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J. S. REYNOLDS

AUTOMATIC CUT-OUT

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2 Sheets-Sheet 1

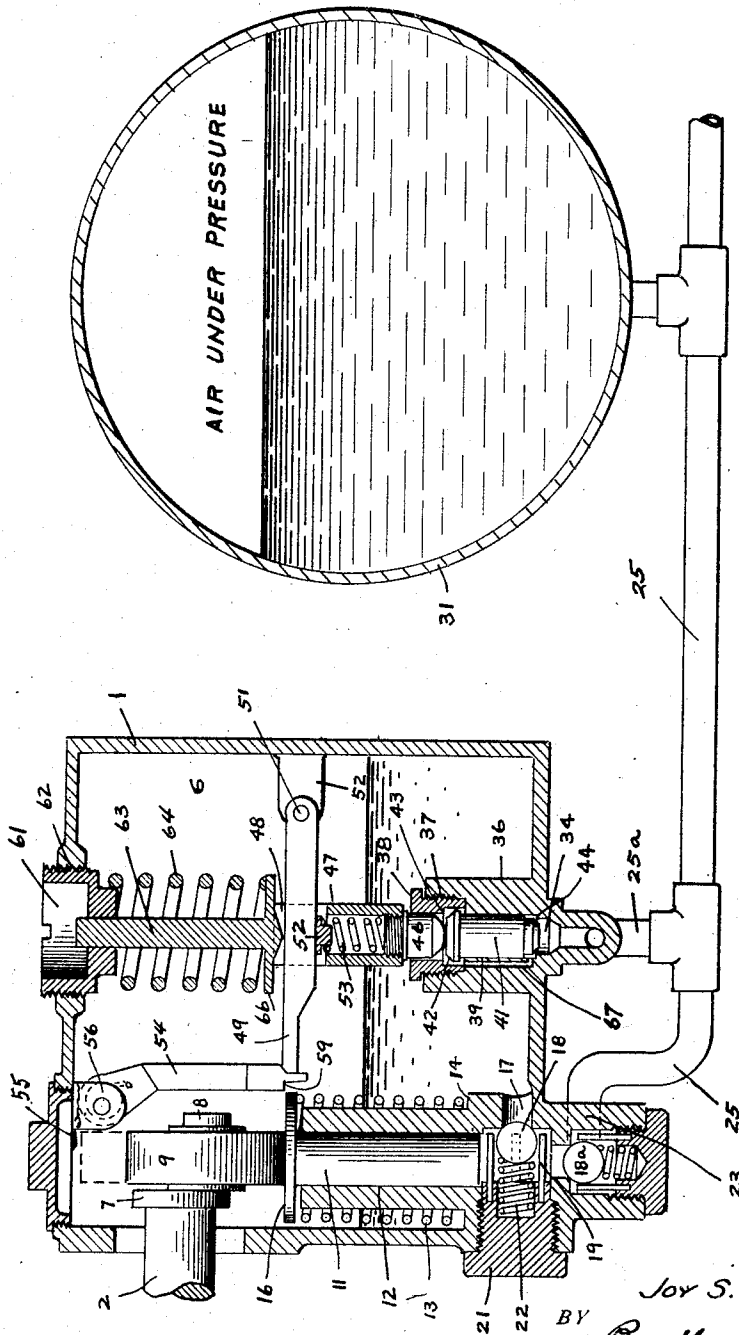


Fig. 1.

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JOY S. REYNOLDS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO REYNOLDS BRAKE CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

AUTOMATIC CUT-OUT.

Application filed June 7, 1924. Serial No. 718,629.

To all whom it may concern:

Be it known that I, JOY S. REYNOLDS, a citizen of the United States of America, residing at 167 Hayes Street, San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Automatic Cut-outs, of which the following is a specification.

The present invention is an improved automatic cut-out and relates to means, automatically responsive to pressure fluctuation for alternately cutting in and out a pump associated with a pressure system and driven intermittently from a constantly driven source of power.

Attention is called to my co-pending application for patent on hydraulic unit, Serial Number 718,630, in which my cut-out is shown but not claimed per se.

The objects of this invention include:

(1) The provision of a cut-out, for intermittently operating a pump or the like, which will have a given range of pressure fluctuation between the cutting in and cutting out operations, and in which the degree of pressure at which one of said operations will take place may be pre-determined while the other operation is always in fixed relation to the other operation.

(2) A cut-out wherein the component parts are of rugged construction and capable of long and hard usage, and wherein said parts are so arranged as to avoid undue strain from the mechanism they control after each operation, or, in other words, to make it impossible for the pump to exert any influence on the cut-out valve mechanism.

(3) In an automatic cut-out, means for engaging a reciprocating part at one extreme of its movement to discontinue its co-action with a moving part, said means also capable of further separating the reciprocating part and the moving part to prevent contact thereof and thus eliminate tapping noises.

In this specification and the annexed drawings, the invention is illustrated in the form considered to be the best, but it is to be understood that the invention is not limited to such form because it may be embodied in other forms, and it is also to be understood that in and by the claims following the description it is desired to cover the invention in whatever form it may be embodied.

In the accompanying two sheets of drawings, Figure 1 is a vertical cross-sectional view of my cut-out;

Fig. 2 is a fragmentary view similar to Fig. 1, showing a modification, and showing an attachment for eliminating tapping of the parts;

Fig. 3 is a side view of a detail;

Fig. 4 is an edge view of the detail shown in Fig. 3, and showing other parts associated therewith.

Referring to the drawings, the numerals indicating the respective parts correspond with those employed in the co-pending application before mentioned.

The numeral 1 indicates a unit or reserve housing containing my cut-out.

Power is applied to my unit through a shaft 2, which, in this case, represents the power take-off shaft of an automobile.

Any suitable source of power will operate the cut-out hereinafter described, and while said cut-out is of particular utility in automobile braking, it is useful for other purposes.

The shaft 2 extends into a chamber 6 within the unit 1. A disc 7 secured to shaft 2, Figs. 1 and 2, carries a pin 8 which is eccentric to said shaft. Freely mounted on said pin 8 is a roller 9.

Thus, each rotation of shaft 2 raises and lowers the roller 9 as indicated in dotted lines. This movement is used to depress a piston 11, Fig. 1, slidable in a bore 12 in unit 1. This piston is returned by a spring 13 which bears at one end against the shoulder 14, and at the other end against a flange 16 on piston 11. The piston 11 serves as a pump, liquid being drawn from chamber 6 into bore 12 through an intake passage 17 on the upstroke of said piston, unseating a check valve 18, guided by pins 19, quadrilaterally disposed in a plug 21. The valve 18 is urged to seat by a spring 22. The down stroke of piston 11 unseats a similar check valve 18^a and forces said liquid

through a discharge passage 23 communicating with a pipe 25. The unseating of this valve 18^b by the pump 11 forces liquid through pipe 25 to a pressure tank 31.

5 A quantity of air is trapped and compressed in tank 31 by the introduction of liquid, furnishing an expensive medium for forcing said liquid back through pipe 25 and a pipe 25^a to chamber 34 in unit 1.

10 At 36, I show a boss on the floor of chamber 6. This boss is bored and tapped as indicated at 37, to receive a bushing 38, and this bore is reduced at 39 to slidably contain a piston 41.

15 The piston 41 acts as a valve on each end, the upper end being enlarged and tapered as indicated at 42 to seat on a shoulder 43 in bushing 38, and the lower end of said piston being reduced in diameter and tapered to seat on the shoulder 44 at the end of bore 34. The limit of travel of said piston 41 is between said seats.

20 Slidable in a smaller bore of bushing 38 is a plunger 46, rounded on the end adjacent to piston 41 for contact therewith, and threaded at the opposite end for engagement with a sleeve portion of a member 47. This member 47 is slotted as indicated at 48 to admit therethrough a lever 49, pivoted on a pin 51, Figs. 1 and 2, protruding from a boss 52, integral with the unit 1.

25 This lever is of the third kind, the fulcrum being at 51 at one end, the work being done at the opposite end and power applied therebetween. The lever is raised by a button 52 urged by a spring 53, which bears at one end against said button and at the other end against plunger 46.

40 By reason of this structure, a rise in pressure in tank 31 will raise piston 41, plunger 46, and the lever 49 will be raised to the dotted line position shown in Fig. 2. In order to cause this elevation of lever 49, to arrest the pump piston 11 in inoperative position, I provide a finger 54 which is bifurcated and suspended from the roof of chamber 6 and is pivotally mounted in lugs 56. The finger 54 is normally held in the full line position shown in Fig. 1 by a spring 55 coiled around a bushing 57 surrounding a pin 58 which extends through the lugs 56.

50 The bore in bushing 57 is eccentric to the periphery thereof in order to afford a means of adjustment of the operative length of finger 54. At 60, I show a lock nut threaded on bushing 57 to engage one of the bifurcated members of finger 54. This secures any adjustment after it is made.

60 When lever 49 is raised, due to a rise of pressure, said lever will throw finger 54 to the dotted line position because of the oblique bearing between the abutting portions of lever 49 and finger 54.

When in said dotted line position, a notch 59 in the end of said finger engages the flange 16 on piston 11 and prevents further reciprocation thereof until released by the restoration of lever 49 to its initial position. 70

The finger 54 is positively held in this engagement with piston 11 by the abutment of the end of lever 49 with the flat portion on the side of finger 54 remote from said piston, as clearly shown in dotted lines, Fig. 2. 75

I will now describe automatic means, responsive to a fall of pressure, for lowering the lever 49, and releasing finger 54 from engagement with piston 11, leaving said piston free to operate. 80

At 1, Fig. 1, I show a plug threaded at 62 into the roof of chamber 6. This plug 61 is centrally bored to form a guide for a stem 63 integral with the member 47.

At 64, I show a coiled spring bearing at 85 one end against plug 61, and at the opposite end against a flange 66 on member 47. The threaded plug 61 affords a means for adjusting the pressure of spring 64 and predetermining the degree of pressure at which the cut-out will render the pump inoperative. 90

Operation.

Assuming that my unit is connected to a 95 power take-off housing of an automobile transmission, and that shaft 2 is constantly rotated, the pump 11 will be depressed at each revolution of said shaft and raised by spring 13 until such time as said pump has forced a sufficient quantity of liquid into tank 31 to compress air therein until said pressure, acting on the reduced end of piston 41 is sufficient to overcome the urge of spring 64, slightly raising said piston, introducing pressure to the full piston area, as represented by bore 39, whereupon, (due to this increase of effective area), the piston 41 will immediately move to its upward limit of travel where it seats on shoulder 100 43.

The piston 41 will be held firmly on its seat 43 because the area of the bore forming shoulder 43 is greater than that of either bore 39 or bore 34. 105

It will be seen that engagement of piston 11 by finger 54 is only possible when said piston is in its lowermost position. Should the action of piston 41 (just described) take place when said piston 11 is in any other position, flange 16 thereon would prevent the movement of finger 54 and lever 49. In order to provide a yieldable element whereby the cut-out action may be delayed until piston 11 reaches its lowermost position, I provide spring 53 and button 52. 115

When pressure raises piston 41, the abutting plunger 46 and member 47 rise therewith. If the parts all assume the full line position shown in Fig. 1, the oblique abut- 120 130

ment of lever 49 with finger 54 will at once move said finger to its dotted line position and effect a cut out of the pump.

However, should the piston 11 be up, the finger 16 thereon will prevent said movement of finger 54, and instead the spring 53 will be compressed as member 47 rises until said piston 11 reaches its downward limit, at which time the urge of the compressed spring 53 will throw lever 49 and finger 54 to their dotted line positions, rendering the pump inoperative until pressure subsides to a degree where pressure admitted through a by-pass 67 from bore 39 to bore 37 is insufficient to overcome the urge of spring 64.

When pressure has subsided to a point where spring 64 depresses member 47 and piston 41, and also lever 49, thus permitting finger 54 to return to its full line position in response to the urge of spring 55, the pump will resume operation. It will be seen that when the pressure is no longer sufficient to keep the larger end seated, the piston descending seats firmly on the smaller end.

It is obvious that a greater reactive force will be required to unseat the smaller valve, and this fact affords an interval of time and range of pressure between cutting in and cutting out operations.

In order to make a sure-fire engagement of finger 54 with piston 11, at 59, a certain clearance must be allowed between the parts. This clearance, however, is objectionable, first, because, after the cut out is made, the piston 11 is tapped at each revolution of roller 9. This tapping produces a noise that is objectionable on pleasure cars and also reciprocates said piston 11 slightly and, the liquid behind said piston, being now compressible, is forced into tank 31, raising pressure therein.

In order to prevent this undesirable noise and accumulation of pressure, I provide the member 70 shown in Fig. 3. This member 70 is pivoted on a pin 71, extending through the slotted ends of finger 54, and is provided with an oblique cam surface 72, which corresponds with the oblique surface of finger 54 at the point where said finger contacts with the end of lever 49, but the cam surface on the member 70 is purposely made longer than that on finger 54.

It results from this structure that, when lever 49 is raised in response to pressure, the first travel of said lever forces finger 54 to its dotted line position, Fig. 2, and the continued movement of lever 49 (acting on the longer oblique surface 72 on member 70) rocks said member on its pivot 71 and depresses a heel 73. This heel 73 engages flange 16 on piston 11, depresses piston 11 to a point where it will not contact with the roller 9 during the rotation thereof.

When lever 49 raises to its upward limit of travel (dotted line position, Fig. 2), the end of said lever abuts the surface 74 on member 70. This is to prevent the urge of spring 13 from causing any premature cutting in operation through lever 49, plunger 46, and piston 41. The end of member 70 remote from its pivot 71, serves as a stop to limit the travel of said member with respect to finger 54.

The heel 73 is rounded to facilitate engagement with flange 16 on piston 11 and dispense with any spring for holding member 70 in its full line position.

I claim:

1. An automatic cut-out, comprising, a continuously rotating shaft, a pump having a piston adapted to be operated thereby in one direction, a spring adapted to operate said piston in the reverse direction, a pressure tank, said pump connected to said tank and adapted to force fluid therein and create pressure therein, a finger adapted to engage said piston and retain it at approximately the limit of its inner stroke, pressure operated means connected to said tank and adapted to operate said finger in the direction of engagement, and means, associated with said finger and operated by said pressure for depressing said piston to a level where it will clear its drive means.

2. An automatic cut-out, comprising, a continuously rotating shaft, a pump having a piston operated in one direction by said shaft and in the opposite direction by a spring, a pressure tank, said pump connected to said tank and adapted to force fluid therein and create pressure therein, a finger adapted to coact with said finger and cause it to engage or disengage said pump, pressure operated means for actuating said lever in one direction, a spring adapted to operate said lever in the reverse direction, and means associated with said pressure operated means affording a range of pressure and an interval of time between the operation of said lever by said pressure and the operation thereof by said spring, said means comprising a piston provided with a valve on each end and with a permissible limit of travel to actuate said lever, the said valves being of differential areas whereby greater pressure will be required to actuate the smaller than the larger of said valves.

3. An automatic cut-out, comprising, a continuously rotating shaft and in the opposite direction by a spring, a pressure tank, said pump connected to said tank and adapted to force fluid therein and create pressure therein, a finger adapted to coact with said finger and cause it to engage or disengage said pump, pressure operated means for actuating said lever in one direction, a spring adapted to operate said lever in the reverse direction, and means associated with

said pressure operated means affording a range of pressure and an interval of time between the operation of said lever by said pressure and the operation thereof by said
5 said spring, said means comprising a piston provided with a valve on each end and with a permissible limit of travel to actuate said lever, the said valves being of differential areas whereby greater pressure will be required to actuate the smaller than the larger 10 of said valves, and a shoulder on said piston of an area greater than that of said smaller valve and less than that of said larger valve, whereby pressure will be effective on said shoulder upon the unseating of said smaller 15 valve.

In testimony whereof I affix my signature.
JOY S. REYNOLDS.