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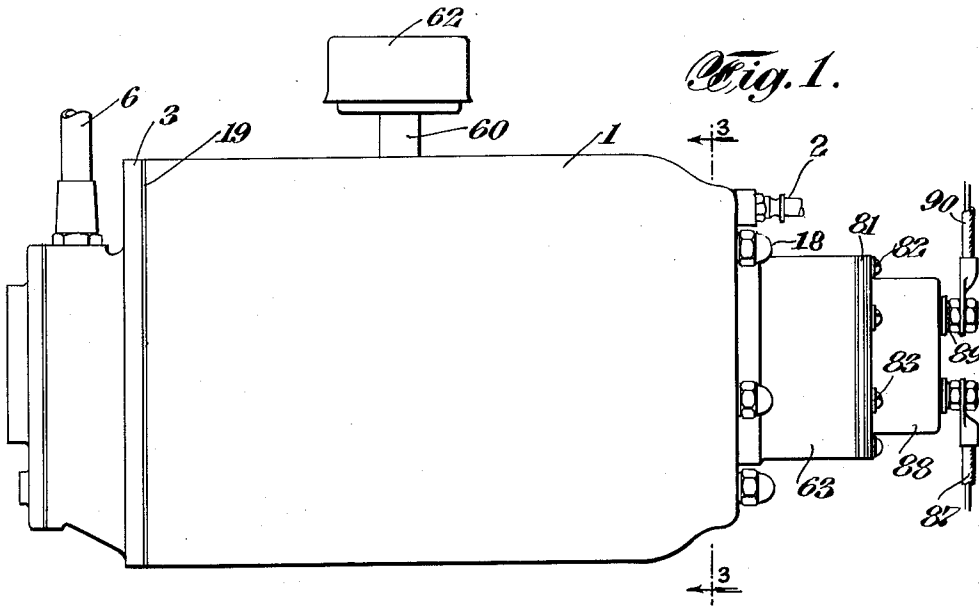
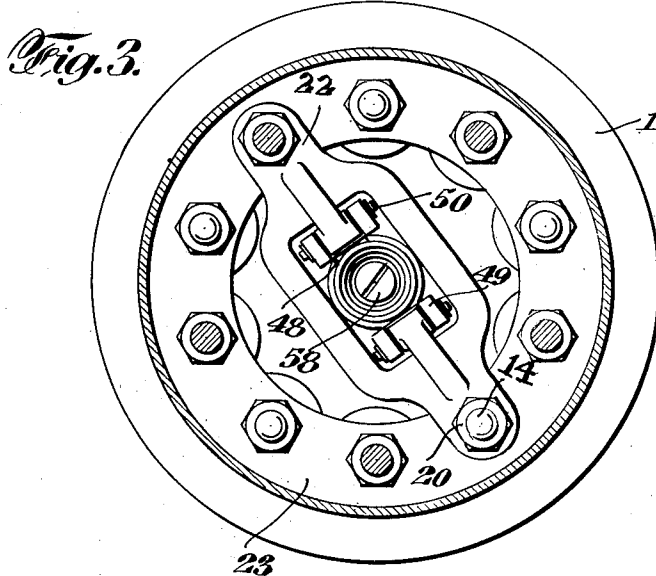
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SNAP ACTION APPARATUS

Original Filed Oct. 15, 1936

2 Sheets-Sheet 1



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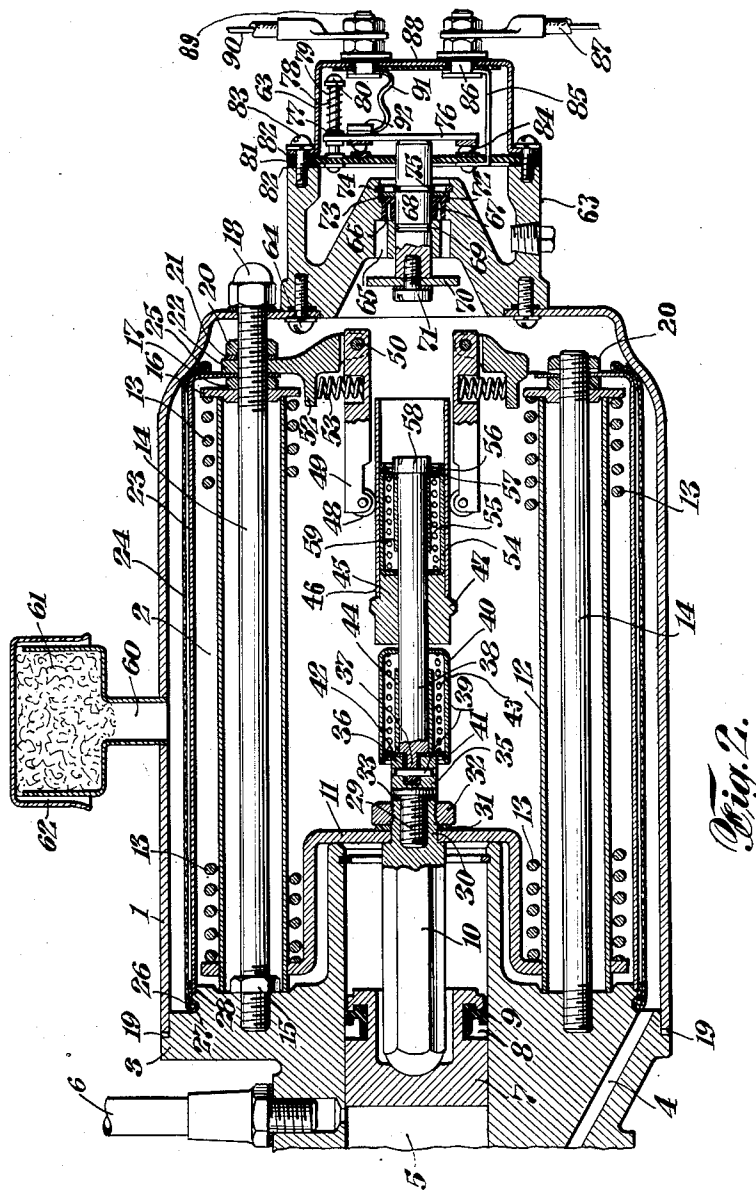


Fig. 2.

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2,292,546

SNAP ACTION APPARATUS

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Original application October 15, 1936, Serial No. 105,679, now Patent No. 2,197,772, dated April 23, 1940. Divided and this application April 22, 1940, Serial No. 330,901

20 Claims. (Cl. 200—82)

My invention relates particularly to an apparatus designed to obtain effective and quick action in the operation of controlling mechanism, the position of which is designed to be changed positively and quickly.

This application is a division of my application upon Pressure accumulator apparatus, Ser. No. 105,679, filed October 15, 1936.

The object of my invention is to provide an apparatus of the above character by means of which parts to be moved to alternate positions can be effectively and quickly changed as to their position. A further object is to provide such an apparatus by means of which an electric switch may be moved from one position to another. Still another object is to provide an apparatus of this character which is compact and dependable in operation. Further objects of my invention will appear from the detailed description of the same hereinafter.

While my invention is capable of embodiment in many different forms, for the purpose of illustration I have shown only one form of the same in the accompanying drawings in which—

Fig. 1 is a side elevation of an apparatus made in accordance with my invention;

Fig. 2 is a longitudinal vertical section of the same; and

Fig. 3 is a transverse upright section of the same taken on line 3—3 of Fig. 1.

Referring to the drawings, I have shown an apparatus comprising an accumulator casing 1 having an inlet 2 for low pressure liquid into the same. The casing 1 is closed at the inlet end by a casting 3 having a draw-off passageway 4 for the low pressure liquid from the accumulator casing 1. The oil from the low pressure passageway 4 is adapted to be placed under high pressure by a pump or any other desired apparatus, not shown, and thence is delivered into a pressure chamber 5 to be expelled through a discharge pipe 6 to be utilized for any desired purpose. The pressure in the chamber 5 is maintained by means of a piston 7 having an annular recess 8 in the periphery thereof carrying a rubber gasket 9 to prevent scoring the wall of the chamber 5. The piston 7 is pressed towards the left by a hexagonal rod 10 to enable it to be held from turning when the apparatus is being assembled and to maintain a given desired pressure in the chamber 5. For this purpose the rod 10 is carried in a centrally recessed spring retaining plate 11 having ten apertures near its periphery so as to receive guiding tubes 12. On the tubes 12 there are a plurality of compression

5 springs 13 around the same. Within each of the tubes 12 there is a bolt 14 screw-threaded at its left hand end to the casting 3 and held in place by lock-nuts 15. At the right hand end each of said bolts 14 carries a spring-retainer disc 16 held in place by a nut 17, each of five of said bolts having on its right hand end a nut 18 for drawing the casing 1 tightly against a rubber gasket 19 interposed between the casing 1 and the casting 3. Furthermore, each of said bolts 14 has a further nut 20. In the case of each of two of the bolts 14, each of the same has adjacent to the nut 20 a lock-washer 21 so as to hold in position an end casting 22. In position between the latter and the nuts 17 there is a perforated supporting shell 23 for a cylindrical filter cloth 24 to permit the incoming oil to pass outwardly through the cylindrical filter cloth 24. A retaining ring 25 holds the filter cloth 24 over the shell 23 and a retaining-ring 26 holds the filter cloth 23 in an annular recess 27 in the casting 3. The perforated shell 23 rests at its left hand end in a further recess 28 in the casting 3 against which it is clamped by the force exerted from the nuts 18. The hexagonal rod 10 is arranged to receive in its end a screw 29. The screw 29 is carried in a narrow extension 30 of the said hexagonal rod 10, the outside of which extension is screw-threaded and carries thereon a lock-washer 31 and a nut 32. A lock-washer 33 is carried around the screw 29 at the end of the reduced extension 30. The said screw 29, furthermore, has a head 35 with a central slit 36 to receive loosely therein a tongue 37 of a switch operating rod 38, said tongue being held loosely in place to allow slight lateral movement of the switch operating rod 38 by means of a pin 39. On the head 35 of the said screw there is carried a spring housing 40 which is held in place thereon by a snap-ring 41 and adjacent to the face of the said head 35 there is a washer 42 against which one end of a spring 43 rests. The said spring 43 is located around a stop sleeve 44, the right-hand end of which acts as a stop in cooperation with the inturned end of the spring housing 40 in the operation of the switch. The said switch operating rod, furthermore, carries movably thereon a hardened steel-block 45 having brazed to the right-hand end thereof a switch-operating sleeve 46 and there is located around the periphery of the block a tapered annular flange 47 for cooperating with a plurality of rollers 48 which are carried, respectively, on arms 49 supported on pivots 50 on the end casting 22, which also is pivoted with lugs 52 for

supporting springs 53 bearing against the said levers 49 to press them inwardly for snap action in cooperation with the said flange 47. Within the switch operating sleeve 46 there is another spring housing 54 having within the same a spring 55 and held in place by a snap-ring 56 against a spring-retaining washer 57 which rests against a head 58 on the rod 38. The said spring 55 is held at its other end by an intumed inwardly directed portion of the sleeve 54. Within said spring there is, furthermore, a stop sleeve 59, the left-hand end of which acts as a stop in the compression of the said spring. Located on the top of said casing 1, furthermore, there is a vent tube 60 having a chamber 61 filled with horse-hair and provided with a fluted cover 62 to admit air to the interior of the casing 1.

On the right-hand end of the enclosing casing 1, around a central opening therein, there is supported a switch housing 63 by screws 64. This switch housing 63 has a plurality of oil ports 65 which communicate with an oil recess 66 having a rubber gasket 67 therein, U-shaped in cross-section, to seal a switch plunger 68 having an annular oil-carrying-recess 69, and on the left-hand end a push-plate 70 held in place by a screw 71. The said plate 70 is adapted to be operated by the switch operating sleeve 46. The rubber seal 67 rests against a backing piece 72 against which there is located a washer 73 held in place by a snap-ring 74 in the switch housing 63. Around the outside of the plunger 68 there is a stop snap-ring 75. The right-hand end of the plunger 68 rests against a conducting disc 76 which is supported in eyelet shaped rings 77 slidably carried on a plurality of studs 78 carrying coil springs 79 supported against heads 80 on said studs. The studs 78 are carried by a nonconducting plate 81 supported between Bakelite washers 82 by screws 83 from the switch housing 63. The said plate 81 carries thereon a contact ring 84 which is connected by a conductor 85 to a terminal 86 of the electric circuit, to which a wire 87 is connected. The terminal 86 is mounted in a switch cover 88 held in place by the screws 83 and from which it is suitably insulated in the usual way. On the switch cover 88 there is also located another terminal 89 to which the other wire 90 of the circuit is connected. The inner end of said terminal 89 is connected by a braided insulated wire 91 to a terminal 92 mounted on the conducting disc 76. The terminals 86 and 89 may go to any suitable circuit for controlling in any usual manner an electric motor driven pump for placing the oil received from the passageway 4 under pressure, to be delivered to the chamber 5, these parts not being shown as they may be of any well-known conventional character.

In the operation of the apparatus, the low pressure oil is received through the inlet port 2 in the casing 1, which is vented at all times through the tube 60. This low pressure oil will pass outwardly through the filter cloth 24 and thence to the low pressure discharge passageway 4 and finally, after having been raised to high pressure by any suitable means, as for instance the operation of the electric motor driven pump, not shown, due to the closed position of the switch 84, 85, is delivered into the chamber 5 and discharged through the pipe 6 to be used for any desired purpose. This pressure is rendered uniform by the piston 7 under the influence of the springs 13. When, for any reason, due to discharge of liquid from the pipe 6, the piston 7 has approached the left end of the chamber 5,

the snap action apparatus will be in the position as shown in Fig. 2. When, however, the piston 7 is moved far to the right, due to accumulating pressure within the chamber 5, the switch operating flange 47 will come into contact with the rollers 48 and thus compress the spring 43 up to the end of the sleeve 44 and, upon further movement of the switch operating sleeve 46, will suddenly be forced past the rollers 48 in opposition to the spring 43, thereby exerting a sudden force against the push plate 70 and breaking the contact between the parts of the switch 84, 76, thus interrupting the circuit to the electric motor driven pump, not shown, until the pressure in the chamber 5 lessens, resulting in the movement of the piston 7 to the left, until the switch operating sleeve 46 contacts with the rollers 48, thus putting the spring 55 under compression until stopped by the end of the sleeve 59, whereupon the switch operating flange 47 will be forced past the rollers 48, thus suddenly closing the switch 84, 76 which will result in energizing the electric motor driven pump to again bring up the pressure in the chamber 5. In this way the pressure in the chamber 5 will be maintained substantially uniform to deliver a uniform hydraulic pressure through the pipe 6.

While I have described my invention above in detail I wish it to be understood that many changes may be made therein without departing from the spirit of the same.

I claim:

1. In combination, a part to be moved and a snap action apparatus, comprising an element on said part, with an interrupted surface having a yielding connection to said part, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element and including a movable member engaging and disengaging said interrupted surface adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement.

2. In combination, a part to be moved and a snap action apparatus, comprising an element on said part, with an interrupted surface having a yielding connection to said part, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element and including a movable member engaging and disengaging said interrupted surface adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, comprising an electric switch having a spring contact member opened and closed by said snap action device.

3. In combination, a part to be moved and a snap action apparatus, comprising an element on said part with an interrupted surface having a yielding connection to said part, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element and including a movable member engaging and disengaging said interrupted surface adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, said snap action device comprising an actuating member floated between springs to provide said yielding connection.

4. In combination, a part to be moved and a snap action apparatus, comprising an element on said part with an interrupted surface having a yielding connection to said part, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element and including a movable member engaging and disengaging said interrupted surface adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, comprising an electric switch having a spring contact member opened and closed by said snap action device, said snap action device comprising an actuating member floated between springs to provide said yielding connection.

5. A snap action apparatus, comprising an element with an interrupted surface, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element, including a spring-pressed lever arm for engaging and disengaging said interrupted surface, adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, said element being floated between springs adapted, respectively, to urge said element in opposite directions.

6. A snap action apparatus, comprising an element with an interrupted surface, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element, including a spring-pressed lever arm for engaging and disengaging said interrupted surface, adapted to suddenly stop or start the accumulation of said pressure by the position of said element, and an electric switch, having a spring contact member opened and closed by said snap action device, said element being floated between springs adapted, respectively, to urge said element in opposite directions.

7. A snap action apparatus comprising a flanged element, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element and an arm engaging said flange adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, said flanged element comprising an actuating member floated between springs adapted, respectively, to urge the flanged element in opposite directions.

8. A snap action apparatus, comprising a flanged element, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device connected to said element and an arm engaging said flange adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, comprising an electric switch having a spring contact member opened and closed by said snap action device, said flanged element comprising an actuating member floated between springs adapted, respectively, to urge the flanged element in opposite directions.

9. A snap action apparatus, comprising an element, resilient means for forcing the element in one direction, a source of accumulating pres-

sure for forcing it in the other direction, a snap action device connected to said element, adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, said snap action device comprising an actuating member floated between helical springs, a sleeve stop within each of said springs and a housing outside each of said springs for cooperating with the said springs.

10. A snap action apparatus comprising an element, resilient means for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, a snap action device connected to said element, adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, comprising an electric switch having a spring contact member opened and closed by said snap action device, said snap action device comprising an actuating member floated between helical springs, a sleeve stop within each of said springs, and a housing outside each of said springs for cooperating with the said springs.

11. A snap action apparatus, comprising an enclosing casing for the same, an element, resilient means supported from within said casing for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device mounted on said casing connected to said element, adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement.

12. A snap action apparatus, comprising an enclosing casing for the same, an element, resilient means supported from within said casing for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device mounted on said casing connected to said element, adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, comprising an electric switch having a spring contact member opened and closed by said snap action device.

13. A snap action apparatus, comprising an enclosing casing for the same, an element, resilient means supported from within said casing for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device mounted on said casing connected to said element, adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, said snap action device comprising an actuating member floated between springs.

14. A snap action apparatus, comprising an enclosing casing for the same, an element, resilient means supported from within said casing for forcing the element in one direction, a source of accumulating pressure for forcing it in the other direction, and a snap action device mounted on said casing connected to said element, adapted to suddenly stop or start the accumulation of said pressure by the position of said element in each of its directions of movement, comprising an electric switch having a spring contact member opened and closed by said snap action device, said snap action device comprising an actuating member floated between springs.

15. A snap action device, comprising an actuating member, a plurality of springs between which it is floated, adapted, respectively, to urge the actuating member in opposite directions, said member having an interrupted surface and a lever arm adapted to be moved by the interruption in said surface to give a sudden movement to said member in each of its directions of movement by the release of said lever from said interrupted surface.

16. A snap action device, comprising an actuating member, a plurality of helical springs between which it is floated, said member having an interrupted surface, a lever arm adapted to be moved by the interruption in said surface to give a sudden movement to said member when released by said lever, a sleeve stop associated with each of said springs, and a housing for each of said springs cooperating with one of said sleeves.

17. A snap action device, comprising an actuating member, a plurality of helical springs between which it is floated, said member having an interrupted surface, a lever arm adapted to be moved by the interruption in said surface to give a sudden movement to said member when released by said lever, a sleeve stop associated with each of said springs, a housing for each of said springs cooperating with one of said sleeves, and a rod on which said member, springs, sleeves and housings are mounted.

18. A snap action device, comprising an actuating member, a plurality of springs between which it is floated, adapted, respectively, to urge

the actuating member in opposite directions, said member having an interrupted surface, a lever arm adapted to be moved by the interruption in said surface to give a sudden movement to said member in each of its directions of movement by the release of said lever from said interrupted surface, and an electric switch having a spring contact operated by said member.

19. A snap action device, comprising an actuating member, a plurality of helical springs between which it is floated, said member having an interrupted surface, a lever arm adapted to be moved by the interruption in said surface to give a sudden movement to said member when released by said lever, a sleeve stop associated with each of said springs, a housing for each of said springs cooperating with one of said sleeves, and an electric switch having a spring contact operated by said member.

20. A snap action device, comprising an actuating member, a plurality of helical springs between which it is floated, said member having an interrupted surface, a lever arm adapted to be moved by the interruption in said surface to give a sudden movement to said member when released by said lever, a sleeve stop associated with each of said springs, a housing for each of said springs cooperating with one of said sleeves, a rod on which said member, springs, sleeves and housings are mounted, and an electric switch having a spring contact operated by said member.

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