April 24, 1928. 1,667,158

C. E. IVES

ELECTRIC SWITCH

Filed April 28, 1924 2 Sheets-Sheet 1

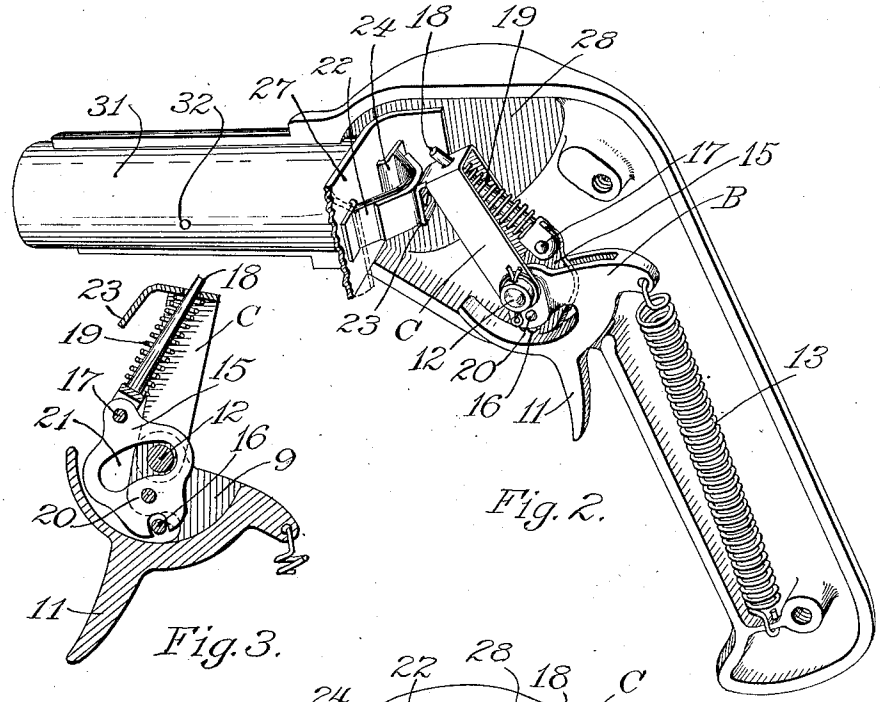


Fig. 2.

Fig. 3.

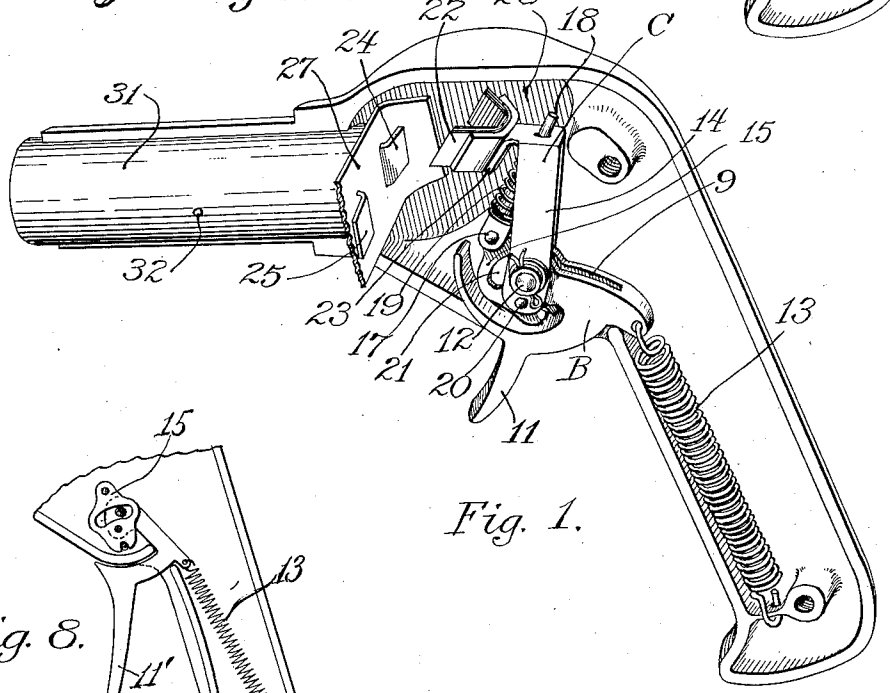


Fig. 1.

Fig. 8.

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2 Sheets-Sheet 2

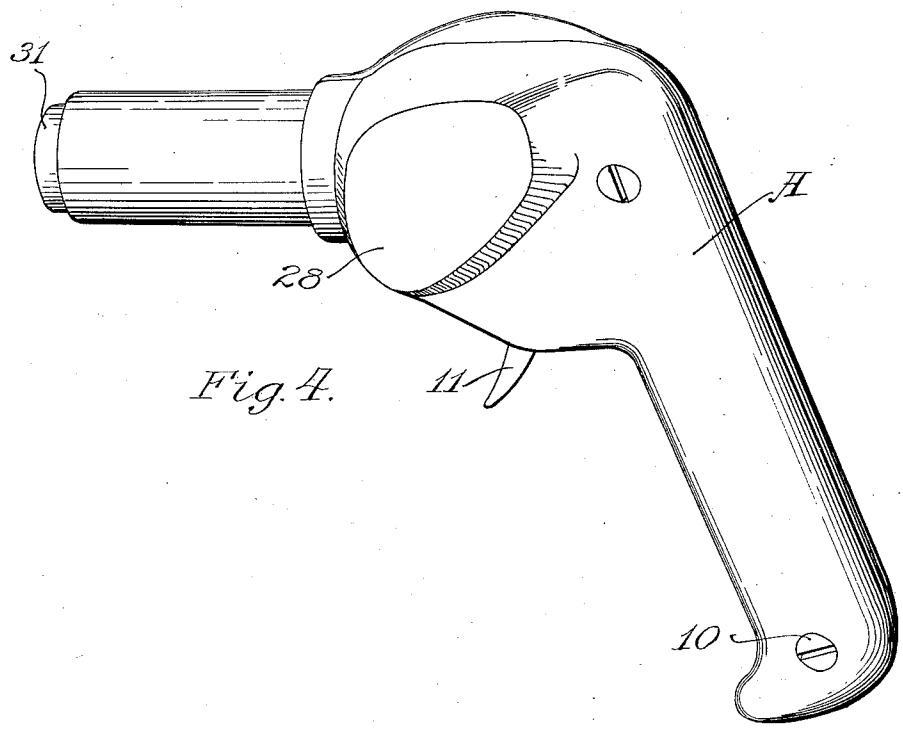


Fig. 4.

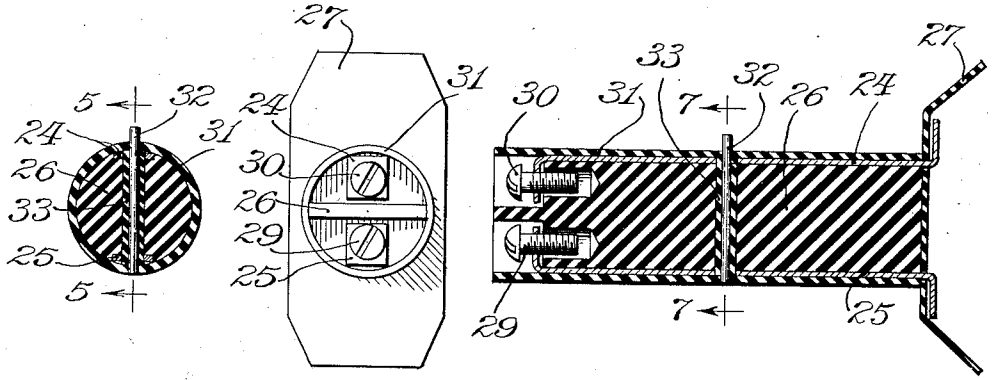


Fig. 7

Fig. 6.

Fig. 5.

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Patented Apr. 24, 1928. 1,667,158

UNITED STATES PATENT OFFICE.

CLIFFORD E. IVES, OF CHICAGO, ILLINOIS.

ELECTRIC SWITCH.

Application filed April 28, 1924. Serial No. 709,468.

My invention relates to electric switches and has to do more particularly with the provision of a hand operated switch, the present embodiment of my invention being applied in combination with a pistol grip or handle for use with various types of apparatus such as meat saws, electric drills, electric hammers, etc. in which instantaneous connection and disconnection of the current is desirable.

An object of my invention is to provide an improved device of the above character having a quick-make and quick-break, or so-called double snap-action, capable of carrying sufficient current for operating small motors and the like.

There are various features to my invention and these will be more particularly pointed out in the ensuing part of the specification and appended claims.

In the accompanying drawings I have illustrated the preferred application of my invention, in which—

Fig. 1 is a perspective view with one-half of the pistol grip casing removed and showing the switch mechanism in its normal or open position;

Fig. 2 is a view similar to Fig. 1, but with the trigger pulled and the switch mechanism in its alternate or closed position;

Fig. 3 is a detail view of the trigger and part of the switch mechanism in a normal position;

Fig. 4 is a perspective view of the complete device;

Fig. 5 is a longitudinal horizontal sectional view through the barrel, showing the switch contacts and terminal construction;

Fig. 6 is a left end view of Fig. 5;

Fig. 7 is a cross section through Fig. 5 at the dowel pin; and

Fig. 8 shows a modified form of trigger.

Referring now more in detail to the preferred form of my invention as illustrated, I preferably apply my improved switch mechanism to a pistol type of grip A comprising the grip portion and barrel extension. The casing A is preferably made of two halves held together by screws 10 and the switch mechanism mounted therein with the finger member 11 of the trigger B in position to be pulled by the finger of the operator as the grip is held in the hand. The trigger B is pivotally supported upon a stationary shaft or pin 12, rigidly secured to the casing, and in order to secure an automatic snap-action return of the switch I provide a spring 13 located inside the grip portion and tending to hold the trigger B in its normal position, as shown in Figs. 1 and 3. A contact carrying lever C is also provided, preferably in the form of a yoke 14, which spans the trigger B and preferably pivotally supported upon the trigger shaft 12. As previously stated, the switch arm C has a quick-make and quick-break movement, that is the double snap type, and to secure this I use a so-called toggle spring arrangement. But on account of the limited space in which the switch may be carried in order to secure a most compact device, the ordinary toggle spring arangement was not positive without an excessive throw of the trigger 11 and this, of course, is objectionable for various reasons. One reason is that it requires too great a movement of the finger, which is tiresome to the operator. To overcome this I provide an intermediate lever 15 adapted to provide an increased throw of the pivotal point of the toggle spring with a minimum throw or angular advance of the trigger lever. This lever 15 is pivoted at one end 16 and has its opposite end 17 pivotally connected with the link 18 carrying the operating spring 19, preferably in the form of a compression spring. In order to secure this increased throw I connect the trigger with the intermediate lever 15 at a point intermediate its ends, preferably by the pivot pin 20, so that with a comparatively small movement of the trigger an increased circular advance of the spring pivot point 17 is secured. In order to secure a most compact device the contact arm C is preferably carried on the axis of the trigger, as already stated, and to further this end and secure the toggle action the intermediate lever 15 is pivoted at 16 below the trigger pivot 12 and the lever 15 provided with the opening 21 so as to clear the trigger shaft 12 and permit reciprocation of lever 15 to move the pivot point 17 back and forth past the central or neutral point. Also to provide a compact construction the intermediate lever is carried in the slot 9 of the trigger, thereby requiring the clearance 21 in the lever. This construction also gives a more balanced support of the elements, and therefore an easier and more positive operation.

Now as to the contact construction of the switch mechanism, I preferably provide an abutting construction so as to avoid the knife

type switch, which by its frictional engagement interferes with the free operation of the switch. To this end I attach a movable contact member 22 of laminated yielding construction, preferably copper or bronze sheeting, as desired. This contact member 22 is insulatingly attached to the lip 23 of the contact lever C and adapted to close the circuit across the stationary terminals mounted in the barrel extension. These stationary contacts are preferably in the form of suitable metal conducting strips of copper consisting of elements 24—25 set in slots along the side of an insulating block 26. The strips 24—25 have their contacting ends bent over to provide a greater contact area and at the same time retain an insulating sheeting 27 in place. In order to secure desirable resiliency in the contact member 22 it is made of sufficient length, and therefore to clear this member the casing has hollowed portions 28 into which the contact member 22 extends and in which it will freely reciprocate clear of the casing walls. Now as to the stationary contact construction already referred to, the strips 24—25 preferably extend to the outer end of the barrel and are there bent inwardly and provided with terminal screws 29—30 by which the conductors are led into the switch. To insulatingly protect the contact members, I provide an insulating sleeve 31 which slips over the assembled block 26 and contact members and is then held in place by a dowel pin 32 extending through a bushing 33 for insulating the pin 32 from the contact strips 24—25. This dowel pin 32 is also adapted to maintain the insulating block in proper position in the barrel, and to this end a hole is provided in the barrel (not shown) in which the end of the pin enters.

The entire grip may be attached to the mechanism to be controlled in any suitable way, but I preferably provide the barrel extension which is adapted to be inserted into a socket of the device to be controlled, such as power meat saws, drills, etc.

Now as to the operation of the device, and assuming the mechanism is in its normal or open position, as indicated in Figs. 1 and 3, to close the switch the operator grasps the handle or grip in the hand and pulls the trigger by applying pressure thereto with the finger in the usual way. This pulls the trigger back into the position indicated in Fig. 2 against the tension of restoring spring 13. As the trigger is moving from its normal position, intermediate lever 15 is moved on its pivot 16 by connection 20 until the spring pivot point 17 passes the neutral line, that is a line running from the pivotal point 12 of the contact arm C to the end of the arm where the spring 19 is attached. It will be seen that as soon as the neutral point is passed sufficiently, spring 19 will cause a snap-action or quick throw of the contact arm into its alternate or closing position, as indicated in Fig. 2. In the preferred form of my switch, and as illustrated herein, the switch remains closed only while the pressure is maintained upon the trigger by the finger of the operator. As soon as this pressure is removed the switch automatically restores. This latter operation is brought about by the spring return of the trigger B through the spring 13. That is, as soon as the operator releases the finger pressure upon the trigger arm 11, spring 13 pulls the trigger back toward its normal position, thereby moving the intermediate lever 15 from its operated position shown in Fig. 2. As soon as the spring pivot pin 17 passes the neutral point the contact arm C is of course thrown back by a quick-break or snap-action into its normal position as indicated in Fig. 1, and is thus ready for the next operation.

It will thus be seen that I have provided a double snap-action or quick-make and quick-break switch positive in operation with an increased throw of the toggle spring by a minimum angular advance of the trigger arm; also in which the switch preferably remains closed only so long as the finger is held upon the trigger and in which the switch automatically opens as soon as pressure upon the trigger is released.

In Fig. 8 I show a modified form of trigger which gives a longer grip at 11′ and also extends through the handle in such a way as to provide a more dust-proof arrangement.

Although I have shown certain forms of my invention, I contemplate using it in other ways than that illustrated herein, and appreciate that changes and modifications will readily occur to those skilled in the art. Therefore, I do not desire to be limited to the exact structure shown and described, but aim to cover all that which comes within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent is:

1. An electric switch comprising a finger trigger pivotally mounted at one end, a contact operating yoke pivotally mounted at one end on the same pivotal axis as the trigger, a lever pivotally mounted and having a free end connected with the yoke by a spring and adapted to swing back and forth to place the spring beyond a neutral point whereby the yoke snaps from a normal to an alternate position and vice versa, and a connection between the trigger and lever to operate the latter.

2. An electric switch comprising a finger trigger pivotally mounted at one end, a contact operating yoke pivotally mounted at one end on the same pivotal axis as the trigger, a lever pivotally mounted and having a free

end connected with the yoke by a spring and adapted to swing back and forth to place the spring beyond a neutral point whereby the yoke snaps from a normal to an alternate position and vice versa, and a connection between the trigger and lever to effect a greater advance of the lever than the trigger to operate the lever and spring.

3. An electric switch comprising a finger trigger pivotally mounted at one end, a contact operating yoke pivotally mounted at one end, a lever pivotally mounted and having a free end connected with the yoke by a spring and adapted to swing back and forth to place the spring beyond a neutral point whereby the yoke snaps from a normal to an alternate position and vice versa, and a connection between the trigger and lever to operate the latter whereby when the trigger is pulled the lever and yoke are moved to an alternate position, and a spring acting upon the trigger whereby it remains pulled while pressure is held thereon but automatically restores to restore the yoke when the pressure is removed.

4. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a spring connected at one end to the yoke and its other end operated by a pull upon the trigger to pass a neutral point whereby the yoke snaps from one position to the other to operate a switch.

5. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a spring connected at one end to the yoke and its other end operated by a pull upon the trigger to pass a neutral point whereby the yoke snaps from one position to the other to operate a switch, and a spring acting upon the trigger whereby it remains operated while the finger pressure is maintained thereon but automatically restores to return the spring oppositely beyond the neutral point to restore the yoke by snap action when the pressure is removed.

6. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a lever pivotally supported beneath the trigger pivot and extending upwardly with a free end connected by a spring to the yoke, a pivotal connection from the trigger to the lever for increasing the throw of the free end to move the spring back and forth beyond a central neutral point to effect a snap action of the contact operating yoke when the trigger is operated.

7. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a lever pivotally supported beneath the trigger pivot and extending upwardly with a free end connected by a spring to the yoke, a pivotal connection from the trigger to the lever for increasing the throw of the free end to move the spring back and forth beyond a central neutral point to effect a snap action of the contact operating yoke when the trigger is operated, and a spring acting upon the trigger whereby it remains operated while the finger pressure is maintained thereon but automatically restores to return the spring oppositely beyond the neutral point to restore the yoke by snap action when the pressure is removed.

8. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a spring connected at one end to said yoke, a lever pivoted beneath the trigger axis extending around the trigger shaft and having an upper end connected to the other end of the spring, and a connection between the lever and trigger pivots, whereby a pull upon the trigger moves the point of connection between the lever and spring beyond a central neutral point to effect a snap action of the contact yoke.

9. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a spring connected at one end to said yoke,

a lever pivoted beneath the trigger axis extending around the trigger shaft and having an upper end connected to the other end of the spring, and a connection between the lever and trigger pivots, whereby a pull upon the trigger moves the point of connection between the lever and spring beyond a central neutral point to effect a snap action of the contact yoke, and a spring acting upon the trigger whereby it remains operated while the finger pressure is maintained thereon but automatically restores to return the spring oppositely beyond the neutral point to restore the yoke by snap action when the pressure is removed.

10. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a compression spring encircling a rod slidably mounted at its upper end in the yoke and having its lower end operated by the trigger to be moved alternately beyond a neutral point to effect a snap action of the contact yoke into alternate positions.

11. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a contact operating yoke pivotally supported upon the axis of the trigger pivot, and having an upwardly extending free end adapted to swing forwardly and backwardly to operate a switch, a compression spring encircling a rod slidably mounted at its upper end in the yoke and having its lower end operated by the trigger to be moved alternately beyond a neutral point to effect a snap action of the contact yoke into alternate positions, and a spring acting upon the trigger whereby it remains operated while the finger pressure is maintained thereon but automatically restores to restore the lower end of the yoke spring to effect a restoration of the contact yoke when the pressure is removed.

12. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a switch operated by the trigger having a contact arm movable toward and away from the barrel and a pair of contacts for cooperation with the contact arm insulatingly supported at one end of a frame removably held in the barrel and having conductor extensions along the frame to the outer end of the barrel, and terminals for the extensions at the outer ends of the barrel.

13. An electric switch comprising a pistol type grip and barrel extension, a trigger pivotally mounted in the grip so as to be operated by the finger when the grip is held in the hand, a double snap-action trigger operated switch mounted in the grip having a reciprocatable contact arm movable toward the barrel when the trigger is pulled and away from the barrel when the trigger is released, and contacts carried in the barrel adapted to be closed when the contact arm moves toward the barrel and opened when the arm restores.

In witness whereof, I hereunto subscribe my name this 31st day of March, 1924.

CLIFFORD E. IVES.