May 2, 1933. E. L. ACKERMAN ET AL 1,907,028

WINDOW REGULATING MECHANISM

Filed Dec. 17, 1929 4 Sheets-Sheet 1

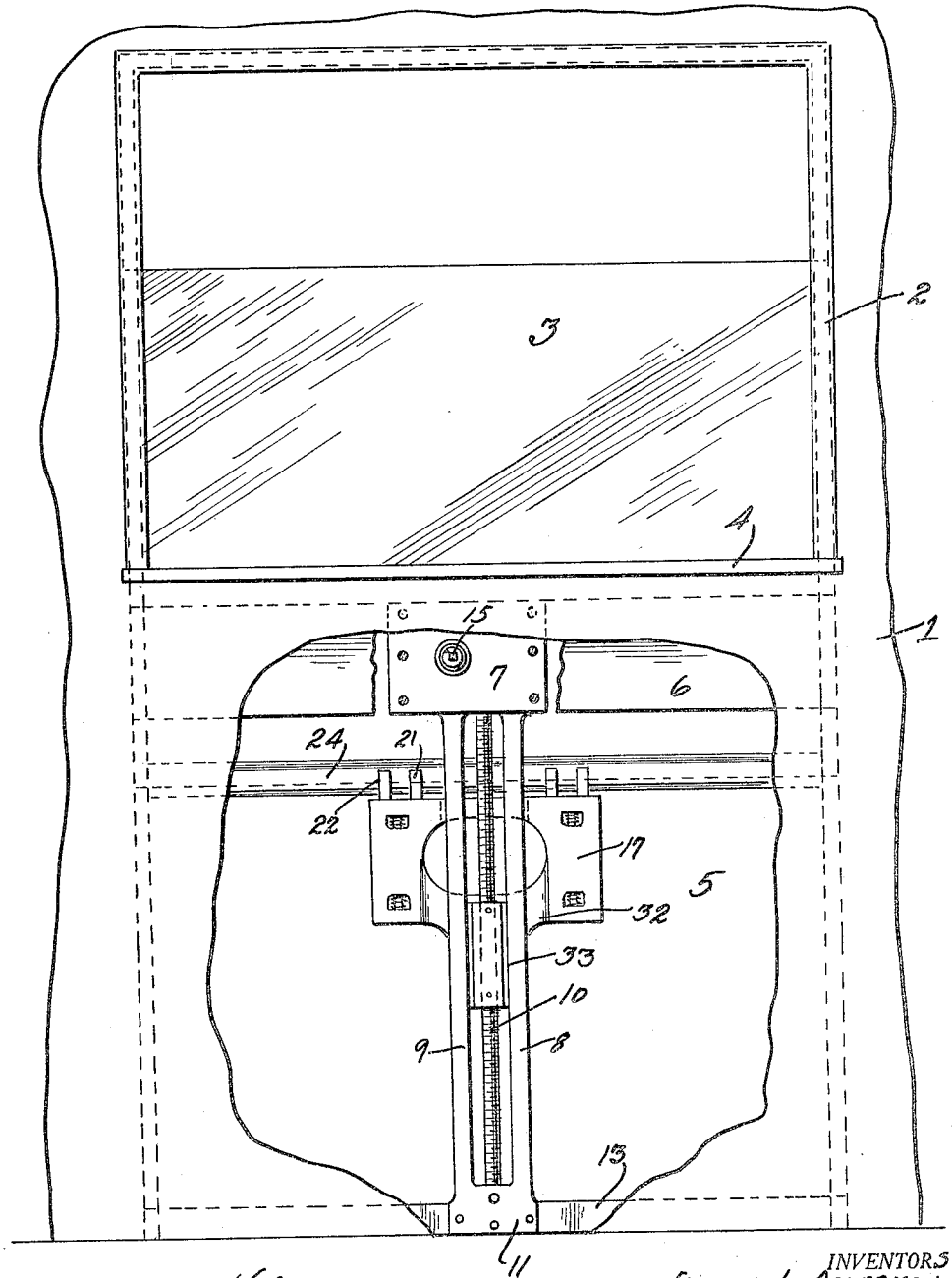


Fig. 1

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WINDOW REGULATING MECHANISM

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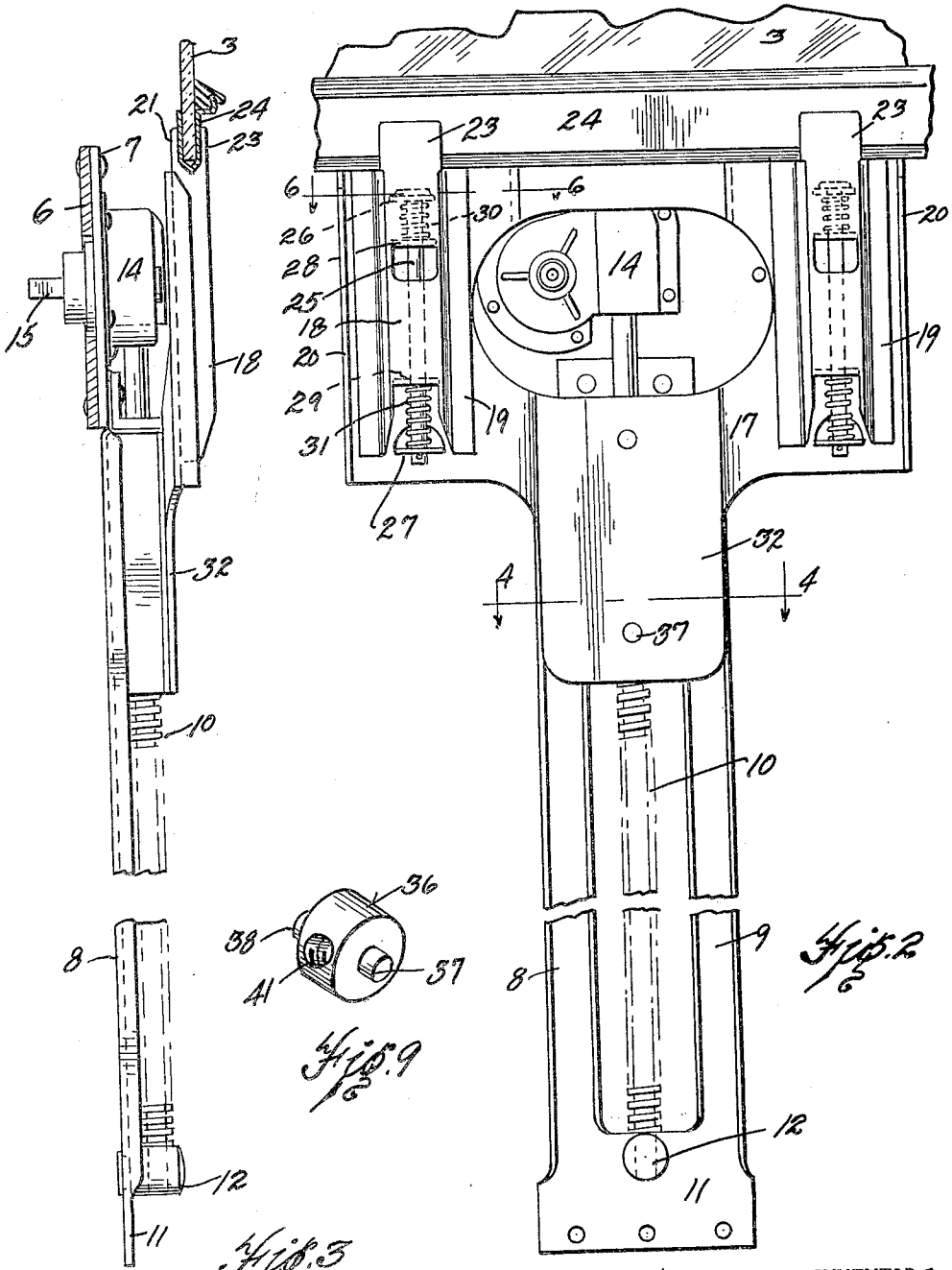


Fig. 2

Fig. 3

Fig. 9

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WINDOW REGULATING MECHANISM

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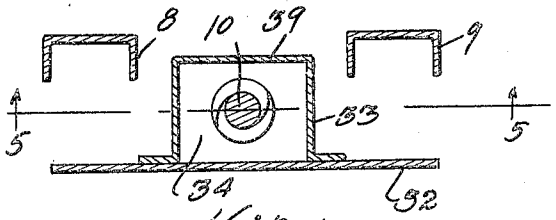


Fig. 4

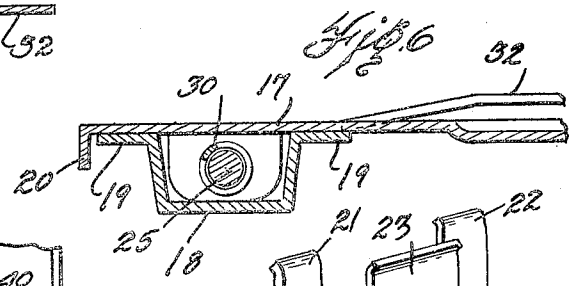


Fig. 6

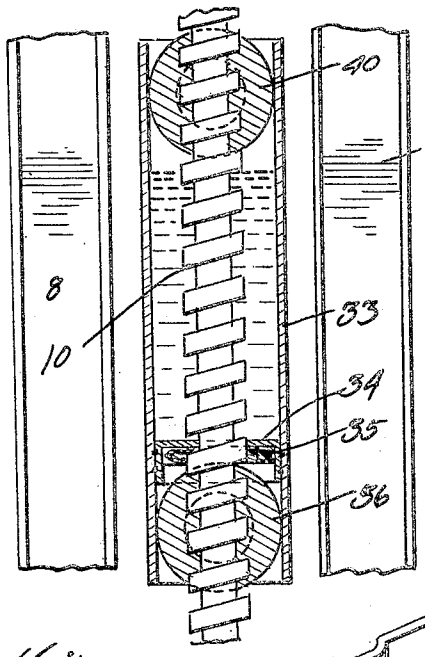


Fig. 5

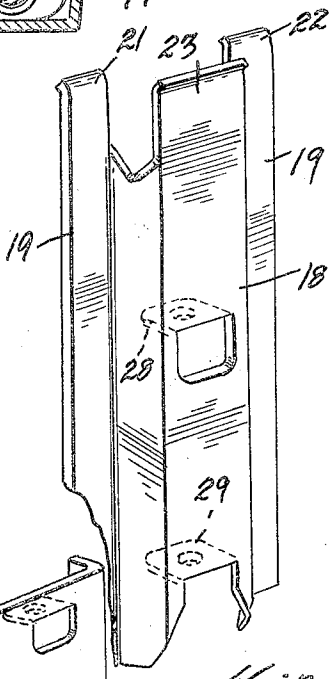


Fig. 8

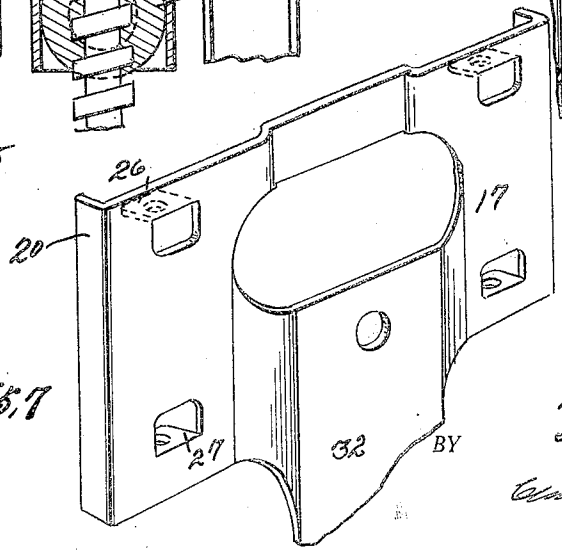


Fig. 7

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WINDOW REGULATING MECHANISM

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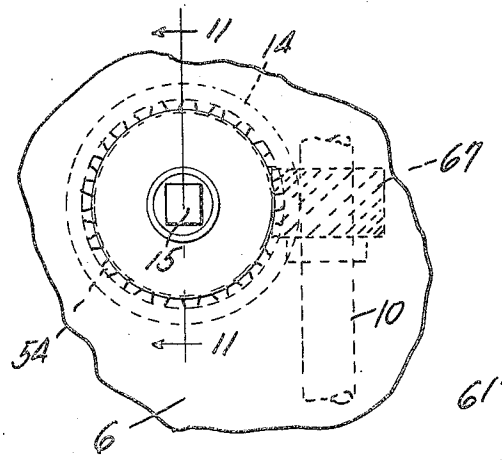


Fig. 10

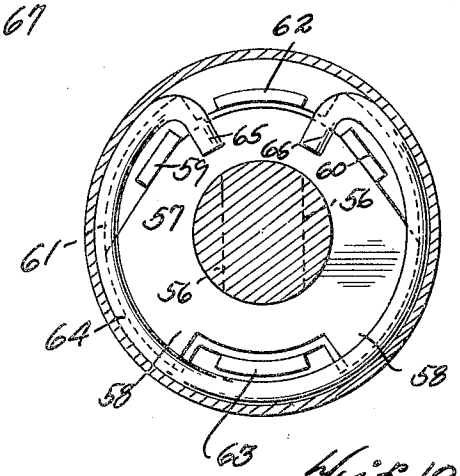


Fig. 12

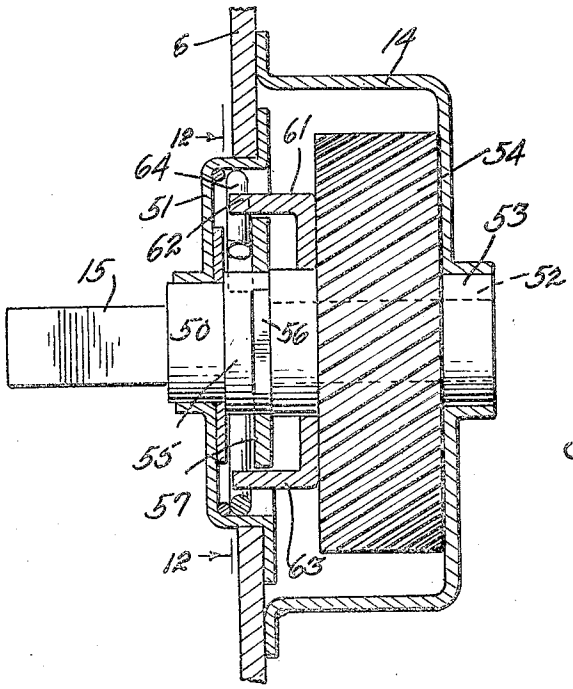


Fig. 11

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UNITED STATES PATENT OFFICE

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WINDOW REGULATING MECHANISM

Application filed December 17, 1929. Serial No. 414,775.

This invention relates to window regulating mechanism, the purpose being to provide a comparatively simple mechanism for the purpose in which the sash is yieldably supported in any of its adjusted positions.

In busses and like types of vehicles in which the general public may raise or lower the sash to vary the size of the opening through a window frame it has been found that breakage occurs through misuse of the structure—that is, the sash will often be jammed shut or moved to its lowermost open position under such force that breakage of the glass often occurs. Further, in the busses or like vehicles the road shock is transmitted to the body of the vehicle to an extent greater than in the usual automobile as the spring suspension of the vehicle is of greater stiffness and the tires are either solid or under such pressure as to give the effect of a hard tire and this tends to cause a breakage of the glass and to cause the usual window regulating mechanism to rattle and become loosened. Thus the spring suspension of the sash by the operating mechanism has been devised to avoid these troubles. Further, mechanism of this character is usually not given very much attention by the driver of the vehicle and an additional feature of this invention is in the provision of an oiling means that will continue to operate over a long period without attention.

Further features reside in the construction of the sash holding means and means by which it is operated, and in the mechanism for preventing movement of the sash relative to its frame due to the shock to which the vehicle is subjected in operation.

These and other objects and novel features of the invention are hereinafter more fully described and claimed, and the preferred form of sash or window operating mechanism embodying our invention is shown in the accompanying drawings in which—

Fig. 1 is an elevation of a window frame and sash in slidable relation therein, part being broken away to show our improved regulator mechanism for operating the sash.

Fig. 2 is an enlarged elevation of the sash operating mechanism.

Fig. 3 is an elevation taken from the left side of Fig. 2.

Fig. 4 is a section taken on line 4—4 of Fig. 2.

Fig. 5 is an enlarged section of the oil retaining portion of the regulator mechanism.

Fig. 6 is a section taken on line 6—6 of Fig. 2.

Fig. 7 is an enlarged perspective view of part of the sash supporting means.

Fig. 8 is a perspective view of a complemental part thereof to which the sash bar is attached.

Fig. 9 is a perspective view of the nut used on the screw shaft.

Fig. 10 is an elevation of part of the lock board showing the gearing employed for actuating the sash operating screw shaft.

Fig. 11 is an enlarged section through the said mechanism taken on line 11—11 of Fig. 10.

Fig. 12 is a section taken on line 12—12 of Fig. 11.

The general arrangement of our improved sash operating mechanism in relation to a sliding sash is shown in Fig. 1 in which the body of the vehicle, such as a bus or other conveyance, is indicated at 1 and the window frame is indicated generally at 2 which may be of any desired form or design the side rails and top rail of which are formed with the usual groove to receive the edges of the glass element 3. The window opening is provided with the usual sill 4 at the bottom and the vehicle body is provided with the usual pocket or well 5 into which the sash member may be lowered. This pocket is provided with a common form of lock board 6 and the sash operating mechanism consists of a frame the upper end 7 of which is attached to the lock board and is provided with a pair of depending bars 8 and 9 spaced apart as shown. A vertical screw 10 is rotatably supported at its lower end in a member 12 shown in Fig. 2. This member 12 is secured in the portion 11 connecting the lower ends of the bars 8 and 9.

As will be seen more clearly from Figs. 2 and 4 these bars 8 and 9 are of sheet metal

and channel-like in form to provide strength and the member 11 at the bottom connecting the two is provided with apertures by means of which it may be secured to an element, such as 13 in the lower part of the sash pocket or well 5 by means of screws.

The operating mechanism consists of gearing within the casing 14 operated by the stem 15 projecting to the interior of the vehicle from the lock board. A handle may be attached to the stem 15 for rotation thereof and through rotation of which the screw 10 is rotated in one direction or the other depending upon the direction of rotation of the element 15. Movable vertically on the screw shaft is the sash holding member comprising a plate 17, the upper portion of which is shown in Fig. 7, and on which the housings 18 are slidably supported as will be understood from Fig. 2. The two housings 18 are equidistantly disposed on opposite sides of the screw shaft and the construction of a housing 18 is shown in perspective in Fig. 8 and the base portions 19 thereof lie practically in contact with the upper end of the plate 17 as is shown in Fig. 6. The opposite ends of the head of this plate 17 have an upstanding edge flange 20 to strengthen the same. The upper end of the housing 18 has three fingers 21, 22 and 23 spaced sufficiently to receive the sash bar 24 shown in Figs. 2 and 3 in which the glass 3 seats at its bottom edge. These fingers 21, 22 and 23 may be welded or otherwise secured to the sash bar 24. These housings 18 are slidable on the face of the member 17, as previously stated, and are each supported in place by a rod or pin 25. The head of the plate 17 has struck-up lugs 26 and 27 on each opposite side which extend into the central outpressed portion of the respective housing 18 each of which is also provided with companion struck-up lugs 28 and 29.

The pin 25 passes through apertures in each of the lugs of the two members, it being supported in the lugs 26 and 27 of the plate 17 while the lugs 28 and 29 of the member 18 are slidable thereon and in spaced relation with the first pair of lugs when the parts are assembled as will be realized from Fig. 2. A coiled spring 30 is positioned on the rod between the lugs 26 of the plate 17 and 28 of the housing 18 and a spring 31 is positioned on the rod between the lugs 27 of the member 17 and 29 of the housing and it is to be understood that each housing is similarly arranged and mounted.

The two sets of springs 30 and 31 thus act as a shock absorber and take up the rebound that might result through a shock to the vehicle causing compression of the springs 31, which, without the use of the springs 30, would result in a consequent elongation of the springs 31 subsequent to the compression. The sash is thus yieldably supported against movement in either direction in a vertical plane in the arrangement illustrated.

As the sash is supported solely by the housings 18 it will be noted that it is spring suspended due to the movability of the member 18 on the rod and relative to the plate 17 and that, on closing a window for instance by the operating mechanism, movement of the sash to contact with the upper part of the frame cannot be so forcible as to break the glass due to the fact that the springs 30 on the two opposite sides of the member 17 are placed under compression as the glass member seats at its upper point of movement.

On downward movement of the member 17 to withdraw the glass into the pocket the springs 31 are placed under compression at the limit of movement and both sets of springs may act in either closing or opening movement of the sash providing the glass is frictionally held. Thus, the glass is relieved from excessive strains in the opening and closing movements thereof and at any point of adjustment the glass is spring suspended and therefore yieldably held in position.

As previously stated, it is desirable that the parts be lubricated and in a manner not to require continuous attention and still remain in lubricated condition for a long period of time. For this purpose we have provided on the portion 32 of the member 17 a sheet metal housing 33 which is flanged, as shown in Fig. 4, and preferably welded to the portion 32. As shown in Fig. 5 this housing is provided with a metal plate 34 apertured to permit movement of the screw 10 therethrough and a felt washer 35 is placed therebeneath. The plate holds the washer from following the screw in one direction and is held from movement in the other direction by the lower nut 36 shown in perspective in Fig. 9. This nut is preferably formed of a cylindrical member having the shaft like projections 37 and 38 on opposite sides one of which projects through an aperture provided therefor in the lower portion of the part 32 of the plate 17 and the other of which extends through an aperture (not shown) in the rear side 39 of the housing 33.

There is also a similar nut 40 near the upper end of the housing 33, as shown in Fig. 5, and both these nuts are of similar form and provided with a central transverse threaded aperture 41 for the screw. The nuts are thus attached to the portion 32 of the member 17 and rotation of the screw causes the nuts to traverse the screw and carry the member 17 and the parts supported thereby, including the sash, to move upwardly or downwardly depending upon the direction of rotation of the screw 10.

This housing 33 is adapted to be filled with grease of appropriate fluidity and thus the

screw is lubricated throughout the length of travel of the member 17 thereon. The washer 35 serves to prevent loss of grease through the lower end of the housing 33 and tends to wipe the threads of the screw comparatively clean of grease as the member 17 and housing 33 are moved thereover as will be readily understood from the construction described.

The mechanism for operating the shaft 10, as previously stated, is carried in the housing 14 attached to the lock board 6. This mechanism consists of the shaft 15, having the squared end for attachment of an operating handle (not shown), which is provided with an enlarged cylindrical part 50 rotatably supported in a hub formed in the case 51 also attached to the lock board. This shaft 15 further has a reduced portion 52 shown by dotted lines which extends through an aperture provided centrally of the shaft 53 for the spiral gear 54 in the housing 14.

The shaft 15 also has a central enlarged portion 55 formed with two flat portions 56 on opposite sides thereof as will be understood from Fig. 12 which receive the plate 57 which is held from displacement when the parts are assembled by reason of the end of the gear shaft 53 engaging the same and further through the aperture in the plate 57 being a close fit on the flat portions 56. This plate 57 is preferably of the form shown in Fig. 12 having the oppositely disposed end portions 58 extending practically to the inner periphery of the case 51 and further carries the lugs 59 and 60 as shown in Fig. 12. On the gear shaft and attached thereto or to the gear is a companion plate 61 having the lug 62 at the upper side and lug 63 at the lower side as shown in Figs. 11 and 12. A friction element consisting of practically a single turn of spring wire 64 is positioned in the casing 51 which, in its expanded condition as shown in Fig. 12, engages the casing. By turning the handle 15 in either direction the lugs 59 or 60 as the case may be, engage the respective inturned ends 65 and 66 of the spring and contract the same. These inturned ends lie between the lugs 60 and 62 on one side and 59 and 62 on the other side. Rotation of the gear and consequently of the plate 61 will cause the lug 62 to engage one or the other spring ends 65 or 66 and expand the same to frictional engagement with the casing.

The clutch device and its relationship with the gear 54 is provided to permit practically free rotation of the shaft 15 and gear 54 and consequently of the shaft 10 through the gear 67 on the said shaft meshing with the spiral gear 54 and to prevent rotation of the screw shaft through pressure applied to the shaft 10 due to the fact that rotation thereof causes an expansion of the spring 64. Thus, with the sash carried by a member having the nuts 36 and 40 through which the shaft 10 extends, the jar to which the sash is subjected in the operation of the vehicle and which would normally tend to cause rotation of the shaft 10 is obviated and the sash always yieldably supported in its set position and yet free to be operated as occasion may demand.

By this described arrangement of parts we are enabled to provide a comparatively inexpensive regulator for heavy windows such as are used in busses or the like where they are subject to more or less misuse through the handling thereof by the general public and yet are able to make the major portion of the parts of stamped sheet metal reducing the expense of construction as to material and labor costs involved and secure a window regulator in which the sash is spring suspended at any of its points of movement and at all times and in which the parts are continuously lubricated.

It is further believed evident from the foregoing description that the various objects of the invention are attained by the construction described.

Having thus briefly described our invention, its utility and mode of operation, what we claim and desire to secure by Letters Patent of the United States is—

1. In a window regulator, mechanism for raising or lowering the sash in a vertical plane including a fixed plate, a vertical screw shaft supported thereby, a movable plate, a nut on the screw shaft in fixed relation with the movable plate whereby rotation of the screw shaft in one direction or the other moves the plate, means yieldably supporting the sash relative to the movable plate, a housing enclosing the nut and a portion of the scraw shaft adapted to contain a lubricant, and a felt washer supported in fixed relation in the housing and apertured to receive the screw shaft whereby on movement of the plate the shaft is lubricated and maintained free of excess lubrication.

2. In a window regulator, mechanism for raising or lowering the sash in a vertical plane, a vertical screw shaft, means for rotatably supporting the same, said regulator mechanism including means for rotating the screw shaft, a plate provided with lubricant-retaining housing through which the screw shaft extends, a nut on the shaft in the lower part of the housing fixed to the plate, a closure for the bottom of the housing having an aperture for the shaft, a felt washer supported between the closure and the nut and encircling the shaft preventing leakage of lubricant from the housing and providing means for wiping the screw shaft as the plate and housing are moved thereover through rotation of the shaft, and sash supporting means carried by the plate.

3. In a window regulator mechanism for

raising or lowering the sash vertically in its frame comprising a screw shaft rotatably supported in fixed vertical position, a plate having a nut threaded on the shaft whereby rotation of the shaft in either direction causes movement of the plate, sash supporting elements in spaced relation on the said plate equidistantly on opposite sides of the screw shaft, each of said elements comprising a housing, the upper ends of which are arranged to engage opposite sides of the lower edge of the sash, spaced lugs on the said housing in vertical alignment extending toward the said plate, lugs on the plate in vertical spaced relation respectively with the lugs on the housing, a shaft on the said lugs of the plate, the lugs of the housing being apertured to slide on the shaft, spring means between the lugs of the housing and of the plate whereby the housing is yieldably supported from movement in either direction on the said shaft, and means for rotating the screw shaft including a manually operable friction clutch mechanism releasable by manual operation in rotating the screw shaft and normally tending to hold the screw shaft from rotation.

In testimony whereof we sign this specification.

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