May 20, 1969 C. RIVOLIER 3,444,649

WINDOW RAISING DEVICE

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Fig.1

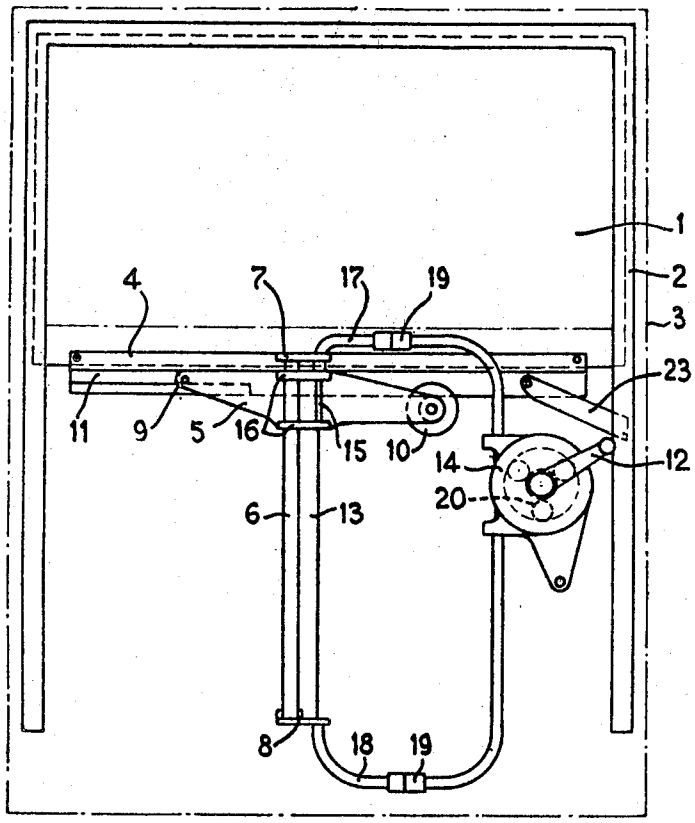
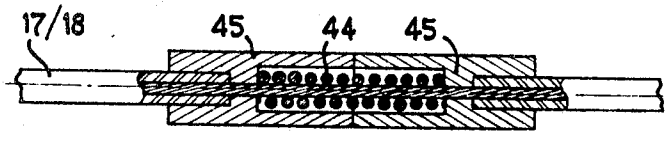


Fig.4



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Fig.3

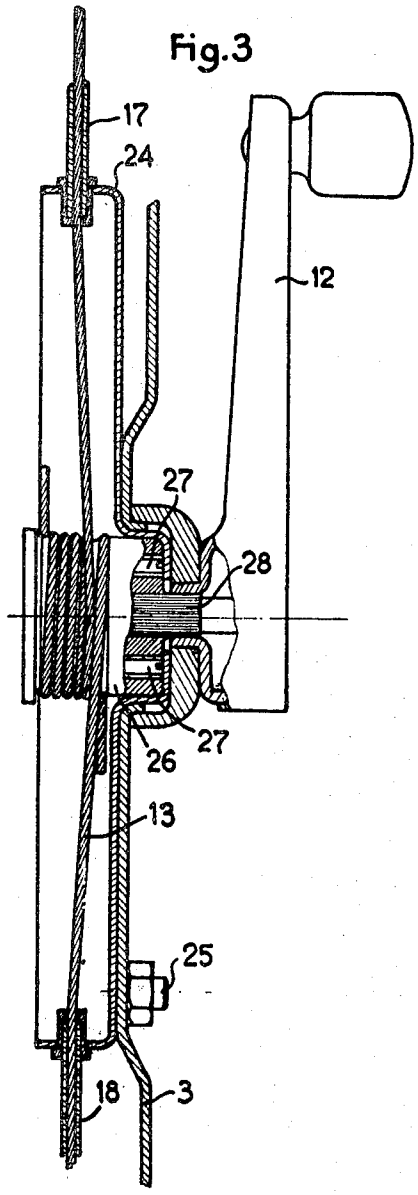
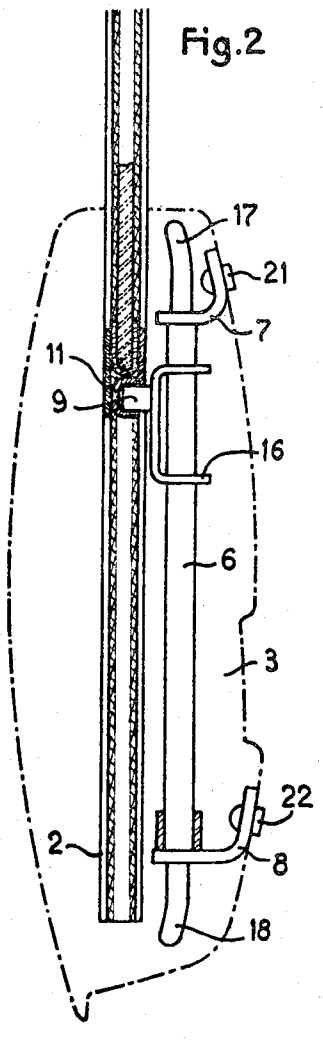


Fig.2



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Fig.5

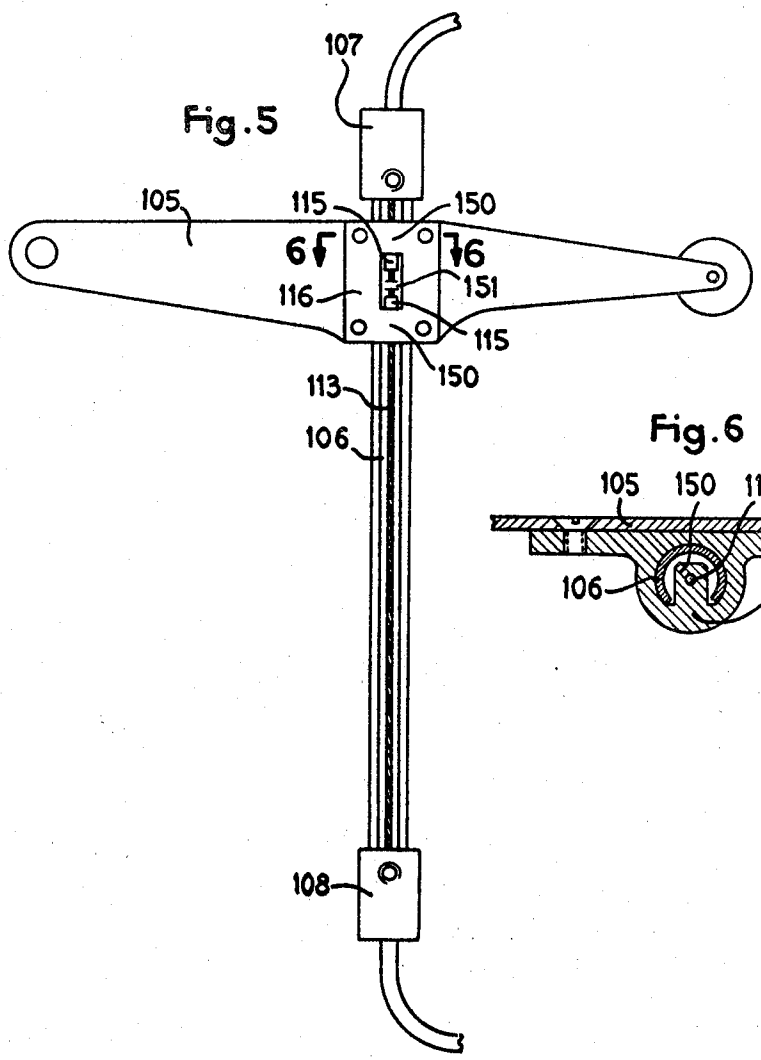


Fig.6

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3,444,649

WINDOW RAISING DEVICE

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Int. Cl. E05f 11/48
U.S. Cl. 49—352 1 Claim

ABSTRACT OF THE DISCLOSURE

A window raising device employing a closed loop cable having at least two cable conduits connected by a device including a compression spring to maintain adequate cable tension with said window being mounted to ride upwardly and downwardly within grooves of a frame thereabout.

Such devices are generally of the type comprising a window sliding on two parallel grooves provided on a fixed frame by means of a cable which lowers or raises the window through a bearing member rigidly connected to said cable, the latter being generally guided by pulleys fixed to the frame.

In the devices of this type, the cable is subjected to the action of the exterior contaminants which entail important damages to the cable. Furthermore, the mounting of said pulleys is generally difficult to effect.

It is therefore an object of this invention to provide a window raising device operative to move a window slidably mounted on two parallel grooves provided on a fixed frame, said window raising device comprising an operatively guided closed loop cable operative upon actuation by a control device to move a bearing member connected to the window for lowering or raising the latter, characterized in that said closed loop cable is located in fixed C-shaped tubing means which are so secured to the frame that the free portion of said cable located between the free ends of said C-shaped tubing means extends substantially parallel to said grooves to support said bearing member operatively secured to said free portion of said cable.

It is obvious that with such a feature, the cable is better protected. Furthermore, one of the two portions of the cable acts on the window to riase it while the second portion lowers it, the two portions of the cable are alternatively submitted to tensile stress during these reverse movements. This feature allows to use a small section cable and consequently not expensive.

Other advantages of the invention will become more apparent on consideration of the following description referring to the accompanying drawings wherein;

FIGURE 1 is a schematic view of the window raising device according to the invention.

FIGURE 2 is a lateral view of the guiding device of the bearing of the cable.

FIGURE 3 is a partial section of a manually control device according to the invention.

FIGURE 4 shows a longitudinal section of a spreading means according to the invention.

FIGURE 5 illustrates partially another embodiment of a window raising device.

FIGURE 6 is a cross sectional view taken substantially on the line 6—6 of FIGURE 5.

FIGURE 1 shows a window 1 adapted to slide on two grooves 2 provided on a fixed frame 3, as represented in phantom lines. Said frame may be the door of a vehicle for instance. At the lower portion of the window 1, a body 4 is secured to receive the descending and raising movements of the window 1 which are communicated to

said body by means of a bearing member 5. The end portions of the latter are provided with rollers 9 and 10 adapted to transversally roll in a groove 11 provided on the body 4 and beneath the latter respectively.

A cable 13, disposed in a plane substantially parallel to the plane of the window, transmits the stresses of a control device 12 to the bearing member 5. The cable 13 is rigidly connected to the latter by means of a sleeve 15 set on the cable and wedged between the two ears of a U-shaped member 16 integral with the bearing member 5. The cable 13 is stretched between two supporting members 7 and 8 fixed to the frame, on the portion of said cable substantially parallel to the grooves 2. The upper and lower portions (FIG. 1) of the cable 13 are each guided in metallic tubing means 17 and 18 or in rigid or semi-rigid plastic tubings preferentially which take abutment on the supporting members 7 and 8. The cable is similar to an endless cable working between the control member 12 and the bearing member 5. The two end portions of the cable are secured to the control member 12.

A guiding stem 6 is integral with the supporting members 7 and 8, by welding for instance. Supporting members 7 and 8 are fixed to the internal wall of the fixed frame by means of bolts 21 and 22 (FIGURE 2). The stem 6 is provided to guide the bearing member 5 through the U-shaped member 16 integral with the bearing member 5 and comprising two ears which will be advantageously as spaced as possible to insure a good guiding of the bearing member 5 on the stem 6. A lack of parallelism between the latter and the grooves 2 is absorbed by the rollers 9 and 10 which have a transversal play.

Thus, a rigorous parallelism between the stem 6 and the grooves 2 is not requested. Furthermore, the rollers 9 and 10 are free perpendicularly with respect to the window when considering FIGURE 1. One of the two rollers, roller 10 for instance, could insure only the raising of the window and not the descending so as to allow the free actuation of a self-clamping device 23 which prevents the window from lowering, by a direct action on the latter.

Another feature of the invention is the guiding of the bearing member by a stem integral with the frame. This embodiment allows to raise the window without any risk of jamming of the latter in its grooves even if one of them is shortened due to the fact that the window is broken in two parts.

Raising and descending movements of the window could be manually effected or by means of an auxiliary power source, electric or pneumatic for instance.

To raise the window, the resultant of the weight of the latter and different parasit frictions must be overcome. A reducing gear must be advantageously provided between the cable and the handle of the crank.

Referring to FIGURE 3, a manually control device is illustrated, wherein the reduction ratio of the stress is merely achieved by means of a small diameter drum 26 around which is wound alternatively each end portion of the cable, in one direction, then in the other direction, within an helicoidal groove provided on the periphery of the drum to guide cable 13. The end portions of cable 13 pass through diametral slots bored in the drum 26. Cable 13 is stretched and each of its end portions is secured by means of a worm 27. A splined axle 28 transmits the rotation of a crank 12 to the drum 26. The supporting member 24 of the drum 26 can be fixed to the frame 3 by means of one set screw only as in 25 and serves as an abutment member for tubings 17 and 18.

A pulley comprising two toric grooves of relatively great diameter can be used instead of the small diameter drum, to maintain a constant direction of each end portion of the cable. Said pulley must be able to develop the raising

of the window by one revolution. It is thus necessary to associate a reduction ratio device. On FIGURE 1, such device **20** is of the type having epicycloidal gearings comprising a sun gear, three planet gears and a rim forming a pulley having two grooves.

An auxiliary power source may be used to raise or lower the window **1**. An electric power source may also be used, the latter controlling a motor which controls an epicycloidal gearing by means of a resilient driving device and a worm and pinion gearing.

The actuation of the device, according to the invention, is as described hereinafter: When the crank **12** is turned in one direction, the cable **13** rigidly fixed to the bearing member **5**, raises the window through the rollers **9** and **10**, the guiding being insured by means of the stem **6**. During this step, the portion of cable **13** passing through the tubing **17** is submitted to tensile stress, while the portion passing through the tubing **18** is submitted to compression stress. Should the crank **12** be turned in the reverse direction, the window lowers, the portions of the cable **13** submitted to tensile and compression stresses being inverted.

Each of the portions of the cable being alternatively submitted to tensile stress, spreading means **19** are inserted in each tubing **17** and **18**. The spreading means as illustrated by FIGURE 4 are comprised of two sleeves **45** surrounding the tubings **17** and **18**. A preloaded spring **44** located in the cavity of the sleeves **45**, is adapted to spread away these latter with respect to one another, to stretch the cable.

The portion of the cable transmitting the movement to the window to raise or to lower the latter, being ever submitted to tensile stress, it is not necessary to associate to the device a return spring, stretched by the descending movement, to help the raising of the window.

Another embodiment of the window raising device, according to the invention, is illustrated by FIGURE 5 and has the advantage to provide a better protection of the cable. The portion of cable **13** outwardly of the tubings **17–18** of the embodiment of FIGURE 1, is represented in FIGURE 5 by reference numeral **113**. This portion passes through a guiding pipe **106**. The latter should be advantageously longitudinally split to permit the passage of a fixation means between the cable **113** and a bearing member **105** which transmits the raising and descending movements to the window. The guiding of the bearing member **105** is insured by means of a guiding member **116**, formed in a plastic material preferentially. As it can be seen in FIGURE 6, the split pipe **106** passes through the guiding member **116**. The driving is effected towards the two directions by means of two projections **150** which penetrate into the split pipe **106** and are respectively drawn by the end portions of the cable **113** on which stop means **115** are crimped. The two end portions of the cable are introduced through a slot **151** provided in the guiding member **116**. This embodiment, allows to the tensile stresses on the cable to exert along the axis of the guiding pipe **106**, and therefore suppresses the resulting torque of the overhang of the stem **6** with respect to the cable **13** in the embodiment accordingly to FIGURE 1.

The split guiding pipe **106** is fixed at its end portions by means of supporting members **107**, **108**, the latter being fixed to the frame by means of worms (not shown). The supporting members **107** and **108** which serve also as abutment members can advantageously be formed in a plastic material, so as to lower the price of the device.

The window raising device according to the invention needs only a single pulley to insure the control of the device, and consists of a set of unitary assembly which can be fixed to the frame by means of few worms.

It will be apparent to those skilled in the art that the invention is susceptible of a variety of changes and modifications without departing from the scope and spirit of the appended claim.

We claim:

1. A window raising device operative to move a window slidably mounted on two parallel grooves provided on a fixed frame, said device comprising:

a guided closed loop cable capable of moving a bearing member operatively connected to the window, said bearing engaging the lower edge of the window and having a guiding member between the free ends of a C-shaped tubing means affixed to the frame, said C-shaped tubing means having at least one sectioned portion between the ends of which spreading means are inserted to spread away said ends with respect to one another to increase tension of the cable, said spreading means being comprised of a preloaded compression spring slipped on the cable and inserted into two sleeves of the spreading means fitted on the adjacent ends of said tubings; and

a control device connected to said cable, characterized in that said closed loop cable is located in said C-shaped tubing means with the free portion of said cable located between the free ends of said C-shaped tubing means being substantially parallel to said grooves and operatively secured to said bearing means.

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