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SWITCH

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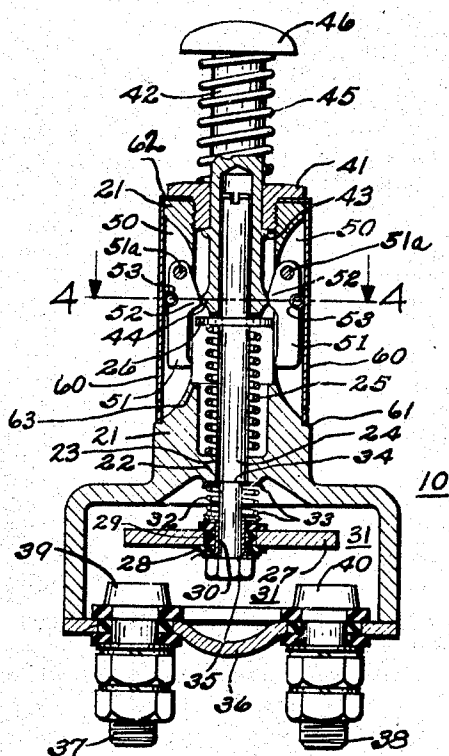


Fig. 1

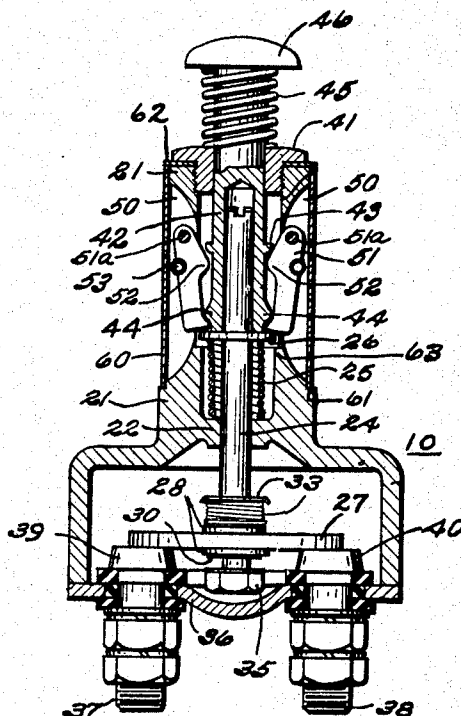


Fig. 2

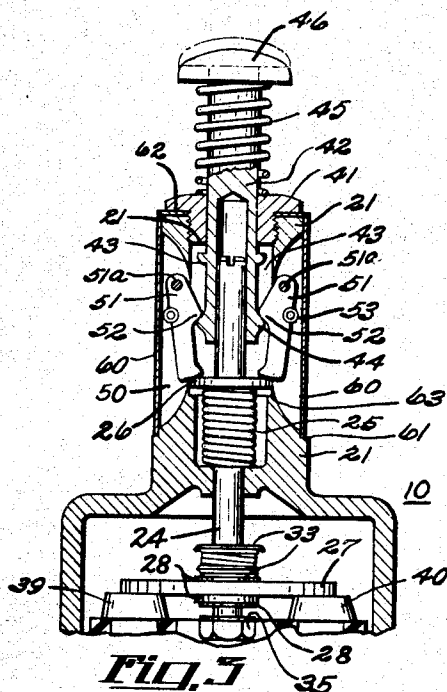


Fig. 3

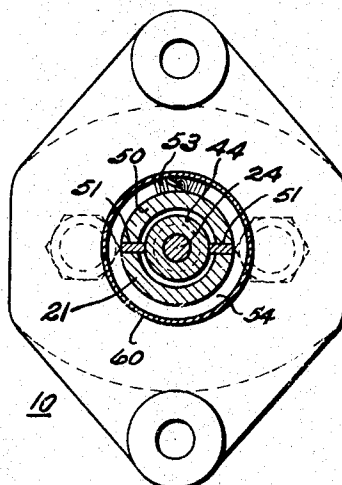


Fig. 4

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SWITCH

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10 Claims. (Cl. 200—159)

This invention relates to electric switches, and more particularly to the longitudinally reciprocating type, and capable of handling comparatively heavy currents, such as is employed in starting internal combustion engines.

An object of the present invention is to provide a full pressure contact, while the starting motor circuit is closed and which is maintained at the terminals until the moment of release.

Another object of the present invention is to provide a switch having means of effecting the release of the contacts without the possibility of arcing or burning of the contacts.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of the present invention is clearly shown.

In the drawing:

Fig. 1 is a longitudinal sectional view of the switch embodying the present invention and showing the various parts in their normal position.

Fig. 2 is a view similar to Fig. 1, illustrating the switch in its operative and locked position.

Fig. 3 is a view similar to Fig. 2 illustrating the switch in its operative and locked position just prior to the switch being unlocked and returned to its normal position indicated in dot-and-dash lines.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1.

Referring to the drawing, the switch is shown comprising a tubular housing or body 10 having a shank 20, a base 21 and a partition 22, the partition dividing the housing into an upper and a lower chamber. The partition 22 is apertured at 23 to form a bearing for a rod or shaft 24. A coiled spring 25 about the rod 24 is confined between the partition 22 and the under side of a washer 26 swaged into an annular groove provided on the rod. The washer also operates to limit the movements of the rod in one direction.

Toward the lower end of the rod 24, which extends into the base 21 or lower chamber of the housing, a contact member or bar 27 is supported. This bar is insulated from the rod by washers 28 and bushings 29. The bar 27, the washers 28 and bushings 29 are held together by an eyelet 30 to form a movable contact assembly 31. A spring 32 is interposed between two cup-shaped washers 33, the spring urging one of the washers 33 against a shoulder 34 provided by the rod and the other washer against one side of the eyelet 30.

The spring 32 constantly urges the contact as-

sembly 31 toward a nut 35 screw threaded to the rod 25 which holds the assembly 31 upon the rod. The spring 32 operates to prevent any injurious effects upon the contact member 27 when same is moved to close a circuit.

The base or lower chamber 21 is closed by a plate 36 which insulatingly supports terminal bolts 37 and 38, the heads of which form stationary contacts 39 and 40, respectively. The bolts 37 and 38 are connected to wires (not shown) of an electric circuit which is to be closed and opened by the operation of the switch.

The shank or upper chamber 21 is provided with internal threads to receive a nut 41. This nut slidably supports an actuating member or sleeve 42 having a stop 43, and an annular cam or boss 44. This sleeve also has a sliding fit on the upper end of the rod 24. The stop 43 limits the outward movement of the sleeve and is normally held against the bottom of the nut 41 by a coiled spring 45 about the sleeve 42 and interposed between the top surface of the nut 41 and a cap 46 screw threaded to the sleeve.

The shank 21 is provided with diametrically opposed slots 50 in which arms or latches 51 are pivoted on pins 51a. Each arm has a protrusion 52 adapted to cooperate with the cam 44 on the sleeve 42. The arms 51 are urged toward each other by an extension spring 53 located within an external annular groove 54 provided by the shank 21 and notches 55 formed in the arms 51. The spring is yieldingly held within the groove by connecting its hooked ends with each other.

A shell or sleeve 60 has a sliding fit over the shank 21 and encloses the arms and spring 53 to protect same from dirt and grease. This sleeve also operates to keep the spring 53 within the annular groove 54 and the notches 55 of the arms 51. The sleeve 60 is held against a shoulder 61 provided by the shank 21 and maintained in position by a washer 62. This washer extends over the upper end of the sleeve and is clamped between the nut 41 and the top of the shank 21.

The operation of the switch will now be described. Upon depression of the cap 46 against the tension of the spring 45, the bottom of the sleeve 42 will bear against the washer 26 to force the rod 24 downward as viewed in Figs. 1, 2 and 3, to compress the spring 25. Upon continued downward movement of the rod the bar 27 will engage the stationary contacts 39 and 40 to close a circuit. On continued movement of the rod 24, the spring 32 will be compressed in order to protect the movable contact from injurious effects in case the operator exerts an exceedingly strong force to

close the switch. In such cases, the rod is limited in its downward movement by the washer 26 engaging a shoulder 63 located within the upper chamber of the housing. When this occurs, movement is imparted to the arms 51 toward each other by the extension spring 53 and cause the lower ends of the arms 51 to engage the upper surface of the washer 26, thereby locking the switch in a closed position (see Fig. 2).

When the switch is closed, as illustrated in Fig. 2, the arms 51 prevent the rod 24 from moving upward in case the operator should slightly release the pressure on the cap 46. When the operator does release the pressure on the cap 46, the sleeve 42 will move immediately upward, as viewed in the drawing, due to the expansion of the spring 45, but the circuit will remain closed until the sleeve has moved a certain distance or until the cam is in the position shown in Fig. 3. On continued upward movement of the sleeve, due to the expansion of the spring 45, the cam 44 then cooperates with the protrusions 52 to force the arms outwardly thereby releasing the arms 51 from engagement with the washer 26. When the arms 51 are free of the washer 26 the rod will move toward its normal position by the expansion of the spring 25. The force in which the spring 25 urges the rod 24 toward its normal position will cause the contact or bar 27 to move away from the stationary contacts quickly and clean to prevent arcing.

The switch above described is especially advantageous for heavy duty work, such as starting motor circuit for Diesel engines where a 32 volt system is used. A quick break must be made between the contacts in order to prevent arcing and burning of the contacts.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In an electric switch, the combination comprising; a housing, stationary contacts supported by the housing; a rod slidably supported by the housing; a sleeve slidably supported by the housing and having a telescopic engagement with one end of the rod, said sleeve adapted to move in one direction actuating the rod in the same direction; a flat movable contact insulatingly supported by the rod and adapted to gradually and yieldingly bridge the stationary contacts; a spring for holding the movable contact away from the stationary contacts and adapted to be compressed on movement of the sleeve in one direction only; latching means carried by the housing for holding the rod against a slight axial movement when the movable contact is in engagement with the stationary contacts; and means carried by the sleeve for releasing the latching means when the sleeve is moved in a reverse direction a certain distance allowing the spring to move the rod in the same direction and cause the contacts to separate.

2. In an electric switch, the combination comprising; a tubular housing having a partition and dividing the housing into two chambers; a rod slidably supported by the dividing means; stationary contacts insulatingly supported within one of the chambers; a movable contact carried by the rod and adapted to gradually and yieldingly bridge the stationary contacts; a spring located in the other chamber and operating on the rod for holding the movable contact away from the stationary contacts; an actuating sleeve

slidably supported in the second mentioned chamber and adapted to move in one direction to compress the spring and urge the rod and the movable contact in the same direction so that the movable contact will yieldingly bridge the stationary contacts; latching means carried by the housing for holding the rod temporarily against return movement when the contacts are in engagement; and means on the actuating sleeve for releasing the latching means when the sleeve has moved a predetermined distance in the opposite direction to allow the compressed spring to move the rod in the same direction and separate the contacts.

3. In an electric switch; the combination comprising; a housing; a pair of stationary contacts having flat surfaces; a rod slidably supported within the housing; a flat contact bar carried by the rod for bridging the contacts; a sleeve slidably supported by the housing and adapted to move the rod against resilient means in one direction to compress a spring so as to cause the bar to gradually bridge the stationary contacts; a latch for holding the rod temporarily against movement while the bar is in contact position; cam means carried by the sleeve to engage and move the latch out of holding position when the sleeve has moved a predetermined distance toward its normal position to permit the spring to move the rod independently to separate the contacts.

4. In an electric switch of the class described, the combination comprising; stationary contacts; a movable contact; a shaft supporting the movable contact; locking means; a plunger having a cam; spring means resisting movement of the plunger; a second spring means; means to actuate the plunger, said plunger adapted to move the shaft in one direction to compress the second mentioned spring until the locking means will hold movable contact into engagement with the stationary contacts and at the same time hold the shaft from moving in a reverse direction against the tension of the second mentioned spring, said plunger after moving a predetermined distance in a reverse direction the cam will release the locking means; whereby the second mentioned spring means will move the shaft independently and cause the movable contact to break quickly from the stationary contacts.

5. In a switch, the combination comprising; a casing; stationary contacts insulatingly supported by the casing; a rod slidably supported within the casing; a movable contact member insulatingly supported by the rod and adapted to bridge the stationary contacts; resilient means tending to resist movement of the rod; a plunger sleeve slidably supported by the casing and fitting over the rod, said sleeve having a cam surface; resilient means outside of the casing tending to resist movement of the sleeve; a plurality of latches pivotally supported by the casing; an extension spring for moving the latches toward each other; and means for moving the plunger sleeve to actuate the rod to put the first mentioned resilient means under tension when the rod is moved in one direction to close a circuit and allowing the latches to engage means on the rod to prevent reverse movement of the rod, and said plunger sleeve when moved in a reverse direction by the second mentioned resilient means a predetermined distance the cam will urge the latches away from each other to permit the rod to move in a reverse direction by the first mentioned resilient means and cause the movable

contact member to break quickly from the stationary contacts to open the circuit.

6. In an electric switch, the combination comprising; a tubular housing having a partition and dividing the housing into two compartments; a rod slidably supported by the partition; stationary contacts supported within one of the compartments; a movable contact carried by the rod to bridge the stationary contacts; a spring located in the other compartment and operating on the rod for holding the movable contact free of the stationary contacts; a sleeve slidably supported in the second mentioned compartment and adapted to move the rod in one direction to compress the spring and gradually urge the rod and movable contact in the same direction to bridge the stationary contacts; means for limiting the pressure applied to the contacts; arms pivotally supported by the housing; spring means for urging the arms toward each other, said arms cooperating with means carried by the rod to hold the rod against return movement and hold the first mentioned spring under a state of compression when the contacts are in engagement; spring means for returning the sleeve; and means carried by the sleeve to urge the arms outwardly after the sleeve has moved in an opposite direction a certain distance to release the holding effect of the arms upon the rod and allow the first mentioned spring to independently move the rod in a reverse direction to separate the contacts.

7. A switch comprising in combination; a housing; terminals supported by the housing; a rod axially supported by the housing; a contact bar slidably and yieldably supported on the rod; a spring within the housing for normally holding the contact bar out of engagement with the terminals; a plunger axially supported by the housing and having telescopic engagement with the rod; a second spring between the housing and one end of the plunger to hold the plunger at one limit of its movement; latching means supported by the housing; manual means for actuating the plunger in one direction for compressing both springs and gradually urge the rod and the contact bar in the same direction to bridge the terminals; and cam means carried by the plunger and so arranged as to cooperate with the latching means and release the rod at a predetermined point in the return movement of the plunger and permit the first mentioned spring to expand and cause the rod and the contact bar to move independently of the plunger to quickly separate the contact bar from the terminals.

8. In a switch of the class described the combination comprising; a tubular housing; a plunger longitudinally supported by the housing; a rod longitudinally supported by the housing and hav-

ing telescopic engagement with the plunger; a pair of springs, each spring supported on the housing independent of each other to resist the movement of the plunger while only one spring resists the movement of the rod; manual means for actuating the plunger in one direction to move the rod in the same direction for compressing both springs; a contact member carried by the rod; latching means adapted to engage a portion of the rod after the compression of the springs to lock the rod temporarily against return movement and hold the spring compressed thereby in a state of compression; means carried by the plunger for tripping the latching means when the plunger nears the end of its stroke in the return direction by one spring to allow the rod to begin its return movement independent of the movement of the plunger by the other spring.

9. A switch comprising in combination; a tubular housing; terminals supported by the housing, an axially movable plunger; an axially movable bridging member adapted to make contact with the terminals; a spring to yieldingly hold the plunger at one limit of its movement; a second spring to yieldingly hold the bridging member at one limit of its movement; latching means pivotally supported by the housing and adapted to engage a portion of the bridging member to temporarily hold the bridging member in engagement with the terminals and to hold the second mentioned spring in a state of compression when the plunger is actuated to move the bridging member into engagement with the terminals; and means projecting from the plunger for releasing the latching means when the plunger nears the end of its stroke in the return direction, the releasing of the latching means causes the second mentioned spring to move the bridging member independently of the plunger and the bridging member to break quickly from the terminals.

10. A switch comprising in combination; an actuator; a movable contact; terminals for the contact; a spring for resisting movement of the actuator in one direction; a second spring for resisting movement of the contact in the same direction; a latch mechanism supported with respect to the contact, said latch mechanism adapted to temporarily hold the contact in engagement with the terminals and to hold the second mentioned spring in a state of compression when the actuator is moved to urge the contact in engagement with the terminals; and means carried by the actuator for releasing the latch mechanism when the actuator nears the end of its stroke in the return direction to permit the second mentioned spring to expand and move the contact independently of the actuator and cause the contact to break quickly from the terminals.