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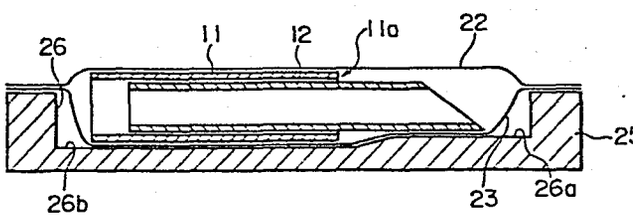
(54) **A rod-like body, a package of the rod-like body and a packing equipment therefor.**

(57) A freely elongatable two-stage type of pipe consisting of a smaller-diameter pipe member inserted into a larger-diameter pipe member, a package thereof and a packing equipment therefor. Said package consists of films having cavity containing a freely elongatable two-stage type of pipe and welded at peripheries thereof. Said packing equipment has an auotmatic product inspection line and so adapted as to continuously pack only freely elongatable two-stage type of pipes judged as normal by said automatic inspection line.

FIG. 13



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A rod-like body, a package of the rod-like body and a packing equipment therefor

The present invention relates to a rod-like body such as a sucking pipe, especially a freely elongatable two-stage type of pipe consisting of a larger-diameter pipe and a smaller-diameter pipe, a package of said rod-like body and a packing equipment therefor.

The 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 type 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 secion. 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.

As an equipment for manufacturing packages containing successively the rod-like bodies described above, there has conventionally been known a machine which is equipped with a hopper accommodating rod-like bodies to be packed, a first rotating drum having a large number of concave grooves on the circumference thereof, a second rotating drum arranged in the vicinity of said first drum and having a large number of concave grooves on the circumference thereof, etc. The rod-like bodies are suplied consecutively from the hopper into the concave grooves of the first drum. On the other hand, a film is supplied to the surface having the concave grooves of the second drum and attracted so as to adhere to the drum surface along the concave grooves. Then, the rod-like bodies are shifted from the concave grooves of the first drum into the cavities of the film adhering to the second drum. Further, another film is supplied to the second drum so as to cover the film having cavities containing the rod-like bodies, and welded by a suitable means to prepare packages as shown in Fig. 2.

The conventional packing machine for rod-like bodies uses plural drums having concave grooves and has a defect that it requires rather difficult adjustment of relative positions of the drums for shifting the rod-like bodies from the drum to the other. When positional adjustment is not performed properly, the rod-like bodies

may not be shifted successfully from the concave grooves of the drum to those of the other drum. In such a case, the machine may be troubled by rod-like bodies caught between both the drums.

A primary object of the present invention is to provide a freely elongatable two-stage type of pipe consisting of a smaller-diameter pipe member having an expanded end and inserted into a larger-diameter pipe member so designed as to permit stable slide owing to slight contact between inside surface of said larger-diameter pipe member having a portion slightly thinner than the rest portion and outside surface of said smaller-diameter pipe member.

A second object of the present invention is to provide a freely elongatable two-stage type of pipe consisting of a smaller-diameter pipe member having an expanded end and inserted into a larger-diameter pipe member, said smaller-diameter pipe member and said larger-diameter pipe member being different in color so as to be distinguishable from each other.

A third object of the present invention is to provide a freely elongatable two-stage type of pipe consisting of a smaller-diameter pipe member having an expanded end and inserted into a larger-diameter pipe member, said smaller-diameter pipe member and said larger-diameter pipe member being made of suitable materials respectively so as to assure close contact between the expanded end of said smaller-diameter pipe member and the inside surface of said larger-diameter pipe member.

A fourth object of the present invention is to provide a manufacturing process permitting a stage to form a portion having a slightly smaller-diameter of the larger-diameter pipe member without stopping a conveyor for successively shifting the larger-diameter pipe members.

A fifth object of the present invention is to

provide a package containing a freely elongatable two-stage type of pipe so designed as to assure close contact with said pipe by swelling both of upper and lower films for packing said pipe.

A sixth object of the present invention is to provide a package containing a freely elongatable two-stage type of pipe wherein a lower film is welded to an upper film in an area surrounding a cavity formed in said lower film for accommodating said pipe.

A seventh object of the present invention is to provide an equipmemt for packing rod-like bodies so designed as to successively inspect and pack said rod-like bodies while they are carried on a conveyor consisting of holding blocks connected to one another and each having a concave groove capable of accommodating a single rod-like body.

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;

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

Fig. 9 shows sectional view illustrating Embodiment 1 of the package according to the present invention;

Fig. 10 shows a sectional view taken along the X-X line of Fig. 9;

Fig. 11 shows a sectional view of a hloding block to be used for preparing the package according to the present invention;

Fig. 12 shows a sectional view taken along the XII-XII line of Fig. 11;

Fig. 13 ahows a sectional view illustrating a process for preparing said package;

Fig. 14 shows a perspective view illustrating Embodiment 2 of the package according to the present invention;

Fig. 15 shows a perspective view illustrating Embodiment 3 of the package according to the present invention;

Fig. 16 shows a perspective view illustrating an equipmemt for preparing said Embodiment 2;

Fig. 17 shows a sectional view of said equipment;

Fig. 18 shows a side view illustrating construction of an equipmemt for successively inspecting and packing the freely elongatable two-stage type of pipes according to the present invention;

Fig. 19 shows a perspective view of an automatic product inspection line of said successive inspection-packing equipmemt;

Fig. 20 shows a perspective view of a holding block of a conveyor used in said automatic product inspection line;

Fig. 21 shows a plan view illustrating locations

of pipes after they are compressed with a first and a second compressing members in said automatic product inspection line;

Fig. 22 shows a perspective view of an automatic packing line of said successive inspection-packing equipment;

Fig. 23 shows a perspective view of winding line of said successive inspection-packing equipment;

Fig. 24A shows a sectional view of a package shifting drum of said winding line; and

Fig. 24B shows a sectional view taken along the B-B line of Fig. 24A.

Fig. 4 shows Embodiment 1 of the freely elongatable two-stage type of pipe according to the present invention. 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.

The present invention selects different colors

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, another embodiment of the freely elongatable two-stage type of sucking pipe according to the present invention will be described. This embodiment has a form which is substantially the same as that shown in Fig. 1 or Fig. 4, 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 indes (JIS K 6758) of 7 to 14 g/10 min and stiffness (ASTM D747) of 10000 to 13000 kg/cm^2, whereas the smaller-diameter pipe member is made of a propylene homopolymer having a melt flow index of 7 to 14 g/10 min and stiffness of more than 13500 kg/cm^2.

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 10000 to 13000 kg/cm^2 for the larger-diameter pipe member, it is possible to make said pipe member eleastic 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 13500 kg/cm^2 is selected for the smallerpdiameter 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 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 7 g/10 min. If synthetic resin materials of these pipe members have melt flow index exceeding 14 g/10 min, in contrast, dimensional precision will extremely be degraded. As propylene type of polymers having melt flow index of 7 to 14 g/10 min and stiffness of 10000 to 13000 kg/cm^2 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 ethyrene, propylene homopolymers blended with polyethyrene having low molecular weight, etc.

When the above-mentioned ethylene propylens 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 polyethylens 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 polyethelene 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 contrived to perform continuously while shifting an object to be molded (for example, the larger-diameter pipe member).

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 shows 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 indicate 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 member within the range indicated by the reference numeral 18 is brought into close contact with each mettalic 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 member is shifted for a difinite 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. Alternately, 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.

Fig. 9 and Fig. 10 show diagrams illustrating a package containing the freely elongatable two-stage type of sucking pipe accroding to the present invention. Fig. 9 shows a longitudinal sectionsl view of the package, whereas Fig. 10 shows a sectional view taken along the X-X line of Fig. 9. In these drawings, the reference numeral 10 represents the freely elongatable two-stage type of sucking pipe having the form shown in Fig. 1 and the reference numeral 21 designates a film A made of synthetic resin (or paper, etc.) having a step 21a which corresponds to the step between the larger-diameter pipe member 11 and smaller-diameter pipe member 12 of said freely elongatable two-stage type of sucking pipe 10. The reference numeral 22 denotes a film B made of a symthetic resin (or paper, etc.) having a slight downward swelling. The reference numeral 23 represents a horizontal seal portion formed by sealing the film A 21 and film B 22 at their edges by a means such as thermo-welding, and the reference numeral 24 designates a vertical seal portion obtained by the similar means. Fig. 9 and Fig. 10 are shown upside down, illustrating the film A 21 at the upper position and the film B 22 at the lower position.

Since the package of such a constraction has swellings on both the top and bottom, either of the film A 21 or film B 22 may be welded or bonded to beverage vessels for attaching the sucking pipe. Further, it is desirable to select a form having the step 21a as shown in Fig. 9 in packing the freely elongatable two-stage type of sucking pipe since such a form allows close contact between the films and freely elongatable two-stage type of sucking pipe on almost all the outer circumference of said pipe.

The step 21a may not be tapered as shown in Fig. 9 but may be bent downward perpendicularly to the top surface. Further, the film B 22 may also have a step corresponding to that of the freely elongatable two-stage type of sucking pipe.

The package described above can be obtained as described below. Fig. 11 and Fig. 12 show a holding block to be used for manufactureing the padkage. Fig. 11 shows a longitudinal sectional view of the holding block and Fig. 12 shows a sectional view taken along the XII-XII line in Fig. 11. The floding block 25 has a concave groove 26 on the bottom surface of which a step is formed by providing a tapered surface 26c between a surface 26a and another surface 26b. Fig. 13 shows the freely elongatable two-stage type of sucking pipe inserted and packed in the concave groove 26 of the holding block 25. As shown in this drawing, the film A 21 is arranged along the inside surface of the concave groove 26 of the holding block 25. Then, the freely elongatable two-stage type of sucking pipe is placed in such a position that the smaller-diameter pipe member 12 is located on the side of the bottom surface 26a of the concave groove 26. Successively, the film B 22 is set over the sucking pipe, and finally the films A and B are welded to each other by thermo-welding around the concave groove 26 of the holding block 25. The package of the freely elongatable two-stage type of sucking pipe is prepared as described above.

Inclination angle θ of the tapered surface 26c formed in the concave groove of the holding block may have an optional value. In addition, the tapered surface may be replaced with a step having $\theta = 90°$. Form of the step 21a of the film A 21 of the package is determined in accordance with value of the angle θ. However, value of step d between the bottom surfaces 26a and 26b should desirably be set at a suitable level on the bases of

difference between diameters of the larger-diameter pipe member and smaller-diameter pipe member.

In order to form a step on the film B 22 in addition to that on the film A 21, it is sufficient to bring the upper packing film into close contact with the freely elongatable two-stage type of sucking pipe by compressing said film with a compressing member having a step or applying air pressure form above the holding block 25.

Since the package shown in Fig. 9 or Fig. 10 has swellings on the upper and lower sides, either of these sides may be bonded with high workability to beverage vassels, etc. for attaching the sucking pipe. Further, the package is advantageous in that it assures close contact between the films and freely elongatable two-stage type of sucking pipe at the packing stage.

Fig. 14 shows a perspective view illustrating another embodiment of the package according to the present invention (upside down as compared with the conventional example in Fig. 2). In this drawing, the reference numerals 31 and 32 represent lower film and upper film (described also later respectively) respectively made of synthetic resin materials, the reference numeral 33 designates a cavity formed in the lower film by the process described later for enclosing a rod-like body such as a sucking pipe, the reference numeral 34 denotes sealed portion (slashed portion) formed by welding the upper and lower films by the thermo-welding or the similar means, and the reference numeral 35 represents another welded spot. The package 30 accommodating thus formed rod-like body in each cavity is arranged successively to form a continuous belt.

This continuous belt of the packages are cut off along the line 36 for separation into individual packages to be practically used in the condition, for example, shown in Fig. 3 to be attached to beverage vessels. Since each

package 30 contains a rod-like body in the cavity 33 as described above and completely sealed at its periphery, the rod-like body is kept in sealed condition and free from fear of liquid penetration.

Fig. 15 shows a perspective view illustrating a third embodiment of the package according to the present invention. In this embodiment, welded spots 34 are formed within the areas (slashed areas) around the cavities 33 for accommodating the rod-like bodies and very close thereto, and welded spots are arranged further around said welded spots. In the Embodiment 3, the continuous belt is cut off along the intermediate line 37 between the cavities 33 for separation into the individual packages. Also in the Embodiment 3, the rod-like bodies are sealed with the welded spots 34 formed in the areas close to the cavities 33 and free from fear of liquid penetration.

Out of the Embodiments 2 and 3 described above, the Embodiment 2 allows users to easily take out the rod-like bodies from the packages by pushing one end of said rod-like bodies since no welded spots are formed in areas very close to said rod-like bodies. However, sealing may be incomplete depending on deviation of cutting lines in separating the continuous film into the individual packages by cutting said continuous belt. In case of the Embodiment 3, on the other hand, it is not easier to break the film by pushing the rod-like bodies than in the Embodiment 2. However, sealing of the rod-like bodies cannot be incomplete even when cutting lines are deviated a little in cutting the continuous belt into the individual packages.

Now, a manufacturing process for the above-mentioned continuous belt will be described taking the package of the Embodiment 2 as an example. Fig. 16 and Fig. 17 show diagrams illustrating a part of a machine for carrying out the above-described manufacturing method of the continuous belt. Fig. 16 show a perspective view,

whereas Fig. 17 shows a sectional view taken along the shifting direction of the metallic molds. In these drawings, the reference numeral 41 represents the metallic molds shifting successively, the reference numeral 42 designates the cavities formed at the centers of the individual metallic molds, the reference numeral 43 denotes convexities formed around the top surfaces of the individual metallic molds, the reference numeral 44 represents spot-like convexities formed in multiple numbers between the cavity 42 and convexity 43 on top surface of each metallic mold, and the reference numeral 45 designates a heating roller having a smooth surface.

A process to manufacture a continuous belt of the packages according to the present inveniton will be discribed. The metallic molds 41 are shifted leftward as indicated by arrows in the drawings. The lower film 31 is first fed to the top surfaces of the metallic molds and shifted together with the metallic molds 41 in the direction indicated by the arrow. At point A shown in Fig. 17, the film is attracted in heated condition to the cavity 42 with an attracting device (not shown), whereby the lower film adheres to the cavity 42. That is to say, the cavity 33 is formed as shown in Fig. 14. Successively at the point B, the rod-like body 10 is supplied into cavity 42 of the metallic mold (cavity 33 of the film), and at the point C, the upper film 32 is supplied so as to cover the lower film 31. When shifting further in the direction indicated by the arrow, the metallic mold 41, rod-like body 10, upper film 32 and lower film 31 reach under the heating roller 45. At this position, the upper and the lower films 32 and 31 are compressed by the heating roller 45 and welded only at the sopts located on the convexities 43 and 44 of the metallic mold 41. While each metallic mold 41 is shifted consecutively in the direction indicated by the arrow, the lower films 31, rod-like body

10 and upper film 32 are supplied, and the films are welded with the heating roller 45 to form a continuous belt of the packages shown in Fig. 14.

In the package according to the present invention described above, a rod-like body is completely sealed and is free from the fear of liqued penetration since the welded spots are formed in the area surrounding the cavity accommodating said rod-like body.

Further, the packing method according to the present invention easily permits forming the continuous belt of the packages with the packing machine described below since the cavities and the convexities around said cavities are formed on the metallic molds, and welded spots are formed by welding the films with the metallic molds and the heating roller.

Now, a successive inspection-packing equipment for inspecting and packing the freely elongatable two-stage type of pipes will be described.

Fig. 18 shows a side view illustrating the overall construction of the continuous inspection-packing equipment according to the present invention. In this drawing, the reference numeral 50 represents a combining machine for automatically preparing the freely elongatable two-stage type of pipe shown in Fig. 4 by combining the larger-diameter pipe member with the smaller-diameter pipe member. At this combining stage, the socket-like portion 11a is formed at the forming process shown in Fig. 8 on the larger-diameter pipe member 11 and the expanded portion 12a is formed on the smaller-diameter pipe member 12 in the process to push the end of the smaller-diameter pipe member 12 against a heated plate. These larger-diameter pipe member 11 and smaller-diameter pipe memter 12 are combined to prepare the freely elongatable two-stage type of pipe with the above-mentioned combining machine 50. The reference numeral 60 designates an automatic product inspection

line, the reference numeral 80 denotes a lack part replenish line, the reference numeral 90 represents an automatic packing line and the reference numeral 110 designates a winding line.

In this continuous inspecting-packing equipment, the freely elongatable two-stage type of pipe prepared with the combining machine 50 is shifted in a condition mounted on a conveyor of the automatic product inspection line 60. During this shift, said pipe is inspected for fitted condition of the smaller-diameter pipe member in the larger-diameter pipe member and defective pipe members are removed from the line. Into a holding block from which the defective freely elongatable two-stage type of pipe has been removed in the automatic product inspection line, a freely elongatable two-stage type of pipe is replenished from the lack part replenish line. After the freely elongatable two-stage type of pipes are inspected by the automatic product inspection line as described above, said pipes are packed at definite intervals berween the upper and lower films in the next automatic packing line.

Now, each line of the continuous inspection-packing equipment will be described detailedly.

Fig. 19 shows a perspective view of the automatic product inspection line. In this drawing, the reference numeral 61 represents a first conveyor of multiple holding blocks 62 (see Fig. 20) having concave grooves 62a into which the freely elongatable two-stage type of pipes 10 are to be set and held, and the reference numeral 63 designates a brush roller consisting of a roller drum planted with brush hairs and arranged in the vicinity of start point of the conveyor 61. This brush roller 63 is provided for dropping off or removing, from the automatic product inspection line, pipes which are not inserted into the concave grooves 62a for some cause including those

which were not inserted into the concave grooves 62a of the holding blocks 62 because the smaller-diameter pipe members were not inserted into the larger-diameter pipe members by the combining machine 50. The reference numeral 64 denotes a guide plate and the reference numeral 65 represents a gauge plate. These plates serve for aligning all the freely elongatable two-stage type of pipes reaching the location of the gauge plate 65 in such positions that their ends are kept in contact with the gauge plate 65 during shifting. The reference numeral 66 represents a pipe clamp belt having a constraction in which a spring or round rope 66a passes around rollers 66b and 66c, the reference numeral 67 designates a first compressor for pushing the smaller-diameter pipe member 12 into the larger-diameter pipe member 11 with weak force, the reference numeral 68 denotes a second compressor for pushing the smaller-diameter pipe member 12 into the larger-diameter pipe member under strong force, the reference numeral 70 represents a defective product detector, the reference numeral 71 designates a defective product detector circuit, the reference numeral 72 denotes a solenoid valve arranged in the course of a tube 73 for supplying high-pressure air and the reference numeral 74 represents a shute for removing defective products.

These compressors, defective product detector, etc. will described more detailedly. The first compressor 67 has a compressing piece 67a which is urged by a built-in spring in the direction perpendicular to the shifting direction of the conveyor 61. The compressing piece 67a is restricted by a limiter 67b so that it will not project beyond a certain positon. Force of the spring urging the compressing piece 67a is adjusted to a suitable level by a spring pressure adjuster 67c. When the smaller-diameter pipe member 12 is fitted more tightly than required to prevent it from coming out of the larger-diameter pipe

member 11 by its own weight, for example, the compressing piece 67a is pushed back for a suitable distance by the smaller-diameter pipe memter 12. The second compressor 68 has the same construction as that of the first compressor 67, but force of the spring of the second compressor is adjusted by a spring pressure adjuster 68c to a level higher than that of the spring of the first compressor 67. Therefore, when the smaller-diameter pipe member 12 is fitted too tightly to move by the ordinary finger power relative to the larger-diameter pipe member 11, the compressing piece 68a is pushed back by the smaller-diameter pipe member 12. Further, the compressing piece 68a is restricted by a limiter 68b so that it will be project beyond a standard position.

Accordingly, when the freely elongatable two-stage type of pipe is shifted on the conveyor 61 and passes by the first compressor 67, the smaller-diameter pipe member 12 is pushed into the larger-diameter pipe member 11 in a defective product having the smaller-diameter pipe member fitted too loose in the larger-diameter pipe member 11. In contrast, normal freely elongatable two-stage type of pipes and those having too tight fitting between the pipe members are further shifted while pushing back the compressing piece 67a of the first compressor 67. Subsequently, the smaller-diameter pipe members of the normal freely elongatable two-stage type of pipes are pushed in to the standard position while passing by the second compressor 68. In contrast, freely elongatable two-stage type of pipes having too tight fitting between the pipe members are further shifted while pushing back the compressing piece 68a of the second compressor 68.

As a result, when the freely elongatable two-stage type of pipes have passed by the first compressor 67 and the second compressor 68, tips of the smaller-diameter pipe members are located at the standard position when the

freely elongatable two-stage type of pipes are normal, inside the standard position when products have too loose fitting between the pipe members or outside the standard position when products have too tight fitting between the pipe members. In short, the tips of the smaller-diameter pipe members are located at the standard position when the freely elongatable two-stage type of pipes are normal, whereas the tips of the smaller-diameter pipe members are not located at the standard position when the freely elongatable two-stage type of pipes are defective.

Alternately, it is possible to set force of the spring of the first compressor 67 at the higher level and that of the second compressor 68 at the lower level.

Fig. 21 shows a diagram descriptive of a means for inspecting defective freely elongatable two-stage type of pipes described above. In this drawing, the reference numeral 10A represents a freely elongatable two-stage type of pipe in which the smaller-diameter pipe member is fitted too loose in the larger-diameter pipe member, the reference numeral 10B designates a normal freely elongatable two-stage type of pipe, the reference numeral 10c denotes a freely elongatable two-stage type of pipe having too tight fitting between the pipe members, the reference muneral 11 represents a larger-diameter pipe member and the reference numeral 12 designates a smaller-diameter pipe member. Shown in Fig. 21 are these pipes in a condition after said pipes have passed by the first compressor 67 and the second compressor 68. As shown in this drawing, the smaller-diameter pipe member 12 is pushed in by the first compressor 67 and tip of said pipe member is located at the same position (indicated by chain line b) as that of the tip of the first compressor 67 in case of the freely elongatable two-stage type of pipe 10A having too loose fitting between the pipe members. In case of the normal freely elongatable two-stage type of

pipe having passed while pushing back the first compressor 67, the smaller-diameter pipe member is pushed into the larger-diameter pipe member by the second compressor 68 and the tip of the smaller-diameter pipe member is located at the same position as that of the tip of the second compressor 68, or the standard position (indicated by the chain line a). The freely elongatable two-stage type of pipe 10C of too tight fitting has passed while pushing back both the first compressor 67 and second compressor 68. Accordingly, the tip of the smaller-diameter pipe member remains at the position before passing by the compressors, for example, that indicated by the chain line c. If the smaller-diameter pipe member 12 is not inserted into the larger-diameter pipe member 11, tip of the pipe is located at the position indicated by the chain line b or on the side of the guage plate 65 from the chain line b.

The defective product detector 70 is composed of a detecting piece 70a whose tip is lightly urged toward the conveyor 61 under force of a spring as shown in Fig. 19, a light shield plate 70c which has a slit and rotates together with said detecting piece 70a when it rotates around a shaft 70b, a photosensor composed of a light source 70d and a photosensor element 70e which are arranged on both sides of said light shield plate 70c. When the freely elongatable two-stage type of pipe having passed by the first compressor 67 and second compressor 68 reaches the defective procuct detector 70, said pipe 10 pushes and rotates the detecting piece 70a, thereby allowing the photosensor to detect the shift of the light shield plate 70c rotating together with the detecting piece 70a. Based on this detection, a signal is inputted to a defective product detector circuit 71 to inform whether or not the product is normal. On the other hand, shifting conditions of the holding blocks are detected (for example, the

individual holding blocks are counted) and detection signals are inputted as standard signals into the defective product detector circuit 71 from a holding block shift detector which consists of a magnet embedded into each holding block 62 of the conveyor 61 and a magnetic sensor arranged in the vicinity of the conveyor 61, or a photosensor consisting of a light source and photosensor element arranged in the vicinity of the conveyor, said components of the detector being not shown. Based on the standard signal and another signal emitted from the defective product detector 70, an operation pulse signal is generated from the defective product detector circuit 71, a high-speed solenoid valve 72 is opened to supply high-pressure air to the conveyor 61 and the air is supplied through a vent hole 62b of the hloding block 62 containing the defective product to remove the defective freely elongatable two-stage type of pipe from the automatic product inspection line 60 through a discharge chute 74. The defective product is detected and removed from the line as described above.

Instead of the above-described arrangement where the tips of the smaller-diameter pipe members are located on the side of the first and second compressors 67 and 68, it is possible to select another arrangement where the freely elongatable two-stage type of pipes are arranged in the holding blocks in such a direction as to locate the tips of the larger-diameter pipe members on the side of said compressors so that the pips of the larger-diameter pipe members will be pushed by said compressors 67 and 68.

In the automatic product inspection line 60, a pipe end thickening device (not shown) may be arranged before the lack part replenish device 80, i.e., at the location represented by the reference numeral 75 in Fig. 18 and Fig. 19. This pipe end thickening device is used

for preventing the smaller-diameter pipe member from getting out of the larger-diameter pipe member by reducing the inside diameter at the end of the larger-diameter pipe member while heating the freely elongatable two-stage type of pipe at the end on the side of the gauge plate 65.

Now, descriptions will be given on the lack part replenish device 80 to be used at the next stage. The lack part replenishment device 80 consists of a hopper 81, a drum 82 having multiple grooves 82a, a conveyor 83 consisting of multiple holding blocks 84, and so on. The hopper is filled with freely elongatable two-stage type of pipes which are consecutively supplied into the grooves 82a of the drum 82 which rotates in the direction indicated by the arrow. When the freely elongatable two-stage type of pipe set in the groove 82a is located at the lowermost position, it is forcibly dropped into the groove 84a of the holding block 84 of the conveyor 83 kept into contact with the drum 82 under the guide by the guide plates 82b and 82c. When the grooves 84a of all the holding blocks of the conveyor 83 are filled with the freely elongatable two-stage type of pipes, said pipes cannot be shifted into the holding blocks 84 even when they are set at the lowermost position. Therefore, the freely elongatable two-stage type of pipes are shifted as they are set in the grooves 82a when the drum 82 rotates. Accordingly, the drum and holding blocks are shifted in the condition where all the grooves of the drum 82 and holding blocks 84 are filled with the freely elongatable two-stage type of pipes. In this condition, defective products are detected and removed by the above-discribed automatic product inspection line. When a hloding block containing no freely elongatable two-stage type of pipe is located under the conveyor 83, a freely elongatable two-stage type of pipe drops from the holding block 84 into the holding block 62 for replenishment. When the holding block 84 containing no freely elongatable two-stage type of pipe

any longer due to the replenishment is further shifted and located at the position brought into contact with the drum 82, said holding block 84 is replenished with the freely elongatable two-stage type of pipe from the groove 82a of the drum 82. The groove 82a containing no freely elongatable two-stage type of pipe any longer is replenished with a freely elongatable two-stage type of pipe from the hopper 81. Into holding blocks 62 from which defective freely elongatable two-stage type of pipes have been removed, the lack part replenish device supplies freely elongatable two-stage type of pipes without fail. Accordingly, any holding block reaching the automatic packing line 90 at the next stage does not contain a defective freely elongatable two-stage type of pipe or is kept empty.

Freely elongatable two-stage type of pipes in the hopper 81 of the lack part replenish device are prepared as described below.

Before packing work is started in the continuous inspection-packing equipment according to the present invention, it is placed in operating condition without feeding packing films in the automatic packing line 90 at the next stage to be described later. By this operation, freely elongatable two-stage type of pipes are fed from the combining machine 50 to the automatic product inspection line, inserted into the holding blocks 62 of the conveyor 61 and then shifted. Freely enlongatable two-stage type of pipes which were not inserted into the grooves 62a of the holding blocks 62 during shift by the conveyor 61 as described above, are removed from the line by the brush roller 53. In addition, defective freely elongatable two-stage type of pipes are detected by the defective product detector 70 and removed from the line by the defective product removing mechanism. Therefore, the freely elongatable two-stage type of pipes shifted to the end point of the conveyor 61 are normal with no exception. Only normal freely elongatable two-

stage type of pipes having been subject to the inspection are collected at a suitable location after the defective product removing mechanism and placed into the hopper before starting the packing work.

Even if freely elongatable two-stage type of pipe is not set in one of the holding blocks of the conveyor 61 during the inspection work of the pipes, no problem is posed since packing is not carried out during this work. In Fig. 19, the reference numeral 85 represents a guide plate for preventing the freely elongatable two-stage type of pipe from springing out of the groove 82a during rotation of the drum 82, the reference numerals 86 and 87 designate also guide plates for the conveyor 83 and conveyor 61 respectively, and the reference numeral 88 denotes a blow air hopper for forcibly dropping freely elongatable two-stage type of pipes.

Now, detailed descriptions will be given on the automatic packing line 90. In Fig. 22, the reference numeral 91 represents a conveyor consisting of multiple holding blocks 92 connected to on another. A lower film 93 is supplied onto the conveyor 91 by a first film feeding means by way of roller 94 arranged at a certain angle relative to the shifting direction of the conveyor 91 (for example 45°). The reference numeral 95 denoted a film attracting device which is communicated with a vacuum pump through a duct tube 96 and functions to attract the lower film 93 through an air vent formed in the holding block 92 of the conveyor 91 so that the lower film 93 adheres to the surface of the holding block 92 along the concave grooves 92a. In addtion, the film may be heated with a heating means (not shown) before or during the attraction. The reference numeral 97 denotes a drum which is located under the end of the conveyor 61 as shown in Fig. 19 and serves for shifting the freelv elongatable two-stage type of pipe carried by the conveyor 61 to the

conveyor 91 of the automatic packing line 90. The freely elongatable two-stage type of pipe which has been carried in the groove 97a of the drum 97 is shifted to the groove 92a of the holding block 92. At this stage, the lower film 93 has already been supplied to the conveyor 91 and adheres to the surface of the holding block 92 along the grooves 92a. Therefore, the freely elongatable two-stage type of pipe is shifted from the drum 97 into the cavity of the lower film 93 formed along the groove 92a. Successively, an upper film is supplied onto the conveyor 91 by a second film feeding means via a roller arranged at a certain definite angle relative to the shifting direction of the conveyor. The reference numeral 100 represents a chain guide plate, the reference numeral 101 designates a first sealer for welding the lower and upper films 93 and 98 to each other by heating at the sections between the freely elongatable two-stage type of pipes, the reference numeral 102 denotes a second sealer for thermally welding the lower and upper films 93 and 98 to each other at their edges (outside the freely elongatable two-stage types of pipes), the reference numerals 103 represents a roller cutter for cutting off both the edged of the lower and upper films 93 and 98, and the reference numeral 104 designates a cover for protecting the entire packing line described above. The first and second sealers may be made integral so as to seal the films simultaneously in both the longitudinal and lateral directions.

The individual freely elongatable two-stage type of pipes are packed between the upper and lower films so as to form a continuous belt by the automatic packing line described above, and shifted to the next winding line 110. Speaking concretely, the continuous belt of the packages passes under a roller 111 and over a roller 112, over an air floating conveyor 113, and attracted to a drum 114 to be described later, thereafter being sent by rotation of

said drum 114. The reference numeral 118 represents a chute revolving around the rotating shaft of the drum 114, the reference numeral 121 designates a reel, the reference numeral 122 denotes a bobbin hopper, the reference numeral 123 represents a bobbin chute, the reference numeral 124 designates a bobbin piston, the reference numeral 125 denotes a bobbin insert piston, the reference numeral 126 denotes a driving motor and the reference numeral 127 represents a torque converter for rotating said bobbin by means of pulleys and a belt. The reference numeral 128 represents a piston for pushing out porducts and the reference numeral 129 designates a chute for sending the products wound around the bobbin.

Now, functions of the above-mentioned automatic winding line will be described. The continuous belt of the packages passes under the roller 111, over the roller 112, and then is floated up and shifted forward over the air floating conveyor 113. Then, the continuous belt of the packages is attracted to a package shifting drum 114 and carried. The drum 114 has a constraction illustrated in Fig. 24A and Fig. 24B. Speaking concretely, the drum 114 has a double constraction consisting of an inner drum 116 fixed to a hollow shaft 115 having a partition 115a at the center, and an outer drum 117 rotatably held around said inner drum 116 and having an air vent 117a. Air is aspirated from one end of the shaft 115 through the air vent 116a of the inner drum 116 and the air vent 117a of the outer drum 117. Further, air is supplied into the other end of the shaft 115, and exhausted through the air vents 116b and 117a. When the continuous belt 105 of the packages is sent to the drum 114 as shown in Fig. 24B illustrating a sectional view taken along the B-B line of Fig. 24A, air above the drum 114 is aspirated through the air vent 117a to attract the continuous belt to the drum 114. The continuous velt 105 is sent when the outer drum

117 is rotated by a suitable means. When the condinuous belt 105 reaches the bottom of the drum 114, it is separated from the drum 114 by flow of the air exhausted through the air vents 116b and 117a. The continuous belt 105 is sent consecutively by rotation of the drum 114 while being attracted and separated, and then wound around the bobbin. When the continuous belt is wound fully around the bobbin, said continuous belt is cut off with a cutter 119. On the other hand, the product pushing piston 128 operates to push out the continuous belt from the reel 121 and send it to the belt conveyor 121.

Since the chute 118 is rotatable around the shaft 115 at the stage to wind the continuous belt around the bobbin, the tip of the chute 118 is always located on the outer circumference of the wound continuous belt at a position corresponding to the quantity of the wound continuous belt, and rotating speed and torque of the bobbin are controlled with the torque converter 117. Accordingly, the continuous belt is wound correctly.

When the product is pushed out upon completing the winding, the next bobbin is supplied to the winding position by a bobbin insert piston 125. Since the bobbin located at the lowermost position is removed from the bobbin chute 123, all the other bobbins are dropped to set the bobbin chute ready for supplying a new bobbin once again. On the other hand, the tip of the subsequent continuous belt of packages reaches, after cutting, the bobbin located at the center of the reel 121 and the winding operation starts once again.

The continuous belt of packages of the freely elongatable two-stage type of pipes is wound around a bobbin at a constant rate during continuous manufacturing, and carried by the belt conveyor 131.

The automatic product inspection line, automatic packing line and the other stages have been described detailedly above. Now, functions

of the entire continuous inspection-packing euipment according to the present invention will be described.

First, the equipment is placed in operating condition to supply freely elongatable two-stage type of pipes from the combining machine 50 to the first conveyor 61 of the automatic product inspection line 60. During this supply, freely elongatable two-stage type of pipes which were not inserted into the concave grooves 62a of the holding blocks 62 are removed from the line by the brush roller 63 as already described above. Further, all defective products such as freely elongatable two-stage type of pieps having too loose or too tight fitting between the larger-diameter and smaller-diameter pipe members, larger-diameter pipe members not containing the smaller-diameter pipe members, and smaller-diameter pipe memters not inserted into latger-diameter pipe members are removed by operations of the compressors 67 and 68, detecting mechanism 70 and defective product removing mechanism Accordingly, normal freely elongatable two-stage type of pipes only are carried by the first conveyor 61 and shifted to the automatic packing line 90 at the next stage.

At the first preparatory operating stage, the packing work is not carried out in the automatic packing line 90. Speaking concretely, the freely elongatable two-stage type of pipes only are shifted by the second conveyor 91 without feeding the lower film 93 or upper film 98. Since the freely elongatable two-stage type of pipes carried to the end point of the second conveyor 91 are dropped without being packed at the end point of the second conveyor 91. A container is placed at this point to accumulate the normal freely elongatable two-stage type of pipes. When the freely elongatable two-stage type of pipes are accumulated in a certain definite quantity, the equipment is stopped and the hopper 81 of the lack part

replenish device is filled with the pipes.

When the equipment is places in operating condition once again, freely elongatable two-stage type of pipes are carried by the first conveyor 61 from the combining machine in the similar manner. Now that the lack part replenish device is filled with the freely elongatable two-stage type of pipes, normal product is inserted into holding blocks made empty by removing defective products and all the holding blocks 62 contain normal freely elongatable two-stage type of pipes at the end point of the first conveyor 61.

Then, the freely elongatable two-stage type of pipes are shifted to the automatic packing line 90 and carried by the second conveyor 91. At this stage, the lower film 93 and upper film 98 are supplied, and sealed by the first and second sealers 101 and 102. The continuous belt 105 of packages containing the freely elongatable two-stage type of pipes prepared by sealing the films is wound around a bobbin at a constant rate by the winding device arranged at the next stage, and carried by the belt conveyor.

In the continuous inspection-packing equipment described above, the holding block of the conveyor 91 in the automatic packing line 90 has the construction shown in Fig. 20, but is longer than the freely elongatable two-stage type of pipe in its condition shown in this drawing. When the holding block 25 shown in Fig. 12 is used, however, it is possible to prepare the continuous belt of packages shown in Fig. 9 or Fig. 10. In this case, it is necessary to use, as the sealing roller 101, a roller having multiple concave grooves parallel to its shaft and preferably a attracting function. Further, it is necessary to adjust said roller so as to align the individual grooves of the roller with grooves 26 of the individual holding blocks 25. Furthermore, it is possible to taper the grooves of this

roller so as to have a shape along the end portion 11a of the larger-diameter pipe member.

The holding block 41 shown in Fig. 16 and Fig. 17 can be used as the holding block of the conveyor 91. In this case, the roller 45 having the smooth surface should be used as the sealing roller. When the holding block and sealing roller shown in Fig. 16 and Fig. 17 are employed, it is possible to automatically prepare a continuous belt of packages shown in Fig. 14 or Fig. 15.

The continuous inspection-packing equipment according to the present invention described above uses no hopper for the component units other than the lack part replenish device, and supplies pipes without fail since it inspects and packs freely elongatable two-stage type of pipes fed into the line immediately from a molding-combining machine. Further, the continuous inspection-packing equipment according to the present invention does not set defective or no products in packages since it inspects freely elongatable two-stage type of pipes during carriage. Moreover, said continuous inspection-packing equipment is rarely troubled and easily adjustable since it adopts the rollers and drums in the smallest possibe mumbers.

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-deameter 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 when said smaller-diameter pipe member is inserted into said larger-diameter pipe member.

2. A freely elongatable two-stage type of pipe comprising a larger-diameter pipe member (11) and a smaller-diameter pipe member (12) inserted into said larger-diameter pipe member, both of said pipe members being differently colored.

3. A freely elongatable two-stage type of pipe according to Claim 1 or Claim 2 wherein said larger-diameter pipe member is made of material having a melt flow index of 7 to 14 g/10 min and stiffness of 10000 to 13000 kg/cm^2, and said smaller-diameter pipe member is made of a material having a melt flow index of 7 to 14 g/10 min and stiffness of more than 13500 kg/cm^2.

4. A freely elongatable two-stage type of pipe according to Claim 3 wherein said larger-diameter pipe member is made of ethylene propylene block copolymer.

5. A freely elongatable two-stage type of pipe according to Claim 3 wherein said larger-diameter pipe member is made of propylene honopolymer blended with polyethylene having a low molecular weight.

6. A continuous froming process for the larger-diameter pipe member (11) of the freely elongatable two-stage type of pipe comprising a step to perform at least two of shift of a shaping members (15) in the direction parallel to larger-diameter pipe members (11) being supplied successibely, shift in the direction perpendicular

to said pipe members and shift determined as a composite thereof, and a step to make portions of said larger-diameter pipe members thinner with said shaping members while shifting said shaping members together with said larger-diameter pipe members during their shift.

7. A package of a freely elongatable two-stage type of pipe consisting of a smaller-diameter pipe member inserted into a larger-diameter pipe member (11), and packed between two films (21, 22) both having swellings respectively.

8. A package of a freely elongatable two-stage type of pipe according to Claim 7 wherein a step (21a) is formed at least on one of two films (21, 22) along the step formed by the end surface (11a) of said larger-diameter pipe member.

9. A package containing a freely elongatable two-stage type of pipe consisting of a smaller-diameter pipe member (12) inserted into a larger-diameter pipe member (11), set in a cavity (33) formed in a film (31) and covered with another film (32) welded at the periphry thereof.

10. A package accroding to Claim 9 wherein both the films (31, 32) are welded to each other along a cavity (33) formed in either of said films.

11. A continuous inspection packing equipment having an automatic product inspection line (60) comprising a first conveyor (61) consisting of multiple holding blocks (62) having concave grooves (63) and carrying freely elongatable two-stage type of pipes (10) consisting of larger-diameter pipe members (11) and smaller-diameter pipe members (12) in a condition set in said concave grooves, first and second compressors (67, 68) arranged beside said first conveyor and different in force for compressing one of the both pipe members, a detecting mechanism (70) for judging normal and defective products

by detecting positions of the tips of one of the both pipe members of freely elongatable two-stage type of pipes having passed beside said first and second compressors, a defective product removing mechanism operated upon detection of a defective product by said detecting mechanism and a lack part replenish device (80) for supplying inspected freely elongatable two-stage type of pipes into hloding blocks not containing freely elongatable two-stage type of pipes, and an automatic packing line (90) comprising a second conveyor (91) consisting of holding blocks (92) connected to one another, first and second film feeding means for supplying lower and upper films (93, 94) to said second conveyor, and a sealer (101, 102), and functioning to supply freely elongatable two-stage type of pipes to the hloding blocks of said second conveyor from said automatic product inspection line at a location between said first film feeding means and said second film feeding means, cover said pipes with said upper film and then weld said films to each other with said sealer.

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FIG. 1

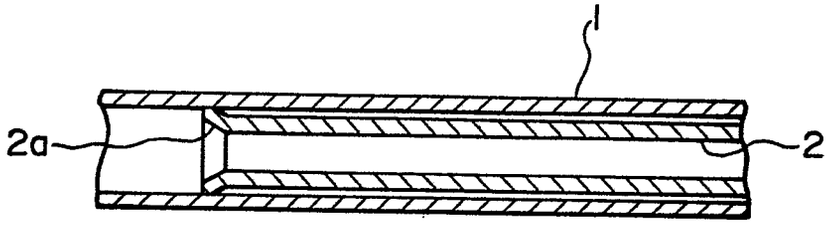

FIG. 2

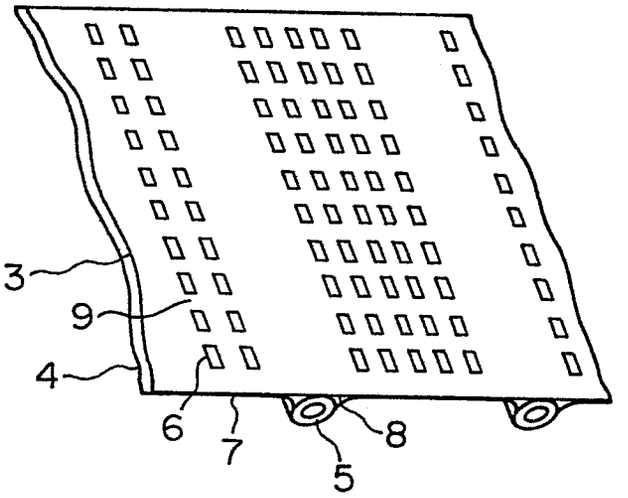

FIG. 3

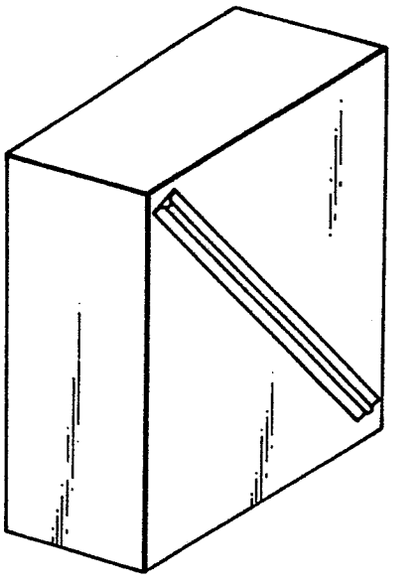

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FIG. 4

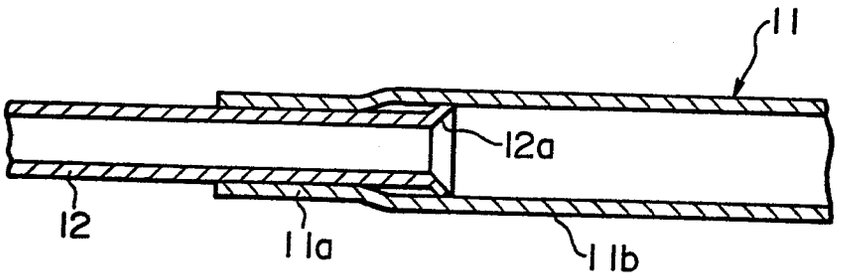

FIG. 5

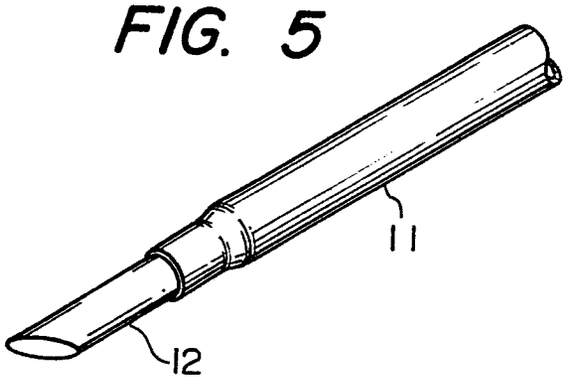

FIG. 6

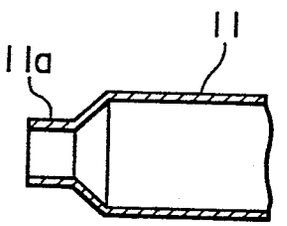

FIG. 7

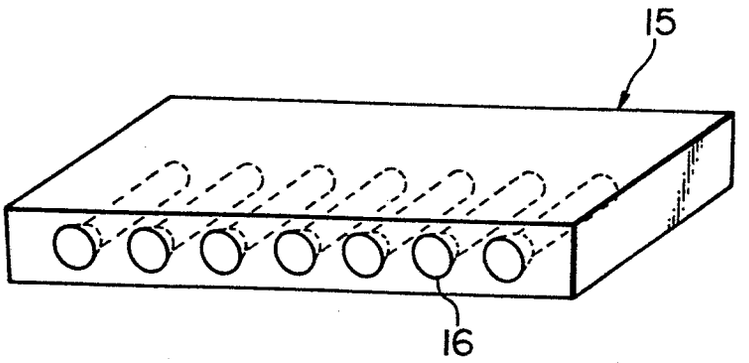

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FIG. 8

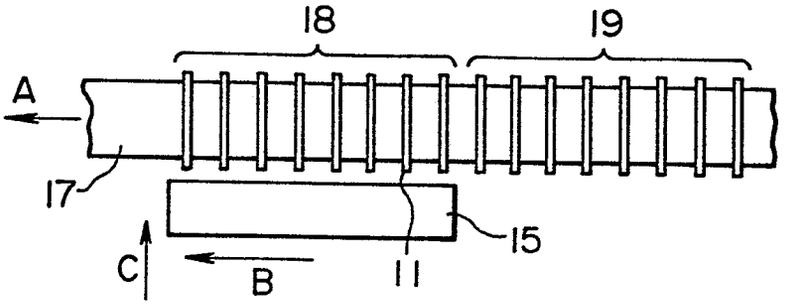

FIG. 9

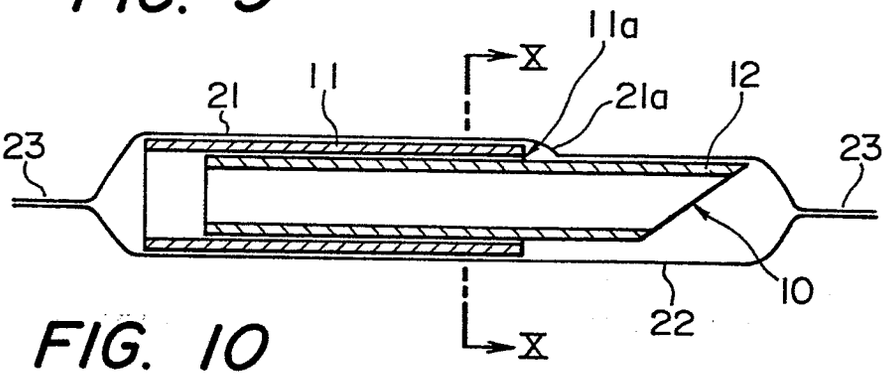

FIG. 10

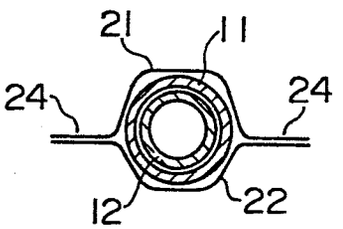

FIG. 11

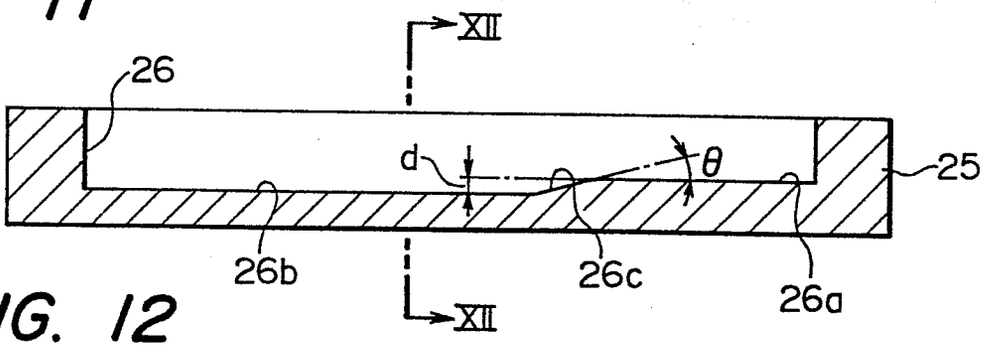

FIG. 12

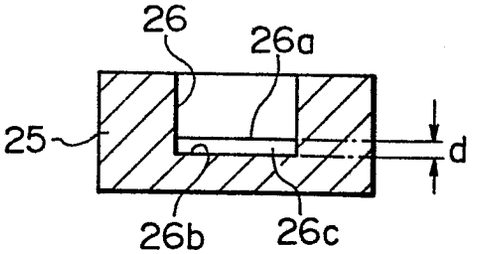

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FIG. 13

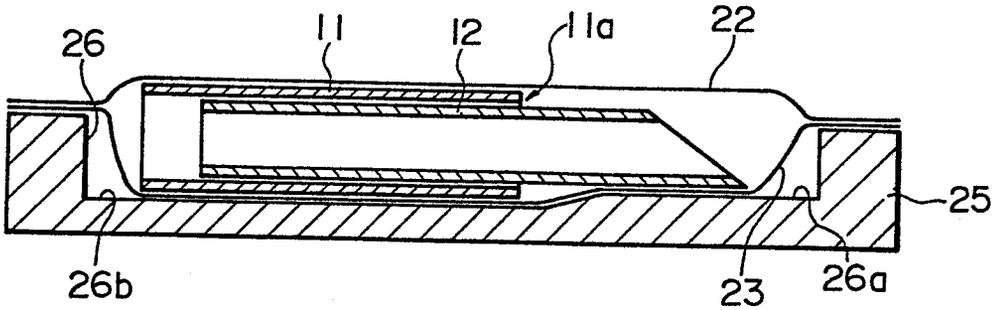

FIG. 14

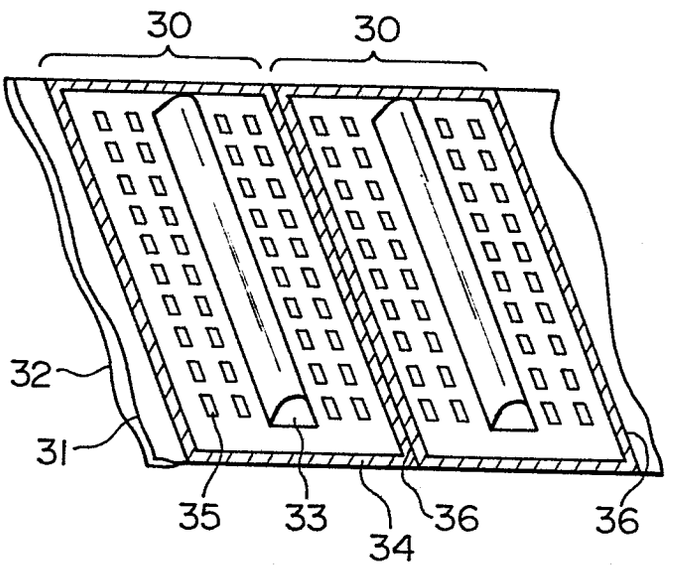

FIG. 15

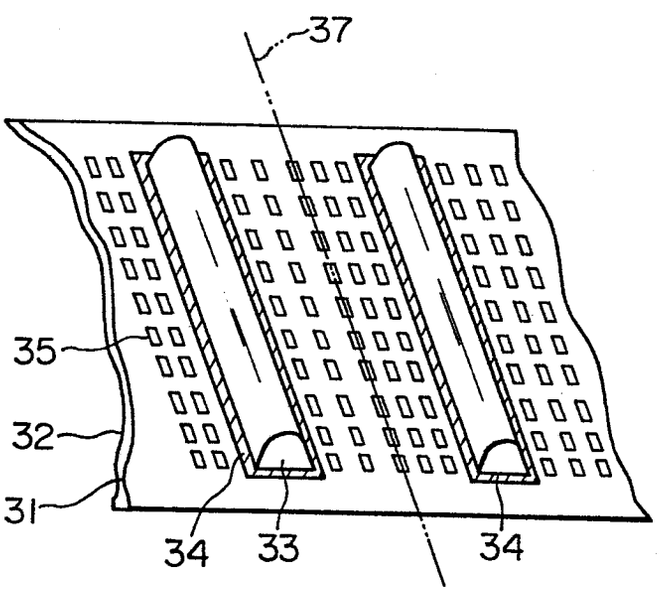

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FIG. 16

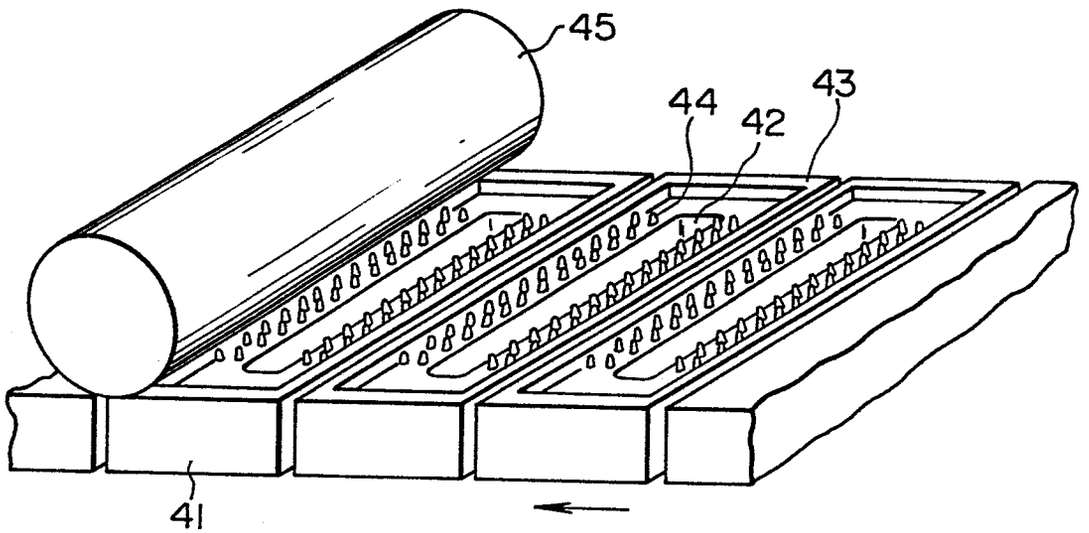
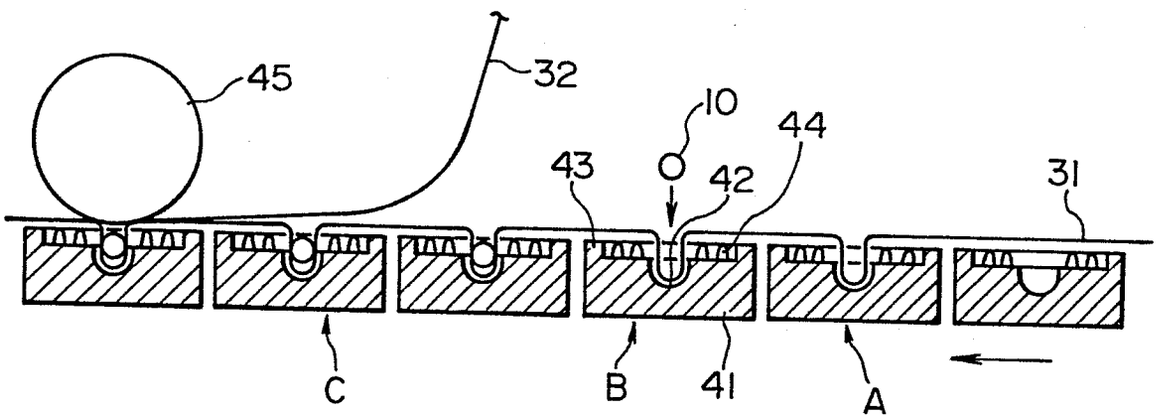


FIG. 17



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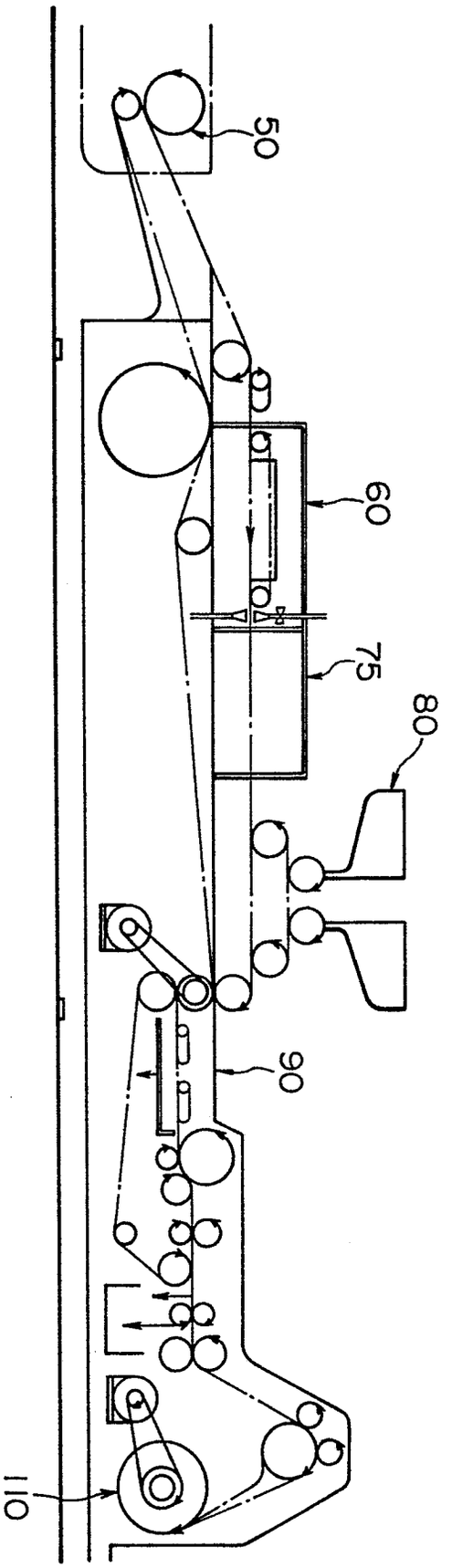

FIG. 18

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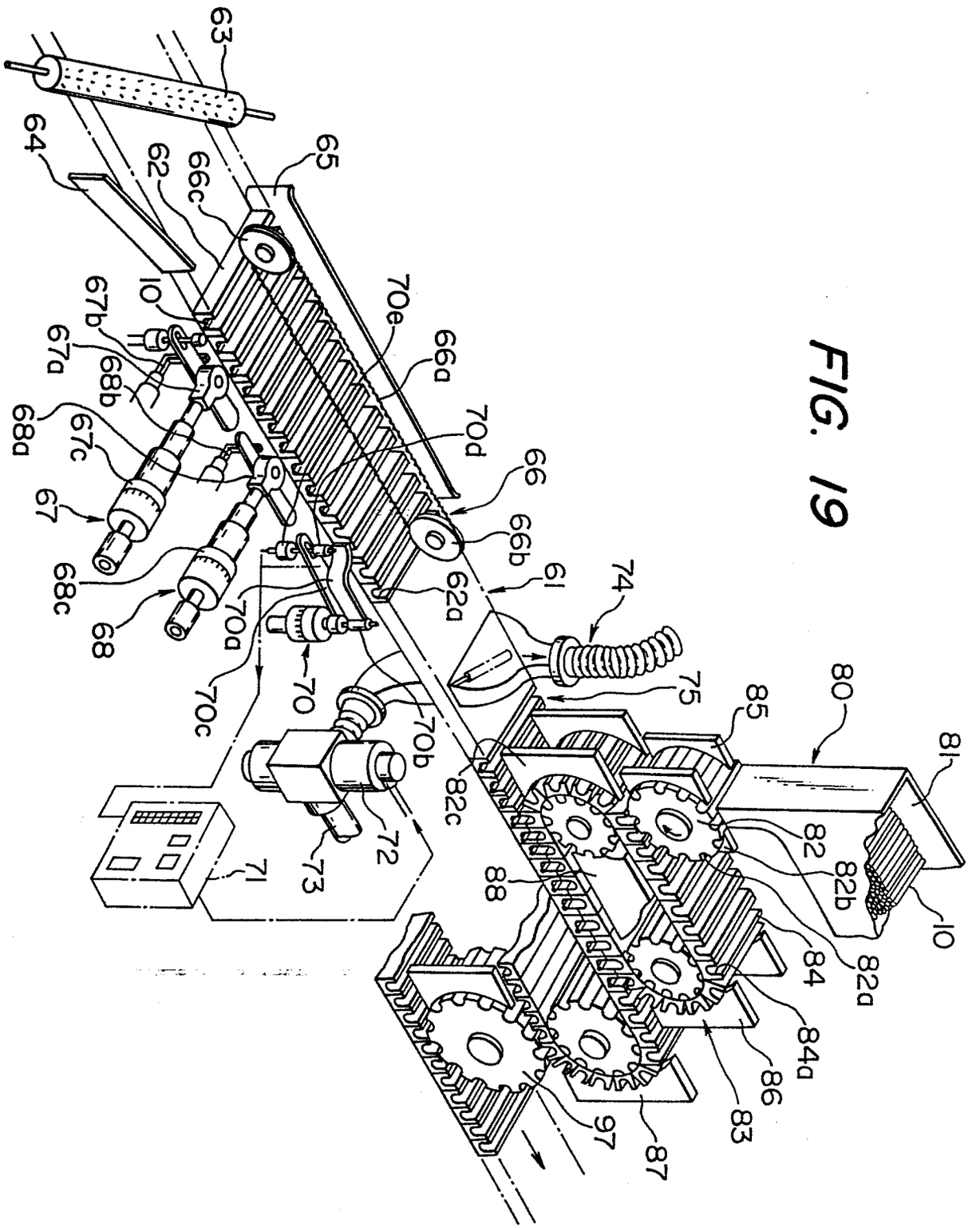

FIG. 19

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FIG. 20

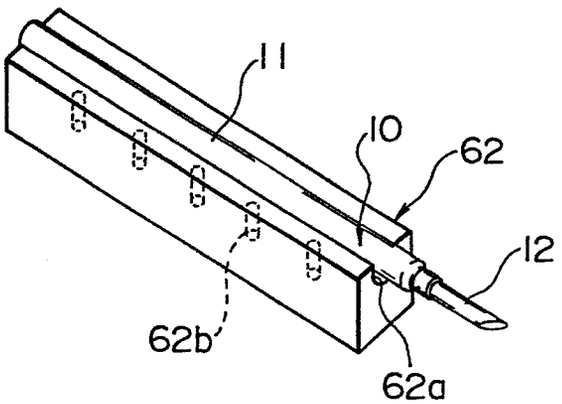
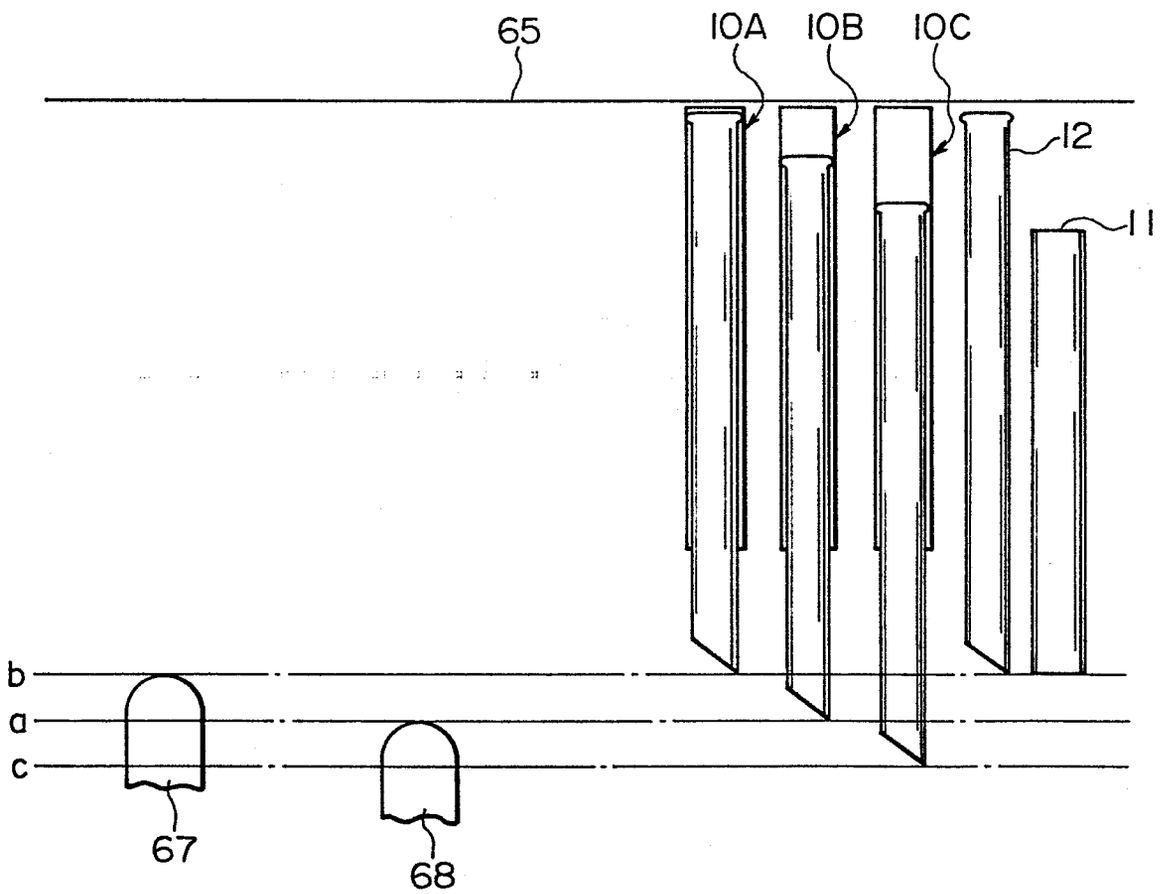


FIG. 21



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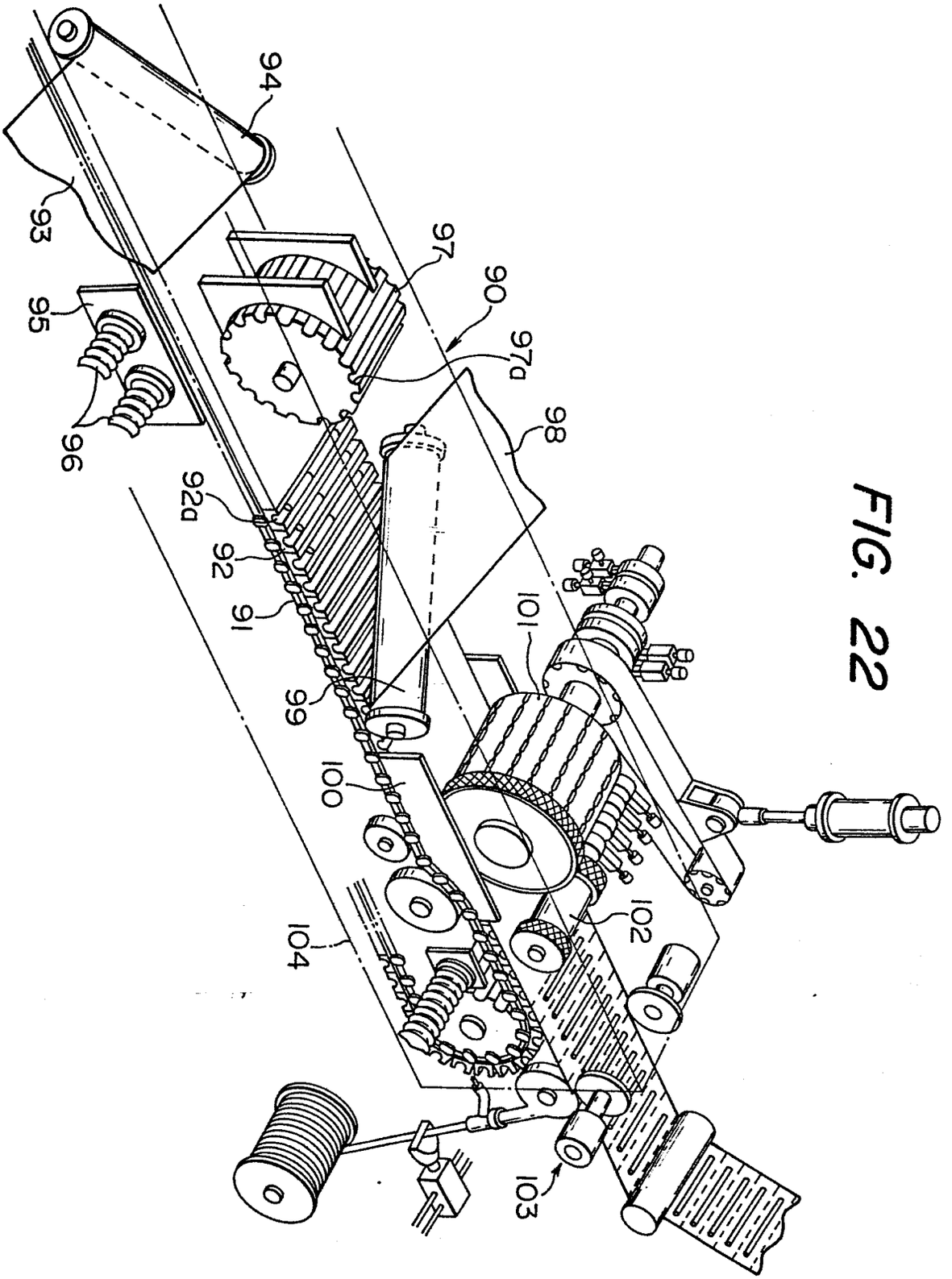

FIG. 22

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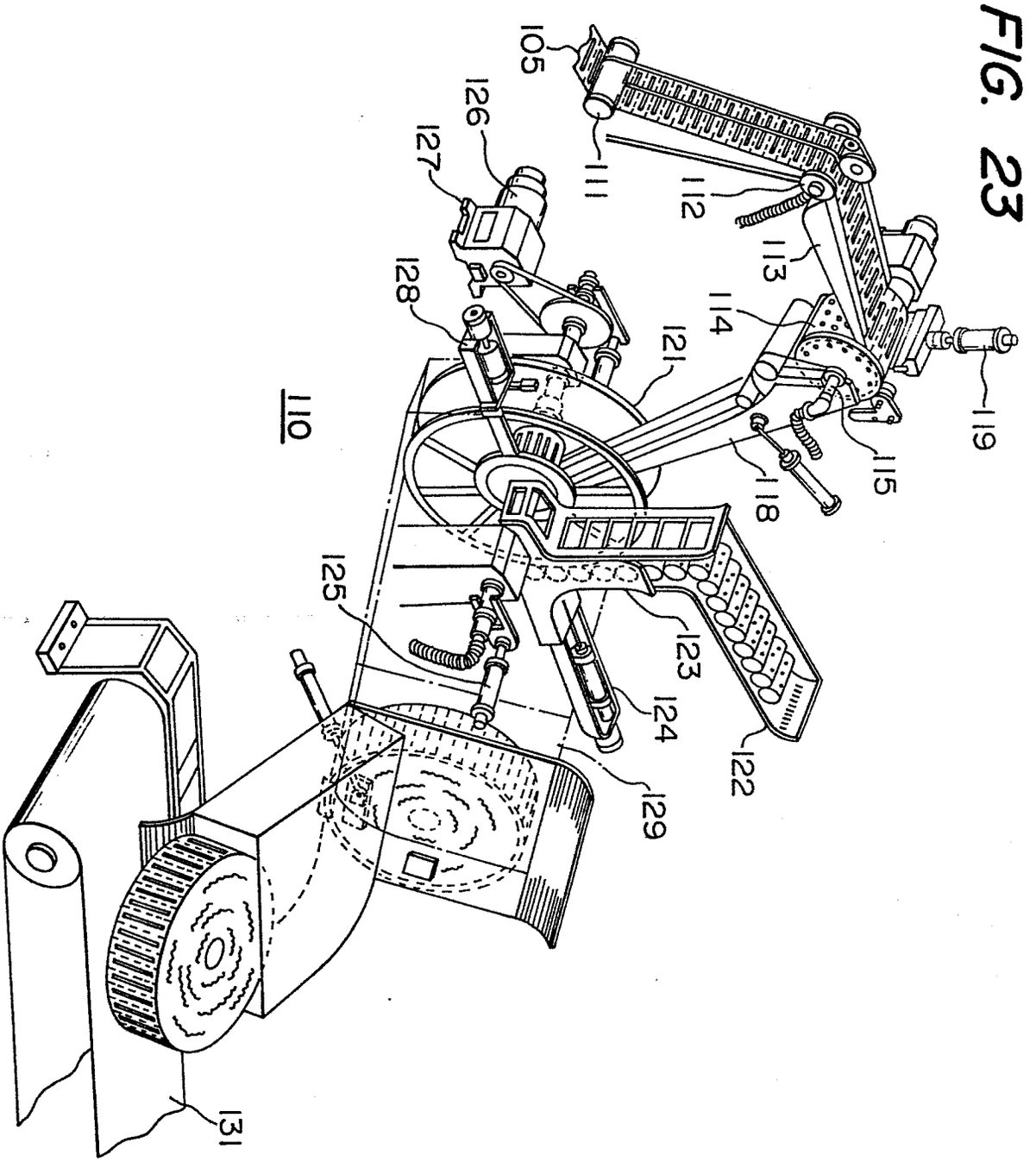

FIG. 23

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FIG. 24A

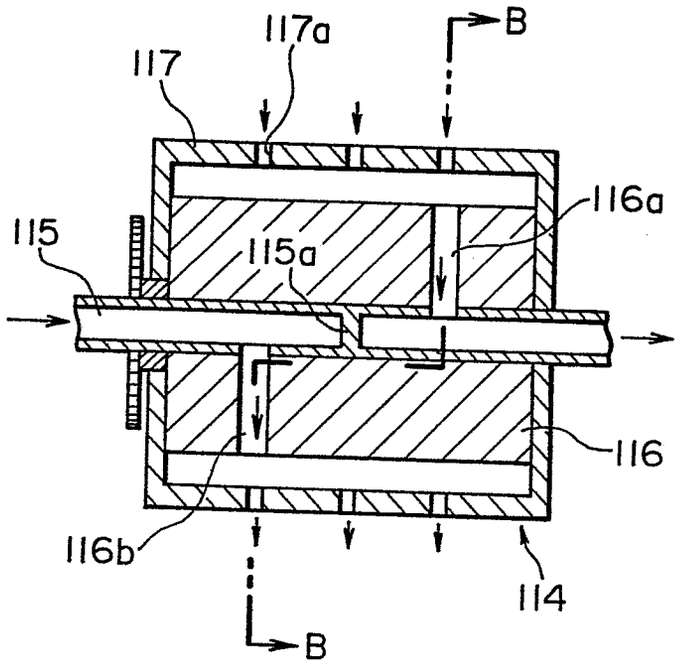

FIG. 24B