

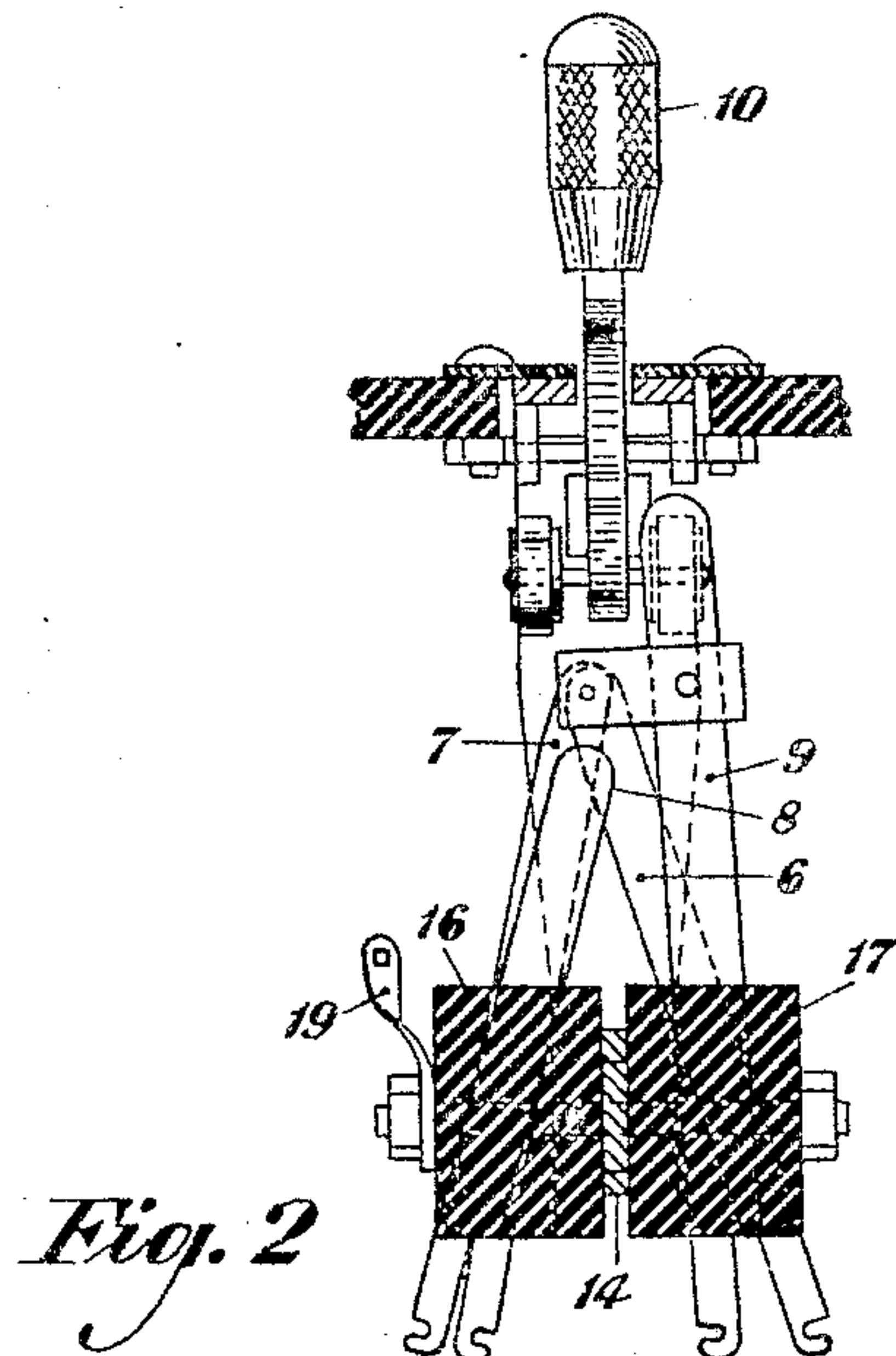
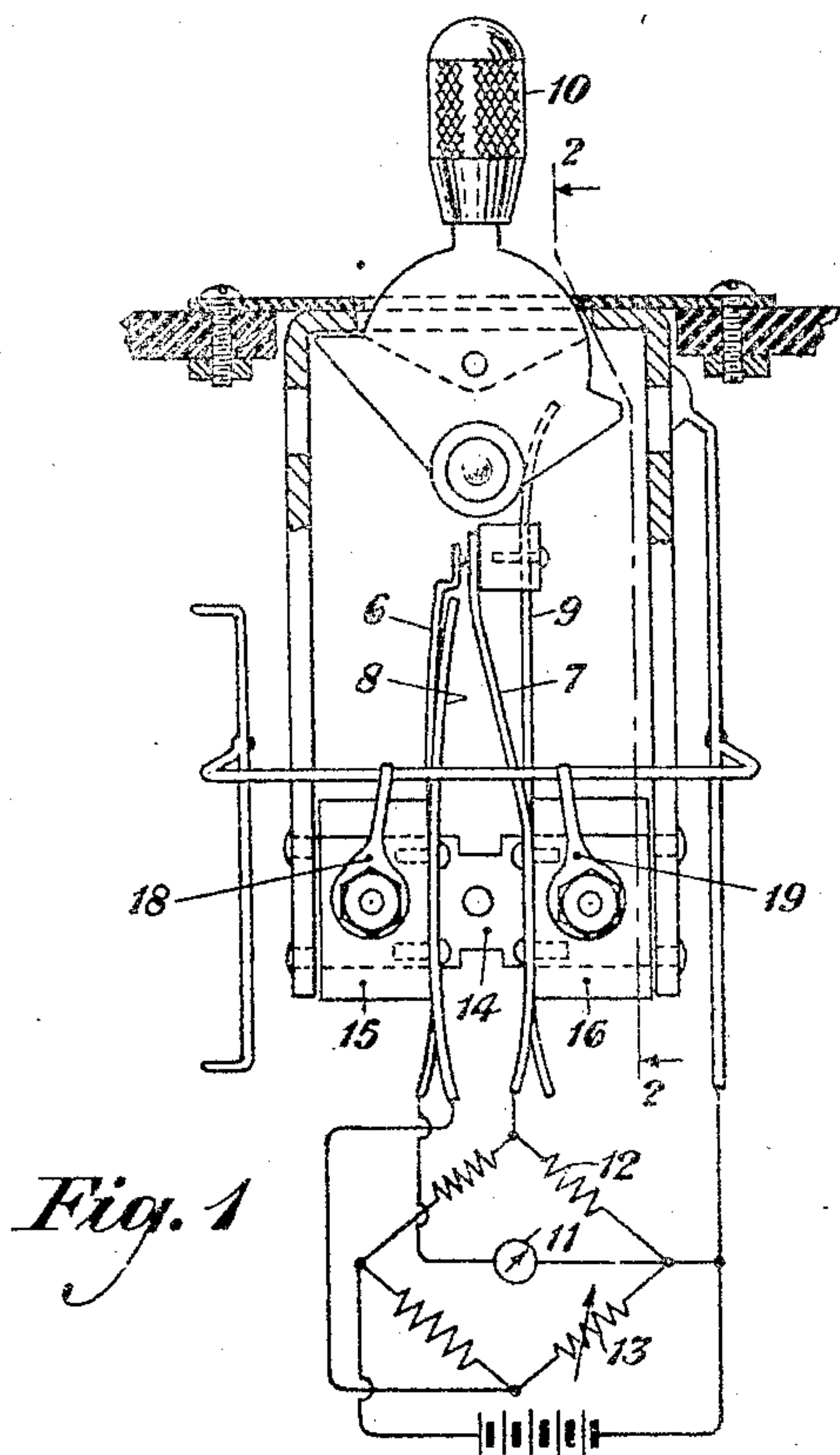
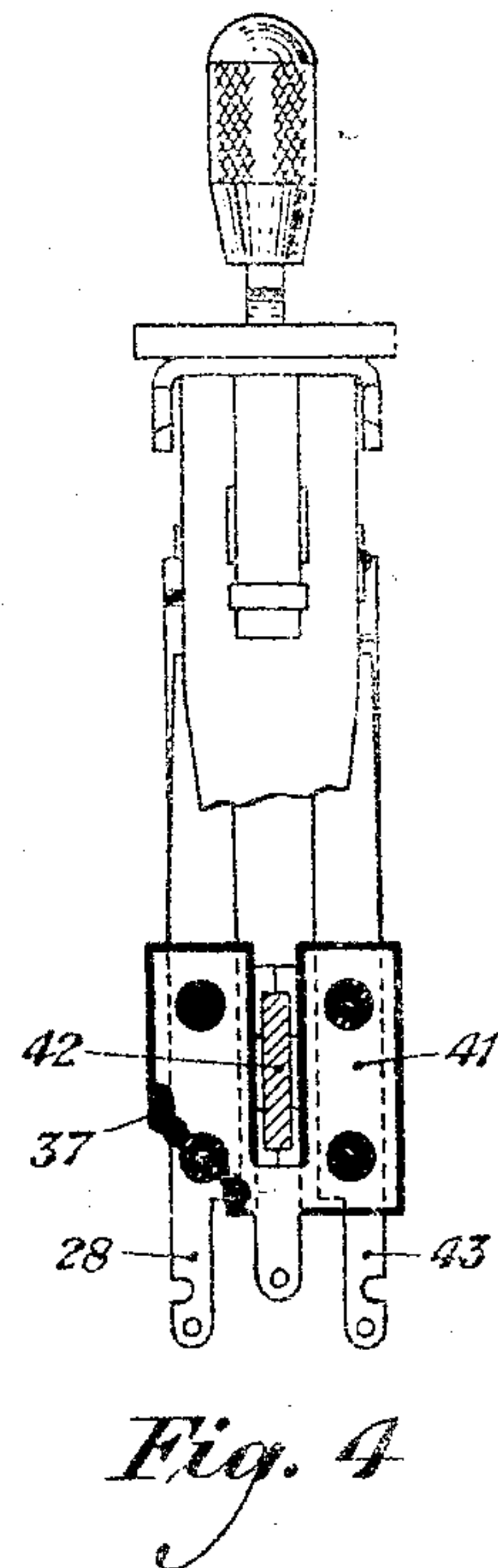
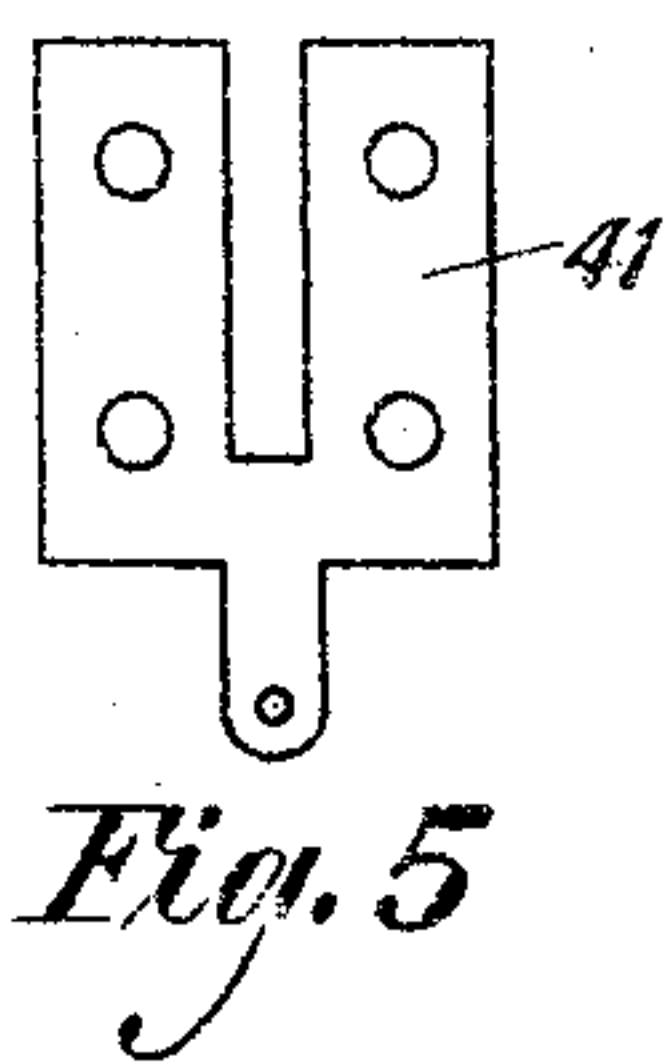
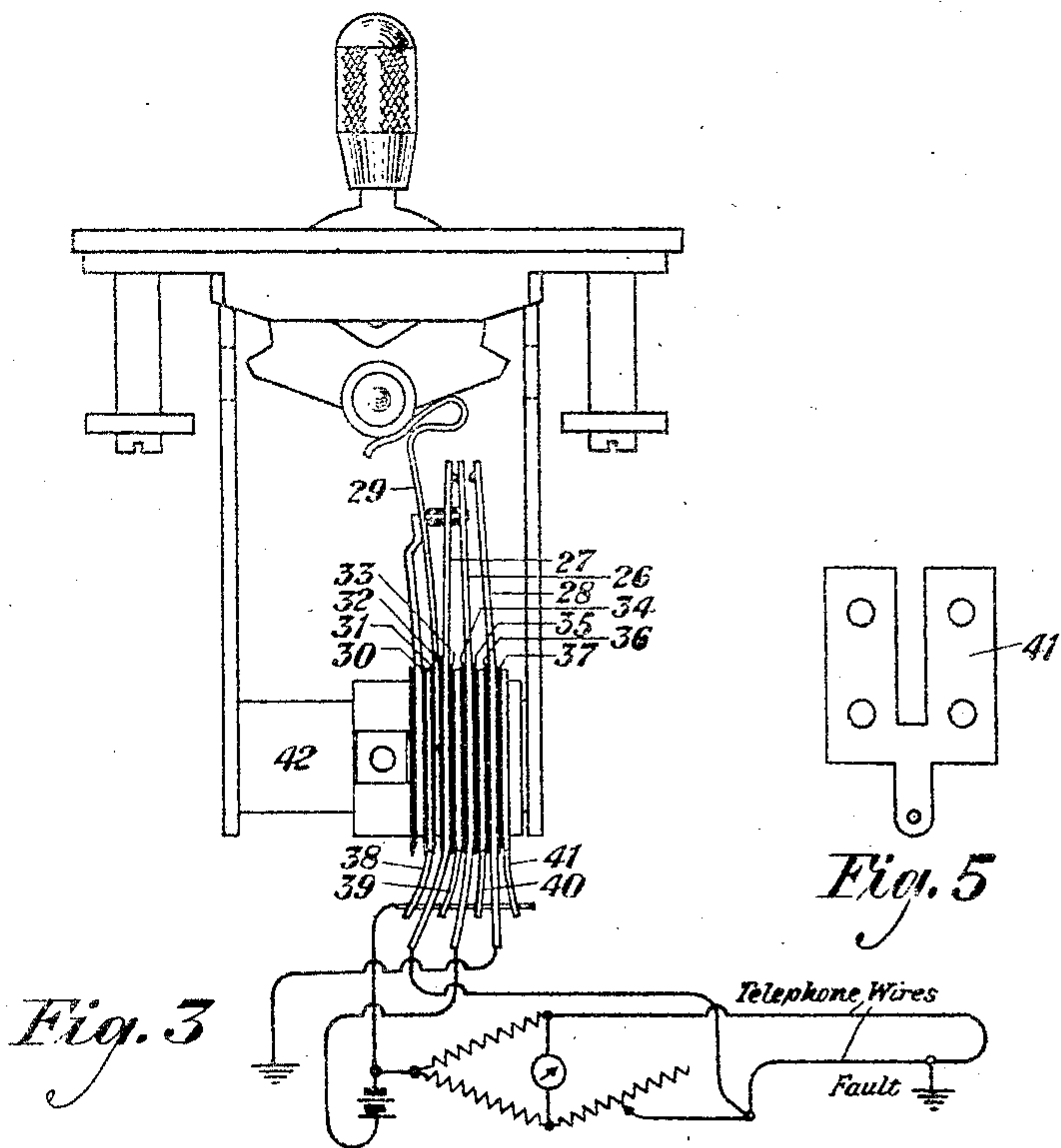
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L. A. GARY ET AL

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CIRCUIT SWITCH

Filed July 17, 1928



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CIRCUIT SWITCH

Application filed July 17, 1928. Serial No. 293,445.

This invention relates to switches for electric circuits, and more particularly to switches suitable for controlling certain testing circuits.

Circuit switches, such as telephone keys, have as parts thereof a plurality of contact springs or the equivalent. It is, of course, necessary that each of these contact springs be insulated from the adjacent contact spring or springs in order to prevent a flow of current between springs when they are not thrown into contact by the operation of the switch. There is, however, the likelihood of current leakage from one spring to another across the surface of the insulating member. If the switch is employed to control, for instance, circuits used for the testing of very high resistances, any leakage across the insulating member or members may be in parallel with the testing circuit or a part thereof, and it will readily be understood that such leakage currents may seriously affect the accuracy of the measurement.

The principal object of this invention is the provision of a circuit switch which is not subject to appreciable current leakage between the contact members, or from external points to the contact members.

A further object of the invention is the provision of a circuit switch which is not only highly insulated but is also quickly and conveniently operated.

In general, the applicants, in accomplishing the objects stated above, employ a switch which has certain features old in the art but which is so arranged that it is shielded from the flow of leakage currents between contact springs and from external points to the contact springs.

The invention may be clearly understood from the following description, which is to be read with reference to the accompanying drawing.

Figure 1 of the drawing shows in side elevation one desirable form of switch constructed in accordance with the invention (parts of the mounting being shown in cross section) and also indicates diagrammatically a circuit controlled and guarded by the switch; Fig. 2 shows a view of the switch of Fig. 1 taken

on the line 2—2; Fig. 3 shows in side elevation a modified form of switch constructed in accordance with the invention, and, like Fig. 1, indicates a controlled and guarded circuit; Fig. 4 shows in end elevation the switch of Fig. 3 with certain elements removed, and Fig. 5 shows a detail of the structure of Figs. 3 and 4. Like numerals of reference indicate corresponding parts.

With reference to the details of the drawing, and, first, with particular reference to Figs. 1 and 2, there is shown what is usually known as a telephone key of the cam type, in which a plurality of springs 6, 7, 8 and 9 are controlled by the operation of the key lever 10. In the normal position of the key, the spring 6 makes contact with the spring 7. When the key lever is thrown to the left (with reference to Fig. 1), contact is broken between springs 6 and 7, and contact is made between springs 6 and 8. In the particular key disclosed, the spring 9 serves merely as a restoring spring.

From an examination of Fig. 1, it will be understood that it is desired, for the ultimate purpose of resistance measurement, for instance, and for the immediate purpose of the measurement of voltage drops, to connect a meter 11 across either a fixed resistance 12 or a variable resistance 13. With the arrangement shown, it will be understood that the key frame and the bridge binding posts may be mounted on the same plate, and leakage in that case would be in parallel with a vital element of the bridge circuit. Also, if the values involved are high, any leakage of current between contact springs may cause serious inaccuracies of readings, this leakage resistance likewise being in parallel with a vital element of the circuit.

In order to prevent the flow of leakage current, the applicants, in the arrangements shown in Figs. 1 and 2, mount each of the springs 6, 7, 8 and 9 on a separate block of insulating material and mount the insulating blocks in turn on the key frame 14. More specifically, the springs 7, 8 and 9 are shown mounted on insulating blocks 16, 15 and 17, respectively. It is understood, of course, that the spring 6 is similarly mounted on an insu-

lating block which does not clearly appear in the drawing. If, now, the key frame 14, which supports the insulating blocks, is connected to a suitable guard system, any leakage currents between the springs across the surface of an insulating block will be picked up through the key frame by the guard system and will not flow from spring to spring. As is clearly shown in the drawing, the members 18 and 19 serve to connect the key frame to the guard system.

In the form of key shown in Figs. 3 and 4 of the drawing, an arrangement, which is in effect the extension of the key frame in a novel manner, permits a somewhat more compact arrangement of the key structure. The springs 26, 27, 28 and 29 are controlled by the operation of a key lever, and a test circuit somewhat similar to the circuit shown in Fig. 1 is controlled by the switching operations. The insulating strips between the springs are shown as 30, 31, 32, 33, 34, 35, 36 and 37. Between the springs and between insulation strips, as shown in the drawing, are metal members 38, 39, 40 and 41, which are supported by and are in effect parts or extensions of the key frame 42. One of these members (41) is clearly shown in Fig. 5. The downwardly projecting extension of each of these members may be tied to the other downward extensions, as indicated in Fig. 3, and all of them connected to complete a shield or guard system. It will be seen that this arrangement of Figs. 3 and 4 is substantially the equivalent of the arrangement shown in Figs. 1 and 2.

It will be noted, upon examination of Fig. 3, that the key is here shown as controlling a test circuit for making a Varley measurement, the purpose being to locate a fault in a telephone line. In this case, it is clearly shown that the shield feature of the key serves to prevent leakage to ground across the key, which leakage would be in parallel with the fault resistance and would lead to an erroneous indication of the location of the fault. Other key leakage, for instance that from the battery to the movable rheostat arm, is likewise prevented.

It is, of course, understood that any number and any arrangement of contact springs may be shielded in the manner described above. For instance, in Fig. 4 the spring 43 lies opposite and corresponds to the spring 28 (shown in Fig. 3), and there are, likewise, springs, not shown, corresponding to springs 27 and 29. It is to be noted that the member 41 (see Fig. 5) serves to shield opposite springs on the two sides of the structure.

While the invention has, for the purpose of illustration, been disclosed in certain specific embodiments, it is to be understood that its scope is not limited thereby but is determined by the appended claims.

What is claimed is:

1. A switch for electric circuits comprising a plurality of contact members, means associated with said contact members for making and breaking contact therebetween, a plurality of insulating members each in juxtaposition with one of said contact members, and a current conducting shield having surface contact with each of said insulating members.

2. A circuit controlling device comprising a plurality of movable contact members, means associated with said contact members for making and breaking contact therebetween and an electrostatic shield interposed between said contact members.

In testimony whereof I have signed my name to this specification this 3rd day of July, 1928.

LAURENCE A. GARY.

In testimony whereof I have signed my name to this specification this 5th day of July, 1928.

HOMER G. TASKER.