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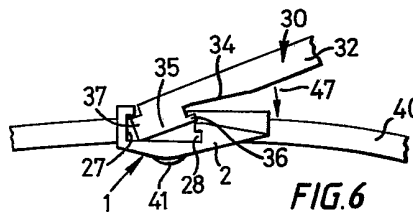
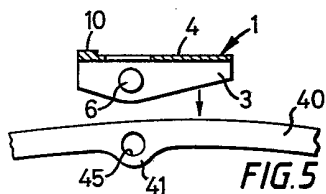
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(54) **Plastics connector**

(57) A connector suitable for pivotally connecting together two yoke members (30, 40) of a windscreen blade assembly comprises a body (1) of substantially channel shaped cross section and made from a resilient plastics material, a pair of opposed trunnion members (6) formed one on each side wall (2, 3) of the channel for engagement in corresponding apertures or recesses (45) in member (40), and projections and/or recesses (27, 28) arranged generally oppositely on the outsides of the side walls of the channel and adapted for snap engagement with recesses and/or projections (36, 37) respectively in member (30).



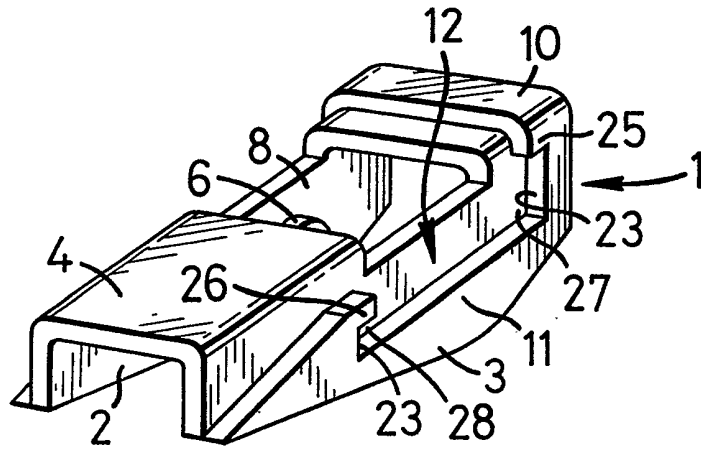


FIG. 1

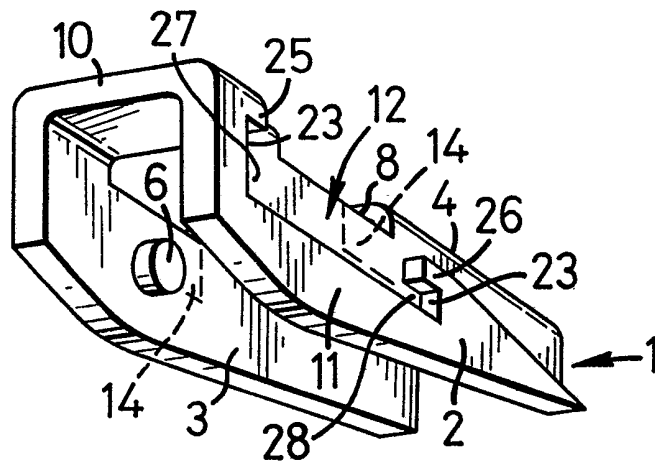


FIG. 2

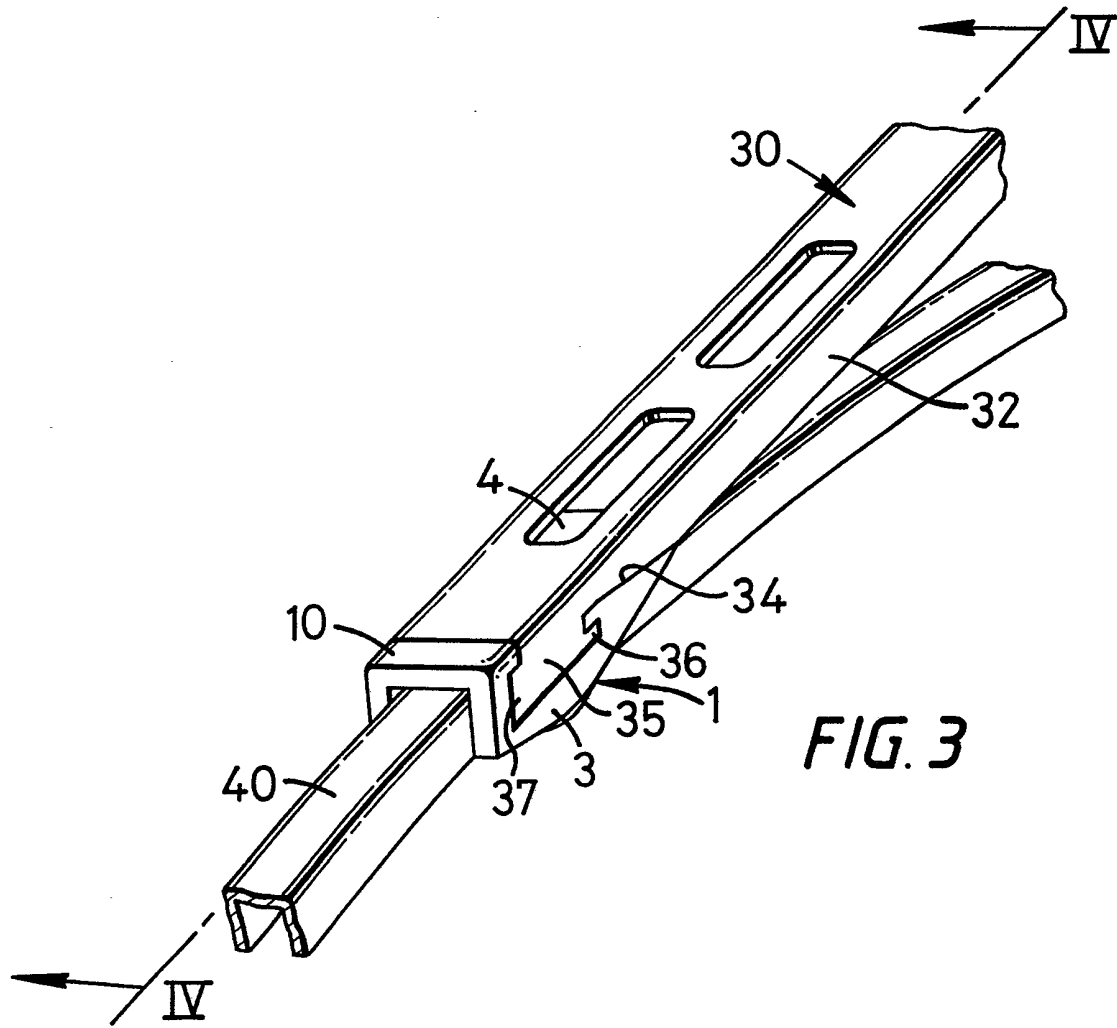


FIG. 3

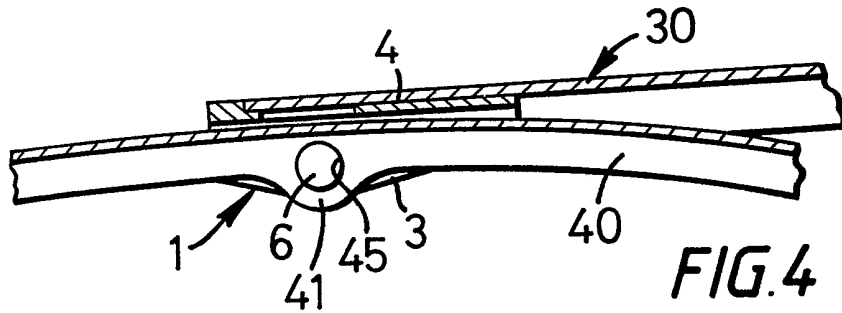


FIG. 4

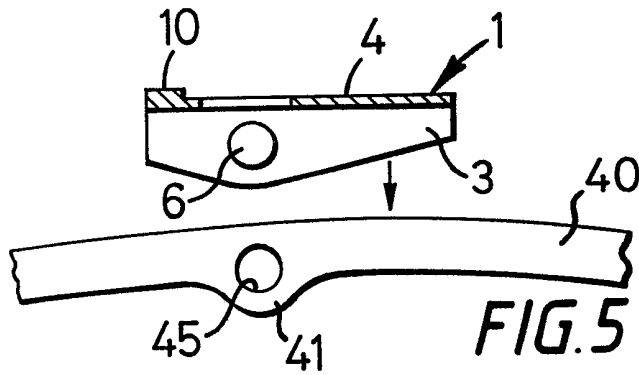


FIG. 5

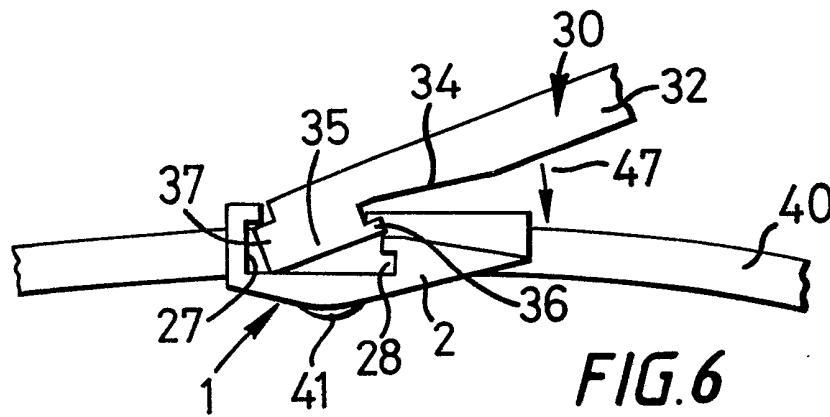


FIG. 6

## SPECIFICATION

**Pivot joint**

5 This invention relates to a pivot joint which is particularly but not exclusively useful in the manufacture of windscreen wipers.

10 In the manufacture of windscreen wipers, a number of pivot joints are used, particularly between the various yokes and/or levers of the harness of a windscreen wiper blade.

15 Problems exist in the manufacture of windscreen wipers due to the necessity, very often, of pivoting metal parts together. These pivot joints tend to be noisy and have a tendency to suffer from wear and corrosion. Various proposals have been made for overcoming these problems, for example, by the provision of plastics members between the metal parts of the joints, but these have not proved entirely satisfactory from a manufacturing standpoint even though they have worked satisfactorily in use. One of the problems associated with prior proposals has been the necessity of retaining the rivet in the joint, making the formation of the joint labour intensive. Even where it has not been necessary to use rivets or the like, post forming has sometimes had to be used with its attendant stress and corrosion problems.

20 The present invention seeks to provide a new and improved pivot joint which is relatively inexpensive to manufacture and assemble and which overcomes or reduces some or all of the above problems.

25 According to the invention, there is provided a pivot joint for pivotally connecting two members, the joint comprising a joint body of substantially channel shaped cross section and of a plastics material such as to enable resilient deformation of the side walls of the channel away from and towards each other, a pair of opposed trunnion members formed one on each wall of the channel and intended to engage in corresponding apertures or recesses in one of the parts to be pivoted and first and second projections and/or recesses arranged generally oppositely on the outsides of the walls of the channel and adapted for snap engagement with recesses and/or projections respectively in the other part to be pivoted.

30 Further according to the invention, a pivot joint comprises a first member which is of channel section at least at one end, a second member pivotable to the said one end of the first member and adapted to sit at least partly within the channel section of the first member with clearance and a joint body of substantially channel shaped cross section and of a plastics material such as to enable resilient deformation of the side walls of the channel away from and towards each other, a pair of opposed trunnion members formed one on the interior of each wall of the channel and intended to engage in corresponding apertures or recesses in the second member and first and second projections and/or recesses arranged generally oppositely on the outsides of the walls of the channel and adapted for snap engagement with recesses and/or projections respectively of the first member.

The first member may, for example, comprise the main yoke of a windscreen wiper blade and the second member may comprise a secondary yoke or lever. The pivot joint may also be used between secondary and tertiary yokes or levers where such exist.

65 The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:—

70 Figure 1 is a perspective view from above of a joint body used in forming a pivot joint in accordance with the invention;

75 Figure 2 is a perspective view from below of the joint body of figure 1;

Figure 3 is a perspective view of a completed joint using the joint body shown in figures 1 and 2;

Figure 4 is a sectional view of the pivot joint taken on the line IV-IV of figure 3;

80 Figure 5 is a side view of the joint in a first stage of construction, and

Figure 6 is a view similar to figure 5 but showing a second stage of construction.

85 Referring firstly to figures 1 and 2, there is shown a joint body 1 of generally channel section having side walls 2 and 3 and a base part 4. The joint body is moulded from a suitable adequately resilient plastics material such that the side walls 2 and 3 can flex resiliently towards or away from each other for a purpose to be described hereafter.

90 Situated towards one end of the channel are two opposed inwardly directed trunnions 6, each of which extends inwardly from one of the walls 2 and 3. The base portion 4 of the channel is cut away to provide an opening 8 therein and one end of the base portion is raised as shown at 10. Approximately one half of the exterior of the walls 2 and 3 has a reduced thickness compared to the other half and the dividing line 11 is so arranged that a recess 12 is formed. This recess is formed by a base portion 22, two side portions 23 and two projecting members 25 and 26. For the purpose of this description, it can be said that the projection 25 forms a first recess 27 with the base portion 22 and that the projection 26 forms a second recess 28 with the base portion 22 and these recesses 27 and 28 are used to connect the joint body 1 to the main yoke 30. Thus it will be seen that each of the connecting means for connecting the main yoke with the joint body comprises a recess with an adjacent projection, one side of the recess forming one side of the adjacent projection. It will also be seen that the trunnions 6 are situated in the region between the recesses 27 and 28.

95 As can be seen from figure 3, the main yoke end 30 has a special shape to enable it to cooperate with the joint body shown in figures 1 and 2. The main yoke 30 is of channel section and the sides 32 of this channel section are reduced at 34, this reduced section 34 ending up with a portion 35 of increased height with a rearwardly directed hook part 36, which forms a recess 38 with the reduced part 34, and a forwardly directed projecting part 37 for cooperation with the recesses 27 and 28 as will be hereinafter described. Thus it will be seen that at least one of the connection means on the main yoke comprises a projection with

an adjacent recess, one side of the projection forming one side of the adjacent recess.

The secondary yoke 40 is also of channel section and merely has, as can best be seen from figures 4 and 5, an enlarged portion 41 on each of its side walls 43 and 44 in the region of the joint and apertures 45 in these enlarged portions 41 to cooperate with the trunnions 6 on the joint body 1.

The assembly of a pivot joint formed as described above will now be described with reference to figures 5 and 6:-

First of all the secondary yoke 40 is offered up to the joint body 1 which is wider than the secondary yoke and can therefore sit across the secondary yoke. If the sides 2 and 3 of the joint body 1 are parted sufficiently, the joint body 1 can be pushed down onto the secondary yoke 40 until the trunnions 6 can snap into the apertures 45, thus providing a pivot connection between the secondary yoke 40 and the joint body 1.

Next, the joint body 1 and the main yoke 30 are joined together (see figure 6). The projecting parts 37 of the main yoke 30 are pushed sideways into the recesses 28 on the side walls 2 and 3 of the joint body, as shown. The main yoke 30 is swung relative to the joint body 1 in the direction of the arrow 47 so that the projections 36 snap past the projections 26 and seat in the recesses 27 so that the main yoke 30 is secured to the joint body 1. It will be seen that, in the completed position shown in figure 3, the raised portion 10 of the joint body provides an end cap for the end of the main yoke 30 and sits flush with the outer surface of the main yoke.

If desired, a pair of slots (shown in broken lines at 14 in figure 2) may be formed in the joint body to provide increased resilience.

While in the construction of a windscreen wiper, it is not necessary to be able to part the pivot joints, with the joint described, it is possible to disassemble it.

This is achieved by reversing the assembly operations.

Thus, firstly, the main yoke 30 is pulled away from the joint body 1 in the opposite direction to the arrow 47 to snap the projections 36 past the projections 26 so that the main yoke 30 is free and the projections 37 can be removed from the recesses 28.

The side walls 2 and 3 of the joint body 1 are pulled apart to remove the trunnions 6 from the apertures 45 in the secondary yoke 40, whereupon the joint body can be pushed upwards to free the joint body 1 from the secondary yoke 40.

It will be appreciated that modifications may be made to the above described embodiment without departing from the scope of the invention. For example, the trunnions 6 could be tapered so that the side walls 2 and 3 are moved apart automatically when the joint body is pushed down on to the secondary yoke 40. The situation of the recesses on the joint body and the projections on the main yoke could be reversed so that projections on the joint body could cooperate with recesses formed in the main yoke.

While the invention has been particularly described in relation to connecting together the main and secondary yokes of a windscreen wiper blade, it will be appreciated that the pivot joint could be used to connect secondary and tertiary yokes and/or levers

where such exist. Furthermore, the invention is not limited to the manufacture of windscreen wipers but may be used in other pivot joints to which this type of joint is applicable.

## 70 CLAIMS

1. A pivot joint for pivotally connecting two members, the joint comprising a joint body of substantially channel shaped cross section and of a plastics material such as to enable resilient deformation of the side walls of the channel away from and towards each other, a pair of opposed trunnion members formed on each wall of the channel and intended to engage in corresponding apertures or recesses in one of the parts to be pivoted and first and second projections and/or recesses arranged generally oppositely on the outsides of the walls of the channel and adapted for snap engagement with recesses and/or projections respectively in the other part to be pivoted.

2. A pivot joint comprising a first member which is of channel section at least at one end, a second member pivotable to the said one end of the first member and adapted to sit at least partly within the channel section of the first member with clearance and a joint body of substantially channel shaped cross section and of a plastics material such as to enable resilient deformation of the side walls of the channel away from and towards each other, a pair of opposed trunnion members formed one on the interior of each wall of the channel and intended to engage in corresponding apertures or recesses in the second member and first and second projections and/or recesses arranged generally oppositely on the outsides of the walls of the channel and adapted for snap engagement with recesses arranged generally oppositely on the outsides of the walls of the channel and adapted for snap engagement with recesses and/or projections respectively of the first member.

3. A pivot joint as claimed in claim 2, wherein the projections and recesses of the joint body and the first member extend longitudinally of the first member and joint body.

4. A pivot joint as claimed in claim 2 or 3, wherein the side walls of the joint body are of reduced thickness between the projections or recesses.

5. A pivot joint as claimed in claim 4, wherein the trunnion members are situated on that part of the side walls of the joint body in the region between the projections or recesses.

6. A pivot joint as claimed in claim 4 or 5, wherein the base of the channel of the joint body is removed in the region between the projections or recesses.

7. A pivot joint as claimed in any one of claims 2 to 6, wherein at least one of the recesses or projections of the joint body and of the first member comprises a projection and recess combination of a projection and adjacent recess, one side wall of the recess being formed by one side wall of the adjacent projection such that, when assembled together, the projection of the projection and recess combination of the joint body engages in the recess of the projection and recess combination of the first member and *vice versa*.

8. A pivot joint as claimed in any one of claims 2 to 7, wherein the first and second members comprise

yokes and/or levers of a windscreen wiper blade.

9. A pivot joint as claimed in claim 8, wherein the first member comprises the main yoke of a windscreen wiper blade and the second member comprises a secondary yoke or lever.

10. A pivot joint substantially as described herein with reference to the drawings.

11. A windscreen wiper blade having at least one pivot joint as claimed in any one of the preceding claims.

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