

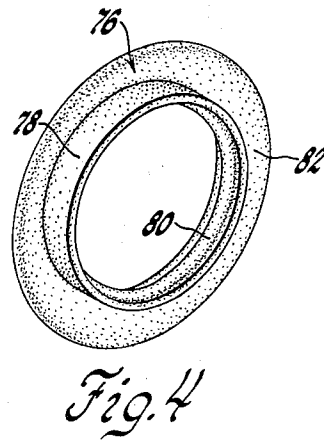
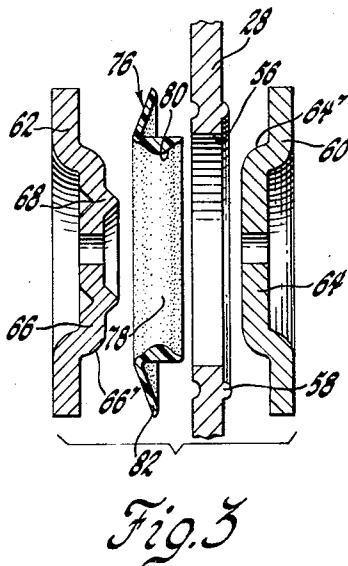
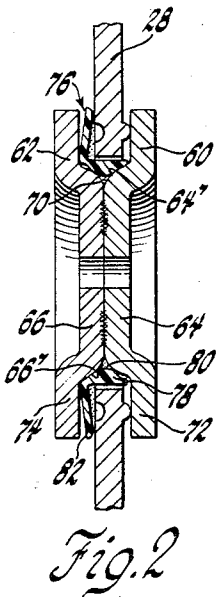
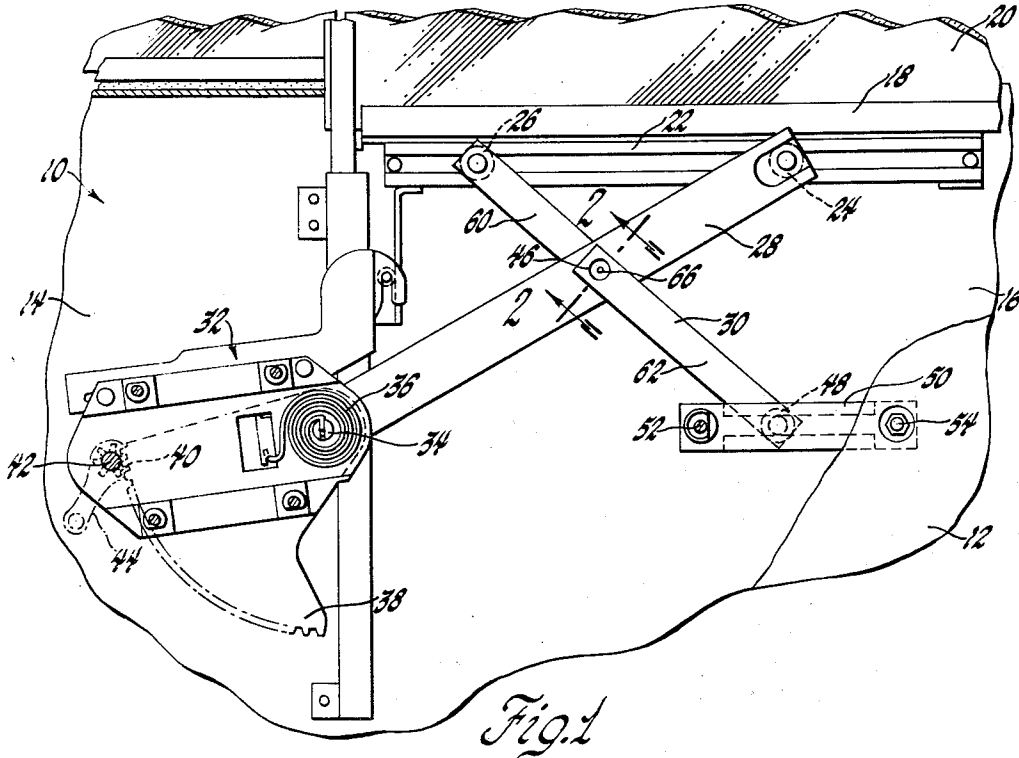
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PIVOTAL CONNECTION FOR A WINDOW REGULATOR

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PIVOTAL CONNECTION FOR A WINDOW
REGULATOR

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2 Claims. (Cl. 287-101)

This invention relates generally to a pivotal connection and more particularly to an improved pivotal connection adapted for use in a vehicle window regulator of the type having crossed lever arms providing two-point suspension of a window panel and other similar applications.

In the illustrative embodiment disclosed herein, the invention contemplates and features the use of a relatively inexpensive unitary plastic bearing and anti-rattle spring member in a crossed-arm window regulator to journal welded embossments on two separately formed balance arm elements thus providing a unitary balance arm structure pivotally supported with respect to a primary window lifting arm. While the pivotal connection of the invention has specific utility in such a window regulator, it may be used to advantage in similar pivotal connections and/or in journaling various elements in other devices.

The foregoing and other objects, advantages and features of the invention will be apparent from the following description, having reference to the accompanying drawings, in which:

FIGURE 1 is an inside elevational view of a vehicle door with an interior panel broken away to show a window regulator having crossed window supporting arms pivotally interconnected in accordance with the invention;

FIGURE 2 is a fragmentary sectional view taken through the pivotal connection substantially in the plane indicated at 2-2 of FIGURE 1;

FIGURE 3 is an exploded view similar to FIGURE 2 but showing the several elements prior to assembly of the pivotal connection; and

FIGURE 4 is a perspective view of the unitary plastic bearing and anti-rattle member utilized in the illustrative embodiment of the invention.

Referring more particularly to FIGURE 1, a vehicle door 10 includes spaced inner and outer panels 12 and 14 defining a window receiving well 16.

A window supporting frame member 18 secured to the lower edge of a window panel 20 forms a horizontal guide channel 22. This channel supports rollers 24 and 26 mounted on respective ends of a primary lift arm 28 and a balance arm 30 of a crossed-arm window regulator assembly 32. This window regulator is similar to that disclosed in United States Patent No. 2,194,700 entitled Two-Direction Movement Regulator issued to Alfred S. Grief and need not be described in detail.

The primary lift arm 28 is pivotally mounted at 34 and counterbalanced by a torsion spring 36 to maintain the window in its adjusted position. The pivotally mounted end of the arm 28 has a gear sector 38 selectively driven to raise and lower the window panel between opened and closed positions. For this purpose, a sector engaging pinion 40 is secured to a shaft 42 rotatably mounted by the door. A pinion driving handle 44 is mounted on an end of this shaft projecting through the inner door panel.

The balance arm 30 of the window regulator is pivotally mounted intermediate its ends at 46 on the primary lift arm 28. A second guide roller 48 is oppositely mounted on the end of the balance arm distal from the window supporting roller 26. The roller 48 rotatably engages a fixed horizontal guide channel 50 suitably supported at 52 and 54 on the inner door structure or interior door panel 12. Window shifting swinging movement imparted to the primary lift arm 28 is thus translated into counter-

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rotation of the balance arm 30 which acts through the roller 26 to prevent undesired cocking of the window relative to the window supporting channels and opening of the vehicle door.

As shown in FIGURES 2 and 3, the primary lift arm 28 has a pivot opening 56 intermediate its roller mounting end and its pivotal mounting at 34. An annular thrust bearing boss 58 is preferably formed on the arm 28 concentrically of the opening 56. To prevent cocking or twisting interference with the primary arm, the balance arm 30 is fabricated from two separately formed arms 60 and 62 having journal forming embossments 64 and 66, respectively. These bosses are centrally perforated and insertable in assembly from opposite sides of the lift arm opening 56. A second sharp-edged boss 68 is concentrically formed on the boss 66 of the arm 62. During assembly and manufacture, this sharp-edged boss engages the boss 64 of arm 60 and permits resistant welding of the two balance arm portions to provide a unitary balance arm.

As best seen in FIGURE 2, the outer peripheral surfaces or corners 64' and 66' of the journal forming bosses 64 and 66 of the assembled balance arm cooperate to define a groove 70 having curved outwardly inclined journal surfaces facing the pivotal opening of the lift arm. These curved journal surfaces terminate in shoulder defining flanges 72 and 74 which embrace the journal bosses formed in the mating ends of the balance arm members 60 and 62. The opposing shoulders formed by these flanged portions of the assembled balance arms are spaced slightly from the side surfaces of the lift arm adjacent the opening 56.

A unitary plastic bearing member 76 is interposed in assembly between the lift arm opening 56 and the journal formed by the mating bosses of the balance arm portions 60 and 62. This bearing may be of any suitable resilient plastic having heat-resistant and self-lubricating bearing characteristics such as nylon or Teflon. The bearing 76 has an annular axially extending flange 78 radially journaling the primary arm opening 56. The inner surface 80 of this bearing flange is curved to provide limited axially confined surface engagement with the inclined journal surfaces 64' and 66' of the journal forming bosses. An axially inclined radial end flange 82 is formed integrally of the axial flange 78 of the plastic bearing member. In assembly, this integral end flange is resiliently interposed between the boss embracing flange 74 of the balance arm 62 and the adjacent lift arm side face and biases the lift arm 28 to maintain rattle preventing thrust bearing engagement between the annular lift arm boss 58 and the boss embracing shoulder or flange 72 of the balance arm 60.

From the foregoing description, it will be seen that the invention provides a relatively simple pivotal connection for a window regulator or similar device wherein the interposed unitary plastic bearing reduces operating friction, prevents rattling of the pivotally interconnected levers, and permits separately formed arms to be directly secured together thus facilitating economic assembly and providing an improved unitary balance arm structure. It will be further apparent that various modifications, changes and departures might be made in and from the design of the several elements of the illustrative embodiment without departing from the spirit and scope of the invention as defined in the following claims.

I claim:

1. A pivotal connection comprising a first member including an aperture therethrough, a second member comprising two portions lying on either side of the first member, both of the portions having inwardly disposed bosses projecting into the aperture that are welded together to

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form a journal, and a bearing member having an axial portion interposed between the journal and the inner surface of the aperture and having a resilient generally radially extending inwardly axially inclined portion that biases one said portion into engagement with the first member to provide a rattle-free pivotal connection.

2. The pivotal connection of claim 1 wherein the first member has a bearing boss formed on one side surrounding the aperture and the said one portion is biased into engagement with the bearing boss of the first member.

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