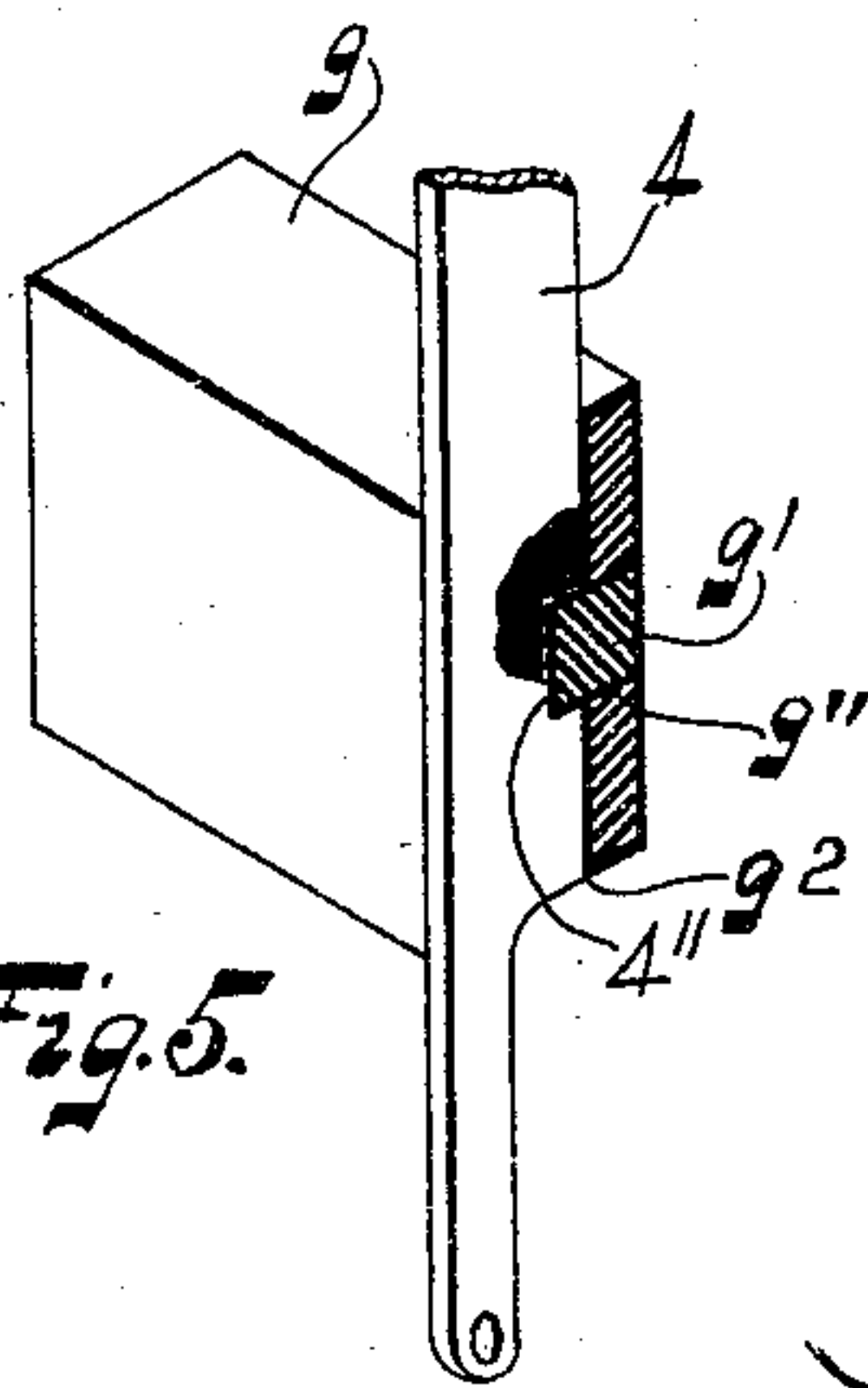


Fig. 5.

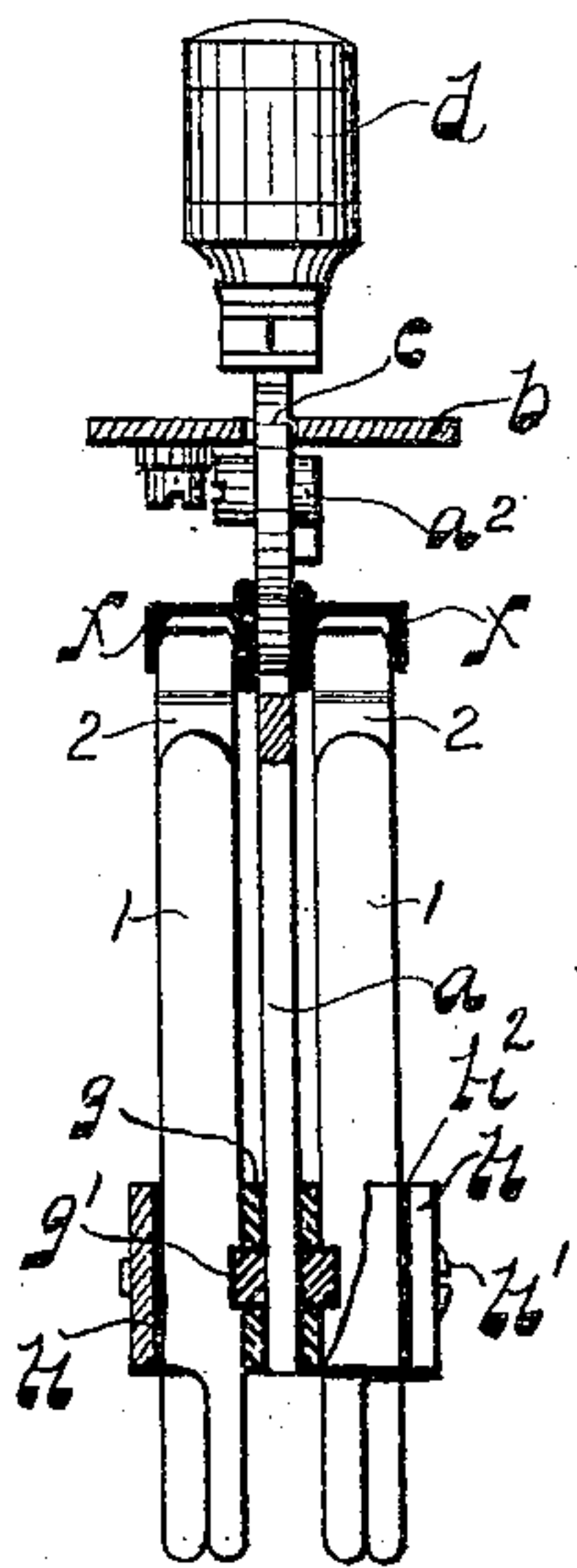


Fig. 2.

Witnesses:

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UNITED STATES PATENT OFFICE.

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RINGING AND LISTENING KEY.

No. 860,874.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed January 10, 1906. Serial No. 295,383.

To all whom it may concern:

Be it known that I, HERBERT L. KNIGHT, a citizen of the United States of America, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Ringing and Listening Keys, of which the following is a specification.

My invention relates to improvements in ringing and listening keys for the operator's use upon telephone switchboards, and has for its object, the construction of a switching device stronger, and more serviceable and compact than are similar appliances previously used.

My improvements have sought materially to simplify the structure of an operator's switch and have been directed moreover toward making the construction thereof more compact than is any other device with which I am acquainted, and the parts thereof freely accessible.

Compactness of construction has become more necessary with the reduction in size of the spring jacks in common use and the correspondingly smaller dimensions of the operator's table. My present improvements have been directed toward the production of a switch or operator's key, which is provided with a rigid central frame in line with the operating-lever pivotally mounted thereon, and carrying the switch in position. At the lower end of the frame are specially-formed blocks of insulating material, wherein the springs are insulatively mounted in vertical positions. Between the longer or actuated springs are roller-parts rotatably mounted upon the lower end of the operating-lever; said parts being flanged to retain the rollers in position.

Other details of my improved construction will appear upon considering the specification, drawings and claims herein presented.

In said drawings, Figure I is a side, and Fig. II an end elevation, illustrating the operator's ringing and listening key of my invention; portions of said figures being broken away in order to illustrate details of construction. Fig. III is a front view of the central supporting-frame. Fig. IV illustrates the operating-lever and its insulating roller-parts; and Fig. V is a perspective view through one of the insulating mounting blocks, showing the means for mounting the contact springs.

Throughout the different figures of the drawings, I have employed the same character of reference to indicate similar parts.

Upon the upper end of the central frame *a* is provided a face-plate *b*, secured to lugs *a'* bent over at the upper end of said frame. A laterally deflected arm or lug *a²*, integral with said frame, serves as a pivotal mounting for the oscillating lever *c* provided with an

insulating handle *d*, carried above the face-plate. The frame *a* provides a semi-circular recess *a³* for accommodating the operating-lever. A circular portion *e* of said lever extends through a slot or opening in the face-plate, being suitably shaped beneath said plate to form stops for limiting the movement of said lever. At the lower end, flanged roller-parts *f f*, formed of insulating material, are rotatably secured upon a stout cross-pin extending through the lower portion of the lever; the flanges upon said roller-parts being positioned within the upwardly extending springs and thus serving to retain the roller-parts securely in place upon the pin. At the lower end of the frame *a* are provided two cross-channeled rubber blocks *g g*, adapted respectively to receive the two sets of contact springs 1 to 6 and the corresponding springs upon the opposite side of the device, within groove *g²*. These contact springs are all laterally cut away upon one side (as at *4''*) as also are their spacing insulators, and a short length of rubber *g'* is inserted in each groove *g''* upon the opposite side of the block *g*, in order to fit within the recesses provided in the springs and securely hold them against vertical movement. The springs are retained in their respective grooves *g²* by means of exterior insulated plates *h h*, clamped in place upon either side of blocks *g* by means of the transverse screws *h' h'*.

In the drawings, the usual springs for effecting the well known circuit changes, required in the cord circuit, have been illustrated, but the number and arrangement of such springs may, of course, be varied, as required. In the arrangement shown, however, six corresponding springs are employed upon either side of the switch-keys, of which the inner springs 3, 4 are normally in contact with the longer or actuated springs 2, 5. Upon moving the lever to the right, however, the spring 2 is flexed and disengaged and then brought into contact with spring 1; the roller riding upon the angularly extending end of said spring 2. This is the "listening-in" position of the operator's key. Spring 6 serves as a terminal for the magneto and is adapted to be engaged by the spring 5 for ringing a called subscriber, upon moving the operating-lever in the other direction; all as will be well understood by those skilled in the art.

From a consideration of my improved construction above set forth, it will be readily appreciated how I have been able to simplify a switch of this class through the employment of a central supporting-frame, preferably formed of a single integral metal-stamping, adapted to mount all of the parts as disclosed in the drawings. Accordingly, the space ordinarily required for an exterior frame is saved in my improved switch-key, and the number of parts is reduced. The

flanged roller-parts lie flush with the exterior edges of the contact springs; respectively engaging the inner edges of said springs. I have found that the simplest mode of mounting the springs within their vertical blocks, is the one herein set forth, wherein the blocks are provided with intersecting channels or grooves cut in the opposite sides thereof; one of said grooves being adapted to receive the bodies of the springs, and the other, to accommodate a block of insulation entering within the cut-away portions of the springs and securing them against movement within their containing groove. When constructed as shown, all of the switch-parts are made perfectly accessible.

Having now described an operator's ringing and listening key, constructed in accordance with my invention, I claim as new, and desire to secure by Letters Patent, the following:—

1. In switching apparatus of the class described, the combination with a central recessed frame-plate, of a laterally deflected lug formed therefrom, an operating-lever pivoted thereto within the recess, a laterally-extending part thereon positioned between sets of springs; and attached near the lower portion of said frame-plate, sets of switch-springs insulatively mounted in position to be actuated into and out of contact by the operating-lever, substantially as set forth.

2. In an operator's ringing and listening key, an integral metal stamping centrally positioned to form the frame thereof, of an operating-lever pivoted directly thereto and in line with the upper portion of said frame, and co-acting switch springs rigidly secured and insulated beneath the lever and immediately adjacent to the lower portion of said frame-plate, in position to be controlled by the operating-lever, substantially as set forth.

3. In an operator's ringing and listening key, an integral metal stamping forming a central supporting-frame for the parts; the same having a cut-away portion for accommodating the operating-lever and an integral laterally-deflected lug whereon said lever is pivoted, an operating-lever secured to the lug near the upper portion of said frame, co-acting springs, and insulating blocks mounting the same upon the lower portion and at either side of said frame-plate in position to be actuated into and out of engagement by the lever, substantially as set forth.

4. In an electrical switch-device, the combination with a plurality of co-acting switch-springs recessed or cut-away in corresponding portions thereof, of an insulating block for mounting the same; said block being cut by intersecting grooves, one of said grooves mounting the group

of springs, an insulating part or key inserted in the other groove and entering the cut-away portions of the springs to retain them against longitudinal displacement, and a superposed insulated part for retaining the springs within their groove, substantially as set forth.

5. In an electrical switch-device, the combination with an insulating mounting block or strip having transverse intersecting grooves entering said block from either side, of a plurality of switch-springs and insulators mounted in one of said grooves; the switch-springs and insulators being cut-away or recessed upon one side, and an insulating key or part inserted within the groove upon the opposite side of the block, adapted to retain the springs in position within said block, substantially as set forth.

6. In an operator's switch, the combination with its supporting-frame, of a plurality of contact springs mounted upon the frame, an operating-lever pivotally mounted upon the frame, and a flanged actuating roller rotatably mounted upon the lever and retained in position by its flanged portion, substantially as set forth.

7. In an operator's ringing and listening key, the combination with a supporting-frame, of two sets of contact springs insulatively mounted thereon, a pivotally mounted operating-lever, and flanged actuating rollers rotatably mounted upon the lever with their flanges engaging the inner edges of said springs, whereby the rollers are retained in place, substantially as set forth.

8. In an operator's ringing and listening key, the combination with a central supporting-frame having its upper portion cut-away and provided with integral lugs for securing the face-plate and the operating-lever thereto, of an operating-lever pivotally mounted near the upper portion of said frame, a face-plate, insulating blocks secured near the lower portion of said frame, and switch-springs mounted within said blocks, closely adjacent to the central frame, in position to be actuated into and out of engagement with each other by the operating-lever, substantially as set forth.

9. In an electrical switch of the class described, the combination with a central vertical frame-plate, of an operating-lever pivoted thereto, laterally-extending insulating parts thereon, and two sets of switch-springs insulatively mounted, respectively, upon either side of the frame-plate in position to be actuated into and out of contact by the insulating parts; whereby all of the switch-parts are made perfectly accessible, substantially as set forth.

Signed at Cleveland, this 8th day of January, A. D., 1906, in the presence of two subscribing witnesses.

HERBERT L. KNIGHT.

Witnesses:

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ALBERT LYNN LAWRENCE.