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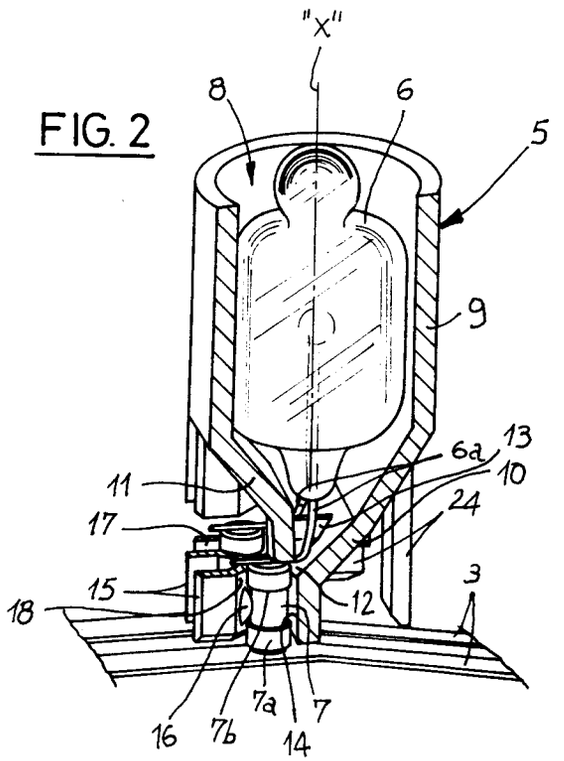
(54) Feeding and supporting device for electric components.

(57) The described device comprises a supporting element (5) defining a plurality of housings (9) in which respective microlamps (6) can be inserted. The thread-like terminals (6a) of each microlamp (6) abut on an inclined bottom wall (10) so that they cross an outlet slot (12) and each of them engages in an auxiliary slot (17) communicating with a coupling seat (14) in which an electric resister (7) is subsequently engaged by forced fitting. The supporting element (5) is coupled by snug fitting with a small board (2) carrying connecting conductors (3) consisting of elastic small plates each acting on one of the resisters for urging it in contact with the respective thread-like terminal (6a).

FIG. 2



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The present invention relates to a feeding and supporting device for electric components, of the type comprising: a small connecting board; a plurality of electric connecting conductors operatively associated with said small board; a supporting element fastened to the small connecting board; at least one first electric component operatively associated with the supporting element and exhibiting at least two thread-like terminals arranged to be electrically connected to said connecting conductors; second electric components operatively engaged with the supporting element and electrically interposed between at least one of the thread-like terminals of the first component and one of said connecting conductors.

In greater detail, the present invention, in the embodiment described, is conceived for making control panels having signal lights of the type usually associated with household electrical appliances, being obviously understood that the innovatory concepts herein disclosed may be also utilized for uses different from the described ones.

It is known that in producing control panels of the type associated with household electrical appliances, lighting installations or other electrical apparatus, the arrangement of signal lights suitably connected to respective electric circuits is usually provided for the purpose of informing the operator, through switching an or off of each of the lights, about the operating state of one or more electric members to which the control panel is interlocked.

Generally, said signal lights essentially consist of bulb microlamps suitably connected, upon interposition of electric resistors connected in series and/or in parallel, to respective connecting connectors arranged in the farm of a printed circuit on a small connecting board also having the function of mechanically supporting the microlamps.

Connection of the microlamps and respective electric resistors to the conductors arranged on the small connecting board can be carried out for example by directly welding thread-like terminals associated with the microlamps and/or the electric resistors on the small board itself.

In other cases, a supporting element is provided to be associated with each signal light, which supporting element comprises a block of plastic material embodying appropriate contact elements for the operating engagement of the electric resistors, the thread-like terminals associated with the bulb microlamp being connected to said contact elements and being partly buried in the plastic material forming the block. Said contact elements are connected to a pair of terminals designed to be welded on the small connecting board made in the form of a printed circuit.

However the execution of said connecting operations by welding involves some problems both in terms of working costs and times and in terms of production flexibility in the automated installations presently in use in the manufacturing centers, as well as in terms of stock management of the produced pieces.

In accordance with the present invention, said problems are solved by providing a device in which all signal lights are associated, in a stable manner and by mere inserting operations to be carried in a completely automated fashion, with a supporting element to be engaged to the small connecting board by a snug fitting operation so as to obtain the simultaneous electric connection of all signal lights, without any welding and/or additional assembling operation being required.

In more detail, the present invention relates to a feeding and supporting device for electric components, characterized in that said supporting element exhibits: at least one engagement portion defining a tubular housing in which the first electric component is inserted; at least one bottom wall obliquely intersecting the axis of said tubular housing and designed to get in contact with the thread-like terminals of the first component for arranging them according to an inclined orientation and guide them to the outside of the tubular housing through at least one outlet slot disposed at the end of the first bottom wall; at least one second engagement portion defining a coupling seat extending in the extension of the outlet slot and arranged to engage a second electric component for operatively connecting it between at least one of said electric connecting conductors and one of the thread-like terminals carried by the first electric component.

Further features and advantages will become more apparent from the detailed description of a preferred embodiment of a feeding and supporting device for electric components in accordance with the present invention, given hereinafter by way of non limiting example with reference to the accompanying drawings, in which:

- Fig. 1 is a transverse sectional view of a feeding and supporting device in accordance with the invention;
- Fig. 2 is a partly cutaway perspective view showing a construction detail of the device in question;
- fig. 3 shows the detail of Fig. 2 seen from below.

Referring to the drawings, a feeding and supporting device for electric components in accordance with the present invention has been generally identified by reference numeral 1.

The device 1 comprises a small connecting board 2 with which a plurality of electric connecting conductors 3 is operatively associated, said conductors being connected to respective electric members to which the device 1 is interlocked, for

example through connecting terminals 3a of known and conventional type, or through extensions of the conductors 3 themselves projecting from the connecting board edges.

Said electric members may also consist of switches, thermostats or similar operating devices directly associated with the device 1 and not shown as known and not of importance to the ends of the invention

Advantageously, the connecting conductors 3 essentially consist of respective elastic thin plates made of conductive material, suitably supported by respective ribs 4 projecting from the connecting board 2, as better clarified in the following.

A supporting element 5 is engaged by snug fitting to the small board 2 by hooking means not shown as made in known manner, said supporting element being advantageously designed to engage one or more of the first electric components 6, as well as second electric components 7 electrically interposed between one of the connecting conductors 3 and one of the first electric components 6. In more detail, in the embodiment shown, each of the first electric components 6 is essentially formed with a bulb microlamp conventionally provided with two thread-like terminals 6a designed to supply the microlamp with current. The second components 7 essentially consist of electric resistors provided with end caps 7a of conductive material at which contact with the respective connecting conductor 3 and one of the thread-like terminals 6a of the microlamp 6 occurs.

Obviously, the microlamps 6 and/or resistors 7 may be replaced by other electric components such as diodes, capacitors or the like, depending on requirements.

Each of the microlamps 6 is disposed in a tubular housing 8 defined within one engagement portion 9 exhibited by the supporting element 5. This first engagament portion 9 advantageously has at least one bottom wall 10 obliquely intersecting the geometric axis "X" of the tubular housing 8. Preferentially, at least one second bottom wall 11 converging towards the first bottom wall 10 is also provided. The second bottom wall 11 terminates before intersecting said geometric axis "X", at an outlet slot 12 defined at the end of the first bottom well 10, from which the thread-like terminals 6a of the microlamp 6 emerge.

A partition 13 associated with the first bottom wall 10 adjacent to the outlet slot 12 is interposed between the thread-like terminals 6 emerging from the slot itself, so that any possibility of a short circuit between said thread-like terminals is avoided.

The electric resistors 7 associated with each of the microlamps 6 are in turn housed in respective coupling seats 14 defined by a pair of second engagement portions 15 afforded by the supporting element 5. In particular, the coupling seats 14 extend parallel to the axis "X" of the tubular housing 8, in the extension of the outlet slot 12 and each of them engages the corresponding electric resistor 7 preferably by forced fitting. In the connection, each of the second engagement portions 15 may internally have at least one retaining lug 16 designed to abut on a shoulder 7b defined by the cap 7a made of conductive material associated at the end thereof with the resistor 7 so that said resistor, when fitting has occurred, will be retained in a stable manner in the corresponding coupling seat 14.

Advantageosly, also defined in each of the second engagement portions 14 is an auxiliary slot 17 extending parallel to the "X" axis of the tubular housing 8 before the guide slot 12. Each of the auxiliary slots 17 lends itself to advantageously engage the end of the corresponding thread-like terminal 6a associated with the micralamp 6 so as to retain said terminal according to a predetermined orientation. For facilitating insertion of the terminals 6a in the auxiliary slots 17, auxiliary guide surfaces 18 converging towards the auxiliary slot itself away from the outlet slot 12 are defined in each of the coupling seats 14.

As viewed from the accompanying figures, the presence of one or mare third engagement portions 24 may be provided, said portions consisting for example of fitting lugs externally projecting from the first bottom wall 10 and each designed to engage, by forced fitting, a third electric component that in the embodiment herein shown consists of an auxiliary electric resistor 25 arranged to get in touch with the connecting conductors 3 so as to carry out a connection in parallel between the thread-like terminals 6a of the corresponding microlamp 6.

The device 1 further comprises at least one front covering element 19 to be engaged to the supporting element 5, for example by snap fitting means generally denoted by 20 in Fig. 1 and not further described as known per se and conventional. This front covering element 19 is provided, in known manner, with a plurality of signal lights 21, each arranged before one of the housing 8 so that light emitted by the corresponding bulb micralamp 6 may be visible from the outside.

The assembling modalites of the device described above mainly as regards structure are as follows.

On production, the small connecting board 2 has the electric connecting conductors 3 disposed in the appropriate configuration so as to achieve a given circuit diagram for connection of the microlamps 6 and any eternal electric component, depending on the intended use of the device.

The supporting element 5, in turn, lends itself to be equipped with the bulb microlamps 6, the respective resistors 7 and, if necessary, the auxiliary resistors 25 by mere inserting operations to be carried out in a completely automated fashion In particular, each of the microlamps 6 is first axially fitted in the corresponding housing 8. Concomitantly with this operation, the thread-like terminals 6a emerge from the slot 12 in an oblique orientation imposed by the orientation of the first bottom wall 10, and they introduce their ends into the auxiliary slots 17 formed in the second engagement portions 15.

At this point, resistors 7 can be axially fitted in the corresponding coupling seats 14. Following the execution of this operation, the thread-like terminals 6a, under the thrust of resistors 7 introduced into the corresponding seats 14, are such bent that they take an orientation perpendicular to the axis "X" of the corresponding housings 8. In this way, each microlamp 6 is engaged in a stable fashion to the supporting element 5 and, due to the orientation of the thread-like terminals 6a its coming out of the housing 8 is prevented even in case of accidental overturnings or shakings.

Also the resistors 7 are fixedly housed in the respective coupling seats 14, by virtue of the interference action exerted by the retaining lugs 16 on the shoulders 7b defined by the corresponding caps of conductive material 7a arranged at the ends of the resistors themselves.

In conclusion, the supporting element 5 lends itself to undergo any manipulation that may be necessary or may take place during transportation, storage and following mounting without involving any risk of losing one or more of the electric components associated therewith.

Therefore, the supporting element 5 thus arranged can be engaged to the corresponding small connecting board 2 by a mere snug fitting operation. As a result of this operation, the simultaneous electric connection of all microlamps 6, the respective electric resistors 7 and auxiliary resistors 25, if any, to the connecting conductors 3 is achieved. The elastic thin plates forming the connecting conductors 3 lend themselves to act on the respective resistors 7 by urging them towards the thread-like terminals 6a in register therewith so as to ensure an excellent electric continuity.

The supporting element 5 and the corresponding connecting board 2 will be therefore engaged, upon connection of the terminals 3a to respective electric circuits arranged in the apparatus, to the front panel 22 of a household appliance or other apparatus with which the device 1 is going to be associated This engagement operation will take place too with the aid of further fitting means 23 not described in detail as known and not of importance to the ends of the invention.

Assembling of the device 1 will be completed with the engagement of the front covering element 19 to the supporting element 5.

The present invention attains the intended purposes.

It is pointed out, in fact, that the expedients envisaged in the device in question make the connecting operations between the electric components and the corresponding small connecting boards much easier as compared to the connection systems adopted in the known art. It will be noted in particular that in the present invention assembling of the devices of the above type acquires a very modular character, due to the stable arrangement of all the electric components in the supporting element, and their simultaneous electric connection to the connecting conductors previously disposed on the small connecting board through a mere connecting operation by snug fitting between the supporting element and the small board.

Practically, there is the possibility of producing a great variety of feeding and supporting devices each designed to comply with particular operating requirements and making different electric diagrams by preparing different sets of connecting conductors having different shapes and/or lengths where each set will lend itself to be associated with a small connecting board for giving the finished device the required operating features.

Obviously, many modifications and variations may be made to the invention as conceived, all of them falling within the scope of the appended claims.

Claims

1. A feeding and supporting device for electric components, comprising:

- a small connecting board (2);
- a plurality of electric connecting conductors (3) operatively associated with said small board (2);
- at least one supporting element (5) fastened to the small connecting board (2);
- at least one first electric component (6) operatively associated with the supporting element (5) and exhibiting at least two thread-like terminals (6a) arranged to be electrically connected to said connecting conductors (3);
- second electric components (7) operatively engaged with the supporting element (5) and electrically interposed between at least one of the thread-like terminals (6a) of the first component (6) and one of said connecting conductors (3), characterized in that said supporting ele-

ment comprises:

- at least one engagement portion (9) defining a tubular housing (8) in which the first electric component (6) is inserted;
- at least one bottom wall (10) obliquely intersecting the axis ("X") of said tubular housing (8) and designed to get in contact with the thread-like terminals (6a) of the first component (6) for arranging them according to an inclined orientation arid guide them to the outside of the tubular housing (8) through at least one outlet slot (12) disposed at the end of said first bottom wall;
- at least one second engagement portion (15) defining a coupling seat (14) extending in the extension of the outlet slot (12) and arranged to engage a second electric component (7) for operatively connecting it between at least one of said electric connecting conductors (3) and one of the thread-like terminals (6a) carried by the first electric component (6).

2. A device according to claim 1, characterized in that it comprises at least one pair of said second engagement portions (15).

3. A device according to claim 2, characterized in that said second engagement portions (15) extend parallel to the axis ("X") of the tubular housing (8).

4. A device according to claim 1, characterized in that said first electric component (6) comprises a bulb microlamp, each of said second electric components (7) comprising an electric resistor connected between one of the electric connecting conductors (3) and one of the thread-like terminals (6a) of the bulb microlamp (6).

5. A device according to claim 4, characterized in that said supporting element (5) exhibits a plurality of said first engagement portions (9) engaging corresponding first electric components (6), a pair of said second engagement portions (15) being associated with each of said first electric components and housing respective second electric components (7) for arranging them in contact relationship each on a corresponding connecting conductor (3).

6. A device according to claim 5, characterized in that it further comprises a front covering element (19) to be engaged to said supporting element (5) and exhibiting a plurality of signal lights (21) each arranged before one of said microlamps (6).

7. A device according to claim 1, characterized in that said connecting conductors (3) comprise elastic thin plates arranged to act on the respective second electric components (7) for urging them against the thread-like terminals (6a) of the corresponding first electric component (6).

8. A device according to claim 1, characterized in that each of said second electric components (7) is engaged in the corresponding coupling seat (14) by forced fitting.

9. A device according to claim 8, characterized in that each of said second engagement portions (15) internally has at least one retaining lug (16) designed to abut on a shoulder (7b) afforded by the respective second electric component (7) for holding said electric component within tile coupling seat (14).

10. A device according to claim 3, characterized in that each of said second engagement portions (15) exhibits an auxiliary slot (17) extending parallel to the axis of said tubular housing (8) , in front of said outlet slot (12) and such arranged as to engage the end of the corresponding thread-like terminal (6a) for holding it in a predetermined orientation.

11. A device according to claim 10, characterized in that in each of said coupling seats (14) auxiliary guide surfaces (18) are defined that converge towards said auxiliary slot (17) away from said outlet slot (12), and arranged to get in contact with the ends of the thread-like terminals (6a) and guide them towards said auxiliary slot.

12. A device according to claim 1, characterized in that said first engagement portion (9) also has a second bottom wall (11) converging towards said first bottom wall (10).

13. A device according to claim 1, characterized in that associated with the first bottom wall (10) of said first engagement portion (9), adjacent to the outlet slot (12), is a partition (13) interposed between the thread-like terminals (6a) emerging from the slot itself.

14. A device according to claim 1 characterized in that said supporting element (5) and small connecting board (2) are mutually engaged by snug fitting.

15. A feeding and supporting device for electric components, comprising:

- a small connecting board (2);
- a plurality of electric connecting conductors (3) operatively associated with said small beard (2) ;
- at least one supporting element (5) fastened to the small connecting board (2);
- at least one first electric component (6) operatively associated with the supporting element (5) and exhibiting at least two thread-like terminals (6a) arranged to be electrically connected to said connecting conductors (3);
- at least one second electric component (7) operatively engaged with the supporting element (5) and electrically interposed between at least one of the thread-like terminals (6a) of the first component (6) and one of said connecting conductors (3),

characterized in that said supporting element comprises a plurality of first engagement portions (9) engaging corresponding first electric components (6) , with each of them being associated at least one second engagament portion (15) housing at least one second electric component (7) to be arranged in contact relationship on a corresponding connecting conductor (3).

16. A device according to claims 15, characterized in that it comprises at least two of said second engagement portions (15) each housing at least one respective second electric component.

17. A device according to claim 16, characterized in that said supporting element (5) comprises:

at least one engagement portion (9) defining a tubular housing (8) in which the first electric component (6) is inserted;

- at least one bottom wall (10) obliquely intersecting the axis ("X") of said tubular housing (8) and arranged to get in contact with the thread-like terminals (6a) of the first component (6) for arranging them according to an inclined orientation and guide them to the outside of the tubular housing (8) through at least one outlet slot (12) disposed at the end of said first bottom wall;
- at least two second engagement portions (15) defining respective coupling seats (14) extending parallel to the axis ("X") of the tubular housing (8), in the extension of the outlet slot (12) and each arranged to engage a second electric component (7) for operatively connecting it between at least one of said electric connecting conductors (3) and one of the thread-like terminals (6a) carried by the first electric component (6).

18. A device according to claim 16, characterized in that said first electric component comprises a bulb microlamp (6), each of said second electric components comprising an electric resistor (7) connected between one of the electric connecting conductors (3) and one of the thread-like terminals (6a) of the bulb microlamp (6).

19. A device according to claim 18, characterized in that if further comprises a front covering element (19) to be engaged to said supporting element (5) and exhibiting a plurality of signal lights (21), each disposed before one of said bulb microlamps (6).

20. A device according to claim 16, characterized in that said connecting conductors (3) comprise elastic thin plates designed to act on the respective second electric components (7) so as to urge them against the thread-like terminals (6a) of the corresponding first electric component (6).

21. A device according to claim 17, characterized in that each of said second electric components (7) is engaged in the corresponding coupling seat (14) by forced fitting.

22. A device according to claim 21, characterized in that each of said second engagement portions (15) is internally provided with at least one retaining lug (16) arranged to abut on a shoulder (7b) exhibited by the respective second electric component (7) for holding said electric component within the coupling seat (14).

23. A device according to claim 17, characterized in that each of said second engagement portions (15) is provided with an auxiliary slot (17) extending parallel to the axis ("X") of said tubular housing (8) , in front of said outlet slot (12), and arranged to engage the end of the corresponding thread-like terminal (6a) for holding it in a predetermined orientation.

24. A device according to claim 17, characterized in that auxiliary guide surfaces (18) are defined in each of said coupling seats (14), which surfaces converge towards said auxiliary slot (17) away from said outlet slot (12) and are designed to get in if contact with the ends of

the thread-like terminals (6a) for guiding them towards the auxiliary slot itself.

25. A device according to claim 17, characterized in that said first engagement portion (9) also has a second bottom wall (11) converging towards said first bottom wall (10).

26. A device according to claim 17, characterised in that associated with the first bottom wall (10) of said first engagement portion (9), adjacent to the outlet slot (12), is a partition (13) interposed between the thread-like terminals (6a) emerging from the slot itself

27. A device according to claim 15, characterized in that said supporting element (5) and small connecting board (2) are mutually engaged by snug fitting.

FIG. 1

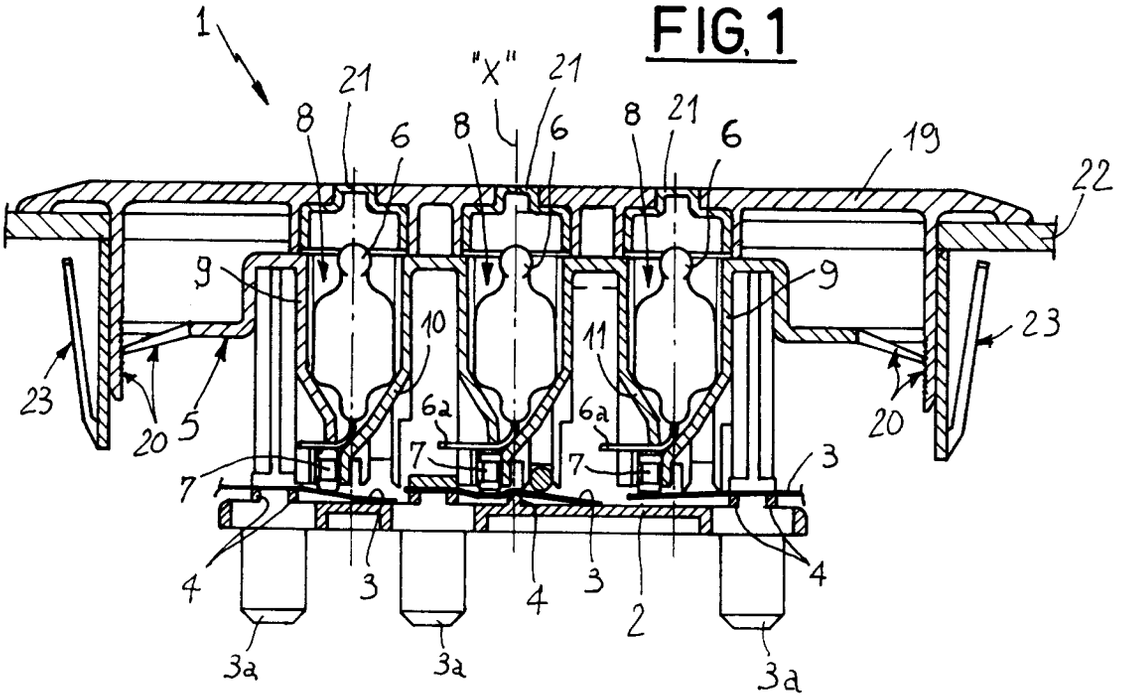

FIG. 2

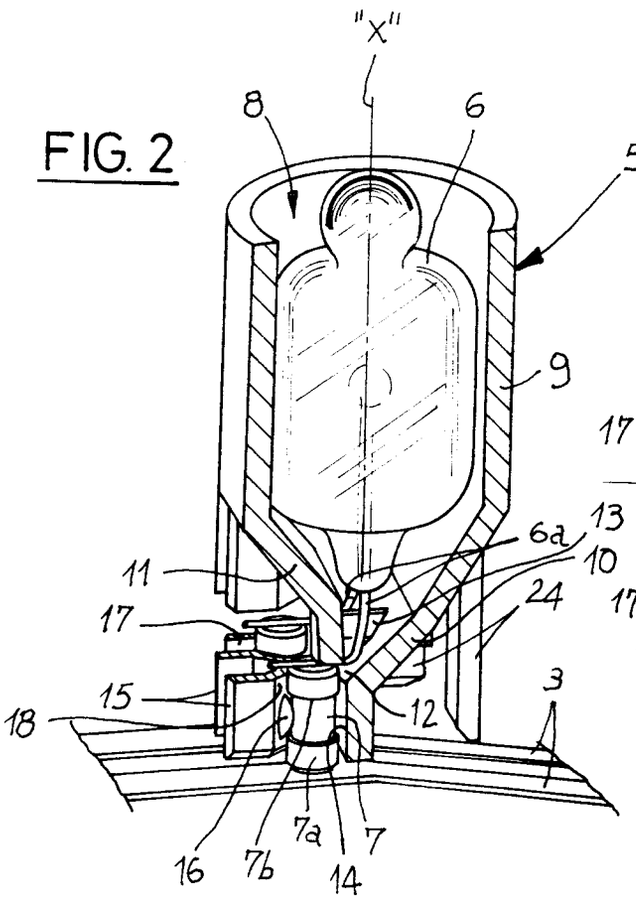

FIG. 3