

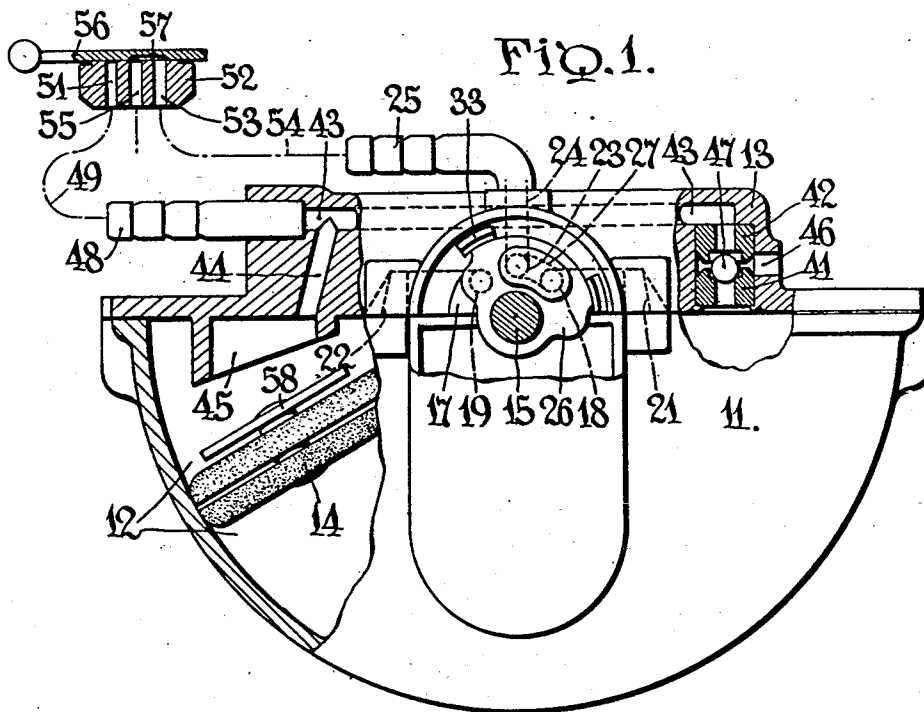
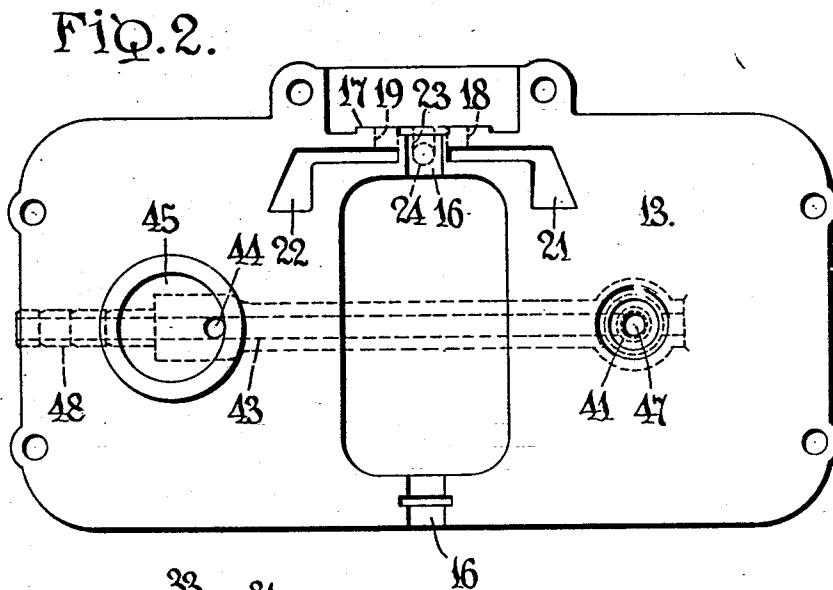
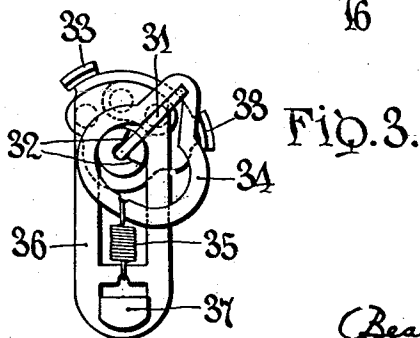
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2,298,734

MOTOR

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2,298,734

MOTOR

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8 Claims. (Cl. 121-97)

The present invention relates to motors operable by differential fluid pressures and has particular relation to motors of the general type employed for operating windshield cleaners and the like.

The invention contemplates a motor provided with valve means operated by a snap action mechanism for alternately placing the motor chamber, on opposite sides of the piston means, in communication with fluid under a given pressure, and other valve means operating in response to fluid pressure at the opposite sides of the chamber for alternately opening the opposite sides of the chamber to a differential fluid pressure. By these means the motor will operate with a slight dwell at the end of each stroke thereof, instead of a rapid reversing action at the end of each stroke.

Means are provided for admitting fluid to one of the chambers independently of the valve means, to effect parking of the piston in a predetermined position. By these means and a control valve which, if desired, may be located remotely to the motor, two fluid conduits extending from the control valve to the motor may suffice to operate and park the motor.

These and other objects and advantages will become apparent from the following description of the typical embodiment of the invention shown in the accompanying drawing, wherein

Fig. 1 is a front elevational view of the motor with parts thereof broken and appearing in vertical section;

Fig. 2 is a bottom plan view of the cover section of the motor casing; and,

Fig. 3 is a front elevational view of a snap action mechanism for operating a valve shown in Fig. 1.

The casing of the motor may comprise a body section 11 having a chamber 12 therein, and a cover section 13. A piston comprising a vane 14 adapted for oscillation in an arcuate path within the chamber, is secured to a rock shaft 15 journaled in bearings 16 of the casing.

On the cover section is a valve seat 17 from which ports 18 and 19 open respectively through passages 21 and 22 into the right and left sides of the motor chamber 12. Another port, 23, from the valve seat 17, communicates through a passage 24 with a nipple 25.

Upon seat 17 and pivotally movable about the axis of shaft 15 is a valve member 26 having a recess 27 adapted to open communication between ports 18 and 23 or between ports 19 and 23, depending upon the position of the valve

member. For operating the latter between the two positions referred to, there may be employed a snap action mechanism of the construction shown in Fig. 3, which is the subject matter of Patent No. 1,978,634 granted to Henry Hueber on October 30, 1934. This mechanism may consist of a kicker 31 which is pivoted to the shaft 15 at the axis of the latter and is engageable by faces 32 of a recess in the end of the shaft. The kicker is engageable with ears 33 on valve 26 to shift the latter between its two operative positions, and its outer end is engaged by a frame 34 which is anchored by a spring 35 to a pressure plate 36, the latter being mounted over the shaft 15 upon a post 37 extended from the adjacent face of the casing section 11, the pressure plate bearing against the outer face of valve member 26. The valve itself differs from that shown in Patent No. 1,978,634 in that it is adapted to block the ports 18 and 19 when the latter are not in communication with the port 23.

It will be seen that when the shaft 15 moves angularly, counterclockwise as viewed in Fig. 2, right shoulder 32 will finally engage and move kicker 31 until the outer end thereof passes beyond a line extended through the center of post 37 and the center of shaft 15, whereupon spring 35 will snap the kicker counterclockwise against the left shoulder 33 of valve 26 and move the latter to its left limit position wherein it opens port 19 to port 23 and port 18 is blocked. Movement of the shaft in the opposite direction, or clockwise, will cause the parts to operate in the reverse manner, snapping the valve to the position shown in Figs. 1 and 3, wherein port 18 communicates with port 23 and port 19 is blocked.

Mounted in the cover section 13 are annular valve seats 41 and 42, the central aperture through seat 41 opening into the right side of the motor chamber, and the central aperture through seat 42 opening through passages 43 and 44 into a well 45 in the left side of the motor chamber. The cover section 13 has an atmospheric vent 46 opening between the valve seats 41 and 42, and a ball valve 47 is disposed between the seats, adapted to close against one or the other of them to close one side or the other side of the motor chamber from the atmosphere.

A nipple 48 communicates with passage 43 and may be connected by a suitable conduit 49 to a port 51 in a control valve member 52. Another port, 53, in the latter is connected, by a conduit 54, with nipple 25; and a third port, 55, in the member may be connected to a suitable

source of less than atmospheric pressure. A manually movable valve member 56, having a recess 57, is adapted to be moved to open communication between ports 53 and 55 to cause the motor to operate, or to open port 51 to port 55 to cause the motor to park, with closure 58 carried by the piston 14 closed over well 45.

When member 56 is in the motor operating position, so that nipple 25 is connected to the source of operating pressure, operation will be as follows, the description assuming the parts to be in the position shown in Fig. 1:

Air will enter vent 46 and flow past valve 47 through seat 42, passages 43 and 44, and into the left side of the motor chamber, moving the piston to the right, and the shaft 15 counterclockwise, since pressure on the right side of the piston is sub-atmospheric, being withdrawn to the source of low pressure via passage 21, port 18, recess 27 in valve 26, port 23 and passage 24 to nipple 25.

When the piston approaches its limit of travel to the right, the valve action shown in Fig. 3 will snap over, blocking port 18 and opening port 23 to port 19. Thereupon the left side of the motor chamber will be subjected to the subatmospheric pressure, via passage 22, port 19, recess 27, port 23, and passage 24 to nipple 25, while the right side of the chamber is blocked from the subatmospheric source. This will result in differential pressure being applied to the opposite faces of valve 47 causing the latter to close against seat 42 and open the right side of the chamber 12 to the atmosphere through seat 41 and vent 46. Accordingly, the piston will be urged to the left, the shaft 15 moving clockwise.

It will be understood that at the moment the valve moves to the position blocking port 18 and opening port 23 to port 19, atmospheric pressure will maintain in the left side of the motor chamber 12 while a partial vacuum exists in the right side of the chamber. This, together with momentum of the piston and associated parts, will cause some continued movement of the piston and an increase in the pressure in the right side of the chamber. With pressure below the valve 47 approaching atmospheric, and a lower pressure above the valve effected by withdrawal of fluid through passage 43, the valve 47 will move to a position closing upon seat 42 and opening the passage through valve seat 41 to the atmosphere. Any leakage of air past valve 47 or past the piston packing that may occur at the time when the valve 26 snaps over, will expedite the movement of valve 47.

When the limit of movement of the piston to the left is approached, the valve 26 will again be reversed, to the position shown in Figs. 1 and 3 by the snap action mechanism; the ball valve 47 will reverse due to the reversal of pressure differential acting thereon; and, as a result, the piston will start another stroke to the right.

It will be seen that the full suction of the source cannot be applied to the motor chamber after the valve 26 has snapped over, until the valve 47 shifts. This results in a slight dwell of the piston at the end of each operating stroke.

When the control member 56 is moved to connect ports 51 and 55, the left side of the motor chamber is connected to the low pressure source via port 51, conduit 49, nipple 48 and passage 44, while port 53 is blocked, preventing passage of fluid from the motor chamber past valve 26. The resulting lowering of pressure in the left

side of the chamber will serve to lift valve 47 against seat 42 (if it is not already in this position) admitting air into the right side of chamber 14 and hence, moving the piston to a parked position wherein member 58 closes over wall 45.

It will be understood that the motor structure herein shown and described is merely an illustrative embodiment of the inventive principles involved, and that these principles may be otherwise embodied without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In a motor, a chamber and piston means movable therein by differential pressures acting thereon, valve means operable by fluid pressures for applying one of said pressures alternately to opposite sides of the chamber, other valve means for applying the other of said pressures alternately to opposite sides of the chamber, and snap action means for operating said other valve means, and means for applying said other of said pressures to one side of the chamber independently of said other valve means.

2. In a motor, a chamber and piston means movable therein, valve means operable by fluid pressure thereon for alternately opening the opposite sides of said chamber to the atmosphere, other valve means for alternately admitting pressure to opposite sides of said chamber and snap action means for operating said other valve means, and means for admitting fluid pressure to one side of the chamber independently of said other valve means.

3. In a motor, a chamber and piston means movable therein, valve means for alternately admitting pressure to the opposite sides of the chamber and snap action means actuated by the movement of the piston means for shifting said valve means when the piston means approaches the terminal phase of each operating stroke thereof, valve means operable in response to the differential pressure at the opposite sides of the chamber for alternately opening said opposite sides of the chamber to the atmosphere, and means for admitting pressure to one side of the chamber independently of the first mentioned valve means.

4. In a motor, a chamber and piston means movable therein, a fluid passage opening through opposed valve seats into the chamber on opposite sides of the piston means, a ball valve adapted to close either one of said seats to open or close communication between said passage and one side or the other side of said chamber, and valve means for effecting a reversal of fluid pressure in the opposite sides of the chamber to cause said ball valve to move from one to the other of said seats.

5. In a motor, a chamber and piston means movable therein, a first outlet passage and outlet ports connecting said outlet passage to the opposite sides of the chamber, valve means operable by and upon the piston means approaching the operating limit positions thereof to close said outlet ports alternately, inlet ports into the opposite sides of the chamber and pressure responsive valve means for closing said inlet ports alternately, a second outlet passage from one side of the chamber, and a valve for closing one of said outlet passages when the other thereof is open.

6. In a motor operable from a source of suction, a chamber and piston means movable therein, a first outlet passage and outlet ports connect-

ing said outlet passage to the opposite sides of the chamber, valve means operable by and upon the piston means approaching the operating limit positions thereof to close said outlet ports alternately, atmospheric inlet ports into the opposite sides of the chamber and pressure responsive valve means for closing said inlet ports alternately from the atmosphere, a second outlet passage from one side of the chamber, and a valve for closing either one of said outlet passages and opening the other thereof to a source of suction.

7. In a motor operable from a source of suction, a chamber and piston means movable therein, a first outlet passage connectible to a source of suction and outlet ports connecting said outlet passage to the opposite sides of the chamber, outlet valve means operable to close one and open the other of said ports, snap action means operable by and upon the piston means approaching the operating limit positions thereof to operate said outlet valve means, atmospheric inlet

ports into the opposite sides of the chamber and inlet valve means for closing said inlet ports alternately from the atmosphere, said inlet valve means being responsive to and operable by fluid pressure therein as directed by operation of said outlet valve means, and a second outlet passage from one side of said chamber and connectible to a source of suction.

8. In a motor, an arcuate chamber, a rock shaft, a vane piston connected to the shaft and adapted to oscillate in said arcuate chamber, outlet ports from opposite sides of the chamber to a source of suction, outlet valve means for closing said ports alternately, snap action means operable by said rock shaft for operating said valve means when the piston approaches its operating limit positions, and valve means operable in response to the differential pressures at the opposite sides of the chamber for alternately opening said opposite sides of the chamber to the atmosphere.

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