

- (21) Application No. 39037/77 (22) Filed 20 Sept. 1977 (19)
- (23) Complete Specification filed 11 May 1978
- (44) Complete Specification published 28 Oct. 1981
- (51) INT. CL.<sup>3</sup> 1B60R 1/06
- (52) Index at acceptance  
B7J 69
- (72) Inventors KENNETH PAUL DAVIS  
and CHARLES ARTHUR BOUGHTFLOWER



(54) IMPROVEMENTS IN VEHICLE REAR-VIEW MIRRORS

(71) We, MAGNATEX LIMITED, a British Company, of Bath Road, Heathrow, Hounslow, Middlesex TW6 2AH, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a vehicle rear-view mirror assembly of the kind in which the mirror support arm is carried by means of at least one movable joint from the mounting part of the mirror assembly which is adapted to be secured to the bodywork of the vehicle. More particularly, but not exclusively, the invention relates to a mirror assembly of the kind referred to which is intended to be secured externally of the vehicle body on or adjacent the vehicle door or within the framing in which the glass panel of a front door window or quarter light is fitted (so-called "door mirror").

The invention consists in a mirror assembly of the kind referred to, wherein the back of the mirror is covered by a shroud of a resilient and flexible material provided with an extension comprising a tubular gaiter of flexible material of bellows-like construction which surrounds the at least one movable joint with the end region of said extension in sealing relation with the mounting part, or with the vehicle body when the mirror assembly is mounted thereon. By means of the construction according to the invention, not only do the shroud and the extension reduce the risk of injury to a person who may be accidentally hit by, or hit, the mirror assembly, but the bellows-like gaiter also protects the movable joint or joints from dirt and moisture while readily flexing to allow the joint or joints to move or to be adjusted.

The shroud and the extension gaiter may be moulded in polyurethane foam material. They may be moulded integrally or may comprise separate parts which may be assembled together, for example with the use of adhesive or heat welding.

In a preferred embodiment of door mirror according to the invention, the mirror arm is carried from the mounting part by two

pivotable joints with parallel pivot axes (which are substantially vertical when the mirror is in use), one of which is adjustable by remote control from inside the vehicle body to select the position of the mirror support arm, and thus of the mirror, for correct rear viewing, and the other of which releases when a force exceeding a predetermined value is applied to the shroud, and thus to the mirror support arm, to permit the mirror arm to move under impact or if it be desired to turn the mirror against the vehicle body during washing the vehicle in an automatic car wash. The releasing joint may be provided with one or more indexing positions to facilitate setting the arm in relation to the part of the adjustable joint which carries the releasing joint. The bellows-like gaiter is particularly advantageous in facilitating turning the mirror arm, up to approximately 90°, about the releasing joint.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings, in which:—

Fig. 1 is a perspective view of one embodiment of a vehicle rear-view door mirror assembly according to the invention,

Fig. 2 is a front view, partly in section, of the mirror assembly shown in Fig. 1 with the mirror glass removed, the section being taken along the line II—II of Fig. 3,

Fig. 3 is a section along the line III—III of Fig. 2,

Fig. 4 is a fragmentary view partly in section at 180° to the section of Fig. 3, and to an enlarged scale,

Fig. 5 is an exploded view of two of the parts of the mirror assembly of Fig. 1,

Fig. 6 is an end view of one of the parts of Fig. 5, and

Fig. 7 is a fragmentary view of a modification, shown partly section.

The door mirror shown in Figs. 1—4 comprises a shroud 1, moulded of polyurethane foam material, into which the mirror glass 2 is fitted, the shroud having a gaiter portion 3 which abuts the outer skin 6 of the vehicle door when the mirror is secured thereto by means of a threaded ring 4 which

5  
10  
15  
20  
25  
30  
35  
40  
45  
50

55  
60  
65  
70  
75  
80  
85  
90  
95  
100

screws on to the threaded end of a tubular mounting member 5 which passes through apertures in and bridges the outer and inner skins 6, 7 respectively of the vehicle door. 5 The mirror assembly is conveniently mounted on a triangular part having inner and outer skins 6, 7 and secured to the vehicle body work within the framing in which the glass panel of the door window is fitted, the triangular part being located where the front quarter light would have been. The outer skin 7 of the triangular part may be a separate plate known as a cheater plate which is secured to the inner skin when mounting the assembly. The free end of the gaiter 3 is formed with an inwardly extending flange 8 which is clamped between the outer skin 6 and an adaptor piece 9, which is shaped to conform with the curvature of the outer skin 6 and abuts the flange 10 on the outer end of the sleeve 5, when the ring 4 is tightened.

To prevent rotation of the mounting member 5 with respect to the door, it may be provided with external ribs 5a which cooperate with corresponding notches in the apertures in the skins 6, 7.

The mirror glass 2 is equipped with a backing member 11 which is secured by a screw 12 to the centre of a spider portion 13 at the end of the mirror arm 14. The ends of the arms of the spider portion 13 support the back of the backing member 11 to resist vibration of the glass. The mirror arm 14 is connected by a releasable pivotable joint, generally indicated at 15, to a mirror support member 16 which is hinged at one end thereof by a pivot (pivotable joint) 17 to the head 18a of a tubular member 18, which may be a metal die casting, supported against the flange 10 and mounted for rotation within the mounting member 5 by mechanism under control of an operating knob 19, conveniently of plastics material. The inclination of the mirror support member 16 relative to the head 18a is effected by a flexible push rod 20 under control of a second operating knob 21, conveniently of plastics material. The mechanism by which the knobs 19 and 21 adjust the position of the mirror 2 is described later.

The releasing joint 15 comprises a spindle 22 having a knurled head 23 by which it is keyed in a recess in the part 16a of the mirror support member 16, the face 16b of which abuts the face 24a of a boss 24 at the end of the mirror arm 14. The spindle 22 passes through a bore in the boss 24 and is provided at its end with a washer 25, held in place by a nut 26 threaded on to the end of the spindle 22, to retain a spring 27 located in a cylindrical recess in the boss 24 under compression. The opposing faces 16b, 24a which are urged together by the spring 27 are provided with one or a plurality of comple-

mentary grooves and ridges, serrations or the like providing one or more locating or indexing positions in which the mirror arm 14 can be releasably held by the spring 27. Conveniently there may be three indexing positions at approximately 90° spacing and defined by ridges 24b (Fig. 4) on the face 16b engaging complementary grooves 24c in the face 24a of the boss, the central position defining the normal position of the mirror arm for rear-viewing. By exerting a force on the front of the mirror 2 or the back of the shroud 1, the arm 14 can be pivoted about the releasing joint 15 in either one direction or the other.

The mechanism by which the operating knob 19 turns the tubular member 18 about a horizontal axis comprises a screw-thread reduction drive whereby the tubular member is held against accidental rotation. The screw-thread reduction drive which comprises a sleeve 30, conveniently of plastics material having an outer surface provided with a smooth portion 29 and a screw thread 31 is axially slideable on the outer surface of the tubular member 18 within the space between the tubular member 18 and the mounting member 5. The sleeve is provided in its inner surface with two diametrically opposed keyways 32 slideable on two axially extending keys 33 on the outer surface of the tubular member 18, and the outer surface of the sleeve is formed with two grooves 34 of opposite hand which extend across the smooth portion 29 and the screw thread 31 and are inclined at an acute angle, preferably as shown in Fig. 5 with a helical curvature, to the axial direction of the tubular member 18, said grooves 34 co-operating respectively with complementary projecting keys 35 on the internal surface of the mounting member 5. Thus the sleeve constitutes a key member which, as it moves axially of the tubular member 18, is caused by the co-action between the guide means defined by the inclined grooves 34 and keys 35 to turn relative to the mounting member 5 and thereby, through the keys 32 and keyways 33, to turn the tubular member 18 about its axis. Both the cooperating grooves and keys have bevelled sides as shown to facilitate movement of the sleeve. The amount of rotation of the tubular member 18 is limited by the inclination of the keys 32 and keyways 33, conveniently to about 35°. Alternatively, one of the two diametrically opposed pairs of grooves 34 and keys 35 may be omitted.

Axial movement of the sleeve 30 is effected by means of the operating knob 19 which has an internal screw thread 36 cooperating with the external screw thread 31 on the sleeve 30.

The rod 20, which is made at least in part, and preferably entirely of a flexible plastics material, is axially movable in the passage through the tubular member 18 by rotating

70

75

80

85

90

95

100

105

110

115

120

125

130

the second operating knob 21 and is connected at its outer end 37 to the mirror support member 16 by the end being formed as a ridge 37 having a rounded head portion merging into a neck portion and fitted in a complementary socket 38 in the mirror support member 16. The outer end of the rod is made rigid with the mirror support member 16 by means of a flange 39 projecting from opposite sides respectively of the rod 20 adjacent the neck portion and engaging against the flat surface 40 on the inner end of the support member 16. Preferably, to ensure rigidity of the connection between the outer end of the rod and member 16 the distance between the outermost point of the rounded head portion of the ridge 37 and the flange before assembly, is less than that between the outermost point on the socket and the flange so that when the outer end of the rod is connected to the mirror support member 16 the neck portion of the rod between the flange and the ridge is under tension so that the flange tightly engages with the mirror support member. A portion of the rod 14 is made of reduced cross-section, or provided with diametrically opposed flats, as shown at 41 to provide sufficient flexibility to enable the mirror support member 18 to be hinged about the pivot 17 as the rod 20 is moved axially. The pivot 17 comprises a hinge pin which extends transversely to the axis of the passage through the tubular member 18 and the rod 20 and to one side of said axis and rod. By moving the rod 20 axially, by rotating the knob 19, the mirror support member 16 can be turned around the pivot 17 from an inner position in which the mirror support member lies close against the head 18a to an outer position in which the mirror support member is inclined away from the head 18a. Rotation of the rod 20 due to rotation of the knob 21 is prevented by the engagement of the ridge 37 in the socket 38. The amount of turning about the pivot 17 is limited, conveniently to about 20°, by a stop 42 on the mirror support member engaging the head 18a in the inner position and by the engagement of a stop 43 on the mirror support member with a stop 44 on the pivot base part 44a on the head 18a in the outer position.

Axial movement of the rod 20 is effected by an elongate tubular nut member 45 which extends into the passage in the tubular member 18 and is screwed on to the screw-threaded inner end portion 46 of the rod 20. The nut member 45 is held captive with the tubular member 18 by providing its end with an enlarged collar portion 47 which is held between a shoulder in said passage and an externally threaded bush 48 screwed into an internal thread 49 at the inner end of the passage. Thus, the nut member 45 is restrained against axial movement relative to

the tubular member 18 while rotatable therein. The free inner end of the nut member 45 projects through an axial bore 50 on the inside 57 of the second operating knob 21 and abuts a plug 51 fitted in an external recess 52 in the knob 21, the nut member being secured to the knob by means of a screw 53 which passes through the plug 51 and is threaded into the end of the nut member 45. Screw 53 is adjusted so that a shoulder on the knob 21, bears, through the intermediary of a washer 55, against the knob 19 to hold its other end against the inner end of the mounting member 5 which inner end of the mounting member forms a thrust bearing for the knob 19. A compression spring 56 is housed in a widened portion of the recess 52 in the knob 21 between a shoulder in the recess and a flange 58 of the plug 51 to take up any play between the two knobs.

By adjusting the knobs 19 and 21, the mirror support member 16 and thus the mirror can be tilted about the generally horizontal axis of the mounting member 5 and the generally vertical axis of the pivot 17 respectively to adjust the orientation of the mirror in both vertical and horizontal planes for correct rear-viewing.

Rotation of the knob 19 produces axial movement of the key member 30 through the screw-threaded drive, the key member cooperating with the guide means 32, 33 extending axially and the guide means 34, 35 inclined at an acute angle to the direction of axial movement to cause the tubular member 18 to turn about its axis as the key member 30 is moved axially. A fine adjustment of the angular position of the tubular member 18 is therefore achieved and also the screw action of the cooperating threads on the key member 30 and the control knob 19 hold the key member in its adjusted axial position and, through the cooperating keys and key-ways 32, 33, 34 and 35, the tubular member 18 is prevented from turning.

To permit these adjusting movements and also displacement of the mirror about the releasing joint 15, the gaiter 3 which surrounds the movable joints is moulded of polyurethane foam with a thinner cross section than the part of the shroud which encloses the back of the mirror and is furthermore provided with a series of corrugations 28 to provide adequate extension and flexing of the gaiter to permit the required movements.

In order to guard against untoward vibration of the mirror support member 16, preferably a vibration dampening device 60 is provided between the mirror support member and the tubular member 18. The dampening device 60 comprises a spring metal pressure plate 61 bridging the gap between the part 16a of the mirror support

member and the head 18a and secured by an outer flat end portion to the part 16a by a screw 62 secured in a bore in the spindle 22. The flat end portion merges into a stepped portion having an aperture therein through which projects with the clearance the head of an adjusting screw 63 screwed into the internally threaded bore of a projection 64 on the part 16a, the screw having a circular flange 65 intermediate its ends which engages with the inner surface of the stepped portion. Extending at approximately 90° to the stepped portion is the inner end portion of the pressure plate, which end portion projects underneath a restraining ridge 66 on the head 18a and into a flat-sided locating and restraining recess in the passage through the tubular member 18. By unscrewing the adjusting screw 63 tension is imparted to the pressure plate through the flange 65 which presses the joint part on the head 18a and joint base part 44a axially together to damp any untoward vibration which may otherwise be transmitted through the pivot 17 to the mirror supporting arm and thus to the mirror under some conditions or in certain instances. Alternatively, the pressure plate 61 could be arranged to act in compression for example by arranging its inner end to abut the outer surface of the ridge 66 and the screw flange 65 to engage the outer surface of the pressure plate.

Fig. 4 shows a fragmentary view of a modification in which the gaiter portion 3 of the shroud is of generally cylindrical cross-section, instead of approximately triangular cross-section as in the previous embodiment. It is retained in position at its free end by an inwardly extending flange 70 extending into a groove 71 around the head 18a and has a skirt portion 72 which bears against the outer surface of the outer skin 6. Preferably the skirt portion 72 is of such length that it is slightly compressed when the mirror assembly is screwed in position on the vehicle door.

While a particular embodiment has been described, it will be understood that various modifications may be made without departing from the spirit of the invention. For example the mirror may be carried from the mounting part by only a single movable joint, such as a releasing joint or a joint for adjusting for correct rear-viewing, whether adjustable from inside the vehicle or not.

#### WHAT WE CLAIM IS:—

1. A vehicle rear view mirror assembly in which a mirror support arm is carried by means of at least one movable joint from a mounting part which is adapted to be secured to the body work of the vehicle and in which the back of the mirror is covered by a shroud of a resilient and flexible material provided with an extension comprising a tubular gaiter of flexible material of bellows-

like construction which surrounds the at least one movable joint with the end region of said extension in sealing relation with the mounting part, or with the vehicle body when the mirror assembly is mounted thereon. 70

2. A mirror assembly as claimed in claim 1, wherein at or towards its free end the gaiter extension has an inwardly extending flange.

3. A mirror assembly as claimed in claim 2, wherein the flange at the free end of the gaiter extension is adapted to be clamped against the outer surface of the vehicle bodywork. 75

4. A mirror assembly as claimed in claim 3, wherein the flange towards the free end of the gaiter extension is received in a circumferentially extending groove in an adjacent part of the assembly and the free end of the gaiter extension forms a skirt portion which bears against the outer surface of the vehicle body work when the assembly is mounted thereon. 80

5. A mirror assembly as claimed in any of claims 1 to 4, wherein the material of the gaiter extension which surrounds the at least one movable joint has a thinner cross-section than that of the part of the shroud which covers the back of the mirror. 85

6. A mirror assembly as claimed in any of claims 1 to 5, wherein the shroud and extension gaiter are moulded integrally with each other. 90

7. A mirror assembly as claimed in any of claims 1 to 6, wherein the shroud and extension gaiter are moulded in polyurethane foam material. 95

8. A mirror assembly as claimed in any of claims 1 to 7, wherein the mirror support arm is carried from the mounting part by two pivotable joints surrounded by the extension gaiter and having parallel pivot axes, one of said pivotable joints being adjustable from inside the vehicle to adjust the position of the mirror support arm and the other of said pivotable joints releasing when a force exceeding a predetermined value is applied to the shroud, and thus to the mirror support arm, to permit the mirror to move under impact or if it is desired to turn the mirror against the vehicle during washing the vehicle in an automatic car wash. 100

9. A mirror assembly as claimed in claim 8, wherein the releasing pivotable joint is provided with one or more indexing positions to facilitate setting of the mirror support arm. 105

10. A mirror assembly as claimed in claim 8 or 9, wherein the mounting part is of tubular form and is located partially within a tubular mounting member which is adapted to be non-rotatably secured through an opening in the vehicle bodywork with the outer and inner ends of the tubular mounting member respectively outside and within the 110 115 120 125 130

vehicle, the axis of the tubular mounting part extending transversely to the axes of the two pivotable joints, wherein the adjustable pivotable joint has two parts which are carried respectively by a mirror support member to which the mirror arm is connected by means of the releasing pivotable joint and the tubular mounting part, wherein a rod of a flexible plastics material extends through the tubular mounting part and has its outer end rigid with the mirror support member, the rod being axially movable to adjust the position of the mirror support member about the axis of the adjustable pivotable joint, and wherein spring means are provided for pressing the two parts of the adjustable pivotable joint together axially to damp vibration of the mirror support member.

11. A mirror assembly as claimed in claim 10, wherein the spring means comprises a spring plate which extends between the mirror support member and the tubular mounting part and which has its outer end fixed to the mirror support member and its inner end restrained against the tubular mounting part.

12. A mirror assembly as claimed in claim 11, wherein the spring plate comprises a stepped portion intermediate its ends, and screw-threaded means for adjusting the pressure exerted by the spring plate on the joint parts extends through an aperture in the stepped portion and into a screw-threaded bore in the mirror support member.

13. A mirror assembly as claimed in any of claims 10 to 12, wherein the outer end of the push rod is connected to the mirror support member by means of a ridge on the rod engaging in a complementary socket in the mirror support member, and a transverse flange on the rod adjacent the ridge engages with the mirror support member whereby the outer end of the rod is made rigid with the mirror support member.

14. A mirror assembly as claimed in claim 13, wherein the material of the rod between the flange and the ridge is under tension.

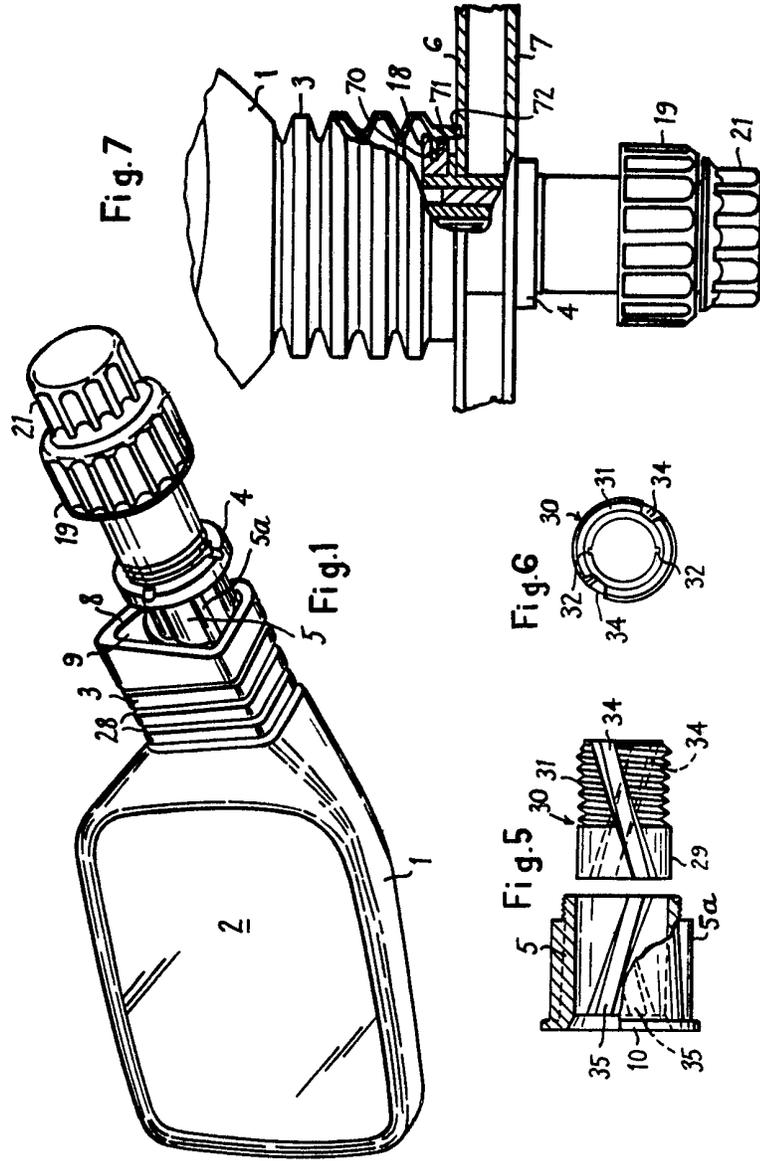
15. A mirror assembly as claimed in any of claims 10 to 14, wherein the tubular mounting part is turnable with respect to the tubular mounting member about an axis extending transversely to the pivot axes of the two pivotable joints by means of a screw-threaded reduction drive.

16. A vehicle rear view mirror assembly substantially as hereinbefore described with reference to Figs. 1 to 6 of the accompanying drawings.

17. A vehicle rear view mirror assembly substantially as hereinbefore described with reference to Figs. 1 to 6 as modified by Fig. 7 of the accompanying drawings.

**BARON & WARREN,**  
16 Kensington Square,  
London W8 5HL.  
Chartered Patent Agents.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon) Ltd.—1981. Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.



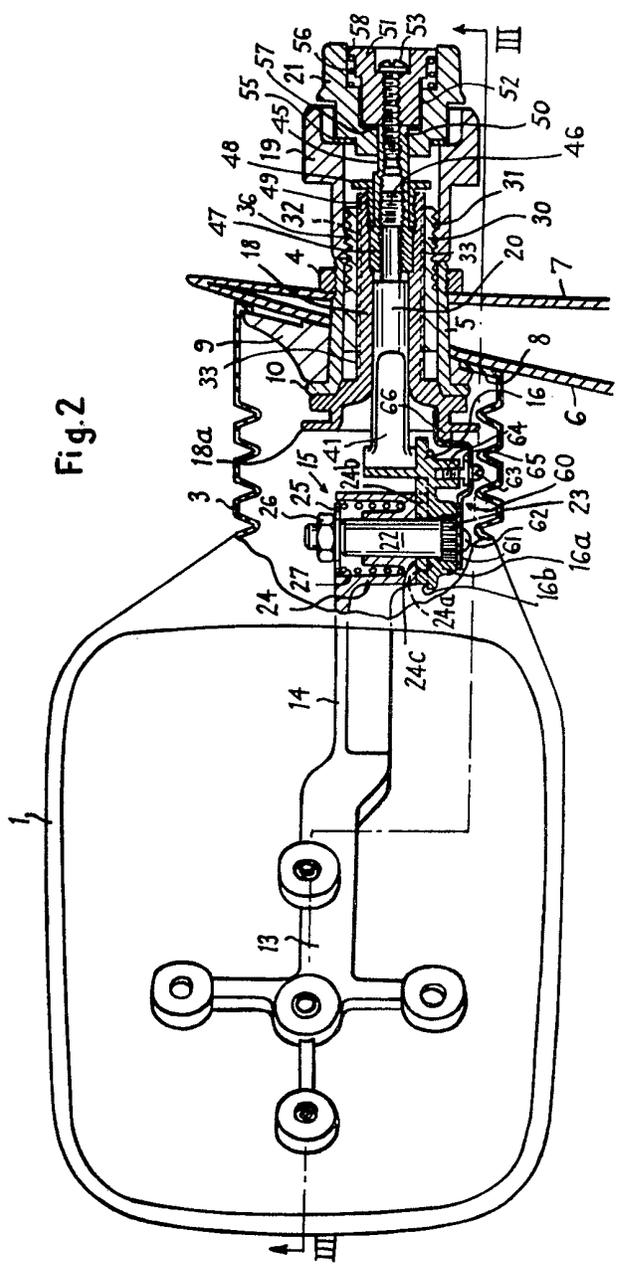


Fig. 2

