Nov. 17, 1942. C. I. MacNEIL 2,302,232

WINDSHIELD WIPING MECHANISM

Filed April 18, 1941

Fig. 1.

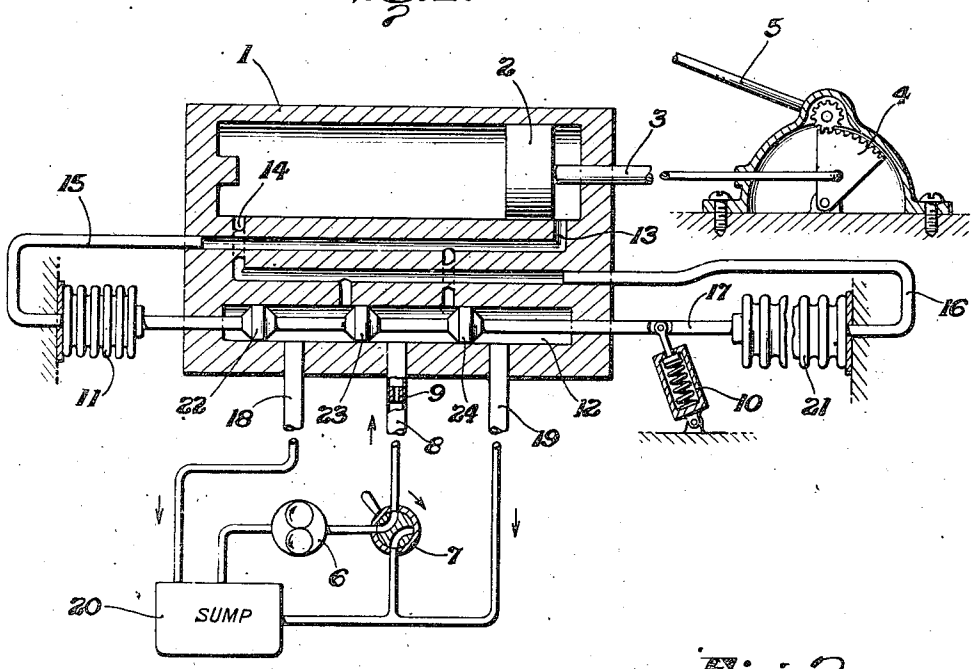
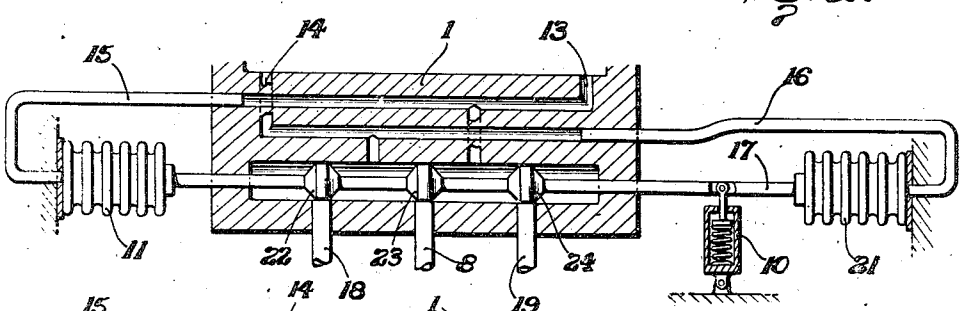


Fig. 2.



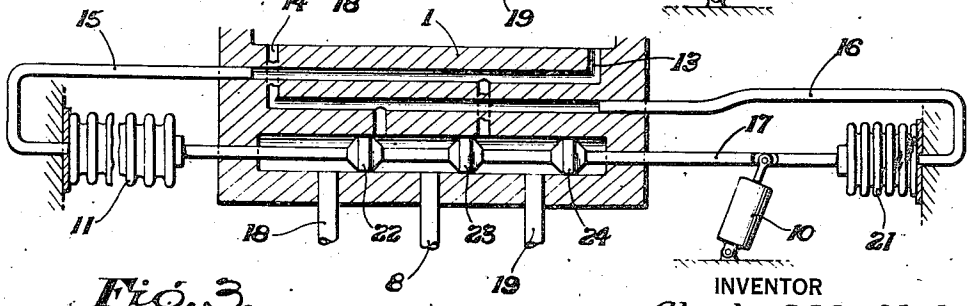


Fig. 3.

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WINDSHIELD WIPING MECHANISM

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Application April 18, 1941, Serial No. 389,243

2 Claims. (Cl. 15—253)

This invention relates to windshield wiping or other servo-mechanism, and particularly to the control of the stroke of such a mechanism.

An object of the invention is to provide a servo-motor of novel construction for the actuation of a windshield wiper blade, a machine tool feed, or any equivalent part to be moved over a limited range of movement.

Another object is to provide for control of the range of movement in such manner as to produce automatic variation in the length of the work stroke, according to conditions encountered.

These and other objects of the invention will become apparent from inspection of the following specification when read with reference to the accompanying drawing wherein is illustrated the preferred embodiment of the invention. It is to be expressly understood, however, that the drawing is for the purpose of illustration only, and is not designed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the drawing,

Figs. 1 and 3 show the relative positions of the parts constituting the preferred embodiment of the invention, Fig. 1 showing them at one extreme limit of valve movement, and Fig. 3 showing them at the other extreme.

Fig. 2 shows the relationship as the valve passes the central point in its rightward or leftward travel.

The invention is shown as embodied in apparatus including a power cylinder 1 adapted to receive motive fluid at opposite ends, alternately, to reciprocate a piston 2 whose projecting rod 3 is linked to a wiper blade 5 (or other work part) through suitable linkage shown partly at 4.

The flow of motive fluid to cylinder 1 is by way of pump 6, manual valve 7, conduit 8, containing a flow-restricting orifice 9, and a pressure-responsive valve mechanism 12; said valve 12 being an important part of this invention. Motive fluid enters the valve 12 (it may be hydraulic fluid or air) through orifice 9, and (with the valve 12 in the position shown in Fig. 1) the fluid enters the cylinder through passage 13, to move piston 2 to the left. The blade will then move correspondingly, until it reaches the end of its stroke, or until it meets an obstacle (such as heavy ice on the windshield). If the latter is too resistant, it will stop the advance, and will cause a rise in the pressure of the fluid because of the reduced flow through orifice 9. Depending upon the setting of the spring tension of snap-action mechanism 10, this increase in pressure acting upon bellows 11 will cause the latter to shift the valve 12 to the right, reversing the direction of the wiper. Any obstacle encountered in the reverse travel, will, of course, produce a corresponding reversing action.

This action will permit the blade to wipe either the entire windshield or a smaller section thereof free of ice; the stroke variation depending upon the setting of the spring 10, and the varying magnitude of the obstructing resistance of the ice or other obstacle in the blade's path. When no resistance is encountered (as in warm weather) the piston will, of course, traverse its complete stroke, after which the pressure rise (due to the resistance of the cylinder end wall) will reverse the valve position, as indicated above, to continue the cycle.

It will be seen that the snap-action mechanism tends to accelerate the final stage of the shifting movement of the valve in each direction, and by so doing there is assured a more rapid oscillation of the wiper blade. It will also be noted that the central portions of each valve bead (22, 23 and 24) are of slightly less extent than the diameter of the inlet and outlet ports, wherefore there is no complete cutting off of fluid circulation at any point in the valve travel; the only mode of cut-off being by turning the manual valve to the cut-off position. In the cut-off position the manual valve diverts flow back to the sump, thus short-circuiting the cylinder 1.

Communication is established between the bellows 11 and the passage 13 by the provision of a pipe as shown at 15, which extends from the passage 13 to one end of the bellows 11. At the end of the cylinder 1 opposite to the location of the passage 13 there is another passage 14 adapted to communicate with the bellows 21 by way of a pipe 16 extending from the passage 14 to the bellows 21. Mechanical connection between the bellows and the valve is provided as indicated at 17 and fluid connections 18 and 19 lead from the valve chamber to the source 20 and constitute means whereby fluid discharged from either end of the cylinder 1, by way of either the discharge passage 13 or the discharge passage 14, may return to the source 20; the discharge pipe 18 having communication with the passage 14, by way of the valve chamber, when the valve is in the position indicated in Fig. 1, and the discharge pipe 19 having communication with the passage 13, by way of the valve chamber, when the valve is in the position indicated in Fig. 3.

What is claimed is:

1. In a windshield cleaner of the type having a blade shiftable by a reciprocable piston, the combination with said reciprocable piston of means including a valve having a beaded portion shiftable first to one side and then the other of a single fluid inlet port, to supply fluid first to one side and then to the other side of said piston, fluid pressure responsive means for reversing the direction of movement of said valve, said reversing means being operable at different points in successive, oppositely directed piston strokes, which different points correspond to the variations in the amount of resistance encountered by the shiftable blade as it proceeds in opposite directions from one stroke to another, said reversing means comprising bellows connected to said valve at opposite ends thereof, and means for delivering fluid first to one and then to the other of said bellows, said fluid delivering means including conduits which alternately communicate with said fluid inlet port by way of said valve.

2. In a windshield cleaner of the type having a blade shiftable by a reciprocable piston, the combination with said reciprocable piston of means including a valve having a beaded portion shiftable first to one side and then the other of a single fluid inlet port, to supply fluid first to one side and then to the other side of said piston, flexible pressure responsive means for reversing the direction of movement of said valve, said reversing means being operable at different points in successive, oppositely directed piston strokes, which different points correspond to the variations in the amount of resistance encountered by the shiftable blade as it proceeds in opposite directions from one stroke to another, said reversing means comprising bellows connected to said valve at opposite ends thereof, and means for delivering fluid first to one and then to the other of said bellows at pressure which increases as the advance of the piston, in either direction, is resisted, said fluid delivering means including conduits which alternately communicate with said fluid inlet port by way of said valve.

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