Feb. 22, 1966 F. G. PHINNEY 3,236,549

ACTUATING ROD CLIP

Filed Dec. 23, 1963

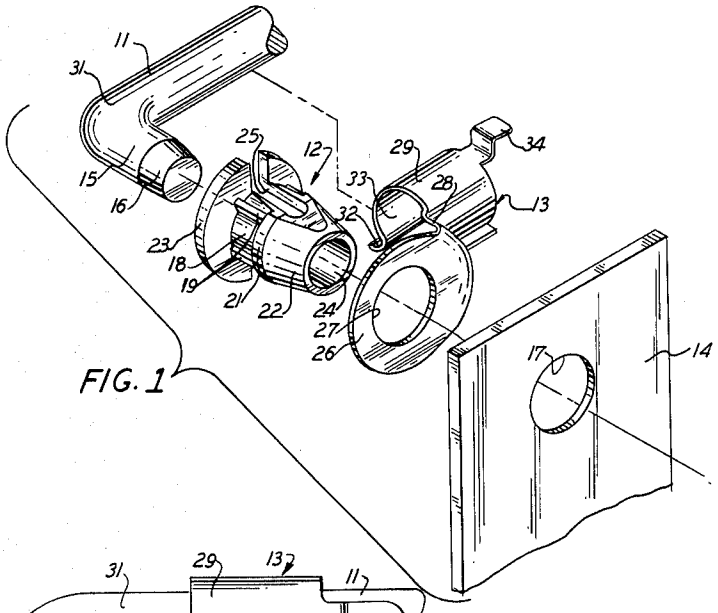


FIG. 1

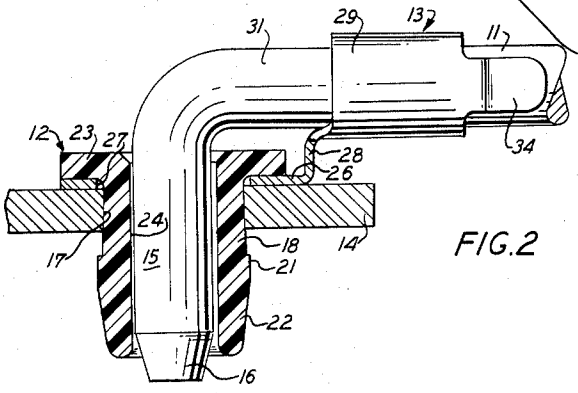


FIG. 2

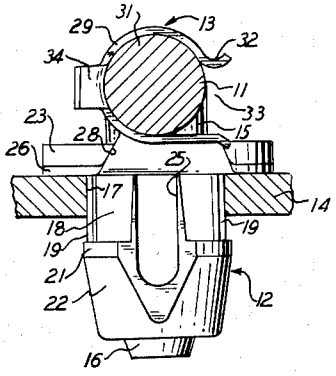


FIG. 4

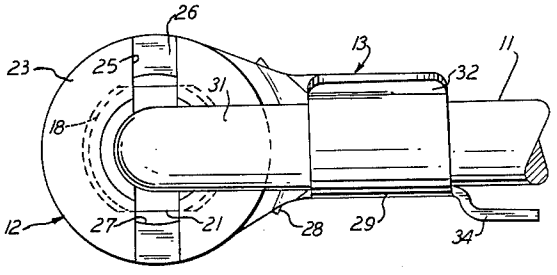


FIG. 3

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United States Patent Office 3,236,549 Patented Feb. 22, 1966

3,236,549

ACTUATING ROD CLIP

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Filed Dec. 23, 1963, Ser. No. 332,786
2 Claims. (Cl. 287—93)

This invention relates generally to devices for retaining actuating rods in coupled relation to lever arms or like mechanism operating members.

There are a number of mechanisms to be found in automotive vehicles that are coupled through links or actuating rods to manually operable push buttons, handles or knobs. For example, automobile body door latch mechanisms must be located, of necessity, at the jamb face of a door for the latch device or bolt to operatively engage a striker or keeper device mounted on a body pillar. Operation of the latch mechanism to permit disengagement of the latch device or bolt from the striker or keeper device is accomplished through manipulation of an operator, such as a push button or handle device. The push button and handle devices are mounted on the inner and outer door panels in optimum positions of accessibility and frequently at some distance from the latch mechanism.

The latch mechanisms are also usually provided with various submechanisms for rendering the inside and outside operators inoperative to cause disengagement of the latch device or bolt from its striker or keeper device. When the outer and inner operators are rendered inoperative, the latch mechanism is said to be in "locked" condition. The locking elements of the latch mechanism are usually constructed and arranged to be operable from the inside of the vehicle door through a knob or push button located at the trim molding defining the inner lower edge of the door window opening, or, in the case of most automobile body front doors, through a key operated locking and unlocking device operable from the outside of the vehicle body. These latch mechanism locking and unlocking devices are located in positions of optimum accessibility, usually remote from the latch mechanism. Accordingly, it has become necessary to couple the inner and outer operating mechanisms and the inner and outer locking and unlocking devices to the latch mechanism through links or actuating rods.

A conventional link or actuating rod is formed of wire or rod stock having at its terminal end portions right angle bend portions adapted to project through apertures in the end of the lever arms or the like. For some time, it has been a practice to place a right angle bend portion through an aperture in a lever arm and then snap a spring clip device of some sort over the projecting end of the actuating rod to prevent withdrawal from the lever arm aperture. The metal against metal contact resulting from this arrangement was unsatisfactory from a noise standpoint or, if the spring clip was designed to prevent vibration and rattling noises, the friction resulting from the tight connection was undesirable. The usual spring clip devices were later superseded by plastic bushings which were pressed into the apertures in the lever arms in position to receive the connection end of the actuating rod. The bushing and the actuating rod had complementary ribs and grooves which were provided to hold the end of the rod against axial displacement from the bushing, and thus from the lever arm. The bushings were relatively small and of thin wall characteristics, and frequent failures were noted after relatively short periods of operation.

Accordingly, it is an object of the present invention to provide an actuating rod retention device which is

substantially a combination of a spring clip device and the bushing device. This has been accomplished by providing a retention device which comprises a bushing adapted to be preassembled to an apertured plate portion of a metal clip. The bushing has a cylindrical body portion complementary to the aperture in the clip plate portion, a retention shoulder spaced from one end, and an enlarged flange at the other end. The plate portion of the clip has a flange thereon, and formed integrally with the flange is a snap fastening means adapted to laterally encompass the actuating rod along the portion of the latter beyond its right bend terminal end portion. The bushing is adapted to be pressed through an aperture in a lever arm until the shoulder portion snaps through the aperture thereby preventing axial withdrawal of the bushing. The actuating rod end portion is then placed through the aperture in the bushing and with a slight twist of the rod or the clip is snapped into the snap fastening portion of the clip. The bushing flange prevents axial displacement of the clip plate portion relative to the lever arm, and the snap fastening means on the clip prevents axial displacement of the end portion of the actuating rod from the aperture in the bushing.

Other objects, advantages and features of the present invention will be made more apparent as this description proceeds, reference being had to the accompanying drawing, wherein:

FIG. 1 is an exploded perspective view of the terminal end of an actuating rod, a fragmentary portion of a lever arm and the actuating rod retention device embodying the present invention;

FIG. 2 is a side elevation in part sectional of the components shown in FIG. 1 in assembled relationship;

FIG. 3 is a plan view of FIG. 2; and

FIG. 4 is an end elevational view in part sectional.

Referring now to FIG. 1, there are shown in disassembled relationship a fragmentary portion of an actuating rod **11**, a bushing **12**, a clip **13** and a fragmentary portion of a lever arm **14**.

The actuator rod **11** has a terminal end portion **15** extending at substantially a right angle to the longitudinal axis of the rod. The terminal end portion **15** has a chamfered tip **16**. This rod is of the type frequently used as a force transmitting or operating link between a door handle assembly (not shown) such as is found on an automobile door, and a lever arm, represented by the lever arm **14**, of a latch mechanism (not shown) mounted within the door. The lever arm **14** is provided with an aperture **17**.

The bushing **12** is preferably molded of a suitable plastic material, such as nylon, and the clip **13** is formed of sheet metal which preferably has or may be treated to have spring steel characteristics.

The bushing **12** comprises a cylindrical body portion **18** adapted for axial insertion in the lever arm aperture **17**. The diameter of the cylindrical body portion **18** and the diameter of the aperture **17** are substantially complementary to each other, although the body portion may have spaced exterior longitudinally extending ribs **19** thereon. The ribs **19**, if provided, are axially tapered and function to ensure a snug fit of the bushing cylindrical body portion within the aperture **17** despite variations in manufacturing tolerances between the body portion and the aperture diameters. The body portion **18** has a slightly enlarged stepped or shoulder portion **21** located intermediate the ends thereof and a tapered pilot portion **22** extending from the shoulder to the end of the body to facilitate insertion through the aperture **17**. On its end opposite the tapered pilot portion **22**, the body is provided with an enlarged flange **23**. The shoulder portion **21** is of a diameter effective to prevent

axial withdrawal of the bushing from the aperture 17 in the lever arm 14 after insertion, and the enlarged flange 23 is effective to prevent complete passage of the bushing through the aperture 17 in the direction of its axial insertion into the aperture. Bushing 12 is provided with an axially extending bore 24 which extends for its full length and is adapted to receive the terminal end portion 15 of the actuating rod. The bushing 12 has a slot 25 extending axially of the bushing from the flange 23 to a depth terminating near the upper edge of the tapered pilot portion 22. The slot 25 permits radial collapse of the bushing body portion to facilitate the insertion of the bushing into the aperture 17.

As will be noted in FIG. 2, the end portion 15 of the actuating rod 11 has a concentric fit within the bore 24 of the bushing. There are no interengageable ribs or grooves in the contacting surfaces of the bore 24 and of the terminal end portion 15 that would function to hold the terminal end portion 15 of the actuating rod 11 against axial displacement relative to the bushing 12. In carrying out the present invention, the end portion 15 of the rod 11 is held against axial displacement through use of the clip 13.

As previously stated, the clip 13 is adapted to be formed of sheet metal and has at one end a circular plate portion 26 having an aperture 27. This aperture 27, as is the aperture 17 in the lever arm 14, is complementary to the cylindrical body 18 of the bushing 12, although the fit between the two is not critical. The external diameter of the plate portion 26 of the clip 13 is preferably but not necessarily substantially equal to the external diameter of the flange 23 of the bushing 12.

The plate portion 26 has an upstanding flange 28 extending around a portion of its peripheral edge. The flange 28 is of a height greater than the thickness of the flange 23 on the bushing 12, to at least accommodate the radius of the bend in the actuating rod 11. The flange 28 has integral with its upper edge a snap fastening means comprising a substantially semicylindrical rod engaging portion 29 adapted to encompass the shank 31 of the actuating rod 11, the shank 31 being considered that portion of the rod contiguous to the terminal end portion 15. The longitudinal axis of the semicylindrical rod engaging portion 29 extends at substantially a right angle to the axis of the aperture 27 in the plate portion 26.

As best seen in FIG. 4, the semicylindrical rod engaging portion has a longitudinally extending lip 32. This lip 32 is formed to create a narrowed entrance gap 33 through which the actuating rod shank must be pressed for retention of the clip on the rod. The direction of entry of the rod into the semicylindrical rod engaging portion 29 is laterally of the axis of the aperture 27 in the plate portion 26 of the clip.

For purposes of definition, the semicylidrical rod engaging portion 29 may be considered as being substantially horseshoe-shaped.

At the end of the rod engaging portion 29 and on the side thereof diametrically opposite to the entrance gap 33, a tab 34 is provided which may be gripped by the end of a pair of pliers for disassembly or lateral disengagement of the snap fastening means from the shank of the rod 11.

The assembly of the components is a relatively simple operation. The bushing 12 is first axially inserted through the aperture 27 in the plate portion 26 of the clip 13. This may be done at the place of manufacture of the clip and the bushing, with the two being shipped as a subassembly to the place of installation of the actuating rod to the lever arm 14. The preassembled bushing 12 and the clip 13 are then mounted to the lever arm 14 by inserting the bushing body 18 axially through the aperture 17. At this stage of assembly, the clip 13 is free to swivel around the bushing 12. Next, the end portion 15 of the actuating rod 11 is axially inserted through the bore 24 of the bushing. The actuating rod is either then swung

about the axis of the end portion 15 or the clip is swiveled about the same axis till the shank engaging means 29 is brought into abutting relation with the shank 31 of the actuating rod 11. The snap fastening means 29 is then snapped over the shank 31 which results in the assembled relationship shown in FIGS. 2 to 4, inclusive.

The foregoing construction and arrangement has a number of advantages, a few of which may be summarized as follows:

(1) A minimum effort is required for assembly or disassembly of the actuating members from the lever arms.

(2) No lubrication is required since the plastic bushing has a low coefficient of friction.

(3) The plastic bushing functions to minimize noise resulting from rattling and vibration since it insulates the metal actuating rod from the metal lever arm.

(4) The end portion of the actuating rod 11 is of simplified design and has no critical grooves or ribs which require alignment with complementary grooves or ribs in the inner surface of the bushing.

It will be understood that the invention is not to be limited to the exact construction shown and described but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. An actuating rod retainer comprising, in combination:

a moulded plastic bushing having a cylindrical body for axial insertion into a complementary aperture in a lever arm,

said body having an enlarged flange at one end and a shoulder portion spaced from the other end,

said shoulder portion being effective to prevent withdrawal of said bushing from the lever arm aperture in a direction opposite to the direction of insertion,

said body having a tapered pilot portion extending from said shoulder portion to said other end to facilitate insertion through the lever arm aperture,

said body having a diametrical slot extending axially from the flanged end into and terminating near the shoulder edge of said pilot portion,

said slot providing for radial collapse of said body at and above said pilot portion to facilitate ease of insertion through the lever arm aperture,

and said body having an axially extending actuating rod portion receiving aperture therethrough;

and a clip comprising a plate portion having an aperture therein also complementary to the cylindrical body of said bushing,

said clip plate portion and said cylindrical body being axially assembled to each other prior to insertion of said body through the lever arm aperture,

said body portion flange and said shoulder portion preventing axial disassembly of said body portion and clip plate portion,

said clip plate portion having an upstanding flange extending along the peripheral edge thereof,

said upstanding flange having a portion extending above said enlarged flange when said plate portion is interposed between the latter and the juxtaposed face of the lever arm after insertion of the bushing through the lever arm aperture,

and a snap fastening means integral with the upper edge of said upstanding flange portion for lateral encompassing engagement with a shank of an actuating rod,

said snap fastening means being elongated in a direction substantially normal to the axis of said bushing aperture.

2. A coupling assembly comprising an elongated actuating rod having an end portion at substantially a right angle thereto,

a lever arm having an aperture therein,

and an actuator rod retention means comprising a

moulded plastic bushing and a formed sheet metal clip;

said actuator rod retention means bushing having a cylindrical body axially inserted in said lever arm aperture,

said body having an axially extending aperture through which said actuating rod end portion extends,

said body having a shoulder portion spaced from one end effective to prevent withdrawal of said bushing from said aperture in a direction opposite to the direction of insertion,

said cylindrical body having a tapered pilot portion extending from the shoulder thereon to said one end of said body to facilitate insertion through the lever arm aperture,

an enlarged flange at the opposite end of said body,

said clip comprising a plate portion having an aperture therein complementary to the cylindrical body of said bushing,

said clip plate portion and said cylindrical body being axially assembled to each other prior to insertion of said body through said lever arm aperture,

said bushing being slotted axially from the flanged end into the pilot portion to provide radial collapse of the bushing at and above the shoulder of said pilot portion to facilitate ease of insertion through the apertures in said clip plate portion and in said lever arm,

said body portion flange and shoulder preventing the axial disassembly of said body portion and clip plate portion,

said plate portion having an upstanding flange extending along the peripheral edge thereof,

said upstanding flange extending above said enlarged flange when said plate portion is interposed between the latter and the face of said lever arm after insertion of the bushing body through said lever aperture,

said upstanding flange having integral with the upper edge thereof a snap fastening means elongated in a direction parallel to the axis of and laterally encompassing said elongated actuating rod.

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