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(54) Improvements to electrical connections.

(57) Improvements to electrical connections are described, consisting of a connector whose cross-section is shaped like the Greek letter omega and which is particularly suitable for connecting two bodies with a round or polygonal cross-section, as well as an electrical terminal in flexible conducting material, constituted on one side by a flexible lamellar terminal and a flexible contact on the other, in which the part conformed as a flexible terminal serves as an anchoring point to a round or polygonal cross-section conductor, while the part conformed as a flexible contact serves to grip the metal pin of a two-pin bulb. The flexible contact has two holes in opposed positions, through which one of the two metal pins of the bulb is inserted. Thus this invention is constituted by the combination of the two principal parts, combined together into a single continuous body which is a conductor of electricity.

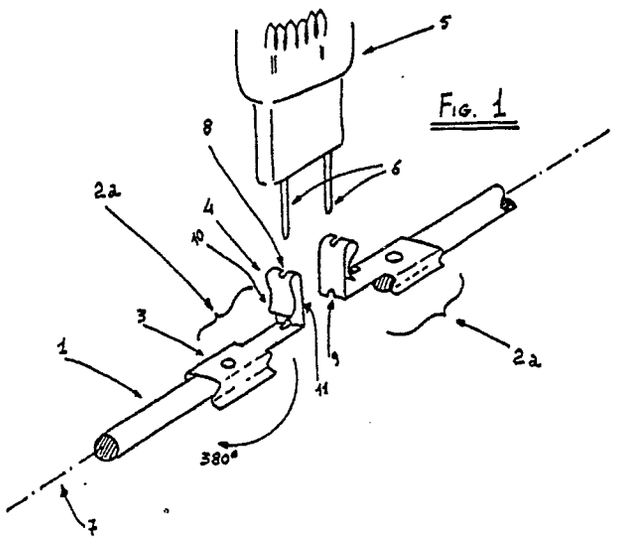

Fig. 1

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IMPROVEMENTS TO ELECTRICAL CONNECTIONS

This invention relates to improvements to electrical connections by means of which a large variety of circuit connections can be implemented both easily sand economically.

In a first aspect, this invention proposes as a basic element on which the various elements described subsequently can be developed, a flexible metal lamellar connector shaped like the letter omega (Ω) having side ends curved outwards and two diametrically opposed holes in the rounded upper part on an axis which is transversal to the symmetrical axis of the connector.

In its second aspect, this invention relates to a terminal strip for electrical connections to a conductor and a flexible contact for clamping the pins of a two-pin electric bulb.

It is known that the electrical connection between two conductors and a two-pin bulb is obtained by means of a commercial bulb socket, of insulating material, provided with metal contacts through which the electrical current flows to light the bulb.

If the conductors are constituted by round or polygonal rods they can act as a support for the bulb socket. However, in this case the support of the bulb-holder simultaneously constitutes the electrical connection between the contacts and the conductors become complicated and expensive in terms of time and accessories.

The object of this invention is to constitute an anchorage for a conductor, to act as a support for a bulb by firmly clamping its pin and to permit optimal electrical conduction between the conductor and the bulb.

Another object of this invention is to effect a connection between two cylindrical bodies or bodies with a polygonal cross section without the aid of terminals, screws, bolts or other accessories.

Yet another object of this invention is to create an anchorage for a conductor and, at the same time, act as a support for a bulb, clamping tightly its pin; thus permitting optimal electrical conduction between the conductor and the pin of the bulb, eliminating the use of the bulb socket and various accessories.

These objects are achieved by means of a connector having the features recited in the characterizing part of claim 1 and by a terminal having the features recited in the characterizing part of claim 9.

The characteristics of this invention are illustrated in several preferred embodiments in the drawings attached hereto, in which:

figures 1 and 2 show a perspective view of the terminal according to this invention in its first embodiment, in which the pins of the bulb lie in a plane which passes through the axis of the opposed conductors;

figure 3 shows a second embodiment of the terminal, in which the pins of the bulb lie in the same plane as that of the conductors which are in parallel;

figure 4 shows a third embodiment of the terminal, in which the pins of the bulb lie in a plane which is at right angles in respect of that of the conductors which are in parallel;

figure 5 shows the terminal in the form proposed in the preceding figure and in other embodiments which can be utilised in accordance with the type of application requested;

figure 6 shows the terminal in one of the embodiments in which the pins of the bulb lie in a plane which passes through the axis of the opposed conductors;

figure 7 and 8 are longitudinal cross sections of the terminal, respectively without and with the pin of the bulb inserted;

figures 9, 9a and 9b, show an example of a bridge connection of the bulb between the two conductors;

figure 10 shows another embodiment of the terminal which can accept a conductor attached to one extremity and a two-pin bulb at the other;

figure 11 shows a perspective view of a first embodiment of the connector of this invention;

figure 12 shows a cross-section of the connector in the embodiment of fig. 11;

figure 13 shows the connector in cross-section (see fig. 12) utilised as a connector between two cylindrical bodies;

figure 14 shows an identical pair of the connectors in cross-section, utilised as a connection between the pins of a two-pin bulb and two conductors of electricity;

figure 15 shows a perspective view of the connector in the utilisation of
figure 14;

figure 16 shows a second embodiment of the connector in cross-section, utilised as a connector between two cylindrical bodies at right angles; and

figure 17 and 18 show a perspective view of a third embodiment of the connector.

Referring now to figures 1, 2, 5 the conductor which, in this case, has a round cross-section is indicated with (1), (2a) is the terminal in a preferred embodiment in which (3) indicates the part which constitutes the flexible metal lamellar terminal strip and which anchors the conductor (1) and carries the current.

The part which acts as a flexible contact is indicated with (4) also clamps a pin (6) of the bulb (5) and, in the case proposed in figures 1 and 2, is at right-angles to the terminal (3).

The terminal (3) is omega shaped (Ω) with the ends curved outwards to permit the grasping of a cylindrical body or a body with a polygonal cross-section of the appropriate diameter and dimensions, its flexibility guaranteeing efficient conduction of electricity.

The part called the flexible contact (4) has a closed-U conformation (see fig. 7-8) with an appendix (10) which curves outwards permitting the insertion of the pins (6) of the two-pin bulb (5), one pin into hole (8) and one pin into hole (9).

These holes (8) and (9) perform a basic function which is that of maintaining the orientation of the bulb.

The pins (6) can be inserted into the flexible contact (4) in two ways:

a) longitudinally through holes (8) and (9) (in both directions) as shown in figures 1, 2,4 and 8;

b) transversally as shown in figure 6.

When it is not utilised, the appendix (10) which is rounded outwards is almost in contact with the other wall (11). See the longitudinal cross-section of (2a) in Fig. 7.

When the pins (6) are inserted in the way described in (a) through the holes (8) and (9), the appendix (10) presses the pins (6) against the wall (11), thus ensuring efficient conduction of electricity; see the longitudinal cross-section of (2a) in fig. 8. This invention achieves the above mentioned object thanks to the characteristic conformation of the part (4) and the flexibility of the material used in its construction.

From figures 1, 2, 6 it can be seen that the pins (5) can be orientated through an angle of 360° around the axis (7) of the conductor (1).

In figure 5, the invention is shown in some of its embodiments and it can be seen that the main parts (3) and (4) can be arranged in a large variety of ways according to the type of application requested. This invention can be easily obtained from sheets of harmonic steel by cutting and bending operations.

Because of the special conformation and arrangement of its parts, the terminal according to this invention, described above, thus combines in a single metal, conducting and flexible body a terminal for electrical connections which carries out the function of supporting a two-pin bulb when used in pairs.

Referring now to figure 9, it can be clearly seen that the terminal 2a can be coupled to a clip on terminal 2n, and arranged one at each end of a section of conductor 1 to form a connecting bridge for a bulb which straddles the two main line conductors 1a which can be parallel to one another (fig. 9a) or one perpendicular to the other (fig. 9b).

The same result can be obtained by using a flexible shaped plate 2M instead of the section of conductor 1 (fig. 10) constructed in a single piece with 2a and 2n.

Passing now to a description of the connector which constitutes the basic element for the electrical connections of this invention and referring first to figures 11 and 12, a first embodiment of the connector is marked (21), (22a) and (22b) are the ends which are curved outwards, (23a) and (23b) are the opposed holes on an axis (x) which is transversal to the symmetrical axis (y), while (z) is the longitudinal axis of the connector (21).

Referring also to figs. 11 and 12, fig. 13 shows the invention in one possible use as a connector of two cylindrical bodies at right-angles to one another. Fig. 13 shows the cylindrical body (24) which has been passed through the holes (23a) and (23b) and the second cylindrical body (25) inserted subsequently between the curved side ends (22a) and (22b) of the connector (21) which, being made from a flexible metal material, grips the body (25) pressing it inwards against the body (24).

If the connector of this invention is used to connect together two electrical leads, the electrical connection between the lead (24) and the lead (25) is guaranteed by the pressure exerted by the ends (22a) and (22b) on the conductor (25) which is pressed inwards against the lead (24) and, simultaneously, by the metal connector (21) by way of the surfaces in contact in the areas relating to (22a), (22b), (23a), (23b).

Figures 14 and 15 show the connector when utilised in a pair to electrically connect a two-pin bulb to two electrical conductors.

Fig. 16 shows a cross-section of a second embodiment of the connector of this invention, in which it can be seen that the upper part (28) has been flattened in order to create a larger contact surface between the connector and the body (24) inserted in the holes (23a) and (23b). The embodiment shown in figure (16) is to be preferred when it is necessary to guarantee optimal conduction between the bodies (24) and (25) in the presence of high electrical currents.

Figure 17 shows a variant of the connector according to this invention characterised by the fact that it has side apertures (23c) and (23d) in the place of the holes (23a) and (23b), which start from the same position as the holes (23a) and (23b) and extend to the ends (22a) and (22b) which, in this case, become doubled into (22a, 22c) and (22b, 22d).

The embodiment shown in fig. 17 is to be preferred when two cylindrical bodies at right-angles to one another have to be connected and it is

impossible to insert one of them into the holes 23a and 23b in the way shown in figures 13 and 16.

The body (24) is simply inserted perpendicularly in the apertures (23c) and (23d) and the connector is pressed onto the body (25) by means of the ends (22a, 22c) (22b, 22d), which will allow the body (25) to pass and will then elastically press it against the body (24).

The objects described in relation to figures 13, 14, 15, 16, 18 are achieved by the connector of this invention thanks to the flexibility of the material from which it is constructed and the characteristic conformation of its parts shown in figures 12, 16, 17 and, in particular, thanks to the presence of the holes (23a) and (23b), see figures 11, 13, 16 or the apertures (23c) and (23d) as in the embodiment of figures 17, 18, which permit a stable connection of one body (24) to another body (25) or the electrical connection of the pins (26) of a two-pin bulb (27) to a connector (24). See figures 14, 15.

The connector of this invention can be easily obtained from a metal sheet by cutting and bending operations and it can be used as a terminal for two cylindrical bodies at right angles to one another, or as an electrical connection for two transversal electrical leads or, when utilised in pairs, as a conductor support for the pins of a two-pin bulb.

The terminal and connector of this invention can also be constructed from materials other than those proposed in the description and also in forms and for objects other than those shown in the attached drawings while still remaining within the scope of this invention as defined in the claims attached hereto.

Claims

1. Connector particularly suitable for connecting two bodies (24) and (25) with a round or polygonal cross-section, characterised in that its cross-section is shaped like the letter Ω (omega); (see fig. 12).

2. Connector, according to claim 1, characterised in that in a second embodiment, its upper part (28) is flattened (see fig. 16).

3. Connector, according to the previous claims, characterised in that it has two holes (23a) and (23b) situated in opposing positions on an axis (x) at right angles to the symmetrical axis (y) passing transversally through the upper cylindrical part (28) of the connector (see figs. 11, 12, 13, 16).

4. Connector, according to the previous claims, characterised in that a third embodiment has two side apertures (23c) and (23d) situated in opposing positions on an axis (x) at right angles to the symmetrical axis (y) and terminating at the side ends which in this case become doubled (22a, 22c), (22b, 22d) (see fig. 17).

5. Connector, according to the previous claims, characterised in that the side ends (22a) and (22b) are curved outwards to enable the insertion of a cylindrical or polygonal cross-section body (25).

6. Connector, according to the previous claims, characterised in that the side ends (22a) and (22b) and the side ends (22a, 22c), (22b, 22d) are curved outwards in order to grip and press inwards a cylindrical or polygonal cross-section body (25).

7. Connector, according to the previous claims, characterised in that it is constituted by a single, metal, flexible, conducting body conformed as shown in figures 11, 12, 16, 17 so that it can be used to connect together two cylindrical or polygonal cross-section bodies arranged at right-angles to one another.

8. Connector, according to the previous claims, characterised in that it is constituted by a single, metal, flexible, conducting body conformed as shown in figures 11, 12, 14, 15, 16, 17 so that it can be used in pairs for connecting electrically two conducting bodies (25) to the pins (26) of a two-pin bulb without the aid of a bulb socket.

9. Terminal for electrical connections, particularly suitable for connection to a two-pin bulb, characterised in that one of its parts (3) is conformed as a flexible metal terminal, a conductor of electricity.

10. Terminal for electrical connections, according to claim 9, characterised in that the flexible terminal (3) is of the lamellar type with a cross-section in the shape of a Ω (omega) and with a round or polygonal cross-section of the appropriate dimensions.

11. Terminal for electrical connections, according to claims 9 or 10, characterised in that the flexible terminal (3) continues into a second part (4) on one side which functions as an electrical contact of the flexible type.

12. Terminal for electrical connections, according to claims 9, 10 or 11, characterised in that the part which functions as a flexible electrical contact (4) has the shape of a closed U (see figs. 2, 7, 8).

13. Terminal for electrical connections, according to claims 9 - 12, characterised in that the part with a closed U shape has one of the arms of the U bent outwards to form a curved appendix (10) while the other (11) is an integral part of the part which functions as a flexible terminal (3) (see fig.7).

14. Terminal for electrical connections, according to claims 9 - 13, characterised in that the part (4), called the flexible electrical contact, has two opposed holes (8) and (9), one hole (8) being located in the curve of the part (4) with a closed U shape and the other (9) being located at the end of the wall (11) which delimits the flexible terminal (3) (see figs. 1 and subsequent figures).

15. Terminal for electrical connections, according to claims 9-14, characterised in that it is constituted by a single body in which two parts can be identified, each performing its own specific function:
part (3) functions as an anchoring part for the conductor (1) permitting the current to pass to the pins (6) of the bulb (5), part (4) acting as an electrical contact for the pins and being pressed by the appendix (10) against the wall (11) and maintained constantly in position by the insertion of the pins (6) into the holes (8) and (9), (see fig 1,2 and subsequent figures).

16. Terminal for electrical connections, constituted by a single continuous lamellar flexible metal body, conformed in such a way as to present two principal parts which can be identified because of their specific function; one of them functioning as a flexible type terminal (3) the other functioning as a flexible type electrical contact (4), characterised in that it can be used in pairs to electrically connect two conducting boedies (1) to the pins (6) of a two-pin bulb (5) without the aid of a bulb socket.

17. Terminal for electrical connections, according to claims 9-16, characterised in that the arrangement of the parts (3) and (4) can vary while their respective shapes remain the same; the aspect which varies is the delimitation between the part (3) which functions as a flexible terminal and the part (4) which functions as a flexible electrical contact (see fig. 5).

18. Terminal for electrical connections according to claims 9-17, characterised in that the functionality of its parts (3) and (4) depends on their respective shapes and on the flexibility of the lamellar metal conducting material used in its construction.

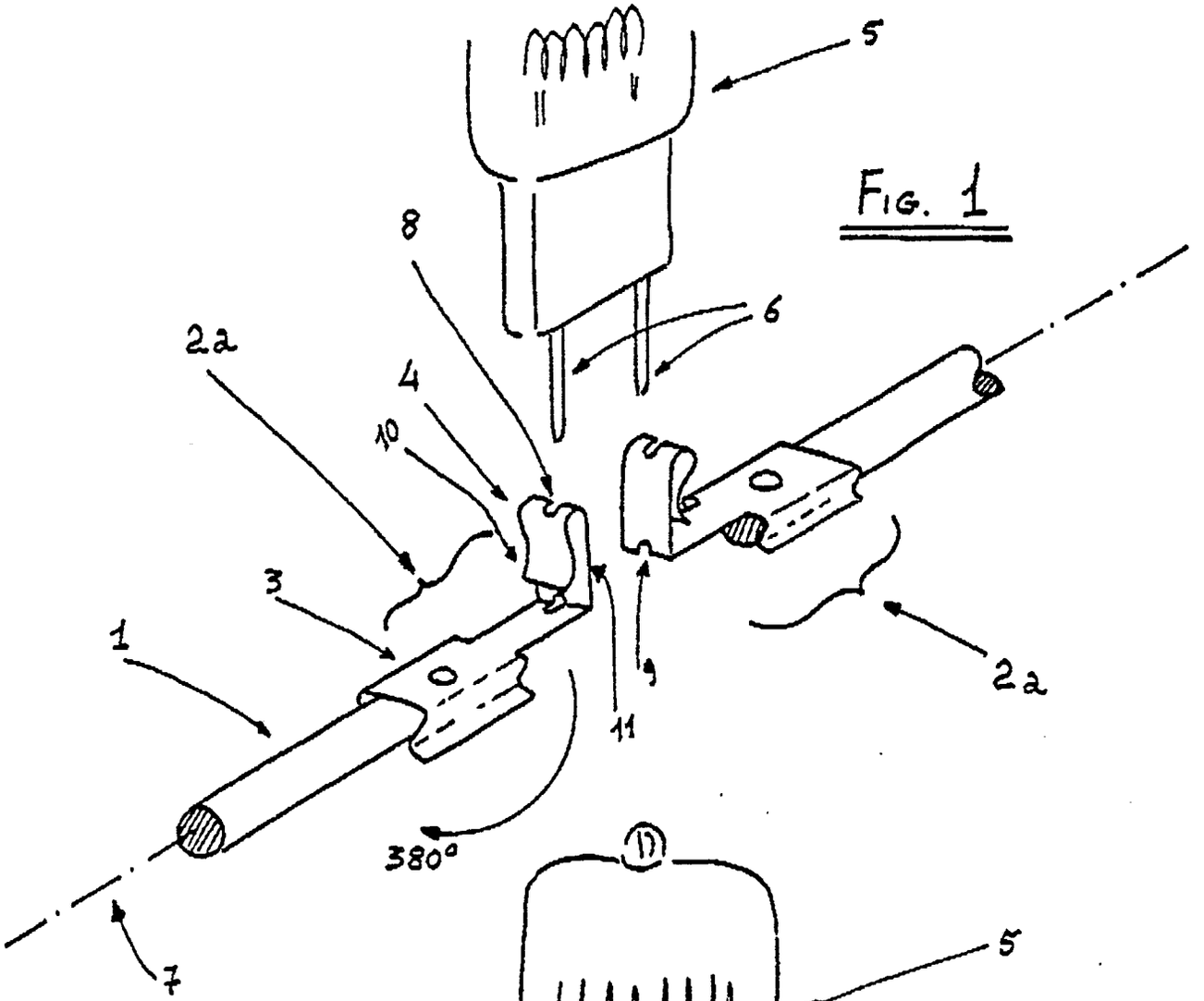


FIG. 1

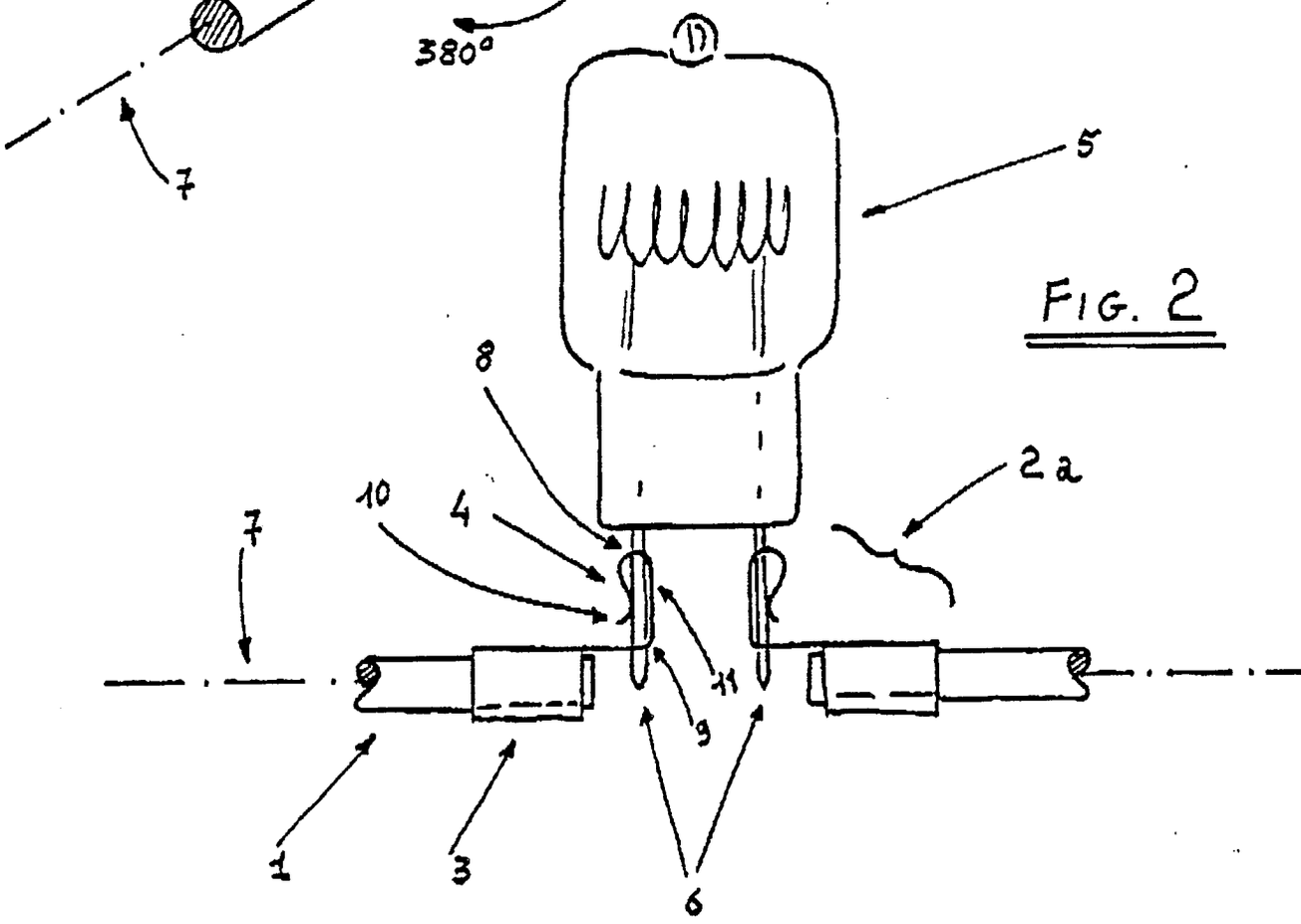


FIG. 2

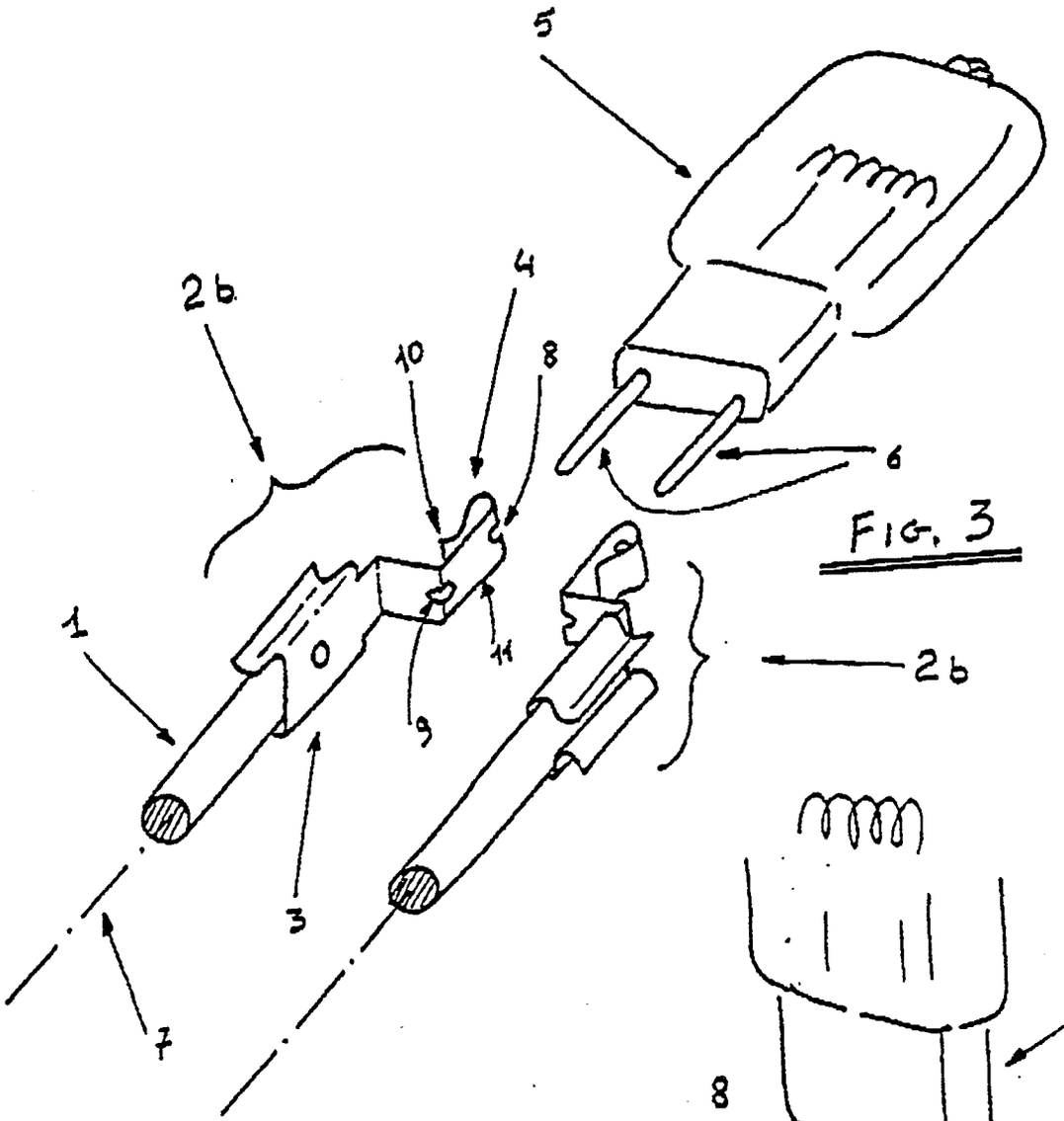


FIG. 3

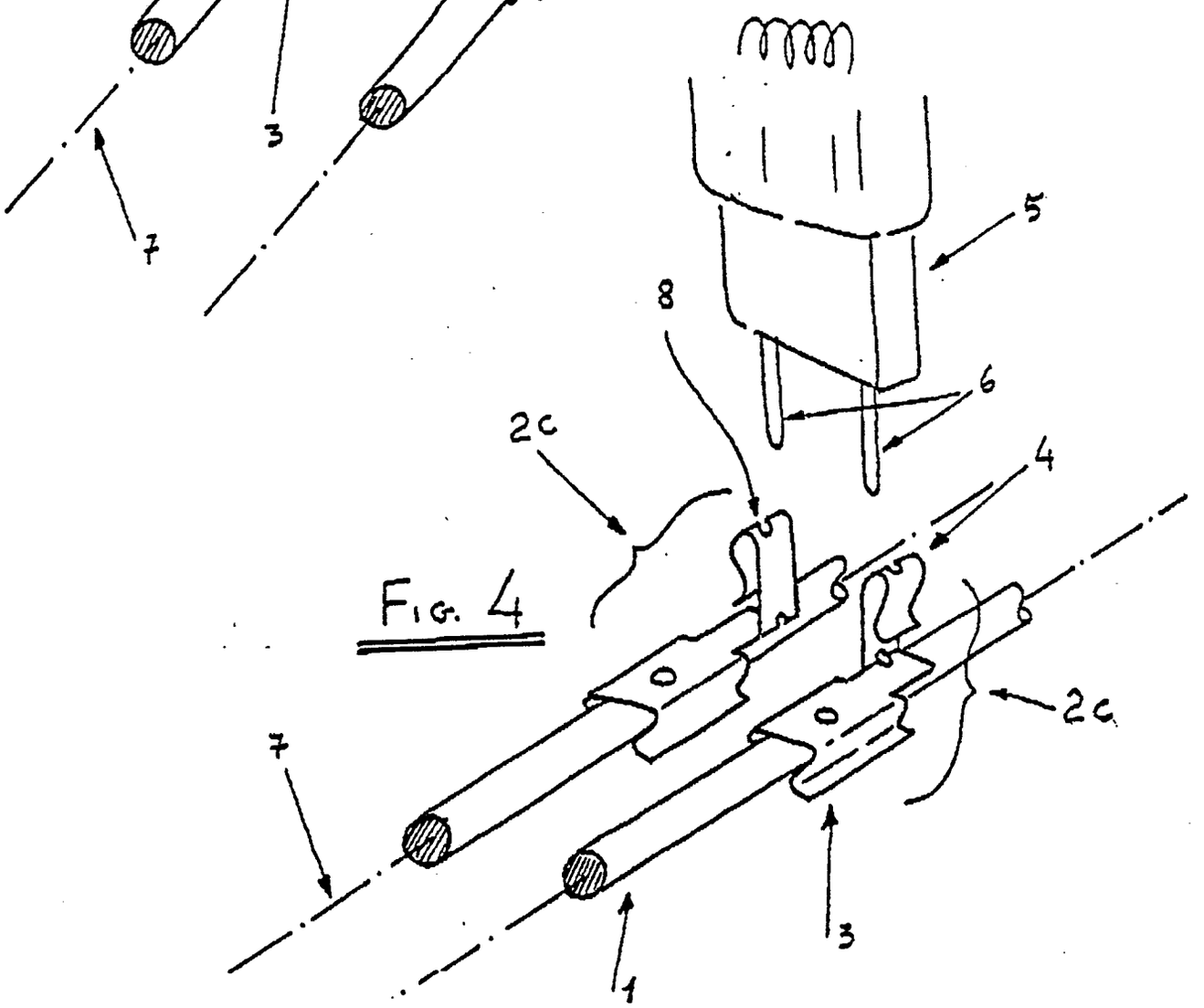
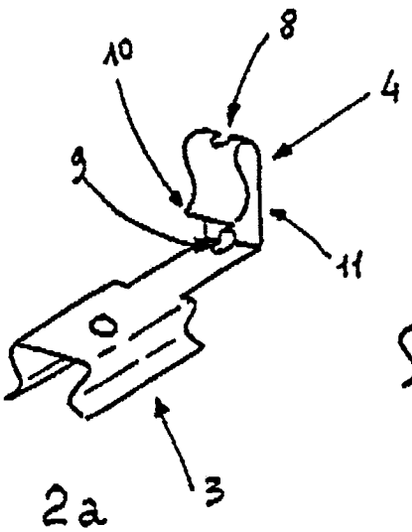
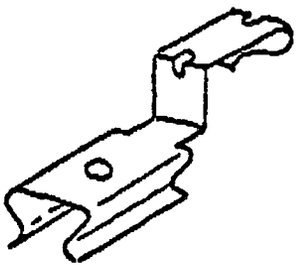


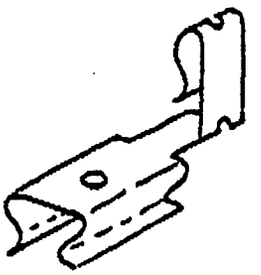
FIG. 4



2a

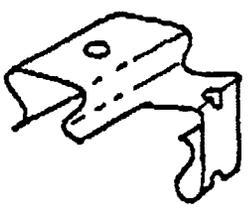


2b

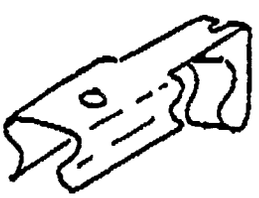


2c

Fig. 5

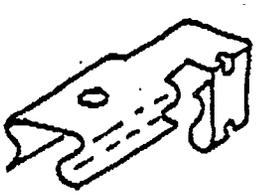


2d

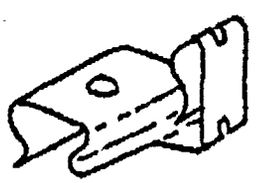


2e

2f

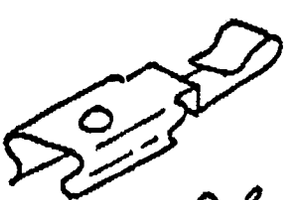


2g



2h

2i



2l

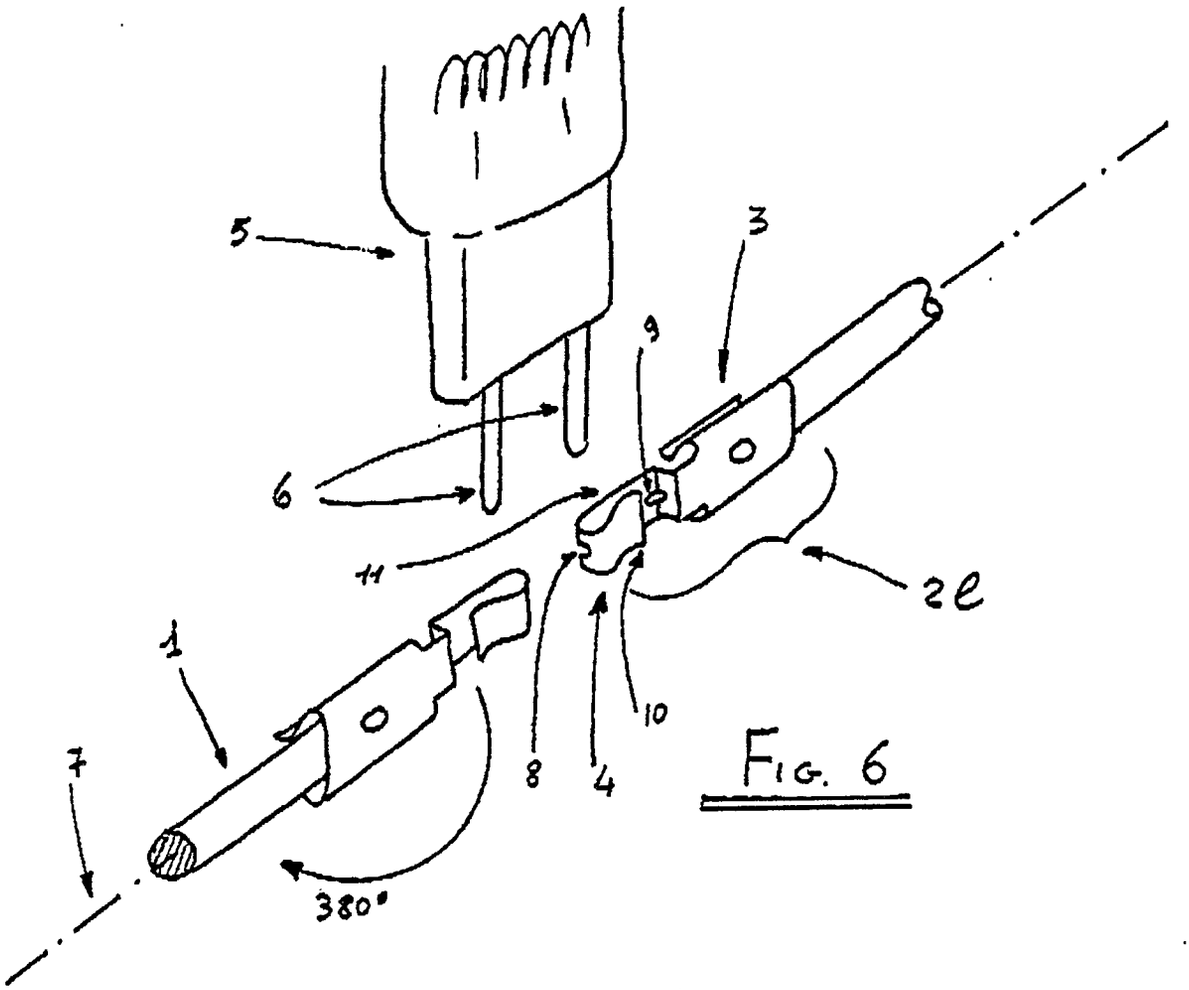


FIG. 6

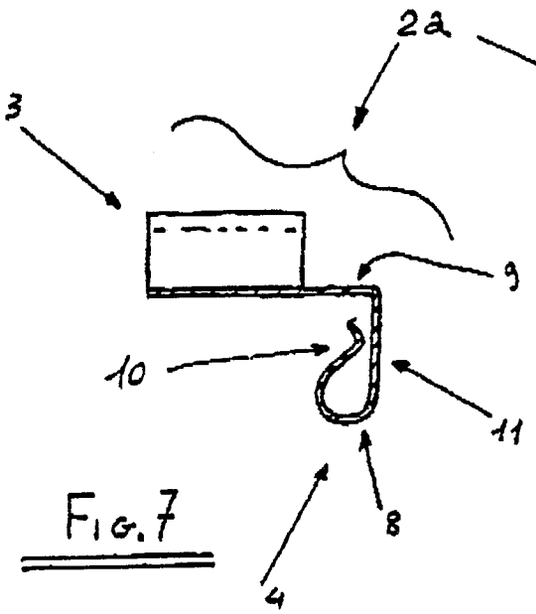


FIG. 7

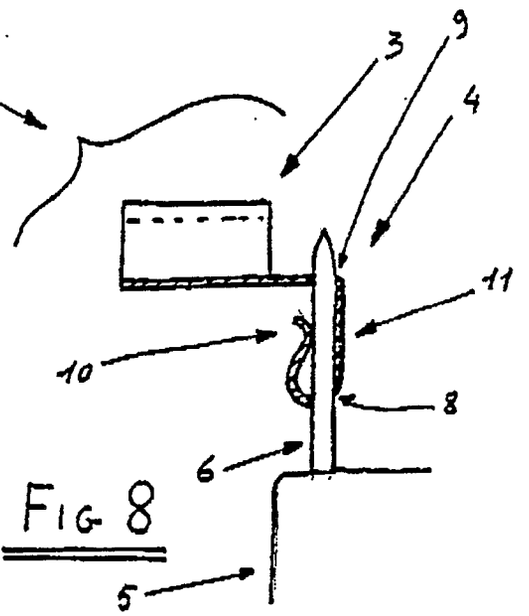


FIG 8

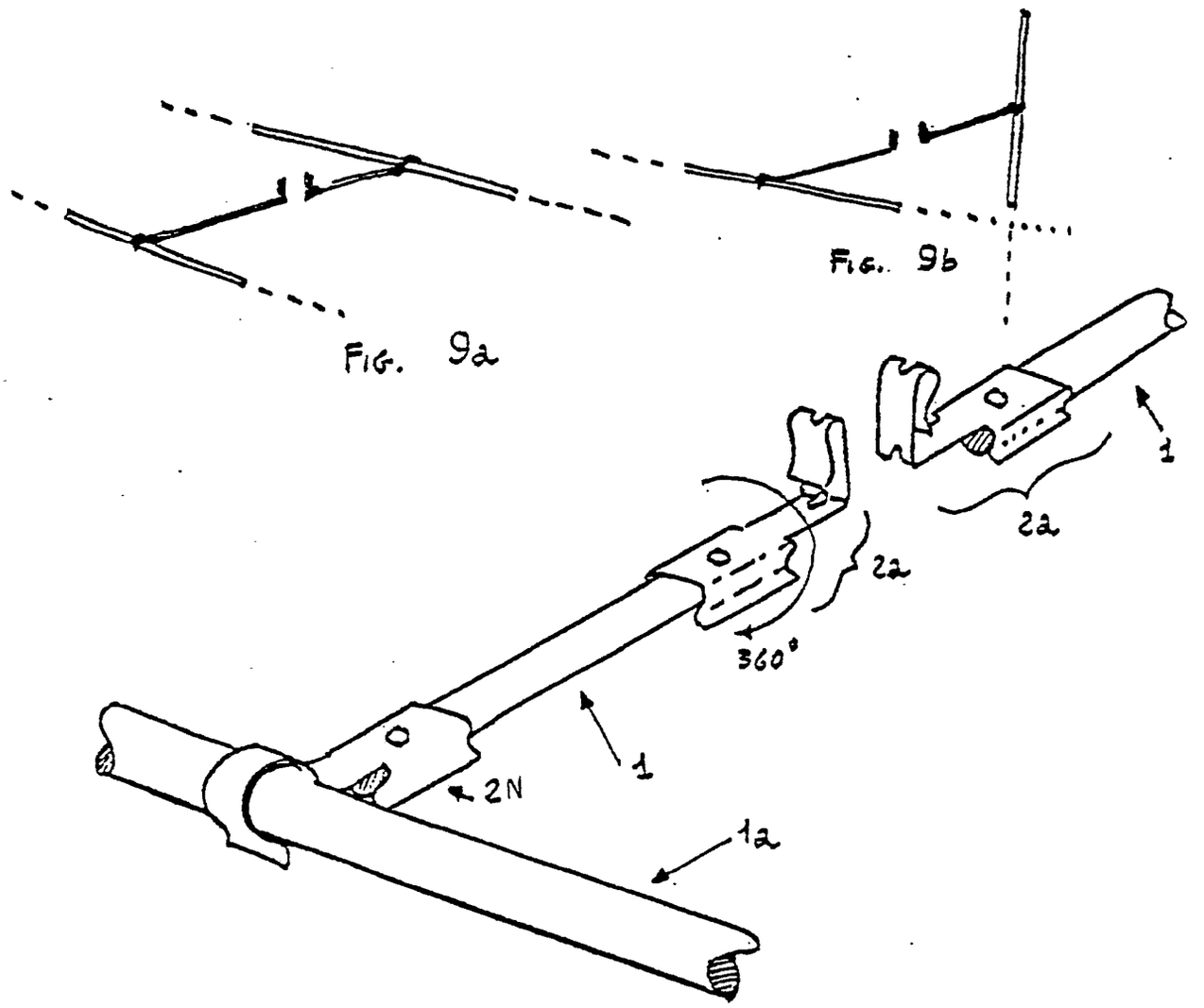


Fig. 9

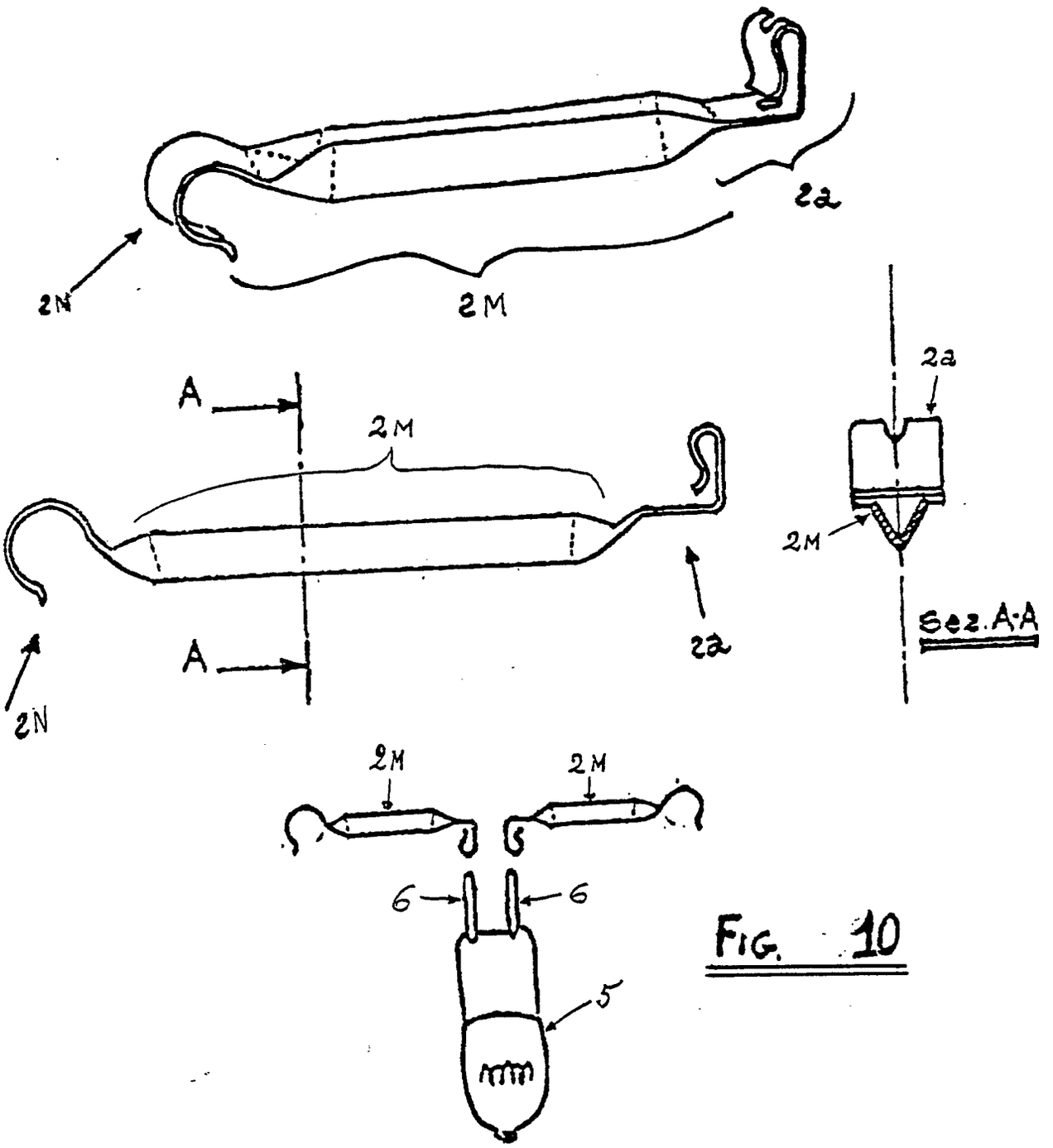


FIG. 10

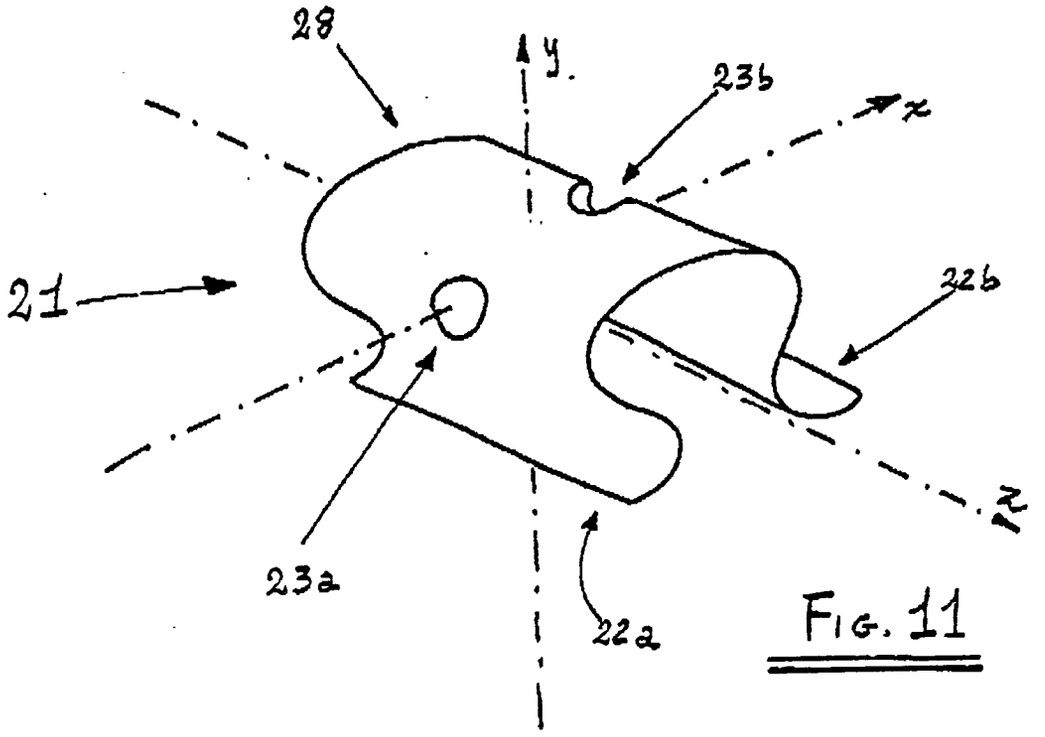


FIG. 11

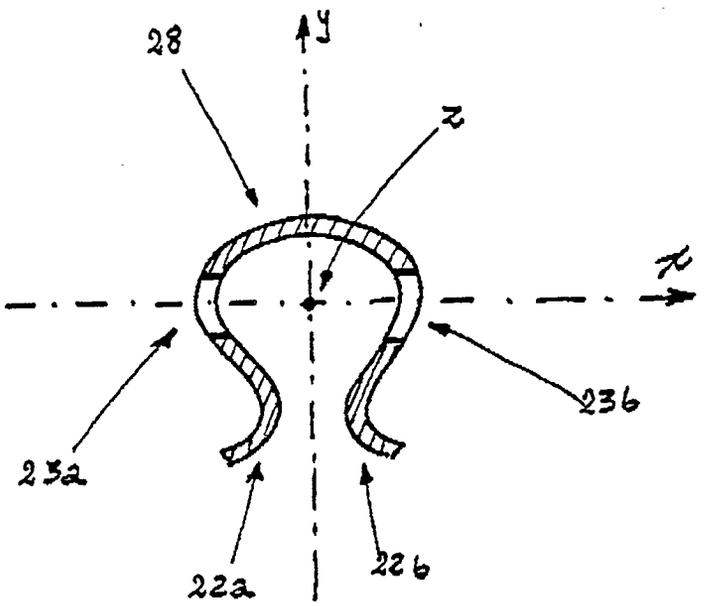


FIG.12

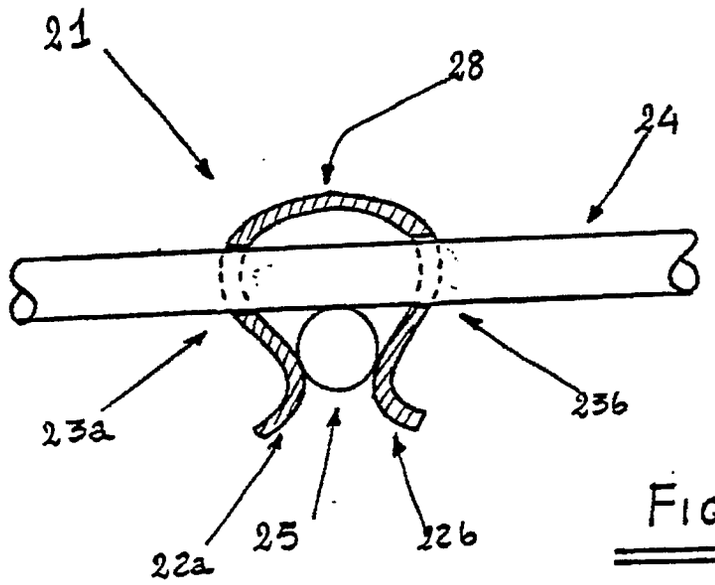


FIG.13

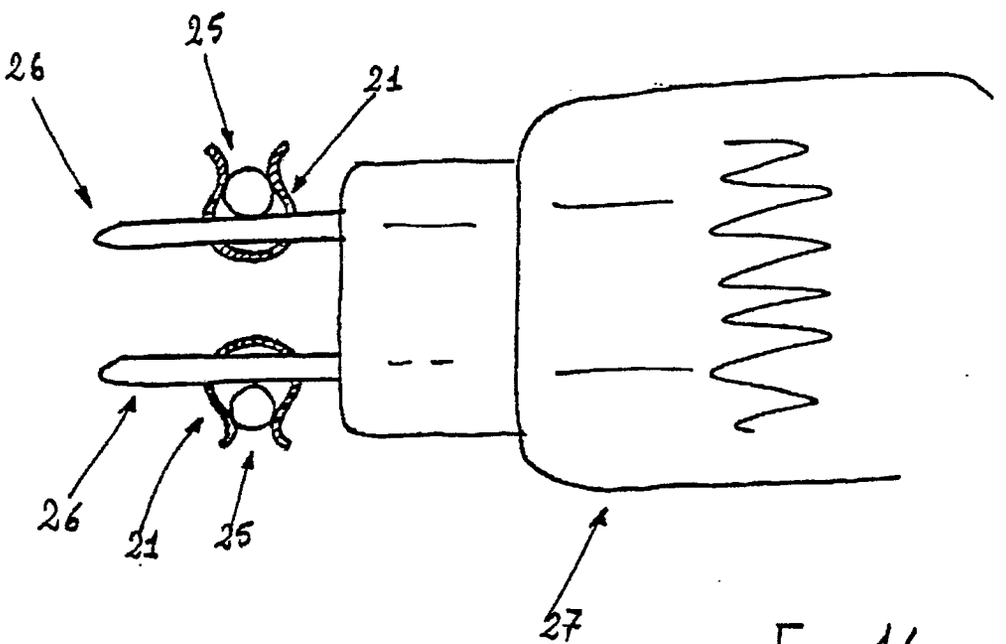


FIG.14

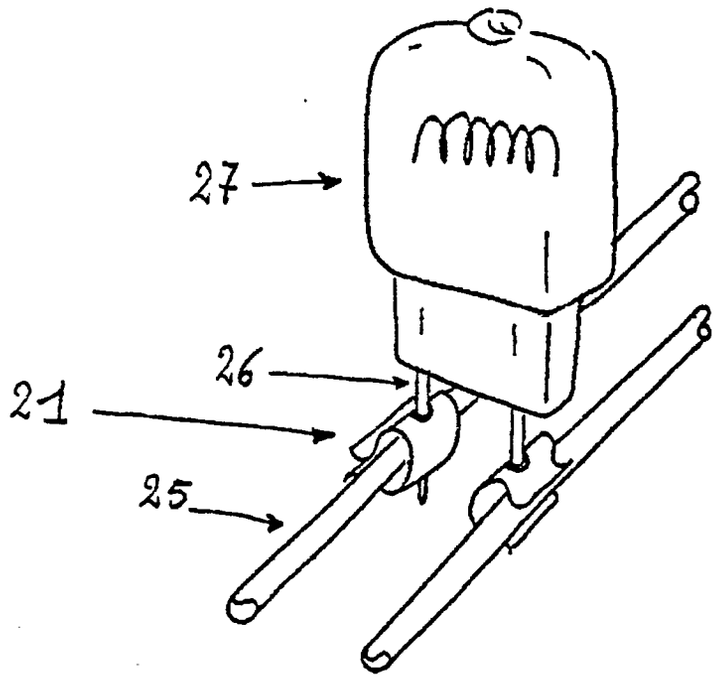


FIG.15

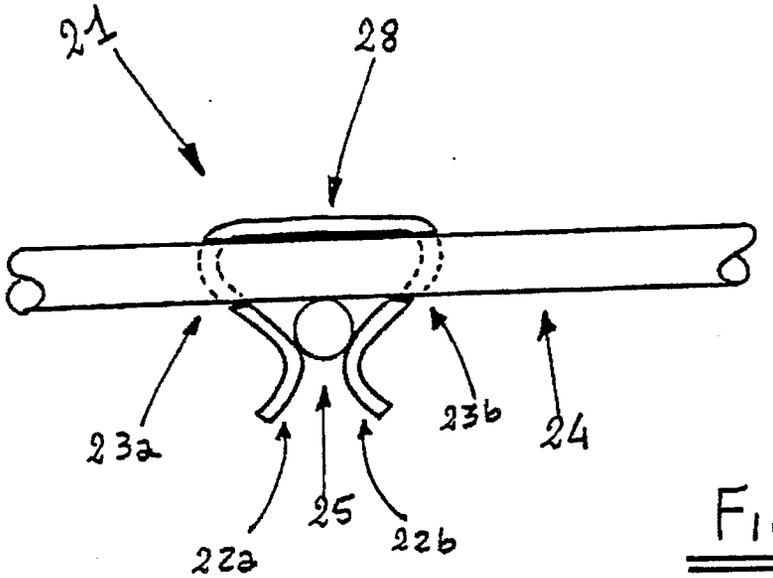


FIG.16

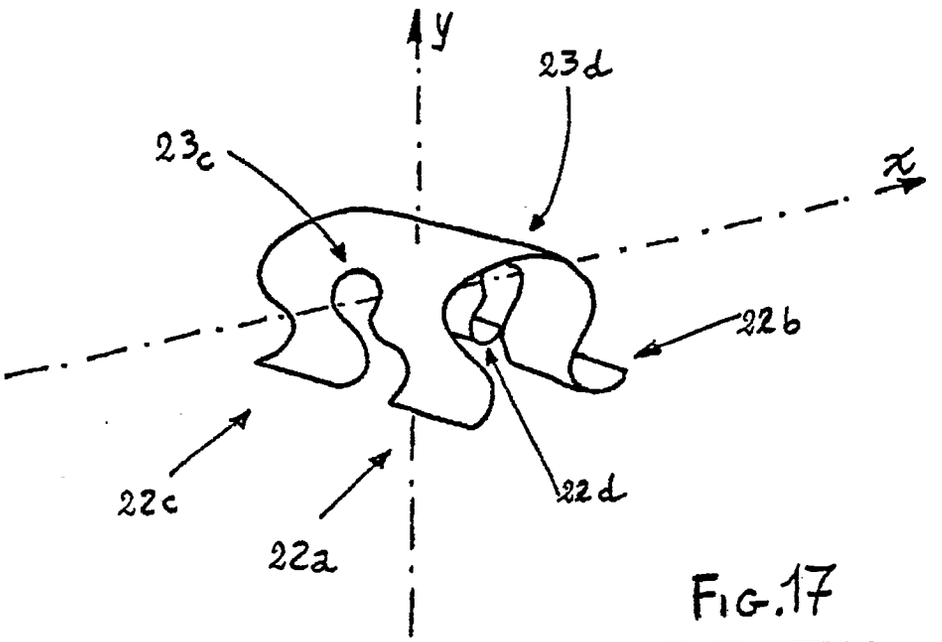


FIG.17

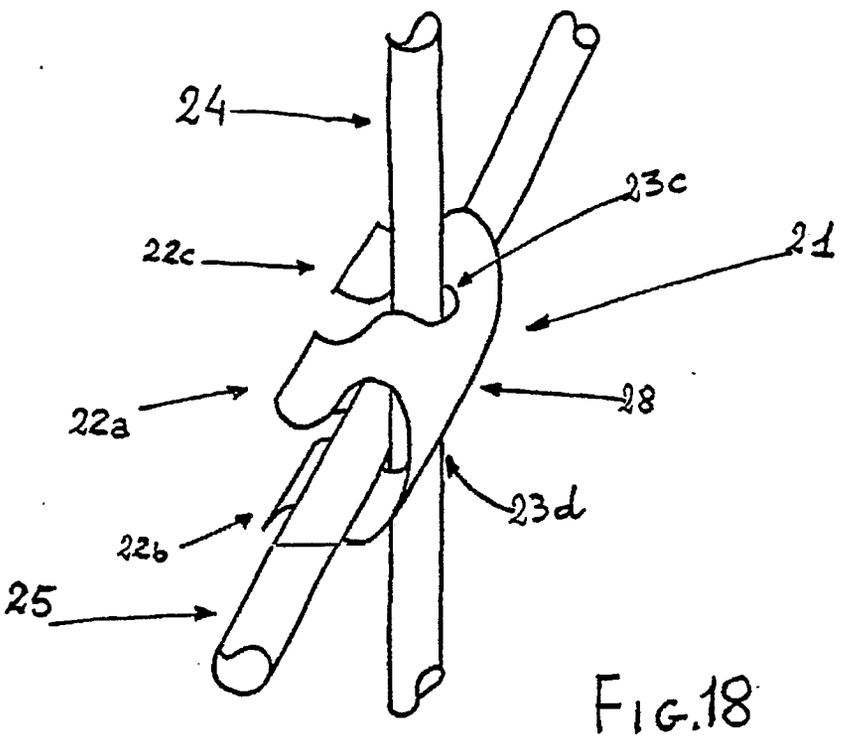


FIG.18