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54 **Fire extinguisher.**

57 A fire extinguisher comprises a container 1 formed of a glass or other breakable material, and a fire extinguishing material 2 sealed in the container 1.

The container 1 is detachably mounted on a ceiling or wall of a room by means of end caps 4 and 5 having projections 6 and 7 engaged in grooves 11 and 12 of a U-shaped bracket 10 mounted on the ceiling or wall. The container 1 breaks into pieces when subjected to a specified temperature of less than 100°C to release the fire extinguishing material 2 in all directions.

In another embodiment, a container is provided with many holes plugged with plugs of at least two different melting points or fire points so that under initially the holes with low melting plugs open and if the fire takes hold the holes with higher melting plugs open. The material 2 contains disodium hydrogen phosphate, sodium sulfate, sodium bicarbonate and ammonium carbonate.

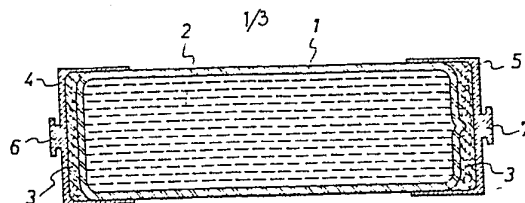


FIG. 1

FIRE EXTINGUISHER

This invention relates to a fire extinguisher which automatically ejects a fire extinguishing material there from, and more particularly to a fire extinguishing material which may prevent the spread of the fire and provide a barrier when a fire occurs by automatically ejecting fire extinguishing material in every direction.

BACKGROUND OF THE INVENTION

Hitherto, there have been proposed many fire extinguishing agents and extinguishing means which automatically extinguish fires. However, such fire extinguishers tend to be complicated to handle, of poor reliability in automatic operation and of complicated structure requiring various control means. In addition, the fire extinguishing agent used is sometimes harmful to human beings and animals and stains furniture and the clothes of persons involved in fire fighting.

SUMMARY OF THE INVENTION

It is a first object of the present invention to provide a relatively simple form of fire extinguisher which may be used to scatter a fire extinguishing material in all directions to extinguish the fire.

It is a second object of the present invention to provide a fire extinguishing material which is not harmful nor stains clothes of persons involved in a fire fighting operation, and yet provides a strong fire extinguishing action or force.

It is a third object of the present invention to provide a relatively simple fire extinguisher which operates with a two or more stage action.

According to a first aspect of the present invention, there is provided a fire extinguisher comprising a container that is so designed as to be broken into pieces, when exposed to heat at a given temperature below 100°C , whereby the container is broken due to the heat produced at the initial stage of the fire, under an increased internal pressure therein, so a fire extinguishing material in the container may be scattered around in every direction for extinguishing the fire.

According to a second aspect of the present invention, there is provided a fire extinguishing material in which three ingredients such as disodium hydrogen phosphate, sodium sulfate and sodium bicarbonate are included and prior art ingredients such as ammonium sulfide and ammonium chloride are replaced by ammonium carbonate, so that there are produced gases which are not harmful to persons involved in the fire fighting and animals therearound and which do not stain clothes of these persons.

According to a third aspect of the present invention, there is provided a fire extinguisher which may be suspended in a space, wherein the fire is anticipated, and which includes a metallic container having many holes in its bottom wall. These holes are closed with plugs of two or more kinds, the plugs of one kind having a relatively low melting point or fire point, and plugs of another kind having a relatively high melting point or fire point, whereby fire extinguishing material in the container is ejected through those holes closed by the plugs having a relatively low melting point when such plugs melt, to extinguish the fire in an initial stage, and the fire extinguishing material is ejected through those holes closed by the plugs having a relatively high melting point or fire point when such plugs melt, to extinguish flames having a strong force. The plugs are melted due to the heat of the fire and blown off due to internal pressure build-up in the container.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross sectional view of one embodiment of a fire extinguisher according to the present invention;

Fig. 2 is a perspective, exploded view showing components of the fire extinguisher of Fig. 1;

Fig. 3A and 3B are perspective views of the fire extinguisher of Figs 1 and 2 in two different mounting modes thereof;

Fig. 4 is a perspective view from underneath of another embodiment of fire extinguisher according to the present invention; and

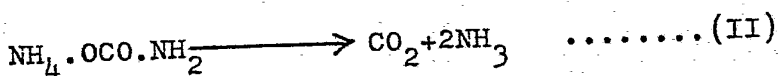
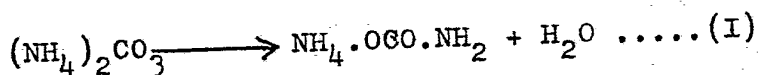
Fig. 5 is a view on a larger scale of part of the fire extinguisher of Fig. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

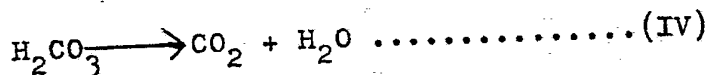
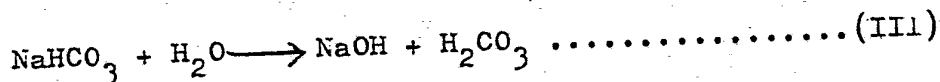
A fire extinguishing material as used in the present invention preferably contains, in weight percent, the following ingredients:

<u>Ingredient</u>	<u>percentage (%)</u>	<u>object of use</u>
burnt alum	2.0	fire protection
water glass	3.0	"
disodium hydrogen phosphate	2.0	"
sodium sulfate	3.0	"
ammonium carbonate	8.0	increasing pressure fire protection
sodium bicarbonate	12.0	"
water	70.0	increasing pressure, fire protection.

The ammonium carbonate in the fire extinguishing material decomposes, when heated to a temperature of 60° to 200°C as follows:-



CO₂ and NH₃ gases produced afford an air shielding action and fire protecting action, thus serving for the initial-fire extinguishing purposes. As the ambient temperature increases sodium bicarbonate keeps producing CO₂ gas according to the following equations.



When the temperature exceeds 200°C , steam is produced vigorously, thereby increasing an internal pressure within a container and increasing the force with which the fire extinguishing material is ejected from the container.

The above fire extinguishing material is packed in a container which is adapted to be broken into pieces when heated at a given temperature below 100°C . When the container is heated to 60° to 70° , CO_2 and NH_3 gases are produced according to the equations (I) to (IV), thus increasing an internal pressure in the container. The internal pressure is also increased as the water vapor pressure increases, thus increasing the volume of the container to break same into pieces. As a result, the fire extinguishing material is scattered in every direction. CO_2 and NH_3 gases thus participate in fire extinguishing, while the water glass and burnt alum produced alumina silicate base compounds which give the desired viscosity. Thus, the alumina silicate compound gives a fire-protective film to cover unburnt substances over a wide area and protect same against catching fire. In other words, a covering function of viscous chemicals, and the fire extinguishing and fire-protective functions of CO_2 and NH_3 gases may be achieved at the same time.

Referring to Figs. 1 and 2, the fire extinguisher comprises a tempered glass container 1 which is adapted to be broken into pieces, instantaneously when heated to a given temperature below 100°C . The container 1 is cylindrical and of circular cross-section although any desired shape may be employed. A fire extinguishing material 2 is sealed in the container 1. Caps 4 and 5 are fitted on axially opposite end portions of the container 1, with spaces left between inner ends of the caps and the ends of the container, in which spaces cushioning pads 3 are provided. Mushroom-shaped projections 6 and 7 are provided at the axially opposite external ends of the caps

4 and 5. A square U-shaped mounting member 10 with holes 9 in its base for receiving screws 8 which are used for receiving screws 8 which are used for attaching the member 10 to a ceiling 13 (Fig. 3A) or side wall 14 (Fig. 3B) of a room. The U-shaped member 10 is further provided with grooves 11 and 12, in the limbs thereof, the grooves 11 and 12 open onto side edges of the limbs. The projections 6 and 7 are engaged in the grooves 11 and 12 so that the container 1 can be detachably supported by the member 10 in a horizontal position spaced from the wall 14 (Fig. 3B) or from the ceiling (3A). In either case, the grooves 11 and 12 slant upwardly towards the openings thereof. The fire extinguisher can be thus mounted in a room in which there is a risk of a fire starting. In the event of a fire, the container 1 is heated by the flames until it is automatically broken or it may be manually thrown by hand at the fire source. As a result, the fire extinguishing material 2 is scattered in all direction to extinguish the fire in the manner described earlier.

Referring now to Figs. 4 and 5, the fire extinguisher comprises a container 1', which is of rectangular box shape although it may be of any shape such as rectangular, square, circular cross-section. The fire extinguishing material 2 is packed in the container 1' which may be suspended from a ceiling 18 as by supports 17 as shown in Fig. 4 or may be directly secured thereto. The container 1' may be made of brass, steel or stainless steel for example. Provided in the undersurface of the container 1' are a suitable number of holes 15 of any suitable size. These holes 15 are plugged with plugs 16 of at least two kinds having melting points or fire points of 60° to 200°C. In this embodiment, each hole 15 is provided with a stepped cylindrical wall of circular cross-section rather than being formed merely by punching the material of the container 1'. The walls may project either outwardly (as shown in Fig. 5) or inwardly of the bottom surface and/or the sides of the container 1'.

by 0.5 to 5mm.

Materials which may be used for the plugs 16 are sulfur (melting point, 114°C), guttapercha (melting point, 60° to 70°C), Wood's metal (melting point, 73°C), Rose's metal (melting point, 110°C) and tin (melting point, 200°C) i.e., a material having a melting point or fire point ranging from 60° to 200°C .

The holes 15 are plugged with the plugs 16 made of suitable material having regard to the positioning and diameters of the holes 15 being taken into consideration.

In the event of fire, when the container 1' is heated to a temperature of 60° to 200°C , the plugs 16 are melted or burnt so that some of the holes 15 are opened, whereupon CO_2 and NH_3 gases carbonate contained in the fire extinguishing material produces CO_2 and formed from the ammonium carbonate according to the equations (I) and (II) cause the fire material to be ejected from the holes 15 in every direction. Thus, the fire at the initial stage may be extinguished by the air shielding function of gases and fire protective functions of chemicals. As the ambient temperature increases sodium bicarbonate keeps producing CO_2 gas according to equations (III) and (IV) above, and when the temperature exceeds 200°C , water is vaporized to produce steam at a high pressure, thus aiding in the forcing of extinguishing material through these holes 15.

In the case where the ambient temperature is relatively low at the initial stage of the fire, only those plugs 16 having a relatively low melting point or fire point are melted or burnt, so that only those holes 15 which are plugged with these plugs are opened for allowing the ejection of the fire extinguishing material in a specific direction or at a source of the fire. If the

fire still takes a hold and the ambient temperature rises still further the holes 15 which are plugged with plugs 16 having a relatively high melting point or fire point are opened thereby allowing the jetting of the fire extinguishing material at a high pressure in every direction. In this manner, the opening of the holes may be suitably timed to suit the anticipated fire conditions. Thus, it is possible that for specific holes are directed towards a limited space, or a source of the fire for providing for the initial extinguishing, while the other holes are directed in every direction, when the force of flames is increased or becomes strong.

The amount of fire extinguishing material used is generally about one liter per 27 cubic metres of space.

CLAIMS

1. A fire extinguisher comprising a container which is so designed as to be capable of breaking into pieces when heated to a given temperature below 100°C , and a fire extinguishing material in the container.

2. A fire extinguisher claimed in claim 1, in which the fire extinguishing material contains, in weight percent, 2.0% burnt alum, 3.0% water glass, 2.0% disodium hydrogen phosphate, 3.0% sodium sulfate, 8.0. ammonium carbonate, and 12.0% sodium bicarbonate.

3. A fire extinguisher comprising a container and a fire extinguishing material in the container, said container including holes provided in at least in a bottom surface thereof, said holes being plugged with plugs made of two or more kinds of materials which have melting points or fire points of 60° to 200°C , the plugs of one kind being melted or burnt when heated to a relatively low temperature whereby a fire extinguishing material is ejected through some of the holes in a specific direction or toward the source of fire, and the plugs of another kind being melted or burnt when heated to a relatively high temperature so that the fire extinguishing material is ejected through the holes in every direction under a pressure of gas produced from said material.

4. A fire extinguisher substantially as hereinbefore described with reference to Figs. 1 and 2 or Figs 4 and 5 of the accompanying drawings.

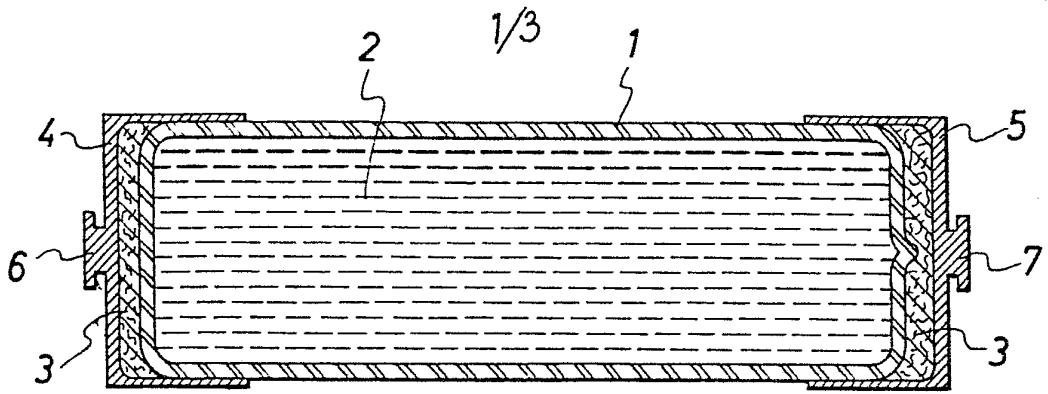


FIG. 1

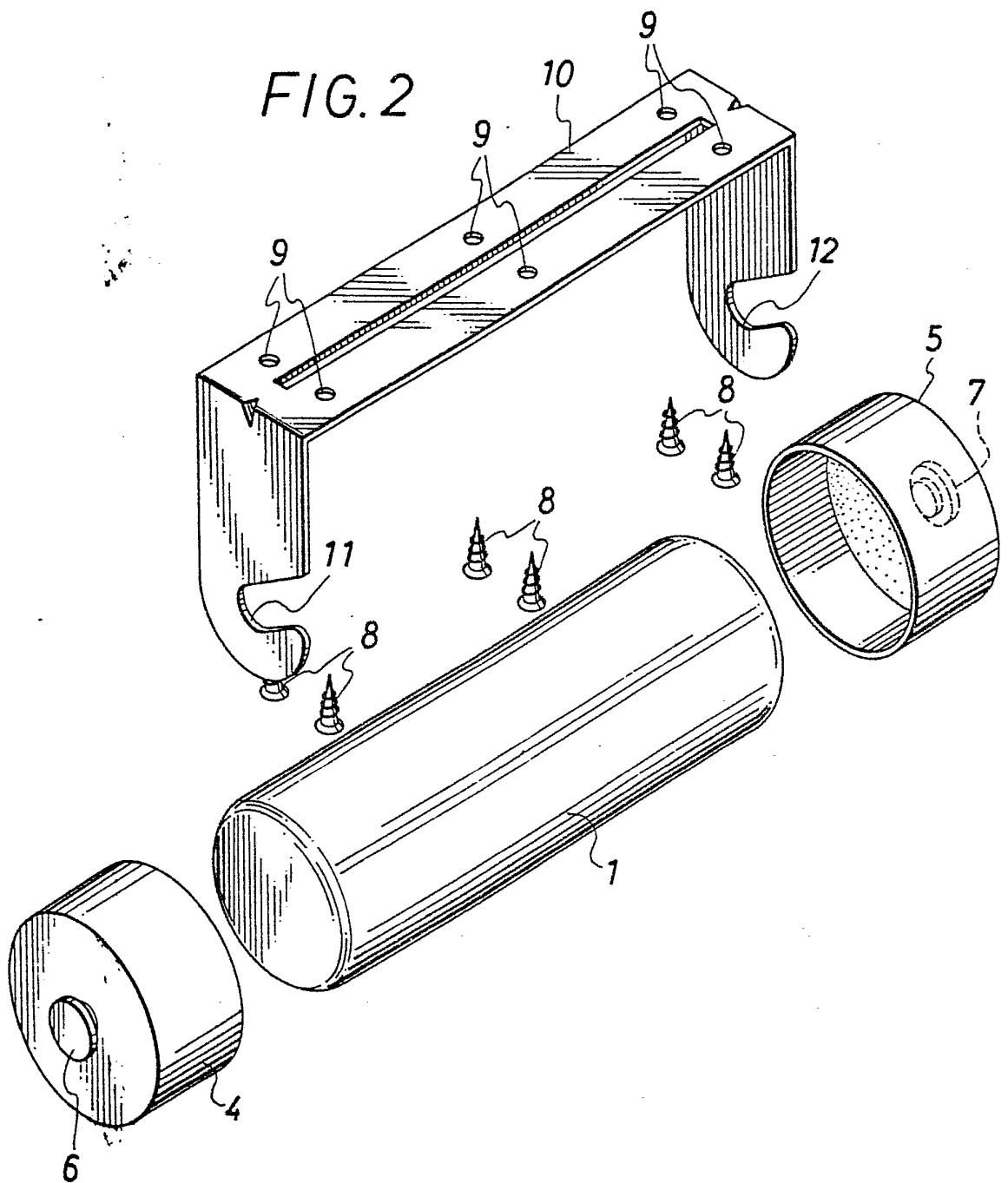


FIG. 2

FIG. 3A 2/3

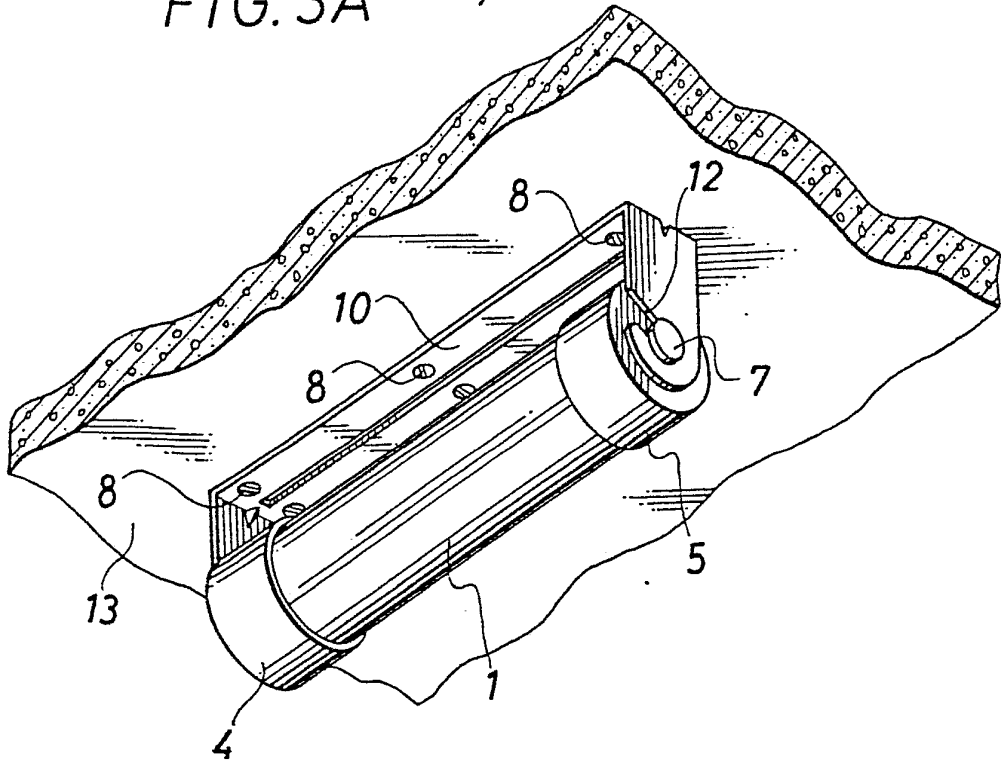


FIG. 3B

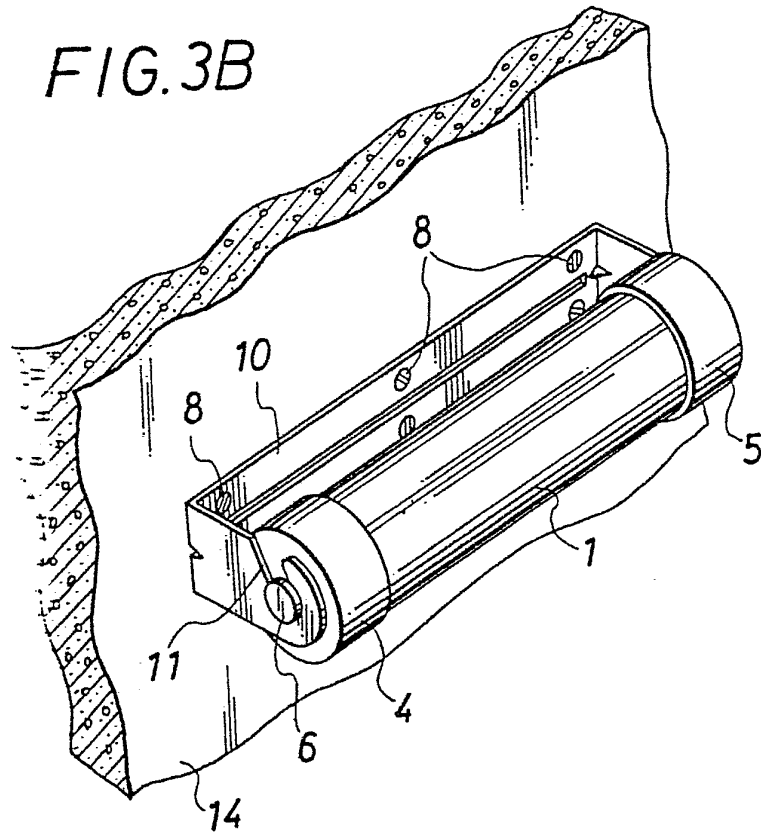


FIG. 4

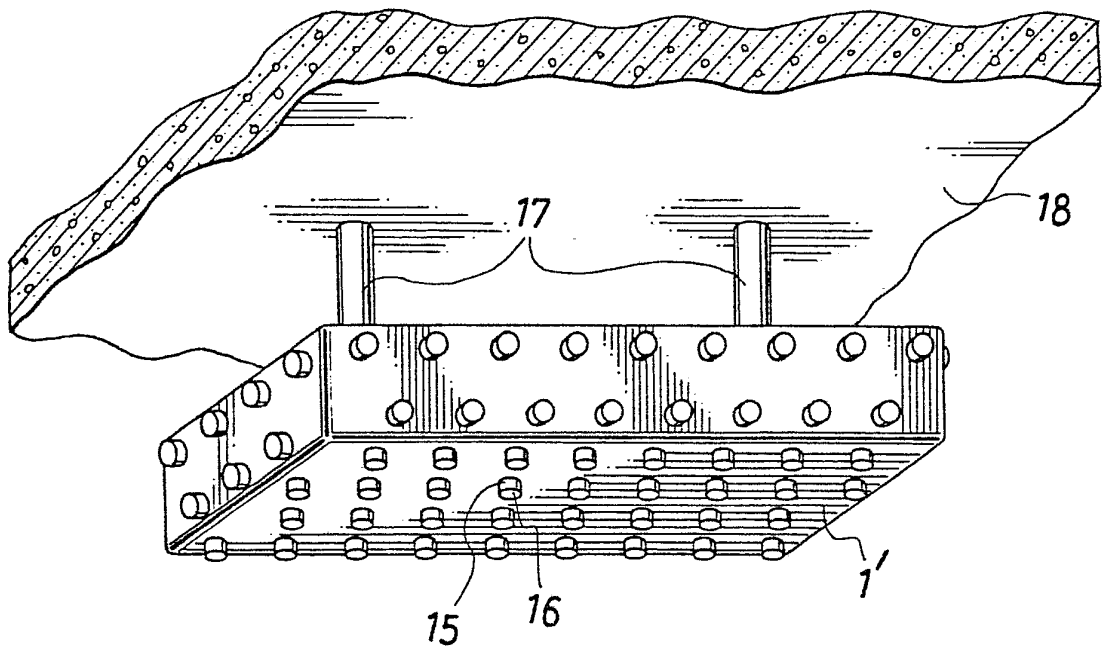
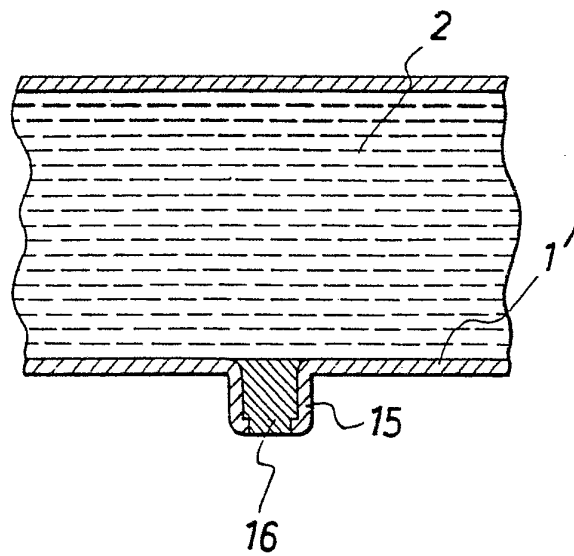


FIG. 5





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PARTIAL EUROPEAN SEARCH REPORT

which under Rule 45 of the European Patent Convention shall be considered, for the purposes of subsequent proceedings, as the European search report

Application number

EP 79 30 62496

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.')
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>US - A - 3 918 526 (HATTORI)</u> * Abstract * --	1,2	A 62 C 35/10 37/12 5/16 TECHNICAL FIELDS SEARCHED (Int. Cl.-) A 62 C
	<u>US - A - 3 172 852 (LOBOS)</u> * Column 3 * --	2	
	<u>US - A - 1 793 420 (BLOCK)</u> * Column 2 * ----	2	
INCOMPLETE SEARCH			CATEGORY OF CITED DOCUMENTS
<p>The Search Division considers that the present European patent application does not comply with the provisions of the European Patent Convention to such an extent that it is not possible to carry out a meaningful search into the state of the art on the basis of some of the claims.</p> <p>Claims searched completely: 1,2 Claims searched incompletely: 4 Claims not searched: 4 Reason for the limitation of the search:</p> <p>Claim 4: Inadmissible according to rule 29(6) E.P.C.</p>			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&. member of the same patent family. corresponding document
Place of search	Date of completion of the search	Examiner	
The Hague	12-10-1979	LUKAS	