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(54) Chest Freezer

(57) A chest freezer comprising a hollow body (12) defined by a flat edge (16) onto which a door (14) closes. Between said edge (16) and the door (14) are defmed channels (22, 26) of variable section, made in the inner door and capable of making the air which seeps through the seal flow toward holes which conduct it away in order to eliminate or reduce frost formation on said edge.

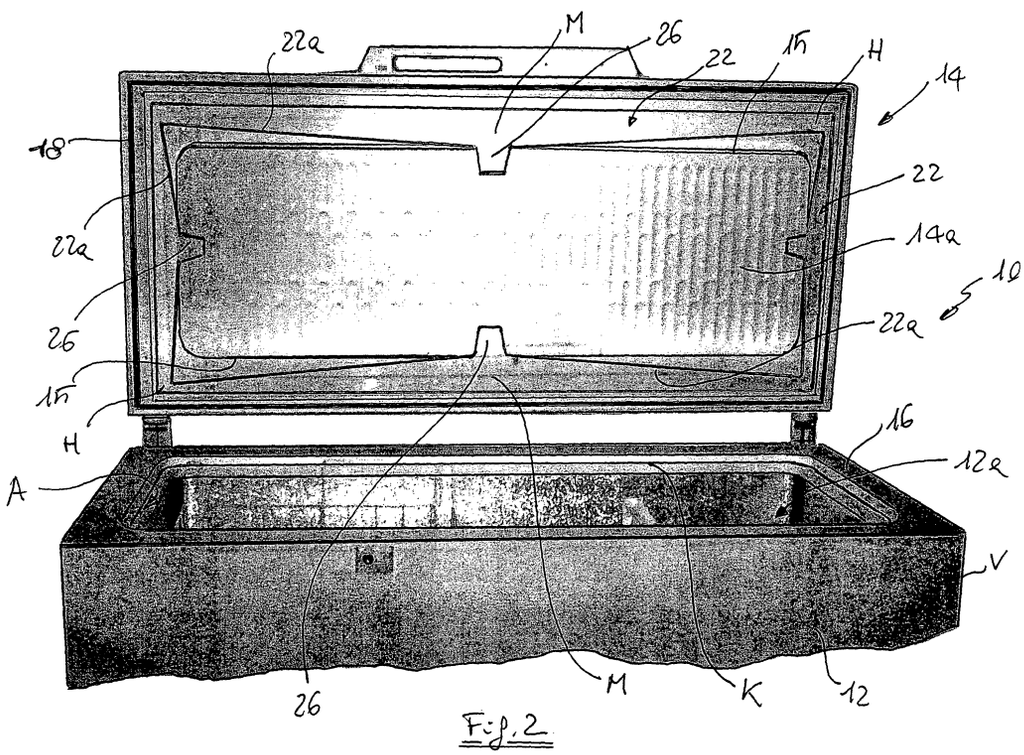

Fig. 2

EP 1 544 558 A2

Description

[0001] The present invention concerns a freezer of the type which includes a hollow body defined by a flat edge onto which a door closes.

[0002] The problem of frost formation on the internal surfaces of the cavity is known in the domestic freezer sector. This problem is particularly noticeable in relation to the peripheral edge of the cavity where the moist air from the exterior seeps through the peripheral seal owing to the reduced pressure created inside the freezer by both cooling of air (with consequent reduction in volume) and condensation of moisture. The build-up of frost on this peripheral zone may be alarming to the user, who may think the freezer is faulty, and may also prevent the baskets supported by the edges of the cavity from sliding easily and the door from closing properly, with a consequent increase in the energy consumption of the appliance. The normal temperature cycle inside the freezer, due to the normal on-off setting of the compressor associated with the refrigerant circuit, is a further cause of ingress of air owing to the continual variations in pressure inside the cavity. One solution to this type of problem is illustrated in EP-A-494587, where an attempt was made to resolve the above-mentioned problem by using a diaphragm external to the cavity but in communication with it. This solution is, however, complicated and costly, although it considerably reduces the problem of frost formation within the cavity.

[0003] The object of the present invention is to provide a freezer which does not exhibit the disadvantages described above and for which production does not involve increased costs.

[0004] This object is achieved by means of the characteristics listed in the appended claims.

[0005] The principal characteristic of a freezer according to the present invention is the presence of channels of variable section between the edge of the cavity and the door, i.e. in the part of the freezer where the moist air coming from outside comes into contact with the cold walls of the cavity. Investigations and tests carried out by the Applicant have shown that, with the stratification of the air flows entering via the seal, the effect of a "channel" of variable section is to prevent frost formation on the frame of the cavity since the moisture is directed toward the interior of the cavity where frost formation (for example, on frozen products) is less problematic. This effect is due to the fact that, since the incoming moist air is warmer, it tends to rise, and suitable channels can therefore be used to guide this flow.

[0006] Said channels are preferably made on an internal surface of the door. This avoids costly modifications to the structure of the cavity, since only the mould used to make the internal door surface, commonly called the "inner door", is modified.

[0007] The present invention is particularly advantageous for chest freezers. Preferably the channels are substantially straight with a section which increases from the end zones toward the centre line zones on each side of the freezer, where the section of these channels is greatest. The channels preferably have three inclinations. Considering a vertical section, longitudinal to the channel, there is an inclination of the upper surface (with reference to the configuration when the door is closed) so as to increase the section from the ends toward a central zone. Considering a horizontal section, longitudinal to the channel, there is an inclination toward the interior of the cabinet. Finally, considering a vertical section, transverse to the channel, there is an inclination (although slight) toward the interior of the cabinet.

[0008] Further advantages and characteristics of a freezer according to the present invention may be seen from the detailed description given below, which is given purely for illustration and is not limiting, with reference to the accompanying drawings in which:

- Fig. 1 is a perspective view of a known type of freezer with the door shown open;
- Fig. 2 is a similar view to that in Fig. 1 and illustrates a freezer according to the invention;
- Fig. 3 is a plan view of the internal surface of the door on the freezer in Fig. 2;
- Fig. 4 is a sectional view according to the line IV-IV in Fig. 3;
- Fig. 5 is a sectional view according to the line V-V in Fig. 3; and
- Fig. 6 is a sectional view according to the line VI-VI in Fig. 3.

[0009] Referring to Fig. 1, 10 designates a chest freezer with a cabinet 12 on which a door 14 is hinged. The cabinet 12 has a cavity 12a for food preservation, accessible via its aperture A. This aperture is defined by an internal rim K on which unwanted frost deposits occur. The door 14 has a raised central portion 14a which penetrates the interior of the cavity 12a to improve thermal insulation. Around the rim K, the cabinet 12 has a flat frame 16 on which there rests a peripheral seal 18 which fits into a corresponding groove 20 in the door.

[0010] According to the invention, and referring to Fig. 2 and those following (in which like parts will be indicated using like reference symbols to those in the known freezer in Fig. 1), the door 14, at the side of the central portion of greater thickness 14a, has channels 22 of variable section, which, when the door 14 is closed, are positioned facing the frame 16.

[0011] Each channel 22 exhibits a form which is substantially straight with a U-shaped cross-section increasing from ends H (placed close to the vertical edges V of the cabinet 12 when the door is closed) toward a centre line zone M.

[0012] This variation in section is obtained by forming an internal rim 22a in each channel so that it is defined by two straight portions with an angle between them converging toward the centre line zone M. In this way the form of each channel 22 is substantially an isosceles

triangle of which the base is parallel to the edge of the door and the two sides (which define the internal edge 22a of the channel) converge toward an apex at the centre line M so as to intersect an edge of the zone of greater thickness 14a of the door 14. A further variation in the section of the channels 22 is due to the variation in depth of the channels from the end zones H to the centre line M, this variation in depth being very clear in Fig. 4.

[0013] The bottom wall of each channel 22 preferably has a second inclination across its direction, such that its section also increases from the exterior toward the cavity 12a. It is therefore possible to identify, for the bottom wall of each channel 22, a double inclination in relation to the horizontal plane of the door: a first inclination, from the end zones H toward the centre line M, due to the variation in depth of the channel; and a second inclination in the transverse plane of the channel which facilitates the conduction of the incoming moist air toward zones away from the rim K. The side walls of each channel 22 are angled in relation to the vertical to facilitate removal from the mould.

[0014] In order further to facilitate the conduction of the moist air toward the cavity, each channel 22 has, on its edge 22a turned toward the interior of the cavity 12a and on the centre line M, a notch 26, trapezoidal in shape in the example illustrated, which penetrates the zone of greater thickness 14a of the door 14. This notch 26, when the door is closed, extends beyond the rim K ensuring that the moist air is rapidly carried away, owing to stratification of the flows, toward the cavity 12a.

[0015] Since the internal surface of the door 14 is usually obtained from a sheet of polymeric material (liner) by thermoforming, formation of the channels 22 involves only a modification to the thermoforming mould compared to known solutions.

[0016] Naturally there are many possible variations to the solution described above by way of example. For example, the channels of variable section may also be used in upright freezers and, rather than on the door, may be placed in the cabinet 12 via the frame 16.

[0017] The solution according to the invention also functions if the channels are shaped in the opposite way, namely with the various inclinations running from the centre line M to the ends H. Obviously this involves placing the small trapezoidal "holes" in the comers instead of on the centre lines. However this is not the preferred solution because the seal is less tight in the comers, so a hole which is on the centre line will provide greater thermal dispersion.

Claims

1. Freezer of the type comprising a hollow body (12) defined by a flat edge (16) onto which a door (14) closes, **characterised in that** between this edge (16) and the door (14) are defined channels (22, 26) of variable section.

2. Freezer according to claim 1, **characterised in that** said channels (22) are made in an internal surface of the door (14).

3. Freezer according to either claim 1 or claim 2, in particular a chest freezer in which the hollow body (12) is in the form of a parallelepiped, **characterised in that** said channels (22) are substantially straight with a section which increases from the ends (H) toward the centre line zones (M) where said section is greatest.

4. Freezer according to claim 3, **characterised in that** the internal surface of the door (14) has, close to the edges, lower zones (22) each having one side substantially parallel to the edge of the door and two opposing sides (22a) inclined and converging toward said centre line zones (M).

5. Freezer according to claim 4, **characterised in that** the bottom surface of each lower zone (22) exhibits a first inclination in relation to the horizontal due to a difference in depth between the centre line (M) and the ends (H).

6. Freezer according to claim 5, **characterised in that** the bottom surface of each lower zone (22) exhibits a second inclination in relation to the horizontal due to an increase in depth toward the internal edge (22a) of the channel (22).

7. Freezer according to any of the preceding claims, in which the door (14) has a central zone of greater thickness (14a) which can enter the cavity (12a) and around which there is a support frame for the hollow body, **characterised in that** said channels (22) are made in this frame.

8. Freezer according to claim 7, **characterised in that** each channel (22) has, substantially on its centre line (M), a portion connected to a lower part in the form of a notch (26) cut into the edge of the central zone of greater thickness (14a) of the door (14).

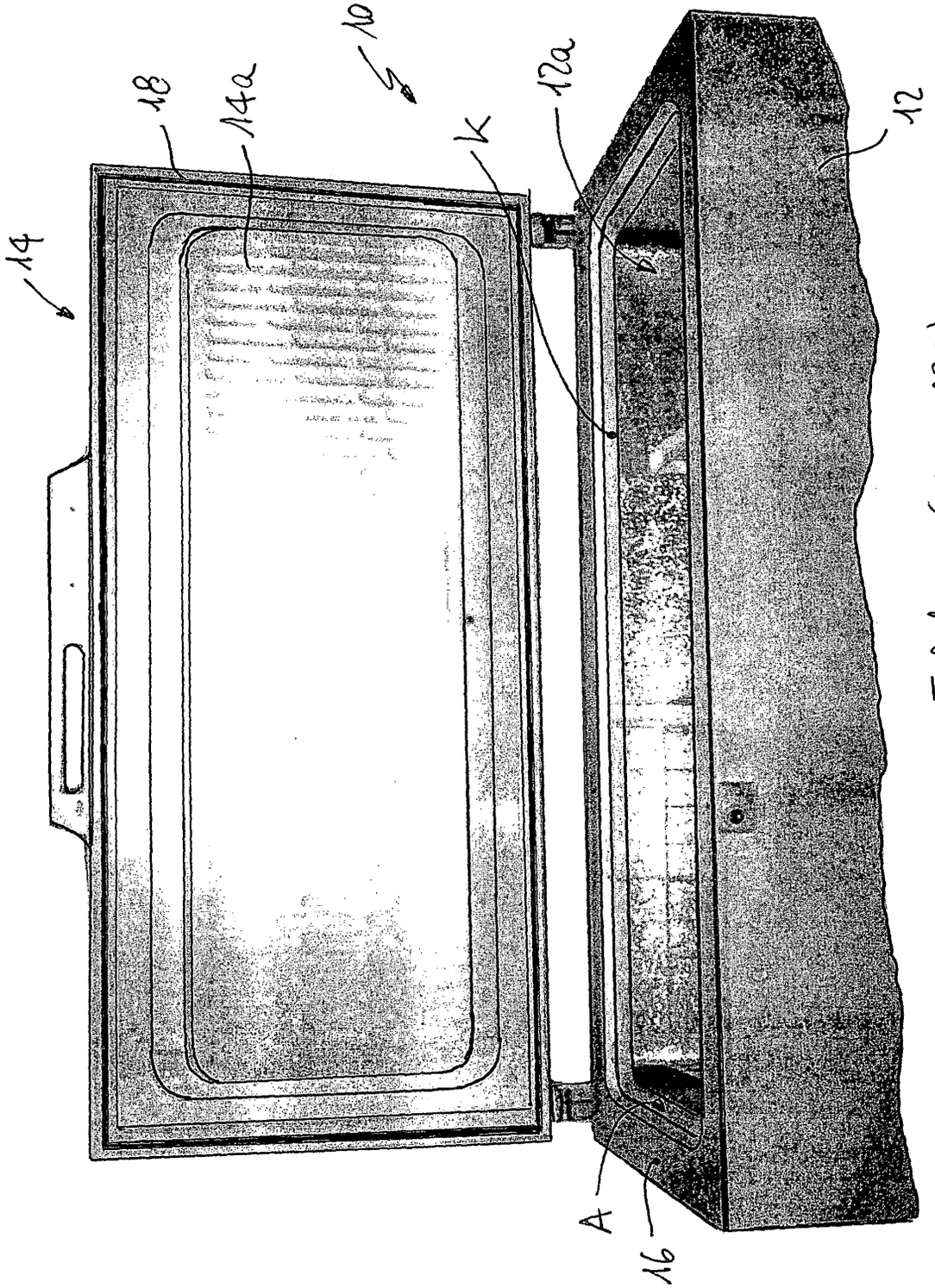

Fig. 1 (PRIOR ART)

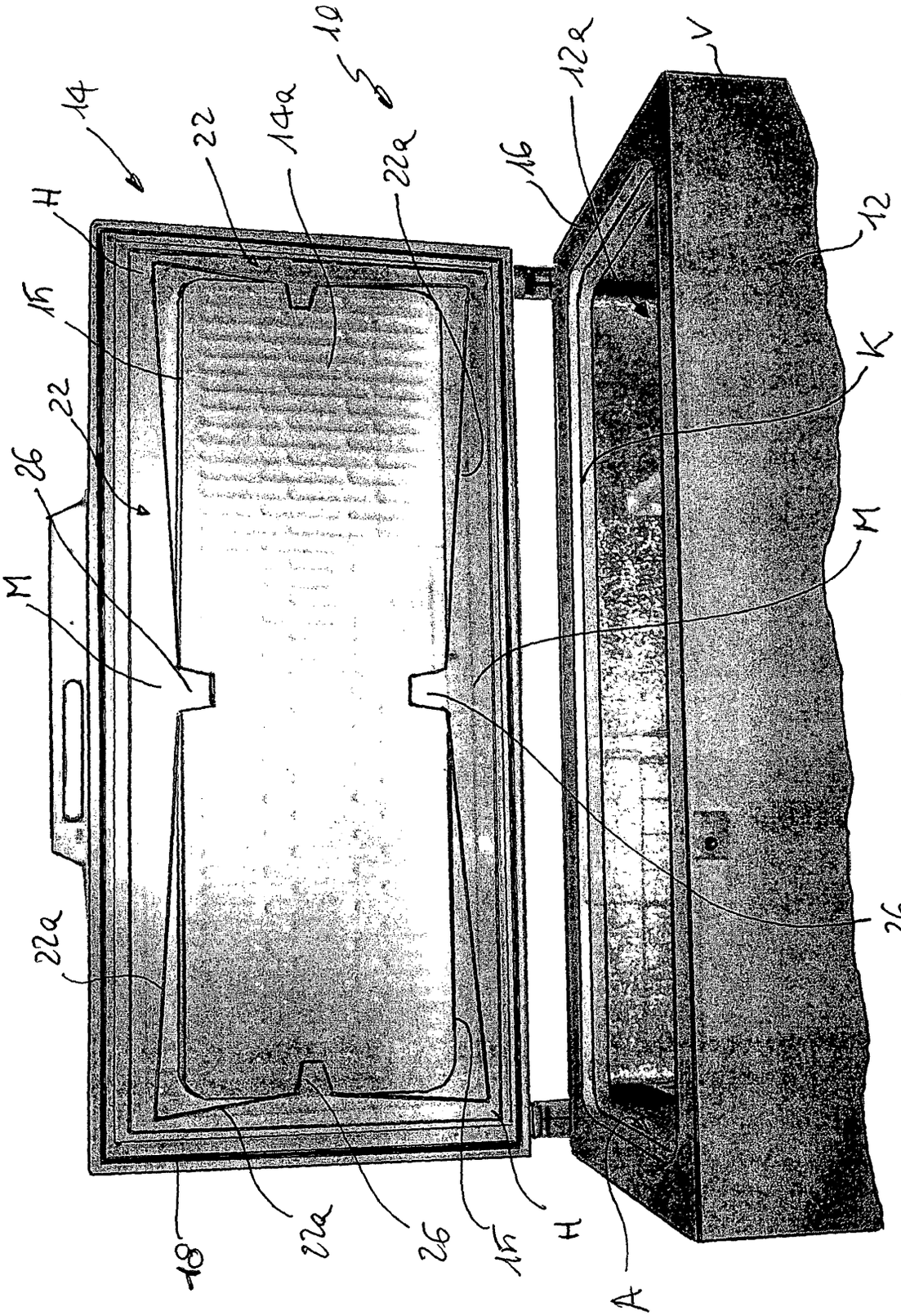

Fig. 2

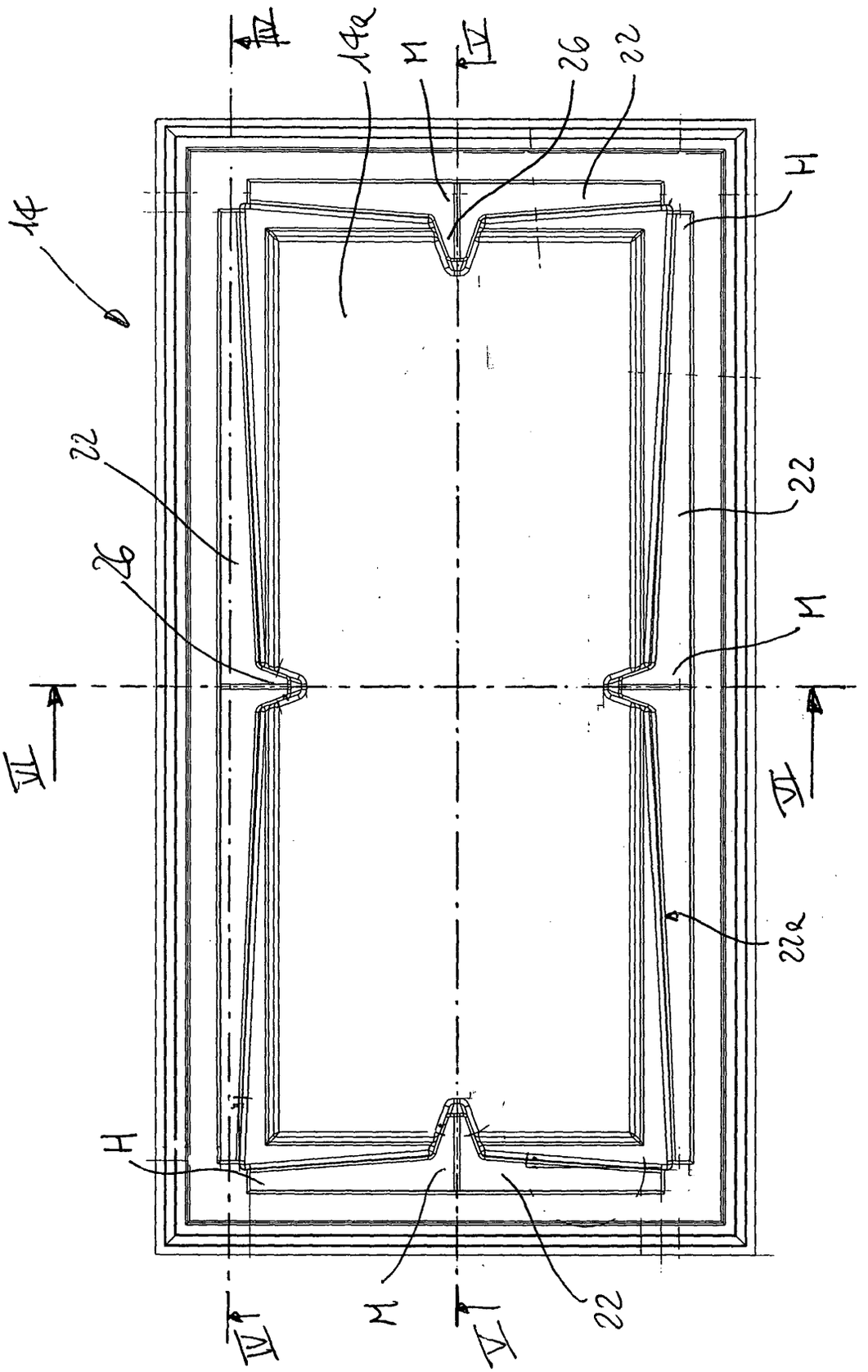

Fig. 3

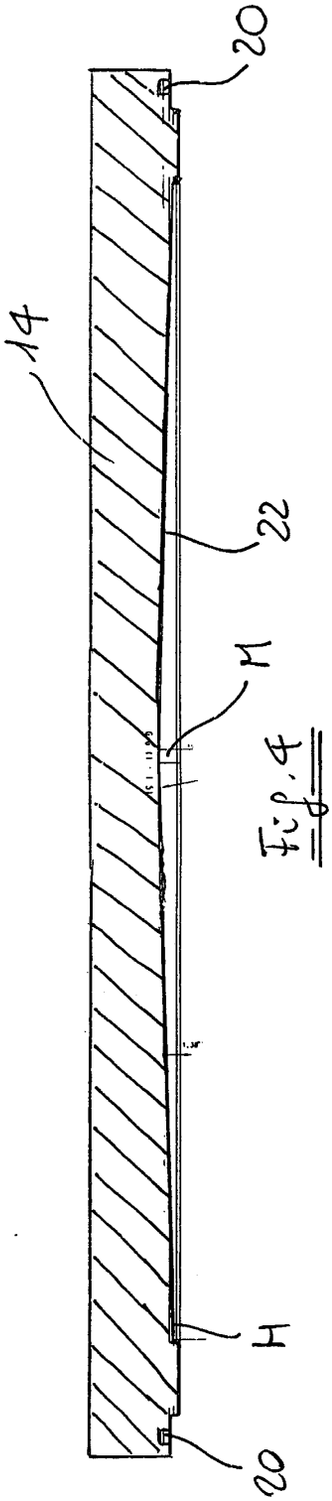

Fig. 4

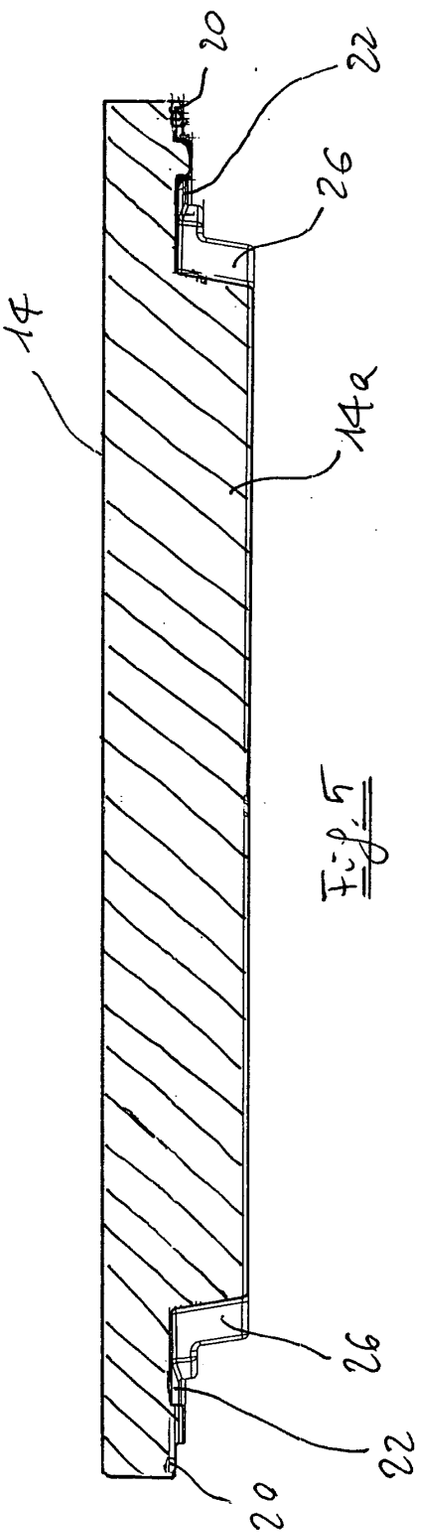

Fig. 5

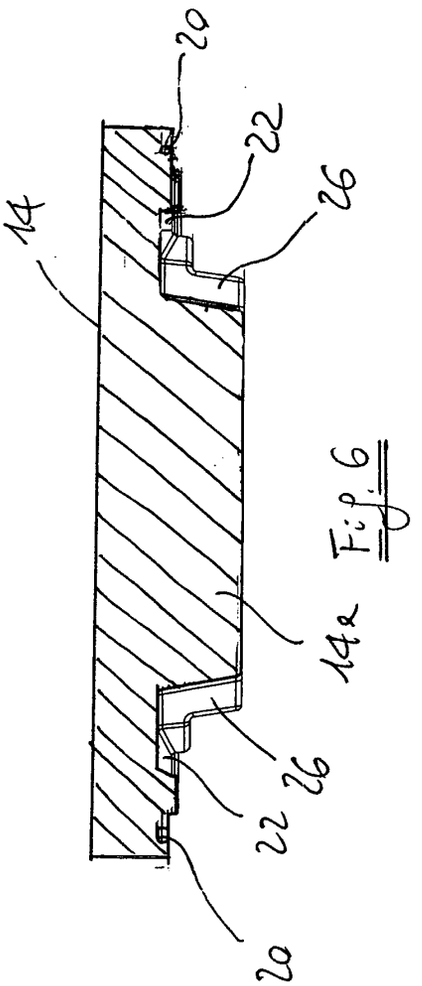

Fig. 6