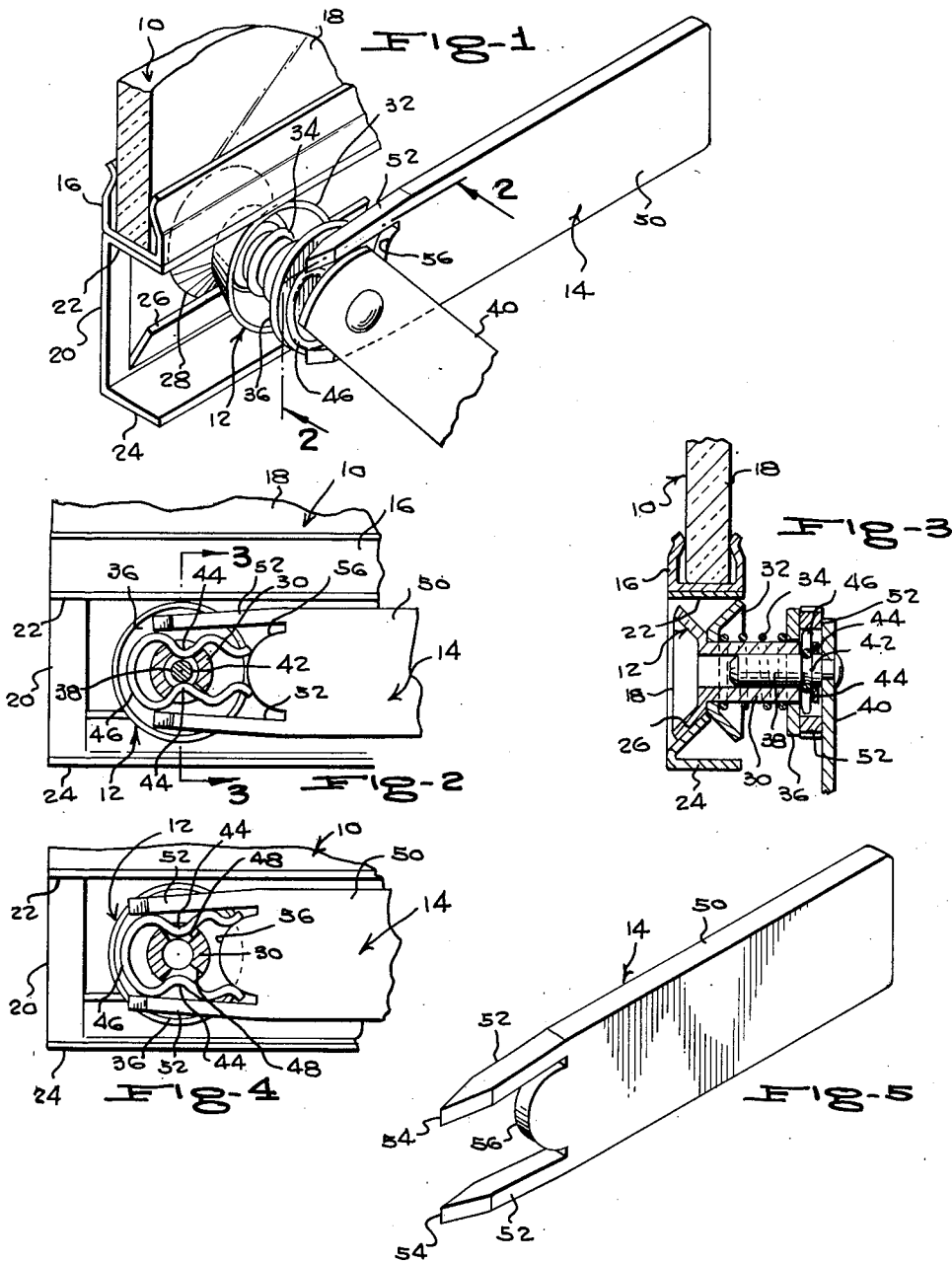


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TOOL FOR REMOVING ROLLER ASSEMBLIES
OF VEHICLE WINDOW REGULATORS
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**TOOL FOR REMOVING ROLLER ASSEMBLIES OF
VEHICLE WINDOW REGULATORS**

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4 Claims. (Cl. 29—229)

The present invention relates to a hand tool, adapted for removing the roller assembly of a conventional window regulator, such as is commonly mounted in the doors of a number of well-known makes of vehicles.

Such an assembly commonly includes a generally U-shaped retainer spring having crimped legs, said spring holding assembled a roller, a washer, a coiled compression spring, and a second washer.

The common procedure in removing an assembly of the type described is to remove the retainer spring or clip, thus releasing all the component parts. These parts must then be reassembled before replacement in the window channel. It is not unusual, following disassembly of the unit, to lose various of the parts, and considerable time and inconvenience results from the necessity of searching for misplaced parts and reassembling the same.

In view of the above, the main object of the present invention is to provide a tool of the character described so designed as to effect the release of the retainer spring from the window regulator shaft in such a manner as to leave the component parts of the roller assembly grouped in their proper relationship as a unit, thus eliminating the search for misplaced parts during reassembling of the device.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a fragmentary perspective view of a vehicle window assembly and the associated roller assembly, with the tool properly positioned for releasing the retainer clip;

Figure 2 is a sectional view on line 2—2 of Figure 1 with the tool in its initial position;

Figure 3 is a sectional view on line 3—3 of Figure 2;

Figure 4 is a view like Figure 2 in which the tool has been shifted to a retainer-clip-releasing position; and

Figure 5 is an enlarged perspective view of the tool per se.

Referring to the drawings in detail, it is appropriate to first describe the window and roller assembly. Although these are not part of the present invention, being rather, the work to which the tool is applied, an understanding of these assemblies is desirable to provide a further understanding as to how the tool of the invention operates.

Thus, in the drawing, designated generally at 10 is the window assembly, at 12 the roller assembly, and at 14 the tool constituting the invention. Each of these will be described in turn.

The window assembly 10 includes retaining channel 16 in which seats the glass 18. Rigid with the channel 16 is a roller assembly support channel 20 having top and bottom walls 22, 24. Struck inwardly from the web of channel 20 is an elongated, inclined tongue 26 supporting the roller assembly 12.

Roller assembly 12 includes a roller 28 having a frusto-

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conical end flange bearing against tongue 26. Roller 28 is integral with a sleeve 30 on which is loosely fitted a frusto-conical washer 32 bearing against flange 28 under the pressure of a compression coil spring 34 circumposed about sleeve 30 and engaging at its other end a flat washer 36.

A pin or shaft 38 extends into sleeve 30, and connected to one end of the pin is the window regulator arm 40. Pin 38 has a circumferential groove 42 adjacent arm 40, receiving inwardly bowed crimped or undulant portions 44 of the legs of a U-type retainer spring 46. Crimped portions 44 also seat under normal conditions (Figure 2) in diametrically opposite openings 48 formed in sleeve 50.

The tool 14 comprises an elongated, flat, rectangular body 50 constituting the handle of the device. Integral with one end of the body are longitudinally projecting arms 52 lying in the plane of the body and converging slightly in a direction away from the body. It is mainly important that the inner surfaces of the arms converge, since the outer surfaces of the arms do not engage any part of the roller assembly. Arms 52, at their free ends, have wedge-shaped or triangularly pointed tips 54 to facilitate insertion of the arms into the space between washer 36 and regulator arm 40. Between the fork arms 52, the body is formed with a semi-circular cam projection 56 forming a spreader for the legs of the retainer spring 46.

In use of the tool, the bifurcated end thereof is inserted in the space between washer 36 and arm 40 in the manner shown in Figure 2. The free ends of the legs of the clip come to bear against the cam projection, at opposite sides of the longitudinal median of the device, after which the tool is shifted from its Figure 2 position to the left in this figure of the drawing, to arrive at a final position shown in Figure 4.

This movement of the legs of the clip, as shown in Figure 4, causes the crimped portions 44 to move out of the circumferential groove 42 of window regulator shaft or pin 38. However, when the clip legs are operated, they are limited in their movement outwardly from one another by engagement of said legs against the inner surfaces of fork arms 52. Thus, the legs are in effect locked in a predetermined spread relationship, between the sides of the cam projection and the inner surfaces of the respective fork arms 52.

It is important to note, in this regard, that in these circumstances crimped portions 44 are still disposed within openings 48 of sleeve 30, though being completely clear of groove 42. As a result, the window regulator shaft 38 can now be extracted from the roller assembly, since the clip does not engage said shaft. However, the tool is left in its clip-locking position shown in Figure 4, so that the roller assembly, with the tool still engaged with and operating the clip, may now be removed bodily from the window channel. The roller assembly, if no repairs are to be performed on this particular mechanism, may be laid aside with the tool and retainer clip remaining in the Figure 4 position. Accordingly, disassembly of the roller assembly 12 does not occur, since the crimped portions 44 remain in openings 48 and hold the two washers and the spring 34 assembled with the roller 28 having sleeve 30.

Misplacement or undesired disassembly of the parts is thus wholly eliminated, and further, the entire device can be placed back in the Figure 3 position as a unit, after which the window regulator shaft can be assembled therewith once again. When this has been done, one merely withdraws the tool, shifting it to the right in Figure 4. The spring 46 thus springs back into engagement in groove 42, so that the entire window assembly, roller

assembly, and window regulator shaft are reassembled with ease and speed.

If desired, after crimped portions 44 move out of groove 42 of window regulator shaft or pin 38, said shaft may be removed from the roller assembly and the tool can be removed. The assembly remains held against relative separation of its components so long as the clip is not removed. The tool need not be left on the assembly as the clip and the other components will be readily returnable to pin or shaft 38 and the clip will snap into groove 42.

It will be seen that the tool is particularly designed to be manufactured at a very lost cost, considering the decided benefits to be obtained from the use thereof. A further important characteristic of the tool resides in the ease with which it is employed for the purposes described herein. Still further, the tool is designed to operate the retainer spring clip sufficiently for removal of the window regulator arm and removal of the roller assembly as a unit, but at the same time, the clip is locked in a predetermined spread position to hold the roller assembly itself in a properly assembled condition.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A tool for freeing a window regulator shaft having a circumferential groove from a roller assembly including a roller sleeve receiving the shaft and having diametrically opposite openings normally registering with the groove, spaced washers on the sleeve, a compression spring, and a U-type retainer spring clip having crimped legs normally engaging in the groove and openings to hold the roller assembly components in assembled relation with each other and with the window regulator shaft, said tool comprising a handle; fork arms projecting from the handle and adapted to straddle the clip; and a cam projection between the fork arms, said projection adapted for spreading the legs of the spring clip into engagement with the fork arms, whereby to shift the clip legs out of the groove while limiting said legs, by engagement against the fork arms, against movement out of the openings, said cam projection being approximately semi-circular in configuration and being disposed medially between the fork arms, symmetrically in respect to the longitudinal median of the tool, the fork arms having inner edge surfaces lying in a common plane and adapted to engage the legs of the clip on spreading of said legs, said inner edge surfaces converging in a direction away from the cam projection.

2. A tool for freeing a window regulator shaft having a circumferential groove from a roller assembly including a roller sleeve receiving the shaft and having diametrically opposite openings normally registering with the groove, spaced washers on the sleeve, a compression spring, and a U-type retainer spring clip having crimped legs normally engaging in the groove and openings to hold the roller assembly components in assembled relation with each other and with the window regulator shaft, said tool comprising a handle; fork arm projecting from the handle and adapted to straddle the clip; and a cam projection between the fork arms, said projection adapted for spreading the legs of the spring clip into engagement with the fork arms, whereby to shift the clip legs out of the groove while limiting said legs, by engagement against the fork arms, against movement out of the openings, said cam projection being approximately semi-circular in configuration and being disposed medially be-

tween the fork arms, symmetrically in respect to the longitudinal median of the tool, the fork arms having inner edge surfaces lying in a common plane and adapted to engage the legs of the clip on spreading of said legs, said inner edge surfaces converging in a direction away from the cam projection, the fork arms being formed at the ends thereof remote from the handle with pointed tips to facilitate their insertion into position to engage the clip.

3. A tool for freeing a window regulator shaft having a circumferential groove from a roller assembly including a roller sleeve receiving the shaft and having diametrically opposite openings normally registering with the groove, spaced washers on the sleeve, a compression spring, and a U-type retainer spring clip having crimped legs normally engaging in the groove and openings to hold the roller assembly components in assembled relation with each other and with the window regulator shaft, said tool comprising a handle; fork arms projecting from the handle and adapted to straddle the clip; and a cam projection between the fork arms, said projection adapted for spreading the legs of the spring clip into engagement with the fork arms, whereby to shift the clip legs out of the groove while limiting said legs, by engagement against the fork arms, against movement out of the openings, said cam projection being approximately semi-circular in configuration and being disposed medially between the fork arms, symmetrically in respect to the longitudinal median of the tool, the fork arms having inner edge surfaces lying in a common plane and adapted to engage the legs of the clip on spreading of said legs, said inner edge surfaces converging in a direction away from the cam projection, the cam projection being formed with an arcuate edge bowed in a direction outwardly from the handle to provide a cam surface for spreading the clip legs.

4. A tool for freeing a window regulator shaft having a circumferential groove from a roller assembly including a roller sleeve receiving the shaft and having diametrically opposite openings normally registering with the groove, spaced washers on the sleeve, a compression spring, and a U-type retainer spring clip having crimped legs normally engaging in the groove and openings to hold the roller assembly components in assembled relation with each other and with the window regulator shaft, said tool comprising a handle; fork arms projecting from the handle and adapted to straddle the clip; and a cam projection between the fork arms, said projection adapted for spreading the legs of the spring clip into engagement with the fork arms, whereby to shift the clip legs out of the groove while limiting said legs, by engagement against the fork arms, against movement out of the openings, said cam projection being approximately semi-circular in configuration and being disposed medially between the fork arms, symmetrically in respect to the longitudinal median of the tool, the fork arms having inner edge surfaces lying in a common plane and adapted to engage the legs of the clip on spreading of said legs, said inner edge surfaces converging in a direction away from the cam projection, the cam projection being formed with an arcuate edge bowed in a direction outwardly from the handle to provide a cam surface for spreading the clip legs, said inner surfaces of the fork arms being spaced closely at their divergent ends from the sides of the cam projection, whereby to define abutments limiting the movement of the clip legs outwardly from each other beyond a distance sufficient to move the legs out of the groove while holding the same within the openings.

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