

[54] **METHOD AND DEVICE FOR CUTTING OUT APERTURES IN THE WALL OF A PLASTIC TUBE**

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[52] **U.S. Cl. 83/54, 83/355, 83/628**

[51] **Int. Cl. B26d 3/00, B26d 5/16**

[58] **Field of Search 83/54, 192, 193, 83/194, 350, 355, 357, 513, 519, 628; 138/121, 173**

[56]

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[57]

ABSTRACT

A process of forming apertures in the wall of a corrugated thermoplastic tube by punching the wall with a punch. The outer circumference of the tube is engaged with a hollow tubular guide in the region of punching and the inner surface of the tube is completely unsupported.

3 Claims, 4 Drawing Figures

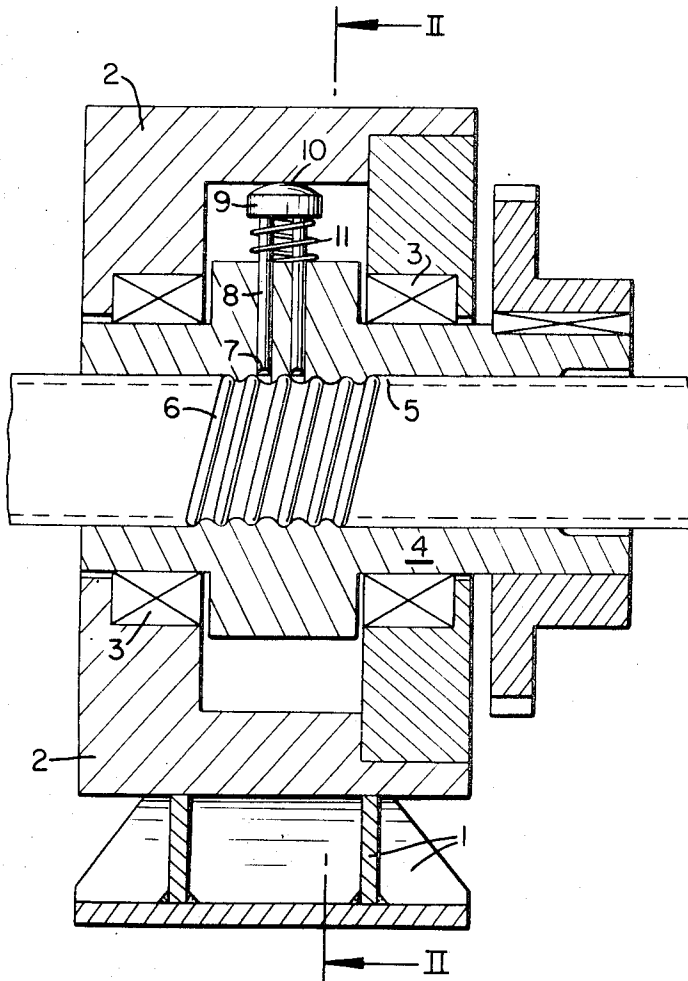


FIG. 2

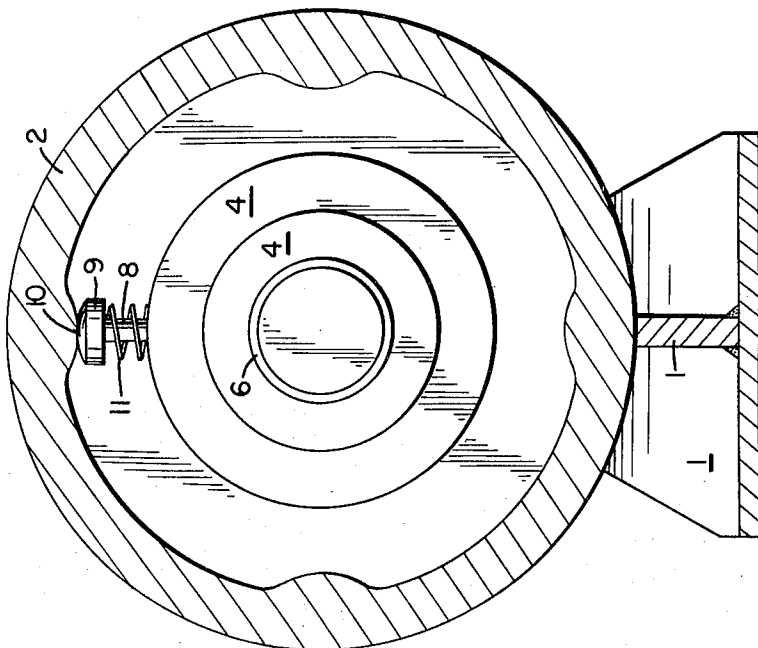


FIG. 1

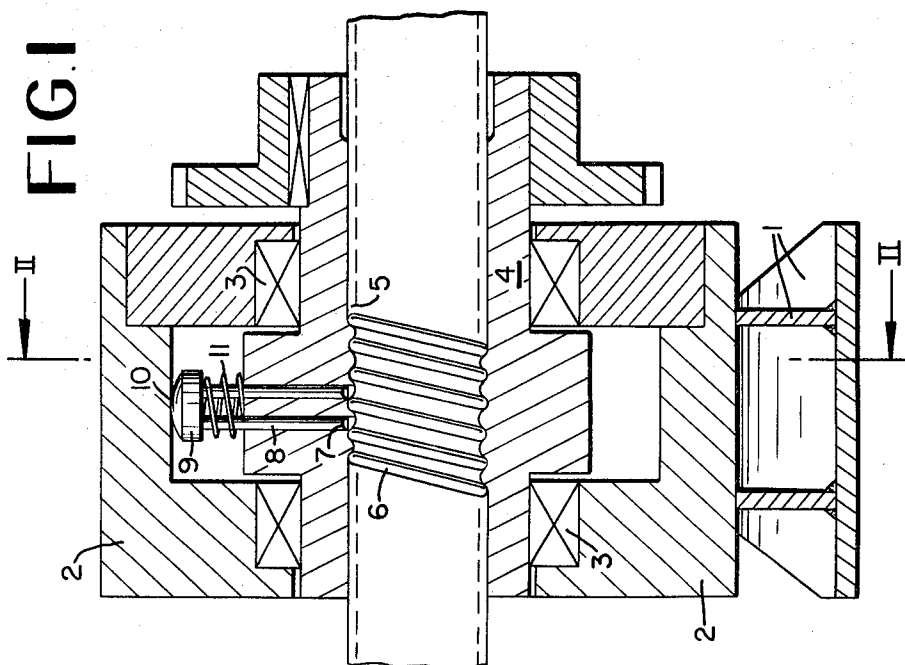


FIG. 4

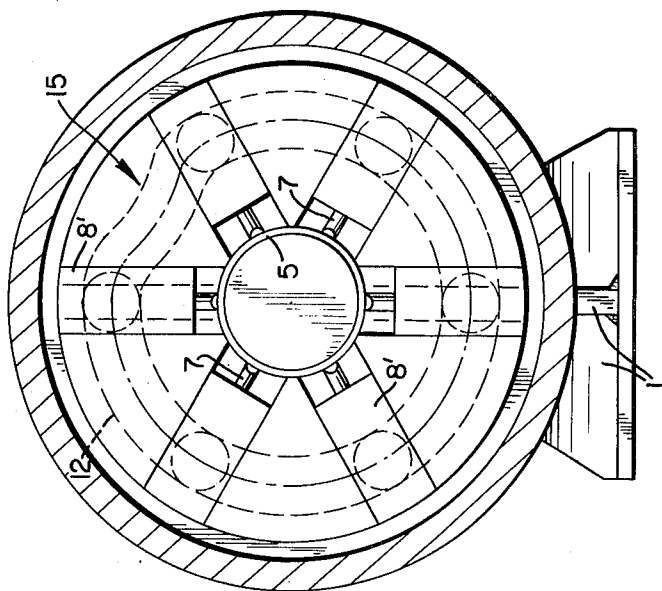
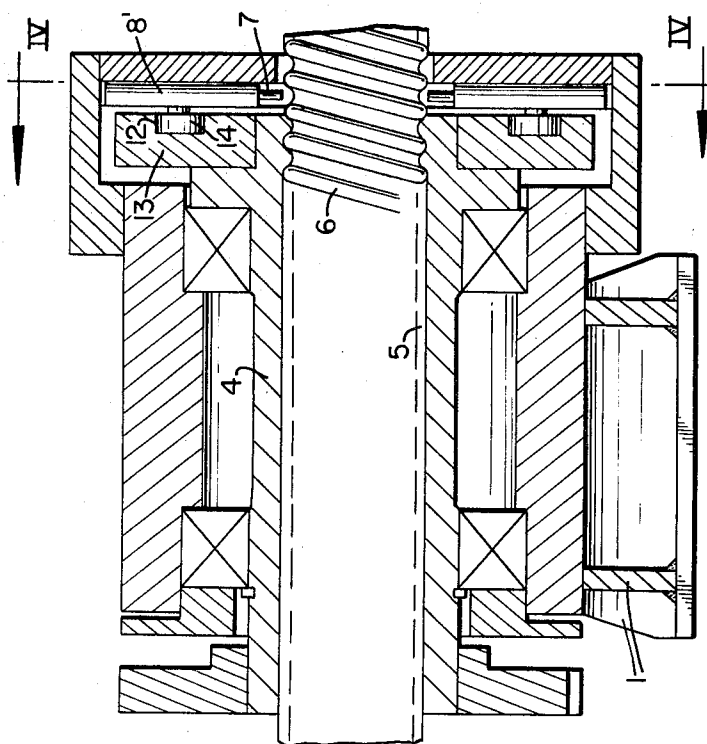


FIG. 3



METHOD AND DEVICE FOR CUTTING OUT APERTURES IN THE WALL OF A PLASTIC TUBE

This case is a division of Ser. No. 756,237, filed Aug. 29, 1968, now U.S. Pat. No. 3,604,301.

The invention relates to machines for making apertures in plastic tube and particularly to that type of machine in which punching elements are operated to pierce a corrugated tube for draining purposes.

Such devices for manufacturing plastic tube with incisions or apertures whereby special sawing devices are employed are known per se.

The kind of draining pipes obtained with the aid of these devices can only be made with difficulty by means of these complicated devices, but even so only at a rather high cost price.

It is now an object of the invention to provide a device by which in a simple way apertures of the desired dimensions can be made in the hollows of a plastic tube, especially a corrugated tube, without employing complicated devices, which apertures contrary to the apertures obtained by sawing in the tube get hardly filled up and consequently have a long lifetime.

such a device for providing apertures in the wall of a plastic tube especially a corrugated tube for draining purposes comprises a frame with guide means for guiding the plastic tube, punching means for making apertures being mounted for radial movement, and lying outside respectively inside the tube, means for depressing said punching means which are effective without supporting means for the punching means at the inner-side respectively outside of the tube.

By employing punching members rectangular or otherwise formed apertures are obtained at the desired locations which have a profile different from that which is normally obtained by means of a saw.

According to an advantageous embodiment the guide means for the plastic tube consists of a hollow rotatable nut, connected with at least one radially inwardly movable punch provided at its end with bits for blanking out parts of the tube wall, which can cooperate with operating cams provided on a stationary ring for actuating the punches.

According to another advantageous embodiment the guide means for the plastic tube consists of a hollow rotatable nut, said nut carrying a disc provided with a non-circular groove, a projection connected with the stationary punch being capable of movement in this disc.

The invention relates also to a method for manufacturing a plastic tube, and a plastic tube especially a corrugated tube for draining purposes, obtained by applying the device mentioned hereinbefore.

The various objects of the invention will be clear from the description which follows and from the drawings, in which

FIG. 1 is a section through a device according to the invention;

FIG. 2 is a section according to line II — II in FIG. 1;

FIG. 3 is a modified embodiment of the device according to the invention;

FIG. 4 is a section according to line IV — IV in FIG. 3.

Represented in FIGS. 1 and 2 is a device consisting of a frame 1 carrying a stationary ring 2 in which by means of a ball bearing 3 a rotatable nut 4 (driven by a non-represented motor) is secured which serves as a

guide member for a relatively thin plastic tube 6 of thermoplastic, polyvinylchloride or polyethylene, being 0.2–0.6 mm thick. The inner wall 5 of the nut 4 has a profile corresponding with that of a corrugated tube 6 to be worked. Fixedly secured on the rotatable nut 4 are punching means in the shape of a punch 8 provided with bits 7 and a head 9. Operating cams 10 on the stationary ring 2 actuate the punch 8 and drive the bits through the wall of the tube.

The device operates as follows. A corrugated tube 6 formed on a tube forming machine is guided in the profiled wall portion 5 of the rotatable nut 4. The rotatable nut is driven via gear wheels (not shown) by the tube forming machine, whereby a synchronous process is obtained. The nut 4 with punch 8, head 9 and punching members in the shape of bits 7 rotate until the head 9 encounters an operating cam 10 whereby the punch is depressed and the bits 7 are passed through an opening in the nut 4 and an aperture is punched in the wall of the tube. It is evident that the number of apertures provided in the wall of the tube is determined by the number of operating cams 10.

The bits 7 are advantageously disposed in such a way that they exclusively provide apertures in the hollows of the corrugated tube, which is readily obtained by the form of the cams.

The punch is springloaded by a spring 11 in order to ensure the return thereof after making an aperture.

It is very remarkable that apertures can be obtained without using an inner core for supporting the inner-side of the tube during punching.

Represented in the FIGS. 3 and 4 is a preferred embodiment in which likewise a frame 1 is provided and a rotatable nut 4 serves as a guide member for the tube. The inner wall 5 of the nut 4 has likewise a profiled surface corresponding with that of the corrugated tube to be treated. This nut is connected with a disc 13 provided with a non circular groove 12. In this groove 12 a projection 14 connected with a stationary punch 8' can move. On rotation of the nut 4 the disc 13 will be taken along and consequently the projection 14 connected with the punch will also be guided in this groove 12. Owing to the non-circular shape of the groove 12 the punch is depressed at the location of the non-circular part 15 and the wall of the tube is perforated. As will be noted the profile of the nut 4 substantially ends before the working area of the bits 7.

It should be noted that in the process of punching the rotatable nut should for a moment stop, but due to the speed (0.1 sec or less) at which the punching operation is carried out, it appears that in practice this can be omitted.

According to the figures the profile of the plastic tube is regular, but in certain cases tubes having a regularly varying profile, e.g., the hollows of different depths alternating with tops of different heights, are preferred.

Having thus described the invention and manner of its operation what I claim as my invention is:

1. A method for forming apertures in the wall of a relatively thin-walled corrugated plastic tube for drainage purposes, said method comprising passing the tube through a hollow tubular guide support, punching apertures in the tube by radially piercing the tube with a punch from the exterior thereof, supporting the tube only on one side of the region where the tube is punched, in said support over a portion of the outer

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surface of the tube, such that the tube can be punched without any internal support for the tube, and effecting the punching of the apertures in the hollows of the corrugated tube in proximity with the location where the tube exits from the guide support where the tube is unsupported.

support is formed with internal threads and the tube is passed through the support in threaded engagement therewith.

3. A method as claimed in claim 2 wherein the tube is passed through the support by rotating the support while holding the support in axially fixed relation.

2. A method as claimed in claim 1 wherein said guide

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