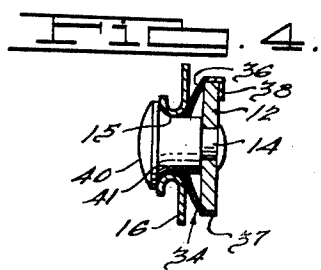
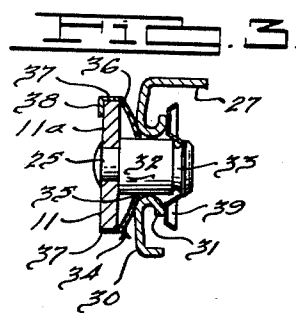
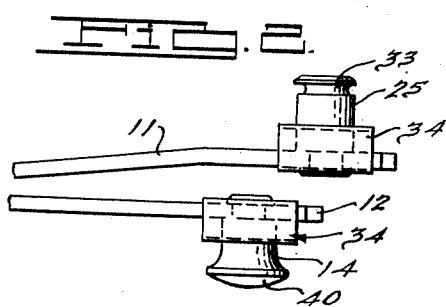
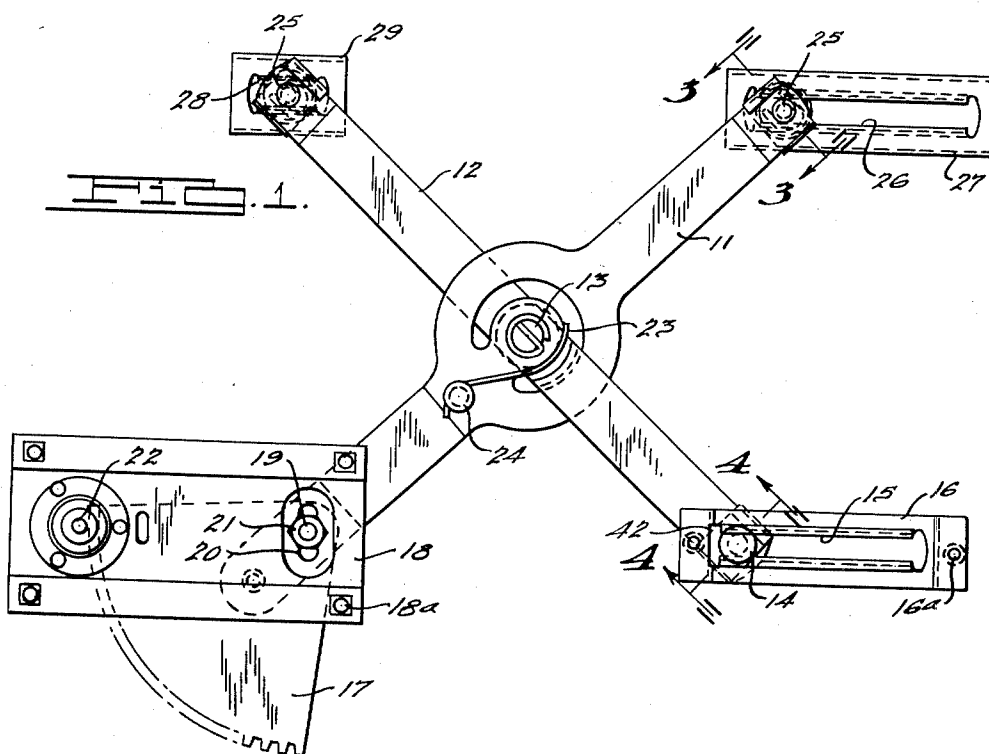


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WINDOW CONTROL MECHANISM

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WINDOW CONTROL MECHANISM

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This invention relates to window regulator mechanism and particularly to mechanism for controlling the movement of glass or transparent panels or the like of vehicles, especially automobile bodies, an object of the invention being to provide an improved mechanism which is compact, relatively simple in construction and economical to manufacture, eliminates considerable frictional resistance to the movement of the window panel, is capable of being easily assembled, and is adapted for use without material changes to various types of windows.

More particularly the present invention is embodied in improved means for slidably connecting the outer end of a swinging regulator arm to a bracket secured to the bottom of the glass or transparent retainer channel or to a mounting plate fastened to the inner side of a vehicle body or door panel, the improved means in its preferred form comprising a transverse stud or pin fixed adjacent the outer end of the arm, a compression element on the stud having means cooperable with the adjacent portion of the regulator arm to hold the element on the stud prior to the insertion of the latter into an aperture in the bracket or mounting plate, and means carried by or mounted on the stud for locking the stud against withdrawal from the aperture in the bracket or mounting plate in a direction normal to the plane thereof after the insertion of the stud through such aperture.

Other features and objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a view illustrating a window regulator mechanism embodying the present invention.

Fig. 2 is an enlarged fragmentary top elevation of the ends of the window regulator arms shown prior to connection to the transparent panel retainer channel bracket and the mounting plate.

Fig. 3 is a section taken substantially through lines 3—3 of Fig. 1 looking in the direction of the arrows and illustrating one embodiment of the present invention.

Fig. 4 is a section taken substantially through lines 4—4 of Fig. 1 looking in the direction of the arrows and illustrating a second embodiment of the present invention.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawings the embodiments of the present invention are illustrated in association with a window regulator of the cross arm type, although it will be understood that depending upon requirements such regulator mechanism may embody a window regulator of the single arm or double arm type. The window regulator mechanism of the cross arm type comprises a pair of intersecting crossed arms 11 and 12 for raising and lowering the window pane. These arms are pivoted together at 13 at the locality of their crossing and the construction and arrangement of the arms are such that they will pass by each other during operation.

The inner or lower end of the arm 12, which may be

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termed the balance arm, is provided with a connection including a transverse stud 14 riveted to the end of the arm and slidable within a guideway or guide slot 15 in a mounting plate 16. This connection of the arm 12 with the mounting plate 16 will later be described in connection with Fig. 4.

The inner end of the regulator arm 11, which may be termed the driving arm, is rigidly attached to a gear sector 17 journaled on a mounting plate 18 by a stud 19 which is adjustable in an arcuate slot 20 in the plate, the stud being held in fixed position by means of a nut and lock washer 21. The gear 17 is driven by means of a pinion (not shown) secured in the usual manner to a transverse handle shaft 22 which may be turned by means of a crank handle at the inner side of the vehicle body or door. The mounting plates 16 and 18 are formed with suitable screw bosses 16a and 18a, respectively, by means of which the mounting plates may be secured by screws to an inner panel. The weight of the window panel and attached parts is counterbalanced by means of a spiral or clock type spring 23, the inner end of which is anchored to the stud 13 and the outer end of which is anchored to a pin 24 secured to the arm 11.

The swinging arm 11 is provided at its outer end with a connection including a transverse stud 25 adapted to travel within a longitudinal guide slot or guideway 26 formed in a bracket 27 adapted to be secured to the bottom of a glass retainer channel. Similarly, the swinging arm 12 is provided at its outer end with a connection also including a transverse stud 25 adapted to travel within a longitudinal guideway or guide slot 28 formed in a bracket 29 also adapted to be secured to the bottom of the glass retainer channel.

In Fig. 3 the construction of the bracket 27 together with the connection of the window regulator arm 11 thereto is shown. It will be understood that the same construction is provided for the connection of the outer end of the window regulator arm 12 to the bracket 29.

Referring to Fig. 3 the guide bracket 27 comprises an angle adapted to be secured, as by spot welding, to the bottom of a glass retainer channel. The depending wall or flange 30 of this guide bracket is formed with the longitudinal horizontal guide slot 26, the edges 31 of which are turned out or rolled. The stud 25 is riveted to the outer end of the regulator arm 11 and is provided with a cylindrical transverse shank 32 of uniform diameter. An annular groove 33 is cut or machined adjacent the outer end of the stud shank 32. Adapted to be mounted on the outer end of the regulator arm 11 is a compression element generally designated 34 which has a bore 35 through which the stud shank 32 is slidable into the position shown in Fig. 3.

The compression element 34, preferably made of spring steel, comprises a curved section 36 which approximates a portion of a cylinder the longitudinal axis of which, when the element is mounted on the regulator arm 11, is parallel to the longitudinal axis of said arm. Each longitudinal edge of the curved section 36 is provided with a flange 37 adapted to engage the side faces of the regulator arm 11. One of the flanges 37 is provided with a right angle extension 38 adapted to engage the inner face 11a of the regulator arm.

The regulator arm 11, the stud 25 and the compression element 34 preferably comprises a sub-assembly which is put together prior to the installation of the regulator within the body or door frame. In manufacturing the sub-assembly the compression element 34 is slipped over the end of the regulator arm and placed so that the bore 35 therein is in alignment with a hole in the regulator arm adapted to receive the rivet end of the stud 25. The stud 25 is then inserted through the bore 35 and the hole in the regulator arm and is riveted over so as to be securely fastened to the regulator arm. The foregoing results in a sub-assembly in which the parts are interlocked and held ready for installation of the regulator in the vehicle body.

Upon installation of the regulator in the vehicle body, the stud 25 is inserted through the guide slot in the guide bracket 27 and a spring clip device 39 is snapped over the annular groove 33 on the end of the stud 25. The compression element 34 is under sufficient tension to ensure

that the stud 25 will not rattle against the rolled edges of the bracket 27 due to vibration of the vehicle while the latter is in motion.

The embodiment of the invention illustrated in Fig. 4 differs from the embodiment of Fig. 3 in that the stud 14 shown therein has an enlarged head 40 on its outer end and does not require a spring clip such as the spring clip 36 to retain it in proper relation to guide slot 15. As in the previously described embodied embodiment, the guide slot 15 is also provided with turned out or rolled edges 41. The mounting plate 16 differs from the guide bracket 27 in order to accommodate the stud 14 in that the guide slot 15 therein is enlarged at one end at 42 to permit the insertion of the stud 14 into the slot 15 by movement in a plane parallel to the plane of the mounting plate 16 rather than by movement in a plane normal to the plane of the mounting plate, as is the case when the stud 25 is inserted in the slot 26. The foregoing construction is preferable in attaching the inner end of the regulator arm 12 to the mounting plate 16 since the mounting plate is usually fastened to the vehicle panel prior to the installation of the regulator thereby rendering the outer end of the stud inaccessible for attaching a spring device such as the spring device 36 after insertion through the aperture or slot 15.

It will be readily understood that the construction shown in Fig. 4 could be utilized to connect the outer ends of the regulator arms 11 and 12 to the respective brackets 27 and 29, if so desired.

The present invention has the important advantage of facilitating the installation of the window regulator within the body or door frame. Since the compression element 34 cannot fall or be knocked off of the stud 14 or the studs 25 the installer does not have to be too careful in fitting the studs in the respective guide slots and the installation time is accordingly accelerated.

I claim:

1. Means for slidably connecting the end of a swinging regulator arm to a member having a guide slot therein, comprising a compression element mounted on said arm and having a section, one surface of which is partly in contact with the edges of said slot and the opposite surface of which is partly in contact with said arm, an aperture in said element, a stud secured to the end of said arm having a portion projecting through said aperture and through said slot, a flange portion on said element in engagement with a longitudinal edge of said arm to prevent displacement of the element in a direction normal to the plane of the arm prior to the insertion of said stud in said slot, and means on said stud to prevent withdrawal thereof from said slot in a direction normal to the plane of said member.

2. Means for slidably connecting the end of a swinging regulator arm to a member having a guide slot therein, comprising a compression element mounted on said arm and having a curved section, one surface of which is partly in contact with the edges of said slot and the opposite surface of which is partly in contact with said arm, an aperture in said element, a stud secured to the end of said arm having a portion projecting through said aperture and through said slot, a flange portion on one edge of said curved section in engagement with a longitudinal edge of said arm to prevent displacement of the element in a direction normal to the plane of the arm prior to the insertion of said stud in said slot, and means on said stud to prevent withdrawal thereof from said slot in a direction normal to the plane of said member and to hold said compression element under compression toward said arm.

3. Connecting means for slidably connecting an end of a swinging regulator arm to a member having a guide slot therein, comprising a compression element mounted on

said arm and having a curved section, one surface of which is partly in contact with one face of said member and the opposite surface of which is in contact with said arm, said curved section comprising a segment of a cylinder having its longitudinal axis parallel to the longitudinal axis of the regulator arm, an aperture in said element, a stud secured to the end of said arm having a portion projecting through said aperture and through said slot, said segment terminating on one longitudinal edge thereof in a flange portion in engagement with a longitudinal edge of said arm to prevent displacement of the element in a direction normal to the plane of the arm prior to the insertion of said stud in said slot, and means on said stud to prevent withdrawal thereof from said slot in a direction normal to the plane of said member.

4. Connecting means for slidably connecting an end of a swinging regulator arm to a member having a guide slot therein, comprising a compression element mounted on said arm and having a curved section adapted to abut one face of said member and compressible toward one face of said arm, said curved section comprising a segment of a cylinder having its longitudinal axis parallel to the longitudinal axis of the regulator arm, an aperture in said element, a stud secured to the end of said arm having a portion projecting through said aperture and through said slot, a flange on at least one of the longitudinal edges of said section having an angularly related extension thereon engageable with the other face of said arm, said extension preventing displacement of said compression element in a direction normal to the plane of said arm prior to the insertion of said stud in said slot, said stud having an enlarged portion on its outer end which after insertion in an enlarged opening at one end of said slot in a direction parallel to the plane of said member will prevent withdrawal of said stud through said slot in a direction normal to the plane of said member.

5. Connecting means for slidably connecting an end of a swinging regulator arm to a member having a guide slot therein, comprising a compression element mounted on said arm and having a curved section, one surface of which is partly in contact with said one face of said member and the opposite surface of which is in contact with one face of said arm, said section being compressible toward said one face of said arm, said curved section comprising a segment of a cylinder having its longitudinal axis parallel to the longitudinal axis of the regulator arm, an aperture in said element, a stud secured to the end of said arm having a portion projecting through said aperture and through said slot, a flange on at least one of the longitudinal edges of said section having an angularly related extension thereon engageable with the other face of said arm, said extension preventing displacement of said compression element in a direction normal to the plane of said arm prior to the insertion of said stud in said slot, said stud having an annular groove on its outer end, and a clip device insertable in said groove to abut the other face of said member to prevent withdrawal of said stud from said slot in a direction normal to the plane of member.

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