

1,045,692.

Patented Nov. 26, 1912.

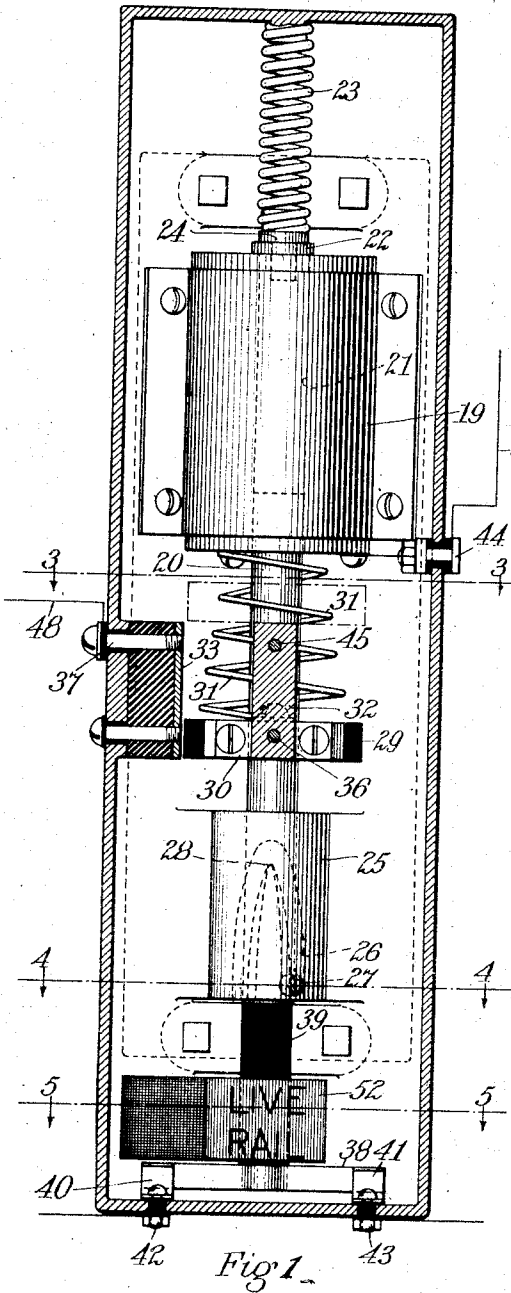


Fig. 1.

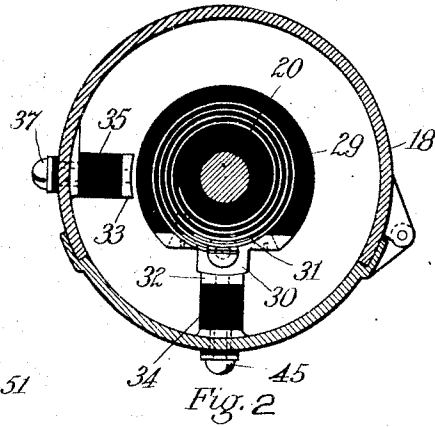


Fig. 2

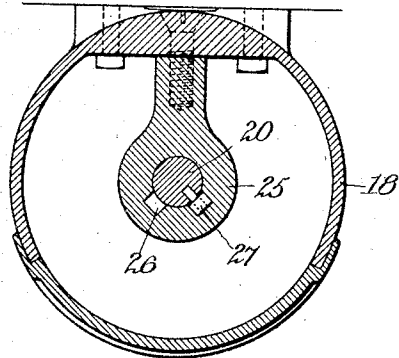


Fig. 3

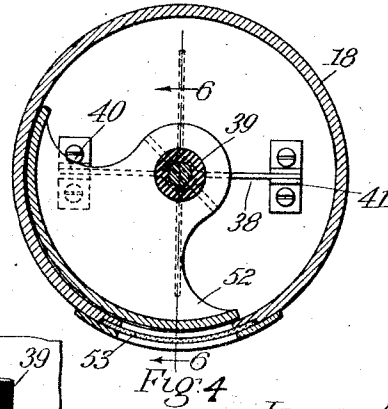


Fig. 4

Witnesses:

Sydney E. Taft.
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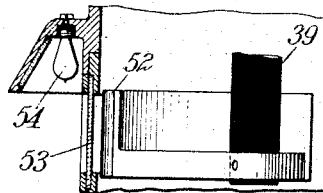


Fig. 5

Inventor.

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UNITED STATES PATENT OFFICE.

ARTHUR G. FITZ GERALD, OF HAVERHILL, MASSACHUSETTS.

ELECTRIC SWITCH.

1,045,692.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed June 23, 1911. Serial No. 635,029.

To all whom it may concern:

Be it known that I, ARTHUR G. FITZ GERALD, a citizen of the United States, residing at Haverhill, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Electric Switches, of which the following is a specification.

This invention relates to improvements in electric switches.

The object of the invention is to provide a switch which is adapted to alternately connect and disconnect a pair of terminals.

My invention consists in the novel features of construction and in the combination and arrangement of parts of the switch set forth in the following specification and particularly pointed out in the claims.

Referring to the drawings: Figure 1 is an elevation of a switch mechanism embodying my invention with the casing and certain other parts shown in section. Fig. 2 is a plan section taken on line 3—3 of Fig. 1. Fig. 3 is a plan section taken on line 4—4 of Fig. 1. Fig. 4 is a plan section taken on line 5—5 of Fig. 1. Fig. 5 is a detail vertical sectional view taken on line 6—6 of Fig. 4, looking toward the left.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings a suitable casing 18 is provided to house the parts of the mechanism and protect them from injury. Within this casing there is mounted an electro-magnet 19 preferably of the solenoid type and having an armature 20 longitudinally movable therein. Extending upwardly from this armature and within the solenoid 19 is a non-magnetic shaft 21 provided with a stop 22 to limit the downward motion of the shaft and armature, and as a means to assist gravitation in returning the armature to its lowermost position after the same has been raised, I preferably provide a spring 23 abutting at its upper end against the casing 18 and at its lower end against a pivot 24 arranged to swivel in the upper end of the shaft 21, this pivot permitting the shaft to oscillate without interfering with the action of the spring.

The armature 20 extends downwardly as a shaft to a point some distance below the solenoid 19 and is surrounded by a stationary cam 25 having a cam path 26 into which extends a cam roll 27 journaled on the armature 20. The cam path 26 extends longi-

tudinally and circumferentially within the bore of the cam, its circumferential extent being preferably 90°. This cam path, it will be noted, is reflex, so to speak, or, in other words, it turns back upon itself, as clearly illustrated in Fig. 1. It will be noted from an inspection of Fig. 1 that if the solenoid 19 be energized, the armature 20 will be lifted and during its longitudinal movement the roll 27 will be carried in a somewhat helical path, thus imparting to the armature and all of the parts carried thereby a rotative movement which, combined with the longitudinal movement, will bring the cam roll 27 to the nose 28 of the cam and the momentum of the moving parts in a circumferential direction will carry the roll laterally past the nose so that when the solenoid is deenergized, as will appear hereinafter, the cam roll will drop into the left hand side of the cam track 26, as will be evident by an inspection of Fig. 1. In like manner, when the solenoid is again energized, the path of the cam roll will be the reverse of that just described and the armature will be rotated in the opposite direction. In this way, it will be seen that the successive energizings of the solenoid result in the armature being oscillated to and fro.

Secured to the armature 20 is a suitable non-magnetic and non-conducting support 29 carrying a brush 30 which is connected in circuit with the winding of the solenoid by a flexible conductor 31 which is preferably spiral in form and helically arranged about said armature so as to accommodate the longitudinal and rotative movements of the armature. The brush 30 is adapted to make and break contact alternately with two contact plates 32 and 33 mounted within the casing 18 upon suitable insulating elements 34 and 35, respectively, and having suitable binding posts 36 and 37, respectively. These contact plates are of such extent vertically that when the brush 30 is raised and is oscillated by the rising and falling of the insulated armature 20 the brush will remain for a certain period of time in contact with one plate or the other, as the case may be, or, in other words, a sufficient length of time for the parts to gain the necessary momentum to carry the cam roll 27 beyond the nose of the cam. These parts just described constitute one of the switch mechanisms, the purpose of which will appear hereinafter.

Another switch mechanism operated by

the armature is of the so-called knife blade type and consists of the blade 38 secured to the lower end of the armature 20 by a non-conducting and non-magnetic element 39. 5 The opposite ends of the blade 38 are adapted to enter usual contacts 40 and 41 therefor, these contacts being provided with suitable binding posts 42 and 43, respectively. These contacts are 180° apart and, accordingly, 10 when the blade 38 is lifted out of contact therewith by the action of the armature and is rotated 90° by the cooperative action of the cam 25 and armature 20, it will come to rest in the position shown in dotted lines in 15 Fig. 4, at which time it will not be in contact with any contact members whatever so that at that time the contacts 40 and 41 will be electrically disconnected from each other.

As hereinbefore described, one end of the winding of the solenoid 19 is connected by the conductor 31 to the brush 30. The other end of the winding is connected to a suitable binding post 44.

In order to properly actuate the armature 20, the winding of the solenoid 19, which is connected at one end to the terminal 44 and at its other end through the flexible conductor 31 to the rotary brush 30, is energized by any suitable means which may be connected to said binding post 44 and the binding posts 36 or 45, said binding posts 36 and 45 being connected through the plate 32 to the brush 30 when the same is in the position illustrated in Figs. 1 and 2, and upon 35 the energizing of the same said armature 20 will be drawn upwardly through said solenoid and the roll 27 engaging the cam groove 26 will act to swing said brush 30 out of contact with the plate 32 and into contact with the plate 33, thereby disconnecting the switch blade 38 from its contacts 40 and 41 and thus open the circuit connected with the binding post 42 and 43.

In this position the switch remains until

it is again desired to close said circuit when 45 an electric circuit containing the binding post 37 and the binding post 44 may be energized and acting through said binding post 37, plate 23, brush 30, conductor 31, solenoid 19 and terminal 44, the armature 20 50 will again be drawn upwardly by said solenoid and the cam roll 27 return said brush 30 to its former position.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:

1. A switch mechanism having, in combination, a solenoid, an armature longitudinally movable within said solenoid, a switch having a non-magnetic and non-conducting 60 element carried by said armature, a brush supported by said element, a flexible spirally arranged conductor connecting said brush in circuit with said solenoid, and means operated by the longitudinal movement of said 65 armature for imparting an oscillatory motion to said switch element and said brush.

2. A switch mechanism having, in combination, a solenoid, an armature longitudinally movable within said solenoid, a plurality of contact plates, a brush secured upon 70 said armature, a flexible spiral conductor helically arranged about said armature and connecting said brush in circuit with said solenoid, adapted to accommodate longitudinal and rotative movements of said armature, and means operated by the longitudinal 75 movement of said armature for imparting a rotary motion to said brush to move the same into and out of contact with said contact plates. 80

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ARTHUR G. FITZ GERALD.

Witnesses:

LOUIS A. JONES,
SYDNEY E. TAFT.