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(54) An electrical connector.

(57) An electrical connector particularly of the insulation displacement type. It comprises an electrically insulated main body, provided with a connector arm slidably mounted through the body to project from the body at either end. The connector arm has a pair of accessible holes for receiving a wire pair to be shorted in the connector to complete an electrical circuit. An electrically conductive element defining a pair of opposed slits aligned to be in the path of travel of the wire receiving holes, are mounted in the body, the conductive element forming a passageway in which the connector arm slides. Acutation of the connector arm moves the wire pair through the slit which is dimensioned to sever the wire insulation and short the wire pair through the metallic plates. To release the wire pair the connector arm is moved in the opposite direction and the connector is then reusable.

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An Electrical Connector

FIELD OF THE INVENTION

The present invention relates to an electrical connector particularly but not exclusively for use in the telecommunications industry.

BACKGROUND ART

Where it is required to distribute telephone lines from the local telephone exchange cable, be it aerial or underground, separate distribution points are established appropriately located either at the top of telephone poles or on the walls of the building requiring the telephone service.

These distribution points consist of block terminals containing telephone wire connectors, which from time to time have to be removed for the purposes of testing or rearrangement.

Up to relatively recent times these connectors have been of the screw connection type, but it is becoming more common these days to employ the use of insulation displacement connectors which do not require the wire insulation to be stripped to effect the connection thus producing a saving in time and cost.

However the majority of insulation displacement connectors presently on the market are not re-usable and are limited in the size and type of wire with which they can deal.

SUMMARY OF THE INVENTION

It is accordingly an object of the invention to provide an insulation displacement electrical connector which is free of the disadvantages of the prior art in particular is re-usable and capable of deployment over a wide range of wire sizes and types.

According to the invention there is provided an electrical connector comprising a connector body, means on the connector body defining a slit for severing insulation on a wire pair to be connected passed through the slit, and shorting the pair therein, and a slidable member on said body actuable to move a said wire pair through and away from said slit.

The above device solves the problem of re-usability because the slidable member, in the form of a plunger guided for reciprocable movement in the connector body, is actuable by finger pressure to withdraw the wire pair from the slit thereby to release the wires for testing purposes in contrast to known insulation displacement connectors where this is not possible.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention will become apparent from the following description of a preferred embodiment of the invention taken with reference to the accompanying drawings wherein:

Figure 1 is a top view of a re-usable connector according to an embodiment of the invention;

Figure 2 is a side view along the arrow P of Figure 1;

Figure 3 is a side view along the arrow R of Figure 2;

Figure 4 is a top view of the wire insulation-severing and electrical pick-up mechanism of the connector of Figure 1;

Figure 5 is a view looking along the arrow T of Figure 4;

Figure 6 shows representative side and end views of the actuating plunger of the connector of Figure 1;

Figure 7 is a view of an alternative embodiment of the main connector part of the re-usable connector depicted in four stages of construction for illustrative purposes only; and

Figure 8 (a) and 8 (b) show a side view and end view respectively of the main connector part formed from the four stage process depicted in Figure 7, Figure 8 (b) being a view along the arrow A in Figure 8 (a).

BEST MODES OF CARRYING OUT THE INVENTION

The insulation displacement re-usable connector shown in the drawings comprises a connector block 1 of square cross section, made of an insulating material, and formed of two identical separable block half-sections 2 and 3.

An axial passageway 4 of circular cross section extends through the block 1, intercepting axially aligned transverse entrant passageways 5 and 6 leading to the passageway 4.

The transverse passageways 5 and 6 are of circular and square cross section respectively, lying in the plane of separation of the block half-sections 2 and 3.

The entrant passageways 5 and 6 are formed from cooperating opposing grooves 7 and 8 provided in the mating surfaces 9 of the block half-sections 2 and 3.

The block half-sections 2 and 3 are held together by means of four screws 10 and associated nuts 11, although other connection means are possible, for example by the provision of cooperating formations on the mating faces which would avoid the need to employ screws and nuts.

A cylindrical brass collar 12 is located in snug-fit relationship, in the axial passageway 4.

The collar 12 is split at 13. A pair of identical semi-circular plates 14 are brazed or welded between the opposing edges E defining the split 13 of the collar 12, to form a pair of longitudinal slits S between opposing edges of the plates 14, both slits S extending midway between the edges E and having axes which are at 90° to the axis of the collar 12. The entrance to the slits S within the collar 12 are widened out at S' as shown.

The plates 14 project from the peripheral surface of the collar 12, to engage the entrant passageway 5 as seen in Figures 1 and 2.

An aperture 15, see Figure 4, is formed in the peripheral surface of the collar 12, the axis of the aperture 15 lying on that of the entrant passageway 6, and thus on the axis defined by the plates 14.

A plunger 16 is positioned for slidable movement in the entrant passageways 5 and 6 of the connector block 1.

The plunger 16 has two plunger halves, 17 and 18, one half 17 of which is of circular cross section and which engages in the collar 14 to protrude from the entrant aperture 5, the other half 18 being of square cross section to engage the aperture 15 and protrude from the entrant aperture 6.

The cylindrical half 17 of the plunger 16 has a pair of circular bores 19, positioned such that, with the square-sectional plunger half 18 positioned in the square sectioned entrant aperture 6, and unable to rotate thereby, the openings to the bores 19 are moveable in line with the slits S between the plates 14, as the plunger 16 is moved in the direction of the arrow A in Figure 1.

To connect a pair of wires of predetermined wire size, each wire of the pair are inserted in the bores 19. The plunger 16 is then depressed in the direction of arrow A to cause the wires to enter both upper and lower slits S between the plates 14. This acts to sever the insulation in the wires to effect a closed circuit in the pair through the plates 14.

Depression of the plunger 16 in the opposite direction, releases the wires from the slits S for testing purposes. The connector is then re-usable.

The material of the plates 14 is such that the slits S as by yielding elastically, are able to accommodate various wire sizes in the range 0.5mm to 1.1mm in diameter, without varying the dimension of the slit itself.

A variant of the invention is shown in Figures 7 and 8. This was developed to avoid the two part manufacture of the main connector part of the device comprising the brass collar 12 and plates 14 of the Figure 1 through 5 embodiment, and lends itself more readily to mass production using rapid stamping and forming techniques.

In this alternative embodiment the main connector part of the device, as shown in Figure 7, stage 1, is made from an integral piece of flat spring copper strip 20, having a rectangular cut-out 21, in each end of the strip 21 and on its longitudinal axis.

An oval hole 22 is provided centrally of the strip 21.

Each limb 23 formed by the cut-outs 21 is turned over at its end to form a spaded end portion 24 the plane of which lies at right angles to the plane of its associated side piece 22, as shown in Figure 7, stage 2.

The strip 20 is then folded, as shown in Figure 7, stage 3, into a U-shape 25.

End sections 26 of the limbs 23 are then turned over, as shown in Figure 7, stage 4, such that the edges 27 of those spaded end portions 24 at either end of the strip 21 and lying on the same side of the longitudinal axis of the strip 20, face one another, and under the spring tension of the strip 21, to form a pair of narrow slits 28. An oval passageway 29 on the same axis as the oval hole 22, see Figure 8, is thus formed between one respective pair of spaded end portions forming one of the slits 28 and the other respective pair forming the other of the slits 28, with the plane of the slits 28 passing through the axis of the oval passageway 29 and the oral hole 22 in the body of the strip 20.

The main connector part thus formed from the strip 20 is positioned in the axial passageway of a connector block (not shown) of the type 1 discussed with reference to Figures 1 to 6, the axial passage being designed to accept the folded strip in tight fit secure relationship.

In this embodiment however, the device is operable by means of a plunger 30, see Figure 8, of oval cross-section corresponding to the oval holes 22 and 29 in the main connector part formed from the strip 20. Hence the corresponding axially aligned passageways in the connector block of this alternative embodiment in which the plunger 30 is slidably mounted, namely those corresponding to entrant passageways 5 and 6 in the Figure 1 to 5 embodiment, are of oval crosssection as will be

appreciated. The plunger 30 is thus unable to rotate but is free for axial slidable movement in a coaxial passageway extending through the connection block provided by the oval holes 22 and 29, and the oval passageways in the body of the connector block.

The plunger 30 is provided with holes 31 for receiving the wire to be connected lying in alignment with the slits 28. The plunger 30 may thus be actuated by manual operation to force the wires to be connected through the slits 28, thereby to pierce the wire insulation in the slits 28, and make the electrical connection of the two wires as required through the copper strip 20 of the main connector part.

Since the copper strip is spring tensioned, the slits 28 will accommodate electrical wire of varied dimensions, due to their yieldability as with the slits S of the Figure 1 to 5 embodiment.

Although the invention has particular applicability to telephone wire connectors, it is not limited thereto, one of its alternative uses for example, is as a replacement for a screw terminal in electrical plugs and sockets.

Claims

1. An electrical connector comprising a connector body, means on the connector body defining a slit for severing insulation on a wire pair to be connected passed through the slit, and shorting the pair therein, and a slidable member on said body actuable to move a said wire pair through and away from said slit.

2. A connector as claimed in claim 1 wherein said slit defining means comprises a pair of electrically conducting semi-cylindrical plates spaced one from the other to form a said longitudinal slit between each opposed longitudinal edge of said spaced plate members.

3. A connector as claimed in claim 2 wherein said spaced semi-cylindrical plates form a circular passageway in said connector body for receiving said slidable member.

4. A connector as claimed in claim 3 wherein said slidable member is formed of two halves, one half being of circular cross-section and slidably engaging said circular passageway, the other half being of square cross-section engaging a further passageway in said body of complementary cross-section thereto, said circular and square passageways being co-axial.

5. A connector as claimed in claim 4 wherein said slidable member has a pair of spaced axially aligned holes in its circular half, said holes being in alignment with said opposed slits.

6. A connector as claimed in claim 5 wherein said body has a central passageway the axis of which is perpendicular to the axis of said circular and square passageways, a cylindrical metallic collar positioned in said central passageway and provided with openings for access to said square and circular passageways for said slidable member, said collar having an axially directed split lying in the path of said longitudinally opposed slits in said plates.

7. A connector as claimed in claim 6 wherein said semi-circular plates are held in said body by being attached to said collar in cut-outs along the opposed edges of said split, said cut-outs being complementary to said semi-circular plates.

8. A connector as claimed in claim 1 wherein said slit defining means is formed from a spring strip of electrically connecting material, each end of the strip having a flat end section turned-out of the plane of the strip, the strip being folded such that an edge of said flat section faces the edge of the other flat section across said slit.

9. A connector as claimed in claim 8 wherein two flat end sections are turned out of the plane of the strip at each end thereof to form two slits for severing wire insulation and lying in a plane containing the axis of the folded strip.

10. A connector as claimed in claim 9 wherein an oval passageway is formed between each respective pair of flat end sections defining a said slit, the axis of said passageway being coaxial with an oval hole formed centrally of the folded strip, said oval passageway and said oval hole receiving said slidable member of corresponding cross section.

11. A connector as claimed in any preceding claim wherein side slidable member projects from said body at either end thereof providing for thumb and finger actuation as between said body and one end of said slidable member respectively.

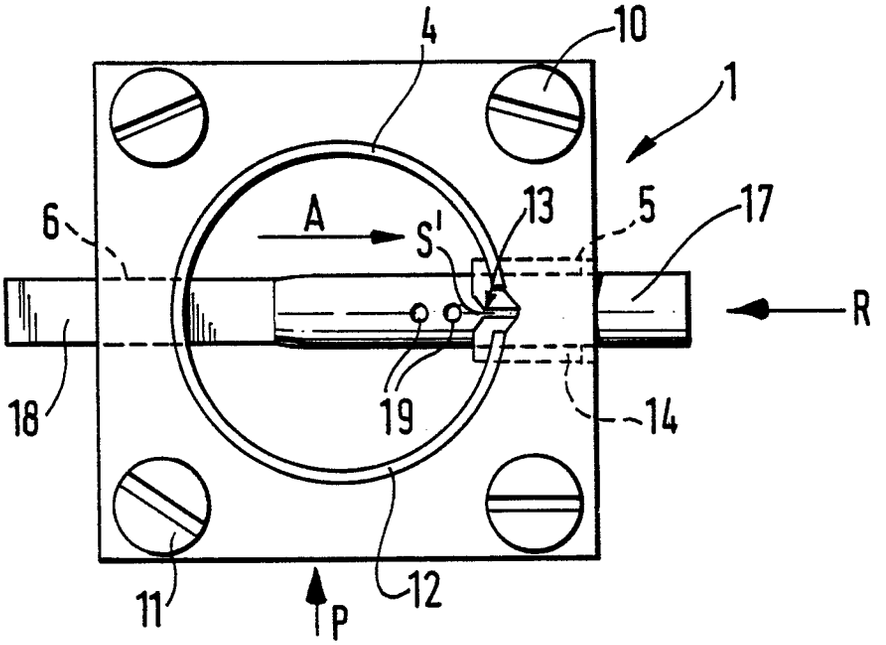

Fig.1.

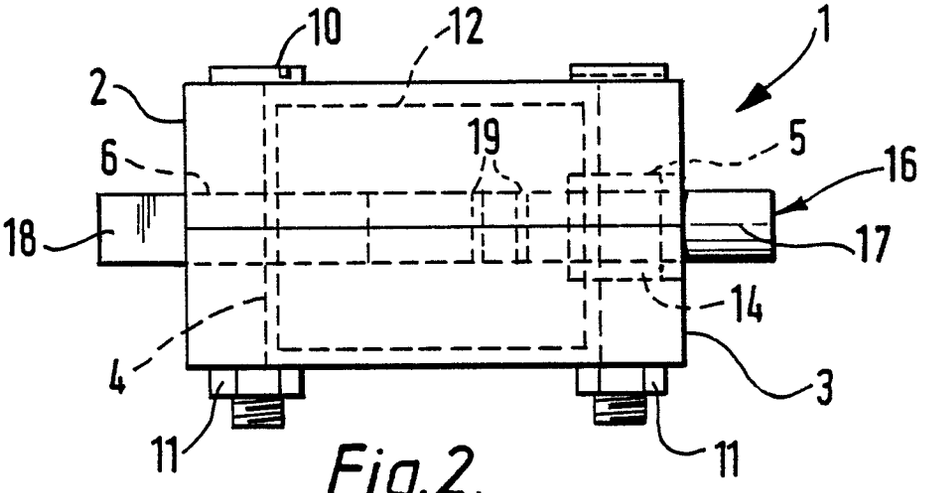

Fig.2.

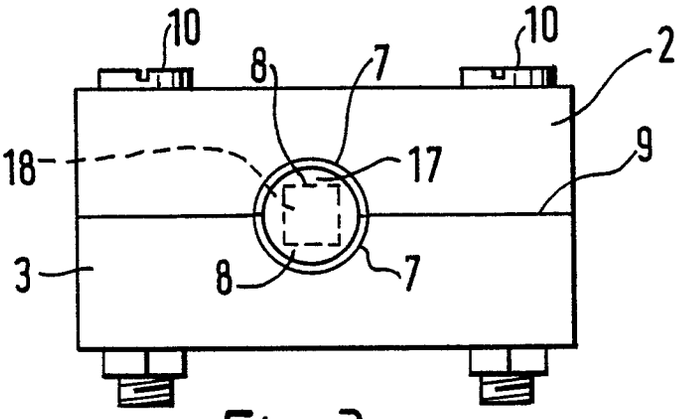

Fig.3.

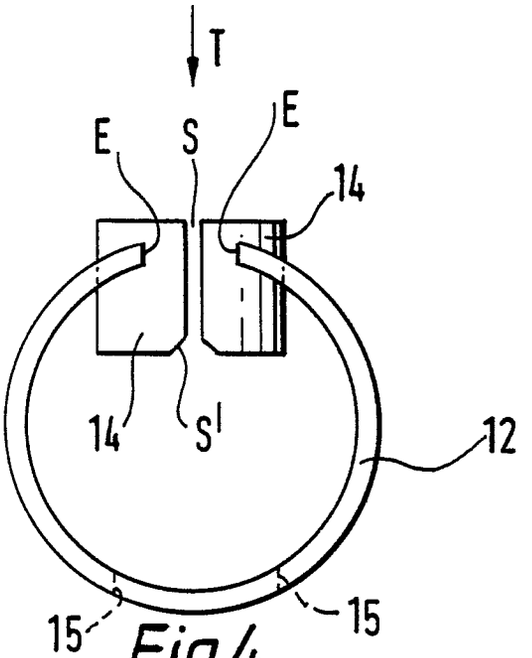

Fig.4.

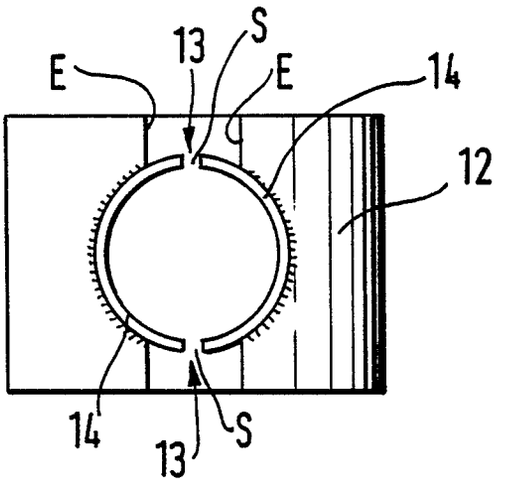

Fig.5.

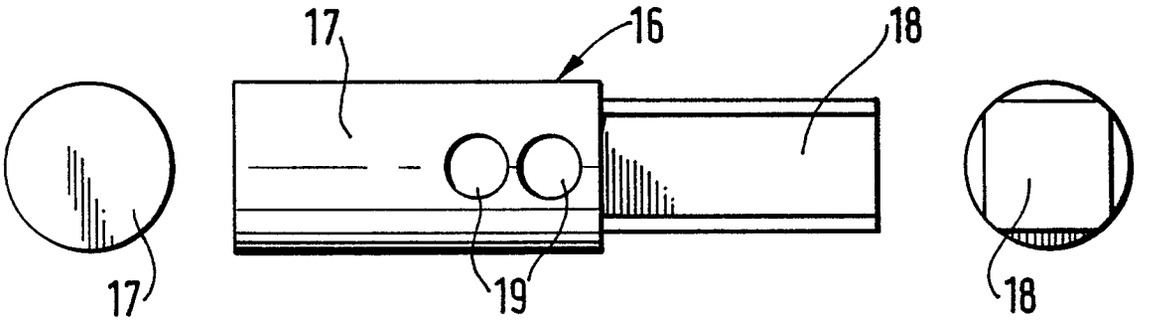

Fig.6.

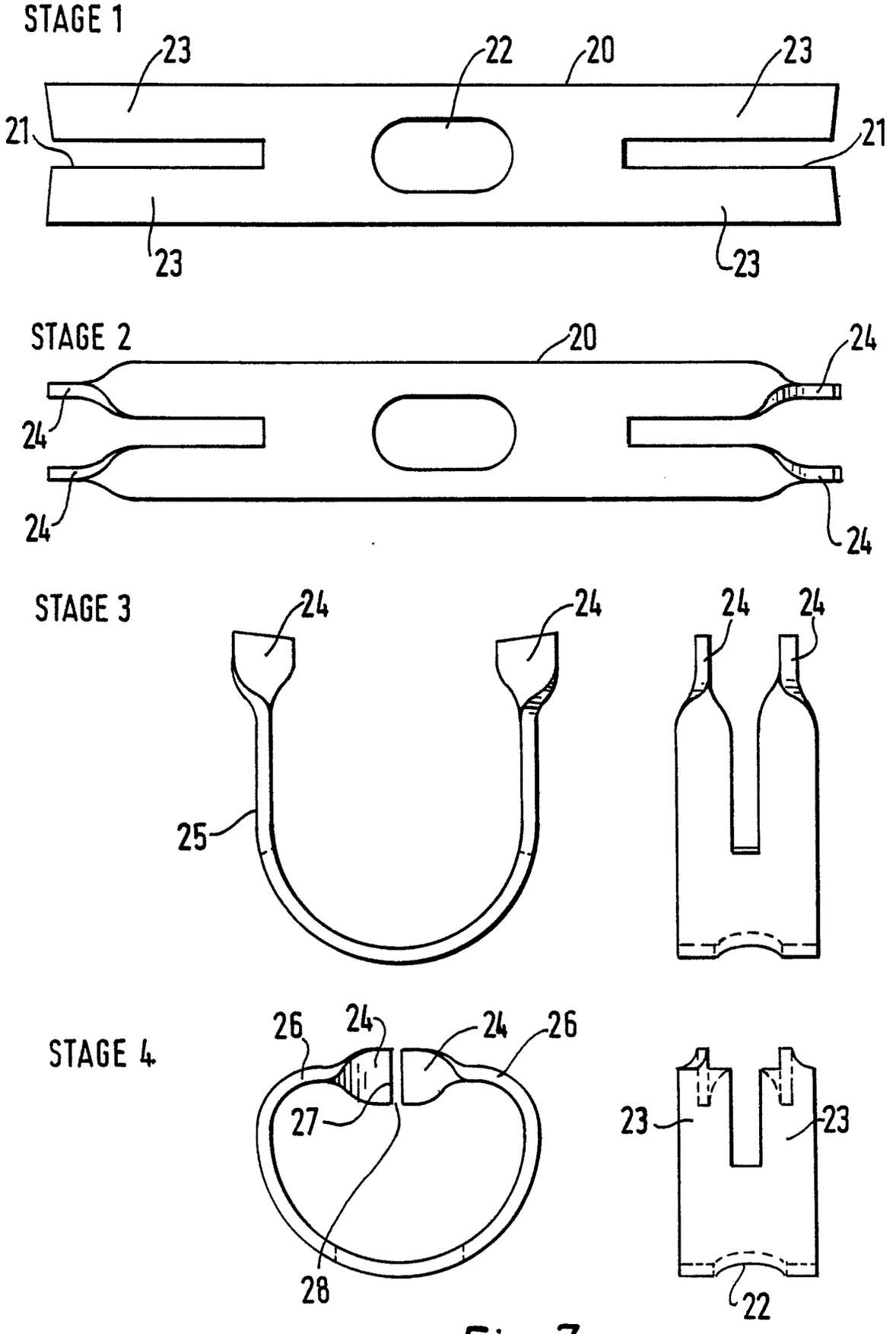
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Fig. 7.

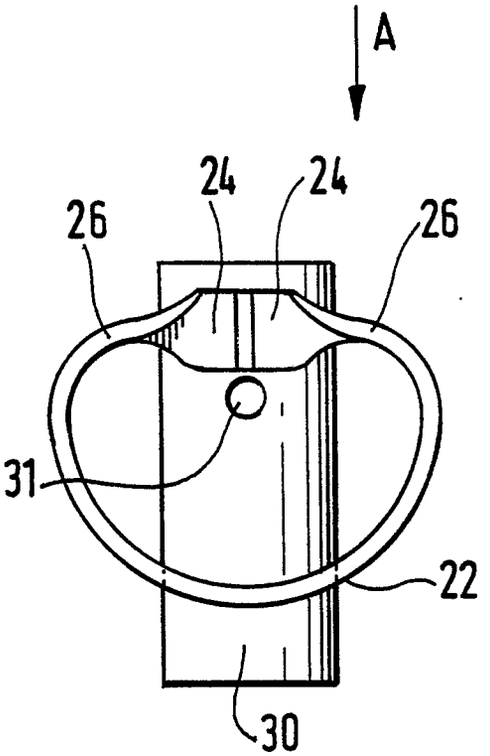

Fig.8a.

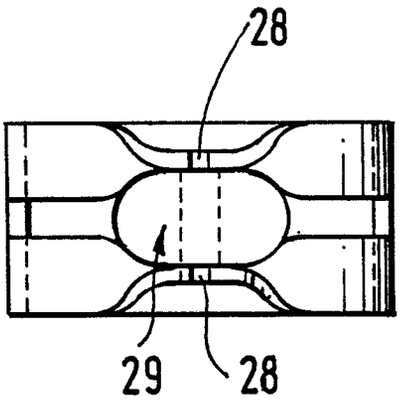

Fig.8b.