Oct. 7, 1930. A. L. JUST 1,777,799

WINDSHIELD CLEANER MOTOR

Filed April 3, 1922 2 Sheets-Sheet 1

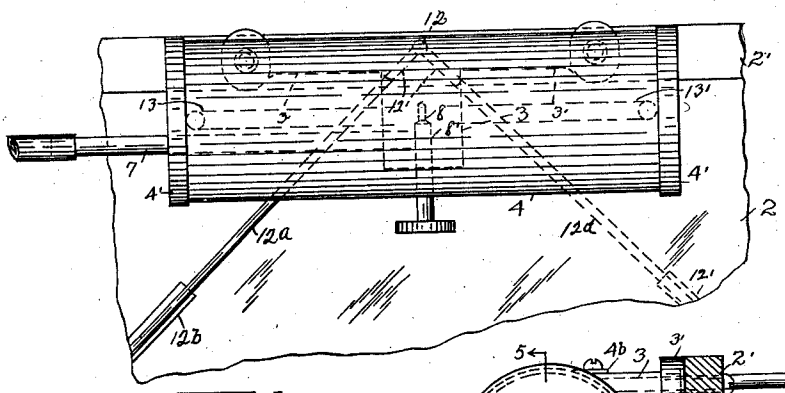

Fig. 1.

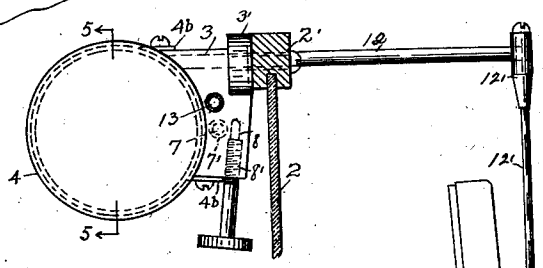

Fig. 2.

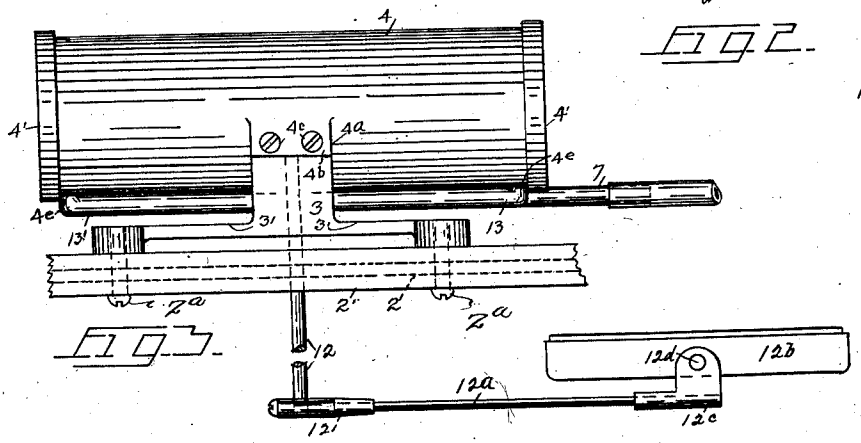

Fig. 3.

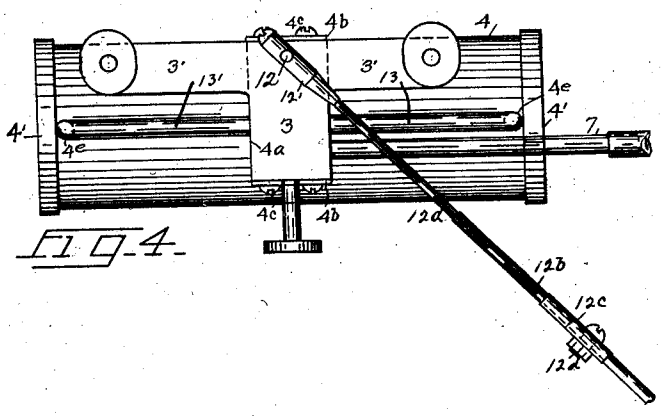

Fig. 4.

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Oct. 7, 1930. A. L. JUST 1,777,799

WINDSHIELD CLEANER MOTOR

Filed April 3, 1922 2 Sheets-Sheet 2

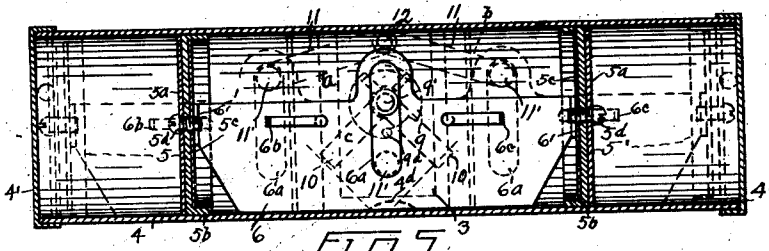

Fig. 5.

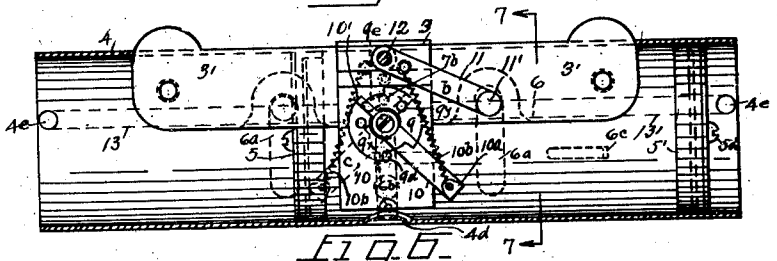

Fig. 6.

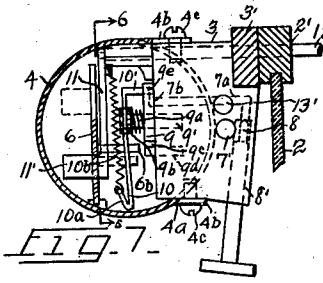

Fig. 7.

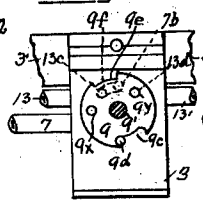

Fig. 8.

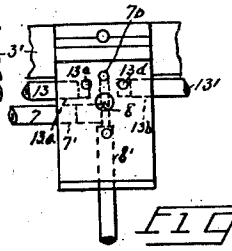

Fig. 9.

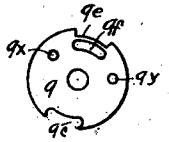

Fig. 10.

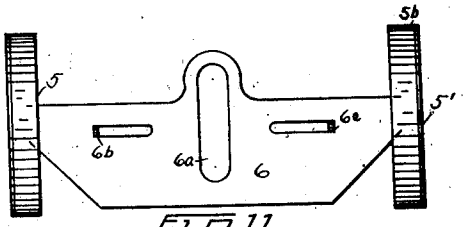

Fig. 11.

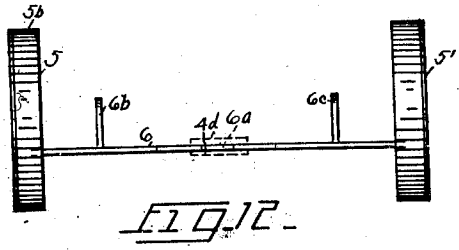

Fig. 12.

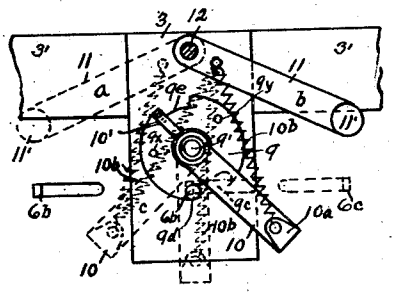

Fig. 13.

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UNITED STATES PATENT OFFICE

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WINDSHIELD-CLEANER MOTOR

Application filed April 3, 1922. Serial No. 549,173.

This invention relates to improvements in windshield cleaners, and has for its object to provide a novel and simple device of the class, which may be operated by either fluid pressure, or by the suction of the ordinary internal combustion engines employed for propelling motor vehicles. A further object is to provide novel and simple means for starting, stopping, and for controlling the speed of the cleaning member, and a further object is to provide novel and simple means for admitting atmospheric pressure to one end of the actuating cylinder, while the suction is being applied to the opposite end of the cylinder.

I attain these objects by the means set forth in the detailed description which follows and as illustrated by the accompanying drawings, in which—

Figure 1 is a rear side elevation of the complete device applied to the windshield of an automobile. Fig. 2 is an end elevation of the same. Fig. 3 is a top plan view of the complete device. Fig. 4 is a front side elevation of the same. Fig. 5 is a central vertical longitudinal section, taken on line 5—5 of Fig. 2. Fig. 6 is a vertical longitudinal section, taken on line 6—6 of Fig. 7. Fig. 7 is a vertical cross-section taken on line 7—7 of Fig. 6. Fig. 8 is a broken rear face view of the bracket which supports the cylinders and the valve. Fig. 9 is a similar view with the valve removed. Fig. 10 is a rear face view of the valve. Figs. 11 and 12 are detached views of the connected pistons. And Fig. 13 is an enlarged view, showing the disc valve and its actuating parts.

In the drawings 2 represents the transparent part of an ordinary windshield, and 2′ is the top rail of its frame.

My improved cleaner consists of the following parts: 3 represents a frame or body, which supports all of the cleaner parts, and which is preferably made of any suitable metal. From the opposite sides of the body 3 extend similar integral arms 3′, both of which are perforated for attachment to the rail 2′, by screws or bolts 2^a.

4 represents a casing or cylinder, whose ends are preferably tightly closed by caps 4′. At one side of the cylinder the wall is cut away, to provide a circumferential opening 4^a, a portion of the metal at the top and bottom of said opening being bent outwardly, to form lugs or ears 4^b, which are perforated. In this opening 4^a is inserted the rear end of the main body 3, as best seen in Fig. 7, and these parts are then detachably secured together, by means of screws 4^c, which pass through the perforations in the ears 4^b, and are threaded into the top and bottom faces of the body 3. Within the cylinder 4 are disposed similar spaced pistons 5—5′, which comprise outer disks 5^a, cup-shaped members 5^b, of any pliant material, and inner disks 5^c, all of which are held in place by bolts 5^d. The pistons are suitably spaced and connected for movement, as one part, by means of a substantially flat sheet-metal spacer 6, as best seen in Figs. 5, 11 and 12. The opposite ends of the spacer 6 are provided with right-angle perforated lugs 6′, which are engaged and held rigidly by the bolts 5^d. The spacer 6 is provided medially with a transverse slot 6^a, and at the opposite sides of said slot, spurs or lugs 6^b—6^c, are stuck out of the body 6 and bent outwardly, as shown in Fig. 12. At one side the cylinder 4 is slitted for providing similar spaced inturned guide-lugs 4^d, between which one edge of the spacer 6 is disposed and plays. This provision tends to hold the pistons, as well as the spacer, from rotation in the cylinder. The cylinder 4, in the present case, is stationary, and only the pistons, the cleaning member, and the valve and its operating parts move. The pistons 5—5′ are preferably operated by the suction produced by the engine pistons, and for this purpose a pipe 7 forms the communication between any suitable part of the engine (not shown), and the cleaner. This pipe 7 connects directly with the main body 3, which is bored out of 7′, to receive one end of the said pipe. The port 7′ connects with an angular passage 7^a, which terminates at an exhaust port 7^b in the rear face of the body 3 constituting a valve seat, as shown in Figs. 6, 7, 8 and 9. The passage or duct 7^a connects with a threaded opening 8′, which is normally closed by a needle-valve 8, the inner end of

which controls the passage 7^a (see Fig. 7), and therefore the starting and stopping, as well as the various speeds at which the cleaning member may be operated. The exhaust port 7^b is controlled by a disk-shaped rotary valve 9, which is pivoted preferably on a pivot post 9′ the latter being anchored in the body 3. The disk 9 is held resiliently and from accidental movement, against the face of the body 3, by a spring 9^a, and a washer 9^b, carried by said post. The valve 9 has a limited rotary movement by means of a peripheral cutout 9^c providing spaced parts or shoulders, and by a stop-pin or stop-post 9^d, which is also rigid to the body 3 (see Figs. 5, 6, 7 and 8). The opposite edge of the valve 9 is also provided with a similar cutout 9^e providing spaced parts or shoulders, which receives the arm 10′ of an inverted L-shaped lever 10, which is pivoted on the post 9′ and serves as the actuator for the valve 9, the arm 10′ contacting with said spaced parts or shoulders on the disk. The lever 10 extends downwardly (see Fig. 7) parallel to the valve and the body 3, and its lower end is formed into a hook 10^a at the opposite side of the pivot point of the valve disk, to which a tension spring 10^b connects. The upper end of the spring 10^b is connected to the corresponding end of a lever 11, mounted rigidly on a shaft 12, which is journalled in the top portion of the body 3. The lever 11 is swung by the movement of the pistons preferably in the folowing manner: The lower free end of the lever 11 is provided with a stud or pin 11′, which is disposed and plays in the slot 6^a of the spacer 6. By this construction and arrangement, the reciprocatory movements of the pistons and spacer, as shown by the full and dotted lines in Fig. 5, rocks the lever 11 (and also the shaft 12), back and forth past the valve 9, as shown by the full and dotted lines in Figs. 5 and 6. 12′ represents the cleaning member, which is rigidly mounted on the outer end of the shaft 12, which projects through the rail 2′, and consists of a rod or arm 12^a, and the cleaning element proper 12^b. The element 12^b is preferably pivotally mounted in a holder 12^c by a pin 12^d which allows said part to readily adjust itself to the outer surface of the windshield. The holder 12^c is preferably rigid on the free end of the rod 12^a.

To operate the pistons 5—5′ by the suction of the engine, as described, I provide two similar tubes 13—13′, which extend in opposite directions from the body 3, along the outer front side of the cylinder 4, as shown in Figs. 2, 3, 4, 8 and 9. The corresponding ends of the tubes 13—13′, are inserted in openings 13^a—13^b at the opposite sides of the body 3, and communicate with combined inlet and exhaust ports 13^c—13^d, which are disposed at the opposite sides of the main exhaust or suction port 7^b. The opposite or outer end-portions of the tubes 13—13′ are bent, and the ends thereof are inserted in perforations 4^e, which are disposed close to the caps 4′, and just beyond the extreme travel of the pistons. In order to connect the ports 7^b and 13^c—13^d, for communicating the suction to the opposite ends of cylinder 4, the valve 9 is provided in its bottom face (see Fig. 10) with a grooved passage or blind recess 9^f. The groove 9^f is so positioned and proportioned that, when the valve 9 is rotated in opposite directions by the lever 10 (see Figs. 5 and 6), a free passage is effected between the port 7^b and the ports 13^c—13^d, as the case may be. In order to prevent the establishment of a vacuum in one end of the cylinder, while the pistons are being drawn towards the opposite end, the valve 9 is provided with two perforations 9^x and 9^y, which are disposed a certain distance beyond the opposite ends of the groove 9^f. By this arrangement when the valve 9 is rocked towards the right, the perforation 9^x is brought into register with the port 13^c, which admits atmosphere through the said ports 9^x, 13^c and tube 13 into the left hand end of the cylinder into the tube 13, and when the valve is rocked toward the left, the perforation 9^y (see Fig. 8) is brought into register with the port 13^d, which admits the atmosphere through the said ports to the tube 13′ and thus to the right hand end of the cylinder. The oscillatory movements of the cleaning member 12′ is effected by the rocking to and fro of the lever 11 through the reciprocatory action of the spacer 6 and the pistons 5—5′, and the movements of these parts always correspond, since they are both rigid on the shaft 12. The timing of the strokes of the cleaner 12′ may be effected by the manipulation of the needle valve 8, by which the unscrewing of the said valve speeds up the cleaner 12′, while the inward screwing of said valve slows down the cleaner, or stops its operation entirely. The forward and backward movements of the lever 11 have no direct action on the valve 9, there being no connection between these parts except through the spring 10^b. The valve 9 is operated directly by the lever 10, through its arm 10′, which plays in the cutout 9^e, as described. The operation of valve 9, is as follows: Assuming that the pistons 5—5′ are positioned at the left end of the cylinder 4, as shown by the dotted lines in Fig. 5, and that the suction is applied to the right end of the cylinder, by means of the tube 13′, the pistons are then drawn towards the right until they reach the full line position, shown in Fig. 6, and the corresponding position, shown by dotted lines in Fig. 5. This movement of the pistons, through the spacer 6, which is always in engagement with the lever 11, swings said lever from the position shown at *a* in Fig. 5, to that shown at *b*, in Figs. 5, 6 and 13. During the greater part of this

movement of the lever 11, the valve 9 and its actuating lever 10 remain stationary, as shown by the dotted position *c*, in Figs. 5, 6 and 13, until the lug or spur 6^b carried by the spacer 6, engages and swings the lever 10 towards the right. The spur 6^b (as well as the spur 6^c) is arranged to come to a stop beneath the center of the valve 9 (see dotted lines in Figs. 6 and 13). By the time the spur 6^b comes to said stop, as described, the lever 10 is moved past the center of the valve, and the spring 10^b, whose tension has been increased by the completion of the stroke of the lever 11, jerks the lever 10 towards the right, as shown by the full lines in Fig. 6. This last quick movement of the lever 10, shifts its arm 10′ from its engagement with the right-hand end of the cutout 9^e, to the opposite end of said cutout (see dotted lines in Fig. 6), after which said arm rotates the valve, to the extent shown by the full lines in Figs. 6 and 13. This positions the groove 9^f for establishing communication between the port 7^d and the port 13^c, which shifts the suction from the pipe 13′ to the pipe 13 and effects the return movement of the pistons towards the left, and so on. By thus delaying the action of the valve 9, the atmospheric communication with the opposite ends of the cylinder is maintained practically throughout the full power stroke of the pistons, which greatly reduces the resistance, as well as the wear and tear upon the operating parts, and incidently, the said provision tends to greatly increase the power of the strokes of the cleaner 12′, which is a valuable feature, when it is understood that the suction of the engine that is available for operating the windshield cleaner is not, as a rule, very strong, particularly when the throttle is wide open or nearly so.

The device herein shown and described is entirely automatic in its action from the time the needle valve 8 is opened until it is closed. The device is simple, compact and light, and can be produced at relatively small cost, and when properly constructed and installed needs no attention nor care except as herein above explained.

Having thus described my invention what I claim, is—

1. A valve construction for fluid motors, comprising a body having a valve seat, a valve disk in contact with said seat, a pivot post on said body pivotally mounting the disk to oscillate to and from two operative positions on said seat, a stop post mounted on the body 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 of said disk and having another end extending to the opposite side of said pivot, a second lever pivoted on said body to swing one of its ends from one side of the pivot of said disk to the other side of the pivot of said disk, a spring connector between the extending end of said first lever and said second lever, an end of said spring connector being moved by said second lever from one side of the pivot of said second lever to the other side of its pivot, means for swinging the second lever to shift its end of the spring, and means for swinging the first lever during a portion of the swing of the second lever to shift its end of the spring to shift the spring from one side of the pivot of the disk to the other side of the pivot of the disk, whereby the disk is snapped from one operative position to the other.

2. A valve construction for fluid motors, comprising a body having a valve seat, a valve disk in contact with said seat and having spaced parts, a pair of posts on the body, one post being positioned to contact alternately with said spaced parts of said disk as the disk is moved to determine the operative limit positions of said disk, the other of said posts pivotally mounting the disk to oscillate to and from two operative positions on said seat, a lever pivoted on one of said posts, said disk having other spaced parts thereon and said lever having a part adapted to engage said other disk parts, at one side of the pivot of said disk and having an end extending to the opposite side of said pivot, a second lever pivoted on said body to swing one of its ends from one side of the pivot of said disk to the other side of the pivot of said disk, a spring connector between the extending end of said first lever and said second lever, an end of said spring connector being moved by said second lever from one side of the pivot of said second lever to the other side of its pivot, a reciprocable member having a part adapted to contact with the second lever to swing said second lever, whereby its end of the spring is shifted, and a part for engaging and moving said first lever during a portion of its movement of the second lever whereby the end of the spring on the first lever is shifted during a portion of the movement of the second lever and the spring is shifted from one side of the pivot of the disk to the other snapping the disk from one operative position to the other.

3. A valve construction for fluid motors, comprising a body having a seat provided with an exhaust port and a pair of inlet and exhaust ports, a valve disk pivoted on said body to move on said seat to and from two operative positions, said valve disk having in its face contacting with said seat a blind recess portion adapted in one operative position to place the exhaust port in communication with one of the inlet and exhaust ports and in its other operative position to place the exhaust port in communication

with the other inlet and exhaust port, a lever pivoted on said body and having an end engaging a portion of said disk to move it, a second member mounted on said body and having a portion movable first to one side 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 portion of said second member, means for moving said second member and for moving said lever a distance with said second member whereby said spring is shifted from one side to the other of said pivot point, snapping the disk from one of its operative positions to the other.

4. A valve construction for fluid motors comprising a body having a rock shaft to be operated journalled therein, said body with its rock shaft being removable as a unit from the cylinder of said motor, a seat on said body provided with an exhaust port and a pair of inlet and exhaust ports, a valve disk pivoted to oscillate on said seat to and from two operative positions, said disk having in a face contacting with said seat a recessed portion adapted in one operative position to place the exhaust port in communication with one of the inlet and exhaust ports and in its other operative position to place the exhaust port in communication with the other inlet and exhaust port, a lever pivoted on said body and having an end engaging a portion of said disk to move it, a second member fixed to said rock shaft and having a portion movable first to one side 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 portion of said second member, means for moving said second member, whereby the end of the spring connected to said second member is moved a predetermined distance from one side to the other side of the pivot point of said valve disk, simultaneously with movement of said rock shaft a predetermined distance in one direction to place said disk and said lever under spring tension tending to move said disk from one operative position to another when the rock shaft has traveled a predetermined distance.

5. A device of the class described comprising a tubular body, a pair of oppositely disposed spaced pistons movable in said tubular body, a piston rod connecting the pistons for simultaneous movement, fluid conduits connected to the opposite ends of said body, a rock shaft, a rock arm connected to the shaft, an operative connection between said rock arm and said piston rod including spaced parts on one of said connected elements and a part on the other of said connected elements interposed between said spaced parts, a main suction line, a valve controlling communication between the main suction line and either of said first-named fluid conduits, a pivoted lever having one end engaged with said valve, a spring connecting the opposite end of said lever with the rock arm, and means movable with the piston rod for effecting an initial movement of said lever from one limit of movement to a position where the spring will suddenly snap the lever to its opposite limit of movement.

6. Mechanism of the character described, comprising a cylinder, spaced pistons reciprocal therein, a member connecting the pistons for simultaneous movement, fluid conduits connected to the opposite ends of the cylinder, means for alternately applying suction to said conduits including a suction line, a valve for bringing said suction line alternately into communication with said fluid conduits, a lever for actuating said valve, a power-transmitting rock shaft, an arm fixed to the shaft and rockable back and forth by the piston-connecting member to opposite sides of the mounting of said lever for oscillating the shaft, resilient means connected at its opposite ends to the lever and arm 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 arm being moved back and forth to opposite sides of the lever mounting by and during movement of said piston connecting member, and means operable by the piston-connecting member to initiate an oscillatory movement of the lever, subsequent to the movement of the arm-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.

7. Mechanism of the character described, comprising a cylinder, spaced pistons reciprocal therein, a member connecting the pistons for simultaneous movement, fluid conduits connected to the opposite ends of the cylinder, means for alternately applying suction to said conduits including a 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, said piston-connecting member having spaced parts adapted to alternately engage said lever as the pistons approach their opposite limits of travel for initiating each oscillatory movement of said lever, a rock arm swingable across from one side to the opposite side of the lever mounting by and during movement of said piston-connecting member, a spring having its ends connected to the lever and to the arm at points spaced from their mountings whereby the ends of the spring will be moved to op-

posite sides of the lever mounting, said arm moving its end of the spring first and thereby tensioning said spring whereby the same will act to complete each oscillatory movement of the lever after the lever movement has been initiated by said piston operated member.

8. Mechanism of the character described, comprising a cylinder, spaced pistons reciprocal therein, a member connecting the pistons for simultaneous movement, fluid conduits connected to the opposite ends of the cylinder, means for alternately applying suction to said conduits including a 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, said piston-connecting member having spaced parts adapted to engage said lever as the pistons approach their opposite limits of travel for respectively initiating an oscillatory movement of said lever, said spaced parts acting upon said lever during its idle movement, and means operable by and during movement of pistons for accelerating the movement of said lever after it has been started, whereby the operative movement of said lever will be comparatively quick.

9. Mechanism of the character described, comprising a cylinder, spaced pistons reciprocal therein, a member connecting the pistons for simultaneous movement, fluid conduits connected to the opposite ends of the cylinder, means for alternately applying suction to said conduits including a suction line, a valve for bringing said suction line alternately into commnication 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, said piston-connecting member having spaced parts adapted to engage said lever as the pistons approach their opposite limits of traved for initiating each rocking movement of said lever, said spaced parts acting upon said lever during its idle movement, a rock shaft, an arm fixed on the shaft and rockable by and during movement of said piston-connecting member, and a spring connecting the arm to the lever at points spaced from their mountings and movable to opposite sides thereof by the combined action of said lever and arm.

10. Mechanism of the character described, comprising a cylinder, spaced pistons reciprocal therein, a member connecting the pistons for simultaneous movement, a power-transmitting rock shaft, an arm fixed on the shaft and oscillatable by said piston-connecting member for rocking the shaft, fluid conduits connected to the opposite ends of the cylinder, a suction line, a valve operable to connect the suction line alternately to the fluid conduits, a lever for actuating said valve, spaced lugs on the piston-connecting member for engaging the valve lever as the pistons approach their limits of travel to thereby initiate the oscillatory movements of said valve lever, and a spring connected to the lever and arm and movable under tension by the latter to positions where said spring will expend its energy in completing the oscillatory movements of said valve lever.

11. Mechanism of the class described, comprising a cylinder, spaced pistons therein, a member connecting the pistons. a power-transmitting rock shaft, a rock arm for operating the shaft from said member, means of connection between said member and said arm including a slot in one of the connected elements and a pin carried by the other of said connected elements and operating in the slot, fluid conduits connected to the opposite ends of the cylinder, a suction line, means for operatively connecting the suction line alternately to the fluid conduits including a valve, a lever for actuating the same, a spring connecting the lever to the rock arm at points spaced from their respective mountings, whereby said spring will be arranged by said rock arm to operate the valve lever after the movement of the latter has been initiated by a moving part of the mechanism, and means carried by the piston-connecting member for engaging and imparting such initial movement to the lever as the pistons approach each limit of travel whereby said prearranged spring will function.

12. Mechanism of the character described, comprising a cylinder, spaced pistons therein, a member connecting the pistons for simultaneous movement, and means for operatively applying fluid pressure to the pistons, said means including a valve, a lever for actuating the valve, a spring connected at one end to the lever for swinging the same, means movably supporting the opposite end of the spring and operable by said piston-connecting member for moving said opposite end of the spring to position said spring in proximity to the pivot of said lever whereby the latter will still be held against movement, and means operable by said piston-connecting member as the pistons approach their respective limits of movement for moving said lever a distance sufficient to bring the spring across and beyond said lever pivot whereby said spring will quickly move the lever for actuating the valve.

13. A valve snap action for windshield cleaners comprising a movably mounted valve, a lever having connection therewith, a spring positioning member movable by a moving part of the windshield cleaner motor, a spring connecting the positioning member to said lever and movable back and forth between two operative positions at opposite sides of the fulcrum of said lever for impart-

ing to the latter a valve shifting movement, and means operable from a moving part of the motor for positively moving said lever subsequent to a preliminary positioning of said spring by said positioning member to supplement such preliminary positioning in effecting a shift of said spring to the opposite side of the lever fulcrum.

14. A valve snap action for windshield cleaners comprising a movably mounted valve, a lever having connection therewith, a spring positioning member operable by a moving part of the windshield cleaner motor, a spring connecting the positioning member to said lever and movable back and forth between two operative positions at opposite sides of the fulcrum of said lever for imparting to the latter a valve shifting movement, and means operable from a moving part of the motor for positively moving said lever subsequent to a preliminary positioning of said spring by said positioning member to supplement such preliminary positioning in effecting a shift of said spring to the opposite side of the lever fulcrum, said means also positively moving said valve through said lever and upon failure of said spring to function when first shifted to said opposite side of said lever fulcrum.

15. The combination with an automobile windshield frame, of a fluid pressure motor comprising a cylindrical casing closed at both ends and having a central opening, a body member inserted in the casing opening and constituting the sole means of support for the casing from the windshield frame, the opposite end portions of the casing being free from said frame, a piston in the casing, a rock shaft journaled in the body member and operable by the piston, valve mechanism on the body member for operatively admitting fluid pressure to the casing, and means for operating the valve mechanism by and during movement of the piston.

16. The combination with an automobile windshield frame, of a fluid pressure cleaner motor mounted thereon, said motor comprising a casing, a piston therein, valve mechanism for operatively admitting fluid pressure to the casing, a rock shaft centrally arranged in the casing and operable by the piston, a casing-supporting body member in which said shaft is journaled, said body member centrally supporting the casing and constituting the sole means of support therefor, the opposite end portions of the casing being unattached to the frame, and means for securing the body member to the windshield frame.

17. A fluid pressure motor for windshield cleaners, comprising a cylindrical body, a block arranged intermediate the length of the body and dividing the latter into a pair of alined cylinders, a piston operable in each cylinder, said block having a valve seat on its inner face with ports opening therethrough from the cylinders and from a source of operating pressure, a wider operating shaft journaled in said block and terminating at its inner end within the cylinder body, said pistons being operatively connected to said shaft to rock the same, a valve within the cylinder body operating on the valve seat to operatively connect the ports thereof, and automatic mechanism for operating the valve, said mechanism including a part directly carried and operated by said shaft.

18. A fluid pressure motor for windshield cleaners, comprising a cylindrical body, a block arranged within the body and dividing the same into a pair of spaced cylinders, a piston operable in each cylinder, means operable by the piston across the inner face of said block, said inner face having a valve seat provided with a pressure supply port and spaced cylinder ports, a valve operable on the seat to operatively connect the pressure supply port alternately to the cylinder ports, means for automatically actuating the valve, and a wiper operating shaft journaled solely in said block and operably connected by the first means to said pistons to be rocked thereby.

19. A fluid pressure motor for windshield cleaners, comprising a cylindrical body, a block arranged within the body and dividing the same into a pair of spaced cylinders, a piston operable in each cylinder, means operable by the piston across the inner face of said block, a wiper operating shaft journaled in said block, the latter constituting the sole means of support for said shaft, a member fixed on the inner end of the shaft and directly connected to said means to be operated thereby, said inner face having pressure supply and cylinder ports, and automatic valve mechanism for operatively connecting the ports, said mechanism embodying said member.

20. A fluid pressure motor for windshield cleaners, comprising a cylindrical body, a supporting member for said body engaged with the same intermediate its ends, pistons operable in the opposite ends of said body, a wiper operating shaft journaled in said supporting member transversely of the body and between the pistons, a member fixed on the shaft within the body, means directly connecting the pistons to said member for operating the same, a valve seat arranged on said supporting member and having a pressure supply port and spaced cylinder ports, a valve operable on the valve seat, and automatic valve mechanism for actuating the valve and being operated directly from said shaft carried member.

21. In a fluid pressure motor, the combination of a sheet metal tube having a peripheral portion struck out substantially centrally between its ends and leaving an out-

standing ear, closures for the remote ends of said tube, a central body portion having a portion adapted to be inserted in said struck-out portion of the cylinder and detachably engaged by said ear, a rock shaft mounted in a bearing in said body portion and extending transversely of the axis of said tube, a fluid exhaust passage in said body, a pair of fluid inlet and exhaust passages in said body, ports from the respective fluid exhaust and fluid inlet and exhaust passages opening on the inner face of said body, a valve on said body for alternately connecting the fluid exhaust passage port with the respective fluid inlet and exhaust passage ports, a pair of spaced pistons connected to move together in said tube, a part on said rock shaft adapted to be moved by said pistons whereby said rock shaft is oscillated as said pistons reciprocate, a part connected to said valve and having a portion engaging a part of said pistons whereby said valve is operated from said pistons, said body, rock shaft and valve being insertible and removable from the struck-out portion of said tube as a single unit, and a pair of removable fluid inlet and exhaust tubes extending from said inlet and exhaust passages in said body to the ends of said tube.

22. In a fluid pressure motor, the combination with an automobile windshield frame, of a body portion adapted to engage said frame and having parts for securement of said body portion to said frame, a cylinder having a recessed or cut out portion to receive a part of said body portion whereby said cylinder is maintained by said body portion on said frame, a rock shaft mounted in a bearing in said body portion and projecting from said body portion beyond said cylinder, a portion of said rock shaft being positioned in said cylinder, means for securing said cylinder on said body portion whereby said cylinder is supported on said windshield frame by said body portion, a valve and valve mechanism mounted on said body portion in said cylinder, a piston in said cylinder, and operable connections between said piston and said rock shaft and said piston and said valve mechanism whereby said rock shaft and said valve mechanism are operated by the movement of said piston, said body portion, rock shaft and valve and valve mechanism being removable as a single unit from said cylinder.

23. A fluid pressure motor comprising a cylinder, a piston construction in said cylinder, a piston rod connected to said piston construction and having an angularly extending part, an oscillatory rod operably connected to said part and adapted to be connected to a windshield cleaner, a bearing in which said oscillatory rod is mounted, said oscillatory rod and bearing being in a valve block detachably mounted in said cylinder, and valve mechanism in said valve block for alternately exhausting fluid from the ends of said cylinder for moving said piston construction in said cylinder.

24. In a fluid pressure motor for windshield cleaners, a tube having a centrally arranged opening and forming a pair of alined cylinder portions, end pieces on said tube closing the ends thereof, a pair of spaced pistons in said tube, one piston being in each of said cylinder portions, a connecting member between said spaced pistons, a body member insertible in and removable from said tube opening and centrally disposed between said cylinder portions and connected to said tube, said body member extending into said tube so that the latter will overlie the former and be directly supported thereby, fluid passages in said body member, a pair of separate tubes extending lengthwise of said cylinder, each of said separate tubes bearing at one end in one of said cylinder portions and at the other end in said central body member for admitting fluid to or exhausting fluid from the ends of said cylinder portions, said connecting member having a part extending angularly relative to the path of operation of said connecting member, a rock shaft having a laterally extending part operably engaging said connecting member part, said body member having a bearing in which said rock shaft is mounted, said body being detachably mounted in said cylinder, and valve mechanism in said body for admitting or exhausting fluid pressure through said tubes.

25. In a fluid pressure motor, the combination with an automobile windshield frame member, of a tube providing a pair of cylinder portions, a central valve supporting block insertible in and removable from said tube, a rock shaft mounted in said valve block, a motion transmitting member mounted on said rock shaft to move said shaft, a pair of spaced pistons in said cylinders, operating connections between said pistons and said motion transmitting member, a valve on said valve supporting block in said tube for controlling the admission of fluid to said cylinder portions, said valve block being provided with a bearing for said rock shaft, mechanism for operatively moving said valve by and during movement of said pistons, and means on said valve block for attaching the motor in position on the windshield frame and for maintaining said rock shaft in operative position with respect to said windshield frame, said valve block, rock shaft and motion transmitting member being insertible in and removable from said tube as a single unit.

26. In a fluid pressure motor, a metal tube providing a pair of alined cylinder portions, a pair of spaced pistons in said cylinder portions, a block centrally disposed between said cylinder portions, and carrying a valve and

valve actuating mechanism, a member connecting the piston, parts of said valve actuating mechanism extending between said pistons to be operated by the movement thereof, a power transmission arm arranged to be operated by said piston connecting member, a rock shaft operably connected to said arm and adapted to carry windshield wiper said rock shaft being carried by said block, a pair of separate tubes connecting said central block to the outer ends of said cylinder portions, said separate tubes being adapted to convey fluid to and from the ends of said cylinder portions and brace the ends of said cylinder portions with the central block to maintain said cylinder portions and said central block alined.

27. In a fluid pressure motor, a metal tube constituting a cylinder, a piston reciprocable in said cylinder, a rock shaft in said cylinder extending transversely to the axis of said piston and adapted to move a member to be operated by said motor, a part on said rock shaft extending into the path of travel of said piston, a part on said piston adapted to engage said rock shaft part to swing said rock shaft, a central body having a portion insertible in a recess in said cylinder and providing a bearing for said rock shaft, said body portion having a part adapted to engage a windshield frame, means for securing said body rigidly to said windshield frame whereby said rock shaft is maintained in operative position with respect to said windshield frame, and means detachably securing said cylinder to said central body whereby said cylinder is supported adjacent the windshield frame by said central body, a pair of spaced projections on an inner wall of said cylinder, a rigid part on said piston movable between and engaging said spaced projections, whereby said piston is prevented from turning in said tube and said first piston part is maintained alined with said rock shaft, and means for admitting fluid pressure to said cylinder for causing said piston to reciprocate in said tube.

28. In a fluid pressure motor, a sheet metal tube constituting a pair of cylinders, a pair of spaced pistons in said cylinders and reciprocable therein, a sheet metal spacer member connecting said pistons and reciprocable therewith, said tube having on its inner wall a pair of projecting guide parts struck inwardly therefrom upon opposite sides of a portion of said spacer to guide the latter lengthwise whereby said pistons are prevented from rotating in said tube, and means for causing said pistons to reciprocate in said tube.

29. In a fluid pressure motor, a metal tube constituting a pair of cylinder portions and having a recess therein, a pair of spaced pistons in said cylinder portions and reciprocable therein, a sheet metal spacer member connecting said pistons and reciprocable therewith, a pair of integral spaced lugs on the inner walls of said tube struck out from the metal of said tube, a portion of said spacer being movable between said lugs, whereby said spacer and pistons are prevented from turning in said tube, a central supporting member having means for rigid securement to a windshield frame of an automobile and having a part projecting into the recess in said metal tube, means connecting said metal tube adjacent said recess to said central member whereby said tube is supported adjacent the windshield by said central member and is prevented from turning with respect thereto, fluid controlling valve and valve mechanisms on said central member in said tube, an operating shaft for a windshield wiper carried in bearings in said central member and being positioned by said central member with respect to the windshield frame and having a part projecting into said tube for operative connection with said pistons, and struck out parts on said spacer for operating said valve mechanism.

In testimony whereof I affix my signature.

ALVAH L. JUST.

CERTIFICATE OF CORRECTION.

Patent No. 1,777,799. Granted October 7, 1930, to

ALVAH L. JUST.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, line 40, claim 9, for the misspelled word "commnication" read communication, and line 46, same claim, for "traved" read travel; page 6, line 68, claim 17, for "wider" read wiper; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of December, A. D. 1930.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)