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(54) Complex-shaped modular terminal board

(57) A complex-shaped modular terminal board having a number of contacts (2) oriented in a number of non-coincident directions, and at least two distinct modular members (3, 4) connectable both mechanically, by means of first reversible fast-fit fastening means (5, 8), and electrically; the modular members (3, 4) having respective conducting elements (2, 10, 11, 16) connected directly when the modular members (3, 4) are connected mechanically.

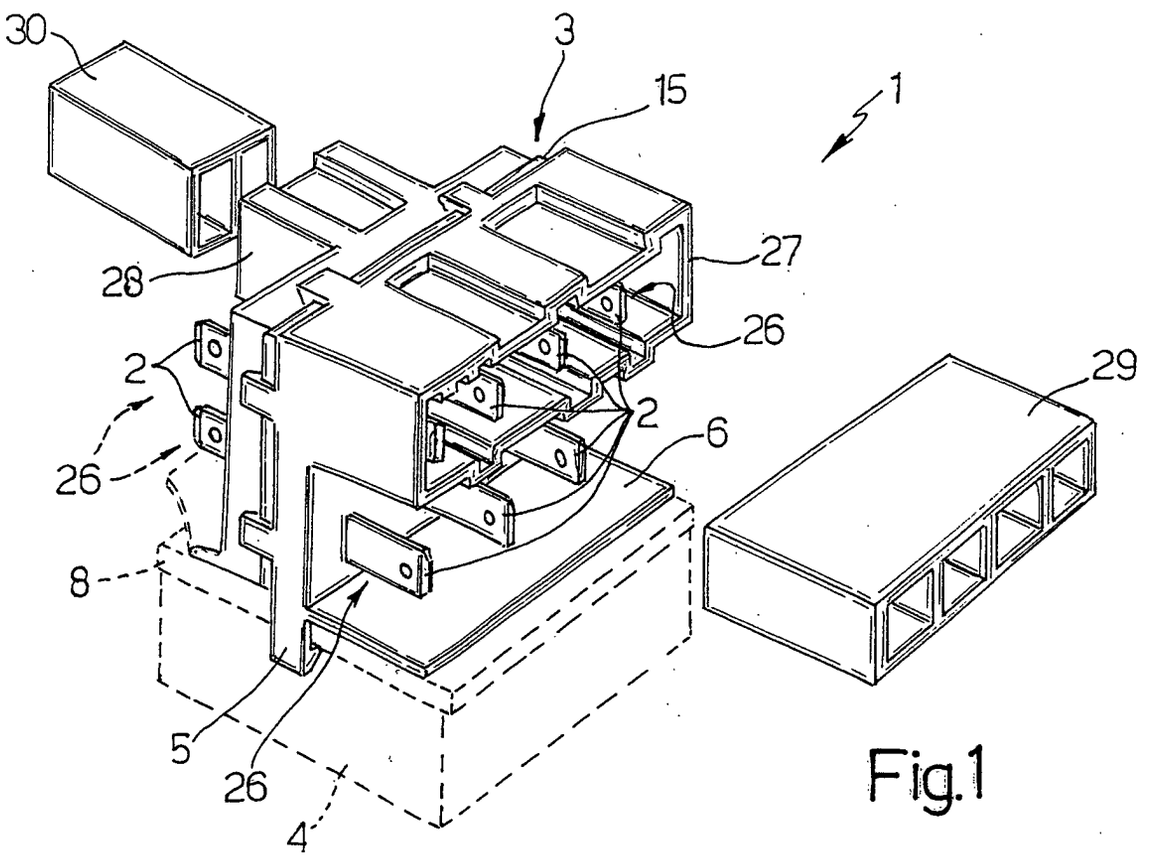

Fig.1

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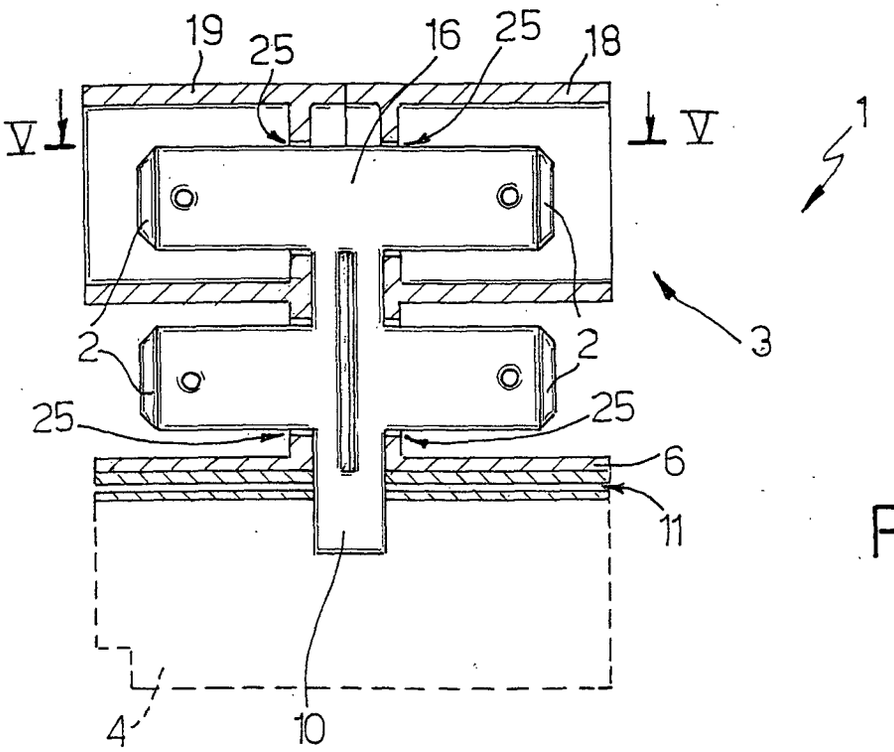

Fig. 2

Description

[0001] The present invention relates to a complex-shaped modular terminal board.

[0002] As is known, many devices, both industrial and non-industrial, require special terminal boards, particularly high-current devices and when user adjustment of the operating mode of the device is required. For example, a compressor may comprise an electric motor supplying user-adjustable power according to the type of application involved. More specifically, energy-saving or overload operating modes may be implemented for a limited period of time, in which case, a number of service terminals and/or connectors must be provided to transmit user-selected commands to, and so modify the operating mode of, the electric motor of the compressor.

[0003] Known terminal boards therefore normally comprise an electric circuit defined by co-molded conducting tracks embedded in a single supporting body of insulating material, and bent so that portions of the tracks lie in respective planes. In this way, it is possible to obtain terminal boards which are compact and, at the same time, comprise even a large number of service terminals and connectors to meet the requirements of specific applications. More specifically, the service terminals and connectors required are preferably oriented in different directions and lie in different planes.

[0004] Known terminal boards, however, have several drawbacks.

[0005] Firstly, while indeed reducing overall size, the complex shape of the terminal board poses problems in comolding the electric circuit and supporting body.

[0006] And secondly, the arrangement of the service terminals being predetermined, the possibility of adapting the same terminal board to different applications or even to devices made by different manufacturers is extremely limited, so that changes must be made to the molding process, thus increasing overall cost.

[0007] It is an object of the present invention to provide a terminal board designed to eliminate the aforementioned drawbacks, and which, in particular, is versatile and cheap and easy to produce.

[0008] According to the present invention, there is provided a complex-shaped modular terminal board comprising a number of contacts oriented in a number of non-coincident directions; characterized by comprising at least two distinct modular members connectable both mechanically, by means of first reversible fast-fit fastening means, and electrically; said modular members comprising respective conducting elements connected directly when said modular members are connected mechanically.

[0009] The simpler-shaped modular members are obviously formed separately (by simpler, cheaper molding processes) and then connected to form a compact, complex-shaped terminal board having service terminals and/or connectors oriented in different directions.

[0010] According to a further aspect of the invention, the first modular member comprises a supporting body defined by at least a first and a second half-shell, which close book-fashion and are connected to each other by straps and second reversible fast-fit fastening means.

[0011] And the supporting body comprises a number of seats, each for selectively receiving a respective conducting blade having service terminals.

[0012] The first member, which is also easy to produce, therefore provides for obtaining various service terminal arrangements, depending on the number and type of conducting blades used, and the seats in which the blades are inserted. A terminal board in accordance with the invention is therefore also versatile, by being easily adaptable to different applications.

[0013] A non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a view in perspective of a modular terminal board in accordance with the present invention;

Figure 2 shows a longitudinally sectioned side view of the Figure 1 terminal board;

Figure 3 shows a larger-scale, partly exploded view in perspective of a detail of the Figure 1 terminal board;

Figure 4 shows a view in perspective of part of the Figure 1 terminal board being assembled;

Figure 5 shows a top plan view, sectioned along line V-V, of the Figure 1 terminal board.

[0014] With reference to Figures 1 and 2, a complex-shaped modular terminal board, indicated as a whole by 1, comprises a number of service terminals 2 oriented in a number of non-coincident directions; and at least a first and a second modular member 3, 4, which are separate and connectable both mechanically and electrically.

[0015] The second modular member 4, which has a known structure and is only shown schematically, comprises further contacts not shown.

[0016] Modular members 3 and 4 are connected mechanically by first reversible fast-fit fastening means comprising first click-on retaining teeth 5 projecting from a base 6 of first modular member 2, and a first retaining edge 8 of second modular member 4.

[0017] Electrical connection is made between connecting terminals 10 on first modular member 3, and conducting tracks 11 co-molded with and embedded inside second modular member 4. More specifically, connecting terminals 10 are connected directly to respective conducting tracks 11 when modular members 3, 4 are connected mechanically.

[0018] As shown in more detail in Figure 3, second modular member 4 has openings 12 exposing connecting portions 11a of tracks 11, which have longitudinal slits 14, each for receiving a respective connecting terminal 10. And connecting terminals 10 project from the

bottom of first modular member 3 by such an extent as to be force-fitted inside respective longitudinal slits 14 when modular members 3, 4 are connected mechanically.

[0019] With reference to Figures 4 and 5, first modular member 3 comprises a supporting body 15; and a number of conducting blades 16 housed partly inside supporting body 15, and each having at least one respective service terminal 2, and a respective connecting terminal 10.

[0020] Supporting body 15 is defined by at least a first and a second half-shell 18, 19, which close book-fashion and are connected to each other by straps 20. And, once closed book-fashion, half-shells 18, 19 are gripped together by second reversible fast-fit fastening means comprising second click-on retaining teeth 21 carried by first half-shell 18, and second retaining edges 22 on the second half-shell.

[0021] Supporting body 15 comprises a number of seats 24, each for selectively receiving a respective conducting blade 16; and the number of seats in supporting body 15 is greater than the number of conducting blades 16 carried by supporting body 15.

[0022] More specifically, seats 24 comprise a number of slits 25 formed symmetrically in first and second half-shell 18, 19, so as to be positioned facing in pairs half-shells 18, 19 are closed book-fashion.

[0023] Slits 25 are arranged in distinct sets, in each of which, the non-adjacent slits 25 are spaced at least 5 mm apart. In the Figure 4 embodiment, each half-shell 18, 19 has two sets of slits.

[0024] First and second half-shell 18, 19 respectively comprise a first and second standard-shaped connector body 27, 28, which are substantially in the form of cup-shaped bodies, project laterally on opposite sides, and receive respective standard connectors 29, 30 shown schematically in Figure 4.

[0025] As stated, each conducting blade 16 has at least one service terminal 2, and may comprise up to four service terminals 2 coplanar with and substantially perpendicular to the respective connecting terminal 10. And at least one of conducting blades 16 comprises at least a pair of service terminals 2 extending on opposite sides of the respective connecting terminal 10.

[0026] Conducting blades 16 are inserted inside respective seats 24 so that service terminals 2 project laterally through respective slits 25.

[0027] Groups of side by side service terminals 2 define connector assemblies 26 of first modular member 1 oriented in a direction substantially perpendicular to said connecting terminals. First modular member 3 preferably comprises at least two connector assemblies 26 extending laterally on opposite sides of supporting body 15; and two of the connecting assemblies 26 are housed respectively in first standard-shaped connector 27, and partly in second standard-shaped connector body 28.

[0028] As shown in Figure 5, conducting blades 16 can be inserted selectively inside different seats 24, depending on the type of connector assembly 26 required.

[0029] More specifically, if conducting blades 16 are inserted inside non-adjacent seats 24, the service terminals of the blades are over 5 mm apart (VERIFY), so that, in conformance with current standards, direct connections can be made using fast-on-type contacts, with no need for connectors with insulating casings.

[0030] In any case, an electric connection by means of standard multiway connectors can be made using the connector assemblies 26 housed in first and second standard-shaped connector bodies 27, 28.

[0031] Clearly, changes may be made to the terminal board as described herein without, however, departing from the scope of the present invention.

[0032] In particular, the number, arrangement, and shape of conducting blades 16 may be other than as shown.

[0033] Changes may also be made to the orientation of service terminals 2, and therefore of connector assemblies 26, with respect to connecting terminals 10.

Claims

1. A complex-shaped modular terminal board comprising a number of contacts (2) oriented in a number of non-coincident directions; **characterized by** comprising at least two distinct modular members (3, 4) connectable both mechanically, by means of first reversible fast-fit fastening means (5, 8), and electrically; said modular members (3, 4) comprising respective conducting elements (2, 10, 11, 16) connected directly when said modular members (3, 4) are connected mechanically.

2. A terminal board as claimed in Claim 1, **characterized in that** said reversible fast-fit fastening means (5, 8) comprise click-on fastening means; and **in that** said conducting elements (2, 10, 11, 16) comprise connecting terminals (10) carried by a first of said modular members (3), and conducting tracks (11) carried by a second of said modular members (4).

3. A terminal board as claimed in Claim 2, **characterized in that** at least said first modular member (3) comprises a supporting body (15) defined by at least a first and a second half-shell (18, 19), which close book-fashion and are connected to each other by straps (20) and second reversible fast-fit fastening means (21, 22).

4. A terminal board as claimed in Claim 3, **characterized in that** said first modular member (3) comprises a number of conducting blades (16) housed partly in said supporting body (15), and each having at least one respective service terminal (2), and a respective one of said connecting terminals (10),

which is connectable electrically to a respective said conducting track (11) on said second modular member (4).

5. A terminal board as claimed in Claim 4, **characterized in that**, in each said conducting blade (16), said at least one service terminal (2) and said connecting terminal (10) are coplanar and substantially perpendicular; and **in that** at least one of said conducting blades (16) comprises at least one pair of service terminals (2) extending on opposite sides of said respective connecting terminal (10).

6. A terminal board as claimed in Claim 5, **characterized in that** said supporting body (15) comprises a number of seats (24), each for selectively receiving a respective said conducting blade (16); the number of seats (24) on said supporting body (15) being greater than the number of said conducting blades (16) carried by said supporting body (15).

7. A terminal board as claimed in Claim 6, **characterized in that** said seats (24) comprise a number of slits (25) formed symmetrically in said first and second half-shell (18, 19), so as to be positioned facing in pairs when said first and second half-shell (18, 19) are closed.

8. A terminal board as claimed in Claim 7, **characterized in that** said slits (25) are arranged in distinct sets; and **in that**, in each of said sets, non-adjacent slits (25) are at least 5 mm apart.

9. A terminal board as claimed in any one of Claims 4 to 8, **characterized in that** said first modular member (3) comprises connector assemblies (26) including respective groups of side by side service terminals (2).

10. A terminal board as claimed in Claim 9, **characterized in that** said connector assemblies (26) are oriented in a direction substantially perpendicular with respect to said connecting terminals (10).

11. A terminal board as claimed in Claim 9 or 10, **characterized in that** said first modular member (3) comprises at least two connector assemblies (26) extending laterally on opposite sides of said supporting body (15).

12. A terminal board as claimed in any one of Claims 2 to 11, **characterized in that** said second modular member (4) has openings (12) exposing connecting portions (11a) of said conducting tracks (11), which have longitudinal slits (14), each for receiving a respective one of said connecting terminals (10).

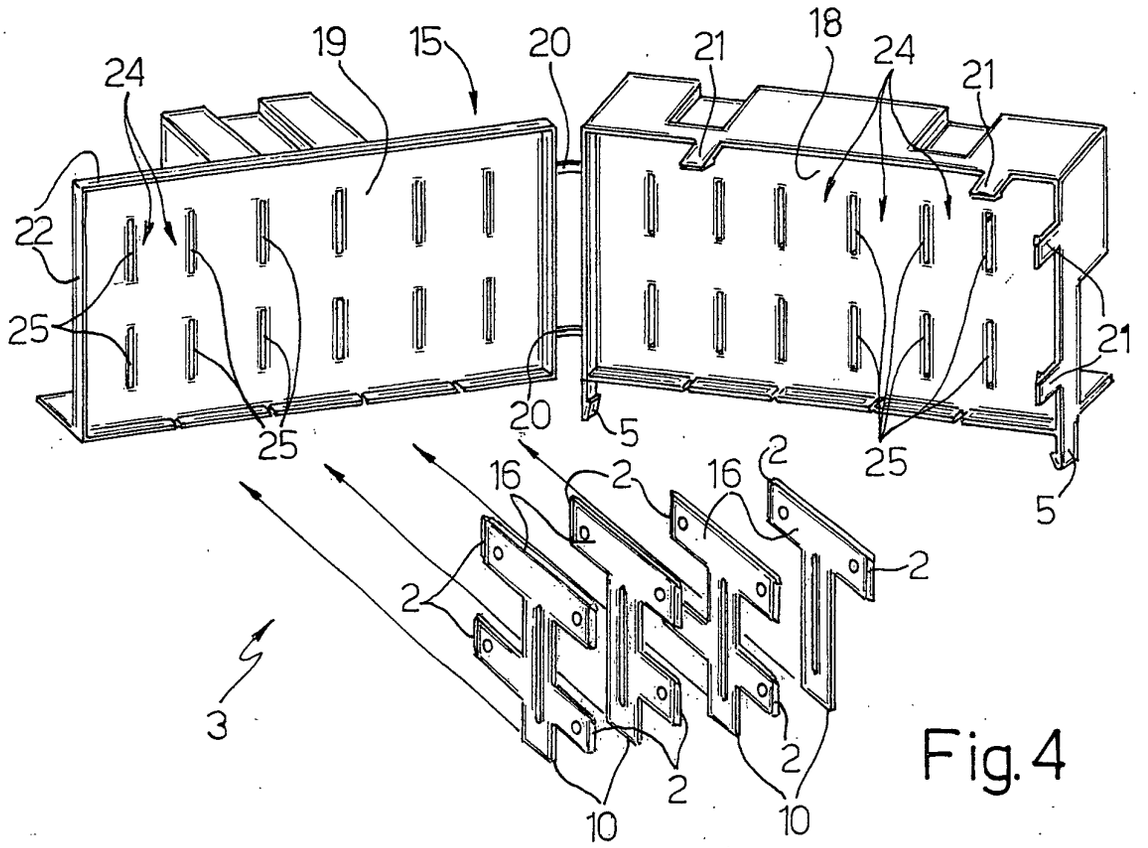
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Fig. 4

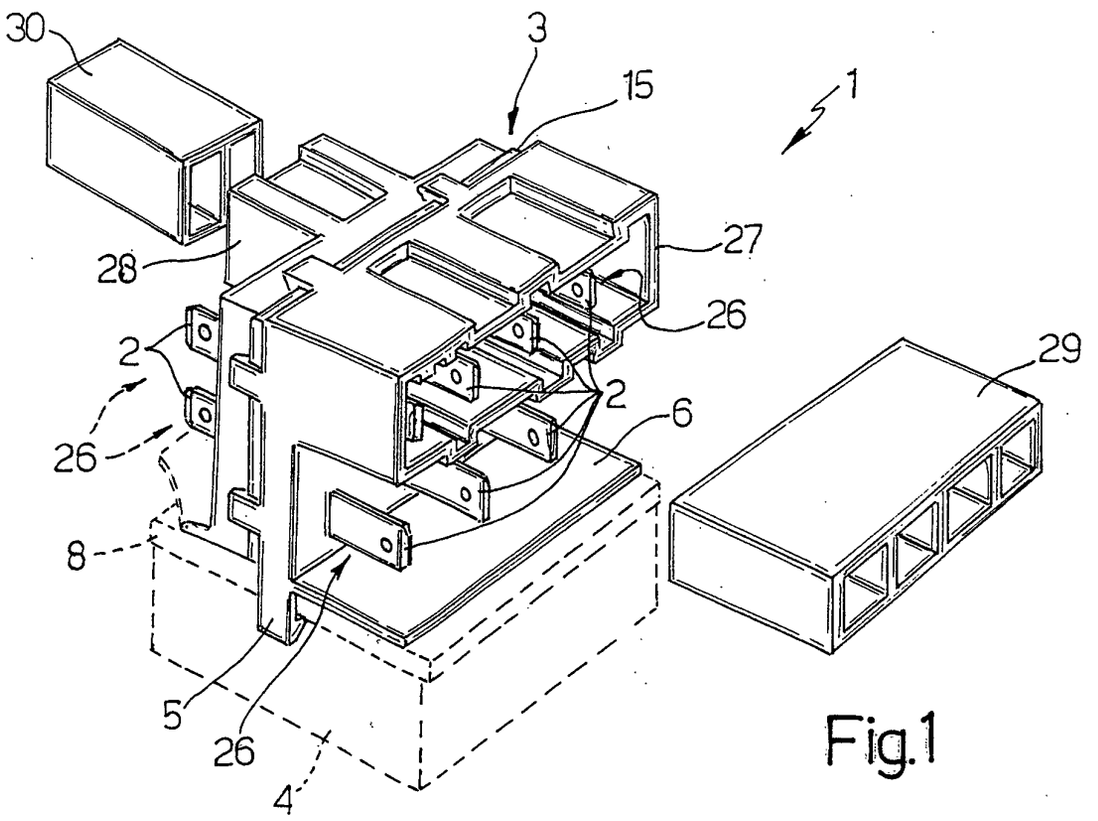
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Fig. 1

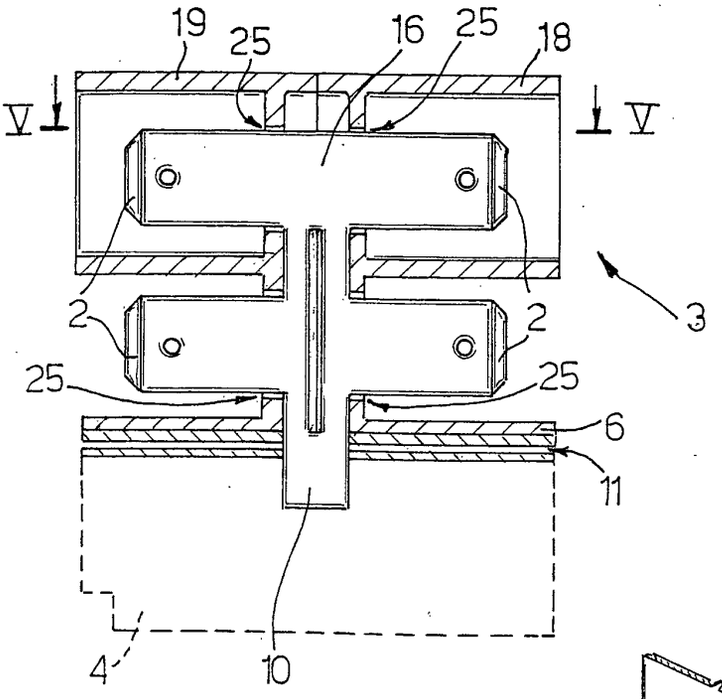

Fig.2

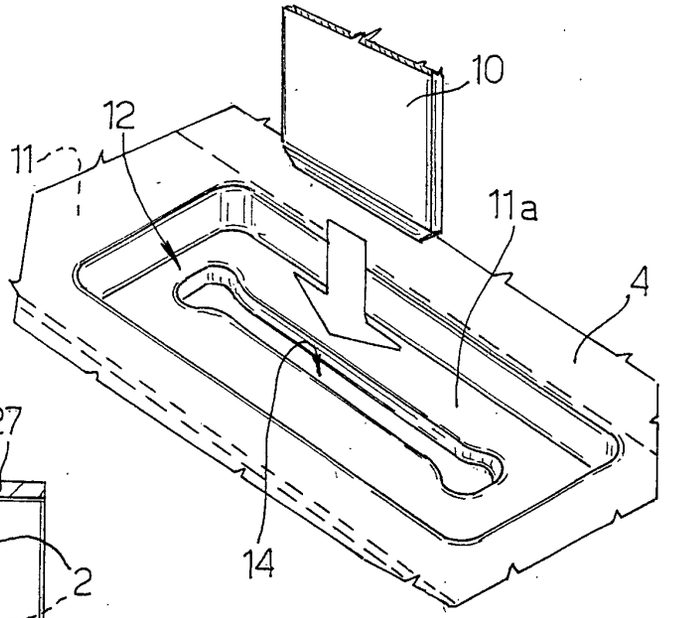

Fig.3

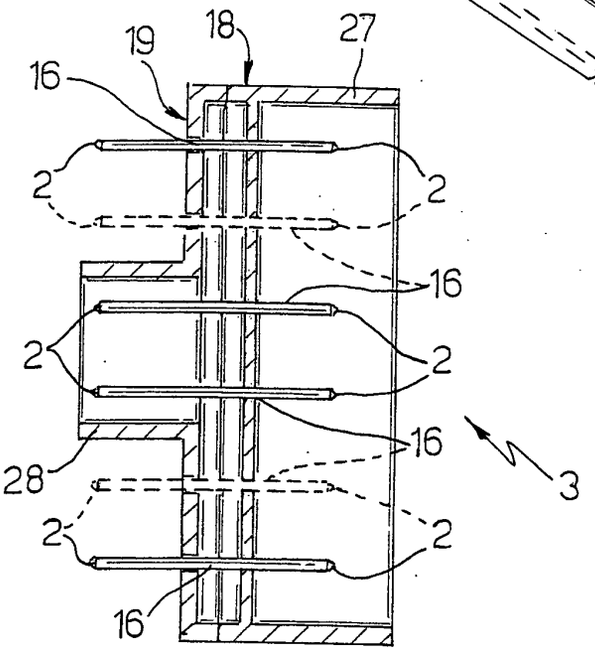

Fig.5