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(72) Inventors:

- **Traina, Alfredo**
33080 Barcis, Pordenone (IT)
- **Arreghini, Luigi**
30020 Pradipozzo di Portogruaro, Venezia (IT)

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(74) Representative: **Giugni, Valter**

(71) Applicant: **Electrolux Home Products
Corporation N.V.**
1930 Zaventem (BE)

**PROPRIA S.r.l.,
Via Mazzini 13
33170 Pordenone (IT)**

(54) Improved clothes drying machine

(57) Clothes drying machine comprising a rotating drum (1) and a front loading opening (2), and provided with a support framework (3) surrounding said loading opening as the frame of a picture, in which there is capable of being positioned in a removable manner a basket-like rack (4) having a reticular structure and an ap-

proximately cylindrical shape, adapted to be inserted inside said rotating drum with its axis in an approximately horizontal position, and further adapted to hold clothing items that must be dried. In a preferable manner, such a basket-like rack is capable of being unfolded and spread out on a plane (6), and said loading opening is substantially circular in its shape.

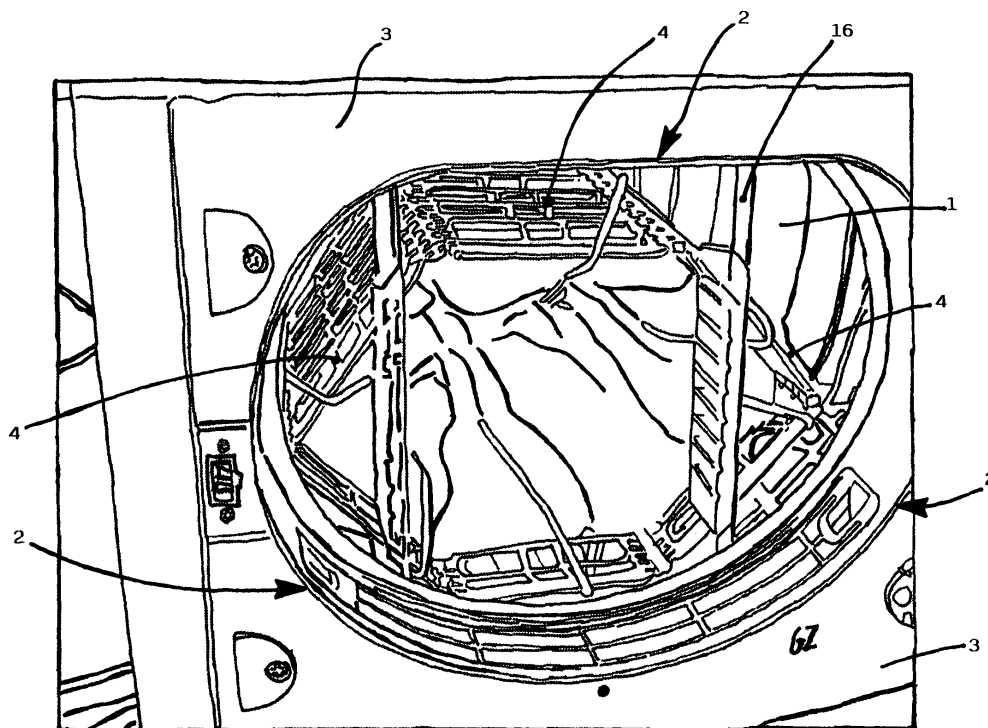


FIG. 1

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Description

[0001] The present invention refers to an improved kind of front-loading clothes drying machine, preferably a so-called front-loading tumble dryer of the household-type.

[0002] Clothes drying machines of the above-indicated kind are generally known to be substantially comprised of an outer casing and an inner rotating drum, having a cylindrical shape and an approximately horizontal axis of rotation, into which the clothes to be dried are filled. These machines further include means for generating a flow of hot dry air, which is circulated in a forced, i.e. fan-assisted manner within said rotating drum in a direction from the front to the backside of the drum or vice-versa.

[0003] To facilitate loading and removal of the clothes into and from the drum, an appropriate opening is provided in the front outer surface of the machine, said opening being capable of being closed by means of an appropriate lid or door hinged on the same outer surface of the outer casing of the machine.

[0004] Machines of the above-described kind are capable of being used to substantially dry any kind of garments and clothing items, including such items as sports footwear and the like.

[0005] However, the drying process, which the items inside the rotating drum are exposed to, may in certain circumstances prove ineffective or even detrimental to both the items to be dried themselves and the integrity of the same machine. In fact, there are certain types and kinds of particularly delicate and sensitive clothing items, such as for instance cashmere pullovers or foulards, which may most easily undergo felting and/or suffer other kinds of damages due to them rubbing against and rolling over the inner cylindrical wall of the rotating drum.

[0006] Among the items that are usually machine-dried there may be included also heavy or rigid items, such as for instance sports footwear, the prolonged rolling and tumbling of which inside the rotating drum causes the drum itself to eventually suffer distortions and buckles, thereby undergoing damages that give rise to roughness and irregularities in general that may in turn cause even not particularly delicate items being dried in a subsequent cycle to be exposed to further damages.

[0007] In addition, a drying cycle designed to handle delicate or heavy items is usually a rather prolonged one, in that it may also take up to two hours or more, and this circumstance surely contributes to a higher risk for the items being dried to suffer damages.

[0008] In view of doing away with all these drawbacks, a known practice consists in providing a supplementary container, generally in the form of a rack-like basket with a reticular structure, for insertion in the rotating drum through the access door of the machine, said rack being then joined firmly to the structure of the machine, i.e. without being able to rotate jointly with the drum.

[0009] In the machines of this kind, the items to be dried are placed on the rack and, owing to them being invested by the flow of hot dry air, eventually dry up. An example of such a solution is described in the German patent application DE 40 34 660 A1.

[0010] However, the solution that is disclosed in the above-cited publication is found to have some drawbacks, i.e.:

a) in order to make maximum use of space within the drum, and therefore to enable a rack having an adequately large carrying or holding surface to be introduced therein, the door providing access into the drum must be given a substantially rectangular shape. Such a limitation, however, practically imposes that the clothes drying machine be designed and manufactured specially for use with said supplementary rack or basket, so that it is not possible for a conventional clothes drying machine, having a circular access door, to be used in conjunction with such a rack or be adapted for such a use in view of enabling it to operate with such a supplementary rack;

b) the disclosed rack consists of a rigid three-dimensional structure, in which the height dimension is furthermore quite considerable: when it must be removed from the drum, in order to let the machine operate in a traditional manner, it therefore proves very cumbersome to store away and, as a result, quite inconvenient to use in general;

c) the same rack is suspended also on the rear side by means of a hook-like member adapted to engage into an appropriate support hole, which is provided coaxially to the rear wall of the rotating drum and is adapted to accommodate a support means provided on said rack; therefore, owing to the need for all these elements, which are situated in a quite low position inside the rotating drum at the rearmost side thereof, to be properly fitted onto or into each other, the installation of the rack turns out to be quite awkward and difficult to be carried out.

[0011] It would therefore be desirable, and it is actually the object of the present invention, to provide a clothes drying machine provided with an additional rack-like basket or similar container for the quick drying of either delicate or heavy and rigid items, which does away with the above-described drawbacks and is further equally capable of being used also in a downright traditional manner.

[0012] Furthermore, this clothes washing machine shall be capable of being easily and readily manufactured with the use of existing, largely available techniques and tools, and shall be competitive in its construction and convenient to use, and in particular it shall be capable of being implemented with minor changes

to currently produced machine designs. In addition, the features added to the machine according to the present invention shall by no way affect or impair the reliability level thereof.

[0013] According to the present invention, these aims are reached in a particular type of clothes drying machine provided with such devices and arrangements as recited in the appended claims and described below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a front perspective view of the interior of a drum of a clothes drying machine provided with a rack according to the present invention;
- Figure 2 is a perspective view of the rack illustrated in Figure 1, but in the state in which it is removed from the drum;
- Figure 3 is a view of the same rack as the one shown in Figure 2, but in the condition in which it is unfolded and spread out on a plane;
- Figure 4 is a view of a detail of an improvement of the rack shown in the preceding Figures;
- Figure 5 is a view of the rack illustrated in Figure 2, but provided with a member for attachment to the clothes drying machine according to the present invention;
- Figure 6 is a symbolical view of a mode of application of the attachment member of Figure 5 to the inner wall of the support structure or outer casing of a clothes drying machine according to the present invention;
- Figures 7 and 8 are views of the rack illustrated in Figures 1, 2 and 3, but in a state in which it is folded up, and a mode of insertion of such a folded-up rack in the outer casing of a clothes drying machine according to the present invention.

[0014] A clothes drying machine of the type adapted to use the present invention comprises a rotating drum 1 housed inside a support framework 3 provided with a front loading aperture 2, through which it is possible for access to be gained into said rotating drum; it further comprises means (not shown) that are adapted to generate a forced flow of hot dry air and cause this flow to move along the horizontal axis of said rotating drum.

[0015] According to the present invention, there is provided a basket-like rack 4 featuring preferably following characteristics:

- it has an open reticular structure, so as to enable it to let a flow of air penetrate it and travel through it in all directions;

- it has a cylindrical or almost-cylindrical shape, thereby meaning that this includes a parallelepiped-like shape with at least four opposite sides, open on one side or base thereof;
- it is in turn adapted to hold items to be dried;
- it has an overall size that enables it to be wholly introduced in said rotating drum;
- it is provided with support means that enable it to maintain a stable position, relative to the structure of the machine, inside said rotating drum, however without coming into any contact with the rotating wall of said drum, its axis being substantially parallel to or coincident with the axis of said drum.

[0016] With reference to the above-listed Figures, said basket-like rack 4 consists of a light structure, with the outer surface thereof formed in a net-like or grid-like manner with very large meshes so as to be capable of being easily penetrated by a flow of air travelling across it in all directions.

[0017] The interior of this basket-like rack is empty; its use consists in removing the rack from the rotating drum, placing the items to be dried thereinside, and finally introducing the so loaded rack again in the rotating drum, where it will be secured with the help of appropriate means, which shall be described in greater detail further on.

[0018] During the operation of the machine, the flow of hot dry air is forced to move along the longitudinal axis of the rack, flowing in from a base thereof and flowing out through the opposite base thereof, thereby fully investing and, therefore, penetrating and moving through the items placed in the rack over the whole length thereof, and ultimately bringing about the required drying action while the items in the rack stand still and do not come into any contact with the rotating wall of the drum.

[0019] In an advantageous manner, said rack may be obtained through the assembly of a plurality of rigid walls 7, 8, 9, 10, 11, 12, which in a preferred manner are similarly sized, and which are associated to each other in pairs, i.e. two by two, by means of appropriate respective hinges 13, 14, as this is best illustrated in Figure 2.

[0020] The assembly of rigid walls that is obtained in this manner has the peculiarity of being able to be spread out on a same plane 6, so as to form an open chain, as this is best illustrated in Figure 3. This facilitates the arrangement of the items to be dried on the rack itself, since these items can actually be spread out thereupon in an optimum manner for drying. Upon having so placed the items in the rack, the latter can be closed again by joining together the outer edges 21, 22 of said chain of rigid walls, which therefore come to lie on a single generatrix line 5 of said cylindrical or parallelepiped rack, as illustrated in Figure 2.

[0021] The construction illustrated above is anyway such as to allow for a further possibility of improvement: in fact, if the items to be dried are spread out on the inside of the surface of the basket-like rack, as this is illustrated in Figure 2, it may then happen - as this can be easily figured out - that the best drying effect is obtained when the hot air, upon being blown into the rack, is able to invest and pass through said items to be dried following a radial movement from the inside towards the outside and/or vice-versa, and not only following a longitudinal flowpath. Therefore, in order to induce the flow of forced air to move radially towards the outside, it is found appropriate to provide some kind of flow-obstructing or baffle member, which may even consist of a simple piece of fabric 15, which closes the rear side or base of said basket-like rack, as this is shown schematically in Figure 4.

[0022] In addition, in view of ensuring a correct installation of the basket-like rack inside the rotating drum of the machine, while anyway excluding any contact between any portion of said rack and any portion of said drum, an appropriate attachment arrangement 16 (see Figure 5) is advantageously provided. Such an attachment arrangement is intended for application on to an end portion of the foldable basket-like rack 4, and is provided on a side thereof with appropriate engagement or fit-in means 16A, preferably in the form of properly shaped apertures, which are adapted to enable it to be linked up to the inner wall 21 of the support framework of said clothes drying machine, on the inside of the rotating drum.

[0023] Said fit-in means must be capable of being coupled to corresponding hook-on members 17 provided on said inner wall of said support framework, again on the inside of the drum, as this is symbolically shown in Figure 6.

[0024] It will of course be readily appreciated that the indications set forth above have a merely exemplary character, since all those skilled in the art are fully capable of identifying the way of designing and making said fit-in means 16A and said hook-on members 17, which will best fit each single, particular case of application.

[0025] A further advantageous improvement lies in providing a basket-like rack in such a manner as to enable the rigid walls that make it up - upon removal of said rack from the drum - to be folded up and laid closely packed upon each other, so as to form a preferably parallelepiped-shaped pack 18, e.g. as illustrated in Figure 7. This would in fact enable the same rack to be compacted into a minimum size, so that it will prove quite easy to provide, within the volume of the clothes drying machine, a corresponding small niche or receptacle 19 adapted to accommodate the duly folded-up and packed rack for convenient storage, when the latter is not being used and, on the other hand, it is not desired to have such rack standing in the way and hampering around without any definite storage or resting position.

Claims

1. Clothes drying machine comprising a drum (1) rotating about an at least approximately horizontal axis, and a front loading opening (2), capable of being closed by a lid or door, and provided with means adapted to cause a flow of heated air to move across the interior of said rotating drum along a flowpath extending between the rear wall of said drum and said front loading opening, as well as with a support framework (3) for the front opening of said drum, surrounding said loading opening in the way of a frame, **characterized in that:**
 - said loading opening is substantially circular in its shape,
 - there is capable of being accommodated a basket-like rack (4) having a reticular structure and adapted to be inserted inside said rotating drum (1) with its axis in an approximately horizontal position, and further adapted to hold clothing items that must be dried.
2. Clothes drying machine according to claim 1, **characterized in that** said basket-like rack (4) is separable along a generatrix (5) thereof, and **in that** it is capable of being unfolded and spread out on a plane (6).
3. Clothes drying machine according to claim 2, **characterized in that** said basket-like rack comprises a plurality of rigid walls (7, 8, 9, 10, 11, 12) that are connected to each other in pairs by means of appropriate hinge means (13, 14).
4. Clothes drying machine according to any of the preceding claims, **characterized in that** said basket-like rack comprises a closing member (15) adapted to close the base situated at the rear of said basket-like rack.
5. Clothes drying machine according to any of the preceding claims, **characterized in that:**
 - on a side of said reticular basket-like rack (4) there is positioned an attachment arrangement (16) provided with appropriate engagement or fit-in means (16A) adapted to stably, but removably couple with corresponding hook-on means (17) provided on the inner wall (21) of said support framework (3).
6. Clothes drying machine according to any of the preceding claims 3 to 5, **characterized in that** said rigid walls (7...12) are foldable upon each other so that said basket-like rack is adapted to be packed into the shape of a parallelepiped (18), and **in that** said clothes drying machine is provided with an appro-

priate receptacle (19) adapted to accommodate
said parallelepiped.

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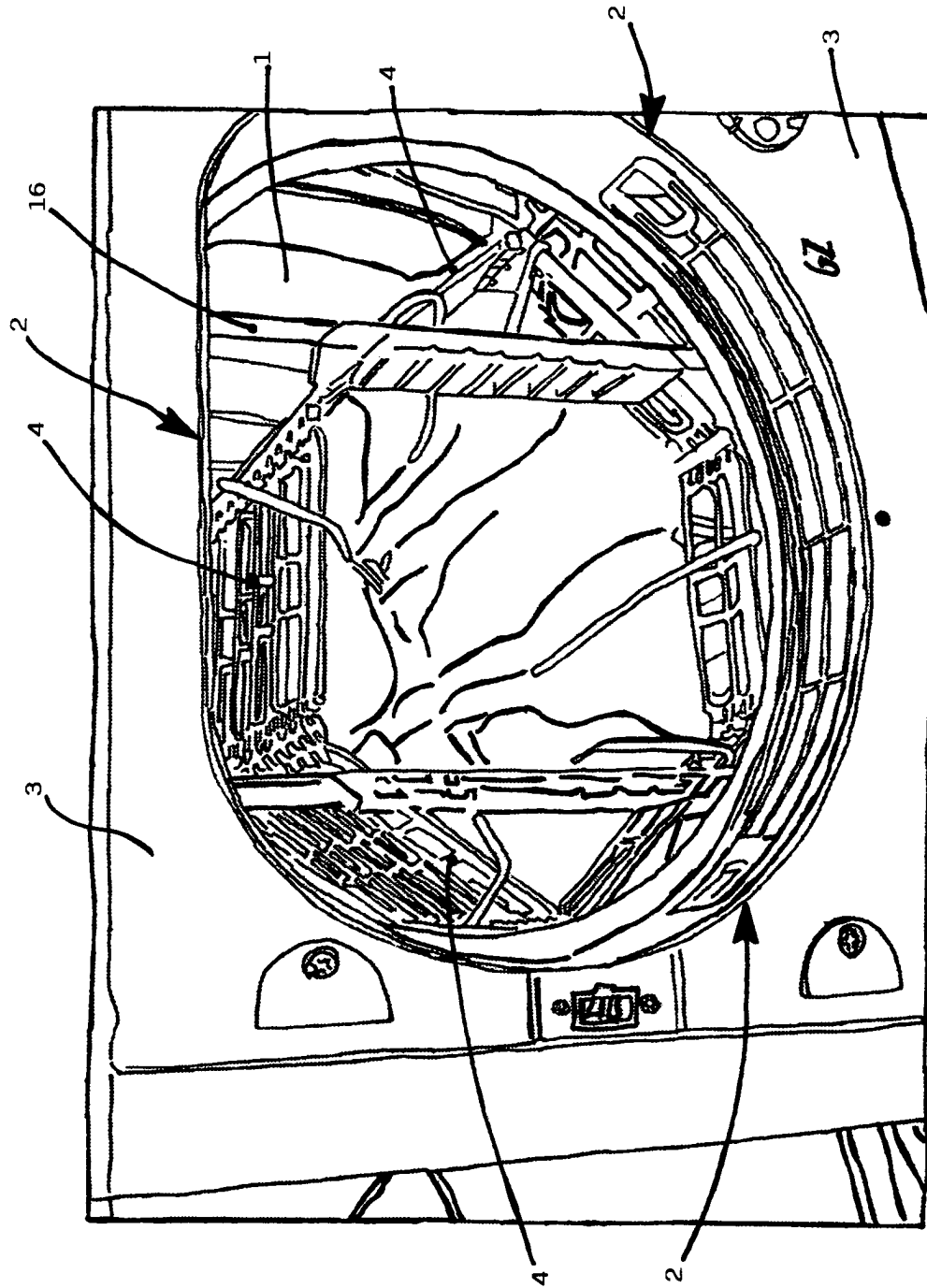
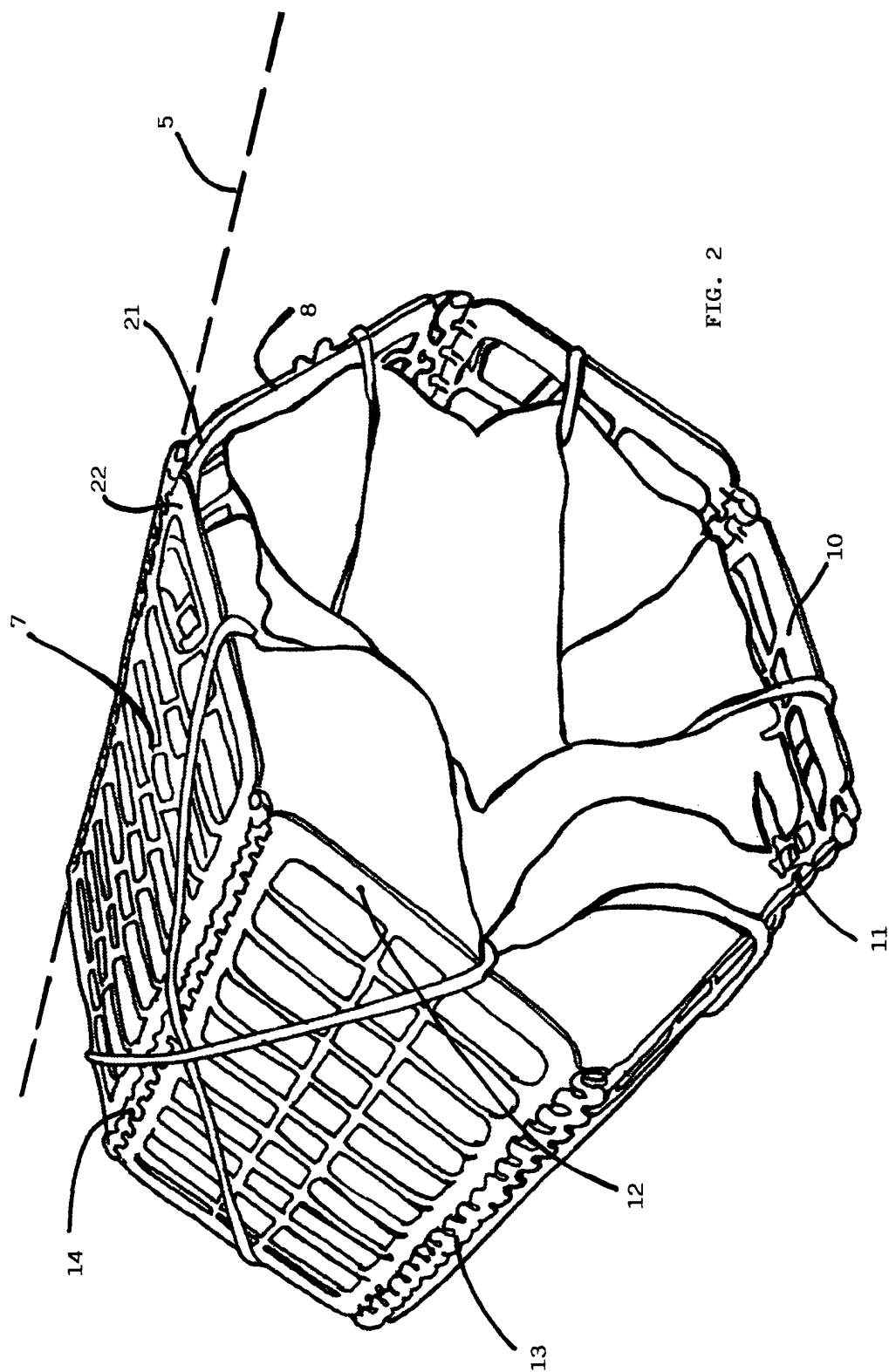


FIG. 1



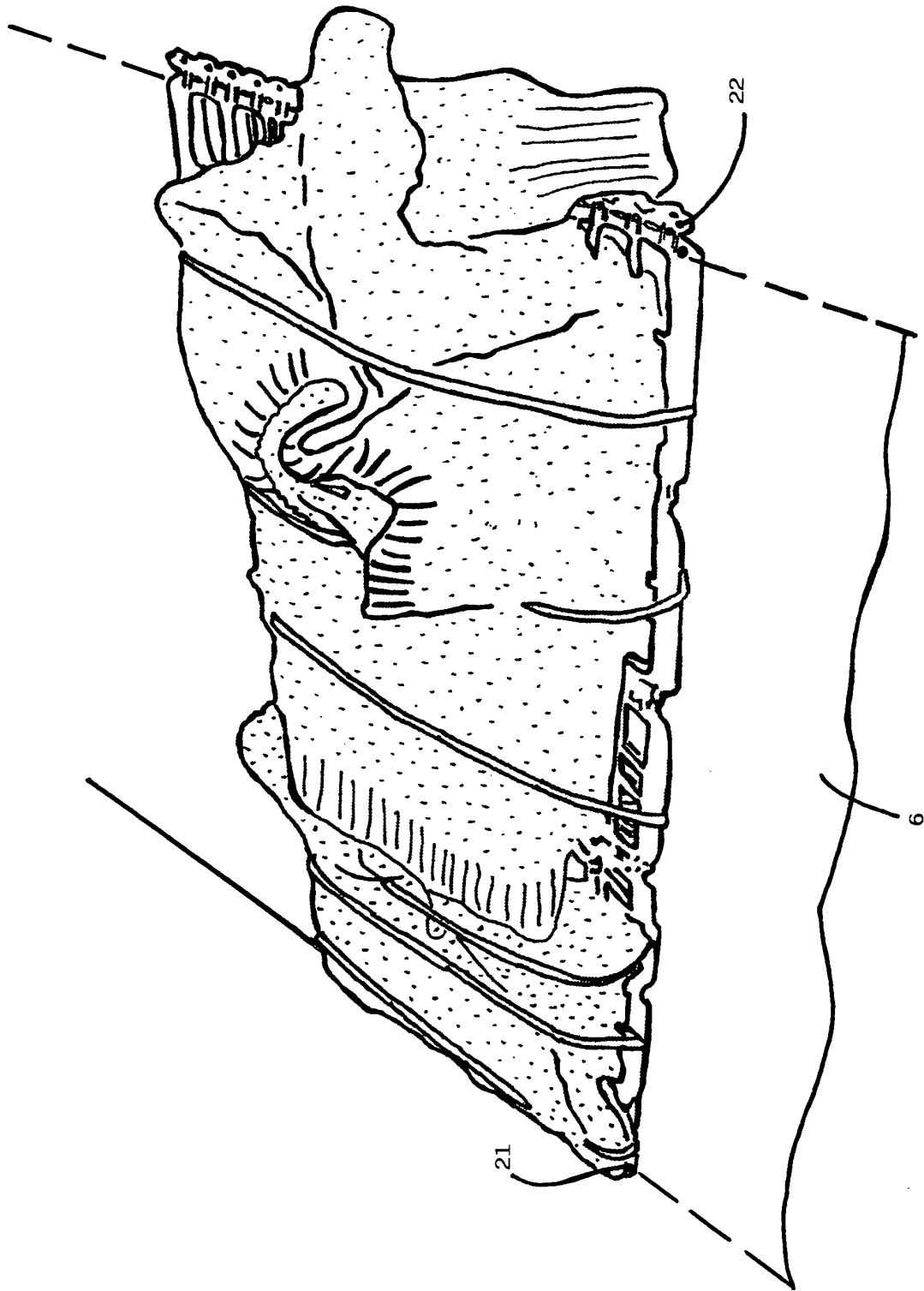
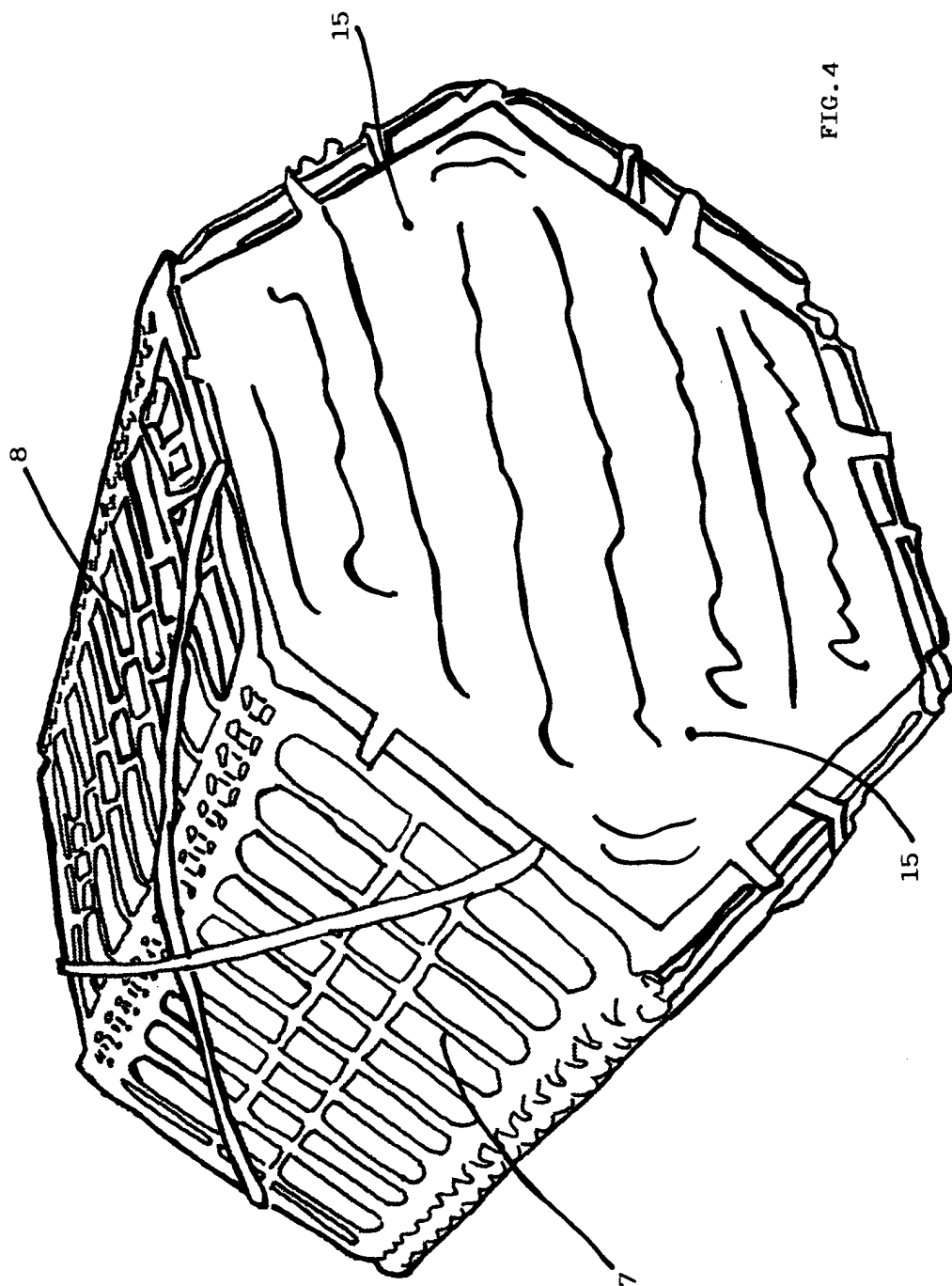
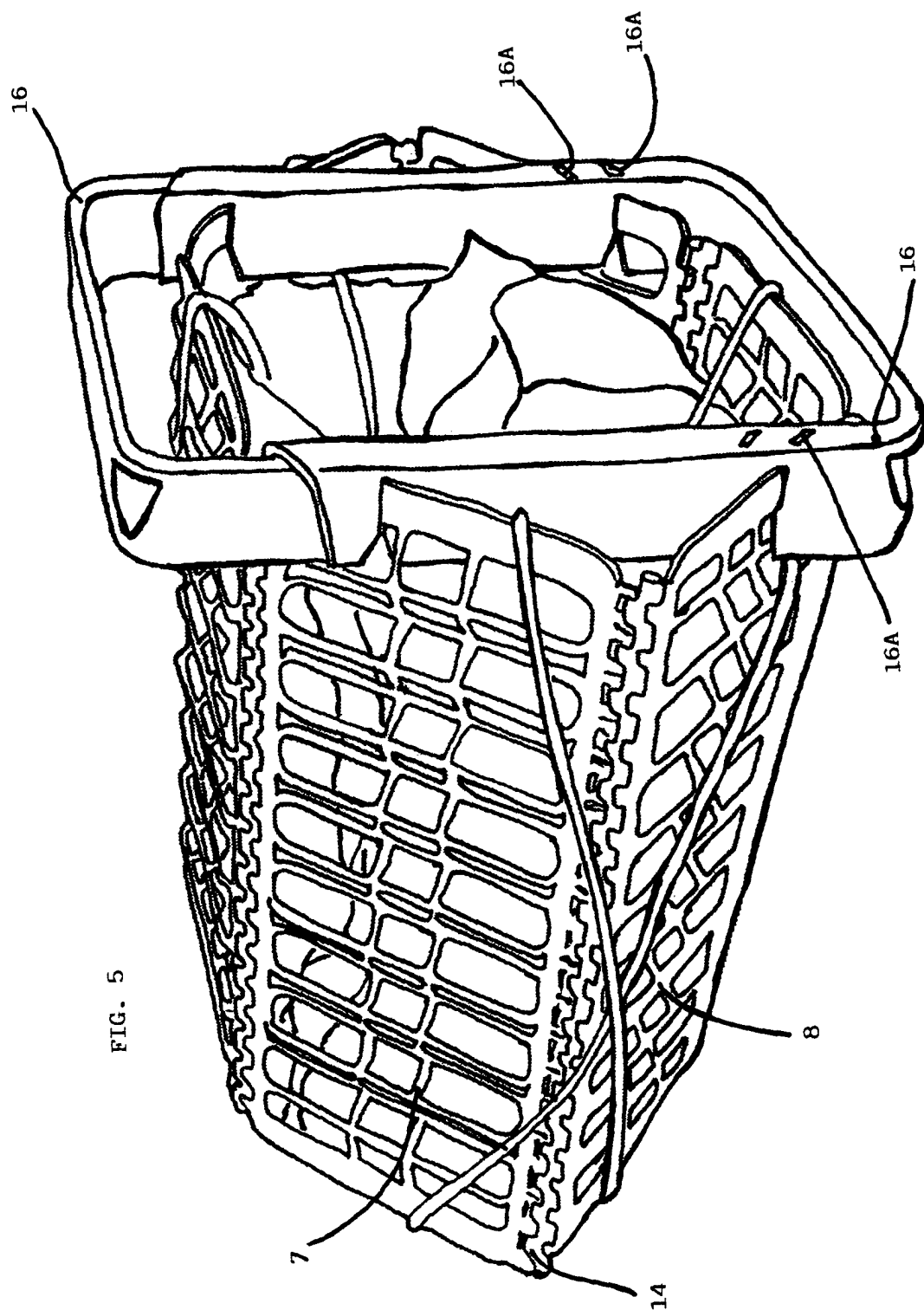


FIG. 3





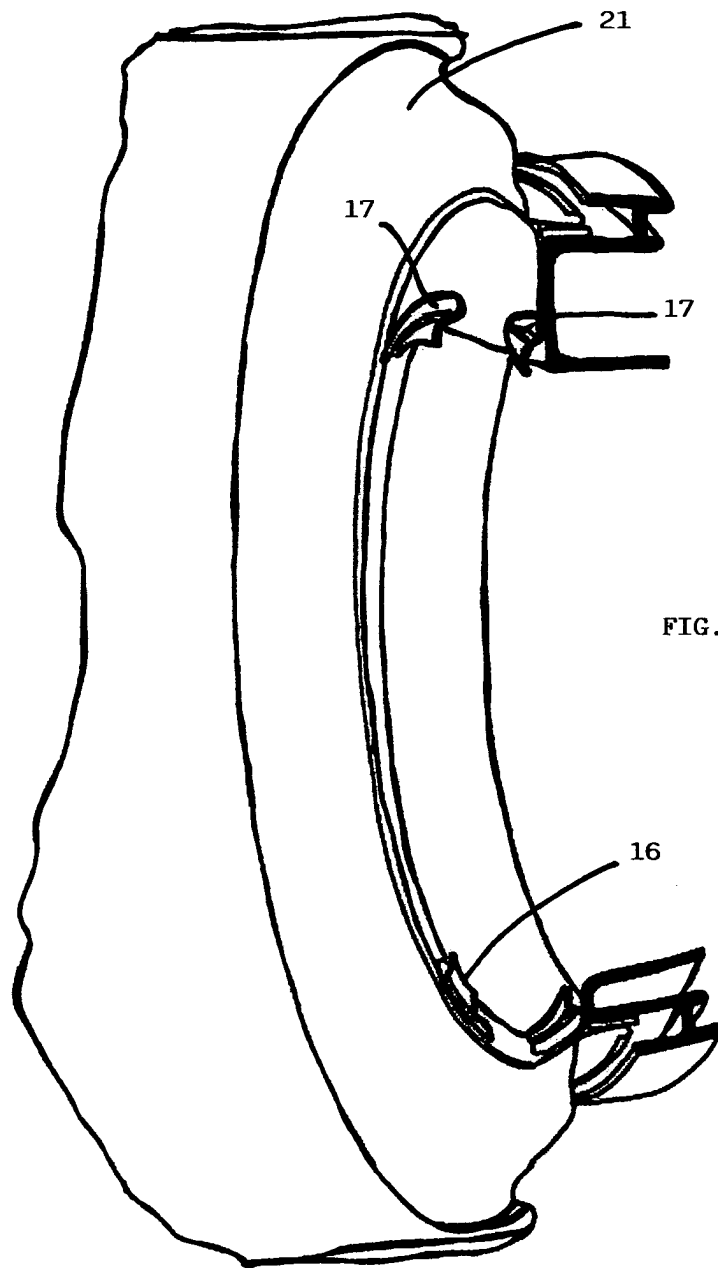


FIG. 6

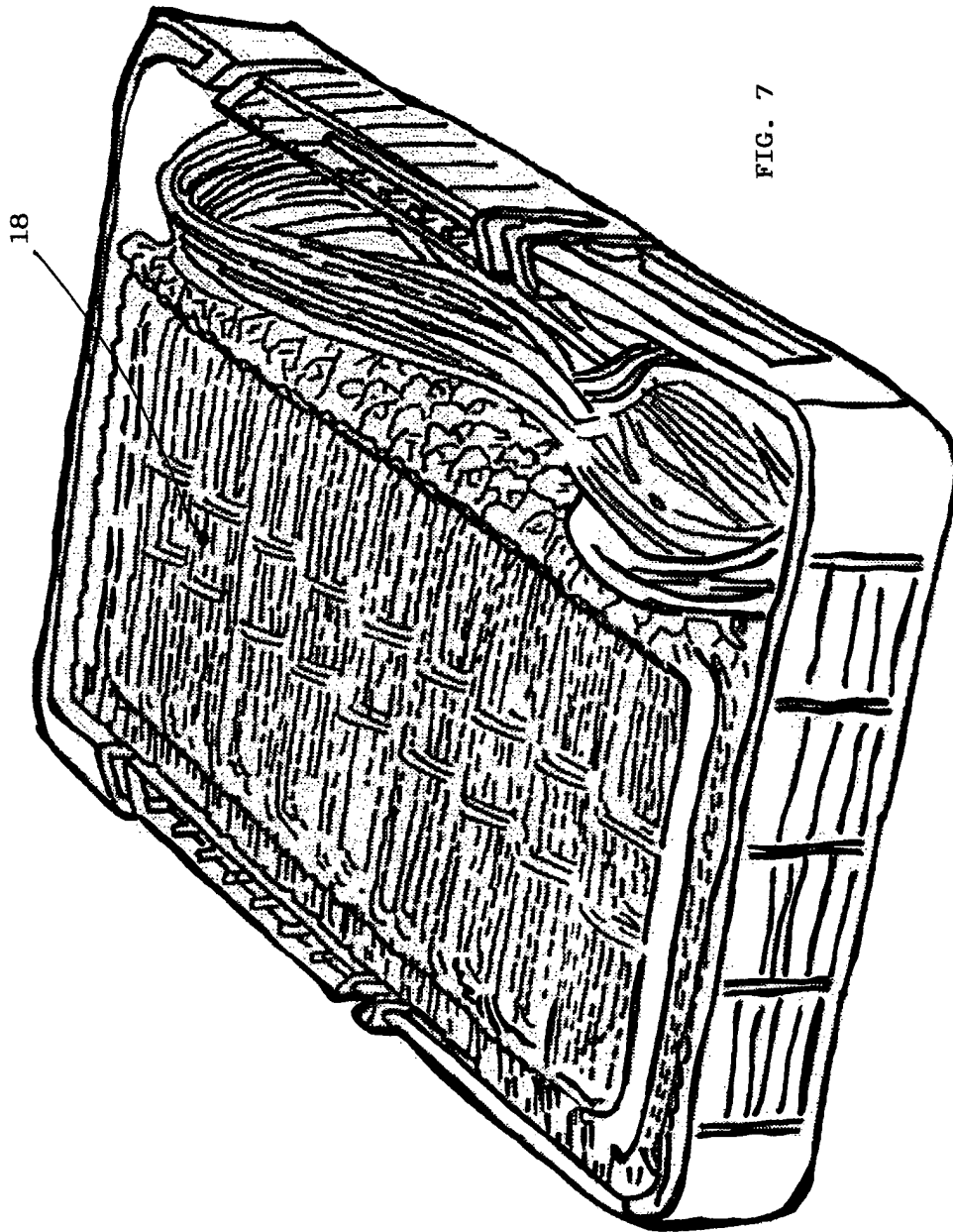


FIG. 7

