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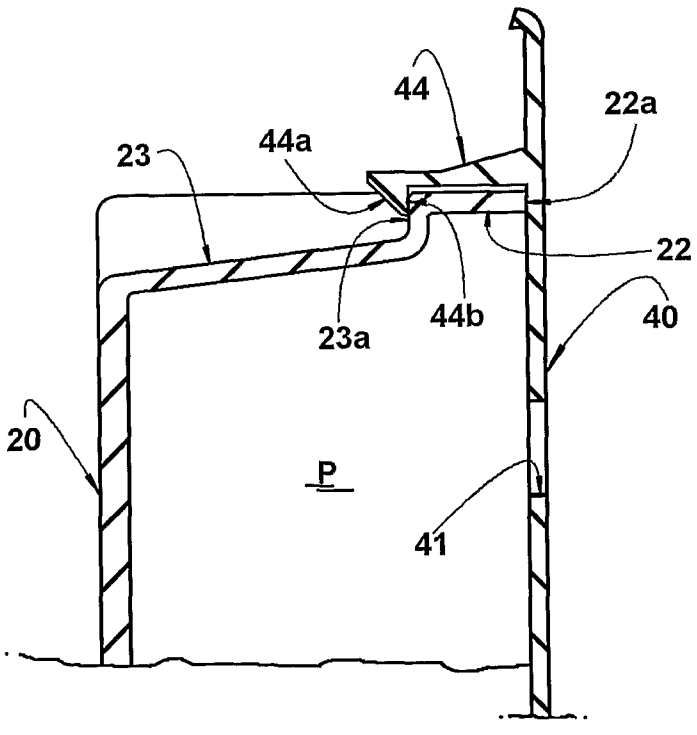
(54) Title: AIR DUCT MOUNTING ARRANGEMENT FOR REFRIGERATION APPLIANCES



(57) Abstract: The air duct mounting arrangement is applied to refrigeration appliances with forced ventilation and comprising a cabinet (10) lodging a plenum (P) formed of an inner wall (20), a front wall (40) and a peripheral wall (22), disposed between the inner and the frontal walls (20,40), incorporated to one of said walls and having a free edge (22a) sealingly seated and retained against the other of said walls, defined in a separate piece and which incorporates a tubular flange (42) around which is telescopically tightly fitted a corresponding portion of the peripheral wall (22) to have its free edge (22a) seated against said other wall (20,40) in a separate piece.

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"AIR DUCT MOUNTING ARRANGEMENT FOR REFRIGERATION APPLIANCES"

Field of the invention

The present invention refers to an air duct mounting arrangement for refrigeration appliances, such as refrigerators, freezers, and combination thereof, using forced ventilation. The invention is particularly suitable to provide a simple and tight assembly of the air ducts with forced ventilation associated with the air cooling compartment, in which interior there is positioned the evaporator of the appliance refrigeration system.

Prior Art

The refrigeration appliances with forced ventilation have their cabinet provided with an inner case molded in plastic material, generally EPS, in which interior is defined an air cooling compartment, lodging an evaporator, through which the refrigeration airflow is forced to pass.

In the exemplary construction illustrated in figure 1, the refrigeration appliance is defined by a combined refrigerator, whose cabinet 10 is provided with an upper inner case 11 defining a freezing compartment FC, and a lower inner case 12 defining a refrigerating compartment RC separated from the upper inner case 11 through a dividing wall 13.

According to the construction illustrated in figure 1, in the interior of the upper inner case 11 is defined the air cooling compartment 14 inside which is provided an evaporator E. The air cooling compartment 14 is defined in the rear region of the respective inner case of the cabinet 10, although in the illustrated example the upper inner case 11 is used.

The air cooling compartment 14 is frontally closed by an inner wall 20 configured to separate said air

cooling compartment 14 from the remaining upper inner case 11, the inner wall 20 being provided with a window 21 in which is mounted a fan 30 designed to draw the air cooled by the evaporator E in the interior of the air cooling compartment 14 and blow it outwardly from the latter, through the window 21, to the interior of a plenum P defined in the interior of the upper inner case 11, between the inner wall 20 and a front wall 40 provided with openings 41 for the passage of part of the forced airflow to the interior of the freezing compartment FC. The plenum P is also maintained in fluid communication with the refrigerating compartment RC by means of ducts (not illustrated) provided through the dividing wall 13.

In the known constructions, the inner wall 20, which separates the plenum P from the air cooling compartment 14, frontally incorporates a peripheral wall 22 which defines the lateral, upper and lower walls of the plenum P and in whose front edge is seated the front wall 40, which frontally closes the plenum P.

The interior of the plenum P is pressurized with the air cooled by the evaporator E and blown by the fan 30. In order to avoid the air from leaking or escaping from the interior of the plenum P to regions other than the freezing compartment FC and refrigerating compartment RC, there is generally provided a sealing gasket 50 (see figure 2), for example in adhesive PVC foam, positioned in the front edge of the peripheral wall 22 or in a rear face of the front wall 40, so as to be pressed against the other of said parts, to assure the coupling tightness between the front wall 40 and the inner wall 20 and to avoid loss of efficiency of the refrigeration system of the appliance.

However, in these known constructions, the inner wall 20 is firstly mounted and affixed, by means of screws, in the interior of the cabinet 10, already carrying the fan 30, and defining the front closure of the air cooling compartment 14. Subsequently, the front wall 40 is taken to the interior of the cabinet 10 and seated against the front edge of the peripheral wall 22, being then screwed to the latter to define the front closure of the plenum P. Before mounting the front wall 40, the sealing gasket 50 must be applied to one of the parts of peripheral wall 22 and front wall 40. This mounting of the sealing gasket 50 is time consuming and laborious, requiring special cares from the operator to provide the right positioning of the sealing gasket 50 and to avoid the pieces from being mounted with inadequate positioning of the sealing gasket 50, causing leakage of cool air from the interior of the plenum P. It should be noted that the inadequate mounting of the sealing gasket 50 is not detected by visual inspection after the plenum P is formed in the interior of the cabinet 10. The mounting accuracy depends on the operator's skill and attention in the production line.

Besides the inconvenience above, the known prior art mounting arrangements for the formation of the plenum P comprise the mounting of the inner wall 20 and, subsequently, of the front wall 40 in the interior of the cabinet 10, more specifically in the interior of the upper inner case 11 of the freezing compartment FC, precluding the visual inspection of the coupling of the pieces and prolonging the mounting operation.

Summary of the Invention

As a function of the inconveniences mentioned above, it is an object of the present invention to provide an air duct mounting arrangement for refrigeration

appliances with forced ventilation, particularly of the air ducts which define the air cooling compartment and the plenum, presenting a simple, quick and reliable mounting of said ducts relative to each other, assuring the coupling tightness against undue air leakages from the interior of the plenum.

It is a further object of the present invention to provide a mounting arrangement as defined above, which allows mounting the air ducts to each other and defining the plenum before its fixation in the interior of the cabinet.

It is still a further object of the invention to provide a mounting arrangement such as mentioned above, which presents a more reliable and practical fixation system for the plenum forming elements.

As already mentioned, the mounting arrangement of the invention is applied to the air ducts of refrigeration appliances with forced ventilation, comprising a cabinet provided with at least one inner case lodging an air duct which defines a pressurized plenum formed by an inner wall, a front wall and a peripheral wall, disposed between said inner and front walls, incorporated to one of said walls and having a free edge sealingly seated and retained against the other of said walls defined in a separate piece.

According to a first aspect of the invention, said other wall in a separate piece incorporates a tubular flange projecting to the interior of the plenum and around which is telescopically tightly fitted a corresponding portion of the peripheral wall to have its free edge seated against said other wall in a separate piece.

The tight telescopic mounting between the peripheral wall and the tubular flange allows an airtight coupling to be obtained between the free edge of the

peripheral wall and the other wall in a separate piece, impeding inadequate air leakages from the plenum and the loss of efficiency of the refrigeration system, without requiring the provision of sealing gaskets.

According to a further aspect of the invention, the peripheral wall is provided, along its contour and spaced from its free edge, with outer recesses which define respective steps, said other wall in a separate piece incorporating jaws elastically deformable from a rest position, in which they seat onto respective steps of the peripheral wall, retaining the latter with its free edge seated against said other wall in a separate piece, to a deformed position, in which they allow the approaching and spacing movements of the peripheral wall in relation to said other wall in a separate piece.

The above described characteristic of the mounting arrangement proposed herein allows the plenum to be formed in a simple and quick manner, by only approaching the peripheral wall to said other wall in a separate piece, so that the jaws of the latter be fitted, after a slight outward elastic deformation, into the steps externally provided around the peripheral wall, forcing the free edge of the latter to seat against said other wall in a separate piece.

Brief Description of the Drawings

The invention will be described below, with reference to the enclosed drawings, given by way of example of an embodiment of the invention and in which:

Figure 1 is a schematic vertical sectional view of a combined refrigerator, of the type to which is applied the mounting arrangement object of the present invention;

Figure 2 is a partial vertical sectional view of an

air duct constructed according to the prior art and defining the plenum of the combined refrigerator illustrated in figure 1;

Figure 3 is an exploded front perspective view of an air duct constructed according to the present invention, and defining the plenum of the refrigeration appliance illustrated in figure 1;

Figure 4 is a partial vertical sectional view of the air duct constructed according to the present invention, taken according to line IV-IV in figure 3; and

Figure 5 is a partial vertical sectional view of the air duct of figures 3 and 4, taken according to line V-V in figure 3.

Detailed Description of the Invention

As already described regarding figures 1 and 2, the present mounting arrangement is applied to a refrigeration appliance with forced ventilation, comprising a cabinet 10, in whose interior is provided at least one inner case 11 which, in the illustrated example, is the inner case which defines the freezing compartment FC of a combined refrigerator and in whose interior is defined the air cooling compartment 14, frontally limited by a plenum P defined by an air duct, generally pressurized with an airflow cooled at low temperatures and coming from the air cooling compartment 14 in which the evaporator E is lodged.

The plenum P is formed of an inner wall 20, generally in plastic material and which, in the illustrated embodiment, incorporates a peripheral wall 22 facing the interior of the plenum P and presenting a free edge 22a to be sealingly seated and retained against another wall in a separate piece and which, in the illustrated example, is a front wall 40 provided with openings 41 to release part of the airflow admitted in

the plenum P. It should be understood that it is also possible to provide a peripheral wall 22 incorporated to the front wall 40 and to be seated against the inner wall 20 which, in this case, would be that wall in a separate piece.

According to a first aspect of the invention, said other wall in a separate piece and illustrated as being the front wall 40, incorporates a tubular flange 42, projecting to the interior of the plenum P and which is dimensioned to allow a corresponding portion of the peripheral wall 22 to be telescopically tightly fitted therearound, when said peripheral wall 22 has its free edge 22a seated against the front plate 40, completing the plenum P.

The dimensioning of the component parts of the plenum P is made to assure an adequate sealing in the coupling region between the peripheral wall 22 and said other wall in separate piece and illustrated as being the front wall 40. The tubular flange 42 forms, with the adjacent face of the peripheral wall 22, a kind of a labyrinth completed by the seating of the free edge 22a of the peripheral wall 22 against the front wall 40, assuring the desired degree of tightness to said coupling, with no need of using the prior art sealing gasket 50.

The invention further provides a new arrangement for mutually attaching the component parts of the plenum P, so as to make optional the utilization of the usual screws responsible for maintaining the mutual pressure between the peripheral wall 22 and said other wall in a separate piece and which is exemplary defined herein as being the front wall 40.

According to this second aspect of the invention, the peripheral wall 22 is provided with outer recesses 23 disposed along the contour of said peripheral wall 22

and slightly spaced from the free edge 22a of the latter, the outer recesses 23 defining respective steps 23a. On the other hand, said other wall 20, 40 considered herein as the front wall 40, incorporates jaws 44 turned towards the peripheral wall 22, these jaws 44 being constructed in such a way as to be elastically deformable from a rest position, in which they seat onto respective steps 23a of the peripheral wall 22, in order to retain the latter with its free edge 22a tightly seated against the front wall 40. Upon mounting or dismounting the plenum P, the jaws 44 are forced to an elastically outwardly deformed position, in which they allow the peripheral wall 22 and said other wall 20, 40 in a separate piece to perform movements of approaching and spacing relative to each other.

As it can be noted in figure 5, the jaws 44 present an inclined end edge 44a defining a ramp which, upon mounting the plenum P, touches the free edge 22a of the peripheral wall 22, providing the elastic outward deformation of the jaw, during the sliding of the jaws 44 along the outer extension of the peripheral wall 22 defined between each step 23a and said free edge 22a. When the jaw 44 reaches the step 23a, its lower tooth 44b is conducted by the elastic recovery force of the jaw 44, to a position in which it is seated onto the respective step 23a, solidly locking the peripheral wall 22 to the front wall 40.

The attaching arrangement mentioned above considerably simplifies the assembly of the component parts of the plenum, dispensing the usual attaching screws, whose assembly requires a relatively laborious operation, increasing the cost of the productive process.

However, depending on the design features of the refrigeration appliance, the inner wall 20 which

carries the peripheral wall 22 can be internally provided with pluralities of small tubular projections 25 dimensioned with a height substantially equal to that of the peripheral wall 22, and axially aligned with respective orifices 45 disposed in the front plate 40 and through which additional screws (not illustrated) can be provided, in order to provide an additional median attachment between the inner wall 20 and the front wall 40.

As already mentioned, the constructive arrangement proposed by the present invention permits the plenum P to be completely formed before its introduction in the interior of the cabinet 10, more specifically in the interior of the respective inner case 11 of the cabinet 10, in order to frontally close the air cooling compartment 14. Thus, in the present construction, the fixation of the plenum in the interior of the respective inner case 11 of the cabinet 10 is effected by screws (not illustrated) introduced through respective marginal orifices 46 provided in the front wall 40 and positioned so as to have their projection disposed external to the contour of the peripheral wall 22, allowing said screws to be applied directly to attaching elements previously provided in adequate places in the inner case 11. With this arrangement, when maintenance is required in the rear region of the inner case 11, it is only necessary to release the attaching screws of the plenum so as to remove the latter as a single piece from the interior of the cabinet 10, also carrying the fan 30 mounted in the opening 21 of the inner wall 20.

While only one embodiment of the invention has been illustrated herein, it should be understood that changes in the form and arrangement of the component parts can be made without departing from the

constructive concept defined in the claims that accompany the present specification.

CLAIMS

1. An air duct mounting arrangement for refrigeration appliances with forced ventilation, comprising a cabinet (10) provided with at least one inner case (11) lodging an air duct which defines a pressurized plenum (P) formed of an inner wall (20), a front wall (40) and a peripheral wall (22), disposed between said inner and front walls (20,40), incorporated to one of said walls and having a free edge (22a) sealingly seated and retained against the other of said walls, defined in a separate piece, characterized in that said other wall (20,40) in a separate piece incorporates a tubular flange (42) projecting to the interior of the plenum (P) and around which is telescopically tightly fitted a corresponding portion of the peripheral wall (22) to have its free edge seated against said other wall (20,40) in a separate piece.

2. The arrangement, as set forth in claim 1, characterized in that the peripheral wall (22) is provided, along its contour and spaced from its free edge (22a), with outer recesses (23) which define respective steps (23a), said other wall (20,40) in a separate piece incorporating jaws (44) elastically deformable from a rest position, in which they seat onto respective steps (23a) of the peripheral wall (22), retaining the latter with its free edge (22a) seated against said other wall (20,40) in separate piece, to a deformed position, in which they allow the approaching and spacing movements of the peripheral wall (22) in relation to said other wall (20,40) in a separate piece.

3. The arrangement, as set forth in claim 2, characterized in that each jaw (44) presents, in its free end, an inclined portion (44a) and, under the

latter, a tooth (44b) to be seated onto a respective step (23a) when the jaw (44) is in the rest position and actuating against the peripheral wall (22).

4. The arrangement, as set forth in claim 2, characterized in that the inner wall 20 internally incorporates a plurality of small tubular projections (25), axially aligned with respective orifices (45) provided in the front wall (40) to receive and secure the additional attaching screws between said frontal and inner walls (40, 20).

5. The arrangement, as set forth in claim 4, characterized in that the small tubular projections (25) of the inner wall (20) present a height substantially equal to that of the peripheral wall (22).

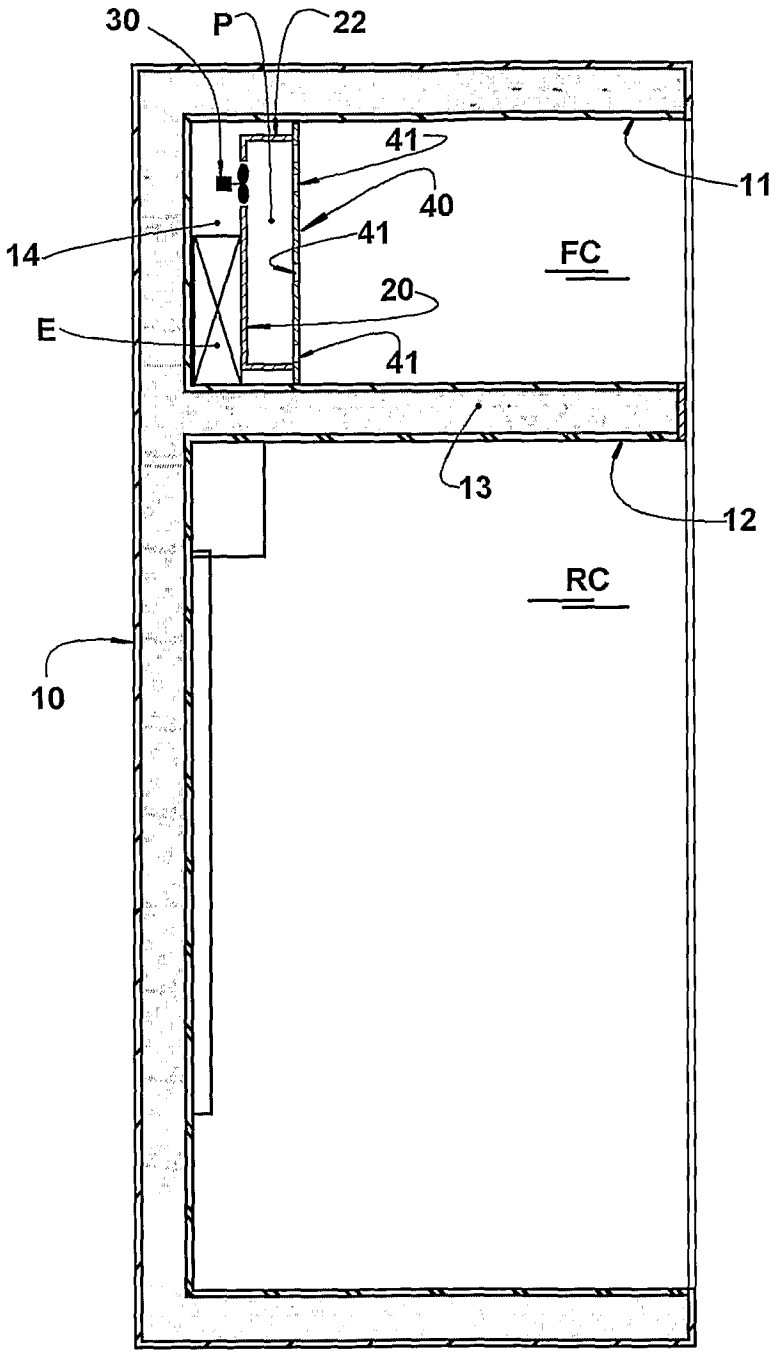

FIG. 1
PRIOR
ART

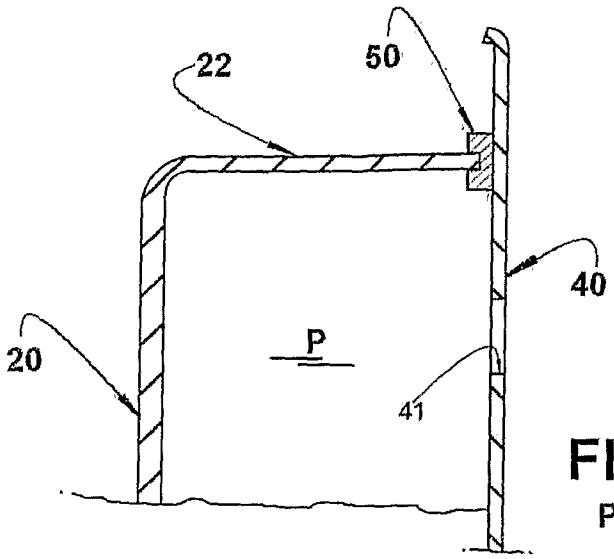

FIG. 2
PRIOR ART

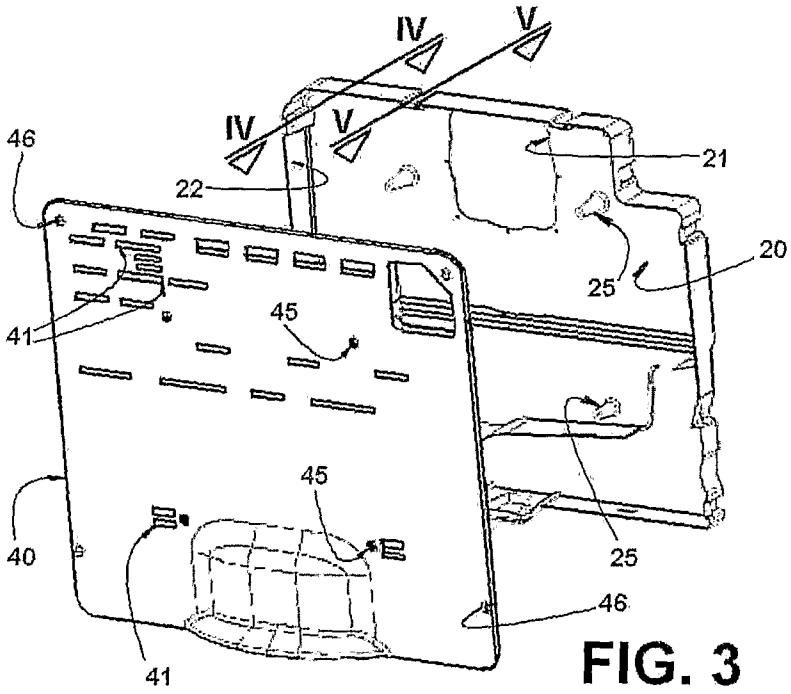

FIG. 3

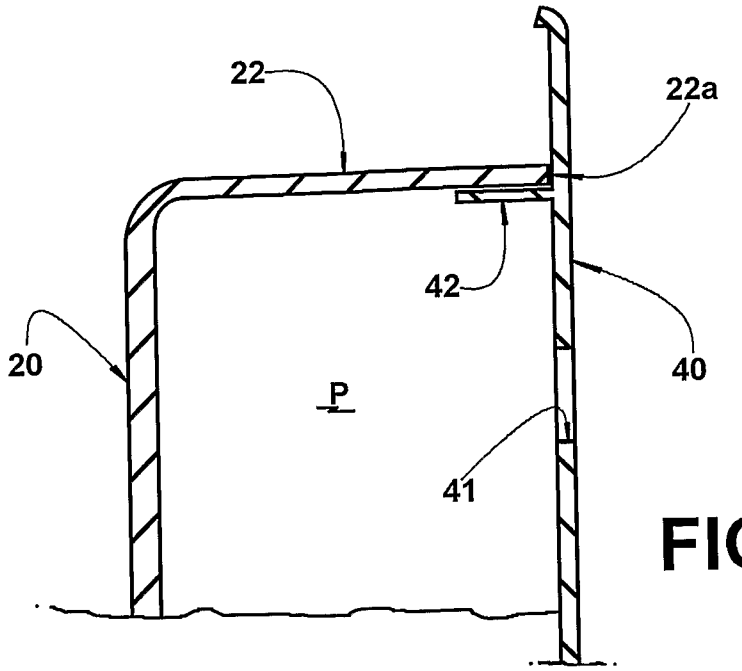

FIG. 4

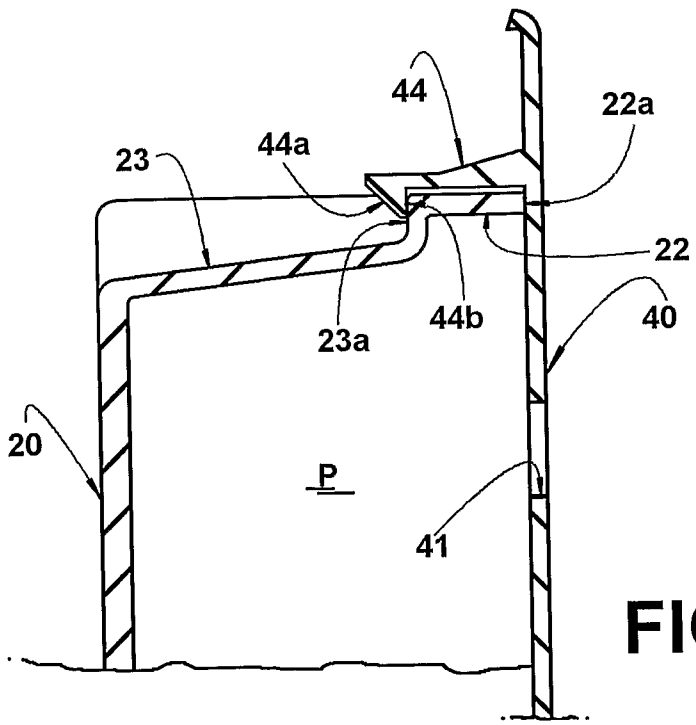

FIG. 5