April 8, 1952 J. B. PARSONS 2,592,180

HYDRAULICALLY OPERATED REGULATOR MECHANISM FOR VEHICLE WINDOWS OR THE LIKE UTILIZING ENGINE STARTER MOTOR

Filed June 16, 1949 2 SHEETS—SHEET 1

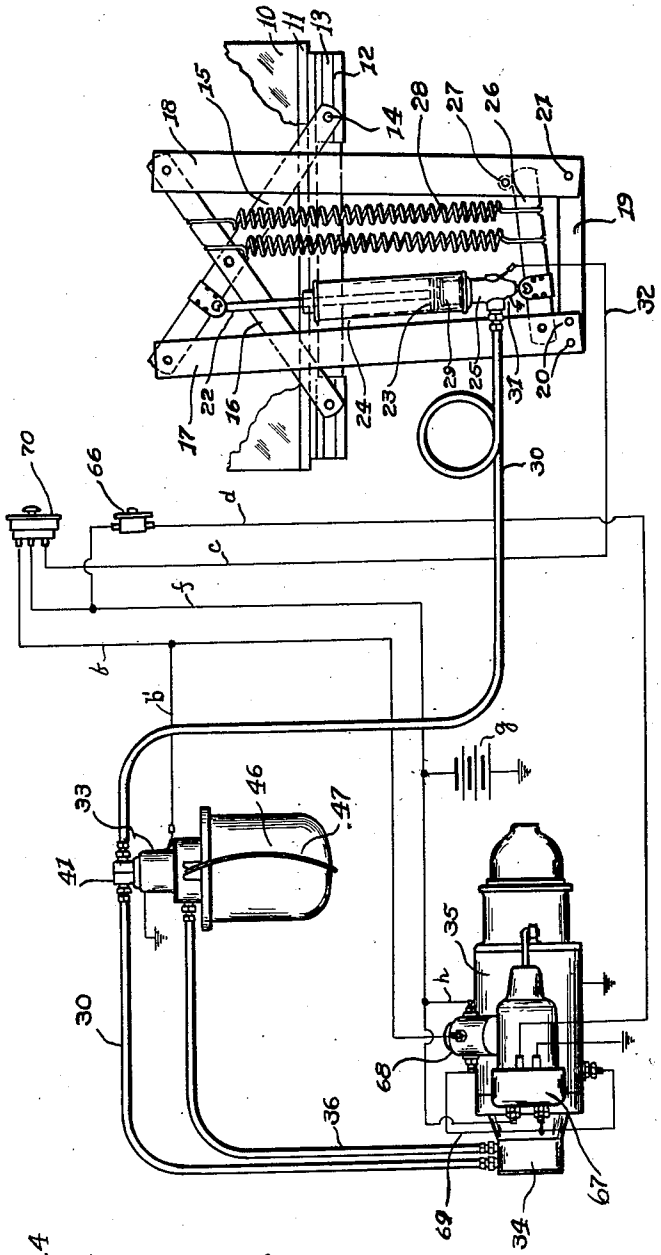


Fig. 1.

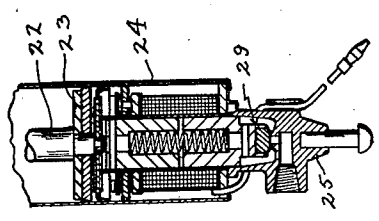


Fig. 1.A

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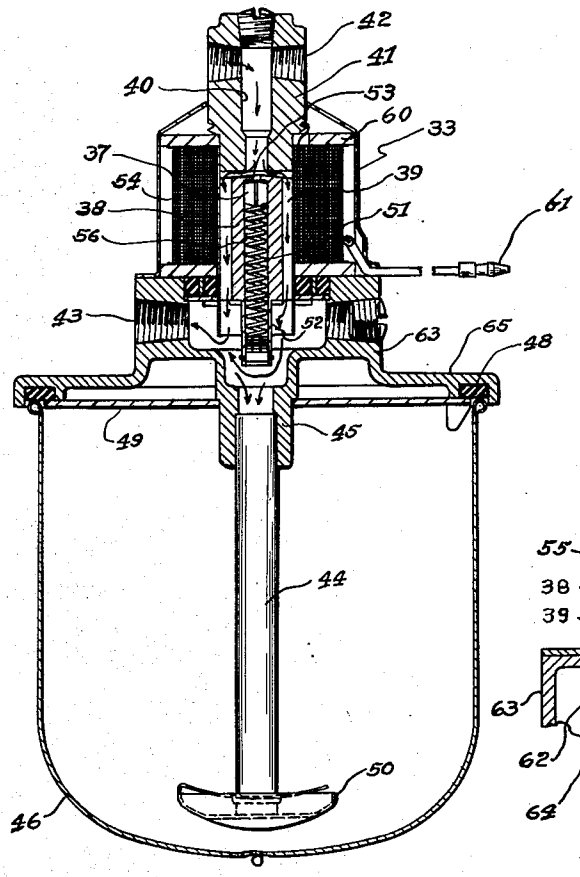


Fig. 2.

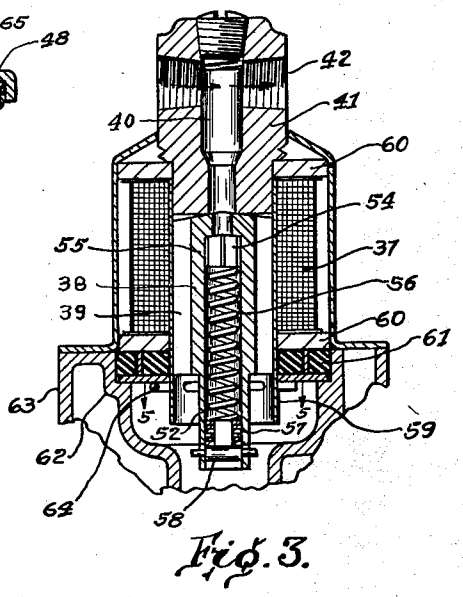


Fig. 3.

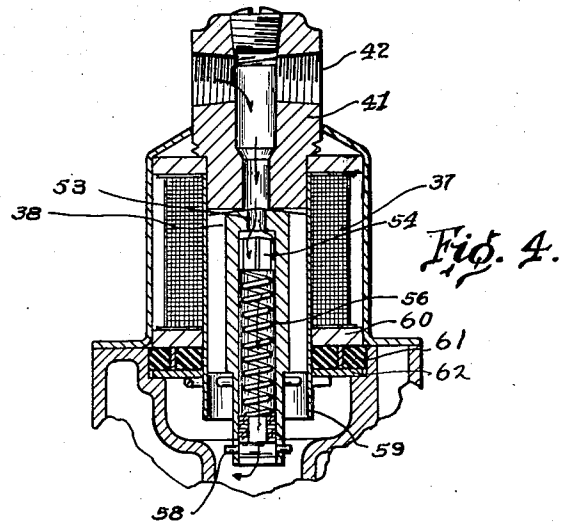


Fig. 4.

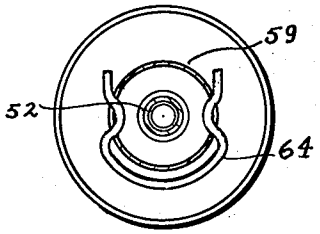


Fig. 5.

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2,592,180

HYDRAULICALLY OPERATED REGULATOR MECHANISM FOR VEHICLE WINDOWS OR THE LIKE UTILIZING ENGINE STARTER MOTOR

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Application June 16, 1949, Serial No. 99,517

1 Claim. (Cl. 60—52)

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This invention relates to hydraulic systems but more particularly to a system employing a motor operating selectively a pump and another device.

An object is to produce a hydraulic system employing a pump which is driven by a motor adapted to perform other work and embodying control features readily enabling the motor to be selectively employed for one purpose or the other.

A further object is to produce a valve device which is so constructed and arranged normally to enable liquid under pressure to enter at one portion and leave at another portion, such, for example, as to enter from the pressure side of the pump and to return to the suction side of the pump, and an interposed valve device which, when closed, shuts off the return to the pump and causes the liquid under pressure to pass to the work, there being incorporated a pressure release operable in the event that the pressure in the work line exceeds a predetermined maximum.

Another object is to produce a vehicle window regulator which is operated by fluid pressure generated by a pump actuated by the engine starting motor, electromagnetic valve mechanism being employed for controlling the flow of fluid from the pump to the regulator mechanism and the arrangement being such that when the motor is being used for engine starting purposes, relatively free circulation of fluid takes place so that practically no resistance is encountered by the motor in such instances.

A further object is to produce a new and improved hydraulic regulator mechanism for actuating vehicle parts such as windows which is powered from the engine starting motor so that such motor can be used either for engine starting purposes or for regulator operation, the same being controlled by switches, one individual to the engine starting motor for engine cranking purposes and the other individual to a regulator mechanism, the organization being such that one or more regulator mechansims may be individually or simultaneously actuated from the same power source.

Other objects and advantages will hereinafter appear, and for purposes of illustration but not of limitation, an embodiment of the invention is shown on the accompanying drawings, in which

Figure 1 is a diagrammatic view of a hydraulic window regulator mechanism in which the hydraulic pump is actuated by an engine cranking or starter motor;

Figure 1A is a fragmentary view partly in section showing the solenoid controlled valve associated with a piston and cylinder assembly;

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Figure 2 is a vertical sectional elevation of the liquid reservoir and solenoid controlled by-pass and release valve therefor, the parts being shown in normal position enabling the liquid to freely circulate to and from the pump driven by the engine starter motor;

Figure 3 is a vertical sectional elevation of the solenoid controlled by-pass and release valve associated with the reservoir showing the position of the parts when the solenoid is energized;

Figure 4 is a view similar to Figure 3, but showing the relief valve unseated to enable liquid to pass to the reservoir from the pump when the by-pass valve is closed in the event that the regulator has moved to the end of its stroke; and

Figure 5 is a transverse section substantially on the line 5—5 of Figure 3.

The illustrated embodiment of the invention comprises a window panel 10 for an automobile or other vehicle, to the lower edge portion of which is fixed a channel 11 from which depends a pair of retainers 12 having longitudinally extending guideways 13 in which buttons or studs indicated at 14 are slidable. The studs 14 are fixed respectively to the free ends of swinging arms 15 and 16 which are pivotally connected respectively to upright supporting arms or stanchions 17 and 18. The arms 15 and 16 are pivoted intermediate their ends and it will be manifest that by swinging movement of the arms in one direction, the window panel 10 is lowered and by swinging movement in the opposite direction, the window panel 10 is raised. The lower ends of the stanchions are connected to a horizontally disposed cross bar 19 which is suitably fixed to a rigid part of the automobile door or the like. As shown, the lower end of the stanchion 17 is connected rigidly by a pair of rivets 20 but the lower end of the stanchion 18 is pivotally connected by a single rivet 21, thereby enabling the latter to rock during the swinging movement of the cross arm regulator as will be readily apparent.

Suitably connected to the cross arm 15 at one side of the pivotal connection between the cross arms is a piston rod 22 which has a piston 23 at its lower end reciprocable within a cylinder 24. The lower end of the cylinder 24 has a fitting 25 which in turn is connected to a compensating arm 26, one end of which is pivotally connected to the lower end portion of the stanchion 17. A rivet 27 provides a stop for the upward movement of the compensating arm 26. Hooked against the under side of the compensating arm 26 is a pair of helically coiled springs 28, the upper ends of which are hooked over the cross arm 16 between

the pivotal connection between the arms thereof and the stanchion 18.

Disposed within the cylinder 24 is a solenoid controlled valve 29 which is normally spring-seated but when the solenoid is energized is unseated to admit liquid under pressure thereto through the tube 30 thereby to force the piston 23 upwardly and swing the cross arm regulator in such manner as to raise the window panel 10. As will hereinafter appear, by energizing the solenoid of the unit 29 without energizing the power source, the window may be lowered by the springs 28, the liquid in the cylinder 24 being forced therefrom back to the reservoir through the tube 30. As shown, the solenoid of the unit 29 is grounded as indicated at 31, a lead 32 extending thereto from a switch as will be hereinafter described.

The tube 30 leads to the upper end portion of an electromagnetic valve mechanism 33 hereinafter described, and from thence extends to a pump 34 of any suitable construction but preferably a rotary or hydraulic pump which is operated by an electric motor 35. One pump satisfactory for the purpose is the well-known "Gerotor" pump. The electric motor 35 is the engine starting or cranking motor having suitable connections (not shown) for cranking the internal combustion engine of the automobile. To the inlet side of the pump 34 leads a tube 36 which extends from the electromagnetic valve device 33 above mentioned.

Figure 3 illustrates the electromagnetic device 33 and consists of an electromagnet 37 which has a coaxial vertically reciprocable piston valve 38 which is provided with a pair of diametrically opposed longitudinally extending grooves 39 which in the normal position of the valve 38 enable the passage of liquid from a passage 40 in a fitting 41. In the upper end of the fitting 41 are laterally extending screw-threaded openings 42 to which the tubes 30 are respectively connected. Consequently when the pump 34 is operating and the valve 38 is in the position shown on Figure 2, liquid is forced by the pump through the tube 30 and passes down through the passage 40, the grooves 39 and laterally through an opening 43 to which one end of the tube 36 is connected. Thence the liquid passes to the inlet side of the pump 34. In this manner, when the motor 35 is used for engine starting or cranking purposes, the liquid has a relatively free flow through the path above described. Some of the liquid may pass into a vertical tube 44 which is connected to a depending portion 45 and into an open mouth can 46 which provides the reservoir. The can 46 is normally held in place by a bail 47 which is hinged at its upper end, the mouth of the can being held against a rubber ring 48. As shown, a disc 49 provides a closure for the upper end portion of the reservoir. A baffle 50 is attached to the lower end of the tube 44.

The piston valve 38 is provided with a central longitudinally extending passage 51, the lower end of which is formed by a depending extension 52. The upper end of the piston valve 38 is closed except for a central relatively small port 53 in alignment with the passage 40. Disposed within the passage 51 normally to close the port 53 is a valve member 54 which is provided with a series of longitudinal ribs 55 forming therebetween channels for the passage of liquid as will hereinafter appear. The coil spring 56 bears at one end against the valve 54 and normally holds it against its seat. The opposite end of the spring 56 bears against the uppermost of a series of washers 57. The lowermost washer rests against a transverse pin 58 the ends of which are reduced and extend through holes in the tube extension 52.

It will be noted that concentrically within the electromagnet 37 is a longitudinally extending tube 59 which provides a slideway for the piston valve 38 and at the upper and lower ends of the magnet are metallic washer members 60 and a rubber washer 61 provides a seal adjacent the lower washer 60, a disc 62 seating on a ledge in the casting 63 retaining the parts in place. A hairpin-like clip 64 having a portion extending through an aperture in the lower portion of the tube 59 retains the parts in assembled relation. It will be observed that the casting 63 has a lateral flange 65 to receive the sealing washer 48 for the reservoir or can 46.

As shown on Figure 1, a switch 66 is for the purpose of energizing the starter motor 35 for engine cranking purposes. As shown, a lead *d* extends from the switch 66 to a starter solenoid 67 forming a part of the starter motor assembly. From the other terminal of the switch extends a lead which joins a lead *f* which connects with a battery *g* and also extends to a binding post on the starter solenoid 67. A branch *h* from the lead *f* extends to a relay 68 for the motor 35, the relay 68 being also connected by a lead 69 which extends to the motor 35. Manifestly by actuating the switch 66, not only is the starter solenoid 67 energized to effect clutching engagement with the internal combustion engine (not shown) of the vehicle, but also energizes the starter motor 35. This organization is well-known to those skilled in this art, and further description of the construction and operation thereof is not considered necessary.

For operating the window regulator mechanism, a switch 70 is provided, the same having three poles and from one of which extends a lead *b* to the motor relay 68, a branch *b'* from the lead extending to the solenoid 33, the latter being grounded as shown in Figure 1. The lead *f* extends from another pole of the switch 70 to the battery *g* and to the motor solenoid 68 as above described. A third lead *c* extends from the other pole of the switch 70 to the solenoid of the solenoid valve assembly 29 associated with the cylinder 24.

From the above description, it will be manifest that by manipulating the switch 70 in one direction, the leads *c*, *f* and *b* are connected, thereby concomitantly to energize the starter motor 35 as well as the solenoid associated with the solenoid valve assembly 29 to open the letter. At the same time, the solenoid 37 is energized to move the piston valve 38 to the closed position as indicated in Figure 3. At such time, the pump 34 is started in operation and liquid is pumped from the reservoir 46 through the tube 33 through the fitting 41 and past the valve of the solenoid valve assembly 29 to force the piston 23 upwardly and thereby move the window panel 10 toward its closed position. Upon release of the switch, the liquid within the cylinder 24 will retain the piston in the position of adjustment by valve 29 which is spring actuated to closed position. In the event that the switch is retained in its "on" position after the window 10 has been moved to its closed position, the pressure thus built up by the pump 34 in the tube 33 will force the relief valve 54 downwardly against the tension of the spring 56 and allow the liquid then to pass as indicated in Figure 4, into the reservoir 46. It will be understood that the strength of the spring 56 is

so chosen and proper tension created by selection of the proper number of washers **57** so that a predetermined pressure is required to unseat the valve **54** before damage or injury occurs to the regulator mechanism and associated parts.

When the switch **70** is moved in the opposite direction from that above described, the leads *c* and *f* only are electrically connected, thereby energizing the solenoid valve assembly **29** to cause its valve to open allowing the springs **28** to pull the cross arm regulator and piston **23** downwardly. This forces the liquid from the cylinder **24** back to the reservoir through the tube **30** past the piston valve **38**. Normally the switch is in a neutral position intermediate the two positions above described. Although any suitable switch may be used for the purpose, one satisfactory switch mechanism is shown in my United States Patent 2,446,141, granted July 27, 1948.

From the above description, it will be apparent that I have produced an exceedingly practical and efficient assembly whereby the ordinary engine starting or cranking motor may be utilized for actuation of vehicle parts such as a window. When the motor is used for engine cranking purposes, the liquid passes in a relatively free manner to and from the valve device **33**. However, when it is desired to actuate another part or mechanism, in this instance a vehicle window, the same motor operates the pump and the valve device is closed so as to direct the liquid under pressure to the part or mechanism. It will be understood that although a single line has been shown from the electromagnetic valve device **33**, that number may be increased as desired, and a switch therefor to each regulator will be employed.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claim.

What I claim is:

In an automotive vehicle, the combination of an electric engine starting motor, a hydraulic pump connected to be driven by said motor, regulator mechanism for moving a vehicle part between two positions of adjustment, said mechanism including a piston and cylinder assembly for driving said part towards one position of adjustment upon admission thereto of liquid under pressure and a counter spring connected in opposition to the piston and cylinder assembly for driving said part towards the other direction upon release of liquid from the piston and cylinder assembly, an electromagnetically opened, spring closed, check valve associated with said piston and cylinder assembly, said check valve being normally closed by the spring thereof to

prevent the admission of liquid to the piston and cylinder assembly and to trap the liquid within the cylinder for retaining the vehicle part in adjusted position, a feed tube leading from the pressure side of said hydraulic pump to said check valve, a return tube connected to the inlet side of said pump, a bypass valve assembly having a main passage therethrough with the inlet side thereof connected to said feed tube and the outlet side thereof connected to said return tube, a reservoir also connected to the outlet side of said main passage, a normally open main valve in said main passage, a solenoid for closing said main valve upon energization thereof, said bypass valve assembly also having a relief passage leading from the inlet side of said main passage to the outlet side thereof, a pressure-responsive normally closed spring tensioned relief valve in said relief passage whereby upon occurrence of predetermined excess pressures in said feed tube said relief valve opens to connect said feed tube with said return tube and said reservoir, a source of electric power, a starter switch, electrical connections between said source, said starter switch and said starting motor whereby upon closing said starter switch said starter motor is energized and said normally open bypass valve assembly circulates liquid from said pump freely through said main passage from said feed tube to said return tube, a regulator switch selectively moveable between a plurality of positions, electrical connections between said source, said regulator switch, said starter motor, said check valve electromagnet and the solenoid of the bypass valve assembly for simultaneously energizing said starter motor, said solenoid and said check valve electromagnet upon movement of said regulator switch to one selected position and for energizing said check valve electromagnet alone upon movement of said regulator switch to another selected position.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,057,088	De Millar	Oct. 13, 1936
2,139,473	Sessions	Dec. 6, 1938
2,147,535	Lankin	Feb. 14, 1939
2,301,576	Parsons et al.	Nov. 10, 1942
2,311,864	Parsons	Feb. 23, 1943
2,330,005	Odenthal	Sept. 21, 1943
2,409,975	Curtis	Oct. 22, 1946
2,425,391	Parsons	Aug. 12, 1947