

Sept. 30, 1930.

H. HUEBER

1,777,142

AUTOMATIC WINDSHIELD CLEANER

Filed June 15, 1926

Fig. 5.

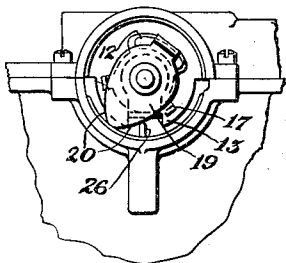


Fig. 3.

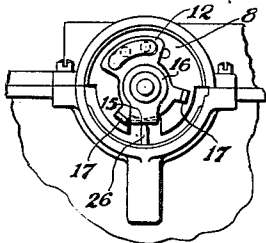


Fig. 1.

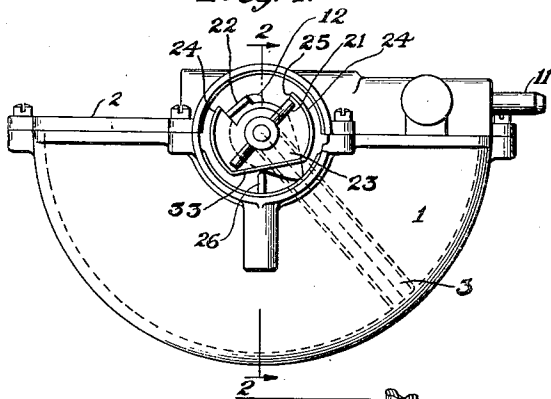


Fig. 6.

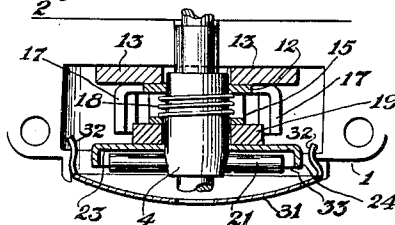


Fig. 2.

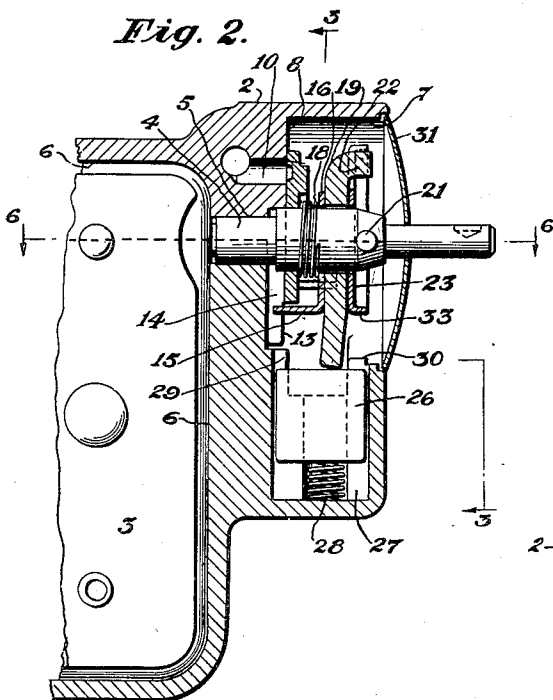


Fig. 7.

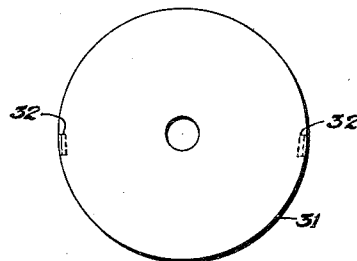
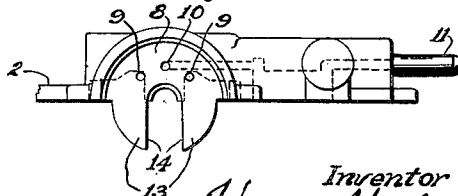


Fig. 4.



Inventor
Henry Hueber
by Barton A. Bean
Atty.

UNITED STATES PATENT OFFICE

HENRY HUEBER, OF BUFFALO, NEW YORK, ASSIGNOR TO TRICO PRODUCTS CORPORATION, OF BUFFALO, NEW YORK

AUTOMATIC WINDSHIELD CLEANER

Application filed June 15, 1926. Serial No. 116,146.

This invention relates primarily to the valve actuating mechanism of fluid pressure operated automatic windshield cleaners, although equally adaptable to the switch actuating mechanism of electrically operated windshield cleaners, and it has for its primary object to simplify the actuating mechanism.

Heretofore, the valve actuating mechanisms employed in this type of motor have required considerable space for housing the valve mechanism, by reason of the fact that the valve or valves are usually at some distance from the piston operated shaft. The present invention aims to provide a compact valve mechanism in which the major portion thereof is arranged directly on the piston operated shaft.

The invention also resides in the disposition of the valve seat on the cover plate of the motor casing and the modification of the cover plate in such a manner as to provide an uninterrupted surface for the valve to move over; in an improved stop member and its arrangement relative to the related valve mechanism, for limiting the movement of the valve; in a novel kicker construction and its association with an accelerator for boosting the valve operating movement of the kicker; in the mounting of a kicker actuator by which the general assembly is retained in position on the shaft; and in a novel form of closure for the valve chamber.

In the drawings:

Fig. 1 is a side elevation of a vane type of fluid pressure operated motor, showing the valve mechanism with the closure plate removed;

Fig. 2 is a fragmentary vertical section therethrough on line 2—2;

Fig. 3 is a detailed sectional view about on line 3—3 of Fig. 2 showing more clearly the valve and its stop member;

Fig. 4 is a detailed side elevation of the cover plate for the motor housing;

Fig. 5 is a view similar to Fig. 3 but showing the valve kicker member disposed upon the valve and its stop member;

Fig. 6 is a horizontal sectional view about on line 6—6 of Fig. 2, further showing the

arrangement of the valve mechanism parts;

Fig. 7 is an inside elevational view of the dust cap or closure for the valve chamber.

Referring more in detail to the accompanying drawings, the fluid pressure motor herein depicted is generally of a well known construction, the same comprising a casing, consisting of a substantially semi-circular body portion 1 and a cover plate 2, a vane or piston 3 operable within the casing and a piston-carrying and wiper operating rock shaft 4 which is journaled in complemental bearings 5 formed in the body portion 1 and the cover plate 2. Said body portion and cover plate are also provided with complemental piston recesses 6 and outwardly opening recesses 7, the latter combining to form a valve chamber for housing the improved mechanism.

The cover plate 2 is provided with a valve seat 8 which has spaced cylinder ports 9, Fig. 4 communicating with the piston chamber on opposite sides of the piston, and an interposed suction port 10 leading to a nipple 11 for ready connection to the source of suction, such as the intake manifold of an internal combustion engine. A disc-like valve 12 is mounted on the shaft 4, where it projects into the valve chamber, for oscillatory movement on the valve seat 8 to connect the suction port 10 alternately with each cylinder port 9. The valve seat is continued downwardly on opposite sides of the shaft 4 to provide a continuous and uninterrupted supporting surface for the valve. This construction provides a pair of spaced shoulders 14 beneath the shaft with which the horizontal stop portion 15 of a stop member 16 interlockably engages. This stop member has an opening whereby it may be passed over the projecting shaft 4 for being hung thereon, and the valve is provided with spaced outstanding shoulders or fingers 17 which straddle the stop portion 15 and are adapted to engage the same for being limited in their movement about the shaft. A coil spring 18 is interposed on the shaft 4 between the valve and the stop member for resiliently urging the valve to its seat.

The valve kicker 19 is pivotally supported on the shaft adjacent stop member 16 and is

adapted to engage the outstanding shoulders 17 for imparting an oscillatory movement to the valve. That portion of the kicker which is disposed between shoulders 17 is extended outwardly to provide a cam part having outwardly converging surfaces or edges 20, Fig. 5 each cam surface functioning as a rise or fall portion of the cam, depending upon the direction of movement of the kicker. Beyond the kicker, the shaft is provided with a transverse hole in which is disposed a pin 21 that functions as an actuator for the kicker, the latter being provided with a lug 22 outturned into the path of the pin for being engaged thereby. The action of the pin is such that one of its projecting ends will engage the lug 22 as the shaft is rocked in one direction and the opposite projecting end will engage the lug when the shaft is rocked in the reverse direction. A pin retainer, in the form of a disc 23, is interposed between the kicker and the actuator pin, and has arcuate peripheral flanges 24 disposed across the ends of the pin for preventing displacement of said pin. The disc is provided with a segmental opening 25, through which the lug 22 projects and in which it has limited free movement.

As the shaft is rocked back and forth by the operative application of operating pressure to the opposite sides of the piston, the actuator pin 21 will also be rocked to alternately engage the opposite sides or shoulders of the lug 22. The initial movement of the actuator is free or idle, and it is only as the piston approaches its limit of movement that said actuator is brought into engagement with lug 22 to carry the kicker along with it. By reason of the spacing of the valve shoulders 17, the kicker also has a limited play or idle movement before it acts upon the valve. Consequently, the valve is not moved until the kicker has begun its movement.

To obtain a quick or snap action of the valve, means are provided for accelerating the valve shifting movement of the kicker. This accelerating means comprises a dog 26 Figs. 1 and 2 which is slidably mounted in a pocket 27 provided in the surrounding wall of the valve chamber beyond the cam surfaces 20 of the kicker. This dog is backed by a coil spring 28 arranged in the bottom of the pocket 27, so that the dog is yieldably projected from said pocket into the valve chamber, and is given lateral support therein by suitable lugs or shoulders 29 and 30. The lugs 30 are extended around the chamber wall for a distance to provide an overhanging edge or flange which not only overhangs and guides the cam part of the kicker but also is utilized in the attachment of the closure or dust cap 31, the latter being provided with inwardly extending spring fingers 32 which are adapted to be sprung or snapped past the overhanging edge or flange, as is shown more

clearly in Fig. 6. In its normal position the dog 26 rests against the stop part 15 of the stop member, the lower side of the pin retainer disc 23 being cut off so as to unobstruct the full or complete projection of the dog. This is shown distinctly in Figs. 1 and 2, wherein the lower portion of the disc is provided with a straight or chord-like flange 33 connecting the arcuate flanges 24.

In the operation of the valve mechanism, as the piston approaches the end of its stroke the rock shaft 4 brings the actuator pin into engagement with the lug 22 of the kicker and carries the latter along with it. Since the dog or accelerator is in the path of the cam part of the kicker the advancing one of the cam surfaces 20 will act to depress the accelerator into its pocket and immediately after the apex of the cam part passes over the dog, the latter will begin its ascendancy, as permitted by the trailing one of the cam surfaces 20. Since the kicker may move forwardly away from the actuator without being retarded by the latter, the ascending action of the dog on the trailing cam surface 20 will be to boost or accelerate the movement of the kicker independently of the actuator. This impetus renders the final movement of the kicker faster than the initial movement, and during its acceleration the kicker engages with the obstructing one of the shoulders 17 and quickly swings the valve to connect the uncovered port 9 to the suction port 10 and to uncover the formerly covered port 9, whereby atmospheric pressure will be applied to the opposite side of the piston. Upon the reverse movement of the actuator, the formerly trailing cam surface 20 will act to depress the accelerator 26, and as the kicker passes over the accelerator the latter will then act upon the formerly advancing but now trailing cam surface 20. Thus the valve will be alternately snapped from one position to the other as the piston approaches the opposite limits of its travel.

The valve actuating mechanism parts are readily and easily assembled without the use of tools by initially disposing the accelerator in its pocket, then slipping the valve over the pivoting shaft 4 and following this with the spring and the stop member, the latter being in such a position that the stop part 15 will extend between the two shoulders 17 and also between the shoulders 14 to interlock with the latter against movement with the shaft. The kicker is next applied, followed by the mounting of the retainer disc and, finally, the actuator pin 21, the retainer disc with the parts behind it being pressed backwardly against the tension spring 18 to facilitate the insertion of the pin. After the pin is in position, pressure on the disc is relieved so that the disc will move outwardly about the pin to lock it in place. Thus, the entire assembly is secured against displacement.

The assembly of the valve mechanism being now completed, the valve chamber closure 31 is now applied to completely enclose the valve mechanism.

5 The valve element 12 constitutes a power switching or power-reversing member by which the motor operating power is switched from one side of the motor to the opposite side. For ease in description the term
10 "valve" has been used, which term is intended to include an electric switch, for while the actuating mechanism has been shown embodied in a fluid pressure or suction operated cleaner its application to the electric windshield cleaner art will be at once obvious
15 when it is considered that the ports 9 and 10 may be replaced by three contacts connected to an electric motor (not shown), whereby when one contact 9 is connected to contact 10
20 by the power switching or reversing member 12, which will be a switch element, the electric current will flow through the motor to drive it in one direction, and when the power switching member 12 is oscillated to connect
25 the other contact 9 to said contact 10 the flow of the current will be reversed to drive the motor in the opposite direction. The wiper shaft 4 may be connected to the motor through a speed reducing transmission (not
30 shown).

What is claimed as new is:

1. An automatic windshield cleaner motor comprising a casing having a removable cover plate and forming therewith a piston chamber
35 and a valve chamber, a wiper operating shaft journaled in the casing and extending into each chamber, a piston within the piston chamber connected to the shaft, the wall of said cover plate within the valve chamber
40 being provided with a valve seat having spaced cylinder ports and an interposed suction port, shaft straddling parts carried by said cover plate, a valve pivoted on the shaft and movable on the seat, a stop member hung
45 on the shaft and engaging between said straddling parts to prevent rotation of said stop member, and means for operating the valve by and during movement of said shaft.

2. An automatic valve mechanism for windshield cleaner motors, comprising a
50 valve chamber having a valve seat provided with a recessed portion, a shaft in the chamber, a valve pivoted on the shaft and movable over the seat, said valve having
55 spaced shoulders, a stop member removably engaged with said shaft and with said recessed portion of the valve seat extending between said shoulders for engagement thereby, a kicker movable by the shaft and having
60 a play connection with said valve for shifting the same, and resilient means for accelerating the valve shifting movement of said kicker.

3. An automatic valve mechanism for
65 fluid motors, comprising a valve chamber

having a valve seat, a shaft journaled in the chamber, a valve pivoted on the shaft for movement on the valve seat, a spring surrounding the shaft for urging the valve to its seat, a stop member carried by the shaft
70 for defining the extent of valve movement on its seat, a kicker pivoted on the shaft and having a play connection with the valve for shifting the latter, means operable by the shaft for rocking the kicker, and a dog resiliently mounted in the chamber and normally
75 held against displacement by said stop member, said kicker having a cam surface engageable with said dog for initially depressing the same whereby when the cam surface rides past the dog the latter will rise
80 and act upon the same to accelerate the movement of the kicker.

4. An automatic valve mechanism comprising a valve chamber having a valve seat,
85 a shaft journaled in the chamber, a valve pivoted on the shaft for movement on the valve seat and having outstanding spaced shoulders, a kicker pivoted on the shaft and having a part movable between and adapted
90 to engage the shoulders for shifting the valve, a play connection between the shaft and the kicker for rocking the kicker by and during oscillation of said shaft, and means for accelerating the movement of the kicker
95 by camming against said part of the kicker after the movement of the kicker has been initiated by said play connection.

5. An automatic valve mechanism comprising a valve chamber having a valve seat,
100 a shaft journaled in the chamber, a valve pivoted on the shaft for movement on the valve seat, a kicker pivoted on the shaft and movable for shifting the valve, said shaft having a transverse hole therethrough beyond the kicker, a pin disposed in said hole
105 and adapted to rock the kicker by and during movement of the shaft, and a dish-like pin retainer pivoted on the shaft between the kicker and pin and having a peripheral pin retaining flange for preventing displacement
110 of the pin, said valve and its kicker being retained against longitudinal displacement from the shaft by said pin.

6. A valve action for windshield cleaners, comprising a valve seat, a valve movable
115 thereon, a kicker rockably mounted for operating the valve and having a cam part with outwardly converging edges, an action accelerating member adapted to act on the rear one
120 of said edges, relative to the direction of movement of the kicker, for boosting the kicker, means connected to the kicker for rocking the same, and a single spring acting
125 to hold the valve on its seat and the kicker operatively connected to said rocking means.

7. An automatic windshield cleaner comprising a casing consisting of a body portion and a removable cover plate provided with
130 complementary shaft bearings, a shaft jour-

naled in said bearings, said cover plate having a valve seat above the shaft with depending face portions straddling the shaft and overlapping the body portion whereby to provide a continuous valve seating surface, a valve pivoted on the shaft for movement over said valve seat and said face portions, and means for moving the valve by and during movement of said shaft.

8. An automatic windshield cleaner comprising a casing consisting of a body portion and a removable cover plate provided with complementary shaft bearings, a shaft journaled in said bearings, said cover plate having a valve seat above the shaft with depending face portions straddling the shaft and overlapping the body portion whereby to provide a continuous valve seating surface, a valve pivoted on the shaft for movement over said valve seat, said valve having spaced shoulders, a stop member hung on the shaft and having an angular part extending between said shoulders and interlocked with said face portions, and means for rocking the valve.

9. An automatic valve mechanism comprising a valve chamber having a valve seat, a shaft journaled in the chamber, a valve pivoted on the shaft for movement on the valve seat, a kicker pivoted on the shaft, said kicker and said valve provided with parts having loose interengagement whereby movement of the kicker will effect shifting of the valve, a play connection between the shaft and the kicker for rocking the kicker by and during oscillation of said shaft, a single resilient means interposed on the shaft between the valve and the kicker for holding the valve on its seat and for maintaining said play connection, and means having a camming cooperation with the kicker for accelerating the movement of the kicker after the movement has been initiated by said play connection.

10. An automatic valve mechanism comprising a valve chamber having a valve seat, a shaft journaled in the chamber, a valve pivoted on the shaft for movement on the valve seat, a kicker pivoted on the shaft for shifting the valve, a valve stop member interposed between the valve and the kicker and having stop means for cooperating with a portion of the valve for limiting the extent of movement of said valve, said shaft having a transverse hole therethrough beyond the kicker, a pin disposed in said hole and adapted to retain the aforesaid valve, kicker and stop member on the shaft, a dish-like pin retainer arranged on the shaft and having a peripheral pin retaining flange for preventing displacement of the pin.

11. An automatic valve mechanism comprising a valve chamber having a valve seat, a shaft journaled in the chamber, a valve pivoted on the shaft for movement on the valve seat, a kicker pivoted on the shaft for shifting

the valve, a spring coiled about the shaft between the kicker and the valve for holding the latter on its seat, a member on the shaft having a stop part coacting with a part of the valve for limiting the movement of the valve, said chamber having a wall pocket, a spring backed dog slidably disposed in the pocket and held against displacement by said stop member, said kicker having a cam part extending beyond said stop member with outwardly converging faces, one of which faces is adapted to be acted upon by the spring urged dog to accelerate the movement of the kicker, and means for rocking the kicker from the shaft.

12. An automatic valve mechanism comprising a valve seat, a shaft journaled therein, a valve rockable on the shaft and engaging said seat, a kicker also rockable on the shaft and having a play connection with the valve for actuating the latter, an actuator carried by the shaft for rocking the kicker, said kicker being movable along the shaft to disconnect from said actuator, means for accelerating the valve shifting movement of the kicker, and a spring arranged on the shaft and interposed between the valve and kicker and acting in opposite directions to urge the valve to its seat and also to urge the kicker toward the actuator for establishing the connection therebetween.

13. An automatic valve mechanism comprising a valve seat, a shaft journaled therein, a valve rockable on the shaft and engaging said seat, a kicker also rockable on the shaft and having a play connection with the valve for actuating the latter, an actuator pin displaceably carried by the shaft for rocking the kicker, a pin retainer interposed between the kicker and actuator pin for holding the latter against displacement from the shaft, and a spring interposed between the valve and kicker for holding the valve to its seat and for maintaining the connection between the kicker and actuator pin, said spring also acting to hold the pin retainer operative.

14. An automatic valve mechanism for windshield cleaner motors, comprising a valve chamber having a valve seat provided with a recessed portion, a shaft in the chamber, a valve pivoted on the shaft and movable over the seat, said valve having spaced shoulders, a stop member mounted on said shaft and having an angular extension extending between said shoulders of the valve for engagement thereby, means on said shaft for preventing the displacement of the stop member thereon, the said recessed portion in said valve seat engaging said extension to prevent arcuate movement of said stop member on and with said shaft, and a kicker movable by the shaft and extending between the shoulders of the valve for shifting the valve on the seat.

HENRY HUEBER. 130