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(54) A method and a device for applying filling rods in openings of liquid containers made of foil material.

(57) A method and a device for applying solid or hollow plastics rods (6) in apertures (15) in sealing seams of intermittently transported liquid containers (14c) consisting of foil material by means of an insertion guide (10) which is movable transversely to the line of transport (13) of said containers (14c), and is provided with a longitudinal cavity (11), said rods being secured, after insertion, in said sealing seams by means of heated shoes (16), unstretched rods (6) formed by extrusion or injection moulding being lined up in a vibrating drum (7), and being guided in succession in said longitudinal cavity (11), the lowermost rod (6') always being driven outwards, said guide (10), after said rod (6') is being held, being retracted again, and, the next rod (6) then being placed in the expulsion position.

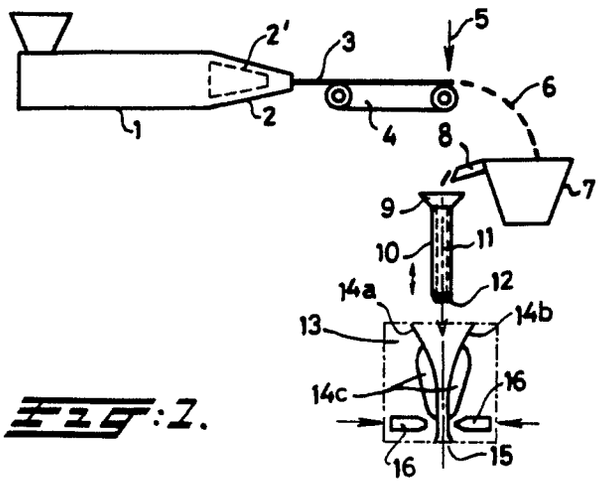

Fig. 1.

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A method and a device for applying filling rods in apertures of liquid containers made of foil material.

The invention relates to a method for applying solid or hollow plastics filling rods in apertures in sealing seams of intermittently transported liquid containers consisting of foil material or not yet completely sealed shaped foil webs for forming such containers, said rods being inserted by means of an insertion guide which is movable transversely to the line of transport and is provided with a longitudinal cavity, into said apertures, and, after insertion, said rods are secured in said apertures by means of heated shoes, and are locally deformed thereby; the invention further relates to a device for executing said method.

Such a method and device are known from DE-C 2 310 787 for applying threads in dispensing containers for eye drops. Therein a thin plastics thread is unwound from a coil and is propulsed in said insertion guide over a given length,and, by translating said guide, is driven into an aperture of a container, after which a cutting knife included in said guide cuts off the thread.

This known method and apparatus have some deficiencies which lead to a very high rejection proportion. Since the thread has been wound, it has a given curvature which is often a cause of failure when inserting the threads into the narrow apertures of the containers. Furthermore the thread is stretched when being wound which leads to strain hardening thereof. For fixing such a thread in the sealing seam of a container by local squeezing, considerable forces are required, a consequence thereof being that in a great many cases the foil material is crushed. Furthermore it becomes, in this manner, very difficult to clamp hollow rods in a container sealing seam, since such rods will be easily flattened.

It is an object of the invention to avoid these draw-backs, and to provide a method for that purpose, which is characterised in that unstretched rods previously formed by extrusion or injection moulding at the desired length, are lined up in a vibrating drum, and are guided one by one in the longitudinal direction and in succession in the longitudinal cavity of the insertion guide, the lowermost rod always being driven outwards and being inserted into an aperture, said guide being retracted again after the rod is being held, the rod then being removed from the guide, and, finally, the next rod is placed in the expulsion position.

The pieces of wire forming said rods are injection moulded or are, shortly after leaving an extrusion press, cut at the required length as is also done when manufacturing drinking straws, so that said rods are not being stretched and remain, moreover, straight. In this manner the draw-backs of the known methods can be avoided, and also in the case of rods having a larger diameter a good clamping can be obtained without damaging the foil material of the containers. This is of great importance in the case of larger containers intended for dispensing milk or more viscous liquids, and in which substantially thicker filling rods are to be used than in the case of eye drop containers.

When hollow rods are to be applied, it is favourable to use the same outer diameter irrespective of the diameter of the bore, the former corresponding with the diameter of the cavity of the insertion guide.

The device according to the invention is characterised by a vibrating drum for lining up and discharging the aligned filling rods towards the insertion guide joining the discharge end of said drum, said guide having a longitudinal cavity in which rods introduced at one extremity thereof can be guided in succession, said guide being provided with a friction clamp by means of which the lowermost rod can be retained, and by driving means by means of which,before or during the longitudinal displacement of the guide towards the transport line, a plurality of rods bearing on the lowermost rod can be shifted onwards in order to drive the lowermost rod outwards through said clamp, and, when retracting said guide, a next rod is being moved towards the starting position, all this in such a manner that said guide is only being retracted after the shoes have become operative.

In particular this device is characterised in that said guide comprises a clamping assembly having a set of out wardly resilient claws, said claws, when moving the guide towards the transport line, are being clamped by wedge action against the rod present in its cavity, said claws being released when retracting the guide so as to allow the next rods to slide onwards, stops being provided for actuating the clamping assembly when the guide is being moved.

Alternatively, the insertion guide can comprise a slide which is movable transversely to the axis of the guide, said slide being provided with a bore adapted to be aligned with the passage of the guide, and, on the other hand, can be placed in alignment with another passage communicating with the outlet end of said vibrating drum, said slide having the height of a rod, all this in such a manner that, on shifting said slide, always one rod can be supplied to the former passage, and a pressing finger to be inserted into said passage can be used, which is adapted to shift the rods present in said passage over a distrance which is smaller than the height of a rod.

The friction clamp at the discharge end of said passage is, in particular, an O-ring.

The invention will be elucidated below by reference to a drawing, showing in:

Fig. 1 a highly simplified diagrammatic representation of the device according to the invention;

Figs. 2A..C partial sections of an insertion guide of the apparatus of Fig. 1 in three consecutive conditions;and

Fig. 3 a partical section of another embodiment of said insertion guide.

Fig. 1 shows a highly simplified representation of a device according to the invention. This device comprises an extrusion press 1 with a nozzle 2 for forming a plastics thread 3, a discharge belt 4 and a cutting tool 5 for cutting the thread 3 into rods 6, which, as such, do not form a part of the device according to the invention, but are shown for indicating how the rods 6 intended for the present purpose can be made. In the case of hollow rods 6 a core 2' is provided in the nozzle 2.

Such an extrusion device is of the known kind used for forming plastics thread or plastics drinking straws, but differs from a thread extrusion press in that no stretching and winding rollers are present, and from a drinking straw press in that the cutting tool 4 is adjusted at the desired small length. Moreover the nozzle 2 is adapted to the desired diameter of the rods, which for liquid containers can be about 1,5 mm, but can be larger for containers for viscous substances. In the case of hollow rods or tubes the diameter of the bore thereof should, of course, be adapted to the intended use, and, in view of the further processing to be described below, it is advisable to use always a fixed outer diameter.

Although this extrusion device is shown in Fig. 1, in the vicinity of the remaining parts of the device according to the invention, the former will, in practice, generally be arranged in an other factory, and the rods will be delivered in larger amounts in bags or boxes.

Subsequently the rods 6 are poured in a vibrating drum 7 belonging to the device of the invention proper, in which drum, by vibration, the rods 6 are lined up in succession in a discharge gutter 8. Such vibrating drums are generally known, and, therefore, need not be described in more detail.

The discharge gutter 8 ends above a filling funnel 9 of a diagrammatically indicated and vertically arranged insertion guide 10 which is provided with a longitudinal passage 11, in which the introduced rods are positioned in succession in a row.

The dispensing opening 12 at the lower end of this guide is directed towards a transport line 13, shown in a highly diagrammatic way, for not yet completed liquid containers 14c consisting of plastics foil webs 14a and 14b, which can be translated stepwise in such a manner that, when stationary, the dispensing opening 12 of the guide 10 can be positioned precisely in front of a passage 14 in an already formed sealing seam between the foils 14a and 14b.

When translating the guide 10 in the longitudinal direction, the rod 6 being shifted outwards through the dispensing opening 12 in a manner to be described can be inserted into the passage 15, after which, by pressing heated shoes 16, said rod can be clasped in the sealing seam, and is, then, somewhat compressed, so that it is unambiguously anchored therein. After retracting the guide 10, the rod 6 remains in the opening 15, and the guide can then be used for a subsequent insertion operation.

A transport line for moving the foil webs 14a and 14b is known from DE-C 2 310 787, and, therefore, needs not to be described in detail. This known device is adapted to manufacturing small eye drop containers, but the present device is, in particular but not exclusively, intended for manufacturing larger dispensing containers, more in particular for milk and the like, but this does not change anything in the fundamental concept of such a transport line.

The most important difference with said known device is that no longer a thread which is wound on a coil and is stretched during manufacture is used, but not stretched short rods. Since these rods are not stretched, they are much better deformable, so that they can be deformed with a substantially lower force of the shoes 16, which, in the case of hollow rods or tubes, can take place without flattening the bore thereof, irrespective of the diameter of these rods which is, generally, substantially larger than in the case of the known device. An other advantage of these rods 6 is that they are absolutely straight, this in contrast with the pieces of thread which, in the known device, are cut from a thread unwound from a coil. These straight rods can be inserted without difficulty into the passage 15.

In Fig. 2 diagrammatic sections of an embodiment of the insertion guide 10 of Fig. 1 are shown in three consecutive operational positions. The operation of this insertion guide is substantially the same as in the case of a push-button pencil.

The guide 10 shown consists, now, of three mutually shiftable coaxial main parts, viz. a clamping and driving piece 17 provided with the filling funnel 9 or joining the latter, a casing 18, and a dispensing terminal piece 19 with the dispensing opening 12, which parts define the passage 11. Between the parts 18 and 19 a coil spring 20 is provided. This guide cooperates with two fixed stops 21 and 22 arranged in suitable points along the displacement line of the guide 10, which are,

for the sake of simplicity, shown here close to one another. The clamping piece 17 is connected with a driving means not shown for reciprocating said piece, but, for the upward displacement, also a spring can be used.

At A the position of rest is shown in which the clamping piece 17 has been moved completely upwards, and clamps 23 forming a part thereof have been elastically moved outwards along a wedge surface 24 of the casing 18, which casing is arrested by the stop 21.

At B the beginning of the downward movement is shown, in which the clamping piece 17 is shifted within the casing 18, and the clamping springs 23 are pressed, by means of the wedge surface 24, against a rod 6 present in the passage 11. The lowermost rod 6' is retained by an O-ring 25 in the terminal piece 19.

At C the end of the downward stroke is indicated, after, at first, the terminal piece 19 is arrested by the stop 22. Then the spring 20 is tensioned, and the string of rods 6 is propelled by the clamping springs 23, the lowermost rod overcoming the resistance of the O-ring 25 and is pressed onwards with friction.

After fixing the lowermost rod in the opening 15 of a container 14, the guide 10 is retracted, and the remainder of the fixed rod is extracted from the O-ring. After arresting the casing 18 by the stop 21, the springs 23 are released, and the rod 6 can shift downwards until the lowermost rod abuts the O-ring 25.

It will be clear that this guide can be modified in many ways. For instance the terminal piece 19 can be a part of the casing 18, and the driving means can be made so that, at first, a rod 6' is pressed outwards before the guide 10 is shifted. In that end,for instance, a claw engaging the collar of the casing 18 can be used, which can move along when the clamping piece 17 is pressed downwards, thus taking over the tasks of the stops 21 and 22. Moreover, instead of an O-ring 25, a number of spring blades can be provided, and also other, and in particular double, claw mechanisms can be used with the same effect.

It will be clear that also a number of guides 10, together with associated shoes 16, can be actuated for simul taneously providing a corresponding number of containers in the foil web 14 with rods 6.

In Fig. 3 an other embodiment of the guide 10 is shown, which is constructed as a plural guide for simulataneously inserting a number of rods 6. This guide 10 comprises a number of passages 11, each joined by a dispensing nozzle 19'. Above these passages 11 a supply slide 26 with bores 27 is arranged, which bores can be aligned with the passages 11, and have a height which equals the length of the rods 6. If the slide 26 is moved to the left, said bores 27 can be placed below corresponding passages 28, each joining the discharge gutter of a vibrating drum 7 according to Fig. 1. A rod 6 can drop, then, into the corresponding bore 27, and will drop into the corresponding passage 11 after shifting the slide 26 to the right.

Into each passage 11, and, for instance, simultaneously with shifting the slide 26, a pressure finger 29 can be inserted, which, when pressed downwards, will shift downwards the underlying string of rods 6 over, for instance, half the height of a rod 6. When retracting said finger, a subsequent rod can fall upon the string already present.

It will be clear that also this embodiment can be modified in many ways.

Although the device described by reference to Fig. 1 is intended for using extruded rods, it will be clear that such rods having the required length can also be made by injection moulding or in another suitable manner.

Claims

1. A method for applying solid or hollow plastics filling rods in apertures in sealing seams of intermittently transported liquid containers consisting of foil material or not yet completely sealed shaped foil webs for forming such containers, said rods being inserted by means of an insertion guide which is movable transversely to the line of transport and is provided with a longitudinal cavity, into said apertures, and, after insertion, said rods are secured in said apertures by means of heated shoes, and are locally deformed thereby, **characterised** in that unstretched rods previously formed by extrusion or injection moulding at the desired length, are lined up in a vibrating drum (7), and are guided one by one in the longitudinal direction and in succession in the longitudinal cavity (11) of the insertion guide (10), the lowermost rod (6') always being driven outwards and being inserted into an aperture (15), said guide (10) being retracted again after the rod (6') is being held, the rod (6') then being removed from the guide (10), and, finally, the next rod (6) is placed in the expulsion position.

2. A device for executing the method of claim 1, comprising a transport line for intermittently moving a series of liquid containers consisting of foil material, or not yet completely sealed shaped foil webs for forming such containers and sealing shoes for fixing, in a sealing seam of said containers, a rod inserted into an aperture of a seam by means of an insertion guide which is movable in its axial direction and transverely to the line of transport, and is always aligned with an aperture of a stationary container,**characterised** by a vibrating drum (7) for lining up and discharging the aligned

filling rods (6) towards the insertion guide (10) joining the discharge end (8) of said drum (7), said suide (10) having a longitudinal cavity (11) in which rods (6) introduced at one extremity (9) thereof can be guided in succession, said guide (10) being provided with a friction clamp (25) by means of which the lowermost rod (6') can be retained, and by driving means (9, 10, 23, 24, 29), by means of which, before or during the longitudinal dis placement of the guide (10) towards the transport line (13), a plurality of rods (6) bearing on the lowermost rod (6') outwards through said clamp (25), and, when retracting said guide (10), a next rod (6) is being moved towards the starting position, all this in such a manner that said guide (10) is only being retracted after the shoes (16) have become operative.

3. The device of claim 2, **characterised** in that said guide (10) comprises a clamping assembly (17, 18) having a set of outwardly resilient claws (23), said claws (23), when moving the guide (10) towards the transport line (13), are being clamped by wegde action (24) against the rod (6) present in its cavity (11), said claws (23) being released when retracting the guide (10) so as to allow the next rods (6) to slide onwards.

4. The device of claim 3, **characterised** by stops (21, 22) for actuating the clamping assembly (17, 18) when the guide (10) is being moved.

5. The device of claim 2, **characterised** by a slide 26 which is movable transversely to the axis of the guide (10), said slide (26) being provided with a bore (27) adapted to be aligned with the passage (11) of the guide (10) and, on the other hand, can be placed in alignment with another passage (28) communicating with the outlet end (8) of said vibrating drum (7), said slide (26) having the height of a rod (6), all this in such a manner that, on shifting said slide (26), always one rod (6) can be supplied to the former passage (11).

6. The device of claim 5,**characterised** by a pressing finger (29) to be inserted into said passage (11), which is adapted to shift the rods (6) present in said passage (11) over a distance which is smaller than the height of a rod (6).

7. The device of any one of claims 2..6, **characterized** in that the friction clamp (25) at the discharge end of said passage (11) is an O-ring.

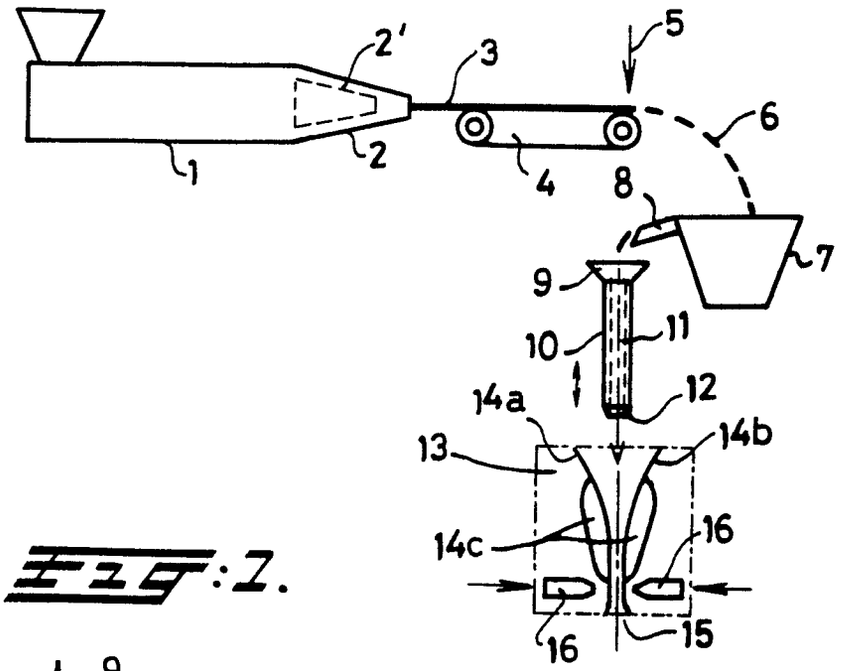
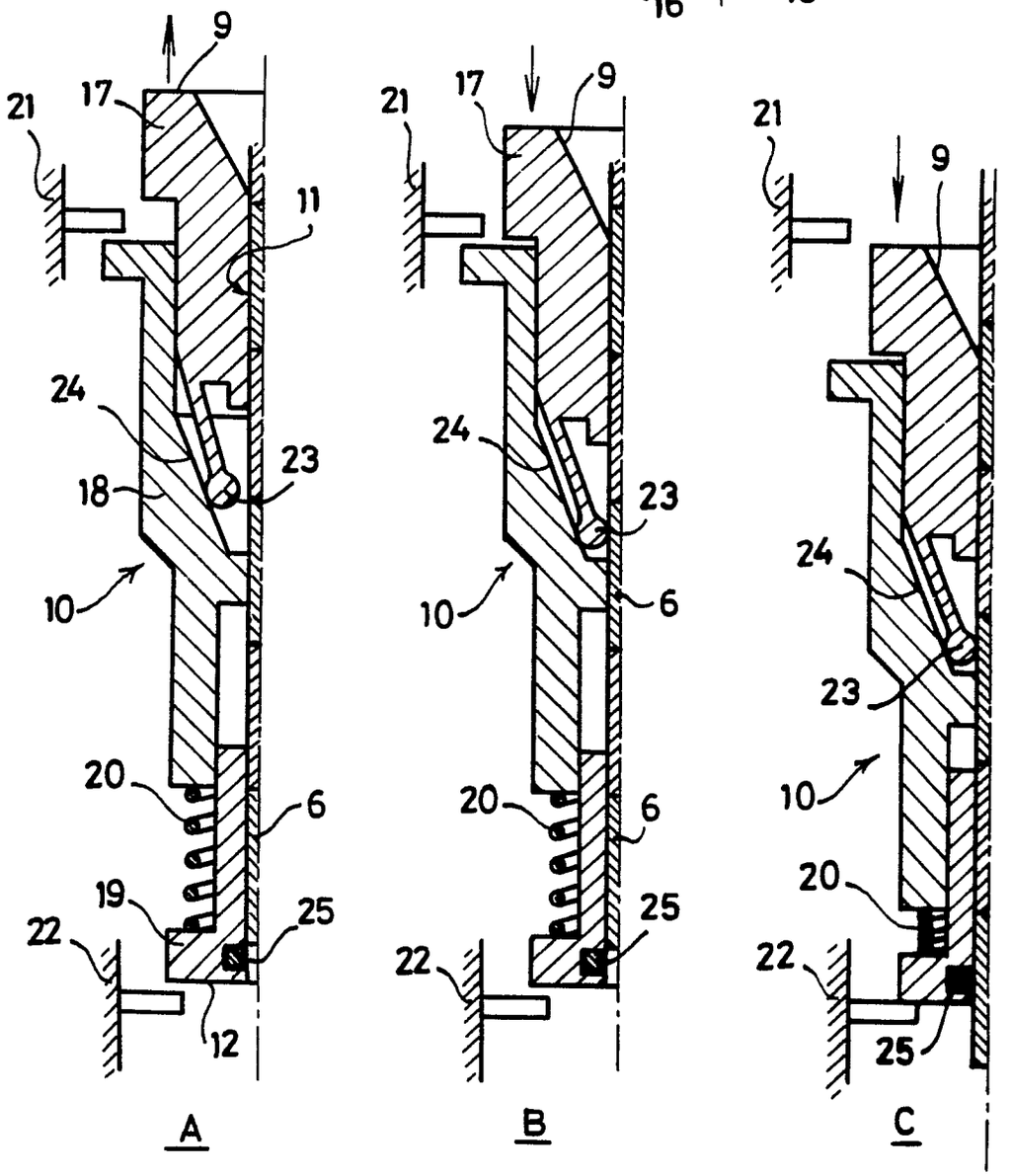

1
2
2'
3
4
5
6
7
8
9
10
11
12
13
14a
14b
14c
15
16
16

Fig: 1.


A
B
C
6
9
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17
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Fig: 2.

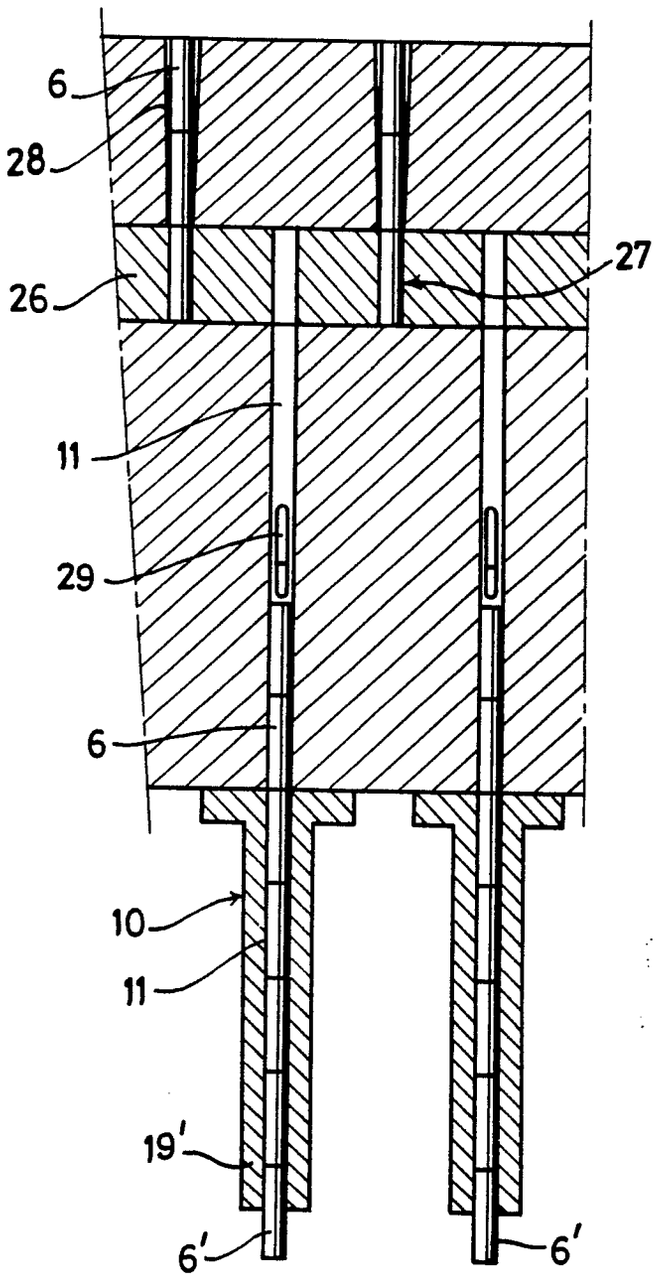

Fig: 3.