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(54) **Joints for casings for household appliances and such casings.**

(57) A joint for joining together edge regions of a first and second portion of sheet material, wherein the first portion includes an elongate U-sectioned slot formed by folding the sheet along parallel lines, the slot having two opposed side walls between which the edge region of the second portion is engagingly retained by press-fit means cooperable between at least one opposing wall of the slot and the so engaged edge region of the second portion.

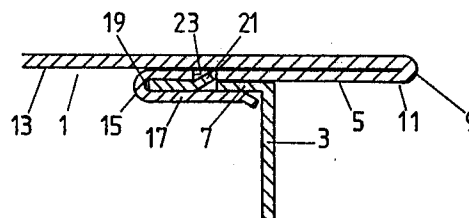


FIG.2.

Description

Joints for casings for household appliances and such casings

This invention relates to joints for casings, particularly casings for household appliances for example microwave ovens, and also such casings.

In a known microwave oven casing a microwave oven cavity of rectangular cross-section is provided by an inner structure, mounted within an outer wrap. The outer wrap comprises a base portion integral with a pair of opposed side walls, and a co-operating cover portion having a top wall and a pair of opposed side walls. This form of casing needs much spot or continuous seam welding along the joints and also suffers from being expensive due to having both an inner structure and an outer structure.

Another casing, as described in European Patent Application Publication No. 0110364, consists of a main body of rectangular cross-section formed from folded metal sheet, and having a top wall, bottom wall and a pair of opposed, upright side walls with a separate electrical components chamber welded to one of the side walls. The main body and the adjoining chamber are themselves open on their remaining sides and an additional wall is fitted onto each of these sides. Each added wall has flanges along its edges, which extend away from the main body and adjoining chamber and which engage inner surfaces of respective peripheral flanges around the edges of the openings of the casing and of the adjoining chamber. Each of the pairs of engaging flanges is crimped by being folded over, providing seams along edges of the openings of the casing.

This casing also suffers from disadvantages. The seams are aesthetically unattractive and require special tooling for their formation. The electrical components chamber cannot be removed from the casing and so servicing of the electrical components is difficult. Also, much spot welding is still required, which results in it being difficult to impart acceptable finishes to some of the external surfaces.

It is an object of the present invention to provide an improved joint for a casing for household appliances such as a microwave oven. A further object is to eliminate or minimise the disadvantages of the previous casings.

According to the present invention there is provided a joint for joining together edge regions of a first and a second portion of sheet material, wherein the first portion includes an elongate U-sectioned slot formed by folding the sheet along parallel lines, the slot having two opposed side walls between which the edge region of the second portion is engagingly retained by press-fit means cooperable between at least one opposing wall of the slot and the so engaged edge region of the second portion.

This joint has the principal advantage of needing no, or very little, spot welding during fabrication. Joining of the first and second portions can thus be achieved efficiently and a satisfactory external finish can also be obtained.

The first and second portions of sheet material may belong to a casing and may be selected from a

pair of side walls; a side wall and a base or top wall; a side wall and a door; an added wall and a wall of the casing defining an opening. Thus, the walling of a main casing body can be preshaped from a single metal sheet and the remaining pair of free edges of the sheet can be joined together according to the joint of the invention. Similarly, additional wall panels and/or a door can be added to a preshaped main casing body to complete the casing. Advantageously the ratio of internal compartment volume to overall cabinet size is increased over previous casings as a result of this invention.

A preferred fastening means comprises a plurality of discrete coupling means along the slot wall of the first portion and the adjoining edge region of the second portion, the coupling means on the one co-operating with the coupling means on the other. The first and second portions can therefore be retained together securely.

The coupling means advantageously comprise spring lugs and corresponding apertures, each lug and corresponding aperture being on a different one of the first and second portions. Preferably, a row of regularly-spaced said lugs is disposed along said second portion and a row of similarly-regularly-spaced corresponding apertures is disposed along a said slot wall.

Advantageously, the slot is unitary with the first portion and comprises a single slot defined by spaced-apart first and second elongate walls. Preferably, the first elongate wall is interconnected with the second elongate wall via a return bend, forming a closed end of the slot, and the second elongate wall is interconnected with the first portion via another return bend. Thus, the slot can be straightforwardly formed by twice turning the wall of the first portion over on itself.

According to another aspect of the invention, there is provided a casing for a household appliance, comprising a walled main body and including at least one joint described above according to the invention.

It is preferred that the slot of the joint according to the invention is spaced from the edge of the first portion by a flange, which projects outwardly beyond the edge region of the second portion in the assembled condition of the joint.

In a preferred embodiment, the casing is of rectangular cross-section and comprises a main body having a front opening and an added front wall fixed to this opening by a joint according to the invention, and a rear opening and an added rear panel fixed to this opening by a joint according to the invention. This casing is especially suitable for a microwave oven. An electrical components chamber may be mounted between the front and rear walls and spaced from the walls of the main body of the casing.

The casing may include a door attached thereto in a manner according to the invention. Such a door is for providing access to the interior of the casing

through an opening in a wall of the casing.

The door may be mounted by means of a hinge comprising two mutually-pivotally-connected hinge plates of which one plate is secured along one edge region of said door and the other hinge plate is joined to the confronting edge region of the opening by a joint according to the invention.

The main body of the casing may be preshaped from a single sheet of material, preferably metal, and the remaining two free edges may be joined together in a manner according to the invention.

According to another aspect of the invention, there is provided a method of making a joint for joining together edge regions of a first and a second portion of sheet material, comprising forming by folding the sheet material of the first portion along parallel lines to form a U-sectioned slot, and forming press-fit means in at least one wall of the slot and the edge region of the second portion, placing the edge regions next to each other and pushing the edge region of the second portion into the slot so as to fasten the adjoining edges together by means of the press-fit means.

The slot may be made by folding the edge region of the first portion over against itself to form a return bend followed by an elongate wall, and then folding the edge region back in the reverse direction so as to form another return bend and another elongate wall spaced from the other elongate wall so as to define the U-sectioned elongate slot therebetween.

The press-fit means may be formed by pressing or stamping lugs and co-operative apertures in the adjoining edge regions, wherein each lug and each corresponding aperture of each pair is on a different one of the slot wall and the edge region of the second portion.

Embodiments of the invention will now be described by way of example, with reference to the drawings, in which:-

Figures 1 and 2 are fragmentary perspective and cross-sectional views illustrating an example of a joint according to the invention between a pair of walls of a casing of a household appliance;

Figure 3 is an exploded perspective view of a microwave oven casing constructed using the joint shown in Figures 1 and 2;

Figures 4 and 5 are perspective views illustrating in detail the fitting of front and rear walls into the casing of Figure 3; and

Figures 6(a) to (d) illustrate alternative locations of a magnetron in the microwave oven casing of Figure 3.

In the drawings like parts have been accorded like reference numerals.

First and second walls 1 and 3 are connected together via co-operating first and second edge regions 5 and 7, as shown in Figures 1 and 2. A narrow slot 19 is disposed along the inside face of the first wall 1 with its opening towards the edge of the wall. The slot is spaced from the edge of the wall and is formed by folding the portion of the wall along the edge rearwardly through a first return bend 9 so that a first part 11 of the first edge region is formed against the inner face 13 of the wall 1 including an

elongate wall of the slot and then folding forwardly through a second return bend 15 so that a second part 17 of the first edge region including an opposite elongate wall of the slot 19, lies alongside the first part 11 thereof but spaced therefrom. The slot 19 is intended to receive the second edge region 7 of the second wall 3, which is at right angles to the plane of that side wall; the slot 19 is just wide enough to admit the second edge region 7 and provide a snug fit.

For securing the second edge region 7 in the slot 19 there are provided coupling means in the form of spring lugs 21 which have been formed by pressing or stamping the second edge region 7 so that the lugs extend outwardly from the second edge region 7 and are inclined to the edge region 7 away from the edge thereof. Apertures in the first part 11 of the first edge region 5 are also formed by pressing or stamping. The lugs spring into these apertures during movement of the second edge region 7 into the slot 19 and are retained therein. In this way the edge regions 5 and 7 are mutually secured.

It will be apparent that edge regions of a casing may be fastened to one another or to an extra door or wall panel by a joint as just described. Slot 19 and apertures 23 may be provided along the interior surface around a rectangular opening in a preformed main casing body of rectangular cross-section as shown in Figure 3. Lugs 21 can be formed along all the four edge regions of a side wall to be fitted to the opening. The side wall edge regions 7 can then be pushed into the slots 19 around the opening and the lugs 21 can then be engaged in the apertures 23 to provide secure engagement of the wall 3 to the main casing body.

As will also be clear, slots 19 could be formed on the exterior of the walls of the casing rather than on the inside thereof: in that case the lugs 21 would be pressed inwardly of the plane of the second edge regions 7 in order to engage the aperture 23 in the first parts 11 of the first edge regions 5. Optionally the lugs 21 could be made to engage apertures in the second part 17 of the edge regions though such arrangement would not be aesthetically as attractive as that described above, especially if the slots are disposed on the outside rather than the inside of the casing.

The interior of the casing shown in Figure 3 provides a microwave oven cavity 25. The casing comprising a main body 27 of rectangular cross-section which consists of parallel, spaced-apart, top and bottom walls 29,31, joined by a pair of parallel, spaced-apart side walls 33 and 35 (upright in use). The two remaining sides are open and a metal sheet wall 37, 39 is fitted onto each of these sides.

These added walls 37,39 are attached to the open sides of the main body by means of the joint already described above and form the front and rear of the microwave oven in use. Slots 5 are disposed around each opening along the inside surface of the edge region of the wall of the body 27. The two added walls each have a second edge region 7 along their periphery; along the second edge region is disposed a row of regularly-spaced spring lugs 21. Each lug each engages in one of a row of corresponding

apertures 23 (shown in broken lines) in the first part 11 of the corresponding first edge region 5.

The main body 27 is made by bending a single sheet of metal into the shape of the four walls 29,31,33, and 35. The two walls having a free edge are secured together by a joint according to the invention. In this embodiment these are the bottom wall 31 and one of the side walls 35. The inside surface of the side wall 35 has a first edge region 5 with a groove 19, in one elongate wall of which a row of apertures 23 is formed. The edge region of the side wall co-operates with an opposed edge region 7 on the bottom wall 31, which has a row of spring lugs 21 which lock into the apertures 23 of the corresponding edge regions of the side wall.

The front wall 37 includes an aperture 41 for access to the microwave oven cavity; the aperture is closed by a door (not shown) mounted in the edge region 5 around the front edge of side wall 33 as hereinafter described. The rear wall 39 includes a rectangular aperture 43. A rectangular electrical components chamber 45 is located in the microwave oven cavity. The components chamber is fitted by being passed through the aperture 43 and secured to the front wall 41 by screws. The rear wall 39 of the components chamber has lateral flanges 47 secured by screws to rear wall 39. The electrical components chamber 45 is spaced from the top, bottom and side walls of the main body of the casing to allow for microwave energy circulation around the exterior of the chamber 45. A magnetron 49 is disposed in the components chamber 45.

The chamber 45 can readily withdrawn from the oven cavity through the aperture 43 in the rear wall to facilitate servicing of the electrical components. The electrical components chamber 45 is provided with a louvred rear wall 51 which allows ventilation of the electrical components.

The front wall 37 of the casing has internal lugs 55 for locating the chamber 45 in place prior to securing it to the wall 37 by screws which are passed through holes 53 in the front wall 37 to engage the adjoining wall of the chamber. Further holes 57 in the front wall of the casing are provided for mounting of door locking means.

The casing includes a door hinge 61 by which a door can be mounted and as shown in Figure 4 comprises a pair of mutually-pivotally-mounted hinge plates 63 and 65. One plate 63 is secured along a vertical edge of the oven door whilst the other plate 64 is seated in the slot 19 of the first edge region 5 on the adjacent side wall 35 in which the second edge region 7 of the front wall 37 is also seated. The lugs 21 on the second edge region 7 of the front wall engage in apertures 23 of the second part 17 of the first edge region 5 of the side wall whilst the lugs 21 on the plate 65 engage in apertures 23 in the first part 11 of the first edge region 5.

It will be appreciated that by suitable dimensioning of the first and second parts 11 and 17 of the first edge region 5 in which hinge plate 65 engages, the door can be flush or recessed or proud of the front wall.

It may be noted that the casing of this invention

may be employed as a casing for ovens other than a microwave oven, for example an electric or gas oven, or for other household appliances having a metallic casing such as refrigerators, freezers, washing machines and tumble driers. The joint of the invention has been found to be highly secure.

Having regard to the above disclosure the invention may be defined by the following statements:-

1. A container, suitable for use as a microwave oven cavity, comprising a metal sheet formed to provide a cavity of rectangular cross-section open at least at one end thereof and having a top wall, a bottom wall and upright side walls, characterised in that the cavity walls are formed at the open end of the cavity each with a flange having a first part which extends alongside the corresponding cavity wall and a second part which extends alongside the first part on the side thereof remote from the corresponding cavity wall to form with said first part a slot facing outwardly of the cavity, the first and second parts of the flange extending through return bends respectively from the corresponding cavity wall and from the first part of the flange, and a further rectangular side wall of the cavity being provided and formed along each edge thereof with a flange which complementarily engages in the slot in the flange extending from the corresponding wall of the cavity and its retained therein by coupling elements provided respectively on the flange of the further side wall and on one of the flange parts defining the slot formed in the flange extending from the corresponding cavity side wall.

2. The container is further characterised in that the coupling elements comprise spring lugs and respective apertures in which the lugs are engaged, the lugs being formed on one and the apertures on the other of the flange on the further side wall and the flange extending from the corresponding cavity side wall.

3. The container is further characterised in that the flanges on the further side wall are formed with said lugs and the flanges extending from the cavity side walls are formed with said apertures.

4. The container is further characterised in that the lugs project from the flanges of the further side wall increasingly in the direction in which the slots in which those flanges are engaged are facing.

5. The container is further characterised in that the spring lugs are formed as a row of regularly spaced lugs extending along the flange at each side of said further rectangular side wall of the cavity and said apertures are formed as a row of regularly spaced apertures extending along the flange of each of the corresponding cavity side walls.

Claims

1. A joint for joining together edge regions of a first and a second portion of sheet material, wherein the first portion includes an elongate U-sectioned slot formed by folding the sheet along parallel lines, the slot having two opposed side walls between which the edge region of the second portion is engagingly retained by press-fit means cooperable between at least one opposing wall of the slot and the so engaged edge region of the second portion.

2. A joint according to claim 1, wherein the first and second portions of sheet material belong to a casing and are selected from: a pair of side walls; a side wall and a base or top wall; a side wall and a door; an added wall and a wall defining an opening.

3. A joint according to claim 1 or 2, wherein the press-fit means comprise a plurality of discrete coupling means along the slot wall of the first portion and the adjoining edge region of the second portion, the coupling means on the one co-operating with the coupling means on the other.

4. A joint according to claim 3, wherein the coupling means comprise spring lugs and corresponding apertures, each lug and corresponding aperture being on a different one of the first and second portions.

5. A joint according to claim 4, wherein a row of regularly-spaced said lugs is disposed along said second portion and a row of similarly-regularly-spaced corresponding apertures is disposed along said slot wall.

6. A joint according to any preceding claim, wherein the slot is unitary with the first portion and comprises a single slot defined by spaced-apart first and second elongate walls.

7. A joint according to claim 6, wherein the first elongate wall is interconnected with the second elongate wall via a return bend, forming a closed end of the slot, and the second elongate wall is interconnected with the first portion via another return bend.

8. A casing for a household appliance, comprising a walled main body and including at least one joint according to any preceding claim.

9. A casing according to of claim 8 which is of rectangular cross-section and which has a front opening, and an added front wall panel fixed to this opening by a joint according to any one of claims 1 to 7 and a rear opening and an added rear wall panel fixed to this opening by a joint according to any one of the claims 1 to 7.

10. A casing for a microwave oven according to claim 9, wherein an electrical components chamber is mounted between the front and rear walls and the sides of the components chamber are spaced from the walls of the main body of the casing.

11. A casing according to claim 9 or 10, including an opening in a wall and a door mounted for opening and closing the opening by means of a hinge comprising two mutually-pivotally connected hinge plates of which one plate is secured along one edge region of said door and the other hinge plate is joined to the confronting edge region of the opening by a joint according to any one of claims 1 to 7.

12. A casing according to any one of claims 8 to 11, wherein the main body is preshaped from a single sheet of material and the remaining two free edges are joined together by a joint according to any one of claims 1 to 7.

13. A method of making a joint for joining together edge regions of a first and a second portion of sheet material, comprising forming by folding the sheet material of the first portion along parallel lines to form a U-sectioned slot, and forming press-fit means in at least one wall of the slot and the edge region of the second portion, placing the edge regions next to each other and pushing the edge region of the second portion into the slot so as to fasten the adjoining edges together by means of the press-fit means.

14. A method according to claim 13, comprising forming the slot by folding the edge region of the first portion over against itself to form a return bend followed by an elongate wall, and then folding the edge region back in the reverse direction so as to form another return bend and another elongate wall spaced from other elongate wall so as to define the U-sectioned elongate slot therebetween.

15. A method according to claim 13 or 15, comprising forming the press-fit means by pressing or stamping lugs and co-operative apertures in the adjoining edge regions, wherein each lug and corresponding aperture is on a different one of the slot wall and the edge region of the second portion.

16. A method of making a casing for a household appliance comprising preshaping a sheet of material into a main casing body and forming a joint between first and second portions thereof according to claim 13, 14 or 15.

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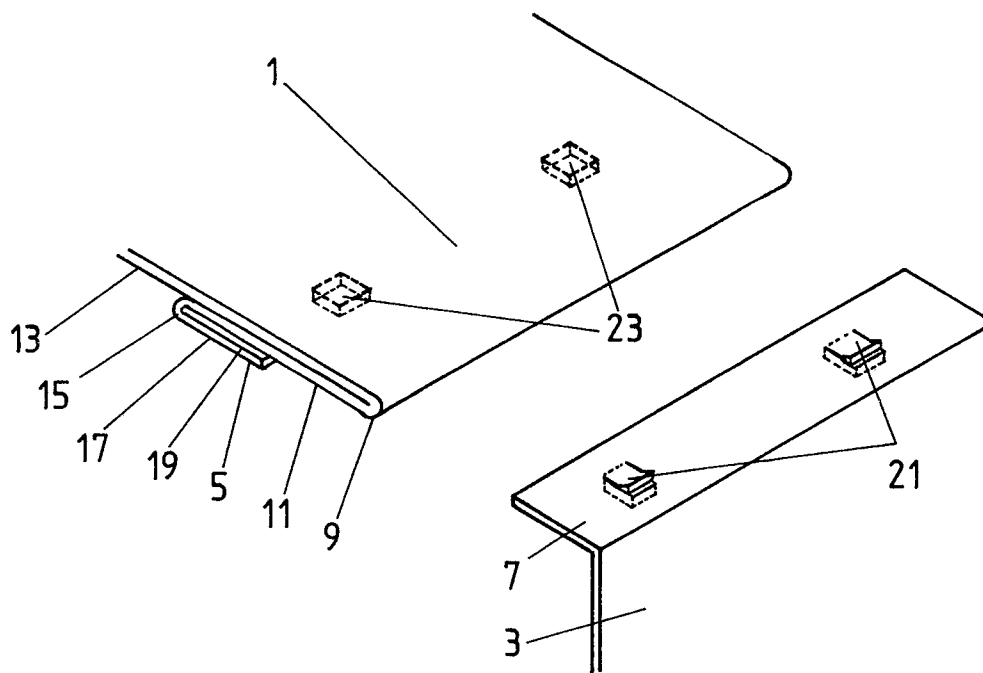


FIG.1.

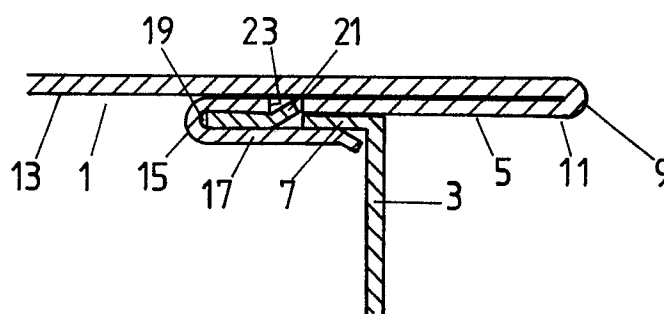
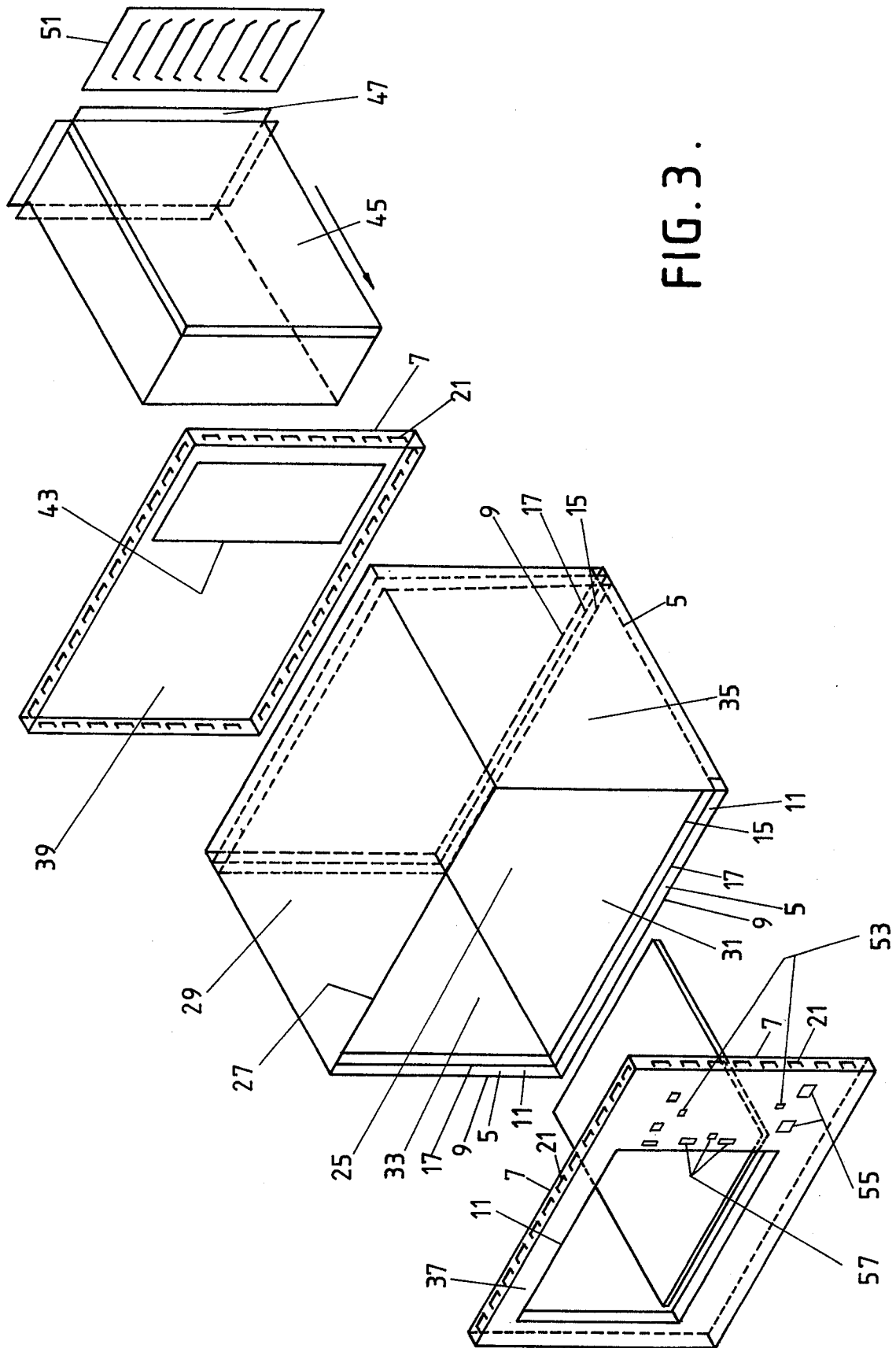


FIG.2.



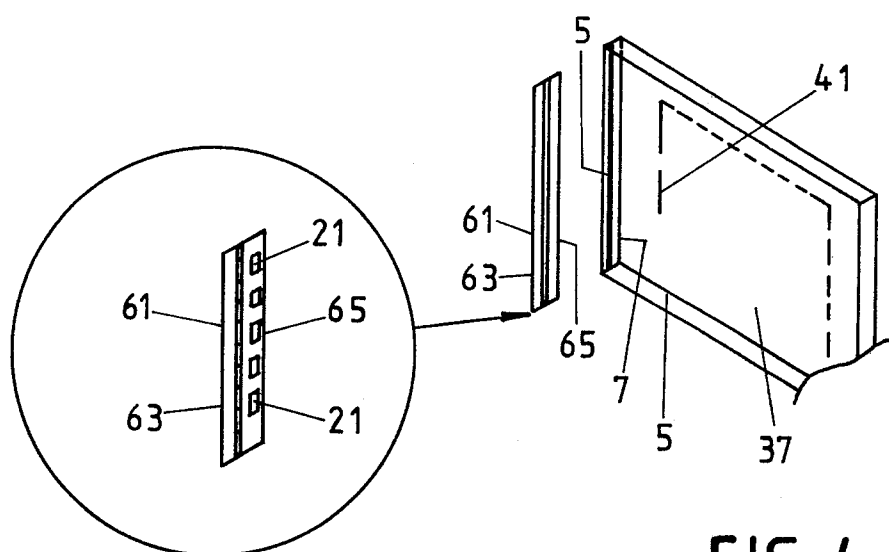


FIG. 4.

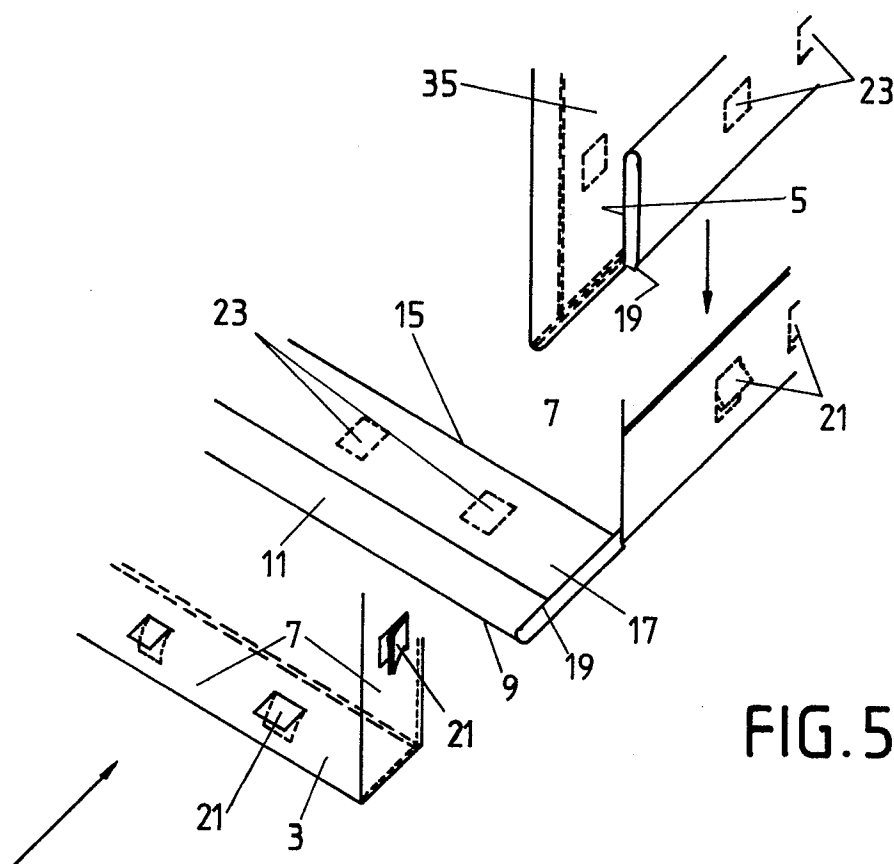


FIG. 5.

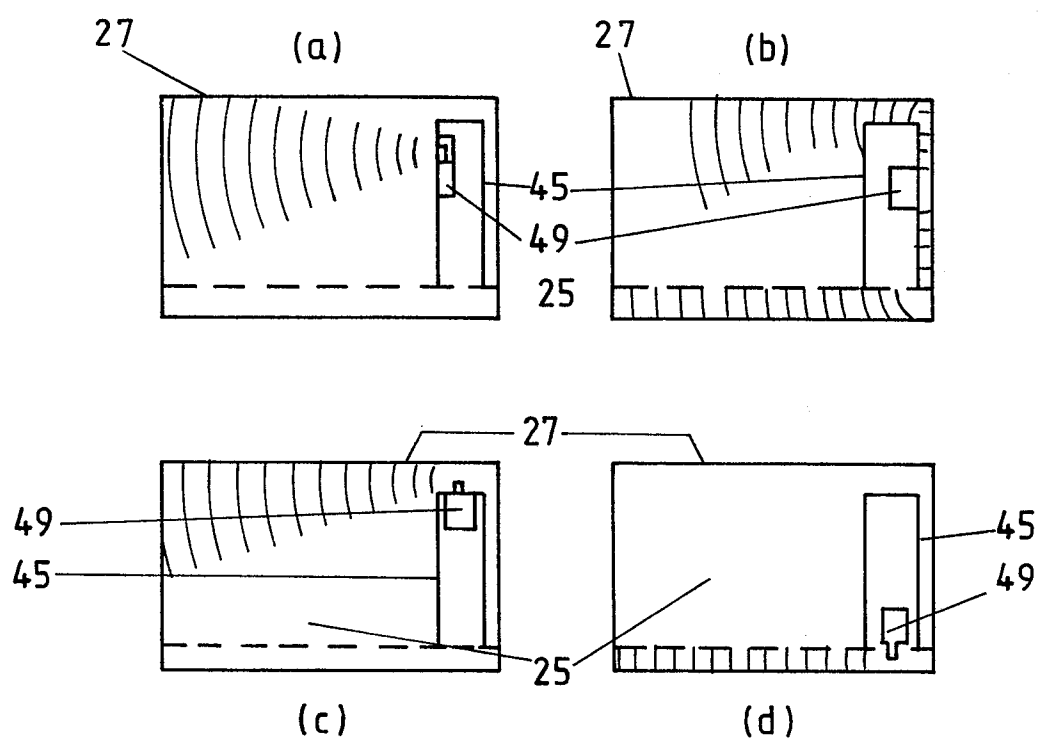


FIG. 6.



European Patent
Office

EUROPEAN SEARCH REPORT

Application number

EP 87 30 5830

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US-A-4 563 559 (ENAMI) * Column 9, lines 25-53; column 12, lines 18-33; figures 20,37 *	1-3,5- 8,13- 16	H 05 B 6/80
X	GB-A-2 052 729 (BRITISH GAS) * Page 1, lines 120-127; figures 6A,6B *	1-3,8, 13	
A	US-A-4 192 431 (BROWN) * Column 2, line 18 - column 3, line 8; figure 1 *	1-3,8, 9,13	
A	PATENT ABSTRACTS OF JAPAN, vol. 9, no. 22 (M-354)[1745], 30th January 1985; & JP-A-59 167 638 (ENAMI SEIKI K.K.) 21-09-1984 * Abstract *	1-3,8- 10	TECHNICAL FIELDS SEARCHED (Int. Cl.4) H 05 B 6/00 F 24 C 15/00
A	GB-A-2 161 049 (SHARP) * Page 2, lines 32-125; figures 1-5 *	1,3,5, 8-10, 13	
A	GB-A-2 107 160 (SHARP)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29-09-1987	Examiner RAUSCH R.G.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

