April 16, 1957 D. W. JOHNSON 2,789,170

TRIGGER SWITCH WITH LOCK-ON AND INTERLOCK

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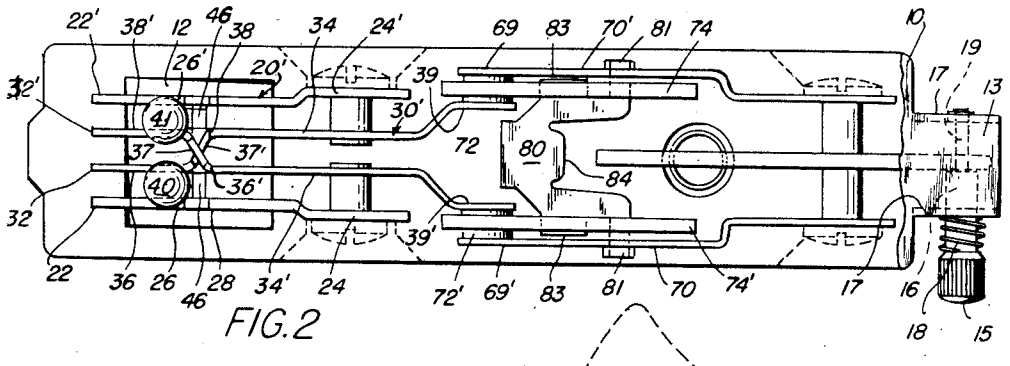

FIG. 2

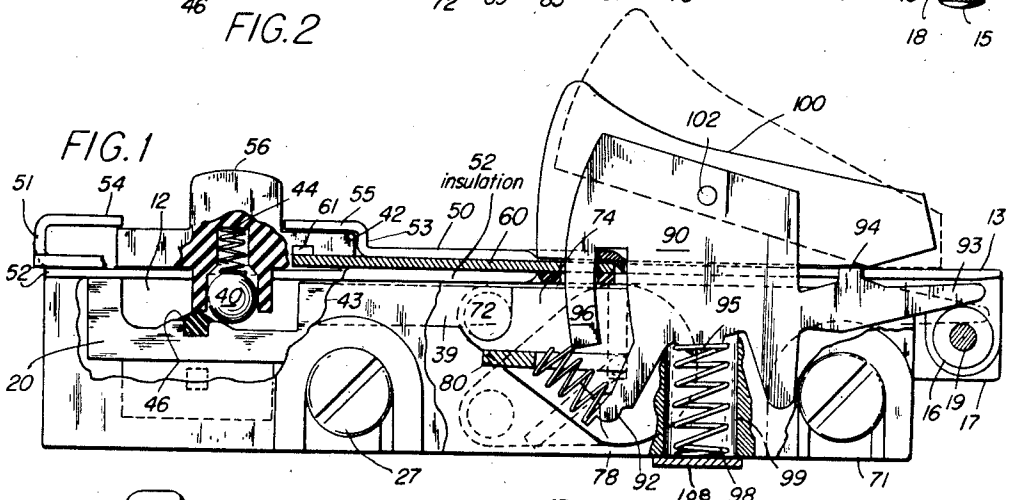

FIG. 1

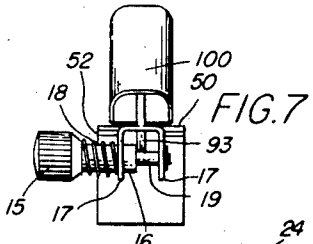

FIG. 7

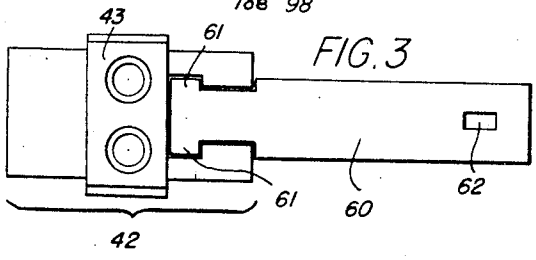

FIG. 3

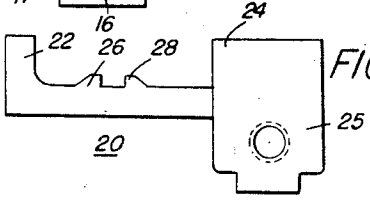

FIG. 6

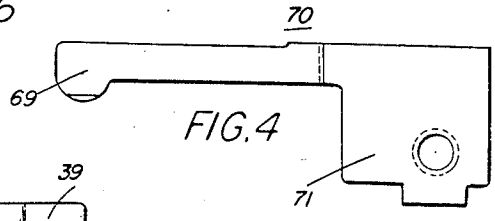

FIG. 4

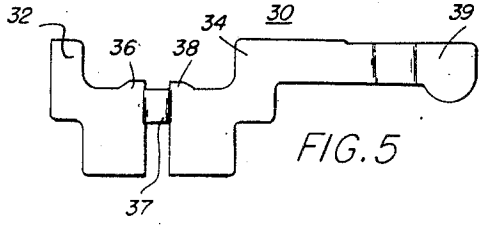

FIG. 5

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FIG. 8

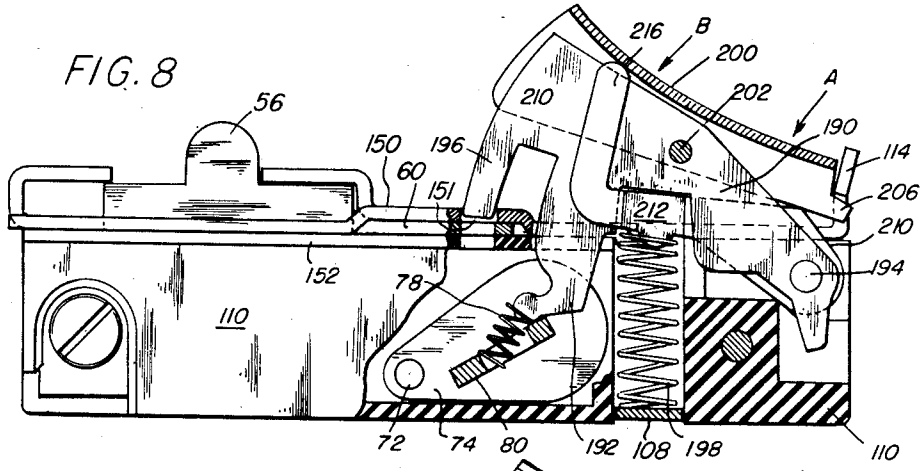


FIG. 9

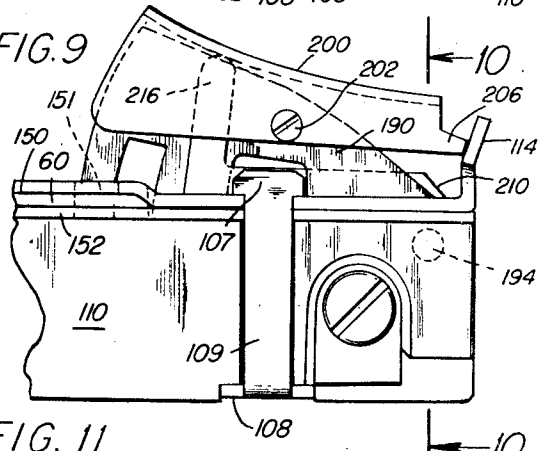


FIG. 13

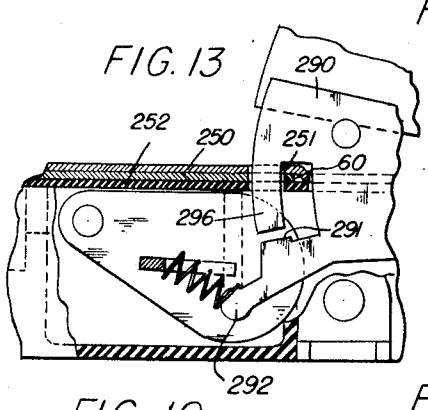


FIG. 10

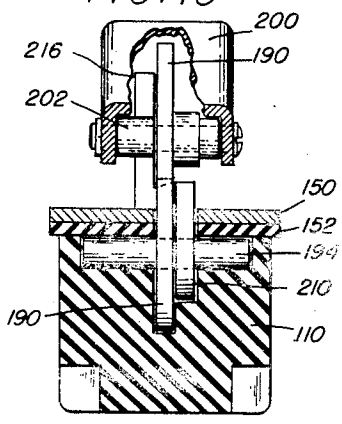
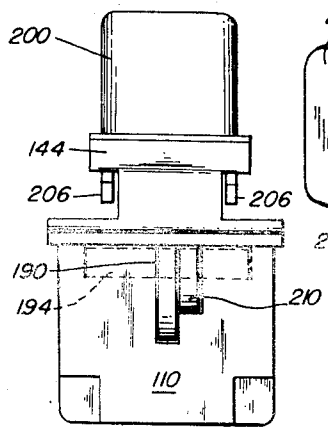


FIG. 11



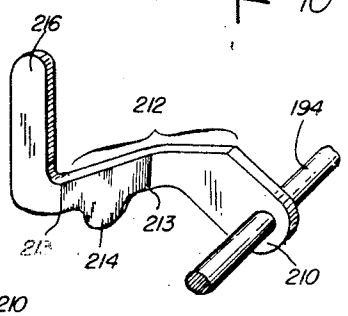


FIG. 12

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2,789,170

TRIGGER SWITCH WITH LOCK-ON AND INTERLOCK

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Application January 9, 1956, Serial No. 558,064

33 Claims. (Cl. 200—50)

This invention relates to electric switches. More particularly it relates to trigger-operated electric switches of a type particularly useful in portable electric tools, though not limited to such use. The invention also relates to an interlocking arrangement of the switch with a reversing switch which can be incorporated as a unit in the tool handle.

It is an object of the invention to provide a manually operable electric switch which is actuated by a trigger or finger piece which will automatically lock in actuated position or return automatically under the bias of a return spring to the original position, depending upon where pressure is exerted upon the trigger at the time of actuating.

Another object is to provide a trigger operated switch accomplishing the foregoing object and which may be easily interlocked by manual pressure selectively exerted on the trigger.

Another object is to provide a switch accomplishing the foregoing objects in combination with a reversing switch and interlocked therebetween to prevent movement of the reversing switch so long as the trigger switch is in actuated position.

Another object is to provide a switch accomplishing the foregoing objects which may be economically manufactured, mainly from stamped sheet metal parts and readily assembled.

Another object is to provide a switch capable of accomplishing one or more of the foregoing objects in which the contacts and terminals may be inserted edgewise in an insulating base and maintained there by a cover plate which at the same time will maintain the switch operating parts in their proper position in the base.

Other objects and advantages of the invention will occur to those skilled in the art as the invention is described in connection with the accompanying drawings.

According to the invention, the manually operated actuating member or trigger of the movable over-center switch, which may include a yoke, operates a contact carrier to cause engagement or disengagement of movable contacts with fixed contacts, and wherein the trigger is mounted and biased to lock in actuated position or return without locking, depending upon where the manual pressure is applied to the trigger at the time it is pressed. The invention may also include a reversing switch which has an interlocking arrangement with the trigger switch to prevent movement of the reversing switch while the trigger switch is actuated.

In the drawings:

Fig. 1 is an elevation view, partly in section and partly broken away, of a switch device embodying the invention.

Fig. 2 is a plan view with the cover removed from the base and embodying the part of the operating mechanism with the control switch removed.

Fig. 3 is a bottom view of the manually operable thumb piece of the reversing switch showing the interlocking slide assembled therewith.

Figs. 4, 5 and 6 are detailed views of one set of the terminals and contacts employed in the invention.

Fig. 7 is an end elevation view of the end of the switch showing the lock-on for the control switch.

Fig. 8 is an elevation view, partly in section and partly broken away, of another form of the invention.

Fig. 9 is a side elevation view of the invention illustrated in Fig. 8 with the control switch locked-on.

Fig. 10 is an end elevation view partly in section taken along line 10—10 of Fig. 9.

Fig. 11 is an end view of the device of Fig. 9.

Fig. 12 is a detailed perspective view of the auxiliary member used in the form of invention illustrated in Figs. 8, 9 and 10.

Fig. 13 is a fragmentary side elevation view of a modification providing a dust seal.

Referring to the drawings, the current carrying parts are mounted in a base 10 of insulating material which may conveniently be of generally rectangular prismatic form. The base is hollowed out from its upper surface to provide a plurality of connecting cavities and slots suitable for reception of the moving parts of the switch and the fixed contacts and terminal, and will more fully appear hereinafter.

In one end of the base is a reversing switch mechanism; in the other end is an "on-off" or control switch.

Referring now to the reversing switch mechanism, a pair of similar stamped sheet metal terminal and contact members, designated generally by numerals 20, 20′ and having an irregular form as illustrated in Fig. 6, are slid edgewise in slots molded longitudinally in the base near the side walls of the base and extend across the opening 12. The contact and terminal members are recessed in their upper surface providing spaced legs 22, 24. In the upper edge of the recessed portion between said legs, spaced humps 26 and 28 are formed approximately midway between the portions 22 and 24. A downward extension 25 from the portion 24 provides a wire terminal tab which is accessible through the side of the base by reason of a recess formed in the side of the base adjacent said portion 25. Preferably the portion 25 is tapped and provided with a binding screw 27 for connection of the conductor wires thereto.

Between the contact and terminal members 20 and 20′ there are provided a pair of dual contact members, designated generally by numerals 30, 30′, which have portions toward one end serving as contacts for the reversing switch and other portions at the opposite ends thereof serving as fixed contacts for the manually controlled trigger switch. The dual contacts are of irregular shape, preferably being stamped from sheet metal into the form as may best be observed in Figs. 2 and 5. They lie edgewise in slots formed in the switch base inwardly of and in the area between the slots in which the contact and terminal members 20, 20′ are located. In general the dual contact members are parallel to each other and to members 20, 20′, but the inner (or right) ends as viewed in Fig. 2, are formed to provide contacts 39, 39′ for the control switch and are offset outwardly toward the side walls of the base.

The opposite ends 32, 32′ of the dual members 30, 30′ (the left ends as viewed in Fig. 2) are crossed over so that such ends exchange positions, placing end 32 in alignment with the midportion 34′ of the contact 30′ and placing end 32′ in alignment with midportion 34 of contact 30. Like the members 20 and 20′, the left or outermost ends are recessed from their top edges providing legs, e. g. 32 and 34. Again, like members 20 and 20′, the upper edges of the recessed portions are provided with spaced humps 36, 38 and 36′, 38′ which are laterally in alignment with the humps 26, 28 and 26′, 28′.

It is between the humps 36, 38 and 36', 38', respectively, that the bends 37, 37' occur in the dual contact members causing the aforementioned cross-over from one side of the center line of the switch base to the other. In order that these bends shall not interengage or interfere with one another, the bottom portion of one of the dual contact members is cut away below the connecting bend 37 while the top portion between the humps 36' and 38' is cut away above the connecting portion 37' so that there is spacing, providing insulation, between the two members at the cross-over point.

In order to connect the contacts of the reversing switch, a pair of spring pressed balls 40, 41 are provided to ride along the top edges of the contacts 20, 20' and 30, 30'. The balls are actuated by a thumb piece 42, made of insulation, and slidable lengthwise across the top of the base 10 by thumb pressure. The thumb piece preferably is rectangular with a depending rib 43 extending into the reversing switch cavity 12 of the base and having two bores therein, each of which received a coiled compression spring 44 pressing on the balls 40, 41.

As the thumb piece is slid, the balls 40, 41 roll over the contacts between the positions of Figs. 1 and 2. In the Fig. 1 position, ball 40 will engage contacts 22, 32'; and the ball 41 will engage contacts 22' and 32. In the Fig. 2 position, the ball 41 engages contacts 22' and 32'; and the ball 40 engages contacts 22 and 32. The current flow is thus reversed in the two positions of the balls and the thumb piece.

In order that the balls will not "hang up" in a mid-position, two transversely aligned insulating ridges 46 are formed in the base in transverse alignment with the space between the humps 26, 26'; 36, 36' and 28, 28'; 38, 38'. Said ridges also lie in the longitudinal paths of the balls 40 and 41 in the base, which paths are between the contacts 22', 32' and 22, 32, respectively.

To hold the thumb piece down and to guide its sliding movement, a metal cover plate 50 is secured over the base with an insulating liner plate 52 between the cover plate and base. The cover plate may be provided with ledge plates 54, 55 integral therewith upwardly offset from the plane of the cover plate by shoulders 51, 53 so as to overlie the top surface of the thumb piece. The inner ends of the ledges are spaced to allow and to limit movement of the thumb engaging ridge 56 on the thumb piece between the ends of the ledges.

For interlocking the reversing switch and the control switch so that the reversing switch cannot be moved while the control switch is in circuit closing or "on" position, a narrow, stamped sheet metal interlocking plate 60 is slidable under the cover plate 50 and on the insulating liner plate 52. The interlocking plate is connected to the thumb piece by laterally extending and upwardly bent small ears 61 at one end, which are received in pockets molded in the bottom surface of the thumb piece. The other end of the interlocking plate has a rectangular aperture 62 therein to receive an interlocking element of the control switch, as will be hereinafter more fully described.

Referring now to the control switch, a pair of sheet metal contact strips 70, 70' is inserted edgewise in slots running lengthwise of the base 10 near the outside walls of the base. At the inner ends of the contact strips 70, 70' are contact faces 69, 69' opposite the contact faces 39, 39' of the previously described dual contact members which extend from the reversing switch. The opposite ends of the contact members 70, 70' may be provided with terminal plates such as 71, accessible through the side walls of the base by recesses or apertures formed in said side walls and tapped to receive conventional binding screws.

To bridge the gap between the contacts 39, 69 and 39', 69', movable contact buttons 72, 72' mounted upon insulating plates 74, 74' are adapted to be moved by the control switch mechanism between said pairs of stationary contacts. The contact carrying plates are carried, in turn, by an operating yoke 80 which is adapted to be moved over-center between "on" and "off" positions by a coiled compression spring 78. The yoke is preferably stamped in U-shape from sheet metal with trunnions 81 laterally extending outwardly from the ends of its arms into recesses formed in the inside surfaces of the side walls of the base on opposite sides of the cavity that is provided for the control switch mechanism. The trunnions preferably extend through apertures provided in the insulating contact-carrier plates 74. Other apertures in said carrier plates are also provided, into which enter lugs 83 that extend laterally from the outside margin of the yoke arms just above the transverse part of the yoke.

A nub 84 on the inside edge of the transverse part of the yoke forms a seat for one end of the switch operating spring 78 which is of the coiled compression over-center type. The opposite end of said spring is seated on a round end of an arm 92 which extends from the lower or inner edge of a stamped sheet metal pressure member 90. The pressure member 90 is of irregular shape as may best be seen in Fig. 1. It is provided with a pivot lug 94 extending from its top edge near the right end (as viewed in Fig. 1) extending into a small rectangular aperture located midway across the cover plate near one end thereof.

In order to provide interlocking between the control switch and the reversing switch, there is at the opposite end of the pressure member 90 an arcuate finger 96 adapted to enter the aperture 62 in the interlocking member 60 when the interlocking member is depressed to the Fig. 1 position. Alternatively, the arcuate finger will be abutted by the end of the interlocking member when an attempt is made to slide the interlocking member or reversing switch forward into the Fig. 1 position after the pressure member is depressed. Thus, when the interlocking member and reversing switch are already in the position of Fig. 1, the arcuate finger will enter the aperture therein and hold the interlocking member and reversing switch in that position so long as the control switch is depressed. On the other hand, if the reversing switch is not in the Fig. 1 position and the control switch is operated, the arcuate finger prevents movement of the reversing switch into the Fig. 1 position by reason of abutment of the end of the interlocking member with the edge of the arcuate finger.

In order normally to maintain the control switch in open or unactuated position, a coiled compression return spring 98 is seated in a centrally located bore 99 in the base 10, the upper end of said return spring engaging with the lower edge of the pressure member and being maintained by a nub or spring seat 95.

For actuating the control switch, a stamped sheet metal trigger member 100, which is substantially U-shaped in cross section and decreases in height from one end toward the other, fits over the pressure member 90 and is pivotally connected thereto by a transverse pin 102 which passes through both of the parallel sides of the trigger 100 and also through the pressure member 90. Those edges of the trigger member which are nearest the cover of the base each diverge from a point directly over the pivot lug 94 of the pressure member. The trigger member may pivot about this point as a fulcrum on returning to unactuated position (dotted in Fig. 1) when manual pressure is released from the trigger and the return spring 98 is allowed by its action upon the pressure member 90 to return the trigger to unactuated position.

In order that the control switch may be locked in actuated position, an extension 93 from one end of the pressure member (the right end in Fig. 1) is provided beyond the end of the switch base. This extension or tail is adapted to engage with a thick or thin portion (larger or smaller diameter) of a transversely movable locking pin 15 which is slidable in parallel legs 17 bent

down from an extending end **13** of the cover plate **10**. To normally hold the locking pin in a predetermined non-locking position, a compression spring **18** is coiled about its shank pressing against one of the legs **17** and against the head on the pin beyond the leg. When the pin is pressed in against its spring, the thick part **16** of the pin is beneath the tail **93**. Hence, the pressure member may not return to unactuated position, but is held and locked depressed or switch "on" position by the engagement of the tail **93** with the periphery of said thick part. Friction of the tail on the pin holds the pin from moving. However, when the trigger is pressed, the frictional hold of the tail on the pin is relieved and the pin snaps out, thereby locating the thin part of the pin under the tail. In that position of the pin, the tail and pressure member can move and return to unoperated position under influence of the return spring. Such movement carries all the control switch parts to "open" position.

In some circumstances it is desirable to have the trigger and control switch lock "on" automatically and to be releasable by merely shifting the pressure of the same finger that a person uses to actuate the trigger. For such cases, a different form and relation of the trigger, cover and pressure member may be provided for cooperation with an auxiliary member **200**.

Referring to Fig. 8, the reversing switch, the fixed and movable contact and terminals for the control switch, the over-center mechanism and return spring may be as in the previously described form of the invention, similar numerals showing similar parts.

The arcuate interlocking finger **196** and the over-center spring operating arm **192** of the pressure member **190** may be like and function similarly to corresponding parts in Figs. 1 and 2. In Fig. 8, the pressure member **190** is pivotally mounted on a pivot pin **194** seated transversely in the base in bearing recesses formed in the top surface of the side walls adjacent one end of the base **110**. The pressure member is also pivotally connected to the manually operable member or trigger **200**. Like trigger **100**, trigger **200** is stamped from sheet metal and bent into arcuately curved channel shape. The pressure member lies under the trigger and between its sides. A connecting pivot **202**, like the pin **102**, passes through both sides of the trigger and through the body of the pressure member.

From that end of the trigger which is adjacent the end of the base and over the pivot mounting pin **194**, ears **206** extend under the lower edges of the head of a T-shaped piece **114** bent up from the end of the cover plate **150**.

Pressure of the return spring **198**, which is located in the base **110** similarly to Fig. 1, is transmitted to the pressure member **190** and trigger **200** by an auxiliary member stamped from sheet metal into the shape illustrated in Figs. 8 and 11. The auxilary member is pivotally mounted at one end **210** on the same pin **194** on which the pressure member is mounted. The auxiliary member extends up from said pin to a mid-portion **212** which extends lengthwise over the cover **150** and is laterally offset as at **213** to pass under the pressure member just over the return spring **198**. A round nub **214** on the lower or inner edge of the offset provides a seat for the upper end of the return spring. The end **216** of the auxilary member away from the pivot **194** extends up and away from the base for engagement with the inner or under surface of the trigger **200**.

To guide the movement of the pressure member and the auxiliary member and to permit them to enter further into the base as they are depressed, the base is longitudinally slotted in its upper surface as is also an insulating liner plate **152** similar to the insulating plate **52**.

In operating the control switch, a person's finger may exert pressure upon the end of the trigger at the point indicated by the arrow A. Such pressure is transmitted through the pivot pin **202** to the pressure member **190** which pivots about its pivotal mounting pin **194**. As the

pressure member is depressed, it causes movement of the over-center spring **78** and eventually a snap movement of the switch yoke **80** and closing of the switch contacts, as in the form previously described.

On removal of manual pressure from the trigger **200**, the return spring **198** presses the auxiliary member upwardly about the pivot pin **194**. The pressure of the upper end **216** of the auxiliary member on the trigger returns the trigger to its original position as shown in Fig. 8. The upward movement of the trigger carries the pivot pin **202** upwardly and, hence, causes upward pivotal movement of the pressure member **190** also, to the position of Fig. 8. Such movement of the pressure member actuates the over-center spring **78** and yoke **80**, moving the contact carrier **74** and contacts **72** to open circuit position of Fig. 8.

When manual pressure by the finger of the person operating the switch is applied to the trigger **200** at the outer or upper end, such as at the point indicated by the arrow B, the closing movement of the switch mechanism is as before while the trigger is being depressed. The trigger itself, however, partakes of an additional movement, due to the different point of application of the manual pressure. The depression of the trigger causes movement of the pivot **202** away from the T-shaped piece **114** and, hence, causes movement of the ears **206** laterally relative to that T-shaped piece until the ears can slide out from under the T; and when the finger pressure is applied at B, the trigger may pivot to the position illustrated in Fig. 9. (In contrast, when the finger pressure is at A, the trigger is held from such pivotal action about pivot **202**.) Tendency of the return spring **198** to restore the parts to the position of Fig. 8 from Fig. 9 is insufficient to overcome the frictional engagement of the ends of the ears **206** against the inner face of the T-member **114**. Therefore, the trigger remains unmoved and the parts of the control switch remain latched in closed circuit or "on" position.

In order to provide adequate frictional pressure between the ends of the ears **206** and the inner face of the T-member **114**, the top portion of the T is inclined outwardly and the end of the ears **206** are similarly inclined. This inclination of these surfaces provides greater frictional resistance against the return of the parts than would otherwise be possible if the T-member were vertical with reference to the plane of the cover member.

With the parts in the position of Fig. 9, if the pressure of the finger of a person operating the switch is transferred from the point indicated by arrow B to the point indicated by arrow A, the ends of the ears **206** can be slid downwardly until the ears can slide under the head of the T, whereupon the trigger, the pressure member, the auxiliary member and other switch parts are free to return to "off" position, as illustrated in Fig. 8.

In both forms of the invention, the bore **99** for the return spring passes entirely through the base. This enables the insertion of the return spring through the bottom of the base. The return spring may be held within the bore by a plate **108** secured to the base. The plate may be a part of a U-shaped securing member **109** whose arms run up along the side of the base and have T-shaped heads **107** overlying the metallic cover plate and thus holding parts of the switch together. Additional securing means may be provided at the other end of the cover; but, obviously, any suitable securing means may be employed without departing from the invention.

In both forms it is often desirable to prevent as much as possible the passage of dust into the casing through the slot **251** in the cover. For that purpose, the end of the interlocking finger **296** (referring to Fig. 13 as an example) terminates in the plane of the cover **250** above the slide **60**. A dust-seal plug **291** in the form of an upward extension from the spring operating arm **292** enters the slot in the insulating plate **252** beneath the cover slot **251** but terminating in the plane of the insulating plate

252 when the operating arm 290 is not depressed. Thus, there is a gap between the end of the interlocking finger 296 and the dust-seal arm 291 through which the interlocking slide 60 can move when the control switch is open.

From the foregoing, it will be apparent that by merely shifting one's finger along the trigger 200, it is possible to cause the switch parts to be latched in "on" position or, alternatively, to be free to return to "off" position, as may be desired. Moreover, latching can be accomplished by shifting one's operating finger along the trigger to change the point of pressure application without the need for employing another finger or hand to operate a locking member or pin.

Many modifications within the scope of the invention will occur to those skilled in the art. Therefore, the invention is not limited to the specific embodiments illustrated and described.

What is claimed is:

1. In an electric switch, a housing, fixed and movable contacts, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivot means connecting said pressured member and trigger member, means providing a fulcrum point for pivoting of said trigger about an axis spaced from said pivot means, means providing a pivotal connection between said housing and said pressured member, and spring means biasing said pressured member and trigger member into non-depressed position.

2. In an electric switch, a housing comprising cover and base portions, fixed and movable contacts within said housing, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivot means connecting said pressured member and trigger member, means cooperating with said housing and providing a pivotal axis for said trigger spaced from said pivot means, means providing a pivotal connection between said cover portion and pressured member, and spring means in said housing biasing said pressured member and trigger member into non-depressed position.

3. An electric switch as claimed in claim 2 wherein said spring means is within a bore in the base part of the housing and is insertable therein from the side of the base opposite the location of said trigger member.

4. In an electric switch, a housing comprising cover and base portions, fixed and movable contacts within said housing, a contact carrier, means to operate said contact carrier to cause quick make and break of said contacts as they engage and disengage, a pressured member having an arm for actuating said make-and-break means, a manually depressible trigger member overlying said pressured member, pivot means connecting said pressured member and trigger member, means cooperating with said housing and providing a pivotal axis for said trigger spaced from said pivot means, means providing a pivotal connection between said housing and said pressured member, and spring means in said housing biasing said pressured member and trigger member into non-depressed position.

5. In an electric switch, a housing comprising cover and base portions, fixed and movable contacts within said housing, a contact carrier, over-center operating means for moving said carrier, a pressured member having an arm for moving said operating means over-center, a manually depressible trigger member overlying said pressured member, pivot means connecting said pressured member and trigger member, means cooperating with said housing and providing a pivotal axis for said trigger spaced from said pivot means, means providing a pivotal connection between said cover portion and pressured member, and spring means in said housing biasing said pressured member and trigger member into non-depressed position.

6. Interlocked reversing and control switches, the control switch comprising fixed and movable contacts, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivot means connecting said pressured member and trigger member, means providing a fulcrum point for pivoting of said trigger about an axis spaced from said pivot means, and spring means biasing said pressured member and trigger member into non-depressed position, said reversing switch comprising fixed and movable reverse-switching contacts, a manually movable reversing member operating said reverse-switching contacts, an interlocking member movable with said reversing member, and means depressible with said trigger and pressure members and engageable by said interlocking member to prevent operation of said reversing switch while said trigger is depressed.

7. Interlocked reversing and control switches, the control switch comprising fixed and movable contacts, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivot means connecting said pressured member and trigger member, means providing a fulcrum point for pivoting of said trigger about an axis spaced from said pivot means, and spring means biasing said pressured member and trigger member into non-depressed position, said reversing switch comprising fixed and movable reverse-switching contacts, a manually movable reverse-switching member operating said reverse-switching contacts, a slidable interlocking plate movable with said reverse-switching member, and means depressible with said trigger and pressured member and engageable when in depressed position by said plate for preventing movement of said reversing switch from the position it occupied when said trigger became depressed.

8. The combination claimed in claim 7 wherein the means depressible with the trigger member comprises an arcuate finger which is engageable in an aperture in said interlocking plate in one position of the reversing switch and is engageable with said plate in another position of said reversing switch, to prevent movement of the reversing switch while the trigger member is depressed.

9. The combination claimed in claim 8 wherein the arcuate finger is on the pressured member.

10. In an electric switch, a housing comprising cover and base portions, fixed and movable contacts within said housing, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivot means connecting said pressured member and trigger member, means cooperating with said housing and providing a pivotal axis for said trigger spaced from said pivot means, means providing a pivotal connection between said cover portion and pressured member, and spring means in said housing biasing said pressured member and trigger member into non-depressed position, and latching means on the housing adapted to hold the trigger and pressured members depressed.

11. In an electric switch, fixed and movable contacts, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivotal connecting means connecting said pressured member and trigger member, means providing a second pivotal axis for said trigger member spaced from said pivotal connecting means, spring means biasing said pressured member and trigger into non-depressed position, and latching means engageable by said pressured member to latch the control switch in position with the trigger member depressed.

12. A switch as claimed in claim 10 wherein the latching means comprises a latch pin transversely movable relative to said pressured member and engageable by said pressured member to hold it and the trigger member in depressed position.

13. A switch as claimed in claim 10 wherein the latching means comprises a latch pin transversely movable relative to said pressured member and engageable by said pressured member to hold it and the trigger member in depressed position, said pin having thick and thin portions, the switch being latched in one position when the pressured member engages the thick portion and being movable into and out of both positions when the pressured member engages the thin portion.

14. A switch as claimed in claim 10 wherein the latching means comprises a latch pin transversely movable relative to said pressured member and engageable by said pressured member to hold it and the trigger member in depressed position, said pin having thick and thin portions, the switch being latched in one position when the pressured member engages the thick portion and being movable into and out of both positions when the pressured member engages the thin portion, and means acting when the pressure of the pressured member on the pin is relieved to move said pin automatically to position wherein the trigger member may be moved into and out of both depressed and non-depressed positions.

15. A switch as claimed in claim 10 wherein the latching means comprises a latch pin transversely movable relative to said pressured member and engageable by said pressured member to hold it and the trigger member in depressed position, said pin having thick and thin portions, the switch being latched in one position when the pressured member engages the thick portion and being movable into and out of both positions when the pressured member engages the thin portion, and a spring biasing said pin into position for engagement of the pressured member with said thin portion.

16. An electric switch as claimed in claim 1 having means adapted to automatically latch said trigger member as it becomes depressed.

17. An electric switch as claimed in claim 1 having means adapted to automatically latch said trigger member as it becomes depressed when pressure is exerted on said trigger member at one point.

18. An electric switch as claimed in claim 1 having means adapted to automatically latch said trigger member as it becomes depressed when pressure is exerted on said trigger member at one point, said latching means being inoperative when said trigger member is depressed by pressure exerted at another point.

19. An electric switch as claimed in claim 1 having means adapted to automatically latch said trigger member as it becomes depressed when pressure is exerted on said trigger member at one point, said means being adapted to be released by pressure on said trigger member at another point.

20. A switch as claimed in claim 1 having means adapted to automatically latch said trigger member in depressed position when pressure is exerted on said trigger member as the trigger member is being depressed but adapted to allow said trigger member to return without latching, when pressure is exerted on said trigger member at another point as it is being depressed.

21. A switch as claimed in claim 1 having means operable selectively, by choice of the point of application of manual pressure on said trigger member, to latch or not to latch it in depressed position.

22. A switch as claimed in claim 2 having means on said cover portion and on said trigger member to automatically latch said trigger member when depressed.

23. In an electric switch, a housing, fixed and movable contacts, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivotal connecting means connecting said pressured member and trigger member, an auxiliary member separate from said pressured member, a return spring acting through the agency of said auxiliary member to bias said trigger member to non-depressed position.

24. In an electric switch, fixed and movable contacts, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivotal connecting means connecting said pressured member and trigger member, means providing a second pivotal axis for said trigger member spaced from said pivotal connecting means, an auxiliary member pivoted about said second pivotal axis and engaging said trigger member, a return spring acting through the agency of said auxiliary member to bias said trigger member to non-depressed position.

25. In an electric switch, fixed and movable contacts, a pressured member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger member overlying said pressured member, pivotal connecting means connecting said pressured member and trigger member, means providing a second pivotal axis for said trigger member spaced from said pivotal connecting means, an auxiliary member pivoted about said second pivotal axis and acting on said trigger member at a point on the opposite side of said pivotal connecting means from said second pivotal axis, a return spring acting through the agency of said auxiliary member to bias said trigger member to non-depressed position.

26. In an electric switch, fixed and movable contacts, a pressure member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger overlying said pressure member, pivotal connecting means connecting said pressure member and trigger means providing a second pivotal axis for said pressure member spaced from said pivotal connecting means, spring means biasing said pressure member and trigger into non-depressed position, and latching means inoperative when the trigger is pressed at one point but operative when the trigger is pressed at another point to latch said trigger automatically in depressed position, said latching means being releasable after latching when pressure is exerted at said first point.

27. A switch as claimed in claim 26 having a housing, and means on said housing engageable by said trigger for latching the trigger in depressed position.

28. A switch as claimed in claim 26 having a housing, and means on the housing affording a pivot for said trigger separate from the axis of said pivotal connecting means.

29. A switch as claimed in claim 26 having a housing, and means on the housing affording a pivot for said trigger separate from the axis of said pivotal connecting means, said means on the housing affording the pivot having slidable engagement with the trigger when depressed for latching the trigger.

30. In an electric switch, fixed and movable contacts, a pressure member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger overlying said pressure member, pivotal connecting means connecting said pressure member and trigger, means providing a second pivotal axis for said pressure member spaced from said pivotal connecting means, means providing a second pivotal axis for said trigger spaced from said second pivotal axis of the pressure member, spring means biasing said pressure member and trigger into non-depressed position, and latching means inoperative when the trigger is pressed at one point but operative when the trigger is pressed at another point to latch said trigger automatically in depressed position, said latching means being releasable after latching when pressure is exerted at said first point.

31. In an electric switch, fixed and movable contacts, a pressure member actuatable to cause engagement and disengagement of said contacts, a manually depressible trigger overlying said pressure member, pivotal connecting means connecting said pressure member and trigger,

means providing a second pivotal axis for said pressure member spaced from said pivotal connecting means, means providing a second pivotal axis for said trigger spaced from said second pivotal axis of the pressure member, said trigger being slidable from said second pivotal axis when depressed thereupon pivoting about said connecting means, spring means biasing said pressure member and trigger into non-depressed position, and latching means inoperative when the trigger is pressed at one point but operative when the trigger is pressed at another point to latch said trigger automatically in depressed position, said latching means being releasable after latching when pressure is exerted at said first point.

32. In an interlocked switching device as claimed in claim 6, a housing for said contacts including a cover; the said means, which is depressible with the trigger and pressure members, passing through an aperture in said cover; and means on said pressure member to close said slot when said control switch is not depressed.

33. In an interlocked switching device as claimed in claim 6, a housing for said contacts including a cover; the said means, which is depressible with the trigger and pressure members, passing through an aperture in said cover and having its end entering said cover slot when the control switch is not depressed, and means on said pressure member to also close said slot from the interior of the housing when said control switch is not depressed.

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