(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 719 988 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.07.1996 Bulletin 1996/27

(51) Int Cl.[6]: **F24C 15/20**

(21) Application number: **95500172.2**

(22) Date of filing: **19.12.1995**

(84) Designated Contracting States:
DE FR GB IT PT

(30) Priority: **19.12.1994 ES 9402648**

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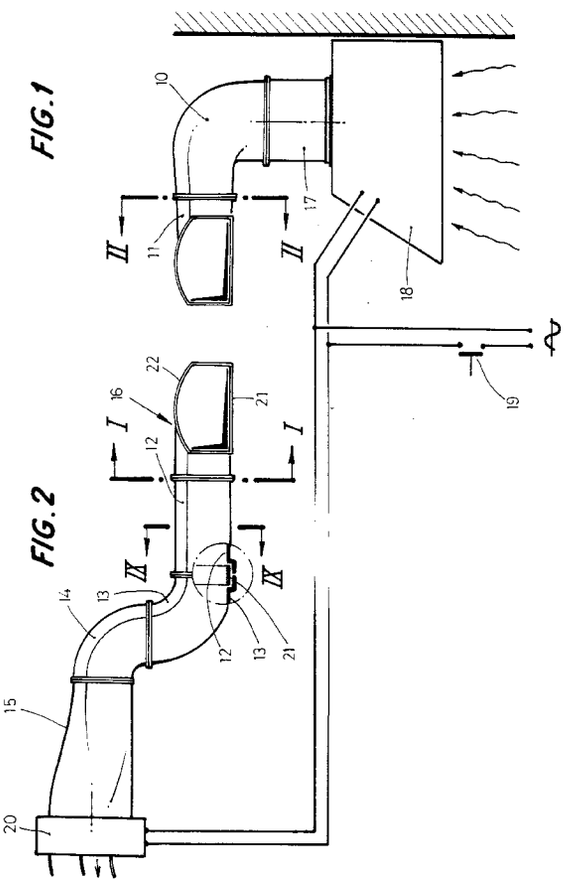
(54) A fume and vapour removal setup

(57) The setup comprises a succession of pipe lenghts (10), (11), (12), (13), (14), (15) connected with each other in order to form the general structure of a fume and vapour piping. The passage cross-sectionj of the different pipe lenghts remains aproximately constant all along the piping and is equivalent to that of the outlet of the fume and vapour hood or exhaust device (18). Terminal (20) which is coaxial to the outlet and provided with a grating, includes means to facilitate during the operation of said fume and vapour hood or exhaust device (18) a free passage of the fumes or vapours through the outlet end of the piping. Pipe lenghts, including the bends, consist in sensibly flattened elements one of whose walls (21) is flat and apt to rest on a flat surface whereas at least another of their walls (22) is bulged towards the outside.

FIG.1



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Description

The present invention concerns a fume and vapour removal setup of the type comprising a succession of pipe lengths connected with each other in order to form the general structure of a fume and vapour piping to be connected to an exhausting unit such as a fume and vapour hood or exhaust device for cooking ranges and the like (bathrooms, enclosures to be ventilated, etc.), the interior of said exhauster being generally divided in two chambers which are namely a suction lower one and a delivery upper one between which are arranged at least a fan or turbine driven by an electromotor and filtering means of diverse nature, said delivery chamber ending in a duct to which said fume and vapour piping is connected.

Although in the existing facilities of the above-mentioned type multiple fume removal hoods of simplified assembly and greater complexity, performance and suction-pumping power have been developed such as those described, for example, in documents EP-A-0271457, EP-A-0374102, EP-A-0555676, ES-A-8701538, ES-A-2024749 and ES-A-2028702, the development of the ductings or pipings connected to said fume and vapour removal hoods has not experienced a parallel evolution, the known solutions of the prior art limiting themselves to describing diverse connecting elements (couplings, socket segments, etc.), flexible ducts (of te bellows or telescopic coupling type), double walled pipes, etc. for simplifying the assembly tasks, forming the bendings with bends of different types, allowing to approach the fume and vapour hoods to the fume and vapour generating source, insulating the pipe, etc., so that documents ES-A-474534, ES-A-U1019509, EP-A-0296089, EP-A-427598 and EP-A-0319485 can thus be cited. Thus we are faced with the paradox that the pipings employed, especially if they are of considerable length and include one or several bends, do not allow to make a proper use of the performance of the fume and vapour hoods or exhaust devices, the air, fume and vapour flow through said pipes taking place in an incorrect way in most cases. Thus it has been found in practice that because of their configuration, inner profile, course with sharp bends and with reductions in the sharp bends, and in general because of the fact of having a passage cross-section which is much smaller than that of the outlet pipe of the fume and vapour hood or exhaust device, the pipings employed so far are not sufficiently apt to properly guide the flow of the air, fume and vapour pumped therethrough up to the outside, and in case of an excessive power of the fume and vapour hood or exhauster do even bring about frequent pressure-surge and even flow turning effects.

These noxious effects are sensibly increaased or enhanced in the case of the fume ducts for concealed or unseen laying which extend on top of a kitchen cabinet and are visible only from a distance of about 5 m. from their zone of installation, said ducts having for such a purpose a flat shape with a generally rectangular contour and a passage cross-section which is much smaller than that of the outlet pipe which is directly connected to the delivery chamber of the fume and vapour hood or exhaust device, and also having very sharp bends.

Besides and as is well known, at the ends of said fume and vapour pipings a guard grating is arranged in order to prevent the penetration into the piping of animals or insects which could clog or damage it, said grating generally comprising a shutter consisting of rotatably hinged leaves made of a light material which are lowered by gravity thereby closing the passage, and which have to be raised by the fluid impelled by the fume and vapour hood or exhaust device. Taking into account the losses intervening during the conduction of the fumes and vapours through the piping, the existence of said grating determines in practice an obstacle which adds one more difficulty to the free removal of said fumes and vapours through said outlet or exhaust.

The invention refers precisely to said fume and vapour pipings for concealed lying which as has been said above have been so far built with a flattened shape of generally rectangular cross-section and with rounded edges, and its aim is to obviate the above-mentioned drawbacks, and more specifically to achieve a good conduction of the fumes and/or vapours in the bends thereby facilitating the redirecting of the flow and avoiding pressuree-surge effects and stagnations and in general providing a proper circulation of the sucked flow all throughout the ducting which has besides a configuration that facilitates its installation.

To such an effect a setup is proposed which characteristically integrates a succession of interconnected pipe lengths including various bends in order to adapt itself to any and every necessary geometrical outline of the installation layout, and which is essentially characterized in that:

- the passage cross-section of the different pipe lengths remains substantially constant all along the piping and is equivalent to that of the outlet of the fume and vapour hood or exhaust device, although in general and as per the principles of the invention and depending on the characteristics of the fume and vapour hood or exhaust device a cross-section is considered to be acceptable if it is within a tolerance of ± 15% of that of the hood outlet pipe, this latter being usually a pipe of circular cross-section with a diameter of the order about 12 cm;
- all pipe lengths have a cross-section which has a common and characteristic shape;
- means have been provided to automatically open said grating associated with the piping exhaust outlet terminal in simultaneity with the activation of the fume and vapour hood or exhaust device thereby assuring a free and unhindered circulation of the fumes and vapours;
- the different pipe lengths and bends used comprise

flattened pieces which facilitate their concealment or camouflage but which always have a flat face whereas the directly opposite wall or top is always bulged towards the outside thereby facilitating the circulation of the fumes and vapours, and curved flanks for all bends, and connectors for the connection of the latter to the straight lengths and with each other.

The piping or ducting as per the invention thus allows to use to full advantage the performance characteristics of the fume removal hood. Thus for example considering that the outlet or delivery pipe of the fume and vapour hood or exhauster has a diameter of about 12 cm and admitting all along the ducting a reduction of the passage cross-section of 15% with respect to that of said outlet pipe, the proposed duct will perform properly in connection with fume and vapour hoods or exhaust devices having an output of up to 6,50 m^3/h.

The characteristics of the invention and the advantages provided by it will become more apparent when reading the following description of an exemplifying implementation of the proposed fume and vapour removal setup given with reference to the accompanying sheets of drawings showing a possible embodiment by way of an illustrative and nonlimiting example.

In said drawings:

Figs. 1 and 2 show two consecutive parts of an example (which has been simplified in order to facilitate the drafting and to be in a position to include the basic component pieces) of a fume and vapour piping as per the setup of this invention, whereby said consecutive parts are shown in an elevational view, are connected to a fume removal hood and are respectively sectioned along section lines I-I and II-II;

Fig. 3 is an elevational view of the terminal coupled to the piping outlet or exhaust end;

Figs. 4, 5 and 6 show in perspective view various bends for the connection of the different piping lengths, said bends allowing to carry out all foreseeable reroutings (horizontal bend, horizontal to vertical and vertical to horizontal);

Fig. 7 shows also in perspective view the last pipe length integrating the fume and vapour exhaust piping;

Fig. 8 shows as well in perspective view an element for connecting two pipe lengths;

and finally Figs. 9a to 9c show several alternative cross-sections or variants of the pipe lengths, including the bends, which form the fume and vapour exhaust pipe, built in accordance with the principle inspiring this invention.

According to these Figures the invention is characterized in that the passage cross-section of the different pipe lengths (including the bends) (10), (11), (12), (13), (14) and (15) forming the fume and vapour piping identified in general with numeral (16) remains more or less constant and is equivalent to that of pipe (17) which generally has a circular shape and is the outlet or delivery pipe of a fume and vapour hood (18), and all pipe lengths (10), (11), (12), (13), (14) and (15) have a common cross-section profile. As can be appreciated in Figs. 1 and 2, it has been foreseen that switch (19) which activates the operation of the fume and vapour hood or exhauster (18) will also actuate a device of conventional type (such as for example an electromagnet, not shown) associated to a terminal (20) coupled with end tubular element (15) of the fume and vapour piping (16), said actuation opening a grating which is conventionally included in the opening of said terminal (20) thereby determining a free outlet or exhaust for the circulating air, fume and vapour flow. This allows to facilitate a free circulation of the flow impelled by the fume and vapour hood (18) through ducting (16), as has been explained.

An essential characteristic of the invention is besides the particular configuration and structure of the different pipe lengths (10), (11), (12), (13), (14) and (15) employed which consist in sensibly flattened elements which are apt to pass unnoticed and one of whose walls is flat in order to be in a position to rest on a flat base (top surface of a kitchen cabinet in the most typical case), at least another of their walls being bulged towards the outside and being essentially the one that forms the top of the respective element.

Thus pieces (11) and (13) shown in perspective view in Figs. 5 and 6 have in all cases a flat wall (21) and another convexly curved wall (22) which is bulged towards the outside and is in this case directly opposite the former one.

Bend (10) which is the first pipe length connected to outlet or delivery pipe (17) of the fume and vapour hood or exhaust device, and which is shown in Fig. 4, comprises a tubular body describing a quarter bend which having a first end (10a) of circular cross-section matching the cross-section of said outlet pipe (17) of fume and vapour hood (18) changes its shape progressively towards the other end till forming a length (10b) of essentially rectangular cross-section with rounded edges with a top wall bulging towards the outside and with a flat bottom wall connecting in a descending ramp and curved profile with the lateral wall of length (10a).

And the last pipe length (15) of the fume and vapour piping, shown in Fig. 7, comprises a tubular straight body which having a first end (15a) of essentially rectangular cross-section with rounded edges and with a top wall bulging towards the outside to connect with a straight or bent length of equivalent cross-section of piping (16) changes its shape progressively towards the other end (15b) till forming a cylindrical length which is apt to be connected to terminal (20).

Fig. 8 shows an element for connecting pipe lengths in order to adapt their length, said element consisting of a ring (30) whose profile matches that of pieces (10),

(11), (12), (13), (14) and (15) and whose cross-section is slightly bigger than that of said pieces, said ring having a central inner rib (31) which is apt to receive in a plug-in connection through both ring openings the ends of two ducts (10), (11), (12), (13), (14) or (15).

The profile of the conventional connection between pipe lengths has been illustrated in Fig. 2 in the detail that shows the connection of pieces (12) and (13).

As can be seen, all pipe lengths forming bends (10), (11), (13), and (14) end in a stepped rim (32) at both their openings.

Figs. 9a, 9b and 9c show the cross-sectional shape of several pipe lengths (23), (24), (25) which are apt to be employed to form the fume and vapour removal setup of the invention, and which differ only in the way to form the duct top or vault and in the number of faces bulging towards the outside.

Fig. 3 shows more in detail terminal (20) connected to end pipe length (15) of the fume and vapour piping, said terminal being provided with a grating of horizontal leaves (26) which are made of a light material, are rotatably hinged at their upper part and close by gravity a central opening of said terminal (20) which is coaxial with the passage of said pipe (15). To raise said leaves (26) an electrically operated device such as an electromagnet (not shown) has been provided which moves levers or riders (27) which are rotatably pin-jointed with a first stationary post (28) and are as well linked to a bar (29) attached to the rod of said magnet. A spring counteracts said magnet thereby allowing the leaves to return to an inactive position in case of a power shutdown or trouble, so that even if said magnet does not actuate properly the leaves regain their closed position in any case thereby closing the outlet.

Claims

1. A fume and vapour removal setup of the type comprising a succession of pipe lengths connected with each other in order to form the general structure of a fume and vapour piping to be connected to an exhausting unit such as a fume and vapour hood or exhaust device for cooking ranges or the like, characterized in that the passage cross-section of the different pipe lengths remains aproximately constant and is equivalent to that of the outlet of the fume and vapour hood or exhaust device, means having been provided to facilitate during the operation of said fume and vapour hood or exhaust device a free passage of the fumes or vapours through the outlet end of the piping, and in that all said pipe lenths, including the bends, consist in sensibly flattened elements one of whose walls is flat and apt to rest on a flat surface whereas at least another of their walls is bulged towards the outside.

2. A setup as per the previous claim, characterized in that said wall of the pipe lengths which is bulged towards the outside has a convexly curved profile.

3. A setup as per claim 1, characterized in that said wall of the pipe lengths which is bulged towards the outside has a profile which is formed by a polygon of various sides approximating an arc.

4. A setup as per claim 1, characterized in that said wall bulging towards the outside forms the top of the different pipe lengths.

5. A setup as per claim 1, characterized in that the pipe lengths have a flat wall, two lateral walls bulging towards the outside and a top wall bulging towards the outside.

6. A setup as per claim 1, characterized in that said means provided in order to achieve that during the operation of said fume and vapour hood or exhaust device the fumes or vapours can pass freely through the outlet end of the fume and vapour piping consist in a terminal connected to the exhaust end of said piping and provided with a grating of horizontal leaves which are rotatably hinged at their upper part and close by gravity said exhaust end, said terminal incorporating an electrically operated device which is activated together with said fume and vapour hood or exhaust device thereby raising said leaves and thus providing a free opening at said exhaust outlet.

7. A setup as per claim 1, characterized in that the first pipe length connected to the outlet pipe or delivery outlet of the fume and vapour hood or exhaust device comprises a tubular body describing a bend which having an end of circular cross-section matching the cross-section of said outlet pipe changes its shape progressively towards the other end till forming a length of essentially rectangular cross-section with rounded edges with a top wall bulging towards the outside and with a passage cross-section which is substantially equivalent to that of said outlet pipe of the fume and vapour hood or exhauster.

8. A setup as per claim 1, characterized in that the last pipe length forming the fume and vapour piping comprises a tubular straight body which having an end of essentially rectangular cross-section with rounded edges and with a top wall bulging towards the outside changes its shape progressively towards the other end till forming a cylindrical length.

9. A setup as per claim 6, characterized in that all the remaining bends used to connect the different lengths of the exhaust pipe have their walls corresponding to the inflexion described by the bend

curved, and are provided with a stepped rim at both their openings.

10. A setup as per claim 1, characterized in that the passage cross-section of the different pipe lengths connected to each other to form the fume and vapour piping remains constant all along said ducting exceed or is smaller a 15% than the passage cross-section of the outlet pipe of the fume and vapour hood or exhaust device.

FIG.1

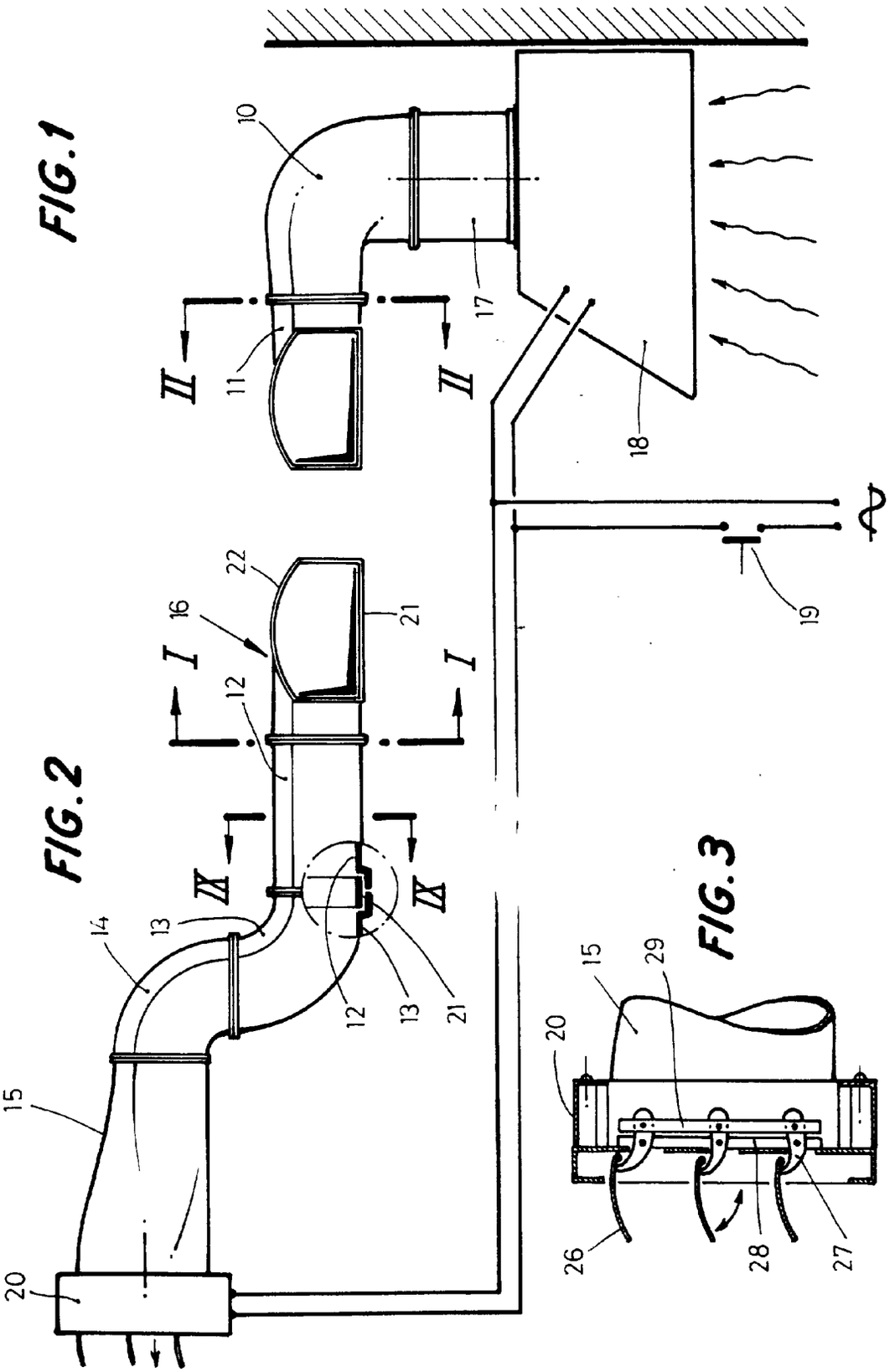


FIG.2

FIG.3

FIG. 5

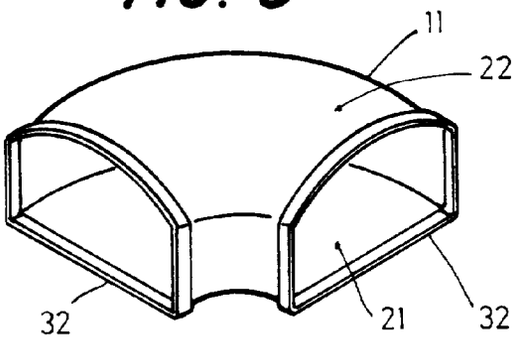


FIG. 4

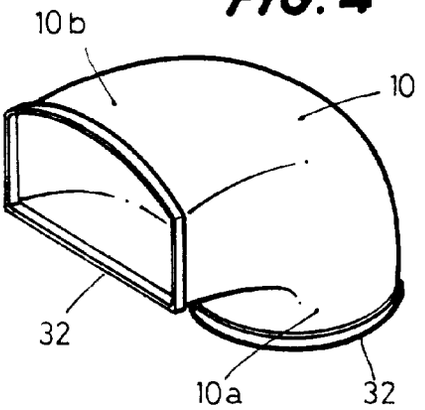


FIG. 7

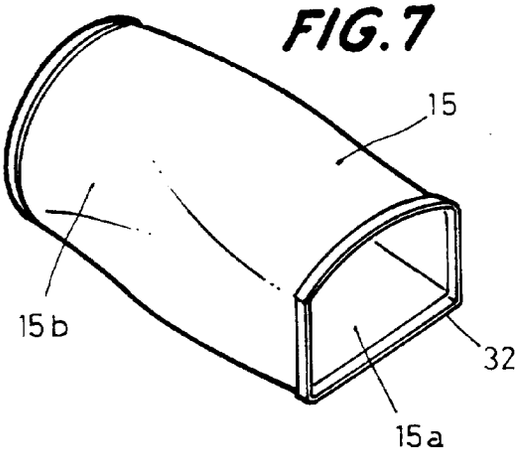


FIG. 6

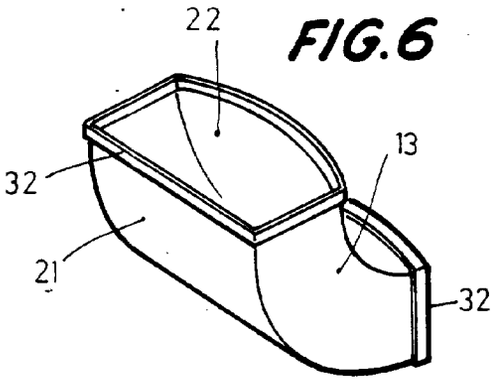
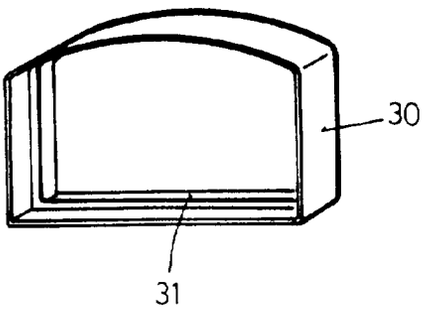


FIG. 8



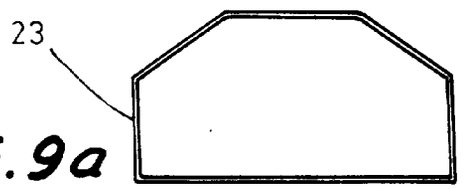


FIG. 9a

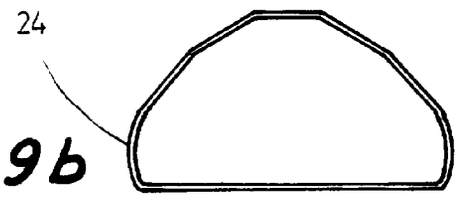


FIG. 9b

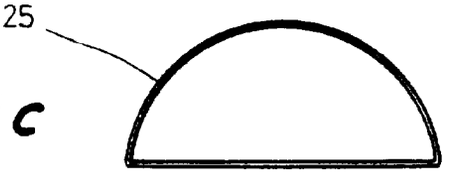


FIG. 9c