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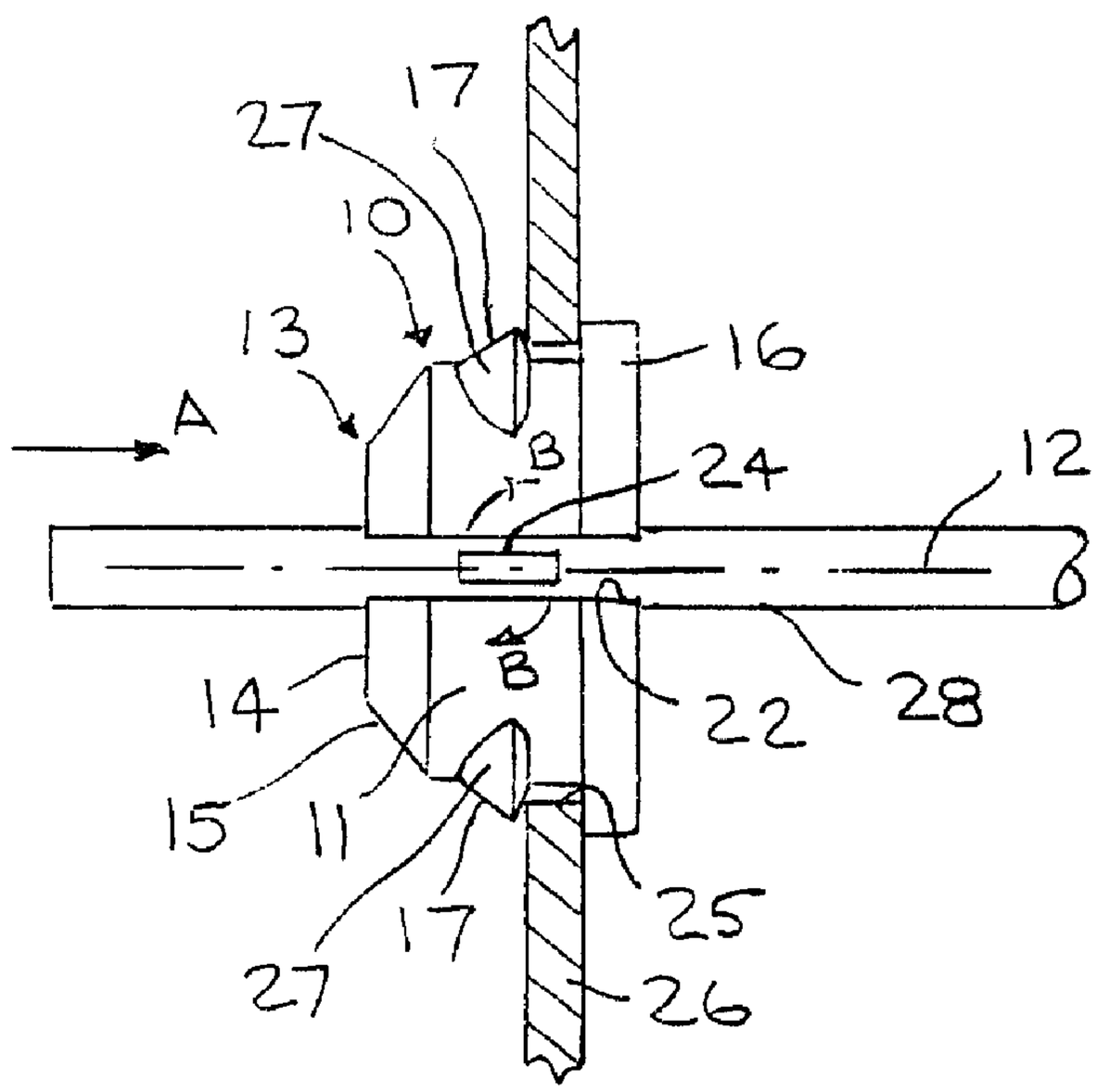

(57) Abrégé/Abstract:
In a connector for connecting an electrical cable in an opening in a wall of an electrical outlet box, a first slot extends from an aperture in a rear end wall, along a tubular portion, and across an outwardly projecting flange, so that at this first slot the connector is circumferentially discontinuous. A second slot which is diametrically opposed to the first slot extends from the aperture and along the tubular portion to the front end thereof but does not extend across the flange, this second slot preferably being constituted in the tubular portion by a groove in the inner face thereof. The connector is integrally molded of a resiliently deformable plastics material, so that in order partially, or completely, to withdraw an electrical cable disposed through the aperture in the rear end wall of the connector the width of this aperture may be increased by forcibly increasing the width of the first slot with resultant resilient deformation of the connector at the second slot.

ABSTRACT OF THE DISCLOSURE

In a connector for connecting an electrical cable in an opening in a wall of an electrical outlet box, a first slot extends from an aperture in a rear end wall, along a tubular portion, and across an outwardly projecting flange, so that at this first slot the connector is circumferentially discontinuous. A second slot which is diametrically opposed to the first slot extends from the aperture and along the tubular portion to the front end thereof but does not extend across the flange, this second slot preferably being constituted in the tubular portion by a groove in the inner face thereof. The connector is integrally molded of a resiliently deformable plastics material, so that in order partially, or completely, to withdraw an electrical cable disposed through the aperture in the rear end wall of the connector the width of this aperture may be increased by forcibly increasing the width of the first slot with resultant resilient deformation of the connector at the second slot.

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CONNECTOR FOR CONNECTING AN ELECTRICAL CABLE

This invention relates to a connector for connecting an electrical cable, and more particularly a non-metallic clad cable, in an opening in a wall, such as an opening formed by the removal of a knock-out plug in a wall of an electrical outlet box.

Such a connector is conventionally provided in which, after removal of a knock-out plug from a wall in the electrical outlet box, the connector is securely mounted in the opening formed thereby, with an end portion of an electrical cable thereafter being disposed from outside the electrical outlet box through the connector for electrical connection of the wiring in this end portion of the electrical cable, after it has been stripped, to an electrical switch, outlet socket or other electrical device disposed within the outlet box, the connector serving to prevent chafing of the electrical cable against the edge of the wall of the outlet box which defines the opening therein and which could result, in operation, in an electrical short-circuit. Such connectors conventionally also so grip the electrical cable disposed therethrough that while the electrical cable can readily be urged through the connector in the direction from outside the electrical outlet box the cable cannot subsequently be withdrawn in the opposite direction, thereby operatively providing a strain relief effect in that a force on the cable outside the outlet box tending to withdraw the cable from the outlet box is substantially prevented from being transmitted to the connection between the stripped wiring in the end portion of the cable and the terminals of the electrical device installed within the box. This strain relief effect is,

of course, desirable, but during the disposition of the end portion of the electrical cable through the connector the electrician may insert an excessive length of the end portion of the cable through the connector. It is a disadvantage of the conventional connectors as described above that there is no quick and convenient arrangement for partially withdrawing the end portion of the cable so that only the desired length of cable projects through the connector into the outlet box, and it is a primary object of the present invention to provide a connector in which this disadvantage is substantially overcome or mitigated.

In accordance with the present invention there is provided a connector for releasably connecting an electrical cable in an opening in a wall, comprising a tubular portion having a front end and a rear end, an outwardly projecting flange at the front end of the tubular portion, a rear end wall at the rear end of the tubular portion, outwardly projecting ribbing on the tubular portion and spaced from the flange for securing the connector within an opening in a wall with the wall between the flange and ribbing, and an aperture in the rear end wall for the passage of an electrical cable therethrough. First and second circumferentially spaced slots extend from the aperture in the rear end wall to the front end of the tubular portion, only the first slot of the first and second slots extending fully through the connector so that at this first slot the connector is circumferentially discontinuous, with the connector at the second slot being of resiliently deformable material whereby the width of the aperture in the rear end wall may be increased by forcibly increasing the width of the first slot with resultant resilient deformation of the connector at the second slot. The ribbing comprises

two diametrically opposed, circumferentially spaced ribs each of which extends in a circumferential direction partially around the tubular portion.

In order that the present invention may be more clearly understood and more readily carried into effect the same will now, by way of example, be more fully described with reference to the accompanying drawings in which Fig. 1 is a side view of a connector according to a preferred embodiment of the invention secured in an opening in a wall and with an end portion of an electrical cable disposed through the connector;

Fig. 1a is a view corresponding to Fig. 1 but showing an intermediate stage in the mounting of the connector in the opening in the wall;

Fig. 2 is an end view of the connector shown in Fig. 1 in the direction of the arrow A;

Fig. 3 is a sectioned view of the connector on the line 3-3 in Fig. 2; and

Fig. 4 is a sectioned view of the connector on the line 4-4 in Fig. 2.

Referring to the drawings, 10 denotes generally a connector comprising a tubular portion 11 which is of generally cylindrical form having a longitudinal axis 12, with at the rear end of the tubular portion 11 a rear end wall 13 comprising a central transverse portion 14 surrounded by a frusto-conical portion 15. At the front end of the tubular portion 11 is an outwardly projecting flange 16, and presented on the tubular portion 11 at a spaced distance from the flange 16 is outwardly projecting ribbing 17 preferably comprising two diametrically opposed, circumferentially spaced ribs each of which extends in a circumferential direction partially around the tubular portion 11.

The central portion 14 of the rear end wall 13 has an aperture 18 which is preferably of elongated form and is bounded by opposed jaws 19 each of which, as is most clearly shown in Fig. 3, has an axial rear edge portion 20, and a curvilinearly chamfered front edge portion 21 merging smoothly into the associated rear edge portion 20.

A first slot 22 extends fully through the connector 10 from the elongated aperture 18 across the frusto-conical portion 15 of the rear end wall 13, the tubular portion 11 and the flange 16 so that at this first slot 22 the connector 10 is circumferentially discontinuous, a second slot 23 which is circumferentially spaced from and preferably diametrically opposed to the first slot 22 extending from the aperture 18 across the frusto-conical portion 15 of the rear end wall 13, and the tubular portion 11. In the preferred embodiment of the invention shown in the drawings, however, this second slot 23 does not extend through the tubular portion 11 but comprises, in the tubular portion 11, a groove 23' in the inner face thereof, the wall thickness of the tubular portion 11 being, in the preferred embodiment, 0.075 inch with the depth of the groove 23' being 0.050 inch so that the depth of the groove 23' constitutes a major portion of the wall thickness of the tubular portion 11. Thus, at the second slot 23 the two parts of the connector 10 bounded by the slots 22 and 23 are interconnected only by the flange 16 and the wall part 11' of the tubular portion 11 outwardly of the groove 23'. At the second groove 23 the flange 16 and this wall part 11' of the tubular portion 11 are of a resiliently deformable material, and in the preferred embodiment the connector 10 is integrally formed of a molded plastics material, this plastics material being, for example, nylon so that, as is hereinafter further described, the width of the aperture 18 between the opposed jaws 19 may be increased by forcibly

increasing the width of the first slot 22 by, for example, inserting the blade 24 of a conventional screwdriver or a coin into the first slot 22 and then twisting the blade 24 of the screwdriver or the coin as shown by the arrows B in Fig. 1 with resultant resilient deformation of the flange 16 and said wall part 11' of the tubular portion 11 at the second slot 23.

In operation, an opening 25 is provided in a wall 26, this opening 25 being formed, for example, by the removal of a knock-out plug (not shown) in an electrical outlet box. The connector 10 is then secured within this opening 25, this securement of the connector 10 being achieved by initially disposing the connector 10 from outside the outlet box at an inclined angle through the opening 25 as shown in Fig. 1a with one of the ribs 17 such as, for example, the upper rib 17 as shown in Fig. 1a within the outlet box. Thereafter, by applying a force to the flange 16 from outside the outlet box the other rib 17 is snapped through the opening 25 fully to install the connector 10 within the opening 25 with the wall 26 between the flange 16 and the ribs 17, the rear faces 27 of the ribs 17 being of tapered form to facilitate this snapping of the appropriate ribs 17 through the opening 25.

An end portion 28 of a non-metallic clad electrical cable is then urged from outside the outlet box through the connector 10 and the aperture 18 therein with resilient flexing of the central portion 14 of the rear end wall 13 in the rearward direction, the curvilinearly chamfered front edge portion 21 of each jaw 19 facilitating this insertion of the end portion 28 of the electrical cable through the aperture 18, but the edges 29 at the junctions of the axial rear edge portions 20 of the jaws 19 and the central portion 14 substantially preventing withdrawal of the end portion 28

of the electrical cable in the opposite direction since urging this end portion 28 of the electrical cable in said opposite direction results in resilient flexing of the central portion 14 in the forward direction thereby causing the edges 29 at the junctions of the portions 20 of the jaws 19 and the central portion 14 more securely to grip the electrical cable. The connector 10 may alternatively be installed after the end portion 28 of the electrical cable has been disposed through the opening 25 in the wall 26 by forcibly increasing the width of the first slot 22 with resultant resilient deformation of the flange 16 and said wall part 11' of the tubular portion 11 at the second slot 23, and outside of the outlet box urging the electrical cable through the first slot 22, the connector 10 thereafter being secured through the opening 25 in the manner described above.

If, however, the electrician has inserted an excessive length of the end portion 28 of the electrical cable into the outlet box the blade 24 of a screwdriver or a coin may be inserted in the first slot 22 and twisted as hereinbefore described in order sufficiently to increase the width of the aperture 18 between the jaws 19 as to permit partial, or complete, withdrawal of the end portion 28 of the electrical cable as desired.

Generally, in new building construction electrical outlet boxes are installed with the end portions of electrical cables disposed through connectors mounted in knock-out openings in the outlet boxes, and wall panelling is then installed with associated plastering being performed before the electrical switches, outlet sockets or other electrical devices are mounted in the outlet boxes and are electrically connected to the wiring in the end portions of the electrical cables. If after the wall panelling has been

installed and the associated plastering has been performed the electrician discovers that an excessive length of the end portion of an electrical cable is disposed within an outlet box this end portion of the electrical cable can be partially withdrawn from the outlet box in the manner hereinbefore described but by pushing the end portion of the electrical cable from within the outlet box, rather than by pulling the end portion of the electrical cable from outside the outlet box, since of course the wall panelling and associated plastering renders inaccessible the end portion of the electrical cable outside the outlet box.

If it is desired to remove the connector 10 from the opening 25 in the wall 26 the end portion 28 of the electrical cable is completely withdrawn from the aperture 18 as described above, and then by pushing from inside the outlet box on one of the ribs 17 this rib 17 is snapped out of the opening 25 so that the connector 10 is then in the condition shown in Fig. 1a and the connector may be removed and re-used, this snapping of the ribs 17 out of the opening 25 being permitted by the ribs 17 each having a face 30 directed towards the flange 16 which has a rearward rake preferably at an angle of approximately 15° as indicated in Fig. 3.

If desired, the connector 10 including of course the aperture 18 may be so dimensioned relative to the electrical cable that two or more such electrical cables may be disposed therethrough as shown in chain-dotted lines in Fig. 1a.

While in the preferred embodiment as hereinbefore described with reference to the accompanying drawings, the second slot 23 comprises the groove 23' in the inner face of the tubular portion 11, in alternative embodiments (not

shown) this second slot 23 may extend fully through the tubular portion 11 and to the front end thereof, so that in these alternative embodiments the two parts of the connector 10 bounded by the slots 22 and 23 are interconnected only by the flange 16 at the second slot 23.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A connector for releasably connecting an electrical cable in an opening in a wall, comprising a tubular portion having a front end and a rear end, an outwardly projecting flange at the front end of the tubular portion, a rear end wall at the rear end of the tubular portion, outwardly projecting ribbing on the tubular portion and spaced from the flange for securing the connector within an opening in a wall with the wall between the flange and ribbing, an aperture in the rear end wall for the passage of an electrical cable therethrough, and first and second circumferentially spaced slots extending from the aperture in the rear end wall to the front end of the tubular portion, only the first slot of the first and second slots extending fully through the connector so that at this first slot the connector is circumferentially discontinuous, with the connector at the second slot being of resiliently deformable material whereby the width of the aperture in the rear end wall may be increased by forcibly increasing the width of the first slot with resultant resilient deformation of the connector at the second slot, and the ribbing comprising two diametrically opposed, circumferentially spaced ribs each of which extends in a circumferential direction partially around the tubular portion.

2. A connector according to claim 1, wherein the first and second slots are substantially diametrically opposed.

3. A connector according to claim 1, wherein the tubular portion has an inner face, with the second slot comprising a groove in this inner face of the tubular portion and extending to the front end thereof.

4. A connector according to claim 3, wherein the tubular portion has a wall thickness, with the groove in the inner face of the tubular portion having a depth constituting a major portion of this wall thickness of the tubular portion.

5. A connector according to claim 1, wherein the connector is integrally formed of a molded resiliently deformable plastics material.

6. A connector according to claim 5, wherein the molded plastics material is nylon.

7. A connector according to claim 1, wherein each rib has a face directed towards the flange, this face having a rearward rake.

8. A connector according to claim 7, wherein said rearward rake of said face of each rib is at an angle of approximately 15 °.

9. A connector according to claim 1, wherein the aperture in the rear end wall is bounded by opposed jaws each of which has an axial rear edge portion, and a curvilinearly chamfered front edge portion which merges into the rear edge portion.

10. A connector for releasably connecting an electrical cable in an opening in a wall, comprising a tubular portion having a front end and a rear end, an outwardly projecting flange at the front end of the tubular portion, a rear end wall at the rear end of the tubular portion, two outwardly projecting, diametrically opposed, circumferentially spaced ribs each of which extends in a circumferential direction partially around the tubular portion, and each of which has a rearwardly raked face directed towards the flange, with the ribs spaced from the flange for securing the connector within an opening in a wall with the wall between the flange and ribs, an aperture in the rear end wall for the passage of an electrical cable therethrough, with the aperture in the rear end wall being bounded by opposed jaws each of which has an axial rear edge portion, and a curvilinearly

chamfered front edge portion which merges into the rear edge portion, and first and second substantially diametrically opposed slots extending from the aperture in the rear end wall to the front end of the tubular portion, only the first slot of the first and second slots extending across the flange so that at this first slot the connector is circumferentially discontinuous, and the connector being integrally formed of a molded, resiliently deformable plastics material whereby the width of the aperture in the rear end wall may be increased by forcibly increasing the width of the first slot with resultant resilient deformation of the flange at the second slot.

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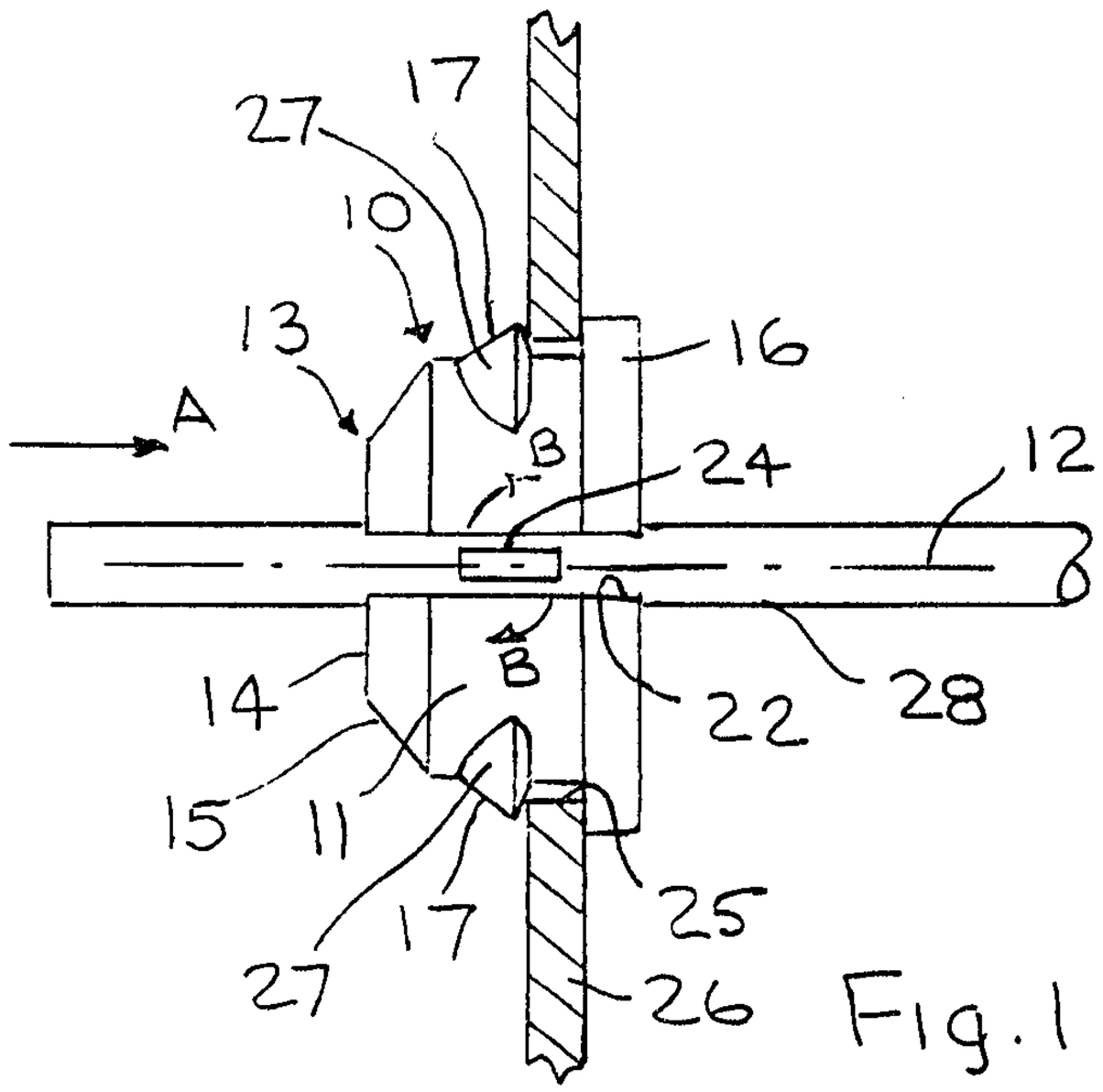

Fig. 1

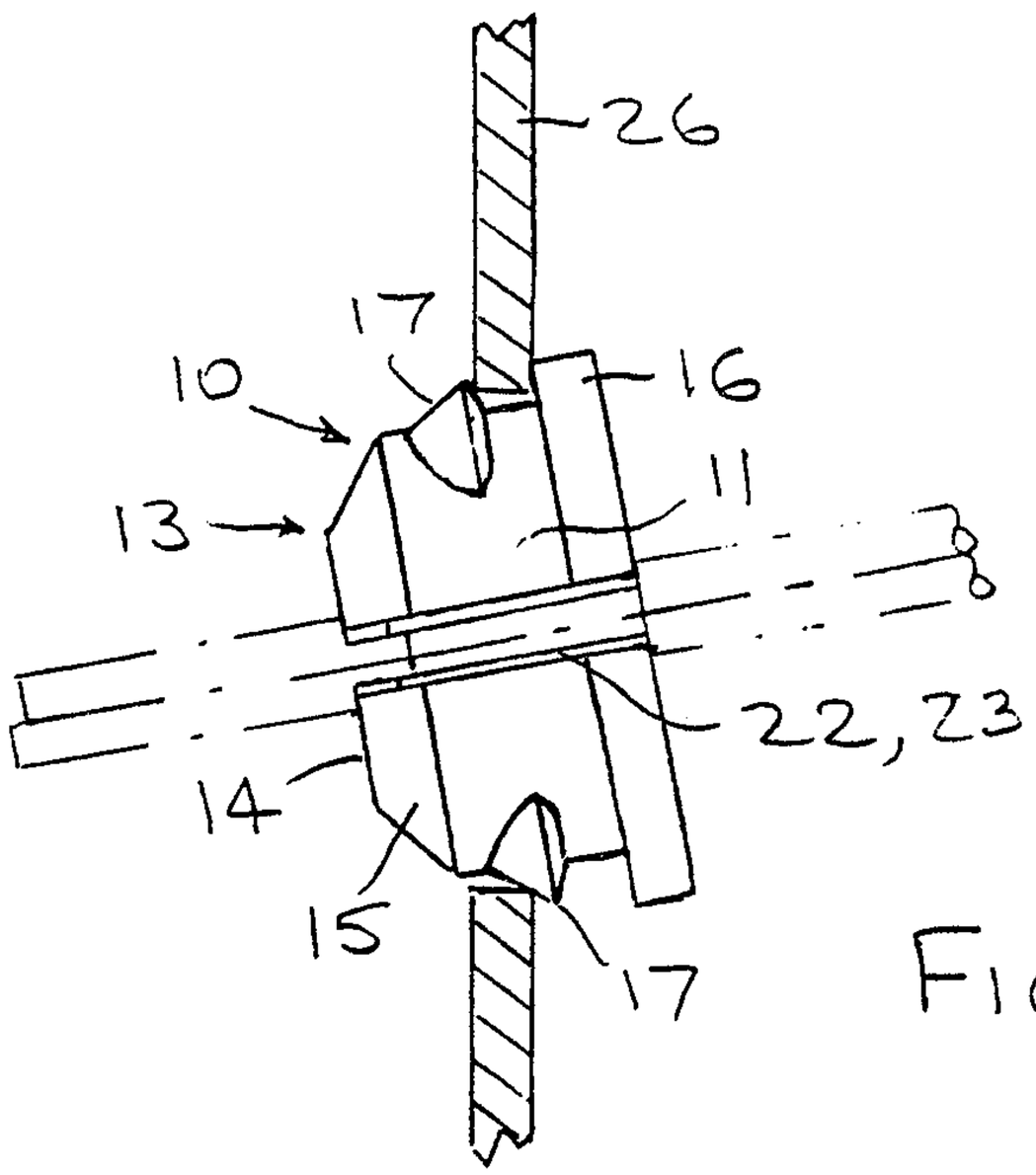

Fig. 1a

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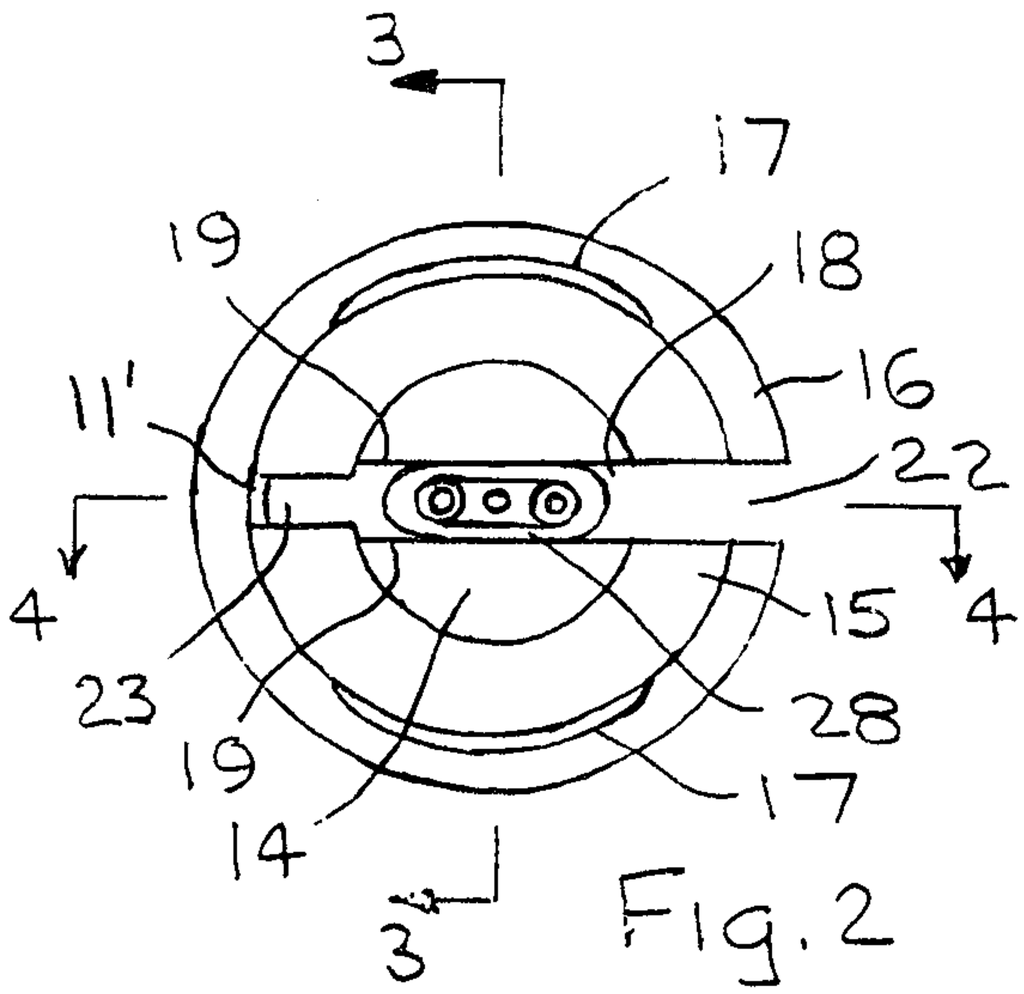

Fig. 2

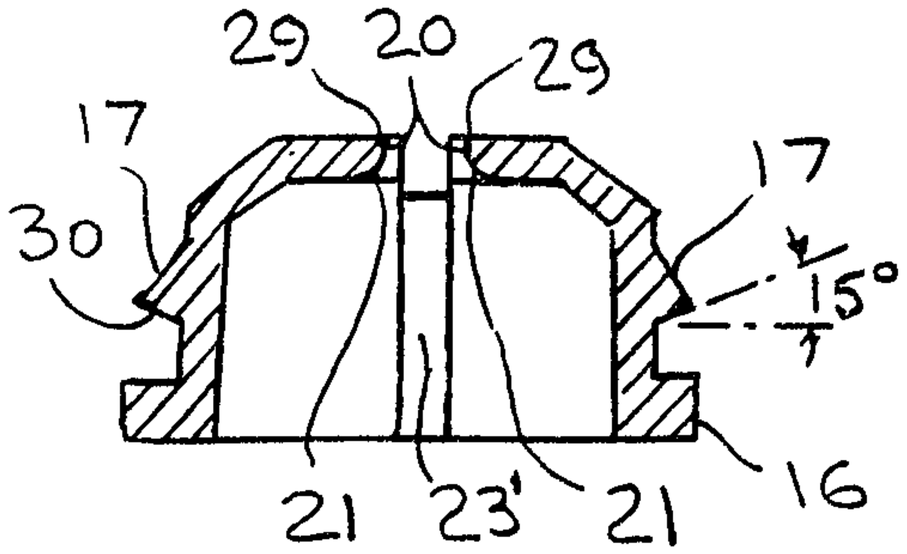

Fig. 3

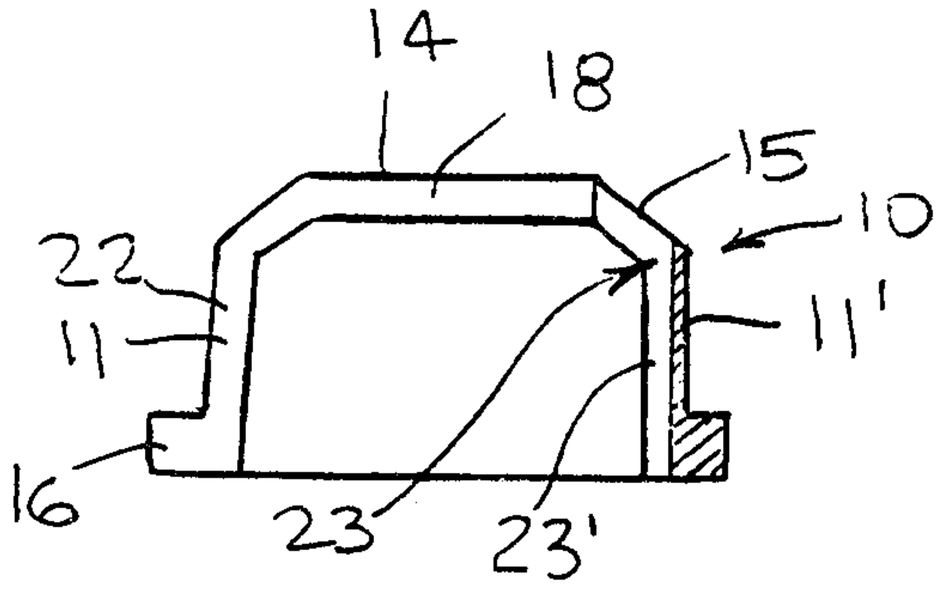

Fig. 4

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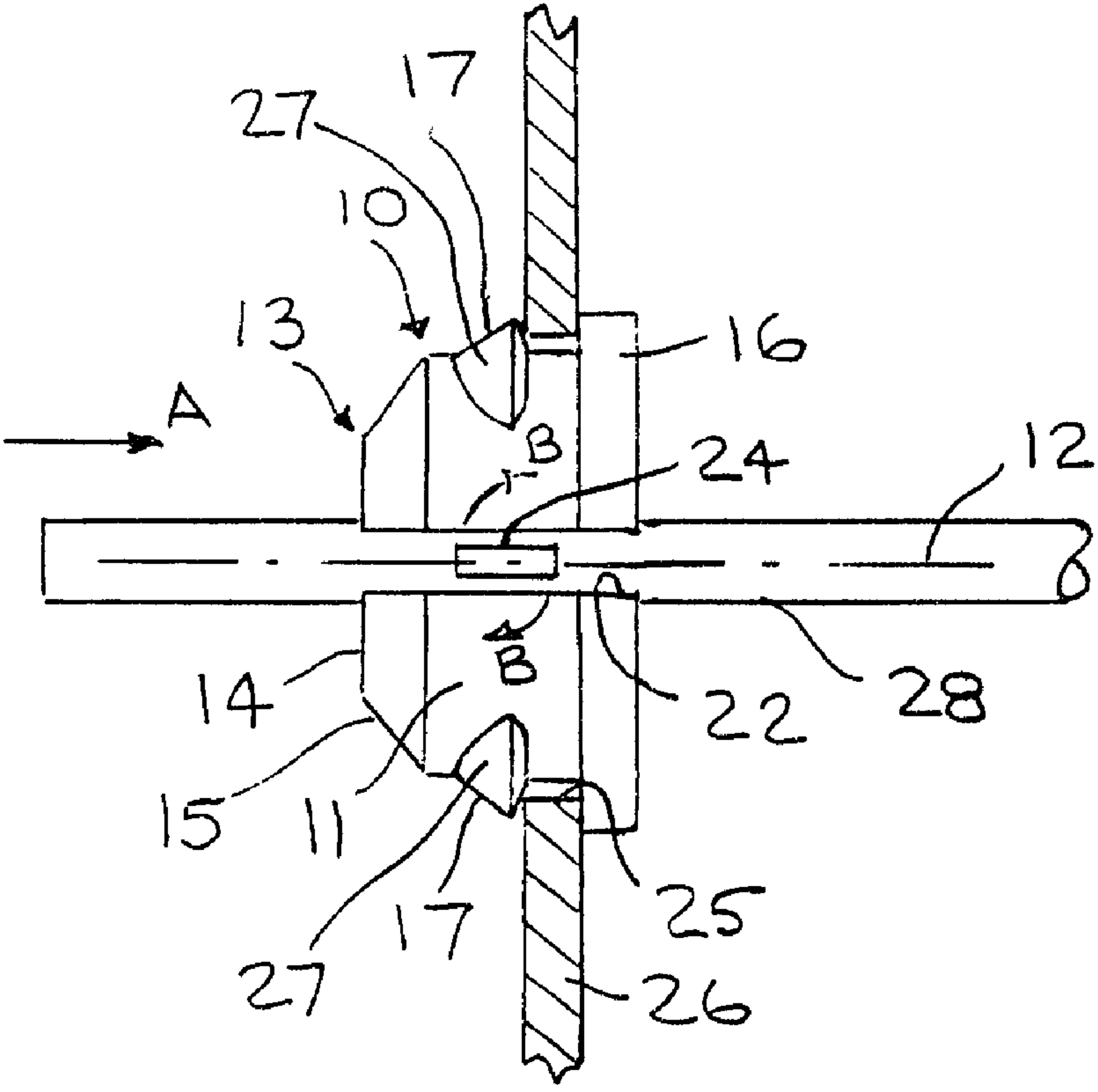
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