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EUROPEAN PATENT SPECIFICATION

④⑤ Date of publication of patent specification: **19.04.89**

⑤① Int. Cl.⁴: **A 47 G 21/18, B 65 D 85/08,**
B 65 B 19/34

②① Application number: **84106133.6**

②② Date of filing: **29.05.84**

⑧⑧ **Divisional application 88101820 filed on 08.02.88.**

⑤④ **A rod-like body.**

③⑧ Priority: **31.05.83 JP 81310/83 u**
30.06.83 JP 117162/83
28.12.83 JP 199472/83 u

⑦③ Proprietor: **SHOWA DENKO K.K.**
13-9, Shiba Daimon 1-chome
Minato-ku, Tokyo 105 (JP)

④③ Date of publication of application:
05.12.84 Bulletin 84/49

⑦② Inventor: **Hoshi, Katsumasa**
3073, Uruido
Hasuda-shi Saitama-ken (JP)
Inventor: **Mizushima, Kyohei**
2-1-1-206, Midoridai
Funabashi-shi Chiba-ken (JP)

④⑤ Publication of the grant of the patent:
19.04.89 Bulletin 89/16

⑧④ Designated Contracting States:
DE FR GB IT LU

⑦④ Representative: **Liska, Horst, Dr. et al**
Patentanwälte H. Weickmann, Dr. K. Fincke, F.A.
Weickmann, B. Huber, Dr. H. Liska, Dr. J.
Prechtel Möhlstrasse 22 Postfach 86 08 20
D-8000 München 86 (DE)

⑤⑥ References cited:
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EP-A-0 139 074
DE-U-1 912 368
GB-A- 904 010
US-A-4 340 175

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Description

The present invention relates to a freely elongatable two-stage type of pipe comprising a larger-diameter pipe member having a thinner portion and a smaller-diameter pipe member inserted into said larger-diameter pipe member and having an expanded portion at one end thereof, said pipe members being so adapted as to be brought into mutual contact on the thinner portion when said smaller-diameter pipe member is inserted into said larger diameter pipe member (known from GB—A—904 010).

A conventional sucking pipe consists, in most cases, of a single thin cylindrical body. The sucking pipe consisting of a single cylindrical body must be longer than depth of the beverage vessel to be combined with it. However, such a long pipe is inconvenient for storage, carriage, conveyance and attachment to vessels.

For this reason, there have already been developed freely elongatable two-stage types of pipes consisting of larger-diameter pipes into which smaller-diameter pipes are inserted.

An example of such freely elongatable two-stage type of pipes has the composition shown in Fig. 1. An enlarged sectional view of a portion of the freely elongatable two-stage type of pipe is shown in Fig. 1 wherein the reference numerals 1 and 2 represent a pipe member having a larger diameter and another pipe member having a diameter slightly smaller than that of the pipe member 1 which are so combined as to form a freely elongatable pipe. Further, tip of the smaller-diameter pipe member 2 on the side inserted into the larger-diameter pipe member 1 is expanded, for example, in a trumpet shape. When the smaller-diameter pipe member 2 is inserted into the larger-diameter pipe member 1, the expanded tip is brought into contact under pressure with the inside surface of the larger-diameter pipe member, thereby preventing the smaller-diameter pipe member 2 from coming out of the larger-diameter pipe member 1 under the own weight of the former pipe member.

The freely elongatable two-stage type of sucking pipe is so designed as to be shortened for convenience of storage, carriage, etc. by displacing the smaller-diameter pipe member 2 relative to the larger-diameter pipe member 1, and elongated for sucking beverage, etc. by drawing out the smaller-diameter pipe member 2 from the larger-diameter pipe member 1.

This freely elongatable two-stage type of sucking pipe has a defect that it allows leakage of breath or sucked liquid when close contact is not obtained between the expanded portion 2a at the tip of the smaller-diameter pipe member 2 and inside surface of the larger-diameter pipe member 1.

Further, close contact is obtained only between the expanded portion 2a at the tip of the smaller-diameter pipe member and inside surface of the larger-diameter pipe member, whereas outside diameter of the smaller-diameter pipe member is

slightly smaller than the inside diameter of the larger-diameter pipe member at the other section. As a result, sufficient stability cannot be assured in drawing out the smaller-diameter pipe member 2 from the larger-diameter pipe member 1.

Moreover, both the pipe members are different in diameter only in the freely elongatable two-stage type of sucking pipe. In addition, both the pipe members are actually thin as shown on a larger scale in Fig. 1, thereby making it impossible to easily judge whether the sucking pipe is of the two-stage type or consists of a single pipe member. Rod-like bodies 5 such as the freely elongatable two-stage type of pipes are generally prepared as packages wherein said rod-like bodies are arranged parallelly at certain definite intervals between upper and lower belt-like plastic films 3 and 4 having a constant width, for example, as shown in Fig. 2, cut into each package containing a rod-like body and attached to beverage vessels as shown in Fig. 3.

Since the package in which rod-like bodies are packed successively at certain definite intervals are made of the films 3 and 4 welded at spots 6 and edges 7 on both the sides of the films, there remain gaps at portions 8 in the areas around the rod-like bodies and portions 9 between the welded spots 6. Therefore, liquid may penetrate from these gaps. It will be almost impossible to remove liquid after it penetrates from the gaps; When liquid penetrates into the packages and remains therein for a long time, it is rotted to result in undesirable effect on sanitation.

From GB—A—904 010 is known a telescopic, freely elongatable drinking straw consisting of a larger-diameter pipe member and a smaller-diameter pipe member slidable in the larger-diameter pipe member. The larger-diameter pipe member has at one end thereof a thinner portion with which it tightly encloses the smaller-diameter pipe member, whereas the smaller-diameter pipe member has at one end thereof an expanded portion with which it closely contacts the inner side of the larger-diameter pipe member. A similar telescopic drinking straw is known from EP—A—139 074 (not prepublished).

Finally, there is known from DE—U—1 912 368 a telescopeable drinking straw consisting of two pipe members inserted one into the other, the pipe members of which drinking straw are of differently colored material, for example synthetic plastic material.

It is an object of the invention to provide a freely elongatable two-stage type of pipe which is simple to manufacture and in which the two pipe members are sealed against each other better than in conventional two-stage types.

In accordance with the invention, this object is accomplished in that said larger-diameter pipe member is made of propylene type of polymers having a melt flow index of $1.167 \cdot 10^{65}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) and stiffness of 10^8 to $1.3 \cdot 10^8$ kg/m² (10000 to 13000 Kg/cm²), and said smaller-diameter pipe member is made of propylene type of pglymers having a melt flow

index of $1.167 \cdot 10^{-5}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) and stiffness of more than $1.35 \cdot 10^8$ kg/m² (13500 Kg/cm²).

Particular embodiments of the invention are set out in dependent Claims 2 and 3.

Hereinafter the invention will be explained in greater detail with reference to a drawing in which

Fig. 1 shows a sectional view illustrating the conventional freely elongatable two-stage type of pipe;

Fig. 2 shows a diagram illustrating packages of the conventional pipes;

Fig. 3 shows a perspective view illustrating the package attached to a beverage vessel;

Fig. 4 shows a sectional view illustrating the freely elongatable two-stage type of pipe according to the present invention;

Fig. 5 shows a perspective view illustrating the freely elongatable two-stage type of pipe according to the present invention;

Fig. 6 shows a sectional view illustrating an end of the larger-diameter pipe member of the freely elongatable two-stage type of pipe according to the present invention;

Fig. 7 shows a perspective view illustrating an outline of a metallic mold for forming the end of the larger-diameter pipe member of the freely elongatable two-stage type of pipe according to the present invention and

Fig. 8 shows a plan view descriptive of a process for successively forming said end of the larger-diameter pipe member.

Fig. 4 shows Embodiment 1 of the freely elongatable two-stage type of pipe. In the Embodiment 1 shown in this drawing, the larger-diameter pipe member 11 has a diameter a little smaller at one end portion 11a thereof than that of the other portion 11b. As a result, when an expanded portion 12a is formed at the end of the smaller-diameter pipe member 12, it can be brought into contact under light pressure with the inside surface of the end portion 11a of the larger-diameter pipe member 11. Accordingly, when the smaller-diameter pipe member is drawn out or pushed in, the inside surface of the end portion 11a of the larger-diameter pipe member slides while being kept in contact with the outside surface of the smaller-diameter pipe member, thereby making it possible to shift the smaller-diameter pipe member in stable condition.

The freely elongatable two-stage type of sucking pipe shown in Fig. 1 or Fig. 2 consists of a larger-diameter pipe member and a smaller-diameter pipe member which are different slightly in their diameters only, and is apt to be judged as if it were composed of a single pipe member.

Different colors are selected for the larger-diameter pipe member and smaller-diameter pipe member. For example, the larger-diameter pipe member 11 and smaller-diameter pipe member 12 shown in Fig. 5 are colored, for example, red and white respectively. The difference in colors of the larger-diameter pipe member 11 and smaller-diameter pipe member 12 is effective to suggest

that the sucking pipe is of the freely elongatable two-stage type which is to be used in elongated condition, for example, after drawing out the smaller-diameter pipe member 12 from the larger-diameter pipe member. The difference in colors is useful also for discriminating the larger-diameter pipe member from the smaller-diameter pipe member in the stage to combine these pipe members and advantageous for the combining stage. The colors of red and white are selected as an example for the larger-diameter pipe member and smaller-diameter pipe member, and proper selection of colors will be effective for obtaining aesthetic appearance of the pipe members. Instead of different colors, one and the same color but different in shade will also be selectable for the larger-diameter pipe member and smaller-diameter pipe member. In addition, either one of the pipe members may be colored without coloring the other member. In this case, coloring material of half a quantity will be sufficient.

The larger-diameter pipe member and smaller-diameter pipe member can be colored at the stage of forming said members by a means such as extrusion molding.

Even for manufacturing a freely elongatable two-stage type of sucking pipe which is not colored, the larger-diameter pipe member and smaller-diameter pipe member are formed separately, and these members are combined to prepare the sucking pipe. Therefore, any special or additional stage is not necessary for preparing colored sucking pipes since a material blended with coloring agent or colored material can be used for forming each pipe member. When either one of the pipe members is formed in the color of its material, it is sufficient to color the other pipe member only. Synthetic resins, papers and so on will be usable as materials for the freely elongatable two-stage type of sucking pipe described above.

Now, the freely elongatable two-stage type of sucking pipe will be described. This embodiment has a form which is substantially the same as that shown in Fig. 1 or Fig. 4b, but is characterized in that the materials for the larger-diameter pipe member and smaller-diameter pipe member have the properties described below.

Speaking concretely, the larger-diameter pipe member is made of a propylene type of polymer having a melt flow index (JIS K 6758) of $1.167 \cdot 10^{-5}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) and stiffness (ASTM D747) of 10^8 to $1.3 \cdot 10^8$ kg/m² (10000 to 13000 kg/cm²), whereas the smaller-diameter pipe member is made of a propylene homopolymer having a melt flow index of $1.167 \cdot 10^{-5}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) and stiffness of more than $1.35 \cdot 10^8$ kg/m² (13500 kg/cm²).

When the above-mentioned materials are selected for the larger-diameter pipe member and smaller-diameter pipe member, it is possible to form the larger-diameter pipe member so as to have an inside diameter slightly smaller, for example, 1 to 1/10 mm, than outside diameter of

the expanded portion of the smaller-diameter pipe member, and prepare a freely elongatable two-stage type of sucking pipe by forcibly inserting the expanded portion of the smaller-diameter pipe member into the larger-diameter pipe member. In other words, by selecting the propylene type of polymer having stiffness of 10^8 to $1.3 \cdot 10^8$ kg/m (10000 to 13000 kg/cm²) for the larger-diameter pipe member, it is possible to make said pipe member elastic and a little stiff, and insert the expanded portion of the smaller-diameter pipe member into the larger-diameter pipe member even when the expanded portion of the smaller-diameter pipe member has an outside diameter larger than the inside diameter of the larger-diameter pipe member as described above. Further, when a propylene homopolymer having stiffness of more than $1.35 \cdot 10^8$ kg/m² (13500 kg/cm²) is selected for the smaller-diameter pipe member in combination with the above-mentioned material of the larger-diameter pipe member, the expanded portion of the smaller-diameter pipe member is made of a suitable material to assure close contact with the inside surface of the larger-diameter pipe member.

Improved moldability is obtained by selecting synthetic resin materials having melt flow index of $1.167 \cdot 10^{-5}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) for both the pipe members. Productivity will be lowered to half level or so if synthetic resin materials of these pipe members have melt flow index smaller than $1.167 \cdot 10^{-5}$ kg/s (7 g/10 min). If synthetic resin materials of these pipe members have melt flow index exceeding $2.333 \cdot 10^{-5}$ kg/s (14 g/10 min), in contrast, dimensional precision will extremely be degraded. As propylene type of polymers having melt flow index of $1.167 \cdot 10^{-5}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) and stiffness of 10^8 to $1.3 \cdot 10^8$ kg/m² (10000 to 13000 kg/cm²) to be used as the above mentioned material for the larger-diameter pipe member, there are known ethylene propylene block copolymers having 10 to 40% by weight of ethylene, propylene homopolymers blended with polyethylene having low molecular weight, etc.

When the above-mentioned ethylene propylene block copolymers have ethylene contents lower than 10% by weight, softness will be insufficient. When ethylene content exceeds 40% by weight, in contrast, softness will undesirably be too high.

Further, when a high density polyethylene is used as material for the larger-diameter pipe member and smaller-diameter pipe member, stiffness will be insufficient, thereby degrading dimensional precision and roundness. When a low density polyethylene is used as material, stiffness is further insufficient, thereby making dimensional precision and roundness also insufficient.

Now, a continuous molding process for forming the expanded portion 2a of the smaller-diameter pipe member 2 shown in Fig. 1 and thinner portion 11a of the larger-diameter pipe member 11 shown in Fig. 4 will be described. These portions are generally formed by cold forming or hot forming such as vacuum forming

and air pressure forming. The process is continued to perform continuously while shifting an object to be molded (for example, the larger-diameter pipe member). The process as explained is not part of the invention.

Fig. 6 shows the portion to be formed (socket portion) 11a of the larger-diameter pipe member selected here as an object to be formed. Fig. 7 show an assembly 15 of metallic molds 16 to be used for forming the socket portion 11a of the larger-diameter pipe member 11. Each metallic mold 16 has a vacant space for containing the larger-diameter pipe member 11 and is so constructed as to form the socket portion 11a. The assembly 15 of the metallic molds may be used in a plural number as occasion demands.

Fig. 8 shows a plan view illustrating the continuous forming process wherein larger-diameter pipe members 11 as objects to be formed are arranged at definite intervals on a conveyor 17. When the conveyor 17 is placed in operating condition, the larger-diameter pipe members 11 are shifted consecutively and continuously at the definite intervals in the direction indicated by the arrow A. Reference numeral 15 denotes the assembly of the metallic molds shown in Fig. 7 which is arranged along the conveyor 17 on the side for shaping the larger-diameter pipe members 11.

This assembly 15 of the metallic molds is shifted in the direction indicated by the arrow B which is the same as the travelling direction A of the conveyor 17 and at the same speed as the travelling speed of the conveyor 17 and, at the same time, in the direction indicated by the arrow C. That is to say, the assembly 15 of metallic molds is shifted in the direction determined as a composite of the shifting at the same speed as that of the conveyor 17 in the direction indicated by arrow B and shifting at an optional speed in the direction indicated by the arrow C. By this shifting, the assembly 15 of metallic molds advances in the direction indicated by the arrow C, i.e., approaches toward the larger-diameter pipe members 11, for example, represented by the reference numeral 18 in Fig. 8, while shifting side by side with the larger-diameter pipe members in the shifting direction of the conveyor 17. Accordingly, each of the larger-diameter pipe members within the range indicated by the reference numeral 18 is brought into close contact with each metallic mold 16 of the assembly 15. At this stage, it is preferable to provide stopper members on the conveyor to prevent the larger-diameter pipe members from being deviated. While each of the larger-diameter pipe members is shifted for a definite time (definite distance) in the condition kept in close contact with each metallic mold 16, one end of each pipe member 11 is formed into a socket-like shape as shown in Fig. 6. Upon completing the forming, the assembly 15 of metallic molds is shifted in the direction indicated by the arrow B at the same speed (as the shifting speed of the conveyor (17) and, at the same time, in the direction opposite to that indicated by the arrow

C. That is to say, the assembly 15 performs shifting determined as a composite of the shifting in the direction indicated by the arrow B and shifting in the direction opposite to that indicated by the arrow C. By this shifting, the assembly 15 of metallic molds separates from the larger-diameter pipe members 11. At this stage, it is preferable to provide suitable clamp members which serve for fixing the larger-diameter pipe members 11 to the conveyor 17 in order to prevent the larger-diameter pipe members from adhering to the metallic molds 16 and shifting in directions deviating from the conveyor 17.

When the assembly 15 of metallic molds separates for a certain distance from the conveyor 17 or larger-diameter pipe members 11, it is shifted in the direction opposite to that indicated by the arrow B for circulation along a track. At this stage, the assembly 15 of metallic molds may be shifted not in the direction opposite to that indicated by the arrow C but straight in the direction opposite to that indicated by the arrow B. Alternatively, the assembly 15 of metallic molds may be shifted in the direction determined as a composite of shifting in the direction opposite to that indicated by the arrow B and shifting in the direction opposite to that indicated by the arrow C.

One cycle of the assembly 15 of metallic molds completes as described above. Then the assembly repeats the same cycle. In addition, a single or plural number of the assembly 15 of metallic molds may be circulated to bring each of the plural number of the larger-diameter pipe members within the range indicated by the reference numeral 19 into close contact with each metallic mold 16 for forming the socket-like shape on said larger-diameter pipe member.

By repeating the operations described above, the larger-diameter pipe members are shaped consecutively in a unit of plural numbers (within the ranges indicated by the reference numerals 18 and 19 in Fig. 8) without stopping their shifting. In addition, independent metallic molds may be adopted in place of the above-mentioned assembly 15 of metallic molds.

The foregoing descriptions are given for an example to form the socket-like shape 11a on the larger-diameter pipe members 11. However, the Embodiment is applicable to other processes, for example, to form the expanded portions on the larger-diameter pipe members shown in Fig. 1 or Fig. 4, to cut off pipe members and form slits in pipe members.

Claims

1. A freely elongatable two-stage type of pipe comprising a larger-diameter pipe member (11) having a thinner portion (11a), and a smaller-diameter pipe member (12) inserted into said larger-diameter pipe member and having an expanded portion (12a) at one end thereof, said pipe members being so adapted as to be brought into mutual contact on the thinner portion (11a) when said smaller-diameter pipe member (12) is

inserted into said larger-diameter pipe member (11), characterized in that said larger-diameter pipe member (11) is made of propylene type of polymers having a melt flow index of $1.167 \cdot 10^{-5}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) and stiffness of 10^8 to $1.3 \cdot 10^8$ kg/m² (10000 to 13000 Kg/cm²), and said smaller-diameter pipe member (12) is made of propylene type of polymers having a melt flow index of $1.167 \cdot 10^{-5}$ to $2.333 \cdot 10^{-5}$ kg/s (7 to 14 g/10 min) and stiffness of more than $1.35 \cdot 10^8$ kg/m² (13500 Kg/cm²).

2. A freely elongatable two-stage type of pipe according to Claim 1, characterized in that said larger-diameter pipe member (11) is made of ethylene propylene block copolymers having 10 to 40% by weight of ethylene.

3. A freely elongatable two-stage type of pipe according to Claim 1, characterized in that said larger-diameter pipe member (11) is made of propylene homopolymer blended with polyethylene having a low molecular weight.

Patentansprüche

1. Frei verlängerbares Rohr der Zweistufenbauform, welches ein durchmessergrößeres Rohrteil (11) in einem dünneren Abschnitt (11a) und ein durchmesserkleineres Rohrteil (12) aufweist, das in das durchmessergrößere Rohrteil eingeführt ist und einen erweiterten Abschnitt (12a) an einem Ende hiervon hat, wobei die Rohrteile derart ausgelegt sind, daß sie wechselseitig in Kontakt an dem dünneren Abschnitt (11a) bringbar sind, wenn das durchmesserkleinere Rohrteil (12) in das durchmessergrößere Rohrteil (11) eingeführt ist, dadurch gekennzeichnet, daß das durchmessergrößere Rohrteil (11) aus einem Polymer des Propylentyps mit einem Schmelzflußindex von $1,167 \cdot 10^{-5}$ bis $2,333 \cdot 10^{-5}$ kg/s (7 bis 14 g/10 min) und einer Steifigkeit von 10^8 bis $1,3 \cdot 10^8$ kg/m² (10 000 bis 13 000 kg/cm²) besteht, und daß das durchmesserkleinere Rohrteil (12) aus einem Polymer des Propylentyps hergestellt ist, das einen Schmelzflußindex von $1,167 \cdot 10^{-5}$ bis $2,333 \cdot 10^{-5}$ kg/s (7 bis 14 g/10 min) und eine Steifigkeit von mehr als $1,35 \cdot 10^8$ kg/m² (13 500 kg/cm²) hat.

2. Frei verlängerbares Rohr der Zweistufenbauform nach Anspruch 1, dadurch gekennzeichnet, daß das durchmessergrößere Rohrteil (11) aus Ethylenpropylen-Blockcopolymeren besteht, die 10 bis 40 Gew.-% Ethylen haben.

3. Frei verlängerbares Rohr der Zweistufenbauform nach Anspruch 1, dadurch gekennzeichnet, daß das durchmessergrößere Rohrteil (11) aus Propylenhomopolymer besteht, das mit Polyethylen gemischt ist, das ein niedriges Molekulargewicht hat.

Revendications

1. Tuyau librement allongeable du type à deux étages, comprenant un élément de tuyau de plus grande diamètre (11) possédant une partie plus mince (11a), et un élément de tuyau de plus petit

diamètre (12) inséré dans l'élément de tuyau de plus grand diamètre et possédant à une extrémité une partie élargie (12a), les éléments de tuyau étant conçus de manière à être amenés en contact mutuel sur la partie plus mince (11a) lorsque l'élément de tuyau de plus petit diamètre (12) est inséré dans l'élément de tuyau de plus grand diamètre (11), caractérisé en ce que l'élément de tuyau de plus grand diamètre (11) est réalisé en polymères du type propylène possédant un indice d'écoulement en fusion de $1,167 \times 10^{-5}$ à $2,333 \times 10^{-5}$ kg/s (7 à 14 g/10 min.) et une rigidité de 10^8 à $1,3 \times 10^8$ kg/m² (10.000 à 13.000 kg/cm²), et l'élément de tuyau de plus petit diamètre (12) est réalisé en polymères du type propylène possédant un indice d'écoulement en fusion de

$1,167 \times 10^{-5}$ à $2,333 \times 10^{-5}$ kg/s (7 à 14 g/10 min.) et une rigidité supérieure à $1,35 \times 10^8$ kg/m² (13.500 kg/cm²).

5 2. Tuyau librement allongeable du type à deux étages selon la revendication 1, caractérisé en ce que l'élément de tuyau de plus grand diamètre (11) est réalisé en copolymères du bloc éthylène-propylène possédant 10 à 40% en poids d'éthylène.

10 3. Tuyau librement allongeable du type à deux étages selon la revendication 1, caractérisé en ce que l'élément de tuyau de plus grand diamètre (11) est réalisé en homopolymère de propylène mélangé avec du polyéthylène possédant un faible poids moléculaire.

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FIG. 1

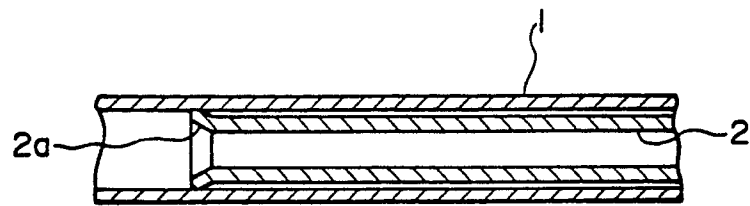


FIG. 2

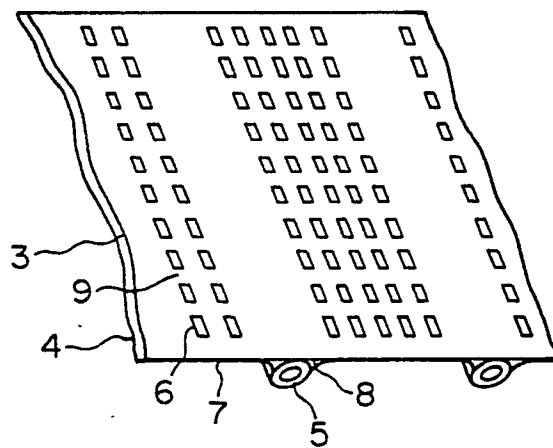


FIG. 3

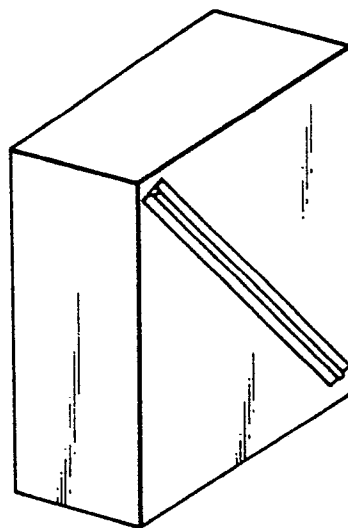


FIG. 4

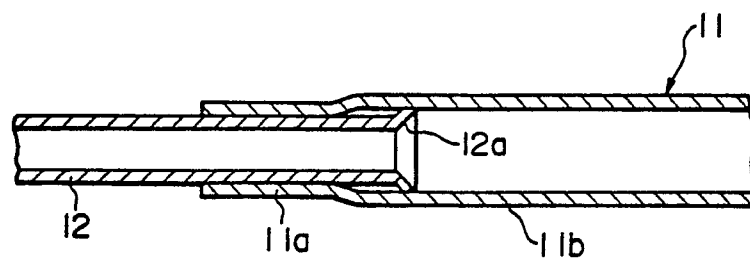


FIG. 5

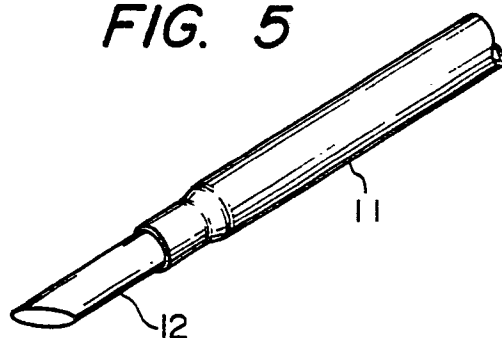


FIG. 6

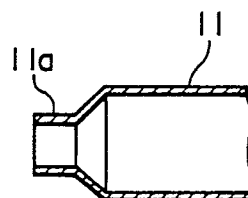


FIG. 7

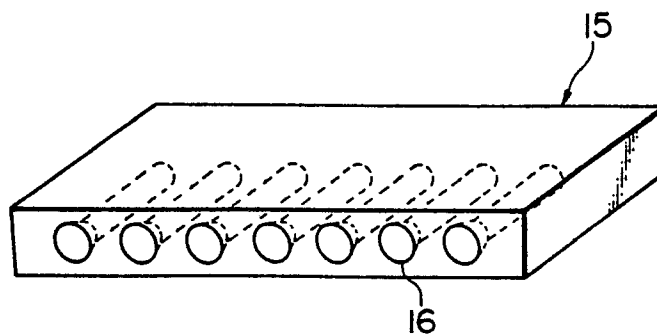


FIG. 8

