

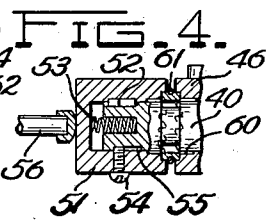
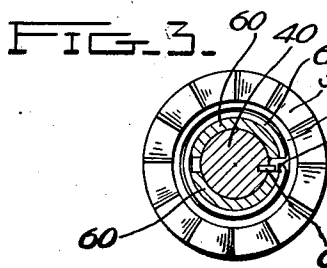
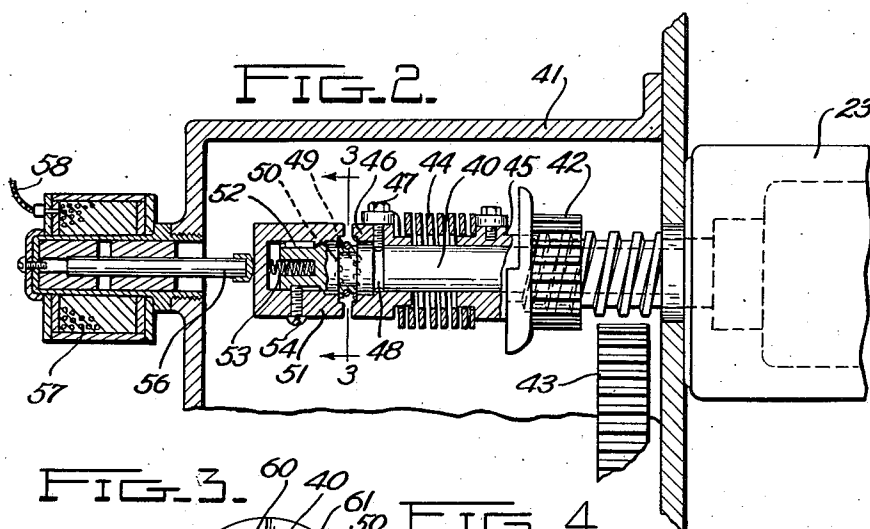
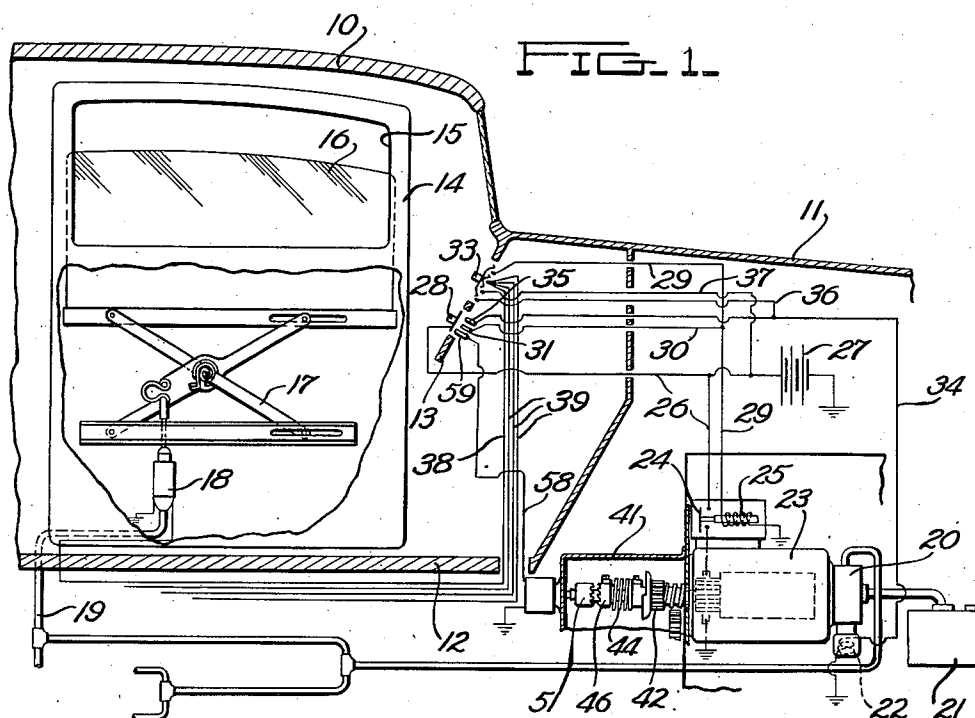
July 8, 1941.

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2,248,379

HYDRAULIC WINDOW REGULATOR.

Filed Aug. 5, 1939



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2,248,379

HYDRAULIC WINDOW REGULATOR

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Application August 5, 1939, Serial No. 288,611

11 Claims. (Cl. 180—1)

This invention relates to automotive vehicles but particularly to the starting mechanism thereof which is adapted to actuate through suitable mechanism a device associated with or forming a part of the vehicle such, for example, as the vehicle windows.

An object of this invention is to produce a simple and efficient window regulator mechanism powered from the starter motor of the vehicle, provision being made for rendering the starter drive ineffective when it is desired to actuate the starter motor for window operation.

Another object is to modify the Bendix drive in such manner that it is rendered ineffective when the starter motor is operating, such, for example, as to operate the vehicle windows.

A further object is to improve the control for the starter motor in an automotive vehicle whereby the driving connection may at will be established with the internal combustion engine but which may also be rendered ineffective in the event the starter motor is operating or is being employed for purposes other than starting the engine.

A still further object is to produce a hydraulic window regulator mechanism which is actuated through the agency of a pump driven by the starter motor and in which the mechanism for establishing driving connection between the motor and internal combustion engine is rendered ineffective when the motor is used for driving the pump, provision being made for militating against operation of the engine driving mechanism while the starter motor is operated.

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 drawing in which

Figure 1 is a diagrammatic view of a portion of an automobile showing a starter motor, the control therefor and also showing one of the vehicle windows operably connected to be driven from the starter motor by a hydraulic device;

Figure 2 is an enlarged sectional view showing the drive or control by which operative connection between the starter motor and internal combustion engine is established;

Figure 3 is an enlarged transverse sectional view on the line 3—3 of Figure 2; and

Figure 4 is a fragmentary sectional view showing the centrifugal device in operative position for blocking movement of the clutch parts thereby to prevent operation of the Bendix drive.

The illustrated embodiment of the invention

comprises an automobile having a top 10, hood 11, floor board 12, and instrument board 13. One door 14 is shown having a window opening 15 which is adapted to be closed by a vertically movable glass panel 16. The window 16 is operatively connected to a suitable regulator mechanism 17 which is actuated through a suitable power unit 18 operatively connected through a pipe line 19 to a hydraulic pump 20. The detail construction and operation of these parts forms no part of the present invention. Suffice it to say that the pump 20 which, in this instance, is unidirectional, operates to pump liquid, such as oil, from a reservoir 21 to the power cylinder 18 to raise the window through the regulator mechanism 17. By shifting a valve associated with the pump 20 by means of a solenoid 22, the pump 20 operates to force liquid from the power cylinder 18 and deliver it through the line 19 to the reservoir 21 and thereby cause downward movement of the window panel 16. Detailed description of the structure and operation of this mechanism is shown and described in the following patent and co-pending applications to which reference is hereby made: Patent No. 2,216,518, dated October 1, 1940; Serial No. 270,014, filed April 25, 1939; Serial No. 275,207, filed May 23, 1939.

It will be understood that, as more definitely set out in the above co-pending applications, when the solenoid 22 is energized, the valve associated with the pump 22 is actuated to a position to reverse the direction of flow of the pump liquid and when in such position, the load imposed upon the pump is reduced. Such reduction in load is of importance as will hereinafter appear.

The pump 20 is operatively connected in any suitable manner as by direct connection to the armature shaft of a starter motor 23 which is dominated by a switch 24 actuated to make a circuit by a solenoid 25, suitable spring means (not shown) being employed holding the switch 24 in the position shown on Figure 1. Current is supplied to the switch 24 by a lead 26, which is suitably connected to a battery 27 and which also extends to a starter control switch 28. From the solenoid 25 extends a lead 29 from which a branch lead 30 extends to a contact piece 31, the lead 29 terminating in a contact engageable by a window regulator switch 33.

It will be observed that the valve controlling solenoid 22 is connected by a lead 34 to a contact piece 35 adjacent the starter control switch 28. A lead 36 branches from the lead 34 and terminates

in a contact member adjacent the window regulator switch 33. Associated with the window regulator switch is a contact piece which is joined by a lead 37 extending to the battery 27. Also associated with the window regulator switch 33 is a contact piece, from which a lead 38 extends to the power cylinder or fluid motor 18 and controls the operation of a valve for permitting liquid to be pumped to or withdrawn from the power cylinder as defined in the above mentioned applications.

Leads 39 extend respectively from contact pieces associated with individual switch members therefor to each of the windows and extend to similar power cylinders associated with each of the windows respectively, in this instance leads for four windows being indicated.

The starter motor 23 has an armature shaft 40 which extends within a housing 41. Mounted on the shaft 40 is a Bendix drive which includes a starting pinion 42 which is adapted to be moved in the usual manner axially of the shaft into engagement with the engine fly wheel gear 43. The spring 44 has one end connected in the usual manner to the sleeve 45 which carries the pinion 42. The opposite end of the spring 44 instead of being secured to the shaft 40, as in the ordinary Bendix drive, is secured to a sleeve 46 which rotates independently of the shaft 40, a screw 47 extending from the sleeve into an annular groove 48 formed in the shaft 40. Formed on the inner face of the sleeve 46 are clutch teeth 49 with which clutch teeth 50 on a cap member 51 are adapted to mesh. The cap 51 fits over the end portion of the shaft 40 and is slidable axially thereof but is connected for rotation with the shaft by a key 52. The cap 51 is normally urged away from the sleeve 46 by a coil spring 53 which is socketed in the end portion of the shaft 40. Movement of the cap is limited by a screw 54 which engages in an elongate slot 55 in the shaft 40.

It will be apparent that when the cap 51 is moved toward the sleeve 46, the clutch teeth 49 and 50 are brought into engagement with each other thereby driving the pinion 42. It will also be apparent that when the cap 51 and the sleeve 46 are separated from each other, the armature shaft 40 can rotate without operating the Bendix drive, thereby enabling the pump 20 to be operated for actuating the windows.

The cap 51 is moved axially of the shaft 40 to bring the clutch teeth into engagement by a rod 56 which loosely abuts the end of the cap and which constitutes the armature shaft of a solenoid, the solenoid coil 57 enclosing the shaft and being suitably mounted on a casing connected to the end of the housing 41. The solenoid 57 is connected by a lead 58 to a contact piece 59 adjacent the starter switch 28. It will be noted that the contact piece 59 projects outwardly beyond the ends of the contact pieces 31 and 35. This is to enable the solenoid 57 to be energized slightly in advance of the time when the valve solenoid 22 and switch solenoid 25 are energized, thus enabling the clutch teeth to be engaged before the starter motor 23 is operated. From the above description it will be apparent that when the starter button 28 is depressed, the cap 51 is first moved axially in order that the Bendix drive may be rendered operative and successively the switch dominating the motor 23 is energized and the valve operating solenoid 22 operates to move the latter to the position of least load.

In some instances, the starter motor 23 may

be operating for window actuation at the same time that the starter button 28 is depressed. Obviously, if the cap 51, which is rotating, is brought into engagement with the teeth on the sleeve 46, damage or injury to the parts might result. To militate against this condition, means is provided for preventing the clutch teeth from being moved into engagement with each other when the armature shaft 40 is rotating. In this instance, an annular groove is formed in the armature shaft 40 in the region between the clutch teeth 49 and 50. Disposed in this groove with their outer surfaces substantially flush with the periphery of the shaft 40 is a pair of arcuate segments 60, which are held in place by a wire spring 61 fitting into a groove in the outer surface of the segment 60. One end of the spring 61 is turned inwardly as indicated at 62.

Fixed to the shaft 40 is a pin 63 which engages one of the segments 60 in order positively to drive the same. During the rotation of the shaft 40, the segments 60 fly outwardly by centrifugal force, the spring 61 being sufficiently light merely to hold the segments in position but not interfere with their outward movement. When the segments 60 are thrown outwardly and the clutch parts are disengaged, they enter complementary recesses 64 formed in the cap 51 and sleeve 46. In such position, the segments prevent the cap 51 from being moved toward the sleeve 46 and thus block engagement of the clutch teeth 49 and 50. As soon as the armature shaft 40 comes to rest, the spring 61 is strong enough to move the segments 60 into their normal position, as shown on Figure 2, and in such position the cap 51 is enabled to move axially of the shaft to bring the clutch teeth into engagement.

From the above description it will be obvious that I have produced a simple and efficient mechanism whereby the windows of an automobile may be moved to and from open position as desired by means of the starter motor of the automobile engine. When the motor is being used for such purpose, the Bendix drive is ineffective but when it is desired to start the engine, the Bendix drive can be readily and conveniently rendered operative. Provision is made for militating against the operation of the Bendix drive in the event that the starter motor is operating for any other purpose.

It will be understood that although I have described the embodiment of my invention in connection with the actuation of vehicle windows, the motor may be employed for other purposes and therefore it will be understood that the above description is given merely for purposes of illustration and 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 claims.

What I claim is:

1. Automotive apparatus comprising in combination, an internal combustion engine, an electric motor, and means responsive to rotation of said motor to connect the motor to the engine for starting, said means including independently operable normally disengaged clutch means for establishing an operative connection between said motor and said connecting means and electromagnetic means for engaging said clutch means.

2. Automotive apparatus comprising in combination, an internal combustion engine, an electric motor, means responsive to rotation of said motor to connect the motor to the engine

for starting, said means including independently operable normally disengaged clutch means for establishing an operative connection between said motor and rail connecting means, and means for preventing operative engagement of said clutch means in case of rotation of the parts at a speed in excess of a predetermined maximum.

3. Automotive apparatus comprising in combination, an internal combustion engine, an electric motor, and means responsive to rotation of said motor to connect the motor to the engine for starting, said means including normally disengaged clutch means and electromagnetically operable means for establishing an operative connection between said clutch and said supporting means.

4. The combination with a vehicle having a window, an internal combustion engine, an electric motor, means responsive to the rotation of the motor to connect the motor to the engine for starting, means interposed between said connecting means and motor for rendering said connecting means normally ineffective, electromagnetically operable means for selectively rendering said connecting means effective, a pump operatively connected to said motor, and an operative connection between said pump and window for actuating the latter.

5. In a drive for a motor adapted to serve as the source of power for a window regulating mechanism comprising a pinion automatically movable into engagement with an engine fly wheel, the combination with a shaft operatively connected to said motor, and with respect to which said pinion is movable, normally disengaged clutch means operatively interposed between said shaft and pinion, and separate means for rendering said clutch means effective.

6. In a starter drive for a motor adapted to serve as the source of power for a window regulating mechanism comprising a pinion automatically movable into engagement with an engine fly wheel, the combination with a shaft operatively connected to said motor and with respect to which said pinion is movable, normally disengaged clutch means operatively interposed between said shaft and pinion, electromagnetic means for engaging said clutch means, and means for militating against operation of said clutch means in the event of rotation of said shaft at a speed in excess of a predetermined minimum.

7. A window regulating system comprising a movable window, fluid actuated means connected to move said window, an internal combustion engine, an electric motor, means responsive to the rotation of said motor to connect the motor to the engine for starting, means interposed between said connecting means and motor for rendering said connecting means normally ineffective, means for energizing said electric motor and rendering said connecting means effective, a pump operatively connected to said motor for supplying fluid to said fluid means, and means operable to establish an operative connection between said connecting means and said motor.

8. A window regulating system comprising a movable window, fluid actuated means con-

nected to move said window, an internal combustion engine, an electric motor, a shaft connected to be driven by said motor, a pinion slidable on said shaft into engagement with the engine fly wheel for starting, a pair of coaxing clutch parts, means operatively connecting one clutch part to said pinion, said last clutch part being rotatable independently of said shaft, a mounting for the other clutch part enabling same to rotate with but movable longitudinally of said shaft into and out of engagement with said first clutch part, manually controlled means for actuating said other clutch part to connect said pinion to said shaft, and a pump driven by said motor for supplying fluid to said fluid means, said clutch parts being normally disengaged to permit said motor to drive said pump independently of the operation of said pinion to start said engine.

9. A window, regulating system comprising a movable window, fluid actuated means connected to move said window, an internal combustion engine, an electric motor, a shaft connected to be driven by said motor, a pinion movable longitudinally on said shaft into engagement with the engine fly wheel for starting, a pair of coaxing clutch parts, means operatively connecting one clutch part to said pinion, said last clutch part being rotatable independently of said shaft, a mounting for the other clutch part enabling same to rotate with but movable longitudinally of said shaft into and out of engagement with said first clutch part, manually controlled means for actuating said other clutch part for selectively connecting said pinion to said shaft, a pump driven by said motor for supplying fluid to said fluid means said clutch parts being normally disengaged to permit said motor to drive said pump independently of the operation of said pinion to start said engine, and means to prevent operation of said manually controlled means in the event that said motor speed is in excess of a predetermined maximum.

10. In a window regulating system having a movable window, fluid actuated means connected to move the window, a pump for supplying fluid to said fluid actuated means, a starter motor connected to operate said pump, an internal combustion engine, and means for establishing a driving connection between said starter motor and engine, said connection including a motor shaft, a pinion on and normally disconnected from said shaft, means for operatively connecting said pinion to said shaft including a pair of clutch members, and means for rendering said clutch members effective to connect said pinion to said shaft.

11. In a drive for a starter motor adapted to serve as a source of power for a device other than an internal combustion engine, the combination of an internal combustion engine, an electric motor, means responsive to rotation of said motor to connect the motor to the engine for starting, said means including independently operable normally disengaged clutch means for establishing an operative connection between said motor and said connecting means, and means for engaging said clutch means.

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