

J. O. HEINZE, JR.
ELECTRICAL SWITCH.
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957,953.

Patented May 17, 1910.

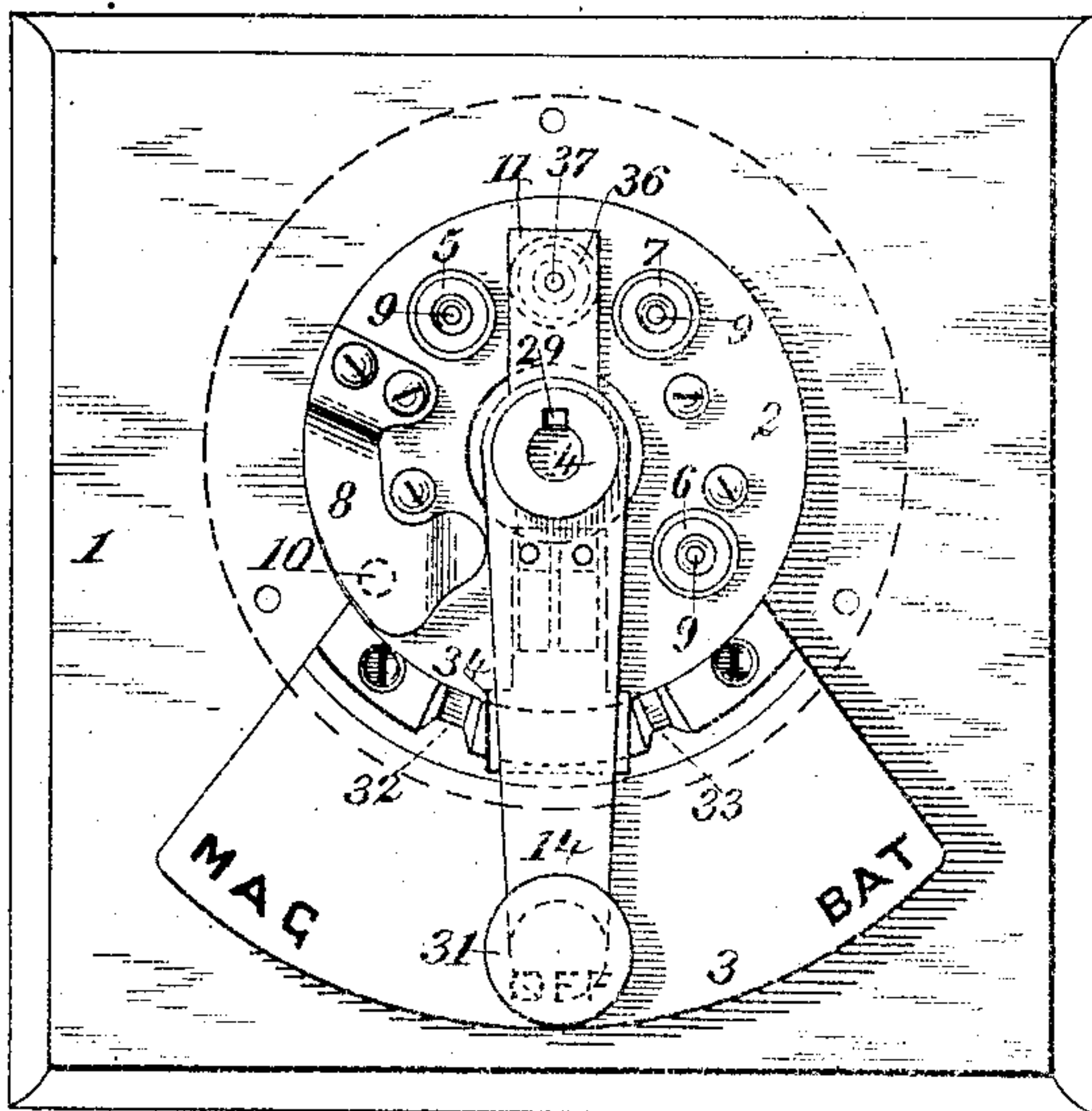


Fig. 1.

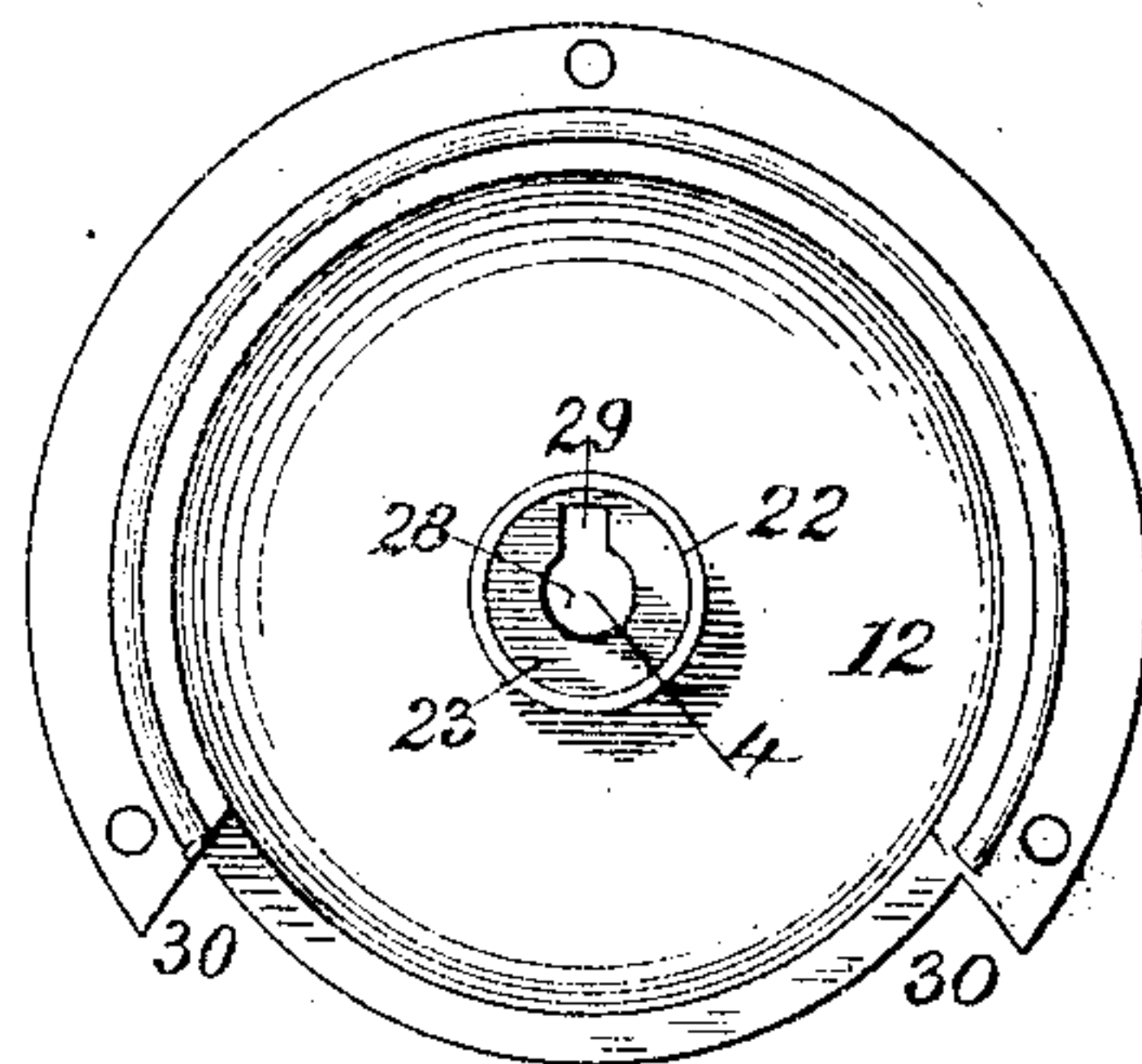


Fig. 2.

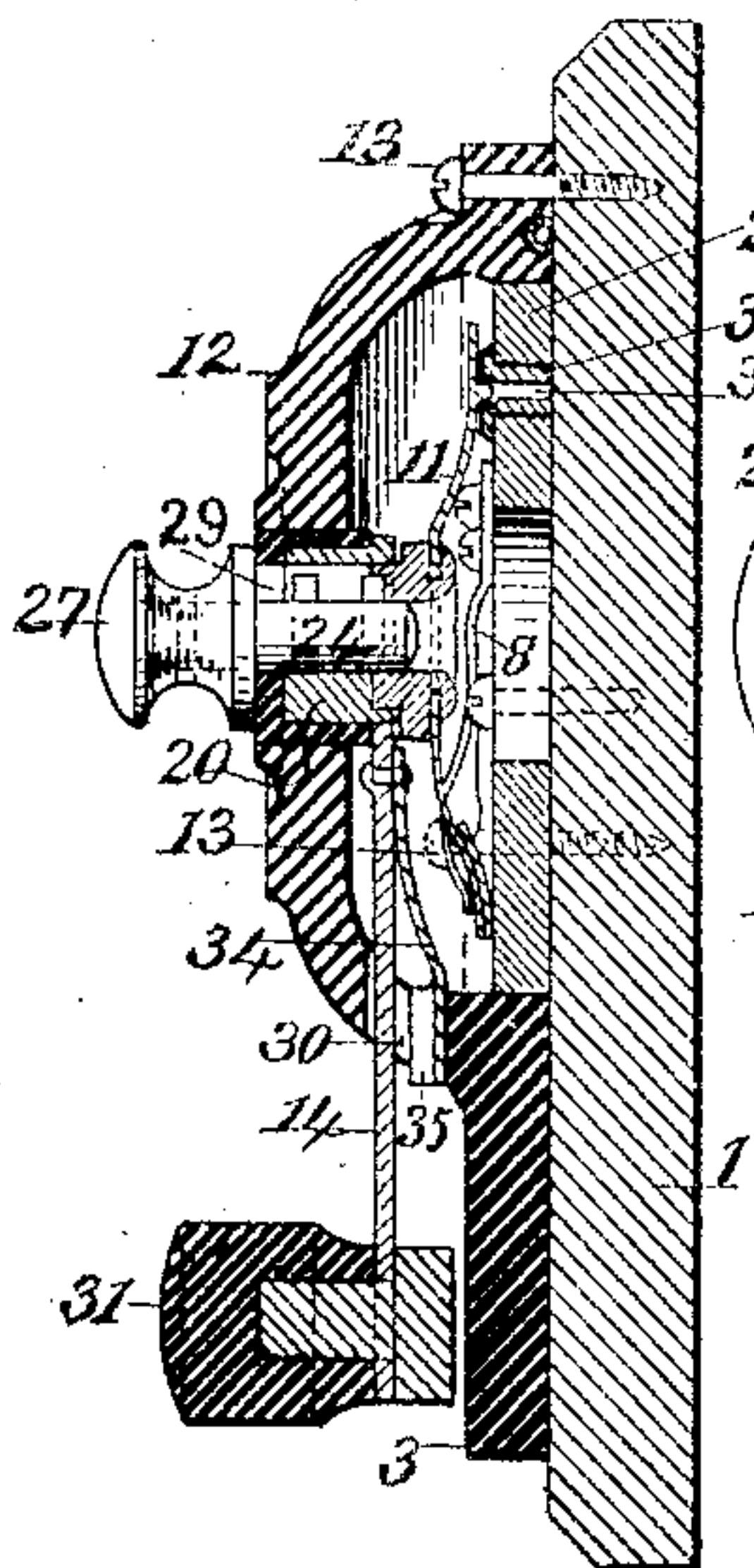


Fig. 3.

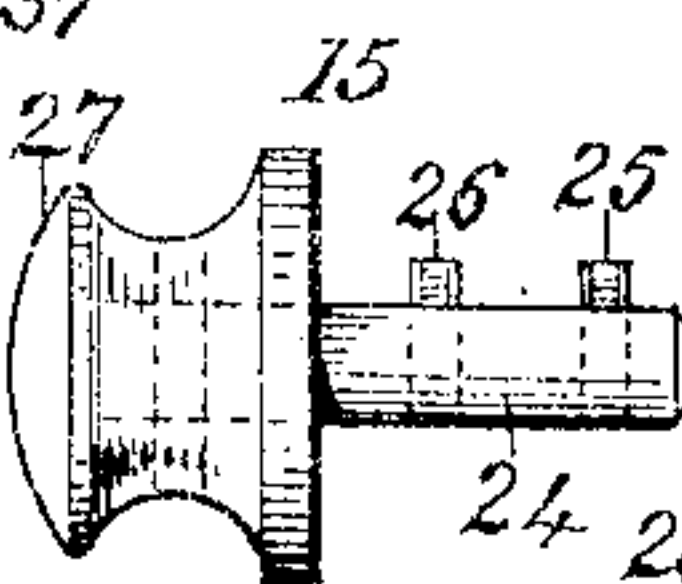


Fig. 4.

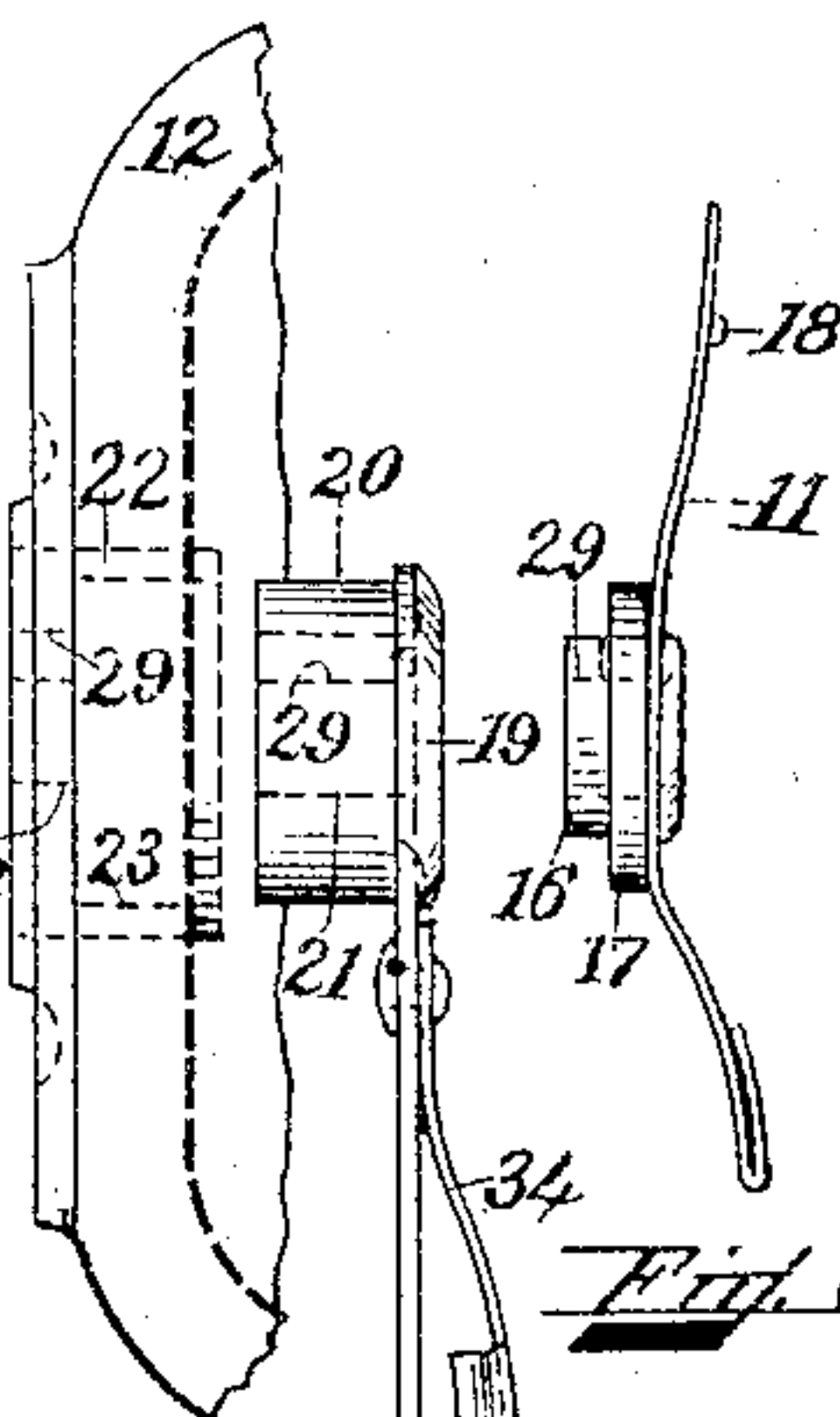


Fig. 5.

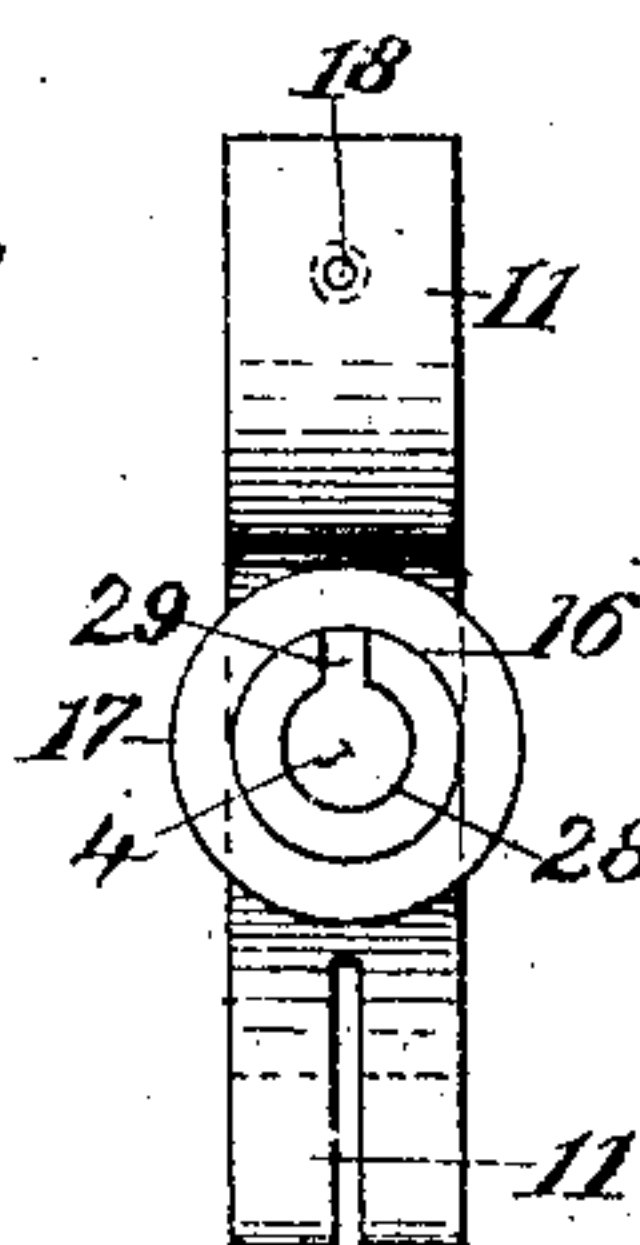
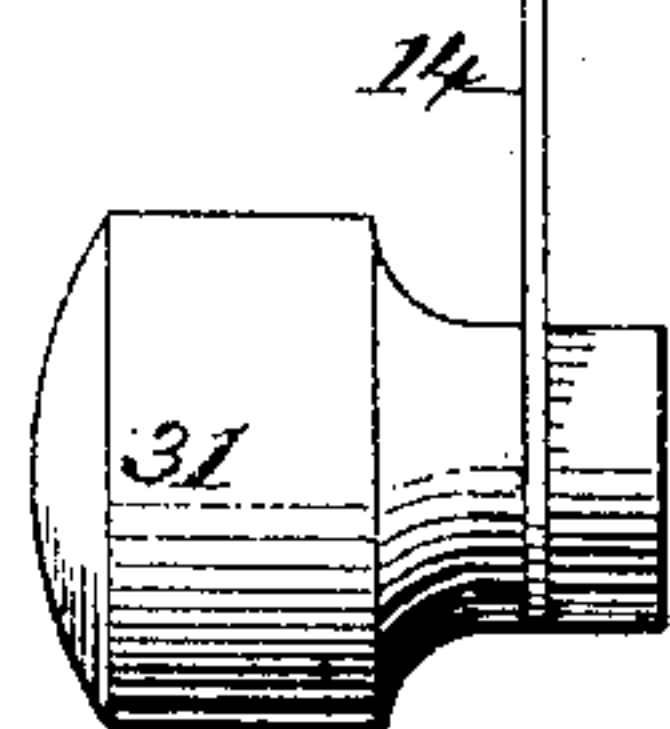


Fig. 6.

Fig. 7.



Witnesses:

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UNITED STATES PATENT OFFICE.

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ELECTRICAL SWITCH.

957,953.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN OTTO HEINZE, Jr., a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electrical Switches, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to electrical switches, and particularly to those for making and breaking electrical circuits employed in connection with internal combustion engines.

The principal object of my invention is to make the operation of a concealed electrical switch arm dependent upon the use of a key, and I accomplish this object by means of an accessible operating lever and a removable key with which mechanically to connect or disconnect the operating lever and the concealed electrical switch arm.

The other objects of my invention will appear hereinafter.

My invention is very useful and convenient when embodied in what I may call a "foot switch," for automobiles; and for the sake of illustrating the principle of my invention, I will now show and describe such a "foot switch."

In the drawings, Figure 1 is a plan view showing an electrical switch arm with the operating lever of my invention in normal position in relation to the switch arm; the key and concealed switch cover having been removed. Fig. 2 is a like view of the switch cover; its normal position being indicated in dotted lines in Fig. 1. Fig. 3 is a vertical section of the electrical switch provided with my invention. Figs. 4, 5 and 6, respectively, show separately, the key, cover and operating lever, and electrical switch arm; they being so arranged that if caused to approach each other along a common axis and engage, they will assume their normal positions as shown in Fig. 3. Fig. 7 is a front elevation of the electrical switch arm.

The switch shown is assumed to be vertically mounted upon the dash board of an automobile, and to be in proximity to the foot of the chauffeur. A wooden base 1 has, mounted therein, a flat ring 2 of insulation, as gutta percha; and an adjacent segment 3, of such insulation; said ring 2 and segment 3 having a common center 4, as shown in Fig. 1. In the ring 2 there are fixed two

pair of electrical terminals 5, 6, and 7, 8, which lie in a circle having the center 4 in common with the ring; the two terminals of each pair being diametrically opposed. The heads of these terminals protrude above the surface of the ring, and have in the tops thereof cavities 9. One pair of terminals 5, 6, may be, for example, in a battery circuit; and the other pair, 7, 8, in a magneto circuit; the terminal 8, being a spring having a downwardly inclined under surface to engage a suitable spring switch arm 11. Beneath the spring terminal 8 is a terminal 10 with which the spring terminal 8 engages to short circuit the magneto circuit when the latter terminal is not engaged by the switch arm 11.

A hollow cover 12, made of gutta percha, see Figs. 2 and 3, fits over the ring insulation 2, and when secured in relation thereto, as by screws 13 to the base, serves to support an operating lever 14, the switch arm 11, and a removable locking key 15; the latter being used mechanically to connect together the operating lever 14 and switch arm 11, so that a movement of the operating lever will cause a corresponding movement of the switch arm.

The switch arm 11, Figs. 1, 3 and 6, is made up of a thin strip of copper, and is slightly curved; the outer end portions being designed to be moved into and out of electrical contact with each pair of circuit terminals. Centrally located upon the outer surface of this switch arm is a metallic ring made up of a journal portion 16, and a collar portion 17, of slightly larger diameter. On the under side of one end portion of the switch arm is nib 18 to slide into and out of engagement with the slip cavities 9 in the heads of the terminals.

The operating lever 14 is made of brass, and has, riveted on one end portion, a metallic ring 19, the under side of which has, cut therein, a circular bearing surface 20 for the journal 16 of the switch arm 11; while the outer surface of the ring serves as a journal 21.

Mounted centrally in the cover 12, is a metallic cup 22, the outside bottom of which is flush with the outside of the cover, while the inside of the cup constitutes bearing surfaces 23 for the journal 21 formed by the ring 19 on the switch lever 14.

Before assembling the switch arm 11, operating lever 14, and cover 12, the posi-

tions they will assume before engaging each other, are shown in Figs. 5 and 6. After assembly, they cooperate, as shown in Figs. 1 and 3; the operating lever 14 being rotatably independent of the switch arm 11. To mechanically connect them, the key 15 is used. The key consists of a metal pin portion 24, a fin conveniently composed of two fins 25, 26, and an insulated head 27. For the pin 24 of this key, there is a key hole 28 passing through, and containing the centers of, the rings of the switch arm, operating lever, and cup in the cover, while for the fins of the key, there is longitudinally cut in one side of this key hole, a slot 29 passing through the bottom of the cup in the cover, the ring on the operating lever, and part way through the ring on the switch arm. In the complete switch, here shown, the longitudinal axes of the switch arm and operating lever are designed to occupy the same plane, hence the key hole in the said various parts also lies in that plane, to permit the insertion of the key.

The length of the pin 24 of the key is such that when the key is pushed into the key hole 28 and the head 27 engages the bottom of the cup 22 in the cover 12, the fin 25 of the key engages the fin slot in the switch arm 11, and the other fin 26 engages the fin slot in the switch lever 14. Obviously, a movement of the operating lever will, through the agency of the key, produce a corresponding movement of the switch arm. It will also be obvious that as the key hole 28 is fixed in relation to the stationary cover 12, a rotary movement of the key, out of normal position, will bring the fin 26 of the key to the right or the left of the fin slot 29, and into sliding engagement with the inside 23 of the cup in the cover, so that a withdrawal of the key, when in such position, is prevented by the engagement of the fin with the bottom of the inside of the cup. In short, the key cannot be pushed into or withdrawn from mechanical engagement with the switch arm and the operating lever, unless all of the key slots are in alignment; the switch may be operated when the key engages the switch arm and the operating lever; but it becomes inoperative, if the key is removed from the switch.

The lower edge portion of the cover 12 is cut away, to form an opening 30 for the operating lever 14. The free end portion of this lever extends therethrough and out over the insulating segment 3. It is provided with an insulated knob 31 above, and a smaller one below and adjacent to, the insulating segment 3. Arranged in an arc along the inner top edge of the segment, are two lock teeth 32, 33, dividing the arc into thirds, and having upwardly inclined faces. Fixed to the under side of the operating lever is a spring member 34 having flaring

sides 35. The latter while engaging the faces of the lock teeth, hold the operating lever in position, yet they will give way and pass up over the tops of the teeth, when sufficient force is applied to the operating lever to overcome the resistance offered by the spring to compression. These teeth are arranged so that when the spring is held between the two lock teeth 32, 33, the switch arm and operating lever occupy the mid position, marked "Off", which means the switch arm is not in contact with either pair of terminals. As screw 36 having a cavity 37 in its head is so located in the ring that when the switch is in mid position, the cavity is engaged by the nib 18 of the switch arm, and the switch is removably held in said position. If the operating lever is moved to the left, the spring passes over the tooth 32; is held between the side of the opening 30 in the cover, and the tooth 32; and the switch arm completes electrical connection between the terminals 7, 8, in an electrical circuit leading from, say, a magneto; this fact being indicated by the abbreviation "Mag." Had the operating lever been moved to the right, the spring 34 would have passed over the tooth 33, and have been confined between the tooth 33 and the right side of the opening 30 in the cover. When in this position an abbreviation "Bat." under the operating lever and on the segment 3, would indicate that the switch arm had completed the electrical circuit between the electrical terminals 5, 6, in another electrical circuit connected to another source of electrical current, for example, a battery.

From what has been said, it will now be plain that when the operating lever is in "off" position, the key may be withdrawn from, or inserted into, position to unlock or to lock the switch arm and the operating lever; that if the key is withdrawn, the operating lever may be moved in either direction, yet the switch arm remains in "off" position. If the key is in its normal position, the fins of the key engaging respectively the fin slots shown in the operating lever and the switch arm, a movement of the operating lever to the right, *i. e.* to "Bat.", causes the switch arm to complete a battery circuit, while, a movement of the operating lever to the left, *i. e.* to "Mag.", causes the switch arm to complete a circuit leading from the magneto. When the operating lever occupies middle or "off" position, no electrical circuit is complete, and by removing the key, the switch arm remains "off" and no circuit can be completed until the operating lever is returned to "off" position, and, by the insertion of the key, has become mechanically locked to the switch.

While I have given a description of this particular embodiment of my invention, I

do not wish to be limited thereto, but desire to protect my invention in the broadest manner legally possible. For example, while this switch is very useful when placed in proximity to the foot of a person operating the automobile, so that he can kick the free end portion of the operating lever into any one of the desired positions, without the use of his hands which are thus free to control other parts of the automobile, yet the said switch may be so placed as to be operated solely by hand. Further, the invention is not necessarily embodied in a switch having the three portions shown. Two are sufficient, as when a battery is used alone. Regardless of its environment, my invention resides in a removable key connection between a concealed switch arm and an exposed operating lever.

What I claim is:—

1. In an electrical switch having a pivoted switch arm, and a cover over the same; a pivoted operating lever, partially contained within said cover; a key hole in said cover, in said lever, and in said switch arm; a key to fit said key holes, whereby, when said key engages said switch arm and operating lever, and a force is applied to the exposed end of the operating lever, said force may be transmitted by said key to said switch arm, and cause the lever and arm to move simultaneously.

2. In an electrical switch having a pivoted switch arm, and a cover over the same; a pivoted operating lever partially concealed by said cover; said switch arm and said operating lever having a common pivotal center; a key hole in said cover, in said lever, and in said arm; a key to fit said key hole whereby when said key engages said arm and

lever, and a force is applied to the exposed end of the lever, said force may be transmitted by said key to said lever and cause the lever and arm to move simultaneously.

3. In an electrical switch having a pivoted switch arm, and a cover of insulating material over the same; a pivoted operating lever being partially concealed by said cover; a key hole in said cover, in said lever, and in said switch arm; a key having a fin, to fit into said key holes, whereby when said key engages said switch arm and operating lever, a force if applied to the exposed end of the lever, is transmitted by said key and fin to said switch arm, and causes the lever and arm to move simultaneously; it being impossible to mechanically separate the switch arm from the operating lever except when the key holes in the switch arm, operating lever, and cover are in alinement.

4. In an electrical switch having a pivoted switch arm, and a cover over the same; a pivoted operating lever being partially concealed by said cover; a key hole in said lever, in said switch arm, and in said cover; a key to fit said key holes and engage said switch arm and operating lever, when they are in alinement, all designed so that if the operating lever is moved, the key is moved out of alinement with its hole in the cover and cannot be withdrawn; and the switch arm and operating lever remain locked until the key is withdrawn.

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

JOHN OTTO HEINZE, JR.

Witnesses:

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