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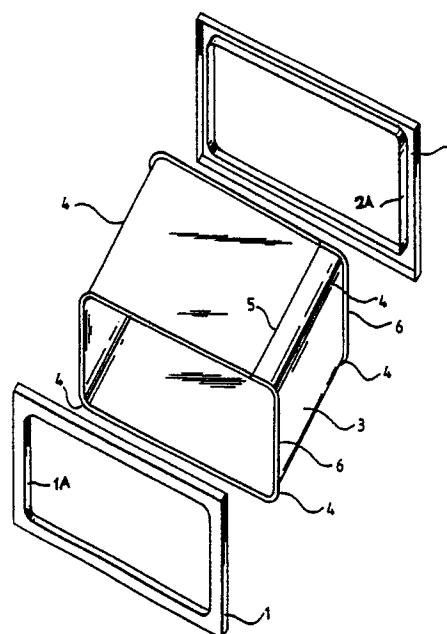
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AT BE CH DE ES FR GB GR IT LI LU NL SE(71) Applicant: **AKTIEBOLAGET ELECTROLUX**
Luxbacken 1
S-105 45 Stockholm(SE)(72) Inventor: **Buttery, Michael Harcourt Christians**
7, Greenways Heath Drive Walton-on-the-Hill
Tadworth Surry, KT20 7QE(GB)
Inventor: **Brooks, Steve Martin**
16 The Drive
Chingford London, E4 7AH(GB)
Inventor: **Crossley, Peter William**
28 Glass Avenue
Ushaw Moor Co. Durham(GB)
Inventor: **Watroba, David Brian**
15 Haselor Road
Boldmere Sutton Coldfield, B73 5BW(GB)(74) Representative: **Arthur, Bryan Edward et al**
Withers & Rogers 4 Dyer's Buildings Holborn
London EC1N 2JT(GB)(54) **Improvements relating to cooking apparatus.**

(57) This invention relates to cooking apparatus constructed from one or more modules. In more detail a cooking apparatus according to the invention comprises one or more modules each capable of carrying out one or more cooking functions associated with the preparation of foodstuffs, each module including frame means and a cavity wrap casing forming walls defining a cooking cavity, a back plate, cooking means supported on the back plate, means receptive to the attachment and detachment of the back plate, and a door affording means to the cavity. A cooking apparatus in accordance with the present apparatus has the advantage that the back plate including cooking means are not finally fixed until the end of the assembly line thereby permitting the cooking means - electric, gas or micro wave to be fully checked and tested and if necessary parts replaced before final assembly. Such a situation also has the advantage that cooking components can be readily replaced during servicing or upon breakdown.

EP 0 254 500 A1**FIG. 1.**

IMPROVEMENTS RELATING TO COOKING APPARATUS

This invention relates to cooking apparatus and it relates in particular, to the construction of said cooking apparatus.

At present there exists a wide variety of cooking apparatus, for example ovens, grills, combined over/grills and microwaves, manufactured to a wide variety of specifications and designs differently fuelled and, consequently, requiring many different assembly lines for their production.

It is an object of the present invention to produce a large number of variants of cooking apparatus from only a few basic modular units, by combining these units in different ways.

According to the present invention there is provided a cooking apparatus consisting of one or more cavity modules fitted together as desired, each of said modules when fitted with appropriate cooking means, being capable of carrying out one or more functions associated with the preparation of foodstuffs and comprising frame means and a cavity wrap casing providing the sides, top and bottom of the arrangement, the said module being provided with means receptive to the attachment of a back plate thereto.

According to another form of the invention, each module includes frame means and a cavity wrap casing forming walls defining a cooking cavity, a back plate, cooking means supported on the back plate, means receptive to the attachment and detachment of the back plate, and a door affording access to the cavity.

In a preferred embodiment of the invention the components required to produce a particular type of oven, for example, any one or more of: electric heating elements for an electric oven and/or grill; gas burners for a gas oven and/or grill; magnetron and wave guide for a microwave oven and a quartz halogen browning lamp for a browning foodstuff; fans and lights, are fitted to the back plate using attaching means; the back plate then being attached to the rear frame of the module. The back plate fitted with the desired components is preferably attached to the rear frame of the module towards the end of the assembly process.

According to a further aspect of the invention there is provided a power unit for a cooking appliance, the power unit comprising a plate which carries heating means and which is adapted to be secured as an entity, to a cooking cavity of the appliance, the plate at least partially covering an aperture in said cavity.

The front and rear frames of the modules are preferably identical; the bolt-holes on the rear frame may preferably be used to bolt on the aforementioned back plate and those on the front frame

are preferably used for the attachment of a reversible left/right-handed door or a bottom hung door. It is further preferred that the said front and rear frames be made by pressing sheet material of enamelling grade.

In a preferred embodiment of the invention the oven cavity is formed by bending a sheet, preferably of a material suitable for enamelling, at four places and joining the two ends together. The joint may be made by welding, lock seaming or by any other jointing technique known in the art. It is also preferred that a flange is thrown up around either end of the cavity wrap. This facilitates the joining of the end frames to the cavity wrap, which is preferably done by spot welding, lock seaming, stitching or any other joining means known in the art.

In a further preferred embodiment of the invention the modules are enamelled after assembly, but before the back plates are fitted. In the cases of electric or gas ovens the back plates themselves may preferably, though not necessarily be enamelled or painted after the holes, via which the cooking components are fitted, are punched. The back plates are then bolted to the rear frame of the module. For microwave ovens the back plate is welded to the frame before being coated, in order to achieve electrical continuity.

It is a preferred embodiment of this invention that only two sizes of cavity module are made (preferably one large, one small) which, when each is fitted with the various desired arrangement of cooking components, are combined in a variety of ways to produce a range of cookers which will satisfy most of the market demands.

In order that the invention may be clearly understood and readily carried into effect, specific embodiments of the invention will now be described by way of example, with reference to the accompanying drawings, of which

Figure 1 is a perspective view of the invention, showing how the cavity module is constructed,

Figure 2 shows a perspective view of a specific embodiment of said further aspect of the invention,

Figure 3 is a side on vertical cross-section of a particular application of the invention,

Figure 4 shows, in vertical cross-section, various ways of combining the modular units of the invention,

Figure 5, is a schematic layout of a possible production line for the invention.

Figure 1 shows how the module of the invention is constructed with front and rear frames 1 and 2 respectively, formed from pressed steel. The front and rear frames 1 and 2 are identical, with

identical bolt-holes for the attachment of reversible left/right-handed door and a back plate (not shown) respectively and with inwardly projecting flanges 1A and 2A. However, since the frames 1 and 2 are identical, the back plate can be fixed to either frame. Thus, if after fabrication the front frame 1 is found to be damaged superficially, that is for example, a scratch or small dent, the assembly can be turned around and the back plate attached to the front frame 1. Also, because frames 1 and 2 are identical, they can be produced on the same production lines without necessitating a change of tooling.

The front and rear frames 1 and 2 are attached to a cavity wrap 3, which is formed by bending typically a 0.4 or 0.9mm thick sheet of enamelling grade material at four places 4 and joining the two ends together to form a seam 5. The seam 5 is lockseamed, stitched or spot welded, or joined by any other suitable jointing technique known in the art. The cavity 3 is also provided with flanges 6 to facilitate the joining of the end frames 1 and 2 to the cavity wrap 3. The end frames 1 and 2 are joined to the cavity wrap 3, via flanges 6, by spot welding, stitching, lockseaming or any other joining technique known in the art. Thus forming an inherently strong mechanically stiff component. After fabrication the modules are enamelled and are ready to have the back plates (not shown) fitted. Up to this point all modules are produced on the one component line, since the type of cooker for which any individual module is intended is not decided until the back plate, fitted with the desired components, is attached. As an alternative jointing arrangement, which may be preferred in some circumstances, the end frames 1 and 2, instead of the cavity wrap 3 are provided with flanges.

The back plates are of three basic types; gas, electric and microwave and are produced at a sub-assembly line sited towards the end of the main assembly line in order to fix the specification of a cooker as late as possible in the production process.

A specific embodiment of a back plate, fitted with components, is shown in Figure 2 and comprises a steel back plate 7 with grill elements 8 and 9, another element 10 surrounding a fan 11, and with a light 12; these components are attached to the back plate 7 via holes (not shown) punched in the back plate 7. In the cases of gas and electric ovens the back plate 7 is preferably enamelled or painted after the holes have been punched, and before the components are fitted. However, for microwave ovens the back plate 7 is not enamelled or painted until it has been attached, with components in place, to the rear frame 2 of a module, in order to ensure electrical continuity.

In conventional ovens the back plate 7 is normally welded or forms part of the rear of the oven cavity or cavity assembly, then it is all enamelled and then the components for that particular oven are fitted, this means that many different assembly lines are needed, or disruptions to assembly lines whilst model changes are effected.

In the case of the present invention the back plates 7 are not fitted until near the end of the assembly line, thus cooker model and specification are not fixed until the end of assembly line and so all models run down the same line and no tooling changes are required for a large number of models of varying size, specification and fuel type. A second advantage of the present invention over the prior art is that the components, that is heating elements etc and associated wiring, are fitted to the back plate 7 before the back plate 7 is fitted to the module, hence working access is much freer and consequently assembly time much reduced. Another advantage of the present invention over the prior art is that the components, that is heating elements etc., fitted to the back plates 7 can be tested before the back plate 7 is fitted to the module; conventionally they are tested after fitting in the oven cavity, which can be problematic if any faults arise. Over all the present invention reduces production costs considerably.

As well as providing a variety of ovens from one basic module by fitting various different back plates 7, it is also possible to extend the range yet further by joining modules together.

Figure 3 shows a side-on vertical cross-section of a small cavity module 13 and a larger cavity module 14, joined together by bolted joints 15 and with their back plates 16, fitted with components, already in place. The back plates 16 having been attached to the end frames 17 by bolting with rivets or screws (not shown) or by welding. Thus, since the modules from which the cooker core is formed are strong and mechanically stiff, so are combinations of said modules.

Figure 4 shows some of the wide variety of cookers that can be produced from just two sizes of module by varying the components fitted to the back plate and by combining and configuring the modules in different ways.

Figure 4(a) is of a single small module and could be used for:-a microwave or a table top oven with grill 18, the completed appliance being approximately 300mm in height. Figure 4(b) is of a single large module and could be used for a main oven with a grill 19, the completed appliance being nominally 600mm in height. Figure 4(c) is of two small modules mounted one above the other and could be used for a microwave 20 combined with a small oven with grill 21 and the completed appliance is nominally 600mm in height. Figure 4(d) is

of a large module mounted above a small module and could be used for either a main oven 22 and a second small oven with a grill 23 or a main oven 22 and grill 23 for use as built in cookers, nominally 900mm in height or a free-standing main oven 22 with a warm drawer 23, and the completed appliances, including hob, would be nominally either 850 or 900mm in height depending on dimensions of plinth and feet. Figure 4(e) can be a free standing main oven 24 and a second oven with a grill 25 or a free-standing main oven 24 and grill only 25. The overall height of the completed appliance including a hob can be 850mm or 900mm depending on dimensions of plinth and feet. Figure 4(f) shows two large modules mounted one above the other and could be used for a double oven comprising two large ovens 26 and 27, the completed appliance being nominally 1200mm in height. Figure 4(g) shows two small modules mounted above a large module and could be used for a main oven 28, second oven with grill 29 and a microwave 30, the completed appliance being nominally 1200mm in height. In addition, by appropriate cooker design three widths of cooker can be provided; 500, 550 and 600mm being the most desirable widths.

Figure 5 shows a schematic layout of a possible production line, which utilizes the invention's method of assembly.

Other possible embodiments of the invention are, for example, a small electric oven with a single flat element attached to the back plate and a small table top oven with a hob on top. Also, although the oven cavity and back plate are described as being preferably made from steel, they could equally well be made from stainless steel, glass, ceramic or any other suitable material. It is also likely that popular combinations of modules could justify special front and back frames, to accommodate a plurality of modules in accordance with the relevant combination. If desired either one of the front and rear frame may be omitted. A thermal break may be provided between the front frame and the cavity wrap to allow for a high temperature self-cleaning construction.

It should also be noted that, in the case of a microwave oven, it is not necessary to weld the back plate to the oven cavity provided the quarter wave choke technique is used with bolting, or other configurations of pressings, to prevent microwave leakage.

Thus, the cooking apparatus of this invention makes it possible to produce a wide range of cookers that will satisfy most, if not all, of the market demands, from only two basic modules plus a variety of back plates and, because the model and specifications are not fixed until the end of the production process, all the models can be

produced on one assembly line without tooling changes, resulting in a cheaper and simpler manufacturing process. A further advantage of the invention lies in the possibility of adapting quickly to unforeseen changes in market requirements as the core construction, that is the modules, will be common to existing production. Limited changes, for example to configuration, accommodation on back plates of novel energy inputting devices or other innovative components and facia, are sufficient to produce a new appliance. This results in faster response to the manufacturer to changing trends and lower costs of changed production equipment.

Claims

1. A cooking apparatus comprising one or more modules each capable of carrying out one or more cooking functions associated with the preparation of foodstuffs, each module including frame means and cavity wrap casing forming walls defining a cooking cavity, a back plate, cooking means supported on the back plate, means receptive to the attachment and detachment of the back plate, and a door affording access to the cavity.

2. A cooking apparatus according to claim 1 wherein the frame means includes a front frame for hingedly supporting the door and a rear frame including said means receptive to the attachment and detachment of the back plate.

3. A cooking apparatus according to claim 1 wherein the cooking means supported on the backplate is in the form of a power unit including heating means, the unit being adapted to be secured as an entity to the cooking cavity with the plate at least partially covering an aperture in the cavity.

4. A cooking apparatus according to claim 3 wherein the backplate totally covers the rear opening of the cooking cavity.

5. A cooking apparatus according to anyone of claims 2 to 4 wherein the front and rear frames are identical and interchangeable.

6. A cooking apparatus according to claim 5 where the front and back frames are each formed with corresponding apertures through which the door and the back plate are respectively attached using bolts, screws or other fixing devices.

7. A cooking apparatus according to any preceding claim wherein the cooking means is at least one of:

electric heating elements for an electric oven and/or grill; gas burners for a gas oven and/or grill; magnetron and wave guide for a microwave oven and a quartz halogen browning lamp for a browning foodstuff.

8. a cooking apparatus according to claim 7 including a circulation fan and/or a light attached to the back plate.

9. A cooking apparatus according to anyone of claims 1 to 8 wherein the cavity wrap, the front frame, the back frame and the backplate are made from sheet material suitable for enamelling. 5

10. A cooking apparatus according to anyone of claims 6 to 9 wherein selected apertures in the front and back frames serve to permit two or more modules to be bolted together. 10

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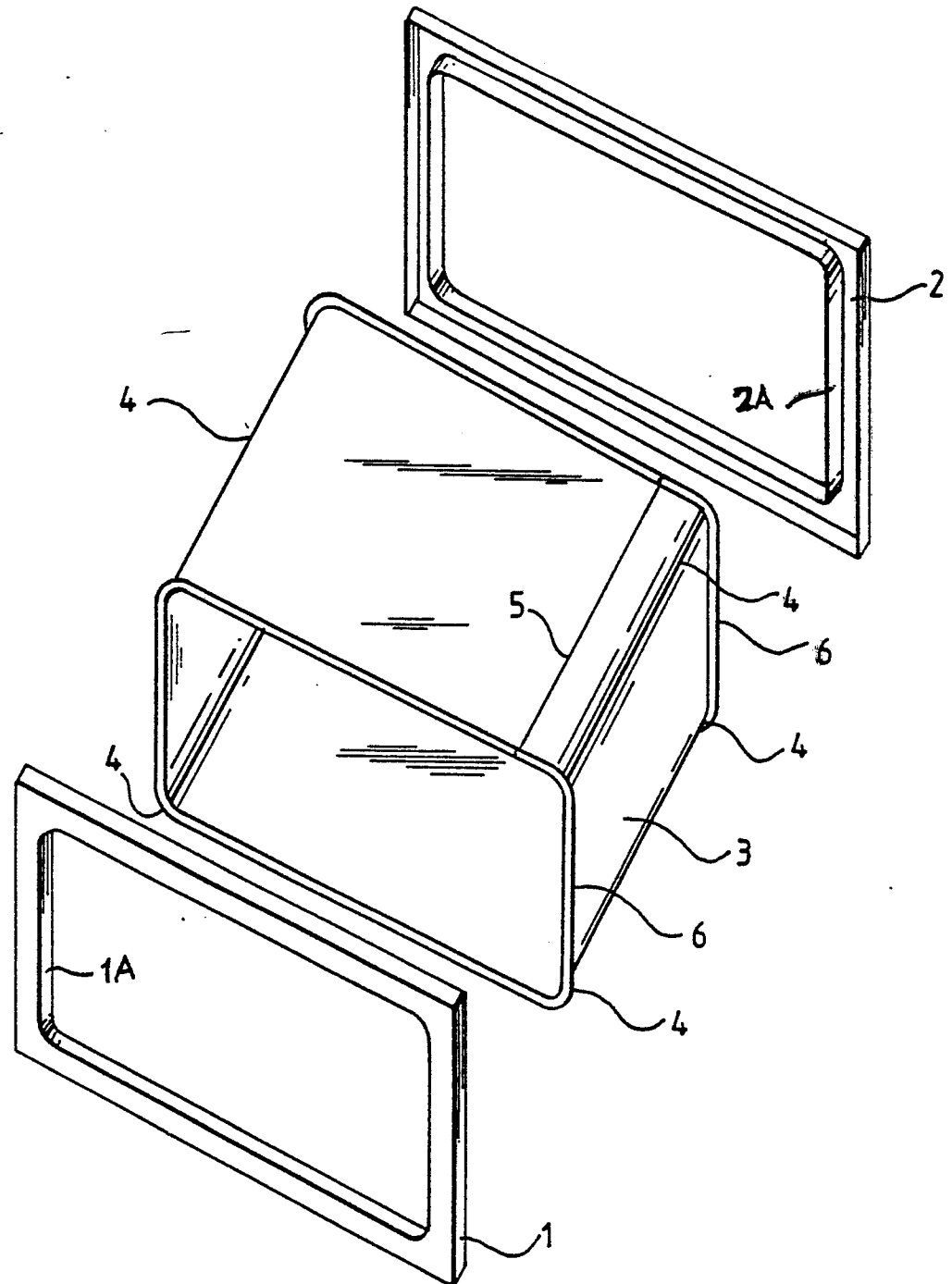


FIG. 1.

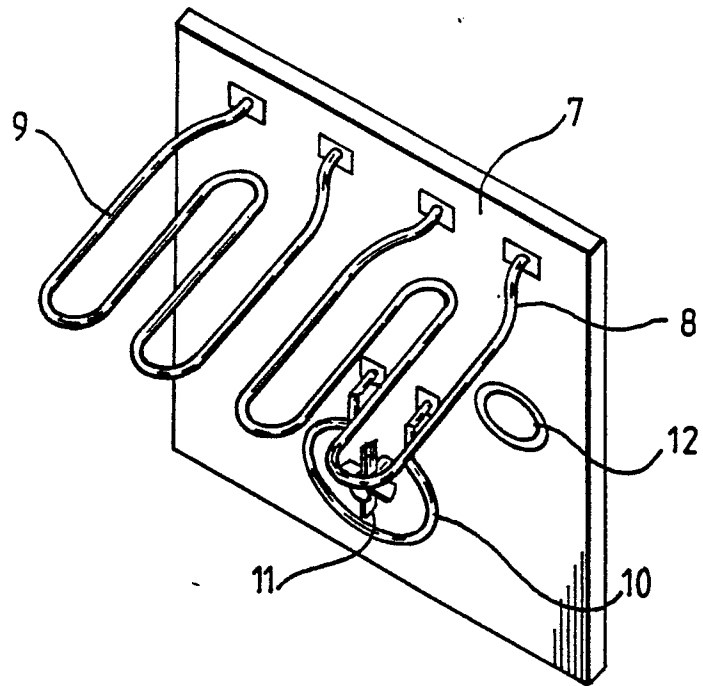


FIG. 2.

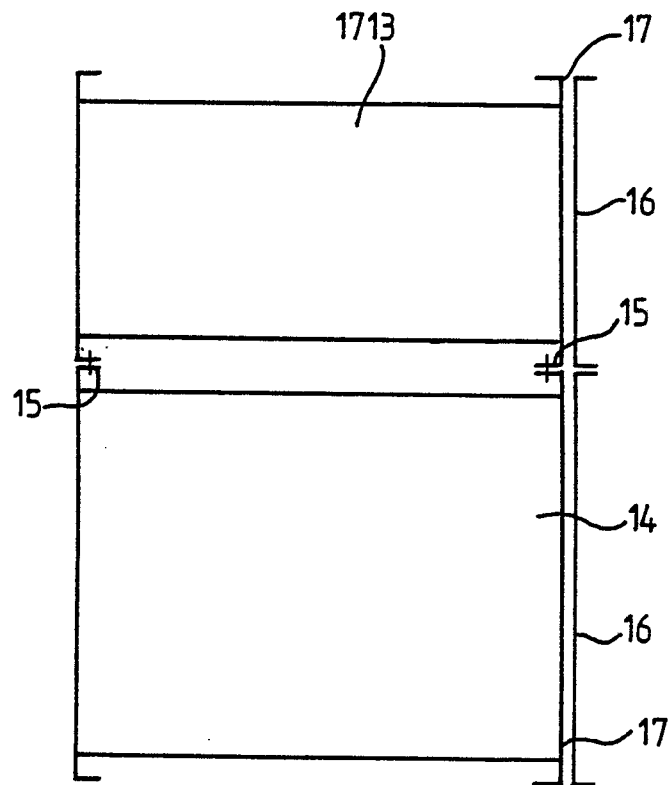


FIG. 3.

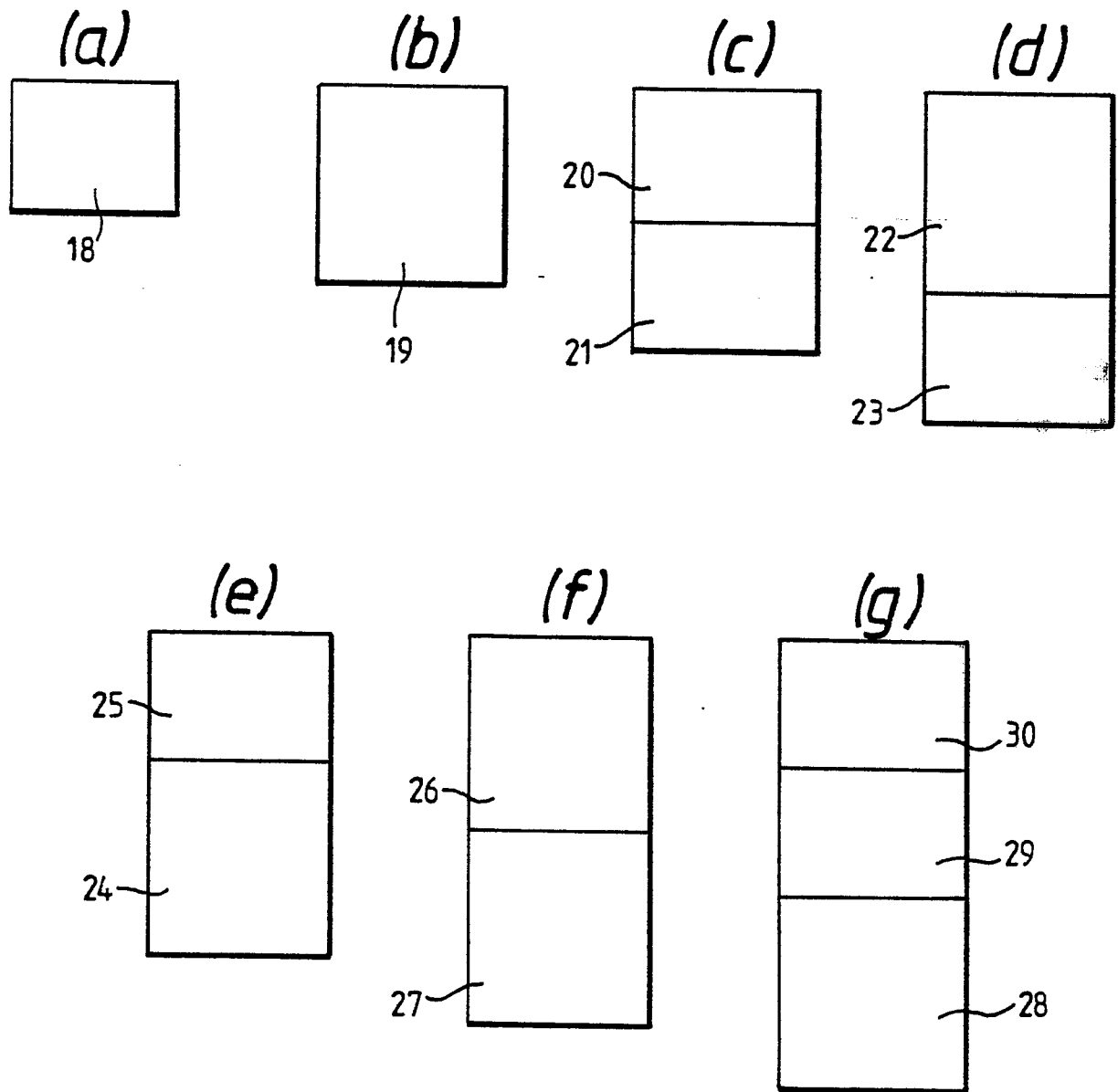


FIG. 4.

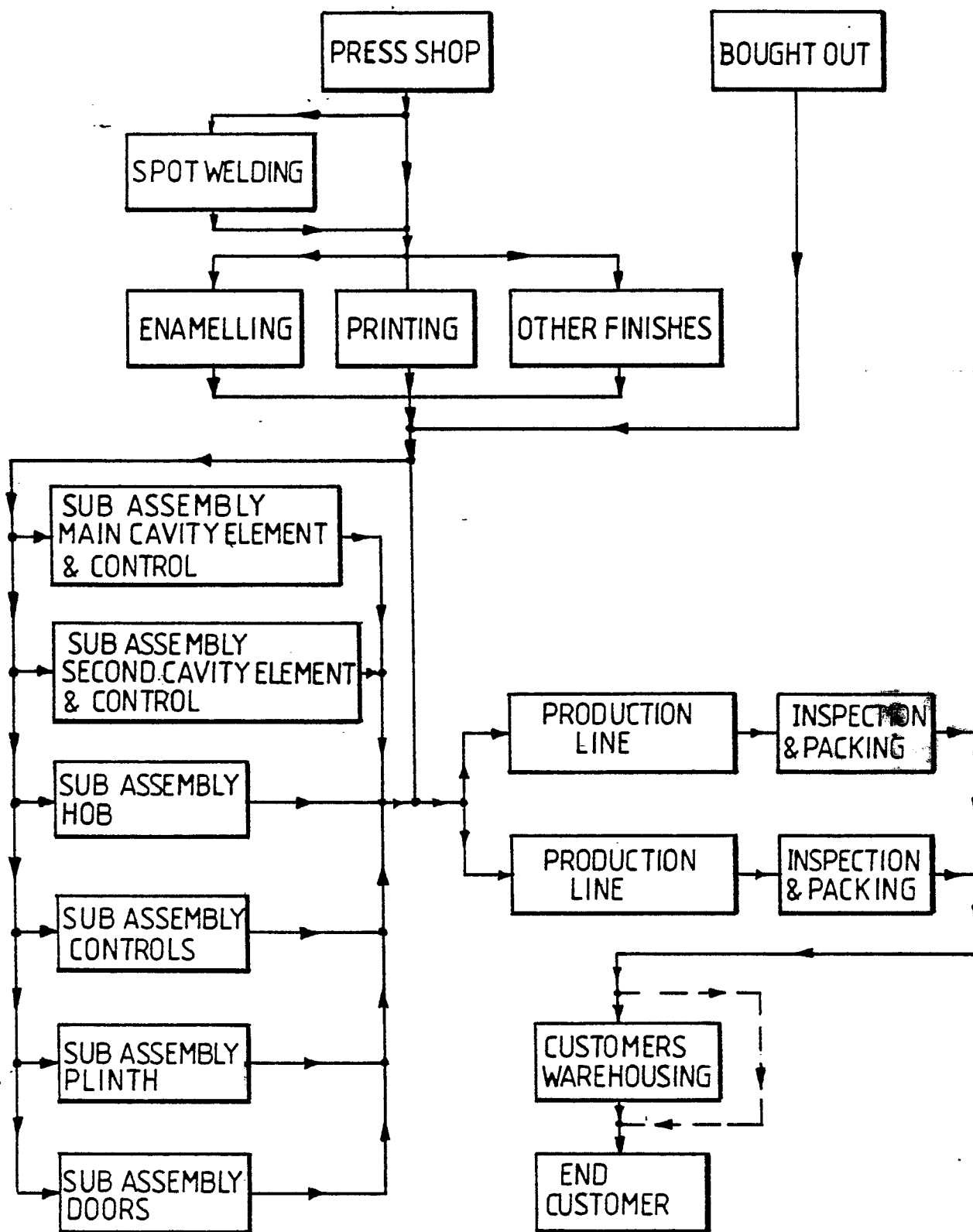


FIG.5.



EP 87 30 6344

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-3 033 188 (CLINE) * Columns 4,5; claim 1; figures 1-6 *	1,2	F 24 C 15/08
A		4	
A	--- GB-A-2 107 160 (SHARP) * Page 3, lines 123-127; figures *	1	
A	--- US-A-1 586 158 (MacINNES) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			F 24 C H 05 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12-10-1987	Examiner VANHEUSDEN J.
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	