

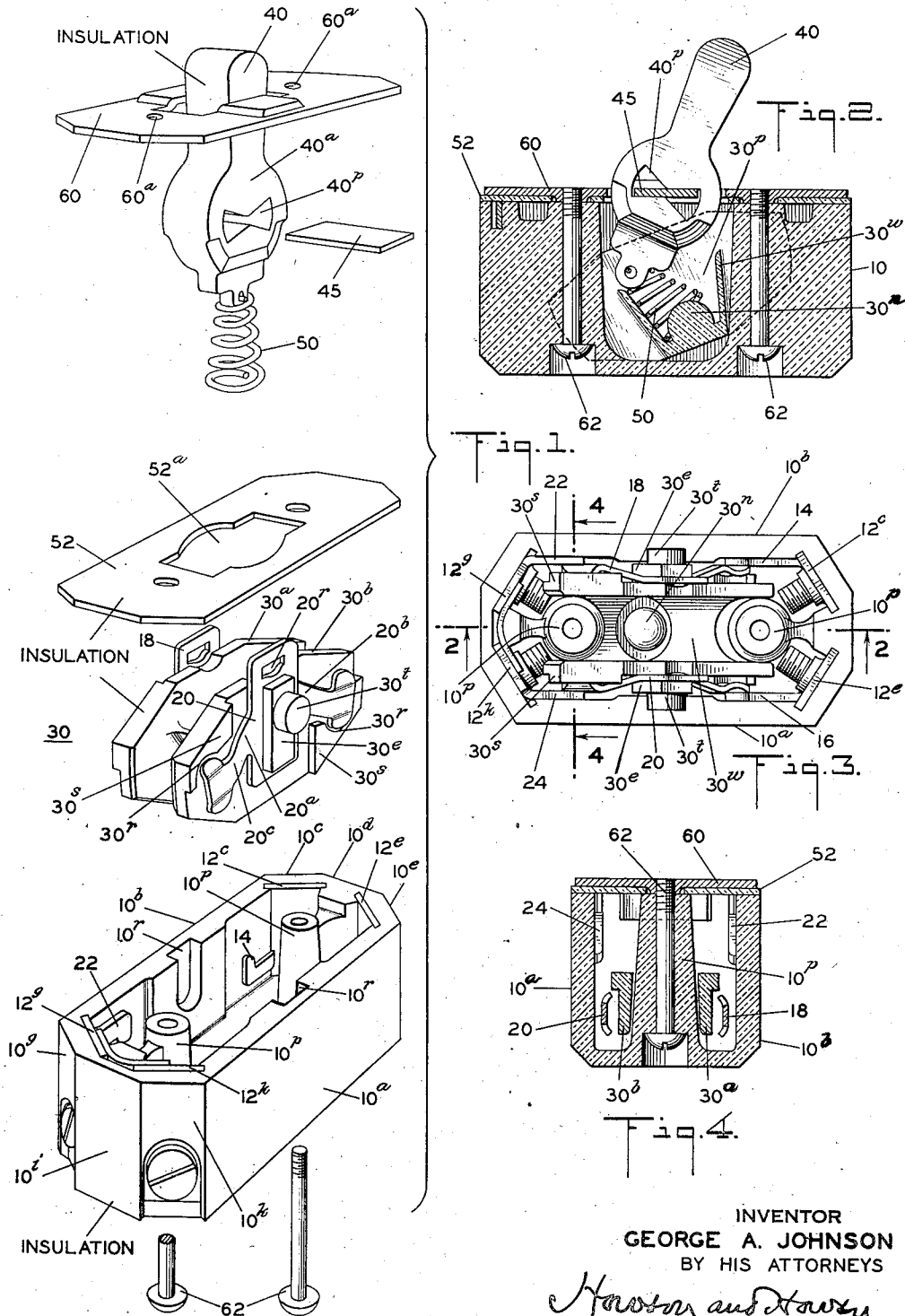
May 2, 1939.

G. A. JOHNSON

2,156,989

ELECTRIC TUMBLER SWITCH

Filed Feb. 3, 1936



INVENTOR
GEORGE A. JOHNSON
BY HIS ATTORNEYS

Johnson and Johnson

UNITED STATES PATENT OFFICE

2,156,989

ELECTRIC TUMBLER SWITCH

George A. Johnson, Trumbull, Conn., assignor to
The Bryant Electric Company, Bridgeport,
Conn., a corporation of Connecticut

Application February 3, 1936, Serial No. 62,175

13 Claims. (Cl. 200—67)

This invention relates to an electric switch. More particularly it relates to the tumbler type of electric snap switch and may be made either as a single pole, double pole, three way or other common type of switch.

It is an object of my invention to make an electric switch of as few and as simple parts as possible and at the same time have the live parts positively insulated from other metallic parts of the device.

Another object of my invention is to provide a tumbler type of electric snap switch in which the contacts are shielded from the snap or switch operating mechanism in order that an arc may not play into the mechanism.

Another object of my invention is to provide an improved construction of a tumbler type of electric switch in which arc quenching means such as cooling surfaces are provided adjacent the area in which the separating of the fixed and movable contacts takes place.

Another object of my invention is to provide an improved form of handle mounting for a tumbler switch which will be easy to assemble and inexpensive to construct.

Another object of my invention is to provide a handle mounting for a tumbler switch in which the rocking movement of the operating lever is limited by the mounting itself.

Other objects and advantages of my invention will become apparent as it is described in connection with the accompanying drawing:

In the drawing

Figure 1 is an exploded view of a tumbler electric snap switch constructed according to the principles of my invention.

Figure 2 is a longitudinal vertical section view taken along line 2—2 of Figure 3, of the tumbler electric snap switch of Figure 1 when assembled.

Figure 3 is a plan view of the interior of the switch casing illustrated in Figures 1 and 2 and showing the contact carrying cradle in position and the snap operating means removed.

Figure 4 is a transverse vertical section view taken along line 4—4 of Figure 3.

Referring to the drawing, it will be noted that the switch parts are mounted within a hollow eight-sided prismatic insulating casing 10, which has a solid bottom formed integrally with the sides of the casing and an open top for insertion of the switch parts. This casing may conveniently be made of molded insulating material. One pair of parallel walls 10a and 10b of this casing are substantially longer than the other walls of the casing, thus giving the casing an

elongated shape. Each of the remaining walls 10c, d, e, g, i, and k are or may be of approximately the same width and may form three-faced opposite end walls of the casing. The end walls 10c, e, g and k have passages cut through them to the interior of the casing adjacent the bottom for wire terminals 12c, 12e, 12g and 12k which have terminal screws threaded into them in a conventional fashion. These wire terminals may consist of sheet metal stampings, with portions which may fit into slots formed in the interior of the casing adjacent the end walls 10c, e, g and k. The wire terminals 12c and 12e may have fixed switch contacts 14 and 16 formed integrally therewith or permanently attached thereto lying along the interior of the side walls 10b and 10a adjacent the bottom of the switch casing. These fixed contacts may be in the form of thin fingers with enlarged ends with which the ends of identical resilient bridging contacts 18 and 20 hereinafter described, may engage. The wire terminals 12g and 12k at the opposite end of the casing may have fixed contacts 22 and 24 formed integrally therewith or permanently attached thereto and lying along the interior of the side walls 10a and 10b adjacent the top of the switch casing in position to be engaged by the other ends of the bridging contacts 18 and 20.

The bridging contacts 18 and 20 may consist of resilient sheet metal stampings having the form illustrated in Figure 1, the bridging contacts have an enlarged rectangular central portion, such as 20a, with rounded corners. In this central portion there is provided a rectangular aperture for the reception of a lateral extension upon the side of a contact carrying cradle as will be hereinafter more fully described. A pair of arms, such as 20b and 20c, extend from opposite sides of the central portion of each bridging contact toward the ends of the switch casing and are provided with enlargements on their ends forming contact surfaces for engagement with the stationary contacts at opposite ends of the switch. Preferably the arms (20b, 20c) are bent out of the plane of the central portion (20) toward the side walls of the switch casing in order to provide spring pressure as the bridging contacts engage the fixed contacts of the switch.

It will be noted that the bridging contacts must necessarily move in a plane close to the inner surfaces of the side walls 10a and 10b of the switch casing in order that they may engage with the fixed switch contacts which lie flush against these inner surfaces of the casing walls.

The bridging contacts 18 and 20 are mounted

upon a cradle of insulating material designated generally by the numeral 30. This cradle comprises a pair of parallel octagonal side walls 30a and 30b which are joined together interiorly by a U-shaped web 30w, as may be seen best in Figure 2, forming a pocket 30p between the side walls of the cradle into which snapping mechanism for the switch may fit. There are provided on the outside surfaces of the side walls of the cradle in a central position, rectangular extensions 30e of the same size and shape as the apertures in the central portions of the bridging contacts so that the bridging contacts may be slipped on the extensions and will move with the cradle as it rocks. In the top and bottom surfaces of the contact supporting extensions adjacent the juncture of the extensions with the side walls of the cradle, there are provided shallow slots of a width approximately equal to the thickness of the bridging contacts. Into the slot at the bottom of each contact supporting extension the portion of the bridging contact around the bottom of the rectangular aperture is fitted, and into the slot in the upper edge of the contact carrying extension the edge of the bridging contact adjacent the top of the rectangular aperture is forced by deforming or pressing down that edge into the slot. If desired, a narrow section of the upper portion of the bridging contact above the rectangular aperture may be punched out leaving a narrow strip or weakened section of metal between the opening 20r thus formed and the larger rectangular aperture, and the edge of this section may be readily forced down into the slot just below it. In this manner the resilient bridging contacts may be permanently attached to the cradle.

For mounting the cradle in the switch casing, there are provided on the sides of the cradle trunnions 30t extending beyond the contact supporting extensions 30e. These trunnions fit into bearing recesses 10r formed in the top edges of opposite sides of the inner surfaces of the walls 10a and 10b of the switch casing.

Preferably the width of the contact carrying cradle is proportioned with relation to the switch casing so that the side walls of the cradle will be closely adjacent the side walls of the switch casing, in order that the cool surfaces of these parts may effect an arc quenching action upon any arc created by the disengagement of the fixed and bridging contacts of the switch.

To assist this function, portions such as 30s, of the outer surfaces of the switch cradle adjacent the ends of the bridging contacts may be extended beyond the walls of the cradle toward the casing walls. These extensions 30s may lie at the sides of the bridging contacts which are last to leave the stationary contacts as illustrated, or may surround entirely the enlarged ends of the bridging contacts. In either case the portions beside the enlarged ends of the contacts will extend closer to the side walls of the casing than the portions of the cradle directly beneath or, in other words, on opposite sides of the contacts from the side walls of the casing. Thus, in a sense, the side walls of the cradle may be considered as having recesses or pockets 30r for the bridging contacts. Also in either case there will be a reduction in space between the cradle and the walls of the casing and any arc drawn into the reduced space will come more intimately into contact with the cool walls and be quickly snuffed out.

The switch is operated by a hand lever 40 which is pivotally mounted in a manner to be herein-

after more particularly described. This hand lever 40 extends from the switch casing in a conventional manner so as to be engaged by the hand of the person operating the switch. A portion of the hand lever extends within the switch casing and has attached to it one end of a coil compression spring 50, the other end of which presses against the bottom of the U-shaped web 30w of the switch cradle. The cradle may conveniently have formed in its bottom a semicircular nub 30n to assist in the positioning of the spring 50.

A cover plate 52 of sheet insulation stamped into similar shape to the top of the switch casing is positioned over the top of the switch casing and is provided with an opening 52a in its center for the switch operating lever 40.

The operating lever 40 of the switch has an enlarged central portion 40a of substantially cylindrical shape which is provided with a transverse passage 40p of uniform cross section through its length. This passage is narrow at its central portion but its width increases towards its ends, thereby giving the passage the appearance somewhat like that of opposed segments of a circle whose apexes overlap. The shape of this passage may be readily ascertained from an inspection of Figures 1 and 2 of the drawing.

The narrowest portion of the passage 40p is approximately equal to the width of a flat rectangular pivot bar 45 which passes through the passage and has its ends extending across the aperture 52a of the insulating plate 52 as the bar lies upon the plate 52. Lying on the plate 52 and across the ends of the bar 45 is a metallic top plate 60 of similar shape to the insulating plate 52. This top plate is held in position by a pair of screws 62 which pierce the insulating switch casing from back to front and take into screw threaded apertures 60a at opposite ends of the top plate. Preferably this metallic top plate has aligned rectangular portions pressed from it on opposite sides of the lever opening to form seats for the ends of the pivot bar 45 so that the pivot bar may be clamped permanently in position between the top plate 60 and the insulating cover 52 to form a fixed pivot for the operating lever 40.

From the foregoing it will be apparent that as the operating lever 40 is moved from left to right and vice versa, the opposed surfaces of the passage 40p engage with opposite sides of the pivot bar in the two extreme positions of the operating lever to limit the rocking movement of the operating lever without the necessity of the operating lever engaging any other portion of the switch casing or mechanism. It may also be observed that this novel form of mounting for the operating lever is inexpensive to manufacture and may be assembled with the greatest ease as the switch parts are put together. It may further be observed that upon rocking of the switch lever between its extreme positions, the line of action of the switch spring 50 moves through a dead center position, in the conventional manner of toggle switches, to cause the cradle to rock back and forth on its trunnions 30t and thereby cause engagement and disengagement of the bridging contacts from the stationary switch contacts with a snap action. The tension of the switch spring tends to hold the operating lever and switch contacts in closed or open position in the usual manner of tumbler switches and it also tends to hold the cradle trunnions in their bearings.

By reference to the drawing, it may be seen

that the securing screws 52 are encased in cylindrical posts 10p which extend up from the bottom of the switch casing. As the switch cradle rocks from one position to another, the web 30w abuts these posts 10p to limit the travel of the cradle when the bridging contacts are engaged with the stationary switch contacts. It may thus be seen that all the metallic non-current-carrying parts of the switch are insulated from the live parts of the switch, that is to say, the switch contacts and terminals are insulated from the snap mechanism, top plate, pivot bar and securing screws in a positive fashion by the cover plate 52, the posts 10p and the sides 30a, 30b and web 30w of the switch cradle. I have therefore provided a switch which is not only positive in operation but which is more efficient in arc quenching and in guarding against arcs interplaying among the non-current-carrying parts of the switch, than devices for a similar purpose in the prior art.

Many modifications within the scope of my invention will occur to those skilled in the art, therefore I do not limit the invention to the specific embodiment illustrated.

I claim:

1. In an electric snap switch, an insulating casing, fixed contacts adjacent one side wall of the casing, a one-piece cradle of insulating material having trunnions supported in the side walls of said casing, a bridging contact carried by said cradle, said cradle having portions beside the ends of said bridging contacts extending more closely to the side walls of the casing than the portions of the cradle directly beneath said ends, and mechanism engaging said cradle for causing disengagement of said fixed and bridging contacts with a snap.

2. In an electric snap switch, an insulating casing, fixed contacts adjacent one side wall of the casing, a one-piece cradle of insulating material having trunnions supported in the side walls of said casing, a flexible bridging contact permanently attached to said cradle by deforming a portion of said contact, said cradle having portions beside the ends of said bridging contacts extending more closely to the side walls of the casing than the portions of the cradle directly beneath said ends, and mechanism engaging said cradle for causing disengagement of said fixed and bridging contacts with a snap.

3. In an electric snap switch, an insulating casing, fixed contacts adjacent one side wall of the casing, a cradle of insulating material having trunnions supported in the side walls of said casing, a bridging contact mounted on said cradle, and mechanism engaging with said cradle for moving said bridging contact out of engagement with said fixed contact with a snap motion, said cradle having a side wall shielding said snap mechanism from said contacts, said side wall of said cradle being parallel and adjacent to the side wall of said casing and having portions beside the ends of said bridging contacts extending more closely to the side walls of the casing than the portions of the cradle directly beneath said ends of said bridging contact when the bridging contact is engaged with said fixed contacts.

4. In a snap switch, an insulating casing, fixed contacts adjacent a side wall of said casing, a one-piece insulating cradle having trunnions supported in the side walls of said casing, a resilient bridging contact mounted on said cradle, said cradle having a side wall parallel to and spaced

narrowly from the side wall of said casing, said side wall of the cradle being recessed for the accommodation of the ends of said bridging contact while said bridging contact is engaged with said fixed contacts, whereby the adjacent faces of said casing and cradle may be more closely spaced and may exercise a substantial arc quenching effect, in combination with mechanism for moving said bridging contact with a snap action, and an apertured hand lever for operating said snap mechanism, a bar passing through said aperture, a plate and means to secure said plate on said casing with the ends of said bar between the plate and the casing whereby said bar forms a fixed pivot for said lever.

5. In a snap switch, an insulating casing, fixed contacts adjacent a side wall of said casing, an insulating cradle having trunnions supported in the side walls of said casing, a resilient bridging contact mounted on said cradle, said cradle having a side wall parallel to and spaced narrowly from the side wall of said casing, said side wall of the cradle being recessed for the accommodation of the ends of said bridging contact while said bridging contact is engaged with said fixed contacts, whereby the adjacent faces of said casing and cradle may be more closely spaced and may exercise a substantial arc quenching effect, in combination with mechanism for moving said bridging contact with a snap action, and a hand lever for operating said snap mechanism, said lever being provided with a transverse passage, a bar passing through said passage, a plate and means to secure said plate on said casing with the ends of said bar between the plate and the casing whereby said bar forms a fixed pivot for said lever, said passage in said lever being elongated and having opposed surfaces engaging opposite sides of said bar, as said lever is rocked, to limit the rocking movement.

6. A cradle for an electric tumbler snap switch, adapted for pivotal movement within an insulating switch casing, said cradle being of insulating material and having a side plate with a non-circular lateral extension, said side plate extending in a plane perpendicular to the axis of said pivotal movement, a contact member stamped from sheet metal and having an aperture for reception of said extension and of the same size and shape as said extension and means for holding said contact on said extension.

7. In an electric tumbler switch, an insulating casing, fixed contacts mounted in said casing, an insulating cradle pivotally mounted in said casing and having a side plate with a non-circular lateral extension thereon, said side plate extending in a plane perpendicular to the pivotal axis of the cradle, a bridging contact member stamped from sheet metal and having an aperture of the same size and shape as said extension for reception of said extension, means preventing said bridging contact from moving off said extension when said cradle is mounted in said casing, and means to move said cradle with a snap.

8. In an electric tumbler switch, an insulating casing, switch contacts and snap mechanism within said casing, a lever for operating the switch, said lever having an elongated transversely extending passage therethrough whose width increases from its center towards its ends, a flat bar extending through said passage, a plate engaging with said casing and the ends of said bar and having an aperture for said lever and means securing said plate to said casing.

9. In an electric snap switch, an insulating casing, pairs of fixed contacts, mounted at opposite ends of said casing, a cradle having trunnions mounted in the side walls of said casing, bridging contacts mounted adjacent opposite outside surfaces of said cradle for bridging the fixed contacts at opposite ends of the casing, and snap mechanism engaging said cradle centrally for moving it with a snap action, said cradle having parallel side walls parallel and closely adjacent to the side walls of the casing to shield the snap mechanism from the contacts and to exercise an arc quenching effect during the separating of said fixed and bridging contacts, and a switch-operating lever having an elongated passage extending transversely through it, a flat bar passing through said passage, and a metal plate overlying said bar and overlying the top of said casing, and means to secure said plate and bar in position on said casing.

10. In an electric snap switch, fixed and movable contacts, means for causing contact engagement and separation including an operating lever having an elongated aperture through it, a flat pivot bar passing through said aperture and engaged on opposite sides by opposing surfaces of said aperture, as said lever is rocked, to limit the rocking movement of the lever, a plate overlying the ends of said bar, and means to hold said bar and plate in fixed relation.

11. In an electric snap switch, fixed and movable contacts, means for causing contact engagement and separation including a switch operating lever having an elongated transversely extending passage through it, an insulating plate having an opening for said lever, a flat pivot bar passing through said passage and engaged on opposite sides by different opposed surfaces of said passage as said lever is rocked to limit the rocking movement of said lever, a metal plate overlying said cover plate and overlying the ends of said bar, and means securing said metal plate and said cover plate together with the ends of said bar between said plates.

12. In an electric snap switch, fixed and movable contacts, means for causing contact engagement and separation including a switch operating lever having an elongated transversely extending passage through it, an insulating plate having an opening for said lever, a flat pivot bar passing through said passage and engaged on opposite sides by different opposed surfaces of said passage as said lever is rocked to limit the rocking movement of said lever, a metal plate overlying said insulating plate and overlying the ends of said bar, and means securing said metal plate and said insulating plate together with the ends of said bar between said plates, said metal plate having portions pressed out of it forming seats for said bar ends.

13. In an electric switch comprising an insulating casing, a switch operating lever extending into said casing and having a transversely extending elongated passage whose width increases from its center towards its ends, a flat bar extending through said passage, and means to secure said bar to said casing.

GEORGE A. JOHNSON.