Jan. 5, 1932. H. HUEBER 1,840,233

SELF PARKING WINDSHIELD CLEANER MOTOR

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Fig. 4.

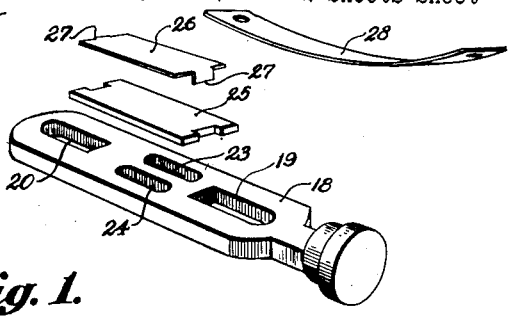


Fig. 1.

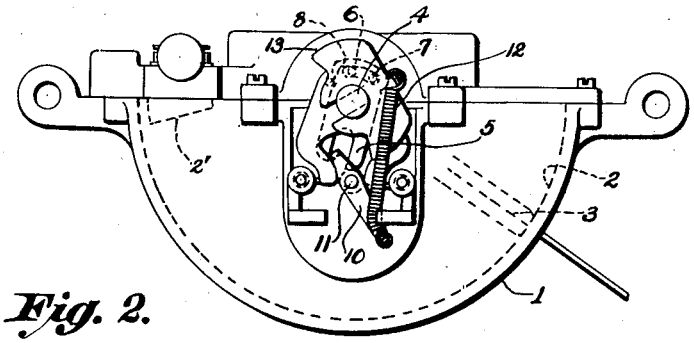


Fig. 2.

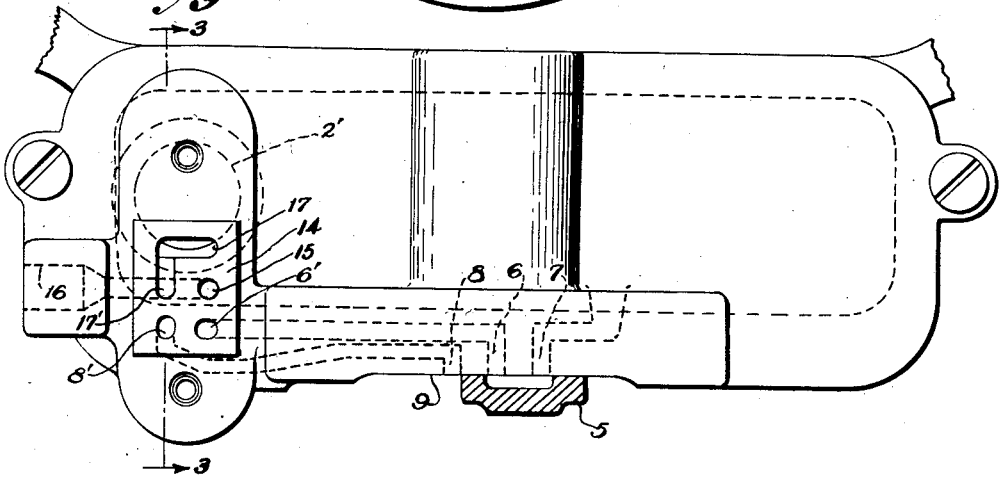
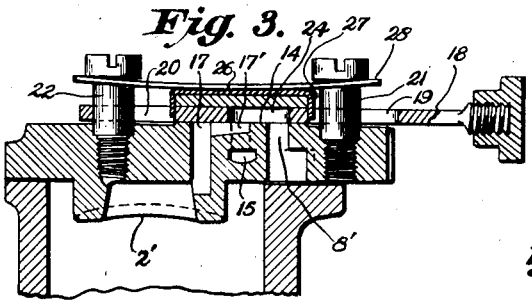


Fig. 3.



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SELF PARKING WINDSHIELD CLEANER MOTOR

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Fig. 5.

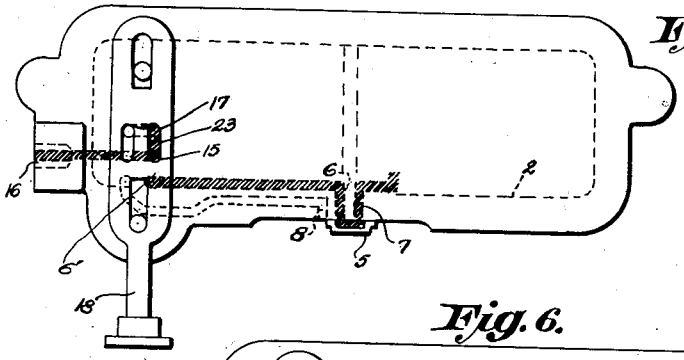


Fig. 6.

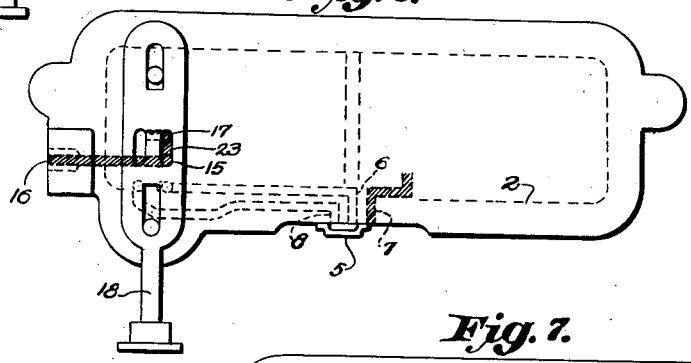


Fig. 7.

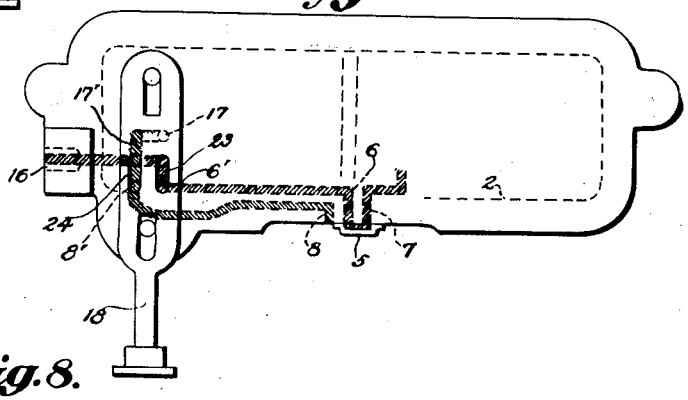
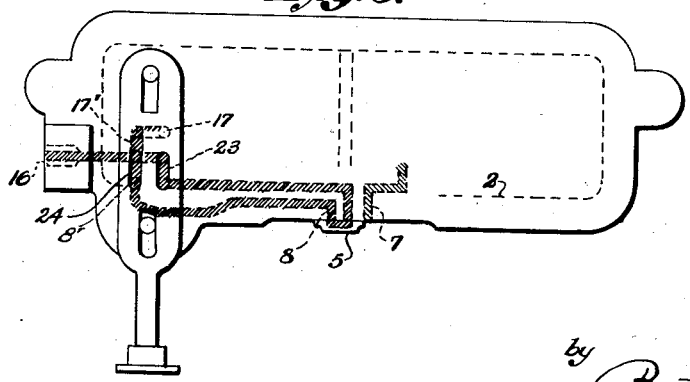


Fig. 8.



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UNITED STATES PATENT OFFICE

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SELF PARKING WINDSHIELD CLEANER MOTOR

Application filed June 14, 1928. Serial No. 285,246.

This invention relates to windshield cleaners and more particularly to that type in which the wiper blade is automatically moved to a position out of or at one side of the field of vision when the cleaner motor is turned off or rendered inoperative.

Windshield cleaners of the suction-operated type have been devised which, when the source of vacuum has been shut off, would have said source directly and constantly connected to one side only of the cleaner motor in shunt relation to the automatic valve mechanism thereof, whereby the motor piston would be urged toward and held at one limit of its movement so as to retain the connected wiper blade out of the field of vision. The automatic valve mechanism of the cleaner motor functions to alternately connect the piston chamber at opposite sides of the piston to the source of suction while opening the unconnected side of the chamber to the atmosphere. The heretofore designed parking type of cleaner would function very efficiently if and when the parking valve was opened during movement of the piston under atmospheric pressure toward the parking position of the piston, but should the piston be operating away from its parked position at the moment the parking valve was opened then the piston would creep and drag very slowly to its parking position because of the fact that the automatic valve mechanism would then be in a position opening the parking side of the piston chamber to the atmosphere and therefore the parking suction would be "pulling in" the atmosphere through the parking side of said chamber while the piston chamber at the opposite side of the motor would be connected to the closed suction passage. In fact, except for leakage to said latter side of the piston chamber, the piston would not even be acted upon by the parking suction. Therefore, while the parking mechanism would function efficiently in one direction of movement of the piston its efficient functioning during the opposite movement of the piston could not be relied upon to satisfactorily park the cleaner outside of the cleaned zone of the windshield.

The present invention has for its primary object to provide a suction-operated windshield cleaner of the parking type in which the parking valve, when opened to connect one side only of the piston chamber to the source of suction, will directly open or connect the opposite side of the piston chamber to the atmosphere regardless of the direction of movement of the piston at the time the parking valve is opened, whereby the parking of the wiper will be expeditiously effected whenever the parking valve is opened.

The invention further has for an object to provide an improved and combined parking and control valve for the windshield cleaner; and to provide a parking windshield cleaner having a novel arrangement of passages and ports controlled and grouped by co-operating valve parts to render the suction effective and efficient in either operating the cleaner or parking the same.

The invention further resides in the formation of the valve seat and its arrangement of ports therein, and in the salient features of construction and arrangement of parts hereinafter referred to, reference being had to the accompanying drawings wherein,

Fig. 1 is a front elevation of a windshield cleaner embodying the present improvements, the cover of the automatic valve mechanism being removed.

Fig. 2 is a top plan view thereof with the combined parking and control valve removed as well as the major portion of the automatic valve mechanism.

Fig. 3 is a transverse sectional view through the motor about on line 3—3 of Fig. 2, depicting the combined parking and control valve in the windshield cleaner operating position.

Fig. 4 is a detailed perspective view of the parts of the combined parking and control valve in their disassembled relation.

Figs. 5, 6, 7 and 8 are diagrammatic showings depicting respectively the lines of fluid communication when the valve is in a "parking" position and when in an "operating" position.

Referring more in detail to the accompanying drawings, the numeral 1 designates the motor as embodying a piston chamber 2 in

which the vane-type of piston 3 operates for actuating its shaft 4. The shaft 4 is designed to operate the automatic valve mechanism as the piston approaches each limit of movement, which valve mechanism may be of an approved type such as that described herein, the same comprising a valve 5 pivoted on the shaft to operatively connect the central, suction supply port 6 to either one of the chamber ports 7 and 8 and uncover the unconnected port to the atmosphere, in alternation, which ports open through the valve seat 9 over which the valve 5 oscillates. Oscillation of the valve is effected through a kicker lever 10 pivoted at 11 and having one end downbent and disposed in a slot in the valve 5 while the opposite end is connected by a spring 12 to an actuator 13 operated by the shaft 4, the operation being such that as the actuator carries the spring 12 across dead center the kicker 10 will snap into action and oscillate the valve 5 to connect the suction supply port 6 to the heretofore unconnected port, such as 8 in Fig. 2, and directly open the other port, 7, to the atmosphere. The ports 6 and 8 are connected by ducts to corresponding ports 6′ and 8′ in a valve seat 14. This seat, which is slightly raised, is also provided with a suction line port 15, directly connected to the suction line by the socket 16, a parking port 17, and an operating port 17′ which is here shown as constituting a lateral extension of the port 17 in the direction of port 8′. The combined port 17, 17′ is depicted as opening into the chamber 2 through a piston seat 2′ on which the piston seats to seal the parking suction.

Means are provided, during the normal operation of the cleaner, to connect the suction line port 15 to the port 6 and which are adapted to be shifted to break this connection and establish connection between the suction line port 15 and the parking port 17, and simultaneously vent the port 6 to the atmosphere. Likewise, there are provided means to normally connect the chamber port 8 to the operating port 17′ and adapted to be moved to interrupt such connection. The two means may be operated concurrently and are herein illustrated as being conveniently embodied in a single member and termed a combined parking and control valve.

The combined parking and control valve is preferably of the sliding valve type and embodies a slide member 18 having longitudinally spaced slots 19 and 20, for guidingly receiving the spaced guide pins 21 and 22, and an intermediate pair of elongated passages or ports 23 and 24 for operatively connecting the ports of said valve seat 14. To facilitate production of the slide member 18 the same may be of a strap-like form and the slots 19 and 20 and ports 23 and 24 struck out of the body. A convenient manner of closing the side of the ports 23 and 24 opposite to the seat 14 is by placing a leather or other packing member 25 on the slide member so as to cover said ports, and then securing the packing in position by a keeper plate 26 secured to said slide member as by an interlocking relation of parts, such as by turning the fingers 27 of the keeper plate down into the slots 19 and 20 of the slide member, as illustrated in Fig. 3. The guide pins 21 and 22 may consist of headed bolts which also pass through apertures in the ends of a leaf spring 28, the latter having its intermediate portion bearing on the keeper plate 26 so as to exert pressure downwardly thereon and urge the slide member 18 to its seat 14. This arrangement provides a construction which may readily be manufactured and assembled in an expeditious manner and without any special or difficult machine operations.

The guide pins 21 and 22 are so arranged and spaced, relative to the remote ends of the slots 19 and 20, that the inner ends of said slots will not come in contact with said guide pins. This construction provides sufficient clearance for the tongues 27 of the keeper plate 26 in securing the packing member 25 in position, and insures of the true and full movement of the valve slide relative to the ports connected thereby.

Assuming the combined parking and control valve to be in its open or normal running position, as indicated diagrammatically in Figs. 7 and 8, the fluid passages will be in communication substantially as indicated. With the automatic, suction-switching valve 5 in the position indicated in Figs. 1 and 7 the suction line will be as follows: suction entering through the coupling part 16 up through the port 15 of the valve seat, thence transferred by the valve passage 23 to the valve seat port 6′ and the port 6. The valve 5 being in a position to establish communication between the ports 6 and 7, the suction is directed to the right hand end of the piston chamber 2 so as to reduce the pressure on that side of the piston. Atmospheric air will enter the piston chamber on the opposite side of the piston through the uncovered port 8, passing upwardly through the port 8′ into the transfer passage 24 of the slide valve 18, thence downwardly into the lateral extension of the combined parking and operating port 17, 17′ and into the adjacent end of the piston chamber.

The reverse position of the automatic valve 5, as indicated in Fig. 8, will open the port 7 to the atmosphere so as to permit of atmospheric pressure entering through the same into the right hand end of the cylinder whereas the suction will be transferred from the port 6 to the port 8, thence passing through the port 8′ into the valve passage 24 and down through the operating port or extension 17′ and into the left hand end of the

cylinder so as to reduce the pressure therein whereby the atmospheric pressure at the right hand side of the piston will force the latter in a clockwise direction, in the usual manner of operation.

When it is desired to render the cleaner inoperative the combined control and parking valve is pushed to its inner position, indicated in Figs. 5 and 6, thereby shutting off or interrupting the suction line leading to the automatic valve mechanism. Upon moving the valve to its inner or closed position the suction line is directly connected to the left hand end of the piston chamber while the right hand end of the chamber is thrown open to the atmosphere, thereby creating a pressure differential in the piston chamber at the opposite side of the piston which will effect movement of the piston in a clockwise direction until it reaches its left hand limit of movement, and there retain the piston with its connected wiper against retrograde movement.

Assuming the motor to be operating with the automatic valve disposed in the position indicated in Figs. 5 and 7 at the moment the combined parking and control valve is moved to its inner position, the suction line to the automatic valve mechanism will be interrupted and the parking suction line established direct to the left hand end of the piston chamber, the suction line following the nipple 16, the port 15, the passage 23, and the port 17.

In order to establish communication between the atmosphere and the right hand end of the piston chamber the slot 19 of the valve slide 18 is caused to function as an atmosphere supply port and to uncover the port 6′, as indicated in Fig. 5, whereupon atmospheric air will enter said uncovered port 6′ and pass through the connected ports 6 and 7 into the right hand end of the piston chamber, as indicated by the hatching.

Should the piston be operating in a clockwise direction at the moment the combined control and parking valve is moved to its inner position, wherein the automatic valve 5 will be disposed to connect the ports 6 and 8, as indicated in Figs. 6 and 8, the suction line to the automatic valve mechanism will be broken and the suction line to the left hand end of the piston chamber established as in the instance just referred to in connection with Fig. 5. The atmospheric communication to the right hand end of the piston chamber will then be directly established through the uncovered port 7, while the connected ports 6 and 8 remain idle, the port 8′ being closed by the slide member 18.

Regardless, therefore, of whether the piston is swinging clockwise or counter-clockwise at the moment the combined parking and control valve is moved to its inner position, the same result will be accomplished to quickly effect a parking of the wiper to one side of the line of vision since in each instance the left end of the piston chamber will be connected to the source of suction or low pressure while the right end of the piston chamber will be connected to the atmosphere.

What is claimed is:

1. A parking windshield cleaner motor including a piston chamber, a piston operable therein, a suction line, an automatic valve mechanism for operatively connecting the suction line to the piston chamber at opposite sides of the piston; a combined parking and control valve comprising a valve seat having a suction line port, a chamber port directly leading to the piston chamber, and a pair of ports leading to the automatic valve mechanism and connectible thereby for the normal operation of the cleaner, and a valve member movable from a position connecting the suction line port with the automatic valve mechanism, to a position connecting the suction line port with said chamber port and simultaneously therewith open one of said pair of ports to the atmosphere and close the other of said pair of ports.

2. In a windshield cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one chamber port communicating directly with the chamber at one side of the piston; a suction line, a parking port, and a combined parking and control valve operable to connect the suction line to the suction supply port of the automatic valve mechanism and to connect the other chamber port of said mechanism to said parking port for operating the cleaner and movable to a position to interrupt said two connections and to establish direct communication between the suction line and said parking port and to open said suction supply port to the atmosphere.

3. In a windshield cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one chamber port communicating directly with the chamber at one side of the piston; a suction line, a parking port connected to the chamber at the opposite side of the piston, an operating port connected to said opposite side of the chamber, means for selectively connecting the suction line either to said suction supply port or to said park-

ing port, and when connecting the suction line to said parking port to simultaneously vent said suction supply port to the atmosphere, and other means operable to selectively close said other chamber port or connect the same to said operating port.

4. In a windshield cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one chamber port communicating directly with the chamber at one side of the piston; a suction line, a parking port connected to the chamber at the opposite side of the piston, an operating port connected to said opposite side of the chamber, means for selectively connecting the suction line either to said suction supply port or to said parking port, means for simultaneously venting said suction supply port to the atmosphere when said first means is connecting the suction line to said parking port, other means selectively operable to close said other chamber port or to connect the same to said operating port, and a common control operating in one position to arrange said first and third means for simultaneously connecting said other chamber port to the operating port and the suction line to said suction supply port, and movable to another position to position said first and third means to connect the suction line to said parking port and to close said other chamber port and simultaneously to render said venting means operative.

5. In a windshield cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one chamber port communicating directly with the chamber at one side of the piston; a combined parking and control valve comprising a valve seat having a parking port and an operating port each leading to the chamber at the opposite side of said piston, said seat also having a suction line port and a pair of ports which pair of ports communicate respectively with the suction supply port and said other chamber port, and a valve member having passages for connecting the suction line port to the parking port and venting the suction supply port to the atmosphere, in one position of the valve member, and in another position of the valve member to connect the suction line port to one port of said pair and to connect the other port of said pair to the operating port.

6. In a windshield cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one chamber port communicating directly with the chamber at one side of the piston; the other chamber port leading to the chamber at the opposite side of the piston, a suction line connected to the valve mechanism, and means for interrupting the communication between said other chamber port and the chamber and for connecting the suction line to said opposite side of the chamber.

7. In a windshield cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one chamber port communicating directly with the chamber at one side of the piston; a suction line, a parking port connectible selectively to said suction line or to said other chamber port, and means for effecting the selective connection and simultaneously vent the suction supply port.

8. In a windshieild cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one of said chamber ports communicating directly with the chamber at one side of the piston; a control valve seat having a suction line port, a second port leading into the chamber at the opposite side of the piston, and a third port leading to the other of said chamber ports, a valve member on said seat having passage means for selectively connecting said suction line port to said second port and said second port to said third port, and means for venting the suction supply port when said suction line port and said second port are connected.

9. In a windshield cleaner motor having a piston chamber, a piston operable therein, automatic valve mechanism for operatively applying fluid pressure to the piston and including a valve seat having two chamber ports and a suction supply port, and a valve

operable to connect the supply port alternately with each chamber port and to open the unconnected chamber port to the atmosphere, one of said chamber ports communicating directly with the chamber at one side of the piston; a control valve seat having a suction line port, a second port leading into the chamber at the opposite side of the piston, a third port leading to said suction supply port, and a fourth port communicating with the other of said chamber ports, a valve slide having spaced transfer passages and a venting passage, one transfer passage positionable to connect the suction line port to either the second or the third of said ports, and the other transfer passage positionable to connect the fourth port to the second port only when the third port is connected to the suction line, and said venting passage being connectible to said third port when said suction line port is connected to said second port.

10. A windshield cleaner motor including a piston chamber, a piston operable therein, a pair of chamber passages opening into the piston chamber on opposite sides of the piston, a valve seat to which said passages lead, a supply passage also leading to said seat, a valve movable on the seat for alternately connecting the supply passage first to one chamber passage and then to the other chamber passage, automatic mechanism for actuating said valve, a suction line, and a control means for connecting the suction line to the supply passage, said control means being movable to a parking position and having a port operable in said position to connect the suction line to one of said chamber passages and a second port operable in said position to open the supply passage to the atmosphere.

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