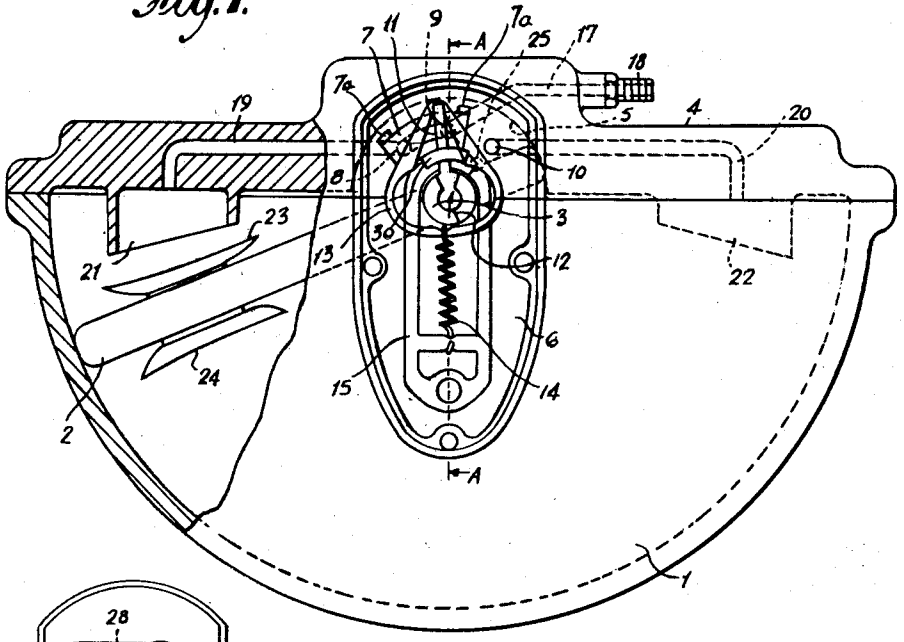
Dec. 29, 1953 W. E. O'SHEI 2,664,074

SUCTION MOTOR

Filed Nov. 8, 1950

Fig. 1.



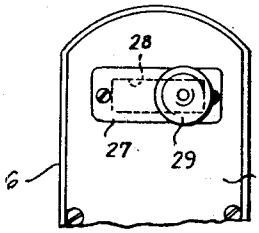


Fig. 1A.

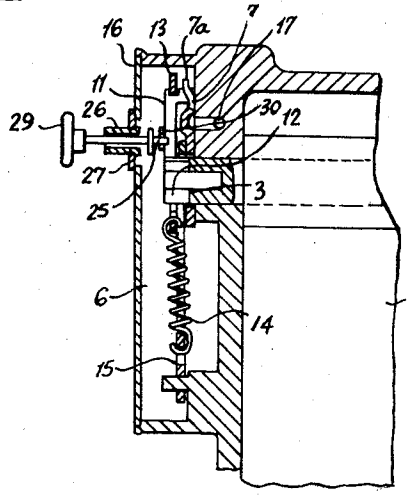


Fig. 2.

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SUCTION MOTOR

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4 Claims. (Cl. 121—164)

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The present invention relates to suction motors, particularly for use in actuating windscreen wipers.

Such motors generally comprise a piston or paddle which is reciprocated back and forth in the motor housing by the application of suction alternately to opposite sides of the piston or paddle, by means of an automatic over-centre valve mechanism. For the purpose of controlling the operation of such motors a manual control valve is provided which, in the "running" position, connects the automatic valve to the source of suction, whereby the valve automatically applies suction alternately to opposite sides of the motor to cause it to operate, and in the "stop" position disconnects the source of suction from the automatic valve and connects it to one side only of the motor housing, whereby the piston or paddle is moved towards that side and is held stationary in a "parking" position at the extreme limit of its movement in that direction. The provision of this manual valve gives rise to the possibility of leakage and also necessitates a tortuous path through which the suction is applied to the motor housing, thereby resulting in a loss of power.

An object of the present invention is to provide a suction motor of which the starting and stopping is controlled by a member which is movable at will into or out of the path of movement of the automatic valve or its actuating mechanism whereby, when in the "stop" position, this member prevents the automatic valve from snapping over and the motor therefore stops.

Another object of the invention is to provide a suction motor which can be parked at either end of its travel, in either of which parking positions the source of suction will be shut off from the piston or paddle by valve means, the suction acting on said valve means to retain the piston or paddle in its parked position.

In conventional suction windscreen wiper motors, the automatic valve mechanism comprises a semi-rotary valve which is moved back and forth with a lost motion action by means of a kicker which is moved with an over-centre motion against the action of a spring. As soon as this kicker is moved by the motor shaft past a dead centre position, the spring snaps the kicker forwards to reverse the position of the semi-rotary valve.

In the preferred arrangement according to the invention, the control member for starting and stopping the motor is moved into the path of

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the kicker when it is desired to stop the motor, and thus prevents the kicker from snapping over to reverse the position of the valve. Thus, the suction remains applied to one side of the piston or paddle and the motor comes to a stop with the piston or paddle at one of the extreme limits of its movement. With the arrangement described, the motor will stop at either one end or other, depending upon its direction of movement at the time when the control member is moved into the path of the kicker, but by suitable design of the kicker or by provision of guards the motor may be so constructed that the control member can only be moved into the path of the kicker when the piston or paddle is moving in one particular direction, thus ensuring that the motor will always stop at the same end. In order that the suction will not continuously be applied to the paddle or piston when the motor is stopped or parked, the piston or paddle may carry a shut-off valve member which engages with a seating in the motor housing when the piston or paddle is in its extreme limiting position. Preferably, this sealing off arrangement is provided at both limiting positions of the piston or paddle; thus, for example, in the case of a paddle type motor, the cover of the motor housing may carry two cup seatings, adapted to co-operate with two closure valve members respectively carried by opposite sides of the paddle. Thus, by simply interchanging or altering the adjustment or position of the kicker or guards, the motor may be arranged to park at will at either one or other of its end positions.

In order that the invention may be more clearly understood, an embodiment thereof will now be described with reference to the accompanying drawing, in which—

Fig. 1 shows a side view of a suction motor of the oscillating paddle type according to the invention, partly in section and with the cover of the valve chamber removed.

Fig. 1A is a view showing the elongated aperture in the cover plate.

Fig. 2 shows a section along the line A—A in Fig. 1.

Referring to the drawings, the motor comprises a casing 1 having an arcuate chamber therein within which a paddle 2 is adapted to rock about a rocket shaft 3, the casing 1 being closed by a cover 4 formed with an auxiliary arcuate chamber 5 within which the upper end of the paddle moves. One end of the shaft 3 is adapted to be connected to drive a windscreen wiper arm (not

shown) and the other end of the shaft extends into a valve chamber 8 and is adapted to operate valve mechanism for alternately connecting a source of suction to opposite sides of the paddle and thereby cause the latter to oscillate. This valve mechanism comprises a semi-rotary valve 7 movable over a valve face provided with three ports 8, 9 and 10, the valve being shifted with a snap action by the over-centre movement of a kicker 11 which is moved by engaging with the radial surfaces 12 formed at the end of the rocker shaft. The kicker 11 is associated with a stirrup 13 connected by a spring 14 to a pressure plate 15. The spring 14 serves the dual purpose of snapping over the kicker immediately it passes its dead-centre position, whereby the kicker snaps over the valve 7 by engaging with one or other of the ears 7a thereof, and also of causing the pressure plate to apply a light pressure to hold the valve 7 against the valve face. The valve chamber is closed by a cover plate 16. As so far described the motor is of conventional and well-known design and further description thereof and the mode of operation of the valve mechanism is unnecessary.

The central port 9 leads directly through a passage 17 in the cover 4 to a nipple 18 by means of which the motor can be connected to a source of suction, such as the intake manifold of an internal combustion engine. The outer ports 8 and 10 connect respectively through passages 19 and 20 in the cover 4 the motor chamber at opposite sides of the paddle. The passages 19 and 20 terminate respectively within cup-shaped valve seatings 21 and 22 carried from the underside of the cover. Carried on opposite sides of the paddle 2 are two sealing members 23, 24, which may comprise flexible or pad-like members which are adapted to fit over the valve-seatings 21, 22, respectively when the paddle is in either one or the other of its extreme limiting positions of movement. The edges of the cups 21, 22 are inclined as shown in order that the sealing members may fit flat against the valve seatings. When a sealing member is fitting against its associated valve seating and suction is applied thereto, the sealing member is sucked against the valve seating, thereby holding the paddle in its limiting position while sealing off the suction from the motor chamber in order that suction will not be continuously acting on the paddle packings whilst the motor is "parked." By the provision of sealing members on both sides of the paddle and the provision of two valve seatings 21, 22 at opposite limiting positions of movement of the paddle, the latter may be "parked" at either end of its travel, at will, by simply maintaining the suction on that end of the motor at which the paddle is to be parked instead of allowing the automatic valve 7 to change over the suction connection to the opposite side of the paddle.

This is achieved by providing a stop member 25 which can be moved into the path of movement of the kicker 11 to prevent the latter from moving sufficiently, after passing its dead-centre position to change over the valve 7. The kicker is arranged to reach its dead-centre position when a sealing member closely approaches its associated valve seating, so that by arresting the kicker after only a small angular movement under the action of the spring 14 beyond the dead-centre position, the valve 7 is not shifted whilst the paddle continues to move, under the action of the suction which is still applied to the same side of the paddle, until the sealing member closes over the valve seating and the paddle is stopped in a "parking" position. To start the motor the stop member 25 is withdrawn out of the path of movement of the kicker 11, whereupon the spring 14 will move the kicker and cause it to move the valve 7, whereby the suction connections are interchanged and the paddle will move away from the position in which it was parked. The valve 7 will then continue to be automatically reversed and the motor will continue to operate until the stop member is again moved into the path of movement of the kicker.

In the embodiment illustrated in the drawing, the stop member 25 comprises a rod slidable in a bushing 26 carried at one end of a plate 27 secured over an elongated aperture 28 in the cover plate 16. The outer end of the rod 25 is fitted with a knob 29. The kicker 11 carries an arcuate guard plate 30 which moves opposite the end of the rod 25 when the latter is withdrawn. By reason of the guard plate 30, the stop member is prevented from being moved inwards to its "stop" position when the kicker is in its right-hand position (referring to Fig. 1); it can only be moved into the path of movement of the kicker when the latter is in its left-hand position, and when moved into this position the inner end of the rod engages with the right-hand end of the guard plate shortly after the kicker has again been moved clockwise over its dead-centre position, thereby arresting the kicker and preventing it from shifting the valve 7. The paddle is thus held in its parked position at the left-hand side of the chamber.

If it be desired that the motor should stop with its paddle at the right-hand end of the chamber, it is only necessary to reverse the position of the plate 27 so that the stop member is positioned to the left of the centre line of the motor; the stop member can then only be moved inwards when the kicker is in its right-hand position.

With the arrangement described the conventional manual valve with its restricted passages is eliminated, thus enabling the motor to operate with full power.

A further advantage of the arrangement according to the invention is that the stop member may be remotely controlled in a very simple manner, either mechanically, for example, by a Bowden cable or electrically by means of a magnet or solenoid which actuates the control member and is energised from a remote point.

Whilst a particular embodiment has been described, it will be understood that various modifications may be made without departing from the scope of the invention. Thus, for example, the cover plate 16 may carry two stop members in the two positions which the member 25 may alternatively be arranged so that the motor may be parked either on one side or the other, at will, and without having to make any adjustment or alteration to the motor. These two stop members may be actuated through a rocking lever so that the side on which the motor parks will be determined by the direction in which the lever is rocked. Further, instead of moving the stop member into the path of movement of the kicker, it is sufficient if it is arranged to frictionally engage the kicker with sufficient friction that the spring 14 cannot move the kicker until the stop member is moved out of frictional engagement therewith. In a further modification, the valve may be stopped in its dead-centre position, whereby suction may be cut off from both sides of the piston or paddle.

I claim:

1. A suction motor having a chamber, a piston movable therein, a rocker shaft oscillated by said piston, a suction line, a valve controlling the connection of said chamber at opposite sides of said piston to said suction line, valve actuating member operated by the movement of said shaft with an over-centre snap-action to reverse the position of the valve and thereby alternately to reverse the direction of movement of said piston, a stop member movable into the path of movement of said valve actuating member to prevent the valve actuating member from snapping over the valve to reverse the direction of movement of the piston, and thereby cause the motor to stop, means for preventing the stop member from being moved into the path of movement of the valve actuating member except when the valve is in a position corresponding to one particular direction of movement of the piston, and means for changing the cooperative relationship between the stop member and said preventive means to select the valve position in which the stop member may be operated, thereby selecting the limiting position in which the piston will be parked when the motor is stopped.

2. A suction motor having a chamber, a piston movable therein, a rocker shaft oscillated by said piston, a suction line, a valve controlling the connection of said chamber at opposite sides of said piston to said suction line, a valve-actuating kicker driven by the movement of said shaft through a lost motion connection, a spring acting on said kicker and serving to move said kicker with an over-centre snap-action in one direction when the piston approaches one of its extreme limiting positions of movement and to move the kicker in the other direction when the piston approaches its other extreme limiting position of movement, means interconnecting the kicker valve to reverse the position of the valve when the kicker snaps over-centre under the action of the spring, thereby alternately to reverse the direction of movement of said piston, and a stop member movable into the path of movement of said kicker and at a position such that it will stop the movement of the kicker shortly after the kicker has moved beyond its dead centre position and is being advanced by the spring but before the kicker has moved the valve to reverse the valve connections.

3. A suction motor having a chamber, a piston movable therein, a rocker shaft oscillated by said piston, a suction line, a valve controlling the connection of the suction line alternately to two ports leading respectively through passages to the chamber at opposite sides of the piston, said passages terminating in valve seatings against which two sealing members carried at opposite sides of the piston respectively engage when the piston is in one or other of its extreme limiting positions of movement, a valve-actuating kicker driven by the movement of said shaft through a lost motion connection, a spring acting on said kicker and serving to move said kicker with an over-centre snap-action in one direction when the piston approaches one of its extreme limiting positions of movement and to move the kicker in the other direction when the piston approaches its other extreme limiting position of movement, means interconnecting the kicker with the valve to reverse the position of the valve when the kicker snaps over-centre under the action of the spring, thereby alternately to reverse the direction of movement of said piston, and a stop member movable into the path of movement of said kicker and at a position such that it will stop the movement of the kicker shortly after the kicker has moved beyond its dead centre position and is being advanced by the spring but before the kicker has moved the valve to reverse the valve connections.

4. A suction motor having a chamber, a piston movable therein, a rocker shaft oscillated by said piston, a suction line, a valve controlling the connection of said chamber at opposite sides of said piston to said suction line, a valve-actuating member driven by the movement of said shaft with an over-centre snap-action to reverse the position of the valve and thereby alternately to reverse the direction of movement of said piston, a stop member movable into the path of movement of said valve-actuating member, and means for changing the cooperative relationship between the stop member and the valve-actuating member for selecting the limiting position in which the piston will be parked when the stop member is moved into the path of movement of the valve-actuating member.

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