Sept. 18, 1928. 1,684,850

S. G. SKINNER

WINDSHIELD CLEANER

Filed July 2, 1924

Fig. 1

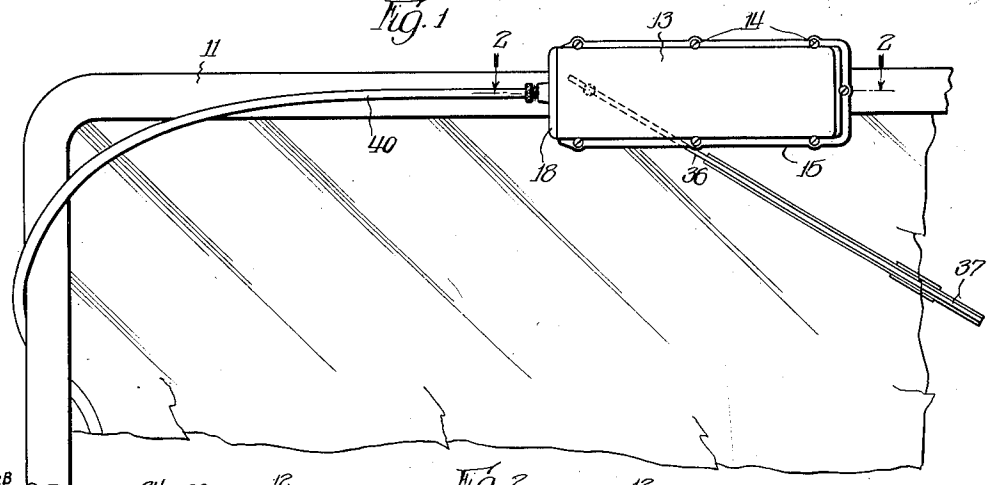


Fig. 2.

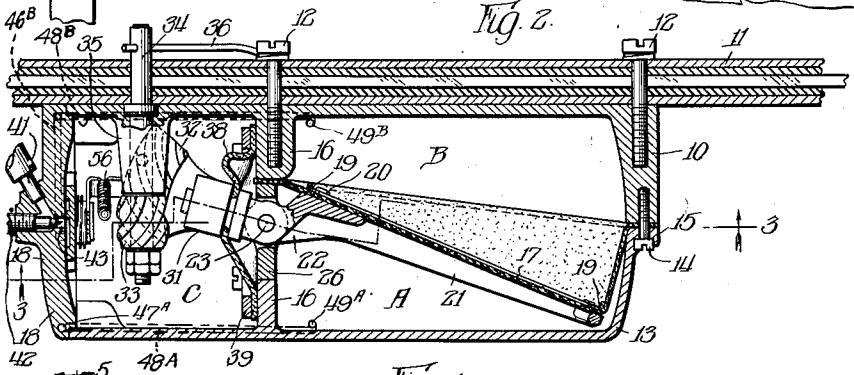


Fig. 3.

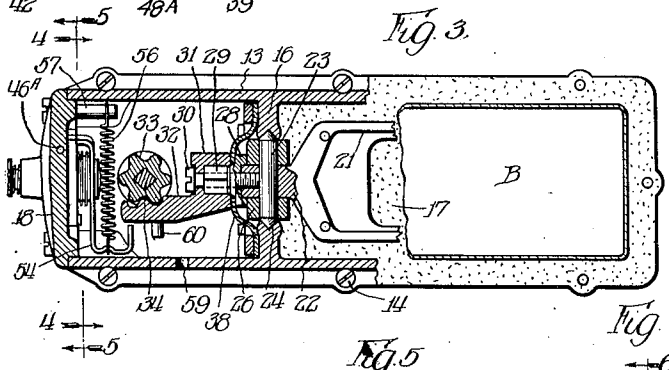


Fig. 7

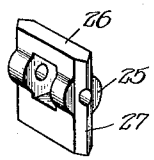


Fig. 4

Fig. 5

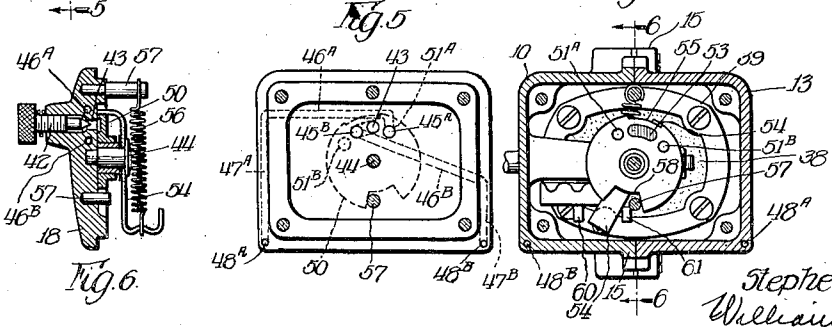


Fig. 6.

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UNITED STATES PATENT OFFICE.

STEPHEN G. SKINNER, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO TRICO PRODUCTS CORPORATION, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

WINDSHIELD CLEANER.

Application filed July 2, 1924. Serial No. 723,614.

My invention relates to windshield cleaners and is particularly concerned with the provision of a windshield cleaner comprising a novel and improved form of fluid pressure motor, which is preferably a suction motor operated by the intake manifold suction of the engine of an automotive vehicle with which the cleaner is associated.

In the accompanying drawings illustrating my invention:

Figure 1 is an elevation of the rear side of an automobile windshield showing the cleaner of my invention attached thereto;

Figure 2 is a horizontal section of the cleaner device taken on the line 2—2 of Figure 1;

Figure 3 is a vertical section taken on the line 3—3 of Figure 2;

Figures 4 and 5 are transverse vertical sections through one end of the device as indicated by the lines 4—4 and 5—5 of Figure 3;

Figure 6 is a vertical detail section of the end plate and the snap-over valve mechanism mounted thereon; and

Figure 7 is a perspective view of the bearing member which journals the vane lever.

The actuating mechanism of my device is housed within a shell or body divided along a vertical line into two halves. One half, termed the inner portion 10, is secured at the back side of the upper rail 11 of the windshield frame by means of a pair of cap screws 12 which extend through the rail 11 and are threaded into the body portion 10. The other half, termed the outer portion 13, is secured to the inner body portion 10 by a plurality of cap screws 14 disposed about mating flanges 15 which extend along two sides and one end of the body portions. As shown in Figure 2, each body portion carries an inner partition 16 intermediate its ends, the two partitions meeting to form the ends of a pair of suction chambers A and B which are divided vertically by a bellows-like leather diaphragm 17 clamped between the mating flanges 15 on three sides, and between the juxtaposed edges of the partitions 16 on the fourth side. To the left of the partitions 16 (Fig. 2) is left an atmospheric chamber C, the open end of which is closed by an end plate 18 upon which is carried the snap-over valve.

The leather diaphragm 17 is secured by a rectangular strip 19 and rivets 20 to the rectangular frame 21 which forms one end of an actuating lever 22. The leather 17, together with the frame 21, forms a vane dividing the suction chambers A and B and movable about the pivotal connection of the lever 22 upon a partition 16. To provide this pivotal connection, the lever 22 carries a pivot pin 23 passing transversely through a reduced neck portion. The partition 16 of the outer body portion 13 is provided with a cut away portion or slot 24, the horizontal edges of which are provided with V-shaped grooves. The protruding ends of the pivot pin 23 are journalled in the bearing portions or hubs 25 of a bearing member 26 which is in the form of a plate having a central aperture through which the neck of the lever 22 extends. The horizontal edges of the bearing member 25 are bevelled as indicated at 27, and mate the grooved edges of the slot 24. The bearing member 26, together with the lever 22 which has previously been assembled therein and locked by the pivot pin 23, is inserted in the cut away portion of the partition and held tightly therein by the juxtaposed partition 16 of the inner body portion 10. It will thus be seen that the vane formed by the leather 17 and the lever 22 is pivoted to swing about a vertical axis and between the suction chambers A and B.

The opposite end of the lever 22, that is, the left end (Fig. 3), carries a collar 28 having a squared shank 29. Upon the squared shank 29 is secured, by a cap screw 30, the hub portion 31 of a gear sector 32. The squared shank 29 and the squared bore of the hub portion 31, it will be understood, co-operate to prevent the rotation of the gear sector about the axis of the shank and hence to hold the gear sector in a horizontal plane.

The spiral teeth of the sector 32 are adapted to intermesh with the spiral teeth of a pinion 33 having a generous lead, to rotate the shaft 34 to which the pinion 33 is secured. The shaft 34 is journalled in a hub 35 extending inwardly from the back wall of the body portion 10, and extends through a suitable hole in the upper rail 11 of the windshield. A squeegee rod 36 is secured in a cross bore at the outer end of the shaft 34 and extends downwardly across the front side of the windshield where it is secured to the usual squeegee 37. It will be seen that as the vane moves back and forth between the suction chambers A and B in oscillating, motion will be imparted to the shaft 34, and hence the squeegee

37 will wipe a truncated sector shaped area on the forward side of the windshield.

The suction chamber A is sealed against the atmospheric pressure in the chamber C by means of a second diaphragm or sheet of leather 38 secured at its outer edges to the partitions 16 by a frame 39 and provided with a central perforation through which extends the squared shank 29, the inner margins of the leather being clamped between the collar 28 and the hub portion 31 of the gear sector. The space between the leather 38 and the partition 16 thus becomes virtually a part of the suction chamber A, since the lever fits loosely enough within the bearing member 26 to permit the passage of air.

For controlling the alternate admission of suction to the chambers A and B to oscillate the vane, I provide the previously mentioned snap-over valve mechanism which is carried upon the end plate 18. Suction is applied by suitable tubing 40 which leads from the intake manifold of the internal combustion engine of the automobile (or from another suitable source of suction) to an inlet stem 41, and past a manually adjustable needle valve 42 to a suction port 43 on the interior face of the plate 18. At either side of the suction port 43, and arranged arcuately therewith about a pivot pin 44, are lead ports 45^A and 45^B. The port 45^A communicates with a horizontal cross bore 46^A to the forward edge of the plate 18, thence downwardly along a vertical bore 47^A, and along a horizontal bore 48^A at the lower forward edge of the outer body portion 13, and past the partition 16 to a cross bore 49^A which terminates in the suction chamber A. Similarly, the suction port 45^B leads through the passages 46^B, 47^B, 48^B and 49^B into the suction chamber B.

A valve disc 50 is rotatably mounted on the pivot pin 44 and has a pair of spaced air inlet ports 51^A and 51^B extending through the disc, and between these ports a slotted depression 53, the ports 51^A and 51^B and the slot 53 all being arcuately arranged about the pin 44 at the same radius as the ports 43, 45^A and 45^B. A crank lever 54 is also pivoted on the pin 44, the upper end being extended inwardly to ride in a peripheral notch 55 in the disc 50, thus affording a lost motion connection with the disc. The lower end of the crank carries a small tension spring 56 which is secured to a post 57 on the plate 18. The lower end of the crank, it will be seen, is adapted to pass over a dead center relation with the pin 44 and the post 57. Oscillation of the valve disc 50 by the snap-over spring 56 is limited by a stop pin 57′ which is adapted to engage the ends of another peripheral slot 58 at the lower side of the disc. When the valve is in the position shown in the drawings, the slotted depression 53 overlies the suction port 43 and the lead port 45^B while the air inlet port 51^A registers with the lead port 45^A, thus admitting suction to the chamber B while connecting the chamber A to the atmosphere of the chamber C. Suction admitted to the chamber B will pull the diaphragm or vane out of the body portion 13 and into the body portion 10. The chamber C, it will be understood, is vented to atmosphere as by the hole 59 in the bottom wall of the body portion 13. When the valve disc is snapped to its alternate position, the slotted depression 53 will embrace the suction port 43 and the lead port 45^A, while the air inlet port 51^B will register with the lead 45^B. At such time the suction chamber B will be relieved to atmosphere and suction admitted to the chamber A to pull the vane back to the position of Figure 2. For tripping the snap-over mechanism, I provide a pair of spaced pins 60 and 61 extending downwardly from the gear sector 32 and adapted to engage the upwardly rebent portion of the lower end of the crank 54.

The operation of the device is as follows:

Assuming the cleaner to be in the position shown in the drawings with the needle valve 42 open, suction will be admitted through the suction port 43, the slotted depression 53 of the valve disc, and the several passages 45^B, 46^B, 47^B, 48^B and 49^B, to the suction chamber B, while the exhaust port 51^A will register with the lead port 45^A and hence relieve the chamber A to atmosphere. The leather diaphragm 17 and the lever 22 will then be pulled forwardly—counterclockwise (Fig. 2)—, swinging the gear sector counterclockwise to rotate the shaft 34 and swing the squeegee 37 in a clockwise direction (Fig. 1) to its alternate position. As the sector 32 is swung rearwardly—that is, away from the windshield—the pin 60 will contact the crank 54 and carry it past its dead center relation, whereupon the spring 56 will snap the valve disc to its alternate position. The suction and exhaust connections with the suction chambers thus being reversed by the valve disc, suction will be admitted to the chamber A while the chamber B is relieved to atmosphere, and the diaphragm 17 and lever 22 will be swung rearwardly and the sector 32 forwardly to swing the squeegee 37 counterclockwise. At the end of this movement, the pin 61 will contact the crank 54 and cause the spring 56 to snap the valve disc to the position shown. The starting and stopping of the device, it will be understood, is controlled by the needle valve 42 which may also be adjusted to regulated the speed of operation.

While I have described but this particular embodiment of my invention, it is to be understood that many changes may be made therein without departing from the scope or spirit of my invention.

What I claim is:—

1. In a windshield cleaner motor, a casing comprising two complemental sections, one of which has an opening in its wall abutted

by the companion section, a bearing plate arranged in the wall opening and held therein against displacement by the abutting companion section, a diaphragm clamped between the two sections and dividing the casing into two chambers, a lever pivoted in the bearing plate and extending through said opening for being attached to the aforesaid diaphragm, means for varying the fluid pressures existing in said chambers, and a second diaphragm attached to said lever and sealing said opening.

2. In a windshield cleaner motor, a casing, a lever extending through a wall of said casing and pivotally mounted on said wall, a diaphragm dividing the casing into two chambers, means for varying the fluid pressures existing in said chambers, said diaphragm being attached to said lever to operate the latter, a rock shaft, a gear on the latter, a rack on the lever meshing with the gear, and trip means on the rack for engaging said first means to operate the same.

3. A fluid pressure motor for windshield cleaners, comprising a housing divided by a transverse wall into two compartments, a diaphragm dividing one compartment into two chambers, a lever pivoted in the wall and rockable by the diaphragm, a segmental rack carried by the lever within the other compartment and having spaced pins, a shaft geared to the rack to be operated thereby, fluid passages connected to the two chambers, and valve mechanism arranged in the rack compartment for alternately connecting the fluid passages to a source of operating pressure, said valve mechanism including an actuating lever extending between and in the path of said pins to be alternately engaged thereby as the rack is rocked by its lever.

4. A fluid pressure motor for windshield cleaners, comprising a sectional housing, one section of which is provided with a transverse wall for dividing the same into two compartments, said wall having a slot opening through one edge and closed by the companion section, a bearing member disposed in the slot and held against displacement therefrom by said companion section, a lever pivoted in the bearing member and extending to opposite sides thereof into said compartments, a wiper operating member operable by one end of the lever, and a diaphragm dividing the compartment into which the opposite end of the lever extends, said diaphragm being connected to said opposite end of the lever, and said diaphragm having its marginal portions clamped between the sections of the casing and between said bearing member and said companion section.

In witness whereof, I hereunto subscribe my name this 26 day of June, 1924.

STEPHEN G. SKINNER.