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(54) **MOLDED TUBE WITH A SEALED END**

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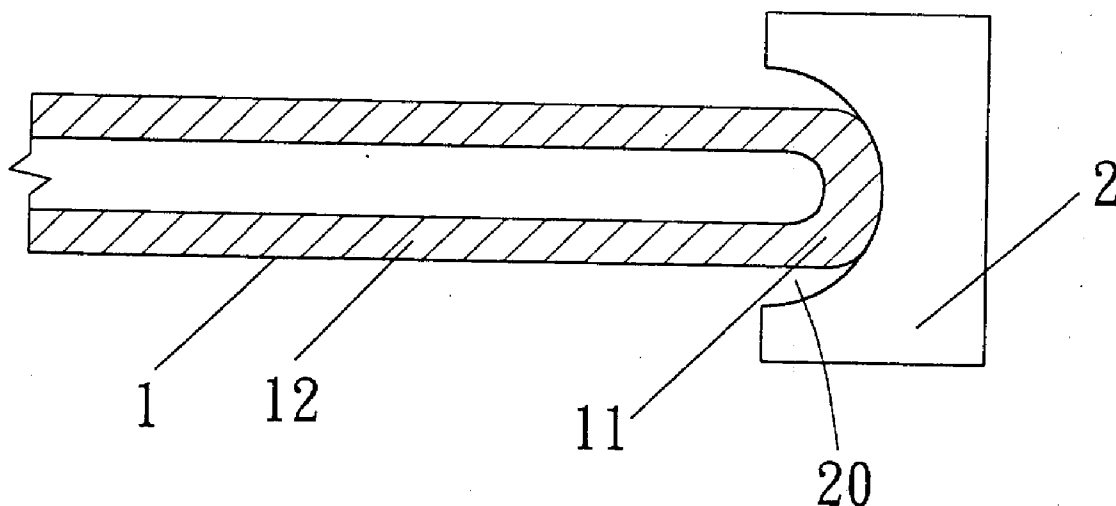
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(57) **ABSTRACT**

The invention provides a molded tube with a sealed end. When the tube body is placed front of a press mold, an end of the tube body is heated while being rotated until the ends is moldable. Thereafter, the end portion of the tube is shaped in a manner that an inner wall of the end portion of the tube body tapes outwardly, so that a wall thickness of the tube body is smaller than that of the end portion. A plurality of threads or a groove is further formed on an external surface of the end portion of the tube to further fastening an additional element.



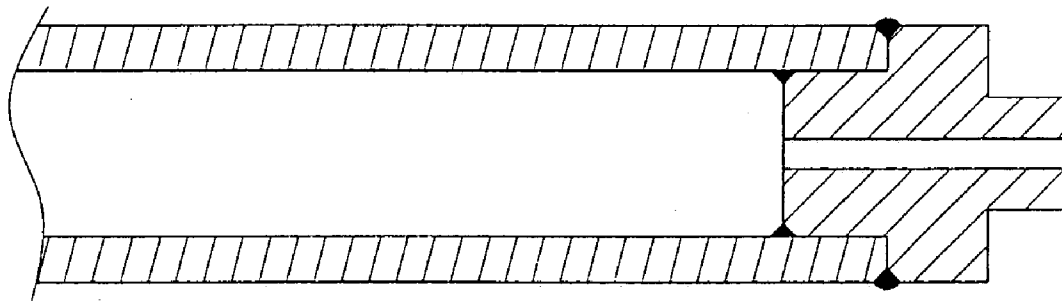


FIG. 1 PRIOR ART

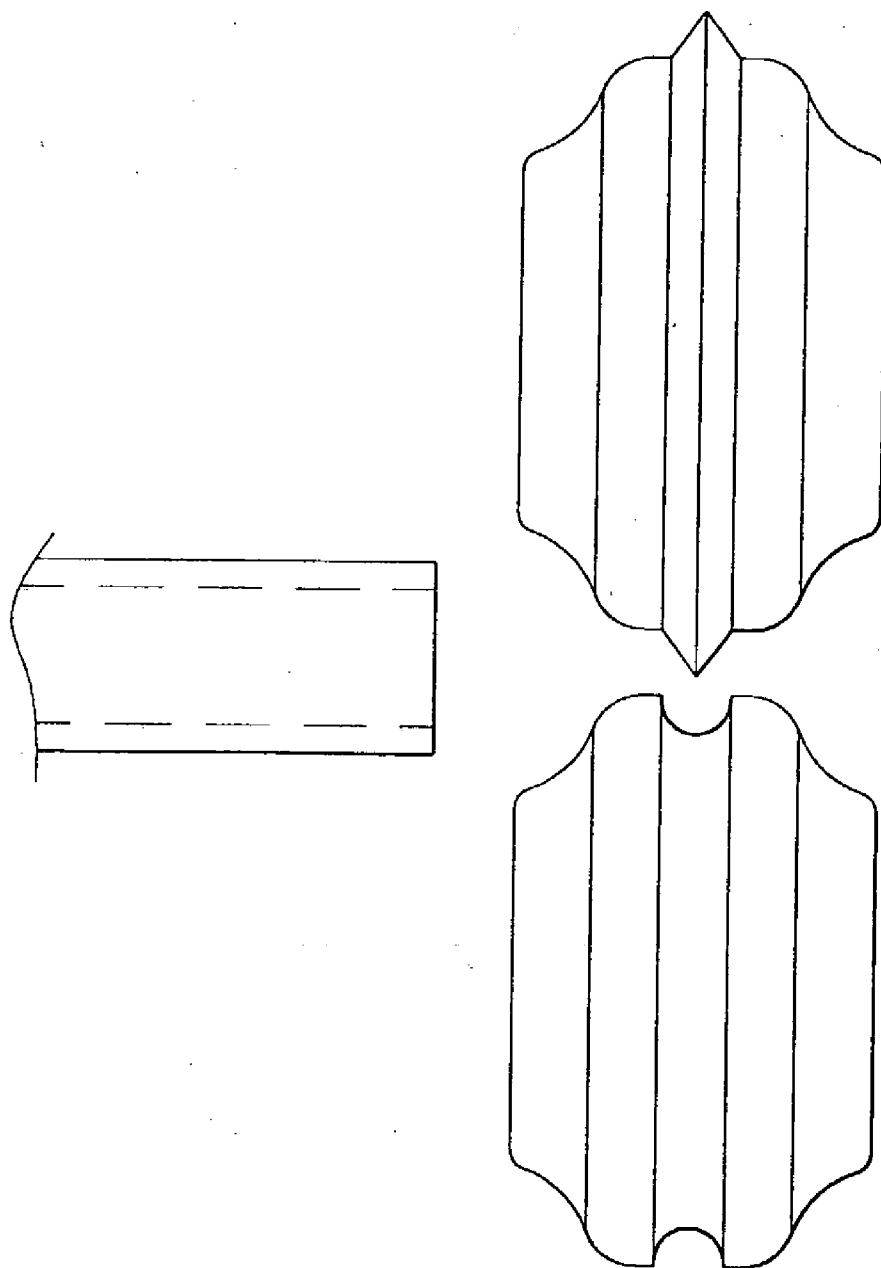


FIG. 2 PRIOR ART

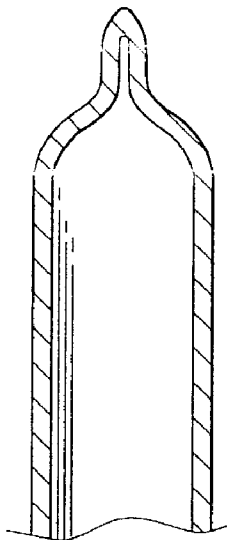


FIG. 4 PRIOR ART

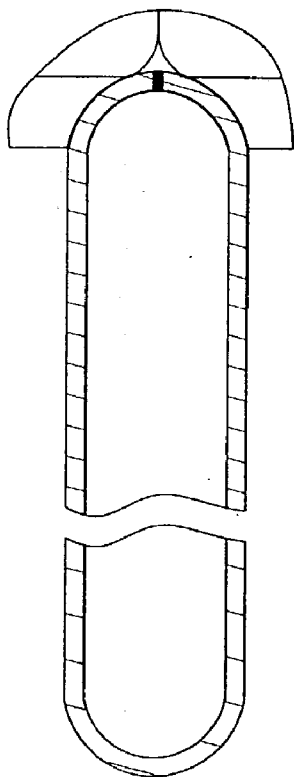


FIG. 3 PRIOR ART

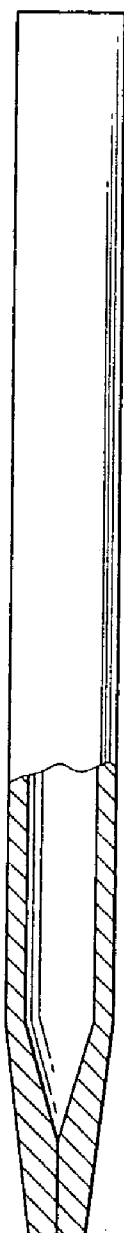


FIG. 5 PRIOR ART



FIG. 6 PRIOR ART

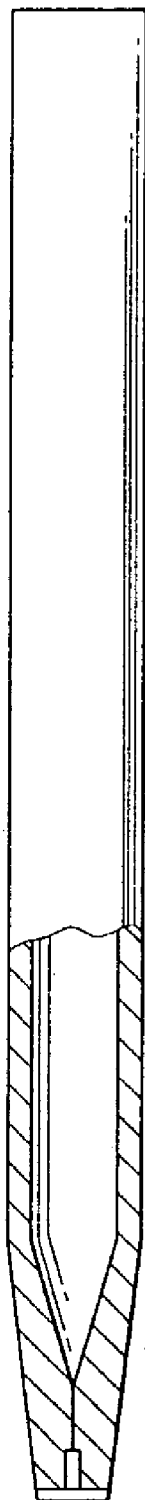


FIG. 7 PRIOR ART

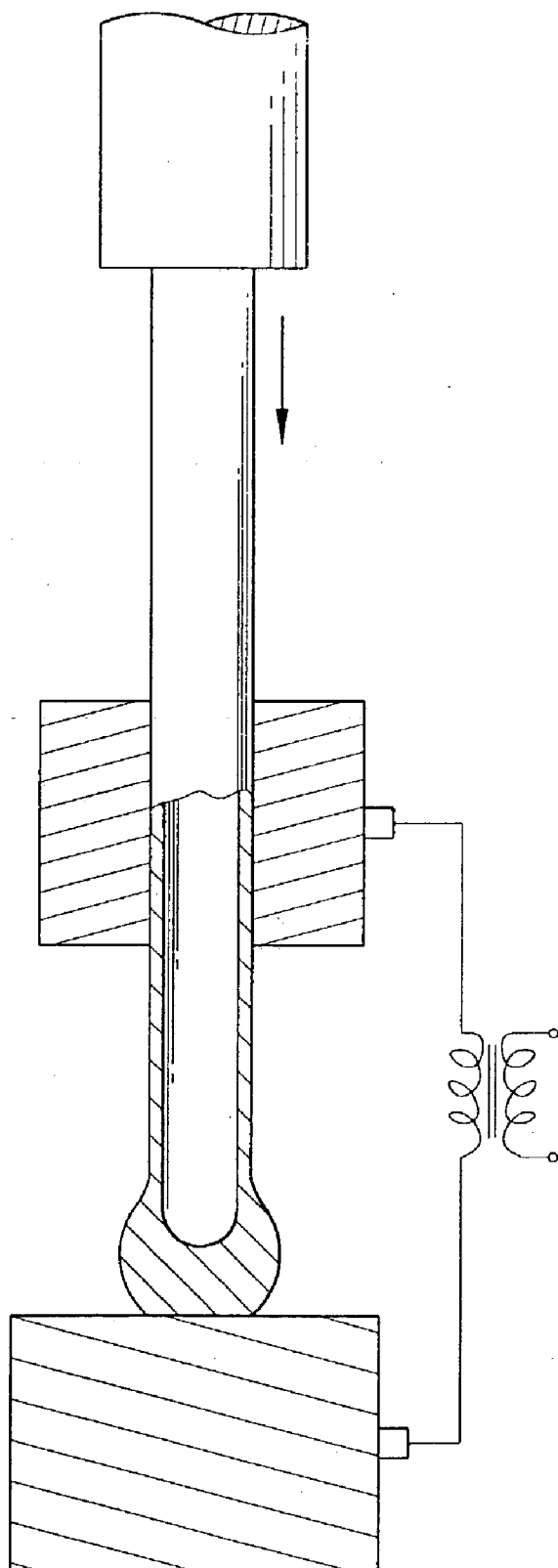


FIG. 8 PRIOR ART

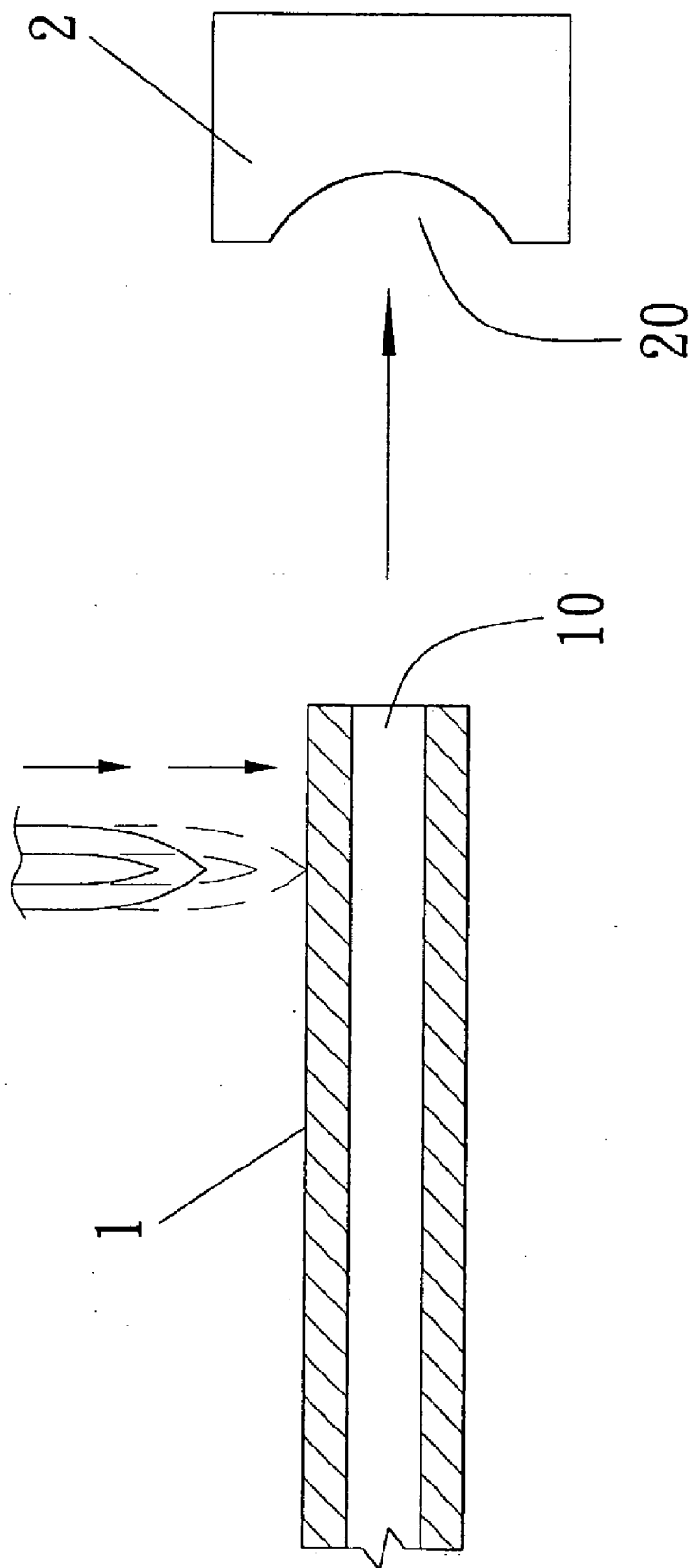


FIG. 9

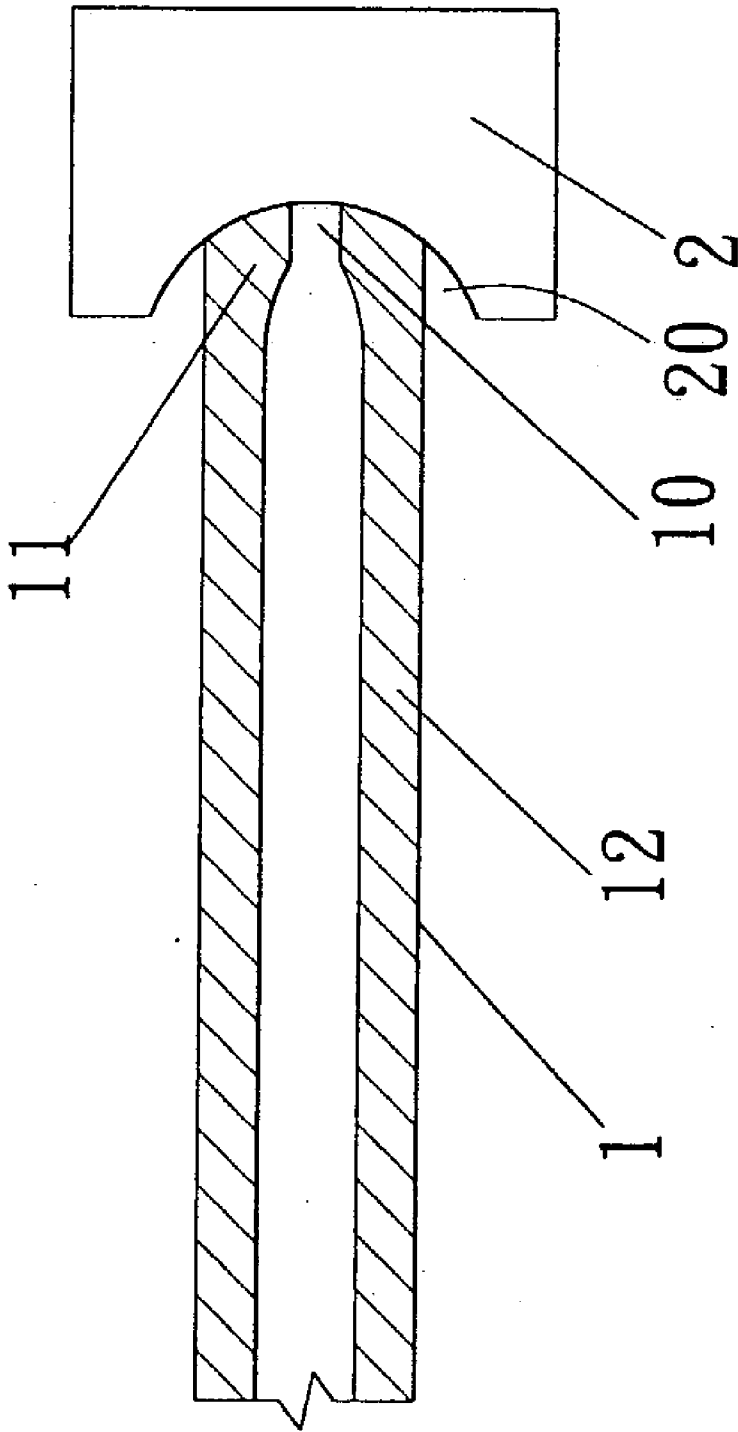


FIG. 10

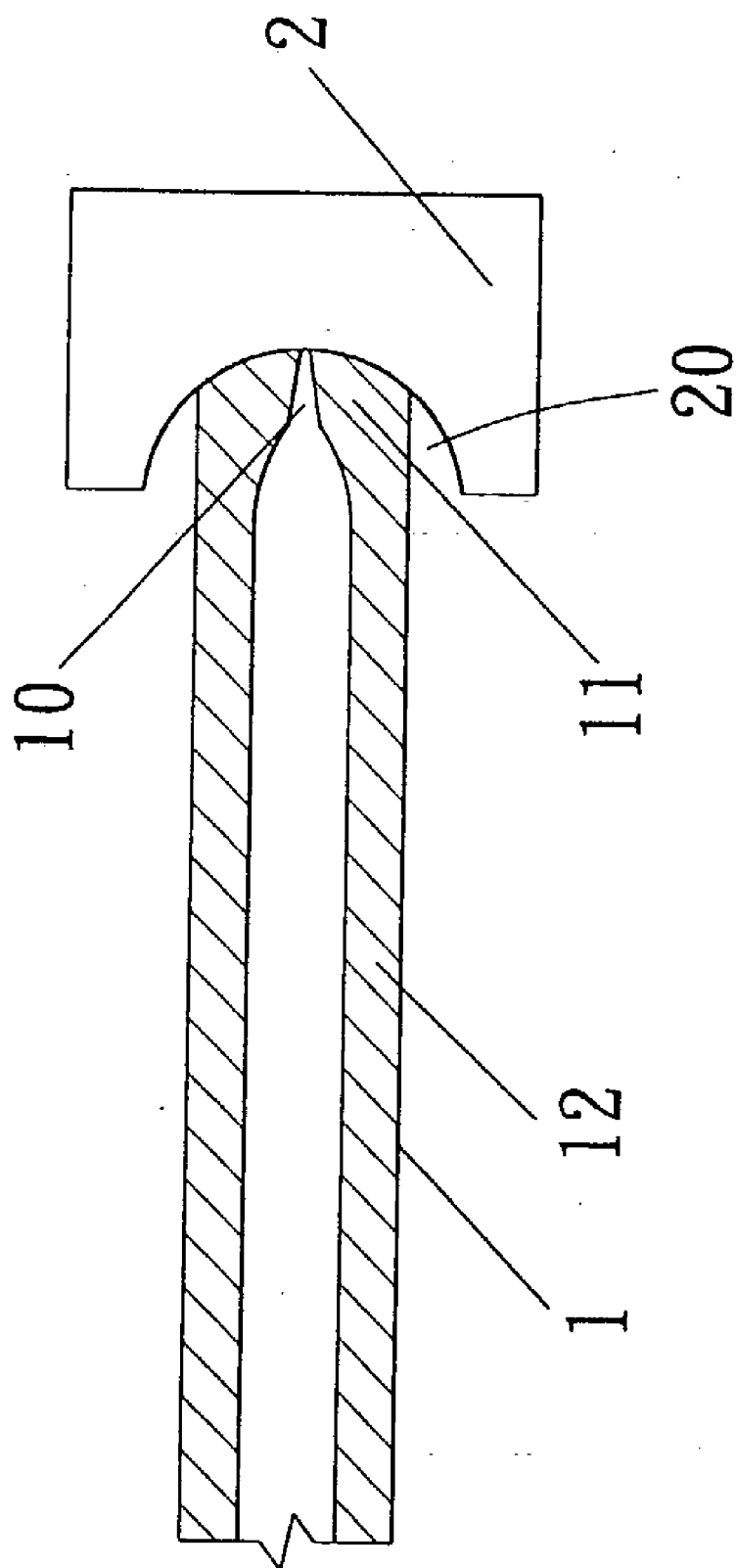


FIG. 11

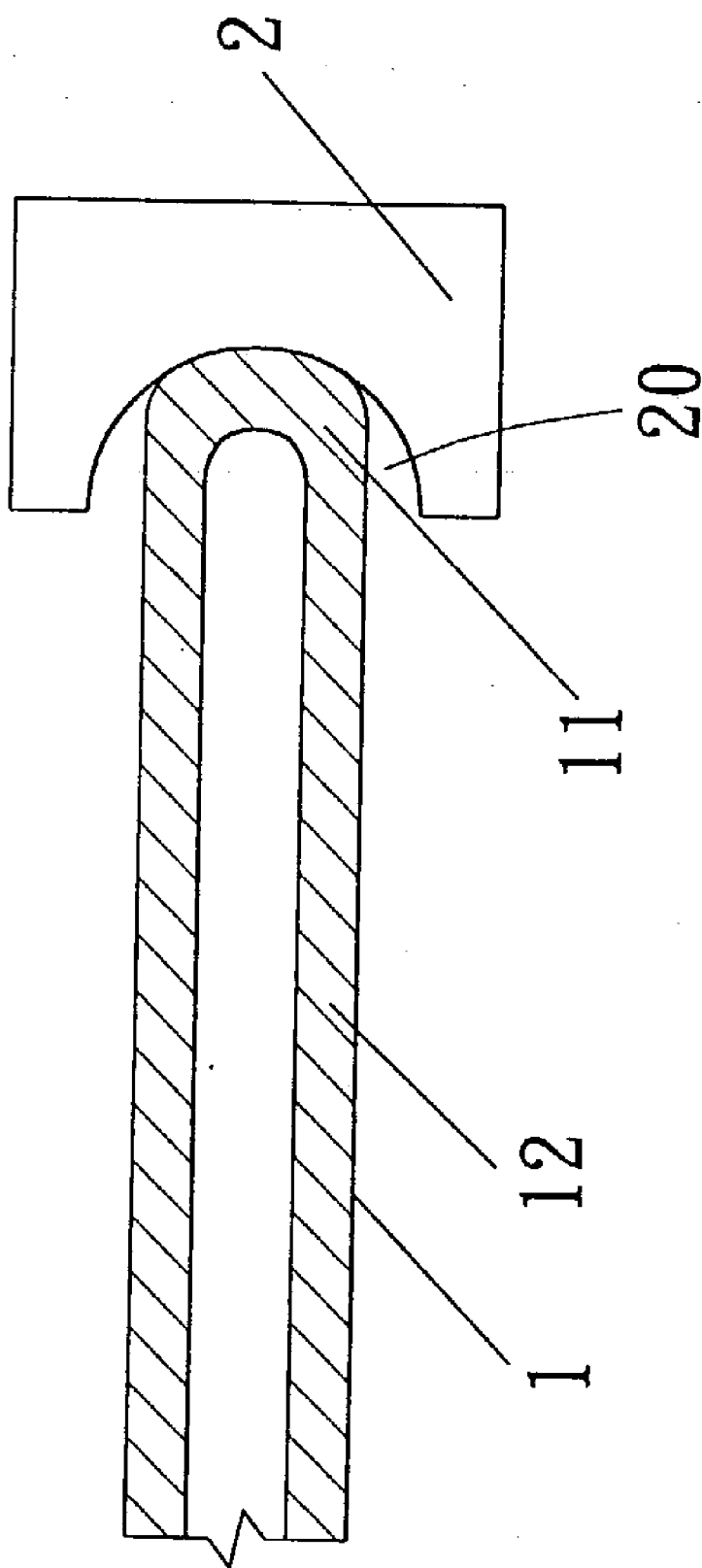


FIG. 12

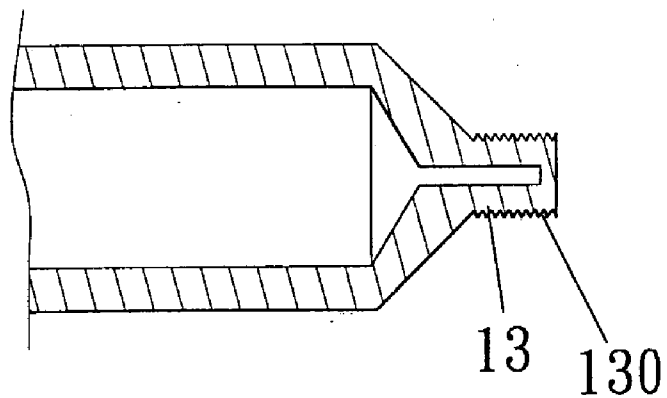


FIG. 13

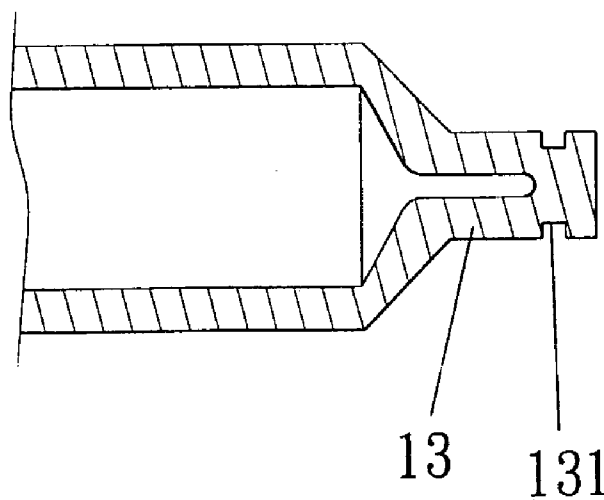


FIG. 14

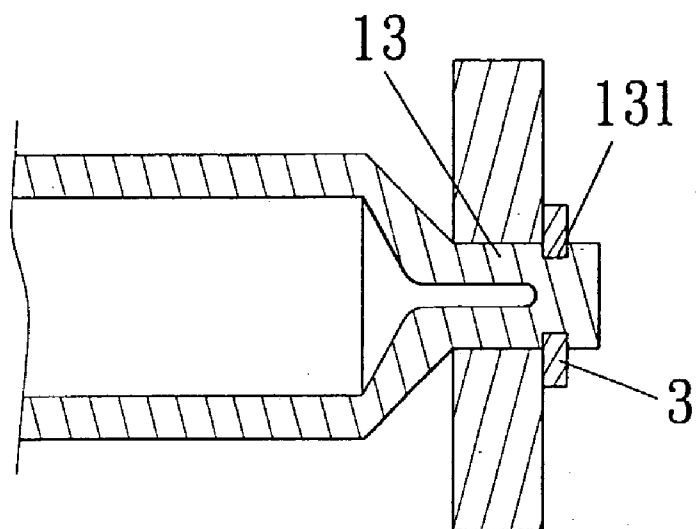


FIG. 15

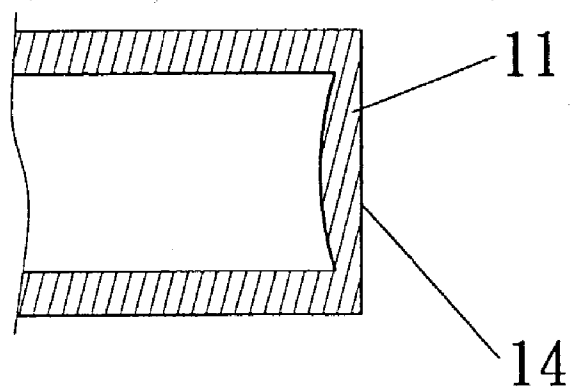


FIG. 16

MOLDED TUBE WITH A SEALED END

FIELD OF THE INVENTION

[0001] The present invention relates to a molded tube with a sealed end, and, more particularly, to a molded tube with a sealed end, in which a wall thickness of a tube body of the molded tube is smaller than that of an end portion of the molded tube.

BACKGROUND OF THE INVENTION

[0002] A conventional process of producing a hollow tube with a closed end is illustrated in **FIG. 1**. A portion of the hollow tube near its end is formed with threads for screwing a lid thereto. Thereafter, a soldering process is performed to firmly seal the end of the tube. Such a tube is widely used in a hydraulic press, pneumatic tool, and a bumper. However, this soldering process is complex and needs high cost. Furthermore, products made by the process have poor soldering quality, imprecise size and non-perfect aspect. Bubbles are easily formed at the joint of the lid at the end of the tube, causing poor airtightness and joint strength.

[0003] Another process of producing a hollow tube with closed end is illustrated in **FIG. 2**. An end portion of the hollow tube is placed between a pair of rollers. By mutually rotational movement of the rollers, the end portion of the tube is extruded and flattened, as shown in **FIG. 3**, until the end portion is closed. However, even after the end portion is flattened, still a slit exists, which means the end portion of the hollow tube is not completely sealed and an additional processing step is required. Furthermore, the end portion of the tube can not be made into any other shape. The manufacture process is also time-consuming. Wall thickness of the whole tube including the end portion is uniform, so that an inner stress is generated at the flattened end portion where is easily damaged.

[0004] U.S. Pat. No. 2,705,275 discloses a hollow tube with a sealed end. The wall thickness of the whole tube is uniform, as shown in **FIG. 4**. When the end portion of the tube is to be formed with threads or a groove, other portions of the tube can not tolerate the stress generated by processing.

[0005] U.S. Pat. No. 4,263,799 discloses a hollow tube with a slit at its end, as shown in **FIG. 5**. An additional processing is required to completely seal the slit at the end of the tube. Sealing the slit is usually achieved by a soldering process. However, a solder point is usually left on the end of the tube, as shown in **FIG. 6**. This soldering process is troublesome and requires high cost. Similarly, products made by the process have poor soldering quality, imprecise size and non-perfect aspect. Bubbles are easily formed at the joint of the lid to the end of the tube, causing poor airtightness and joint strength.

[0006] In another conventional process of producing a tube with a closed end, a rivet is used to seal the end of the tube, as shown in **FIG. 7**. The method is complex and also requires high cost. The quality and precision of bonding via the rivet is not satisfied. The bonding strength and airtightness at the joint are not good, neither.

[0007] Alternatively, the end portion of the tube is melted and sealed by heating, which undesirably increases the

process cost. Furthermore, a mold must to be pushed against the end portion, as shown in **FIG. 8**, increasing the complexity of processing.

SUMMARY OF THE INVENTION

[0008] The primary objective of the present invention is to solve the above problems and provide a molded tube that is directly molding formed with reduced cost, while without support by any mold. The molded tube is airtight with high mechanical strength.

[0009] It is another object of the invention to provide a molded tube with a sealed end that has a wall thickness at its end larger than at its tube body. An external surface of the molded tube is further formed with threads or a groove to extend a use range of the molded tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] **FIG. 1** is a schematic view of a first conventional molded tube with a closed end;

[0011] **FIG. 2** is a schematic view of a second conventional molded tube before its end is closed;

[0012] **FIG. 3** is a schematic view of a second conventional molded tube after its end is closed;

[0013] **FIG. 4** is a cross-sectional view of a part of a molded tube with a closed end of U.S. Pat. No. 2,705,275;

[0014] **FIG. 5** is a cross-sectional view of a molded tube with a slit at its end of U.S. Pat. No. 4,263,799;

[0015] **FIG. 6** is a cross-sectional view of a molded tube with a solder point at its end of U.S. Pat. No. 4,263,799;

[0016] **FIG. 7** is a cross-sectional view of a molded tube sealing a slit at its end with a rivet;

[0017] **FIG. 8** is a cross-sectional view of a molded tube blocking its end by a mold of U.S. Pat. No. 4,263,799;

[0018] **FIG. 9** is a schematic view illustrating formation of a molded tube according to a first embodiment of the invention;

[0019] **FIG. 10** and **FIG. 11** are schematic views illustrating the sealing of the molded tube according to a first embodiment of the invention;

[0020] **FIG. 12** is a cross-sectional view of a molded tube after its end is sealed according to a first embodiment of the invention;

[0021] **FIG. 13** is a cross-sectional view of a molded tube with a threaded surface at its end according to a first embodiment of the invention;

[0022] **FIG. 14** is a cross-sectional view of a molded tube with a groove around its end according to a second embodiment of the invention;

[0023] **FIG. 15** is a cross-sectional view of a molded tube with a groove around its end after assembly according to a second embodiment of the invention; and

[0024] **FIG. 16** is a cross-sectional view of a molded tube with non-tapered ends according to a third embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Referring to **FIG. 9** to **FIG. 11**, the invention includes a tube body **1** which is hollow cylinder and made of any material. The size and shape of the tube body **1** is not particularly limited. The tube body **1** is placed front of a chamber **20** of a press mold **2**. Then, an end **10** of the tube body **1** is heated while being rotated until the end **10** is moldable.

[0026] Thereafter, the end **10** of the tube body **1** is shaped in a manner that an inner wall of the end **10** of the tube body **1** tapes toward the chamber **20** of the press mold **2**, so that a wall thickness **12** of the tube body **1** is smaller than a wall thickness **11** of the end **10**, as shown in **FIG. 12**. Thereby, the end **10** with larger wall thickness **11** tolerances larger pressure than other portions of the molded tube.

[0027] The shape of the chamber **20** of the press mold **2** determines the shape of the end **10**. Therefore, the press mold **2** can have the chamber **20** of various shapes depending on the shape requirement of the end **10**.

[0028] For convenient conveyance of the molded tube of the invention, the end **10** of the molded tube **1** can be rendered to be moldable by heating and molded to form a rod **13** having the wall thickness **11** larger the wall thickness **12**. The shape of the end **10** may be changed by changing the shape of the chamber **20** of the press mold **2**. The external surface of the rod **13** can be further formed with threads **130** at the end **10** to provide further fastness, as shown in **FIG. 13**.

[0029] Referring to **FIG. 14**, the embodiment of **FIG. 14** is the same as that of **FIG. 13**, except that the groove **131** is formed around the external surface of the end **10** for mounting an additional element. A C-shaped clip **3** can be engaged in the groove **131** to further fasten the rod **13**, as shown in **FIG. 15**.

[0030] Referring to **FIG. 16**, the molded tube of the invention is formed with a non-tapered end **14**, the wall thickness **11** at the end **10** being larger than the wall thickness **12** to completely seal the molded tube and increases its mechanic strength.

[0031] The end **10** is formed by heating the tube body **1** while rotating in a manner that the inner wall of the end **10** tapers outwardly until the end **10** is completely sealed. After the end **10** of the tube body **1** is completely sealed, the tube can be optionally subjected to an annealing process or other thermally process to modify the material property of the tube so as to extend the use range of the molded tube.

[0032] It should be apparent to those skilled in the art that the above description is only illustrative of specific embodiments and examples of the invention. The invention should therefore cover various modifications and variations made to the herein-described structure and operations of the invention, provided they fall within the scope of the invention as defined in the following appended claims.

What is claimed is:

1. A molded tube with a sealed end, the molded tube comprising:

- a tube body, having a first wall thickness;
- a sealed end connected to the tube body and having a second wall thickness, wherein an inner wall of the sealed end tapers toward outwardly, the second wall thickness being larger than the first wall thickness; and
- a plurality of thread or a groove, optionally formed on an external surface of the sealed end.

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