Aug. 16, 1927. 1,639,043

B. I. MALOUF

AUTOMATIC WINDSHIELD CLEANER

Filed April 14, 1924 2 Sheets-Sheet 1

Fig. 1.

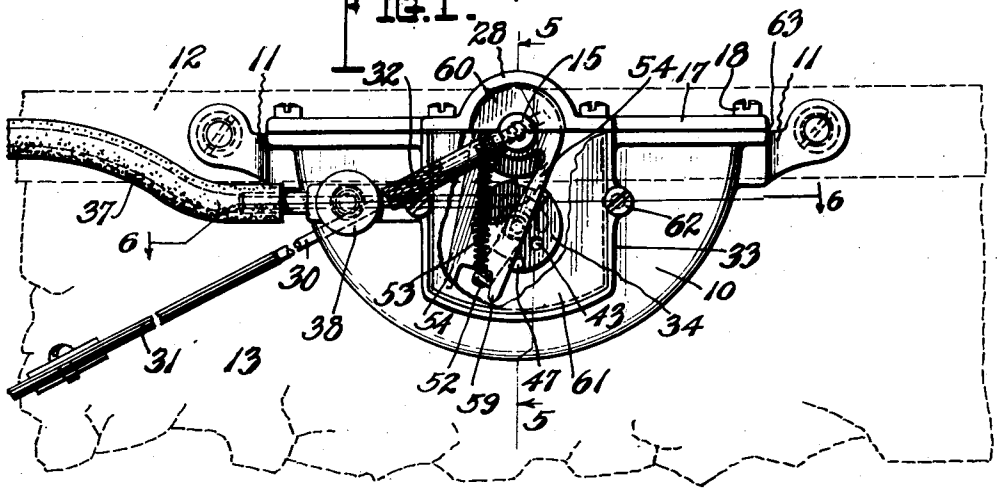


Fig. 2.

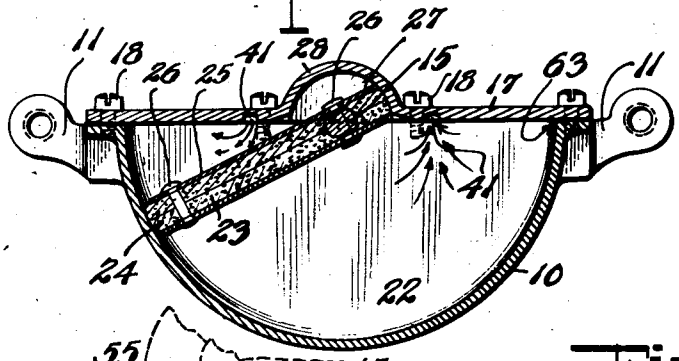


Fig. 3.

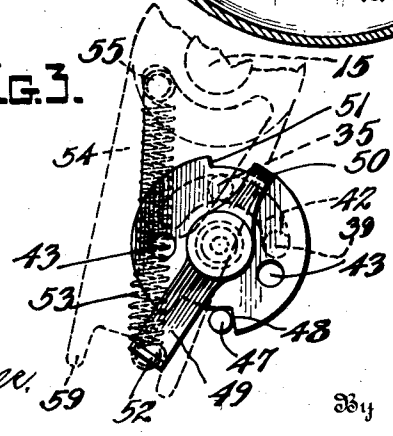
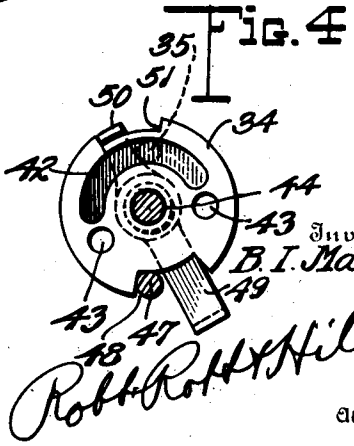


Fig. 4.



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Fig. 5.

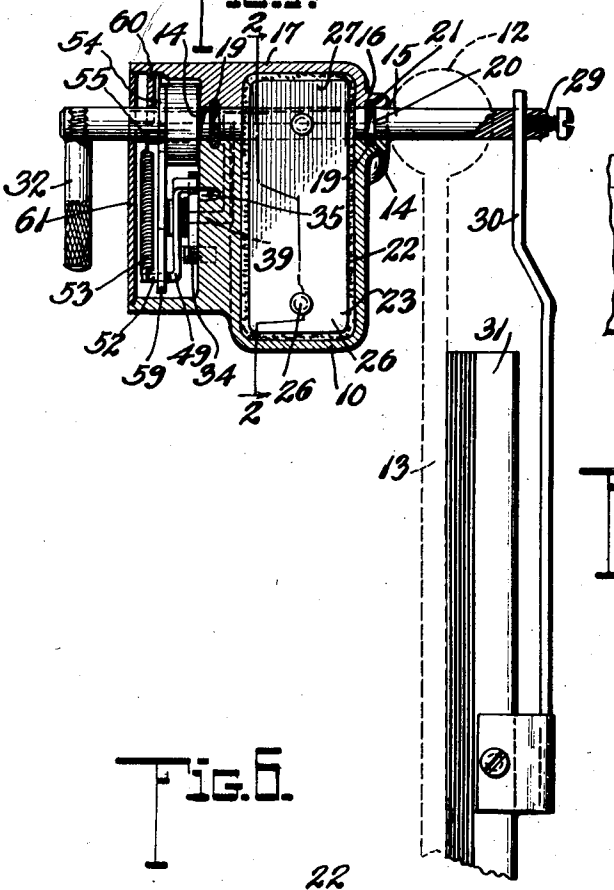


Fig. 7.

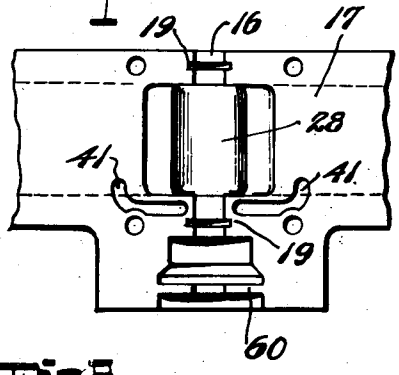


Fig. 8.

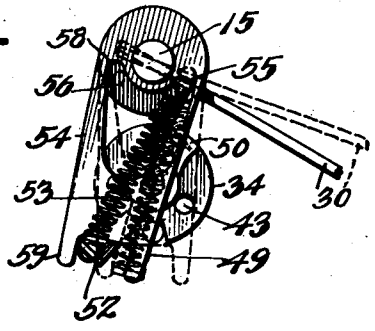


Fig. 6.

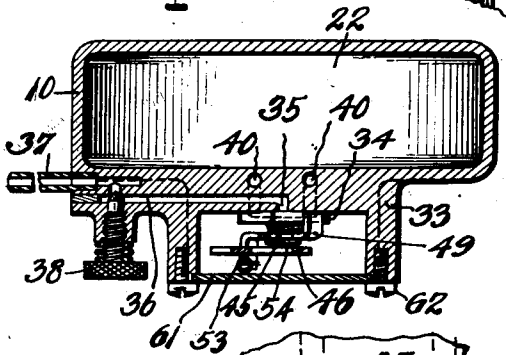


Fig. 9.

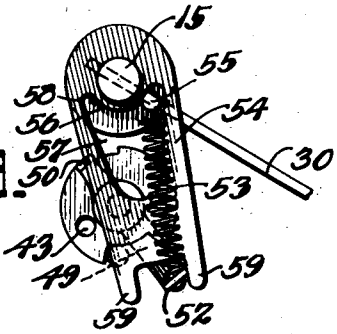
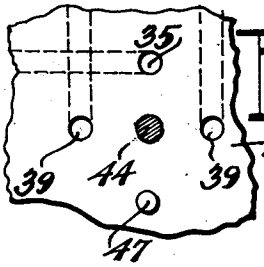


Fig. 10.



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Patented Aug. 16, 1927. 1,639,043

UNITED STATES PATENT OFFICE.

BESHARA I. MALOUF, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO TRICO PRODUCTS CORPORATION, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

AUTOMATIC WINDSHIELD CLEANER.

Application filed April 14, 1924. Serial No. 706,430.

This invention relates to an automatic windshield cleaner, particularly to a construction wherein the wiper arm is given opposite impulses by a vane disposed within an air chamber and adapted to be actuated by fluid tension from a suitable power medium. In devices of this character it is necessary for their practical operation under all conditions that the movable parts be simplified in structure and so arranged as to effect a quick and definite transfer of the power applied to effect the oscillation of the wiper arm in opposite directions. For this purpose the present invention provides an oscillating vane disposed within an air tight chamber and adapted in its movements to control a valve which is automatically shifted to alternately apply the operating power at opposite sides of the vane as it approaches the limits of its travel.

The invention has for its object to provide a novel and improved construction of operating means for a windshield cleaner comprising a casing provided with ports for the application of fluid tension to a vane pivotally mounted intermediate of said ports and provided with means by which the operation of the vane in its opposite directions of travel will control the shifting movement of a valve disposed to govern said ports.

The invention also has for an object to provide an improved windshield cleaner comprising a casing containing a pivoted piston member adapted to be actuated by a fluid medium and controlled by a shifting valve, together with means for positively and quickly shifting said valve as the piston member approaches its opposite limits of travel.

A further object of the invention is to provide an improved structure of casing with an oscillating vane therein, the shaft of which carries during a portion of its travel, a shift lever which engages an arm upon a rotary valve to shift the latter and establish communication successively at the opposite sides of the vane.

Another object of the invention is to provide an improved structure of valve shifting mechanism for the power mechanism of a windshield cleaner which involves a shift lever adapted to be actuated from the shaft of the movable member of the cleaner, an oscillatory valve disposed to control the application of fluid pressure or tension to said member, and a tension device connecting said lever and valve to impart a quick movement of the latter as the vane approaches the limit of its travel.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings:

Figure 1 is an elevation of a cleaner applied with parts broken away;

Figure 2 is a section on the line 2—2 of Figure 5;

Figure 3 is a detail elevation of the outer face of the valve with the shift lever in dotted lines;

Figure 4 is a similar view of the inner valve face;

Figure 5 is a section on the line 5—5 of Figure 1; and

Figure 6 is a section on approximately the plane of the line 6—6 of Figure 1;

Figure 7 is a detail plan of the under face of the cover plate;

Figure 8 is an elevation of the shift lever and valve in its position prior to shifting action;

Figure 9 is a similar view of the position of the parts after such action; and

Figure 10 is a detail elevation of the ported face of the casing with which the valve cooperates.

Like reference numerals indicate corresponding parts throughout the several figures of the drawing.

The numeral 10 designates the casing of the power mechanism for actuating the cleaner which may be of any desired construction or configuration and is herein shown as segmental. This casing may be provided at opposite sides with attaching lugs 11 through which suitable devices are applied for securing the casing to the frame 12 at the upper portion of the windshield 13 as indicated by dotted lines in Figure 1. At opposite sides this casing is provided with bearing portions 14 for the shaft 15 which carries the operative parts of the mechanism. A cooperating bearing 16 is formed in the cover plate 17 which is secured to the horizontal upper face of the casing by any desired means such as fasten-

ing devices 18. Each of the bearings 14 and 16 is provided with grooves 19 which cooperate with peripheral grooves 20 on the shaft to receive a packing ring 21 to insure an air and oil tight connection at each side of the chamber 22 within the casing.

The shaft 15 is provided with a vane or piston 23 adapted to oscillate in opposite directions within the chamber 22. This piston may be of any desired character but a preferred form is herein shown wherein the inner members 24 are formed of leather or other flexible material to effect an air tight joint with the several walls of the chamber and cover and are clamped together by rigid plates 25 secured thereto by attaching devices as at 26. These plates are of less area than the flexible body of the vane which projects beyond the peripheral faces of the plates as shown in Figure 5.

The vane may be attached to the shaft 15 by any desired means such as one of the fastening devices 26 and it projects beyond this shaft at its end 27 which traverses a segmental or dome-shaped portion 28 upon the cover 17. By this construction an air tight joint is effected at both ends of the piston as well as about its side walls which effectually divides the chamber 22 into separate compartments adapted to receive the air tension. This shaft 15 is extended beyond the casing and provided at one end with attaching means 29 to receive the wiper arm 30 which carries the wiper 31 and the latter may be of any desired construction. This mounting permits the adjustment of the wiper to the desired line of vision or height upon the windshield. The opposite end of the shaft is provided with a handle 32 rigidly secured thereto and by means of which the wiper may be moved into a position substantially parallel with the upper frame of the windshield and substantially out of the line of vision when the parts are not in use.

The casing 10 is provided upon one side face with a valve casing 33 and is also formed with a port arrangement for introducing the air tension at opposite sides of the vane, and adapted to be controlled by a valve member 34 within this casing. A desirable arrangement of such parts is herein disclosed and comprises the power port 35 from which a channel 36 extends to a suitable conduit 37 connected with a proper source of air tension such as the intake of an explosive engine, as usual in this art. The flow through the channel 36 is controlled by means of a needle valve 38 by which the speed of operation of the device may be adjusted or the same rendered inoperative. The casing is further provided with the distributing ports 39 and channels or conduits 40 extending to the upper portion of the casing 10 where they communicate with the feed channels 41 formed in the under face of the cover plate 17. These feed channels are disposed to apply the air tension at opposite sides of the axis of the oscillating vane to control its alternate movement in opposite directions.

The valve 34 is formed upon its inner face which abuts the casing with a conducting passage or channel 42 and also with relief ports 43. This valve is mounted upon a bearing or stud 44 from the casing and is held in firm contact therewith by means of a compression spring 45 surrounding the bearing and engaging the head 46 thereof. The oscillating travel of the valve 34 is limited by a stop 47 carried by the casing and traversing a slot way 48 of the valve.

Loosely mounted upon the shaft 44 is a valve arm or lever 49 which is provided with a lateral lug 50 disposed to traverse a recess 51 at the periphery of the valve providing for a lost motion of the shift arm before engaging and moving the valve. The opposite end of the arm 49 is laterally extended at 52 and a tension spring 53 extends therefrom to a pin 55. A lever 54 is loosely mounted upon the shaft 15 and is adapted to be actuated by the pin 55 carried by the shaft or a member thereon such as the disk 56. This pin 55 operates in a cut-away portion 57 of the lever 54 and travels therein without actuating the lever during the main protion of the movement of the vane in one direction and as the latter approaches the limit of such movement the pin engages a socket 58 and carries the lever with the shaft of the vane. The opposite end of the lever is formed with lugs 59 disposed at opposite sides of the extension 52 from the valve arm and adapted to engage such extension. When the movement of the lever begins the valve arm is moved but owing to its lost motion connection with the valve does not impart movement thereto. Such preliminary movement of the arm, however, shifts the lower end of the tension spring 53 laterally and toward the axis of the valve until the parts are upon a dead center and the spring practically inactive. As soon as this center is passed in the continued movement of the lever and arm the spring immediately retracts and throws the valve arm and valve by a quick and definite movement insuring an instantaneous shifting of the parts and a transfer of the fluid pressure to the opposite side of the vane.

The cover plate is provided upon its inner face with a depending partition 60 which partially embraces the shaft 15 and prevents axial movement thereon of the shift lever and other parts connected thereto. The casing 33 for the valve mechanism is also provided with a cover plate 61 situated at the open side thereof and adapted to be retained in position by the heads of the fastening screws 62 entering said casing. In

order to maintain an air tight connection between the casing and cover a suitable gasket 63 may be used at that point.

In the operation of the device when the wiper arm and its actuating piston or vane is at one limit of their travel and about to begin the return stroke, the valve actuating elements are in the position shown in Figures 1 and 3 and a vacuum established in the casing at the right of Figure 1, as the valve ports are disposed to establish an operating tension at one side of the piston and to admit atmospheric pressure at the opposite side thus producing unbalanced pressure in the chamber.

In the movement of the cleaner its shaft travels within the slot of the lever until the parts are substantially in the full line position shown in Figure 8 when a further movement causes the pin carried by the cleaner shaft to engage and move the shifting lever to the dotted line position in that figure. This disposes the spring in alignment with the axis of the valve pivot or upon a dead center relative to the valve motion. The continued movement of the lever carries the spring past this center and its retracting action immediately snaps or throws the valve into an opposite position effecting a quick movement thereof. This is facilitated by the mounting of the arm upon the valve for lost motion as the finger on the lever engages and carries this arm from one extreme to the other permitting the spring to pass the valve center without the resistance of shifting the valve and with the resulting effect that as soon as said center is passed the spring retracts to the opposite position shown in Figure 9 thus reversing the valve.

It will be observed that in the movement of the lever with the valve arm the spring becomes tensioned as it approaches the valve center and its retraction beyond that point provides an independent tensioning means for shifting the valve not necessarily controlled by the full extent of movement of the piston or vane so that when the latter has reached its extreme limit of travel the fluid tension is immediately applied at the opposite sides thereof to effect the reversing movement.

The construction shown provides a very simple type of actuating motor for the cleaner in which the frictional resistance of an intermediate gearing is avoided and the actuating vane directly applied to the shaft of the cleaner which in its opposite directions of travel controls the shift of the fluid pressure valve by which the induced tension from the engine intake is utilized for the operation of the device. The construction by which a quick and instantaneous shifting of the valve is effected is particularly important in a device of this character as it insures a continuous and reliable operation which is frequently defeated when the actuating power is slowly applied and cut off from the opposite sides of the piston, particularly under adverse weather conditions.

The construction of casing and valve therein provides a simple means by which an air tight connection between the operating vane and the enclosing case is secured which effectually prevents leakage and establishes a reliable operation of the parts the speed of which may be controlled through the needle valve determining the amount of pressure applied.

While the specific construction of the actuating means for the windshield cleaner has been shown and described, changes and alterations may be made therein without departing from the spirit of the invention as defined by the following claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a motor, a casing, an oscillating vane having a shaft mounted therein, a valve shifting arm mounted upon said shaft, a movable valve for controlling the application of fluid pressure to the opposite sides of said vane, a tension device connecting the valve and shaft for quickly shifting said valve, and means upon the shaft temporarily engaging said arm for tensioning and actuating one end of said device.

2. A motor for windshield cleaners comprising a casing having a valve seat, a piston in the casing, fluid conduits leading from the valve seat to the interior of the casing on opposite sides of said piston, a valve disk in contact with said seat, a pivot post on said casing pivotally mounting the disk for oscillatory movement to alternately connect the conduits with a source of operating pressure, a stop post mounted on the casing and coacting with the disk for limiting its oscillatory movement, a lever pivoted on one of said posts and having an end engaging a portion of said disk at one side of the pivot thereof, and having another end extending to the opposite side of said pivot, a rock shaft to which the piston is directly connected, said shaft having a part extending therefrom for swinging from one side of the pivot of said disk to the other side of said pivot, a spring connecting said shaft part to the extending end of said lever, said shaft-connected end of said spring being moved thereby from one side of the pivot of the disk to the other side of said pivot, and means operable by and during a movement of the piston for swinging said extending end of the lever after shaft extended end of said spring has been moved to the opposite side of the pivot of said disk.

3. A motor for windshield cleaners comprising a casing having a valve seat, a piston

in the casing, fluid conduits leading from the valve seat to the interior of the casing on opposite sides of said piston, a valve disk in contact with said seat, a pivot post on said casing pivotally mounting the disk for oscillatory movement to alternately connect the conduits with a source of operating pressure, a stop post mounted on the casing and coacting with the disk for limiting its oscillatory movement, a lever pivoted on one of said posts and having an end engaging a portion of said disk at one side of the pivot thereof, and having another end extending to the opposite side of said pivot, a rock shaft to which the piston is directly connected, said shaft having a part extending therefrom for swinging from one side of the pivot of said disk to the other side of said pivot, a spring connecting said shaft part to the extending end of said lever, said shaft connected end of said spring being moved thereby from one side of the pivot of the disk to the other side of said pivot, and means for swinging the lever during a portion of the movement of said shaft part, to shift its end of the spring, for shifting the spring from one side of the pivot of the disk to the other side thereof, whereby the disk is snapped to another position.

4. In a motor, a casing, a piston vane having its shaft mounted therein, a lever loosely mounted upon said shaft to permit independent movement thereof for a portion of its travel, means carried by said shaft to engage and shift said lever therewith in its continued travel in one direction, a pivoted valve, an arm therefor disposed to be actuated by said lever, and a tension spring extending from said arm to the means upon said shaft.

5. In a motor, a casing, a piston vane having its shaft mounted therein, a lever loosely mounted upon said shaft to permit independent movement thereof for a portion of its travel, means carried by said shaft to engage and shift said lever therewith in its continued travel in one direction, a pivoted valve, an arm therefor disposed to be actuated by said lever and having a lost motion connection with said valve, and a tension device extending from said arm to said means upon the shaft to effect simultaneous movement at its opposite ends.

6. A fluid pressure motor for windshield cleaners comprising a casing having a valve seat, a piston in the casing, said valve seat having spaced fluid ports communicating with the interior of the casing at opposite sides of the piston, a valve disk in contact with said seat and having spaced parts, a pair of posts on the casing, one post being positioned to contact alternately with said spaced parts of said disk as the disk is moved to determine two operative positions of said disk, the other of said posts pivotally mounting the disk to oscillate to and from the two operative positions on said seat for connecting the ports alternately with a source of operating pressure, a lever pivoted on one of said posts, said disk having other spaced parts and said lever having a part adapted to engage said other disk parts at one side of the pivot of said disks, said lever having an end extending to the opposite side of said pivot, a rock shaft journalled in the casing and having the piston fixed thereto, said shaft having an element carried thereby for swinging from one side of the pivot of the disk to the opposite side thereof, a spring connected at one end to the extending end of the lever and at the opposite end to said shaft element, the latter end of the spring being moved by said element from one side of the axis of said shaft to the opposite side thereof, and means operable by and during movement of the piston for engaging and moving the lever during a portion of the movement of said shaft element for cooperating therewith in shifting the spring from one side to the other side of the pivot of said disk.

7. In a motor, a casing provided with power and distributing ports, a piston vane having its shaft mounted in said casing, a shifting valve for controlling said ports, a shift lever loosely mounted upon the shaft, a projection from said shaft adapted during a portion of its travel to engage and move said lever, an actuating arm connected to said valve for a limited free movement, means upon said lever to engage and shift said arm in its movement, and a tension spring extending from said arm to said projection movable with the shaft of the vane.

8. In a motor, a casing provided with power and distributing ports, a piston vane having its shaft mounted in said casing, a rotary valve for controlling said ports, a shift lever loosely mounted upon the shaft having an open upper portion and a bifurcated free end, a projection from said shaft adapted during a portion of its travel to engage the walls of the open portion and move said lever, an actuating arm carried by said valve with a part within the bifurcated end of said lever to engage and shift said arm in its movement, and a spring extending from said arm to said shaft projection whereby the connected end of said spring is moved over the axial center of the valve to effect a quick shifting movement of the valve actuating arm.

9. In a fluid pressure motor for windshield cleaners, a casing having a valve seat, a piston in the casing, said valve seat having ports opening into the casing on opposite sides of the piston, a valve disk pivoted on said casing, a lever pivoted on the casing and having an end engaging a portion of said disk to move it, a shaft journalled

in the casing and having the piston fixed thereto, a member mounted on the shaft and movable first to one and then to the other side of the pivot point of said valve disk, a spring connected to a part of said lever and to said member, and a piston operated member having spaced parts for engaging and moving the lever in opposite directions, said spaced parts functioning as the piston approaches its respective limits of movement and after said first member has moved its end of the spring to the opposite side of the pivot point of said valve disk.

10. In a motor, a casing provided with bearings, a piston vane having its shaft mounted in said bearings, a cover plate provided with cooperating bearings, a valve actuating lever loosely mounted upon said shaft, and a depending wall from said cover constituting an added bearing for said shaft and disposed to retain said lever against axial displacement.

11. A motor for windshield cleaners, comprising a casing, a piston therein, a rock shaft journalled in the casing and operable by the piston, said casing having fluid conduits communicating with the interior of the casing at opposite sides of the piston, a valve for bringing a source of operating pressure alternately into communication with said fluid conduits, a lever for actuating said valve, having a play connection with the latter, a part on the shaft rockable back and forth by the piston to opposite sides of the mounting of said lever, resilient means connected at its opposite ends to the lever and shaft part, and having its ends movable to opposite sides of the mounting of said lever, that end of said resilient means which is connected to the shaft part being moved back and forth to opposite sides of the lever mounting by and during movement of said piston, and means operable from the piston to initiate an oscillatory movement of the lever subsequent to the movement of said part-attached end of said resilient means from one side to the opposite side of the lever mounting, for moving the lever-attached end of the resilient means to a position from which said resilient means will continue said oscillatory movement of the lever to effect actuation of said valve.

12. A motor for windshield cleaners, comprising a casing, a piston therein, a rock shaft journalled in the casing and operable by the piston, said casing having fluid conduits communicating with the interior of the casing at opposite sides of the piston, means for alternately applying suction to said conduits including a main suction line, a valve for bringing said suction line alternately into communication with said fluid conduits, a lever having a play connection with the valve for actuating the valve subsequent to a predetermined idle movement of the lever, a piston operated member having spaced parts adapted to alternately engage said lever as the piston approaches its opposite limits of travel for moving the adjacent end of said lever therewith, said rock shaft having a part swingable from one side to the opposite side of the lever mounting by and during movement of said piston, a spring having its ends connected to the lever and to said shaft part at points spaced from their mountings whereby the ends of the spring will be moved to opposite sides of the lever mounting, said shaft part moving its end of the spring first and thereby tensioning said spring whereby the same will act to complete the oscillatory movement of the lever after the lever movement has been initiated by said piston operated member.

13. A motor for windshield cleaners, comprising a casing, a piston therein, a rock shaft journalled in the casing and operable by the piston, said casing having fluid conduits communicating with the interior of the casing at opposite sides of the piston, means for alternately applying suction to said conduits including a main suction line, a valve for bringing said suction line alternately into communication with said fluid conduits, a lever having a play connection at one end with the valve for actuating the valve subsequent to a predetermined idle movement of the lever, a piston operated member having spaced parts adapted alternately to engage the opposite end of said lever as the piston approaches its opposite limits of travel for respectively initiating an oscillatory movement of said lever, said spaced parts acting upon said lever during its idle movement, a spring connecting said opposite end of the lever to a part on said shaft, and means operable by and during movement of said piston for engaging and moving said opposite end of the lever.

14. A motor for windshield cleaners, comprising a casing, a piston therein, a rock shaft journalled in the casing and operable by the piston, said casing having fluid conduits communicating with the interior of the casing at opposite sides of the piston, means for alternately applying suction to said conduits including a main suction line, a valve for bringing said suction line alternately into communication with said fluid conduits, a lever having a play connection at one end with the valve for actuating the valve subsequent to a predetermined idle movement of the lever, a piston actuated member having spaced parts adapted alternately to engage the opposite end of said lever as the piston approaches its opposite limits of travel for respectively rocking the lever in opposite directions, said spaced parts acting upon said lever during its idle movement, an element fixed on the rock shaft and rockable therewith by and during movement of said

piston, and a spring connecting said element to said opposite end of the lever and movable to opposite sides of the lever mounting by the combined action of said lever and arm.

15. A motor for windshield cleaners, comprising a casing, a piston therein, a rock shaft, journaled in the casing and operable by the piston, said casing having fluid conduits communicating with the interior of the casing at opposite sides of the piston, a valve movable for connecting the conduits alternately to a source of operating pressure, pivoted lever having one end engaged with said valve, a spring connecting the opposite end of said lever to a part on said rock shaft whereby said shaft-connected end of the spring will be moved back and forth with the shaft by and during movement of the piston, and means also operable by and during movement of said piston and subsequent to the initiation of the movement of the shaft-connected end of said spring by said shaft for positively moving the lever connected end of said spring to bring the axis of the spring across the pivot of the lever whereby the spring will continue, in acceleration, the movement of the lever to effect actuation of said valve.

In testimony whereof I affix my signature.

BESHARA I. MALOUF.