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(71) **Applicant** *(for all designated States except US)*: KENWOOD MARKS LIMITED [GB/GB]; New Lane, Havant, Hampshire PO9 2NH (GB).

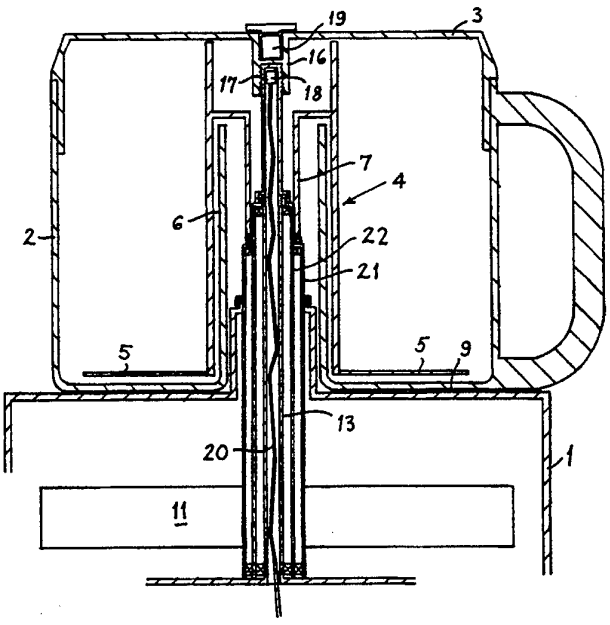
(72) **Inventor; and**
(75) **Inventor/Applicant** *(for US only)*: NICHOLSON, Martin, John [GB/GB]; 24 Combrook Grove, Cowplain, Portsmouth, Hampshire PO7 8RD (GB).

(74) **Agents:** MURGATROYD, Susan, Elizabeth et al.; Baron & Warren, 18 South End, Kinsington, London W8 5BU (GB).

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(54) **Title:** FOOD PROCESSOR



(57) **Abstract**

A food processor comprises a container (2) removably mounted on the processor body (1) and a lid (3) for the container (2). The lid (3) is secured on the container (2) by an upstanding member (13) on the body (1) over which a tubular aperture (7) extending up from the base of the container (2) is mounted such that the upstanding member (13) extends upwardly through the container (2). The upstanding member (13) engages with a central boss (16) depending from the underside of the lid (3) so that engagement of the lid (3) with the upstanding member (13) also serves to secure the container (2) on the body (1). The upstanding member (13) may comprise a fixed shaft around which is disposed a rotatable drive shaft (10, 21, 22) for rotatably driving a processing tool (5) within the container (2). The upstanding member (13) may also contain a safety interlock (18, 19) for preventing operation of the food processor without engagement of the lid (3) with the upstanding member (13).

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FOOD PROCESSOR

This invention relates to a food processor and in particular to a food processor having a removable container with a lockable lid in which food can be prepared by, for example, chopping, slicing, blending, liquidising, grating, or shredding.

A conventional food processor comprises a body, which contains a motor and drive gear mechanism and upon which user-operable controls are mounted. The body has an upstanding drive-shaft over which the container for retaining food to be processed and a food processing tool are mounted. The container is closed by a lid which interacts with a safety interlock in the processor body, thereby preventing the processor from being operated without the lid being secured on the container.

In order to secure both the container to the body and the lid to the container, interlocking lugs and recesses are formed on the body and around the container base and around both the rim of the container and of the lid. Thus, when assembling the processor for use, it is necessary to ensure that all of the small lugs and recesses are interlocked which can be troublesome and time-consuming. Additionally, hygiene problems can arise due to the lugs and recesses forming dirt traps which are difficult to clean. Furthermore, the provision of such lugs and recesses during manufacture of the processor requires complex tooling and constrains the use of different size containers and materials from which the containers are made.

It is therefore an object of the present invention to provide an improved food processor which substantially alleviates the aforementioned problems associated with known food processors.

According to the present invention, there is provided a food processor comprising a food processing container removably mounted on the body of the food processor,

a lid for the container, and means for securing the lid on the container, said lid securing means also serving to secure the container on said body, said lid securing means comprising an upstanding member provided on said body and said lid, when positioned on said container, being arranged to engage with said upstanding member, characterised in that said container is arranged to be mounted over said upstanding member such that said upstanding member extends upwardly through the container and engages with an underside portion of said lid.

In one embodiment, the lid is provided with a central boss depending from its underside, the boss being arranged to engage with an upper end of the upstanding member so as to secure the lid and thus the container.

The container preferably has a tubular aperture extending from its base into its interior, which aperture is disposed over the upstanding member when the container is mounted on the body.

The upstanding member may be a fixed shaft around which is disposed a rotatable drive shaft for rotatably driving a food processing tool within the container. Two or more concentric drive shafts may be provided each for rotating a food processing tool mounted thereon at a different speed.

Preferably, a safety interlock is provided which prevents operation of the food processor without said engagement of the lid with the upstanding member. In one embodiment, the upstanding member is substantially hollow and the safety interlock comprises a switch mechanism located within the upstanding member, the switch mechanism being activated by the action of fitting the lid to the upstanding member.

The processor may include a stop member for inhibiting rotation of the container relative to the body and the lid. The processor may also be provided with an additional safety interlock to ensure that it cannot be operat-

ed without the container as well as the lid being in position on the body.

Due to the fact that no complex tooling of lugs and recesses is necessary, the container may be made of stainless steel or any other desirable material. Furthermore, the user-operable controls for the food processor may be mounted on the processor body and/or the lid and/or the container, as preferred.

The invention will now be described by way of examples with reference to the accompanying drawings, in which:-

Fig. 1 is a cross-section of part of a food processor according to a first embodiment of the invention,

Fig. 2 is a cross-section of part of a food processor according to a second embodiment of the invention, and

Fig. 3 is a cross-section of the shafts and lid locking mechanism of a third embodiment of the invention.

Referring firstly to Fig. 1, the food processor comprises a body 1, a removable food processing container 2 and a removable lid 3. Mounted within the container 2 is a removable food processing tool 4, which as shown is a rotatable cutter having blades 5 extending horizontally from the lowest edge of the cutter 4 and a downward projecting skirt 6. The container 2 includes a tubular aperture 7 rising up from the centre of the base of the container 2, the upper end of the tubular aperture 7 being open to receive the skirt 6 of the cutter 4.

The body 1 of the food processor includes a projection 8 which is upstanding from a face 9 of the body 1 and over which the tubular aperture 7 of the container is disposed when the container is positioned on the face 9.

Protruding up through an aperture 12 in the projection 8 is a rotatable drive shaft 10 which is rotatably driven by a motor-driven gearing mechanism 11 located in the body 1. The upper end of the drive shaft 10 is splined or formed with a number of flat sides which cooperate with

corresponding mating features on the skirt 6 of the tool 4 so that rotation of the drive shaft 10 causes rotation of the tool within the container.

Within, and concentric with, the drive shaft 10 is a hollow central shaft 13, which is fixed to the base of the food processor and extends up through the body 1 to a level substantially commensurate with the upper edge of the container 2. Bearings 14,15 are provided at the upper and lower ends respectively of the drive shaft 10 so that it can be rotated relative to the fixed central shaft 13.

A central boss 16 depends from the underside of the lid and has a threaded recess 17 in its lower part. When the lid is positioned over the container, the threaded recess is fitted over the upper part of the fixed shaft 13 which is also threaded, so that rotation of the lid 3 by one quarter-turn relative to the container secures the lid 3 to the centre shaft 13. The lid 3 is thus fixed to the body 1 and the container 2 is in effect sandwiched between the lid 3 and the face 9 of the body 1.

The fixed shaft 13 and lid 3 contain a safety interlock in the form of a reed switch 18 located in the upper end of the shaft and a magnet 19 located above the threaded recess in the boss 16. The reed switch 18 is connected to control circuitry in the body 1 via a loom 20 which extends down through the fixed shaft 13. Without the lid in position on the container, the reed switch 18 prevents operation of the processor, and thus rotation of the tool 4.

In order to assemble the processor parts for use, the container 2 can be simply dropped on to the body 1, a tool 4 can be splined with the drive shaft, and the lid placed on the container and turned so as to secure it in place with the container sandwiched therebetween. Once the lid 3 is secured to the centre shaft 13, the magnet 19 activates the reed switch 18 so as to enable the processor to be operated. Subsequent removal of the lid remakes the

safety interlock and the food processor is stopped.

Fig. 2 shows an alternative embodiment of the invention, wherein like parts are labelled with like reference numerals with respect to Fig. 1. In this embodiment, the arrangement is the same as shown in Fig. 1 except that a two-speed drive mechanism comprising two concentric rotatable drive shafts 21,22 which rotate at different speeds is provided, instead of the single drive shaft 10. Each tool to be used in the processor can thus be designed to spline with one or the other of the drive shafts depending on the rotational speed required for the particular tool.

Fig. 3 shows a shaft and interlocking lid arrangement of yet another embodiment of the invention, in which like parts are again labelled with like reference numerals with respect to the embodiment shown in Fig. 1. In this embodiment, frusto-conical projection 6' corresponds to the projection 6 of the first embodiment but has been elongated to a level 23 which corresponds to the top of the tubular aperture 7 of the container (not shown in Fig.3). Additionally, the drive shaft 10' is arranged to extend above the tubular aperture of the container so that the tool (also not shown) splines with upper part 24 of the drive shaft 10'. Fig. 3 also shows an alternative means for securing the lid to the fixed central shaft 13'. In this arrangement, the boss 16' is shaped to fit inside the open upper end of the shaft 13' and is provided with protruding pins 25 which engage in shaped slots 26 in the shaft 13' as the lid is turned relative to the container, thereby forming a bayonet-type fixing.

In any of the described embodiments, a further safety interlock (not shown), in addition to the safety interlock in the lid, may be incorporated into the body 1 or the lid 3 to ensure that the container 2 is present before the food processor can be started, thereby preventing a user from operating the processor with the lid on but

with no bowl, and hence preventing direct access to the driven processor tool. Additionally or alternatively, co-operable stop members may be provided on the container 2 and the body 1 to ensure that the container does not rotate relative to the lid and body during operation of the processor.

The present invention thus affords many advantages not provided by known processors.

For example, the procedure for assembling the processor parts for use is substantially simplified. Additionally, the simplified shapes of the container and the lid reduce problems associated with dirt traps and so the food processor is easier to clean, and tooling for the food processor can be simpler and cheaper. Moreover, instead of making the container from plastics material, the simpler design enables it to be made from stainless steel or other metal, which is more practical and cheaper and which enables it to be used as a saucepan, either on a conventional cooker or with a heating element provided as part of the food processor, such as in the base of the container. The present invention also enables many new designs of food processor to be made. For example, controls for the food processor need not be mounted on the body as is conventional, but may be mounted on the container or the lid, and different size containers may be used. Additionally, the bowl and body tolerances can be reduced.

It will be appreciated that variations to the embodiments described are possible without departing from the scope of the invention.

For example, apart from the reed switch and magnet arrangement shown in Fig. 1, which may have single or multiple magnet poles, any alternative safety interlock, particularly involving the cooperation of an element of the lid and an element of the fixed shaft, may be utilised. These alternative means include other proximity switches, a mechanical plunger, mechanical rotation of a rotary switch,

multiple magnet poles, a Hall effect device, a device employing sound waves or an infra-red beam, a micro switch and pin, and a make or break light beam.

The lid can be fixed to the shaft by any suitable means which, apart from the screw-thread and pin-and-slot type fixings shown in the illustrated embodiments, may include fixings of the type utilising for instance a clip feature, push-and-turn, magnetic attraction, suction, friction, gravity or interference fit.

If the processor controls are mounted on the lid or container, various means may be utilised to transfer control information from the lid or container to the body. These include rotating a mechanical knob on the lid or container to operate a rotary switch in the body, the knob and switch being connected by a rod extending through the fixed shaft. Another arrangement comprises vertically moving a mechanical knob on the lid or container to operate a linear movement switch on the body, the knob and switch being connected by a mechanical linkage in the fixed shaft. Further means of transferring control information from either the lid or the container to the body may include the use of an infra-red beam, sound waves, radio waves, a coil and Hall effect sensor, or mechanical/electrical contacts.

The power required to operate any electrical devices in the lid or the container can be provided, for example, by mechanical/electrical contacts between the lid and the body or between the container and the body, by a battery mounted in the lid or the container, or by a transformer the halves of which could be located in respective components of the food processor such as the lid, the bowl, the central shaft or the food processor body. In practice, the components of the battery or transformer could be located in any part of the food processor as long as the components are capable of interaction.

CLAIMS

1. A food processor comprising a food processing container removably mounted on the body of the food processor, a lid for the container, and means for securing the lid on the container, said lid securing means also serving to secure the container on said body, said lid securing means comprising an upstanding member provided on said body and said lid, when positioned on said container, being arranged to engage with said upstanding member, wherein said container is arranged to be mounted over said upstanding member such that said upstanding member extends upwardly through the container and engages with an underside portion of said lid.

2. A food processor as claimed in claim 1, wherein the lid is provided with a central boss depending from its underside, said boss being arranged to engage with an upper end of said upstanding member so as to secure the lid and thus the container.

3. A food processor as claimed in claim 1 or 2, wherein the container has a tubular aperture extending from its base into its interior, which aperture is disposed over the upstanding member when the container is mounted on said body.

4. A food processor as claimed in claim 1, 2 or 3, wherein the upstanding member comprises a fixed shaft around which is disposed a rotatable drive shaft for rotatably driving a food processing tool within the container.

5. A food processor as claimed in claim 4, wherein two or more concentric drive shafts are provided each for rotating a food processing tool mounted thereon at a dif-

ferent speed.

6. A food processor as claimed in any preceding claim, wherein a safety interlock is provided which prevents operation of the food processor without said engagement of the lid with the upstanding member.

7. A food processor as claimed in claim 6, wherein the upstanding member is substantially hollow and the safety interlock comprises a switch mechanism located within the upstanding member, the switch mechanism being activated by the action of engaging the lid with the upstanding member.

8. A food processor as claimed in any preceding claim, including a stop member for inhibiting rotation of the container relative to the body and the lid.

9. A food processor as claimed in any preceding claim, including an additional safety interlock to ensure that the processor cannot be operated without the container as well as the lid being in position on the body.

10. A food processor substantially as herein described with reference to Figure 1 or 2 or 3 of the accompanying drawings.

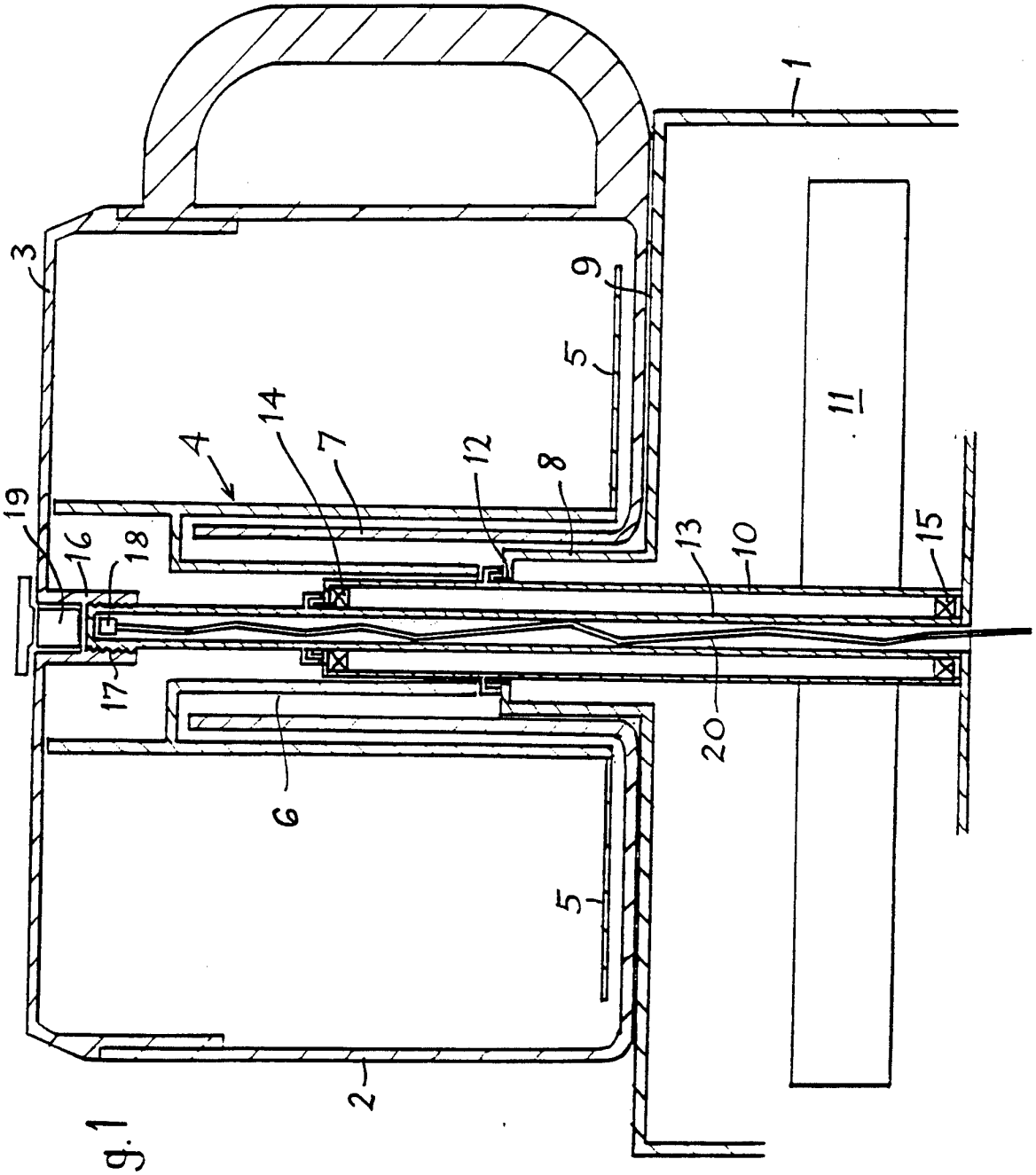


Fig.1

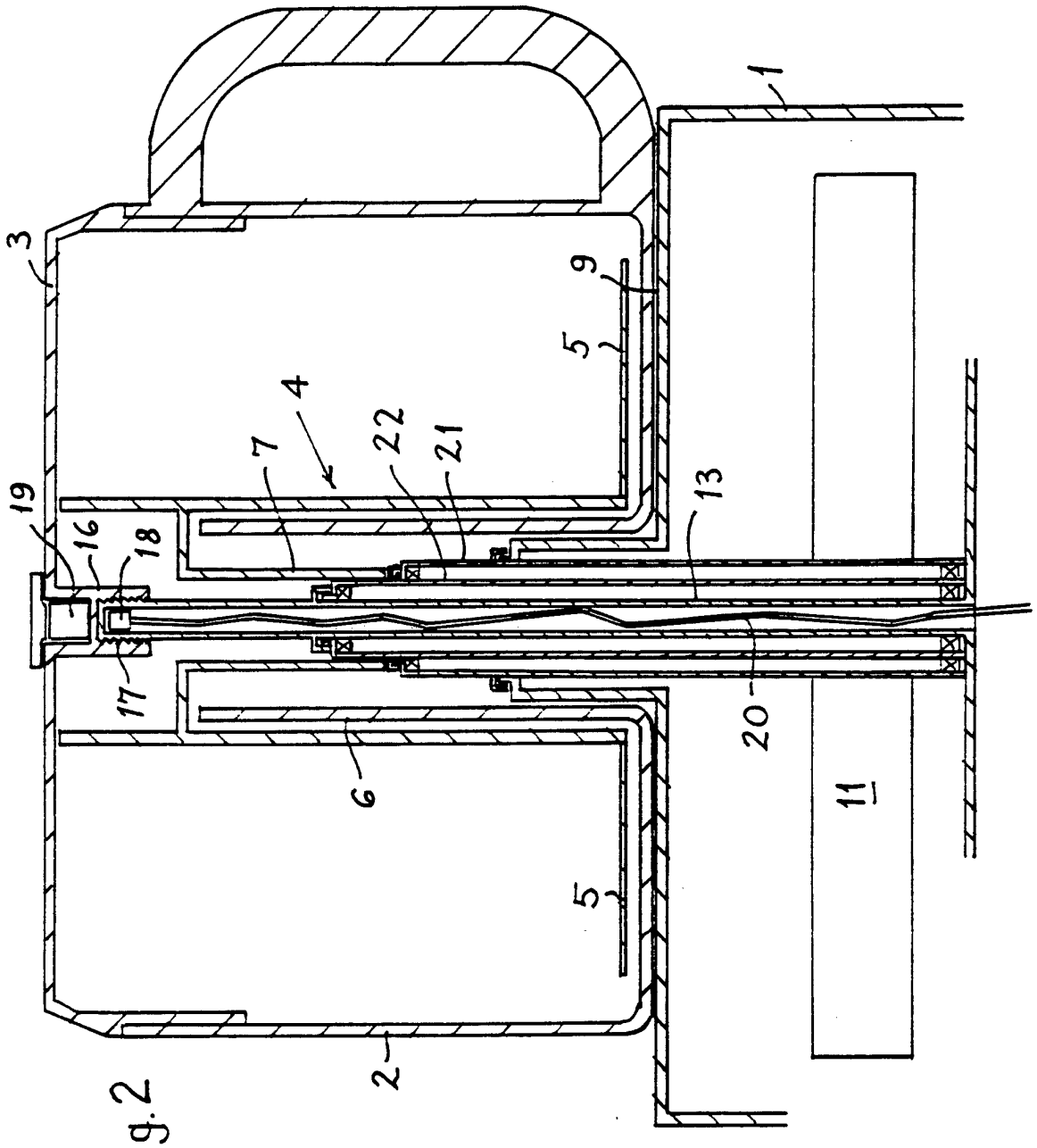


Fig.2

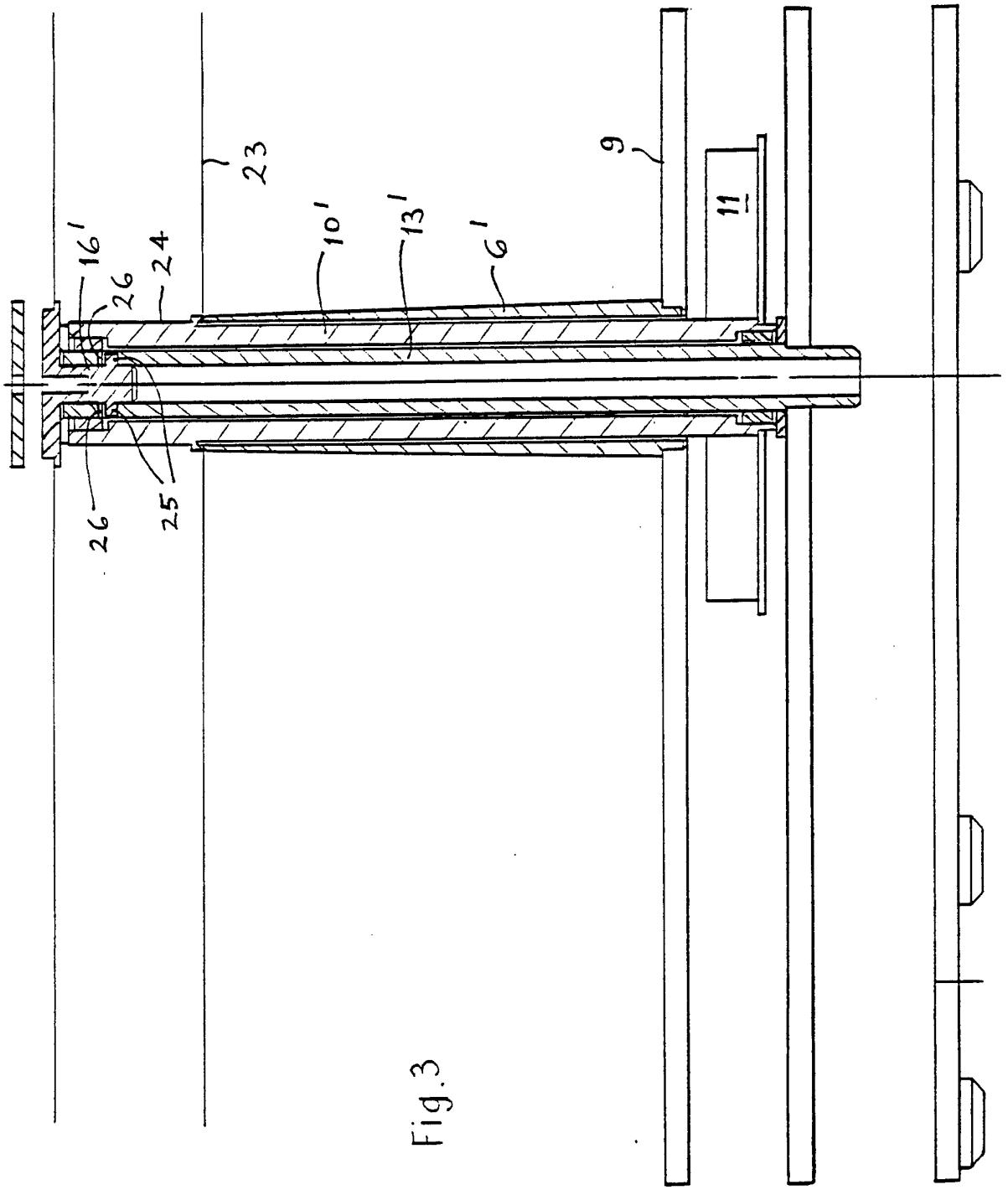


Fig.3

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/GB 94/00062

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 A47J43/046 A47J43/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO,A,86 05658 (M. LOISELET) 9 October 1986 see abstract; figures 5,7 ---	1-3,10
Y	DE,U,89 12 794 (ROBERT KRUPS STIFTUNG) 4 January 1990	1,6-8,10
A	see page 22, paragraph 5 - page 23, paragraph 1; figures 2,3 ---	2,3
Y	DE,A,35 40 370 (BRAUN AG) 21 May 1987	1,6-8,10
A	see abstract; figures 1,2 ---	9
A	CH,A,554 139 (PROSENBAUER & CO.) 30 September 1974 see column 3, line 12 - line 63; figure 1 ---	1-4
A	EP,A,0 270 851 (BRAUN AG) 15 June 1988 see column 4, line 15 - column 5, line 7; figures 1,5,6 ---	1
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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4 May 1994	10. 06. 94

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,92 02168 (BRAUN AG) 20 February 1992 see page 5, paragraph 3 - page 6, paragraph 2; figure ---	1
A	DE,U,89 03 247 (N.V. PHILIPS GLOEILAMPENFABRIEKEN) 11 May 1989 see page 2, line 33 - line 38; figure 1 -----	5

INTERNATIONAL SEARCH REPORT

...information on patent family members

Inter nal Application No
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