Jan. 18, 1955 J. B. PARSONS 2,699,650

REGULATOR MECHANISM FOR VEHICLE WINDOWS

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FIG-1-

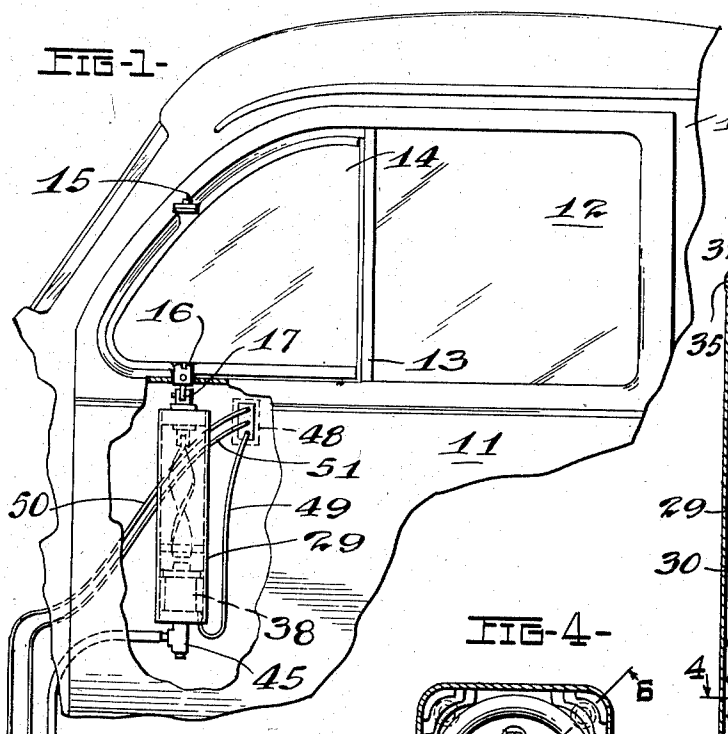


FIG-3-

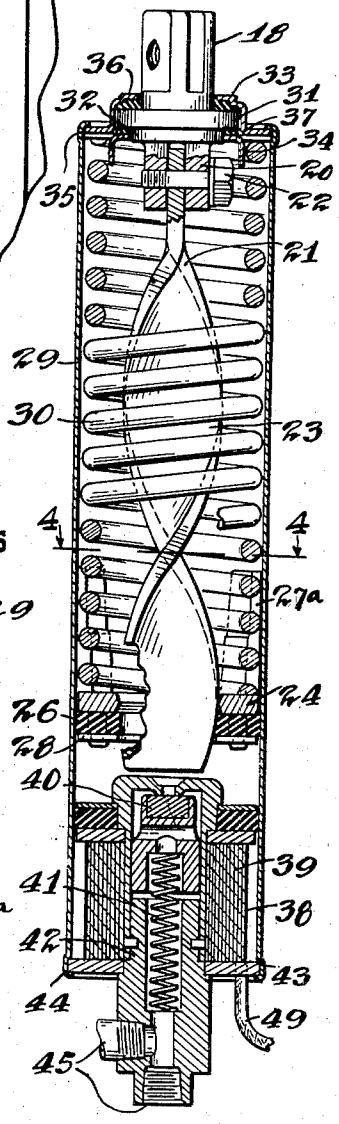


FIG-4-

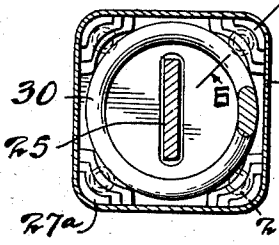


FIG-5-

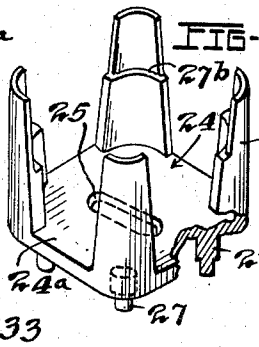


FIG-6-

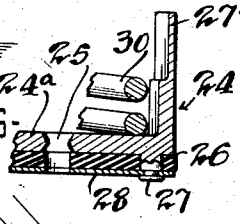
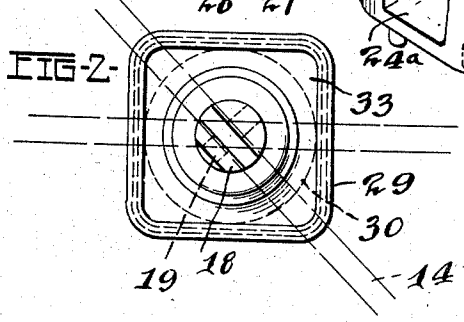


FIG-2-



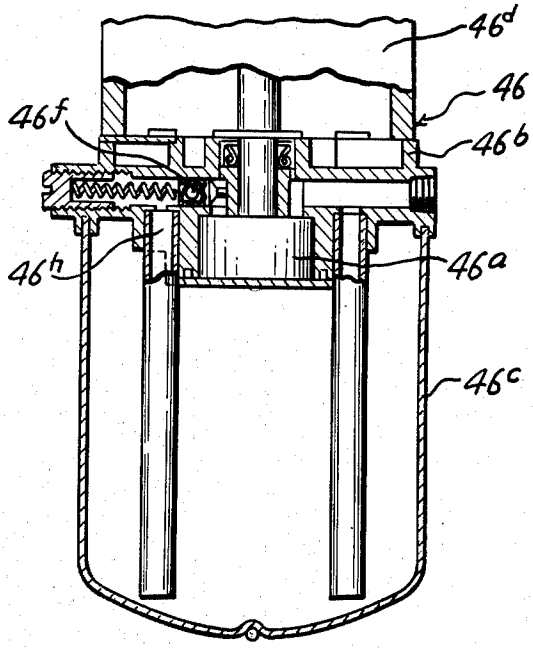
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FIG. 7.



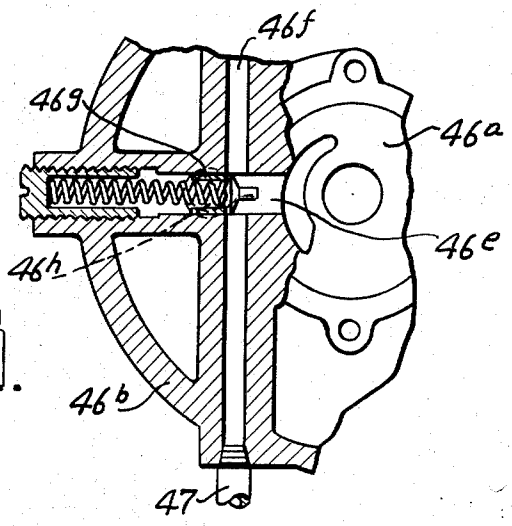


FIG. 8.

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REGULATOR MECHANISM FOR VEHICLE WINDOWS

John B. Parsons, Maumee, Ohio

Application November 20, 1952, Serial No. 321,674

1 Claim. (Cl. 60—52)

This invention relates to regulators, but particularly to regulators for actuating vehicle parts, such as windows, seats and the like, and an object is to produce a regulator of this character which is fluid operated and which includes a device for compensating for fluid pressures in excess of a predetermined maximum. This application constitutes a continuation-in-part of my application Serial No. 678,604, filed June 22, 1946 (now abandoned) and entitled "Pressure Fuid Servo-Motor." Application Ser. No. 678,604 is a division of my application Ser. No. 594,577, filed May 18, 1945, now Patent No. 2,468,943.

Other objects and advantages of the invention 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 fragmentary side elevation of the front end portion of an automobile showing the ventilating wing, parts being broken away to show the regulator mechanism and the pump and connections being diagrammatically illustrated;

Figure 2 is a top plan view of the regulator mechanism indicating by broken lines the positions to which the ventilating vane or wing may be adjusted;

Figure 3 is an enlarged vertical sectional elevation of the regulator and its associated electromagnetically controlled valve;

Figure 4 is a transverse sectional view on the line 4—4 of Figure 3;

Figure 5 is a perspective view of the piston body portion;

Figure 6 is an enlarged fragmentary sectional view of the piston assembly and associated spring, taken on the line 6—6 of Figure 4;

Figure 7 is an enlarged fragmentary view, partly in vertical section, of the motor and pump and reservoir assembly; and

Figure 8 is a fragmentary enlarged transverse sectional view of the pump housing showing the spring-tensioned valve in partially retracted position to allow liquid under pressure to pass therefrom.

The illustrated embodiment of the invention comprises an automobile body **10** having a side door **11** provided with a window opening **12** in which the usual vertically movable window panel is mounted. Forwardly of the opening **12** and separated therefrom by a vertically disposed guide bar **13** is a ventilating wing or vane **14**, which is pivoted to swing about an up and down axis, the upper pivot being indicated by the number **15** and the lower pivot being indicated by the number **16**. Fixed to the vane **14** and depending from the pivot **16** is a flat-sided post **17** which extends between the sides of a yoke **18**, a pin or bolt **19** extending through registered apertures in the post **17** and yoke **18** for holding the parts together. It will be manifest that by rotation of the yoke **18**, the ventilating wing **14** may be swung about its axis, as indicated by the broken lines on Figure 2.

The yoke **18** forms a part of the regulator mechanism and as shown on Figure 3, is an integral part of the slotted stub shaft **20** into which the straight portion of a heilcal ribbon shaft **21** is securely positioned by a bolt **22**. The gradual curve **23** of the helix is formed by twisting a flat, elongate steel ribbon to the desired contour, the ribbon being shown rectangular in cross section.

Fitting the helical ribbon shaft **21** is a piston **24**, which is formed with a slotted central opening **25** conforming to the cross section of and having a sliding fit with the shaft **21** so that the piston can move longitudinally of the

shaft **21**. The piston **24** comprises a substantially rectangular plate or body portion **24***a* from the under side of which depend four integral shouldered pins **27**. A rectangular resilient rubber packing disc **26** is apertured to fit over the pins **27** and retaining the rubber disc **26** in place is a rectangular metallic plate **28** which is also apertured to fit over the pins **27**, the latter being upset or riveted over as indicated on Figure 6, to hold the rubber disc **26** and the plate **28** in position. It will be observed that the slot **25** in the plate **24***a* is of hour glass shape in cross section and as shown in Figure 6, registering slots are formed in the disc **26** and plate **28**. It should be noted that the rubber disc **26** is so constructed and arranged that it not only effects a liquid-tight seal outwardly with the inner walls of the cylinder, but also affords an effective liquid-tight seal inwardly with the helical shaft or ribbon **21**.

On the upper side of the body portion **24***a* of the piston **24** and at each corner thereof are upstanding integral fingers **27***a*, the outer surfaces of which are rounded. Approximately midway of the length of each finger on the inside thereof is formed an inwardly extending shoulder **27***b* the same being formed by reducing the thickness of the metal of the finger projecting outwardly therefrom. It will be manifest that the piston **24** may be conveniently formed by die casting.

The piston **24** is longitudinally slidable in an elongate sheet metal housing **29** which is rectangular in cross section with the corners thereof rounded as indicated on Figure 4, and conforms to the curvature of the outer surfaces of the fingers **27***a*. The fingers **27***a* militate against the piston binding within the housing, insure a smooth sliding movement and also provide a mounting and enclosure for one end portion of a coil spring **30**.

Manifestly the piston **24** is held against rotative movement, but sliding movement thereof longitudinally of the elongate housing **29** is permitted. As a consequence, the longitudinal sliding movement of the piston **24** imparts rotative movement to the helical shaft **21** due to the cooperative engagement of these parts.

As will hereinafter more fully appear, fluid under pressure, such as a liquid, is introduced into the lower portion of the housing **29**, thereby causing the piston **24** to travel upwardly within the housing **29** and impart rotational movement to the shaft **21** in one direction. It will be manifest that downward movement of the piston **24** causes rotational movement of the shaft **21** in the opposite direction. Such downward movement of the piston **24** is effected by the coil spring **30**.

Integral with the stub shaft **20** and disposed a short distance below the yoke **18** is an annular collar **31** directly beneath which is another collar **32** of smaller diameter. The annular collars **31** and **32** are held between the cupped end plate **33** and a curved metallic plate **34** which acts as a bearing element and is backed by the end plate **33**. The metallic end plate **33** serves to close the upper end of the elongate housing **29** and is securely positioned by fitting into the groove formed by crimping the upper end of the metallic housing **29** over the end plate **33**. The upper annular collar **31** rides between a packing **36**, which also snugly embraces the stub shaft **20** and contacts the end plate **33**, and a lower packing ring **37**, which embraces the lower annular collar **32** and contacts the metallic plate **34**. It will be apparent that the shouldered portion of the collar **31** cooperating with the metallic end plate **33** and plate **34** provides a thrust bearing for the shaft **20** and serves to retain the shaft in the desired position.

The lower portion of the casing **29** extends downwardly below the lower end of the shaft **21**, and mounted therein is an electromagnetically controlled valve assembly **38**, which includes a solenoid **39** within which is disposed a hollow slide valve member **40** which is normally urged upwardly to its seat by a coil spring **41**, a portion of the latter being disposed within a sleeve **42**. The arrangement is such that upon energizing the solenoid coil **39**, the valve member **40** is moved downwardly, tensioning the spring **41** and enabling the fluid under pressure to flow therethrough to the piston **24**. When the solenoid coil **39** is deenergized, the coil spring **41** moves the valve to its seat, thereby trapping the fluid within the casing **29** and retaining the shaft **21** in its adjusted position. Thus up-

ward movement of the piston **24** is effected by the introduction of the fluid under pressure to the casing **29**.

When it is desired to effect movement of the vane **14** in the opposite direction, the solenoid coil is energized but the source of pressure fluid is inoperative, thereby enabling the coil spring **30** to force the piston **24** downwardly and effecting a reverse rotation of the shaft **21**. Thus it will be manifest that the valve **40** serves both as an inlet valve to admit fluid under pressure for actuating the piston in an upward direction and also as an outlet valve through which fluid is expelled from the cylinder upon downward movement of the piston in response to the expanding force of the coil spring. A still further advantage of the valve **40** is that it serves automatically to relieve pressure in excess of a predetermined maximum within the cylinder. Thus in the event of expansion of the pressure fluid within the cylinder and beneath the piston, for example when the wing or vane is in closed position, the pressure so built up will unseat the valve **40**, thereby relieving the pressure and militating against injury or damage to the regulator parts.

The extreme lower end of the casing **29** is closed by an end plate **43**, forming part of the electromagnetic valve assembly and which is held in place by crimping the end **44** of the casing **29** about the end plate **43**, which at its inner section seats on to a shoulder in the sleeve **42**. The sleeve **42** is drilled for fluid passage and pipe connections **45**.

The motor pump unit **46** comprises a suitable pump **46***a* contained in a housing **46***b* to which is removably attached a can-like reservoir **46***c* for pressure fluid, such as oil. An electric motor **46***d* drives the pump. In the housing is a passage **46***e* which leads from the pressure side of the pump to a lateral passage **46***f* to which is connected a tube **47** leading to the lower end of the sleeve **42**. Slidable in the passage **46***e* is a spring-tensioned valve **46***g* which in its normal position uncovers a vertical passage **46***h* leading to the reservoir **46***c*, thus allowing fluid from the casing **29** to flow to the reservoir when the pump is idle. When the pump operates, it builds up sufficient pressure to force the valve inwardly covering the passage **46***h* and enabling pressure fluid to pass from the housing to the tube **47** and thus to the casing **29** for piston actuation. More detailed description and illustration of the motor and pump assembly is contained in my Patent 2,393,406, dated January 22, 1946.

A switch **48** is indicated, one lead **49** therefrom extending to the solenoid coil **39**, another lead **50** extending to a relay for controlling the unit **46**, and a third lead **51** extending to a battery B or source of electrical current. The switch may assume the form as shown and described in my Patent 2,344,452, dated March 14, 1944, and is such that either the solenoid **39** may be energized alone, or the solenoid **39** and the pump unit **46** simultaneously may be operated, depending on the manner in which the switch **48** is actuated.

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:

Regulator means for vehicle parts comprising an elongated casing, vehicle part operating means extending through one end of the casing, a piston reciprocable within said casing and serving to actuate said part operating mechanism, resilient means urging the piston towards the opposite end of the casing, a tube leading from said opposite end of the casing, a pump housing having a passage leading to said tube, a reservoir for pressure fluid, a pump in said housing for forcing fluid from said reservoir to said passage thereby to actuate said piston, said housing having a second passage communicating with said first passage and leading to said reservoir, and valve means operable to permit fluid to flow through said first passage to the casing when the pump is operating and to permit fluid to flow from the casing through said passages to the reservoir when the pump is idle, and pressure fluid control means housed within said casing intermediate said combined pressure fluid inlet and outlet means and the piston, said control means including a valve seat, an opening therein to permit passage of pressure fluid to and from the piston, normally closed valve means coacting with said seat for opening or closing said opening and being located on the opposite side of the seat from said piston, said valve means having a surface exposed through said seat towards said piston whereby the resilient means urging said piston towards said opposite end of said cylinder applies fluid pressure tending to unseat said valve means, resilient valve actuating means normally urging said valve against its seat to yieldingly close the pressure fluid opening therein the force of said resilient valve actuating means operating on said valve in opposition to the force resulting from the resilient means urging said piston towards the opposite end of said cylinder, electromagnetic means serving, when energized, to retract the valve from its seat to allow pressure fluid to flow through the opening in the seat in either direction, and when released permitting the valve to be closed by said resilient valve actuating means, said resilient valve actuating means permitting the valve to open to release fluid from the space between said piston and said seat when the pressure of the fluid therein is in excess of a predetermined maximum.

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