

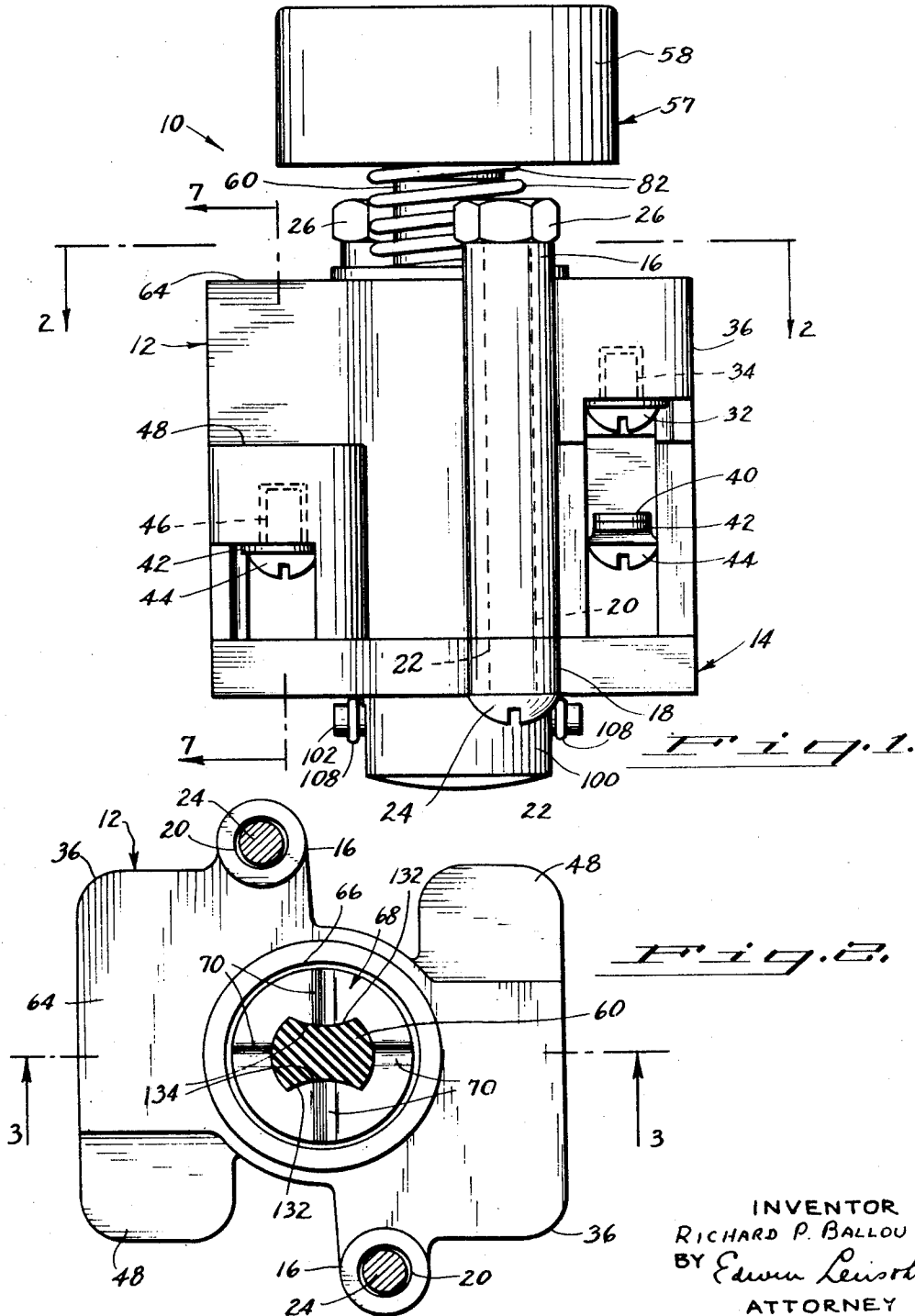
Feb. 27, 1951

R. P. BALLOU
SWITCH

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Filed Oct. 8, 1945

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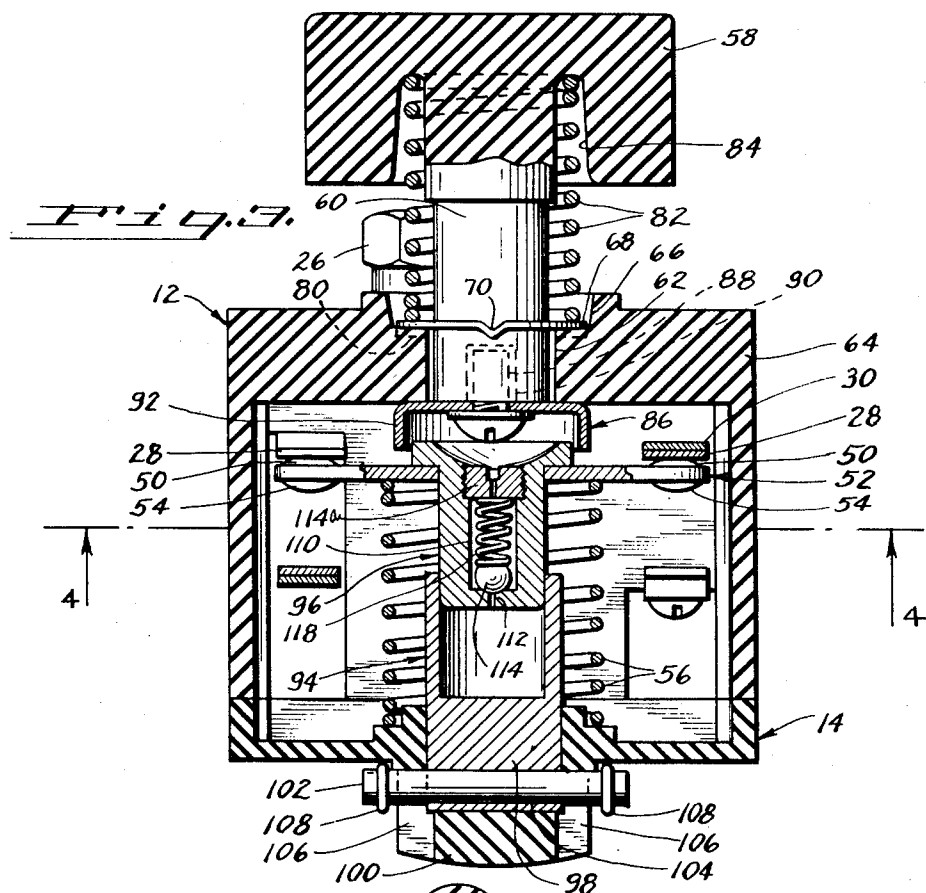
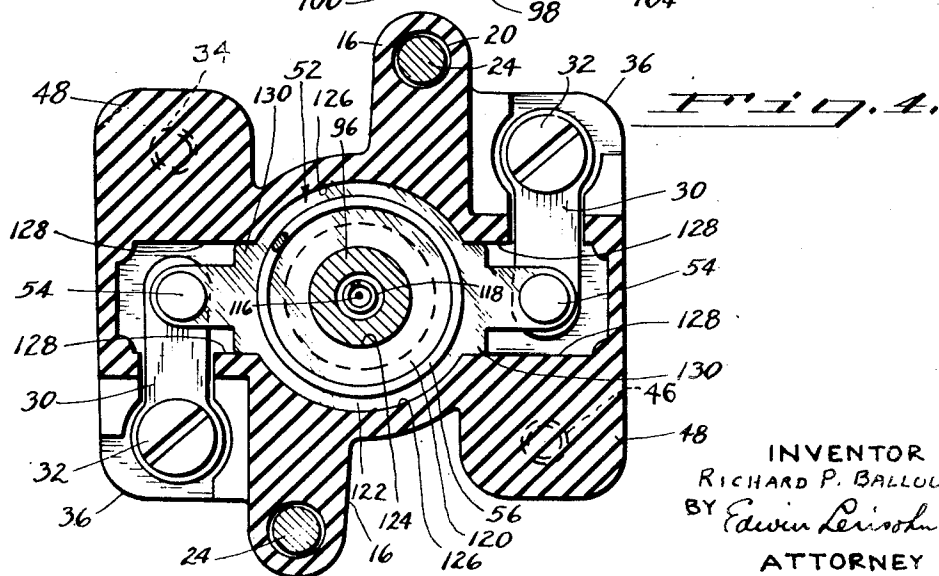
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SWITCH

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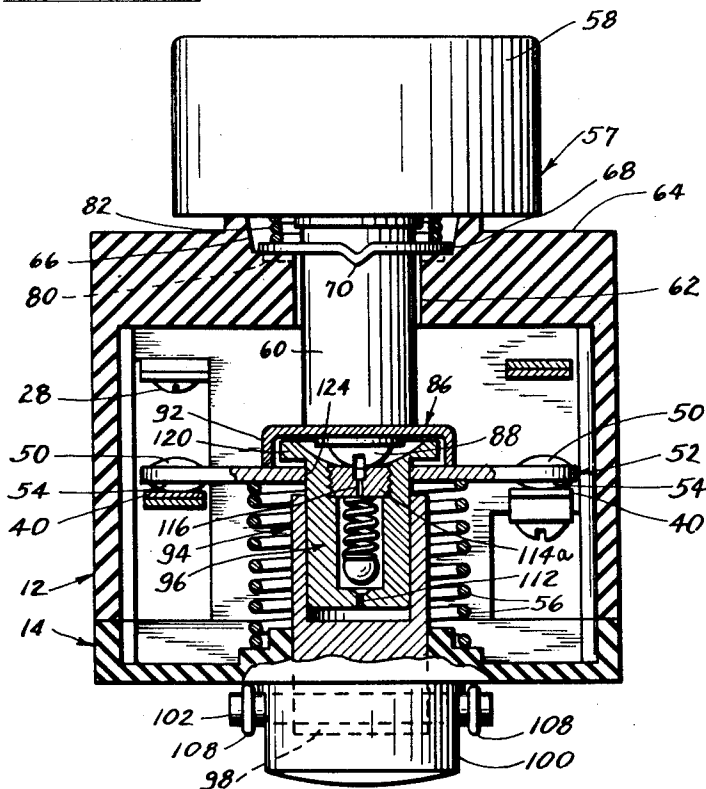
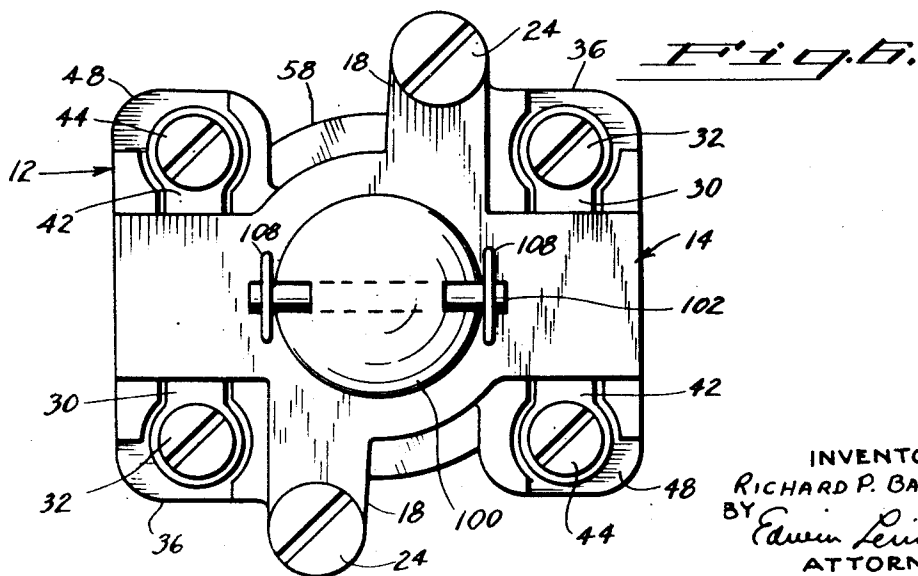
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SWITCH

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Fig. 5.



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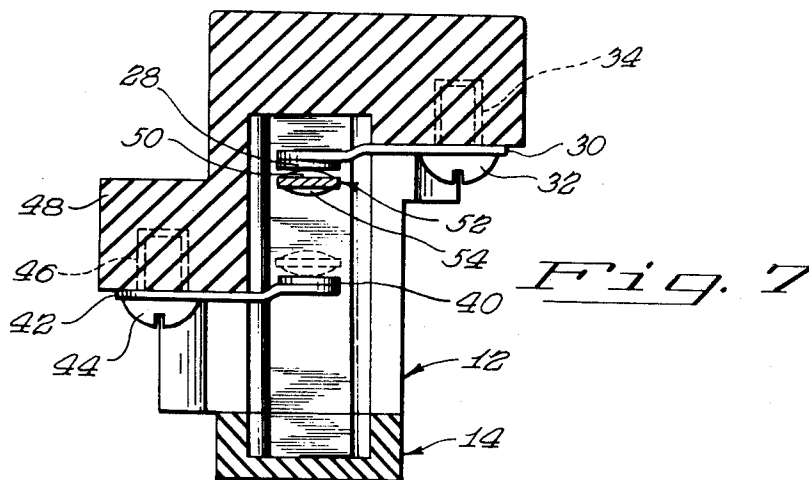
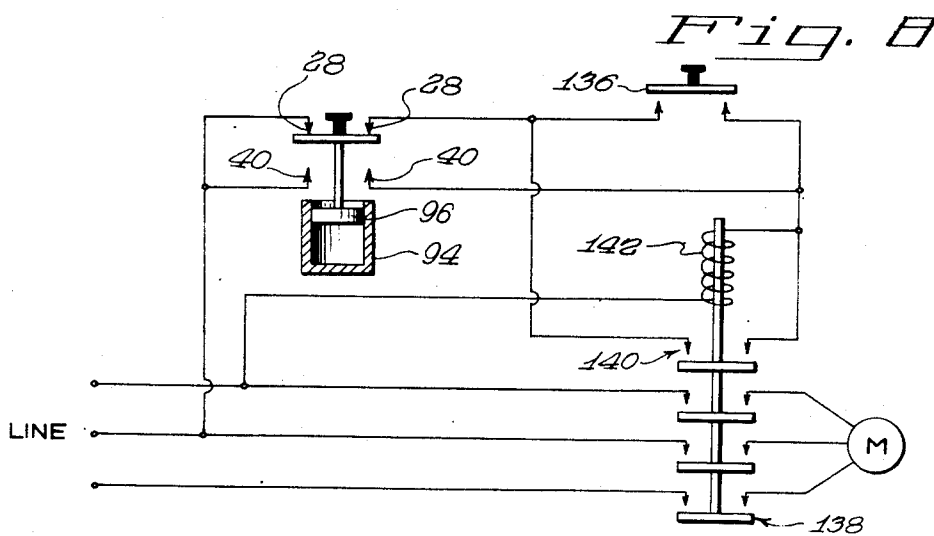
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SWITCH

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4 Sheets-Sheet 4



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2,543,090

SWITCH

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Application October 8, 1945, Serial No. 621,035

17 Claims. (Cl. 200—34)

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The present invention relates to switches and more particularly to switches of the push button type. The invention relates also to motor-starter circuits provided with switches or switching means arranged to enable control of the motor-starter circuit whereby to jog or operate the motor momentarily or for short periods of time in response to manual operations of the switch of the present invention.

One object of the present invention is to provide an improved double throw switch of the push button type having normally closed contacts and normally open contacts and to provide in said switch means for retarding the re-closing of the normally closed contacts of the switch following the operation of the switch for opening said normally closed contacts.

Another object of the invention is the provision in a motor-starter circuit of switching means to enable the motor to be started and stopped at will by the operation of a single switch. More specifically, in accordance with this object of the invention, it is unnecessary, in order to jog the motor, to operate the start and stop switches, while, on the other hand, the normal operations of the start and stop switches are not interfered with by the switching arrangement of the present invention for jogging the motor.

A yet further object of the present invention is to provide a normally closed double throw switch which, while useful for other purposes, is particularly well adapted for use as a jogging switch.

The above and other objects, features and advantages of the present invention will be fully understood from the following description, reference being had to the accompanying illustrated drawings.

In the drawings:

Fig. 1 is a side view of a switch embodying the present invention;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view of the switch on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a view similar to Fig. 3 showing the positions of the parts in which the normally closed contacts are open and the normally open contacts are closed;

Fig. 6 is a view of the back of the switch;

Fig. 7 is a sectional view on the line 7—7 of Fig. 1;

Fig. 8 is a diagram of a simple motor-starter

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circuit provided with the switching means of the present invention.

Referring now to the drawings in detail, the switch 10 of the present invention comprises a casing formed of insulation material and consisting preferably, as here shown, of a main or body part 12 and an end enclosure part 14, each of said parts being preferably formed in one piece by molding the same from the insulation material. Said casing parts are provided with lateral projecting portions 16 and 18, respectively, having tubular axial openings 20 and 22 for removable bolts 24 for detachably fastening said casing parts together, each of said bolts being provided with a removable nut 26.

The normally closed switch contacts 28 are carried by metal strips 30 secured in position by companion terminal screws 32 which are removably threaded into companion metallic socket members 34 secured in the companion lateral extensions 36 of the main casing part 12. Similarly the normally open contacts 40 are carried by metallic strips 42 secured by screws 44 threaded into companion metallic socket members 46 mounted in companion lateral extensions 48 of the casing part 12. It will be understood that the internally screw threaded socket members 34 and 46 are secured in casing part 12 during the molding operation for forming said casing part.

The normally closed contacts 28 are releasably engaged by the companion contacts 50 carried by the movable bridging contact member 52 which consists of a rigid metal strip and the normally open contacts 40 are releasably engaged by companion contacts 54 carried by said movable contact member. A helical compression spring 56 normally holds the movable contact member 52 in its projected position in which the contacts 50 engage the normally closed contacts 28. Spring 56 also resiliently opposes movement of said movable contact member 52 to the opposite projected position thereof, illustrated in Fig. 5, in which the normally closed contacts 28 are open and the normally open contacts 40 are closed. It will be understood that spring 56 biases movable contact member 52 for movement from the position illustrated in Fig. 5 to the position illustrated in Fig. 3.

Manually operable means 57 is provided for actuating movable contact member 52 for moving the same from the position illustrated in Fig. 3 to the position illustrated in Fig. 5, whereby to open the normally closed contacts 28 and to close the normally open contacts 40. Said manually operable means 57 comprises a knob or push

button 58 formed of insulation material and provided with an integral stem 60. Stem 60 projects through an opening 62 provided in the front wall 64 of casing part 12. A recess 66 is formed in front wall 64 in position surrounding the outer end of the opening 62. A metal washer 68 is seated in said recess and is provided with a plurality of rearwardly pressed ribs 70 which fit in companion grooves 80 formed in the bottom of recess 66. A helical compression spring 82 is positioned around stem 60 and bears at one end thereof against washer 68 and at its other end, against knob 58, the latter having a recess 84 in which the adjacent end portion of the spring is received.

It will be understood that spring 82 normally holds knob 58 and stem 60 in the retracted position and resiliently opposes the projecting movement of stem 60 by knob 58. An actuating member 86 is secured to the inner end of stem 60 in any suitable way as by a screw 88 threaded into a metallic socket member 90 which is secured in the inner end portion of stem 60 in the molding operation for forming said stem. Actuating member 86 engages the inner surface of front wall 64 to limit the outward movement of stem 60.

Actuating member 86 has a rearwardly extending flange 92 which is out of engagement with movable contact member 52 when the latter is in the position thereof in which the normally closed contacts 28 are closed. On the other hand, when the knob or push button 58 is pressed inwardly, flange 92 engages movable contact member 52 for moving the latter, against the pressure of spring 56, out of engagement with contacts 28 and into engagement with contacts 40, thus opening the normally closed contacts and closing the normally open contacts of the switch. It will be understood that when knob 58 is released, spring 82 moves stem 60 outwardly thereby disengaging actuating member 86 from movable contact member 52 and that thereupon spring 56 disengages movable contact member 52 from the normally open contacts 40 and projects said movable contact member 52 into the position in which the contacts 50 thereof engage the normally closed contacts 28 for re-closing the latter.

Provision is made for retarding the closing of contacts 28 following the opening of the contacts 40 when knob 58 is released. For this purpose, there is utilized a dash pot which comprises the cylinder 94 and a piston 96. Cylinder 94 is removably secured to casing part 14. As here shown, cylinder 94 is provided with a thickened head or end portion 98 which fits removably in a recessed portion 100 of casing part 14. Said cylinder is removably fastened in said recessed portion 100 by a pin 102 extending through a bore 104 in cylinder head 98 and through slots 106 in recessed portion 100. Cotter pins 108 are provided to hold pin 102 in position. Piston 96 is provided with an internal bore 110 which communicates with the cylinder chamber through a port 112 which is controlled by a spring-pressed ball valve 114. The end of piston bore 110 opposite port 112 is closed by a removable screw threaded member 114a provided with a relief port 116 formed by a narrow slot in its peripheral edge as illustrated in Fig. 5. Spring 118 which holds valve 114 releasably in its closed position bears at one end thereof against said valve and at its opposite edge, against member 114a. The outer end of piston 96 is provided with a peripheral flange 120 which forms an abutment for the movable contact member 52 whereby the return

movement of the latter following its operation to close the normally open contacts 40 is controlled by the dash pot. The outer cylindrical surface of piston 96 provides a guide for the movable contact member 52 toward and away from the contacts 28 and 40, the said movable contact member having a central portion 122 which is provided with a circular opening 124 in which the piston 96 has a sliding fit. Spring 56 bears at one end thereof against the central portion 122 of movable contact member 52 and bears at its other end against casing part 14.

It will be understood that when knob 58 is released and as soon as actuating member 86 is disengaged from the movable contact member 52, spring 56 moves said movable contact member out of engagement with contacts 40 and toward contacts 28 for closing the latter. The relationship between movable contact member 52 and the parts for moving the same is such that during the initial part of the movement of contact member 52 toward contacts 28 said movable contact member is unrestrained by the dash pot whereby to provide for a quick disengagement of contact member 52 from contacts 40. After this initial part of the movement of contact member 52 takes place, the movement of said member by spring 56 toward contacts 28 is retarded by the operation of the dash pot. To provide for the initial quick disengaging movement of contact member 52 from contacts 40, a lost motion connection is provided between piston 96 and movable contact member 52, this lost motion connection being obtained by dimensioning flange 92 of actuating member 86 so that the free edge of said flange engages the movable contact member 52 before the actuating member 86 engages the piston 96, at the time knob 58 is pressed inwardly for opening the contacts 28 and closing the contacts 40, whereby actuating member 86 first moves contact member 52 axially of piston 96 out of engagement with piston flange 120 and then moves said contact member and piston as a unit.

Thus, as illustrated in Fig. 5, when contacts 40 are closed by contact member 52, there is a clearance between flange 120 and contact member 52, so that as soon as knob 58 is released and spring 82 disengages actuating member 86 from contact member 52, spring 56 operates to move said contact member quickly out of engagement with contacts 40. Immediately upon the disengagement of contact member 52 from contacts 40, spring 56 moves contact member 52 into engagement with flange 120, so that the dash pot becomes effective to retard the rest of the return movement of contact member 52 toward contacts 28 to re-close the latter. It is within the scope of the present invention, however, to provide for the movement of member 52 without the lost motion connection. It will be observed that the dash pot does not retard the movement of contact member 52 out of engagement with the contacts 28 when the knob 58 is pressed inwardly, since the air which is compressed in the dash pot cylinder 94 by the inward movement of piston 96 is relieved through ports 112 and 116. On the other hand, when piston 96 is moved outwardly by the pressure of spring 56 on contact member 52 in engagement with flange 120, said outward movement is retarded due to the partial vacuum in cylinder 94 which is slowly relieved by the leakage of air into the cylinder through the very slight clearance between the piston and the inner peripheral wall of the cylinder.

As illustrated in Fig. 4, casing part 12 has con-

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fronting longitudinally extending inner arcuate walls 126, having a slight clearance with the confronting outer peripheral edge portions of central portion 122 of contact member 52. The outer ends of each arcuate wall 126 terminates at the inner ends of the planar walls 128 which define guide openings through which the straight edge portions 130 of contact member 52 extend with small clearance between walls 128 and the confronting straight edge portions of contact member 52 whereby substantial turning movement of contact member 52 around the axis of piston 96 is prevented so that the contacts of said contact member are maintained in registry with contacts 28 and 40. Arcuate walls 126 also form a guide for actuating member 86 of the manually operable means 57, there being a slight clearance between said arcuate walls and the periphery of flange 92 of said actuating member. Stem 60 has longitudinally extending concave edge portions 132 which are slidably engaged by the convex edge portions 134 of washer 68 so that stem 60 and washer 68 are non-rotatable in relation to each other, while permitting the longitudinal movement of stem 60 through the opening in said washer. The ribs 70 of washer 68 releasably restrain rotation of stem 60 in case such rotation is attempted by turning knob 58, but it will be noted that if a sufficiently strong turning force is applied to knob 58, washer 68 can also turn with stem 60 since ribs 70 can ride out of the companion grooves 80 of recess 66. Since actuating member 86 is rotatable in relation to piston 96 and contact member 52, the rotation of knob 58 is ineffective to exert any turning force on contact member 52. It will be observed that, as shown in Fig. 6, the casing is constructed to provide convenient access to the terminal screws 32 and 44, at the back of the switch, for connecting and disconnecting current-conducting wires to terminal strips 30 and 42.

As previously indicated, the switch 10 is particularly well adapted for use as a jogging switch in a motor-starter circuit. Fig. 8 diagrammatically illustrates switch 10 connected in a motor starter circuit for jogging a motor. As here shown, the starter circuit is provided with an ordinary normally open push button start switch 136 and a magnetic motor starter 138 having the usual set of normally open hold-in contacts 140 which are closed by coil 142 of the motor starter when said coil is energized pursuant to the momentary closing of start switch 136. The normally closed contacts 28 of switch 10 are connected in series with the hold-in contacts 140 in the hold-in circuit of the motor starter so that when said contacts 28 are closed the starter can be maintained in its energized or switch-closed condition once it has been closed by operation of start switch 136, i. e., by a momentary closing of said switch 136, and so that said starter cannot be maintained energized or closed by its said hold-in contacts when the normally closed contacts 28 of switch 10 are open. Accordingly, when switch 10 is operated for jogging the motor and contacts 28 are opened and contacts 40 are closed, the starter closes but the hold-in circuit is open and inoperative. When push button 58 is released and the normally open contacts 40 are re-opened, the reclosing of the normally closed contacts 28 is delayed by the dash until after the starter 138 is opened. Ordinarily, the starter opens in a fraction of a second following the re-opening of the normally open contacts 40 of the jogging switch. Although an ordinary spring

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loaded switch can move from one position to another in less time than that required for the starter to open whereby the hold-in circuit would be closed through the re-closed normally closed contacts, this is prevented by switch 10 of the present invention since the dash-pot retards the reclosing of the normally closed contacts 28 for a short interval of time so that the starter opens at its hold-in contacts, as well as its other contacts, before contacts 28 are re-closed.

It will be understood that various changes in the details of construction and in the arrangement of parts may be made without departing from the underlying idea or principles of the invention within the scope of the appended claims.

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

1. A switch comprising normally closed and normally open contacts, manually operable means for opening the normally closed contacts and for closing the normally open contacts, means operable automatically, upon release of said manually operable means, to effect immediate re-opening of the normally open contacts and also to effect re-closing of the normally closed contacts, retarding means separate from said manually operable means and operable independently of the latter upon said release thereof to retard said re-closing of the normally closed contacts by said automatically operable means, and means associated with said retarding means and with said automatically operable means to effect the re-opening of said normally open contacts independently of said retarding means.

2. A switch comprising normally closed and normally open contacts and including a movable contact member common to said normally closed and normally open contacts, manually operable means normally spaced from said movable contact member and releasably engageable therewith for opening said normally closed contacts and for closing said normally open contacts, spring means in engagement with said movable contact member and operable automatically upon release of said manually operable means for re-closing said normally closed contacts and for re-opening said normally open contacts, and means releasably engageable with said movable contact member and operable thereon in opposition to said spring means to retard said re-closing of the normally closed contacts by said automatically operable means, said retard means being operable independently of said manually operable means.

3. A switch comprising normally closed and normally open contacts and including a movable contact member common to said normally closed and normally open contacts, manually operable means operatively connected to said movable contact member for opening said normally closed contacts and for closing said normally open contacts, spring means operatively connected to said movable contact member and operable automatically upon release of said manually operable means for re-closing said normally closed contacts and for re-opening said normally open contacts, and means operatively connected to said movable contact member and operable thereon in opposition to said spring means to retard said re-closing of the normally closed contacts by said automatically operable means, said retarding means having a lost motion connection with said movable contact member and with said spring means whereby said spring means is effective to

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re-open said normally open contacts independently of said retarding means.

4. A switch comprising normally closed and normally open contacts and including a movable contact member common to said normally closed and normally open contacts, manually operable means releasably engageable with said movable contact member and operable thereon to open said normally closed contacts and to close said normally open contacts, spring means operatively connected to said movable contact member and operable thereon to re-open said normally open contacts and to re-close said normally closed contacts, upon release of said manually operable means from said movable contact member, and dash-pot means releasably engageable with said movable contact member and operable thereon for retarding said re-closing of said normally closed contacts, said dash pot means comprising a piston slidably movable therein and on which said movable contact member is axially movable, said piston being provided with means which is releasably engaged by said movable contact member under pressure of said spring means whereby to subject the re-closing operation of said movable contact member to the control of said piston in the retarding action of said dash-pot means.

5. A switch comprising a casing having a wall provided with an axial opening extending into the interior of the casing, a pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, a second pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, one of said pairs of contacts being spaced from the other of said pairs of contacts longitudinally of the casing, a movable bridging contact member mounted for movement between said pairs of contacts for opening and closing the contacts of each pair, spring means in engagement with said bridging contact member for normally holding it releasably in resilient engagement with the contacts of said first pair, manually operable means accessible externally of the casing and normally spaced from said bridging contact member, said manually operable means having a part extending through said opening for releasably engaging said bridging contact member to disengage the latter from said first pair of contacts and to engage said bridging contact member with the contacts of the other of said pairs, said manually operable means being manually movable to move said bridging contact member out of engagement with said first pair of contacts and into engagement with said second pair of contacts and means in said casing releasably engageable with said bridging contact member for retarding the movement of the latter from said second pair of contacts toward said first pair of contacts.

6. A switch comprising a casing having a wall provided with an axial opening extending into the interior of the casing, a pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, a second pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, one of said pairs of contacts being spaced from the other of said pairs of contacts longitudinally of the casing, a movable bridging contact member mounted for movement between said pairs of contacts for opening and closing the contacts of each pair, spring means for normally holding said bridging contact member releasably in

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resilient engagement with the contacts of said first pair, manually operable means accessible externally of the casing and having a part extending through said opening for releasably engaging said bridging contact member to disengage the latter from said first pair of contacts and to engage said bridging contact member with the contacts of the other of said pairs, and means in said casing having a part releasably engageable with said bridging contact member for retarding the movement of the latter from said second pair of contacts toward said first pair of contacts, said retarding means comprising a piston releasably engageable with said manually operable means and movable longitudinally of said casing, said piston having said movable contact member slidably mounted thereon.

7. A switch comprising a casing having a wall provided with an axial opening extending into the interior of the casing, a pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, a movable bridging contact member normally engaged with and closing said spaced contacts, spring means releasably holding said bridging contact member in said engagement, manually-actuated operating means extending through said opening and positively operable against the force of said spring for disengaging said bridging contact member from said contacts to open the latter, and means in said casing engageable with said bridging contact member and operable thereon, after a predetermined movement thereof toward re-engagement with said contacts, to retard the re-engagement of the latter with said contacts.

8. A switch comprising a casing having a wall provided with an axial opening extending into the interior of the casing, a pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, a movable bridging contact member normally engaged with and closing said spaced contacts, spring means releasably holding said bridging contact member in said engagement, operating means extending through said opening operable in opposition to said spring for disengaging said bridging contact member from said contacts to open the latter, and means in said casing operatively connected to said bridging contact member to retard the re-engagement of the latter with said contacts, said retarding means comprising a cylinder carried by said casing and a piston movable in said cylinder and having said bridging contact member mounted thereon for movement relative thereto and for movement concomitantly therewith.

9. A switch comprising a casing having a wall provided with an axial opening extending into the interior of the casing, a pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, a movable bridging contact member normally engaged with and closing said spaced contacts, spring means releasably holding said bridging contact member in said engagement, operating means extending through said opening operable in opposition to said spring for disengaging said bridging contact member from said contacts to open the latter, and means in said casing operatively connected to said bridging contact member to retard the re-engagement of the latter with said contacts, said retarding means comprising a cylinder carried by said casing and a piston movable in said cylinder and having said bridging contact member mounted thereon for movement relative thereto and for movement concomitantly there-

with, said casing having a wall which confronts said first mentioned wall and to which said cylinder is secured, said spring means comprising a helical compression spring surrounding said cylinder and extending between said bridging contact member and said last mentioned wall of the casing.

10. A switch comprising a casing having a wall provided with an axial opening extending into the interior of the casing, a pair of companion contacts carried by said casing and disposed in laterally spaced relation therein, a movable bridging contact member normally engaged with and closing said spaced contacts, spring means releasably holding said bridging contact member in said engagement, operating means extending through said opening operable in opposition to said spring for disengaging said bridging contact member from said contacts to open the latter, said operating means having a part disposed internally of the casing and operatively connected releasably with said bridging contact member for effecting said disengagement thereof from said contacts, additional spring means for holding said operating means releasably in its inoperative position, and means in said casing operatively connected to said bridging member and operable thereon independently of said additional spring means to permit an unretarded initial return movement of said bridging member and then to retard the remaining return movement of said bridging member by said first mentioned spring means when the latter is released from said operative connection with said operating means.

11. In a motor starting circuit which comprises a normally open start switch and a magnetically-operated starter provided with a hold-in circuit having a set of normally open hold-in contacts; a jogging switch having normally closed contacts and normally open contacts, said normally closed contacts, when closed, being connected in series with said hold-in contacts so that said starter can be maintained energized through its own hold-in contacts following the momentary closing of said start switch and so that said starter cannot be maintained energized through its own hold-in contacts when said normally closed contacts of the jogging switch are open, said normally open contacts of the jogging switch being connected in the circuit so that when they are closed the starter is energized and so that when they are open the starter is de-energized, means for operating said jogging switch whereby to open said normally closed contacts thereof without retardation and concomitantly to close said normally open contacts, means operable to re-open said normally open contacts of the jogging switch and concomitantly to reclose said normally closed contacts thereof, and means for retarding said reclosing of the normally closed contacts following said re-opening of the normally open contacts for a sufficient length of time to assure opening of the hold-in contacts, said last mentioned means operating independently of said means for operating the jogging switch.

12. In a motor starting circuit which comprises a normally open start switch and a magnetically-operated starter provided with a hold-in circuit having a set of normally open hold-in contacts; a jogging switch having normally closed contacts and normally open contacts, said normally closed contacts, when closed, being connected in series with said hold-in contacts so that said starter can be maintained energized through its own

hold-in contacts following the momentary closing of said start switch and so that said starter cannot be maintained energized through its own hold-in contacts when said normally closed contacts of the jogging switch are open, said normally open contacts of the jogging switch being connected in the circuit so that when they are closed the starter is energized and so that when they are open the starter is de-energized, push-button actuating means for operating said jogging switch whereby to open said normally closed contacts thereof and concomitantly to close said normally open contacts, spring means operable to re-open said normally open contacts of the jogging switch and concomitantly to reclose said normally closed contacts thereof, and dash-pot means acting in opposition to said spring means for retarding said reclosing of the normally closed contacts following said re-opening of the normally open contacts for a sufficient length of time to assure opening of the hold-in contacts, said dash-pot means operating independently of said means for operating the jogging switch.

13. A switch comprising normally open and normally closed contacts, manually operable means movable without retardation from a first position to a second position for opening the normally closed contacts and for closing the normally open contacts, means operable automatically upon release of said manually operable means to return the latter to said first position thereof, additional means operable automatically upon release of said manually operable means to effect immediate re-opening of said normally open contacts and also to effect re-closing of said normally closed contacts, and dash-pot means associated with said additional means to retard said re-closing of the normally closed contacts by said automatically operable additional means, said movable contact member and said automatically operable additional means having a lost motion connection with said dash-pot means whereby said automatically operable additional means is effective to reopen said normally open contacts independently of said dash-pot means upon release of said manually operable means.

14. A switch comprising normally closed and normally open contacts, movable contact means, manually operable means positively movable from a first position to a second position for positively actuating said movable contact means for opening said normally closed contacts and for closing said normally open contacts, said manually operable means when released being movable to said first position, spring means operable upon the release of said manually operable means to move the latter to said first position thereof, and additional spring means opposing the movement of said movable contact means by said manually operable means and operable upon the release of the latter to move said movable contact means first to re-open said normally open contacts and thereafter to re-close said normally closed contacts, and dash pot means associated with said additional spring and releasably engageable with said movable contact means for retarding said reclosing movement of said movable contact means.

15. A switch comprising normally closed and normally open contacts, movable contact means, manually operable means positively movable from a first position to a second position for positively actuating said movable contact means for opening said normally closed contacts and for closing said normally open contacts, said manually operable means when released being movable to said

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first position, spring means operable upon the release of said manually operable means to move the latter to said first position thereof, additional spring means opposing the movement of said movable contact means by said manually operable means and operable upon the release of the latter to move said movable contact means first to re-open said normally open contacts and thereafter to reclose said normally closed contacts, and dash pot means associated with said additional spring and releasably engageable with said movable contact means for retarding said reclosing movement of said movable contact means, said dash pot having a movable controlling part which is movable with said movable contact means and controls the re-closing movement thereof while said manually operable means is in released stationary position.

16. A switch comprising normally closed and normally open contacts, movable contact means, manually operable means positively movable from a first position to a second position for positively actuating said movable contact means for opening said normally closed contacts and for closing said normally open contacts, said manually operable means when released being movable to said first position, spring means operable upon the release of said manually operable means to move the latter to said first position thereof, additional spring means opposing the movement of said movable contact means by said manually operable means and operable upon the release of the latter to move said movable contact means first to re-open said normally open contacts and thereafter to re-close said normally closed contacts, and dash pot means associated with said additional spring and with said movable contact means for retarding said re-closing movement of said movable contact means, said dash pot having a movable controlling part which is movable with said movable contact means and controls the re-closing movement thereof while said manually operable means is in released stationary position, said controlling part having a lost motion connection with said movable contact means whereby the latter is movable during the first part of the movement thereof by said additional spring means at a faster rate than said controlling part whereby to re-open said normally open contacts

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immediately upon the release of said manually operable member.

17. A switch comprising normally closed and normally open contacts, movable contact means, manually operable means positively movable from a first position to a second position for positively actuating said movable contact means for opening said normally closed contacts and for closing said normally open contacts, said manually operable means when released being movable to said first position, spring means operable upon the release of said manually operable means to move the latter to said first position thereof, a dash pot having its piston operated positively in one direction by said manually operable means in the course of the movement thereof from said first position to said second position whereby the dash pot is conditioned for its retarding operation, and spring means having a lost motion connection with said piston and operable on said movable contact means to move the latter to re-open said normally open contacts immediately upon the release of said manually operable means and then to re-close said normally closed contacts under the control of said piston in said retarding operation of said dash pot.

RICHARD P. BALLOU.

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