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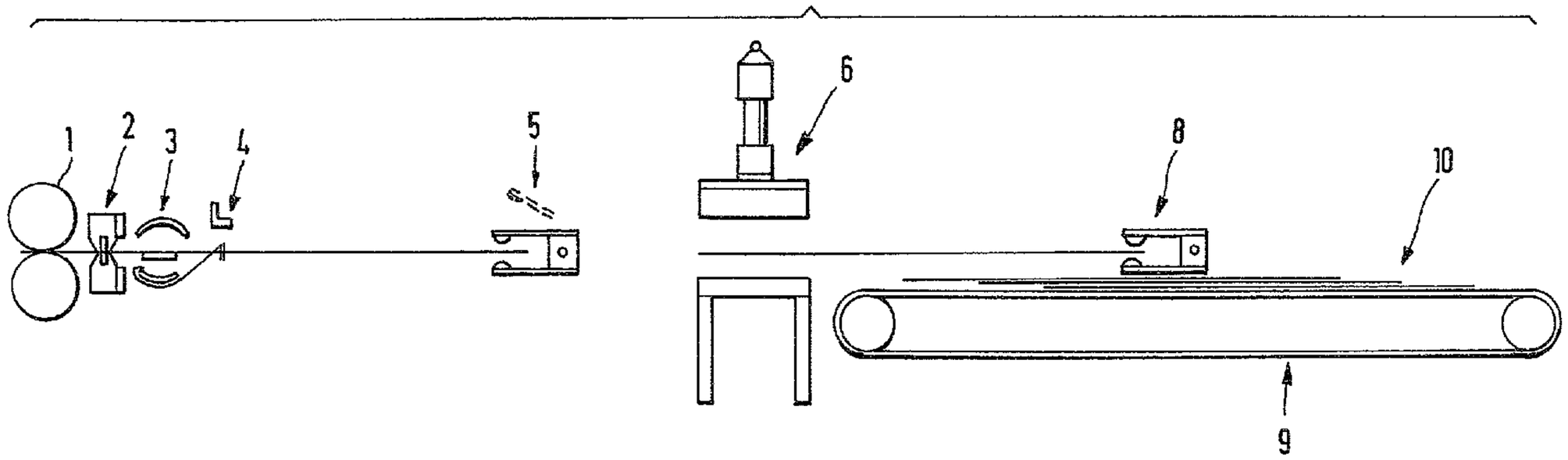
(54) Title: AN APPARATUS FOR DETACHING PIECES OF TUBE PROVIDED WITH TRANSVERSE WELD SEAMS FROM A WEB AND FOR STACKING THE SAME



(57) Abrégé/Abstract:
An apparatus for the provision of transverse weld seams and transverse detaching cuts, or of transverse detaching weld seams, on an intermittently pushed and/or intermittently carried tubular or semi-tubular web of thermoplastic synthetic resin and for stacking the detached sections, consists of a transverse welding and transverse detaching station for detachment of sections provided with bottom weld seams and any leading head weld seams from the web and a stacking station, which is provided with means for retaining or fixing the supplied sections. In order to provide for an efficient cooling of trailing weld seams on the sections without causing any sticking together of the sections during stacking adjacent to bottom weld seams, there is a tube, adapted to rotate about a transverse axis, provided between the transverse welding and transverse detaching station and the stacking station, the enveloping cylindrical outline thereof being constituted by at least two rods or parts of the wall, and which is adapted to be driven in rotation in step with welding through an angular increment which amounts to a fraction corresponding to the number of rods or the like of one revolution. In step with such deposit there is a free path for the web pushed through gaps in the drum between the transverse welding and the transverse detaching station and the stacking station.

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ABSTRACT

An apparatus for the provision of transverse weld seams and transverse detaching cuts, or of transverse detaching weld seams, on an intermittently pushed and/or intermittently carried tubular or semi-tubular web of thermoplastic synthetic resin and for stacking the detached sections, consists of a transverse welding and transverse detaching station for detachment of sections provided with bottom weld seams and any leading head weld seams from the web and a stacking station, which is provided with means for retaining or fixing the supplied sections. In order to provide for an efficient cooling of trailing weld seams on the sections without causing any sticking together of the sections during stacking adjacent to bottom weld seams, there is a tube, adapted to rotate about a transverse axis, provided between the transverse welding and transverse detaching station and the stacking station, the enveloping cylindrical outline thereof being constituted by at least two rods or parts of the wall, and which is adapted to be driven in rotation in step with welding through an angular increment which amounts to a fraction corresponding to the number of rods or the like of one revolution. In step with such deposit there is a free path for the web pushed through gaps in the tube between the transverse welding and the transverse detaching station and the stacking station.

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AN APPARATUS FOR DETACHING PIECES OF TUBE PROVIDED WITH TRANSVERSE WELD SEAMS FROM A WEB AND FOR STACKING THE SAME

The present invention relates to an apparatus for the provision of transverse weld seams and transverse detaching cuts or of transverse detaching weld seams on an intermittently pushed and/or intermittently carried tubular or semi-tubular web of thermoplastic synthetic resin. The invention also provides for stacking the detached sections. A transverse welding and transverse detaching station for detachment of sections provided with bottom weld seams and any leading head weld seams, more particularly bag sections, from the web is provided from which the sections are transferred to a stacking station, for retaining the stacked sections.

In connection with the production of bags, which are severed or detached by hot welding in rapid succession from an intermittently supplied synthetic resin web and are then stacked, the problem arises in conjunction with stacking in that the trailing transverse weld seams or bottom weld seams come to lie on top of each other before they are sufficiently cooled, so there is a danger of the superposed bottom weld seams sticking together.

Many devices have already been proposed which provide cooling of the bottom weld seams prior to stacking of the detached and welded sections, or provide other means, as for instance offset arrangement of the bottom weld seams, in order to prevent sticking together of weld seams in the stack.

A device described in German patent 3,201,170 provides a cooling chamber swept by blown air between the transverse welding and detaching stations whereby the bottom weld seams are cooled before sections are deposited on the stack. In

addition to arranging the stack with an offset to prevent the bottom weld seams from lying on top of each other, there is a rotary rake in the lower part of the cooling chamber consisting of rotary rods which cause the sections provided with bottom weld seams to fall in a fan pattern.

This invention seeks to provide an apparatus which ensures efficient cooling of the trailing or bottom weld seams of the sections so that they may be stacked in a superposed relationship without sticking together.

In accordance with a broad embodiment of the invention there is provided a tube able to rotate about a transverse axis between the transverse welding and transverse detaching station and the stacking station, the cylindrical periphery being defined by the ends of at least two rods or curved wall sections, and which is adapted to be rotated in step with the welding operation incrementally, depending on the number of rods or curved sections per revolution (360°/number of rods or the like). There is a free path through gaps in the tube for advancing the web from the transverse welding and the detaching stations to the stacking station. The tube may be driven continuously or, preferably, intermittently. After each advance of the leading end of the web and securing thereof in the stack forming station, a section provided with a trailing transverse weld seam is drawn off from the web and entrained by rotation of one of the rods or curved sections, so that it is moved along a diversionary path and may accordingly cool down.

It is convenient if the tube is provided with two oppositely arranged wall sections having the form of partial cylindrical shells.

In accordance with a further and more particularly preferred embodiment of the invention a sheet metal guide is provided in a generally horizontal plane within the cylinder of the tube. This sheet metal guide ensures trouble-free passage of the trailing end of the web through the gaps in the tube.

In a further embodiment of the invention there is an elongated plenum in communication with an air duct on the lower side of the sheet metal guide, whose lower wall is provided with air outlet nozzles. Blowing air under pressure may be passed into this plenum so that air emerges from the nozzles to blow the trailing end of a welded section or bag downwards so that the section lands on the stack being formed. The emergence of the air from the nozzles preferably occurs synchronously with rotation of the tube and advancing of the sections. The air blowing from the nozzles of the plenum aids not only satisfactory deposit on the stack but also causes cooling of the weld seams.

Preferably, the part of the sheet metal guide which is adjacent to the transverse welding and transverse detaching station is angled or bent downwards so that it constitutes a ramp-like engagement part for the freely advanced end of the web.
A further advantageous feature of the invention is such that between the transverse welding and transverse detaching station and the tube a pair of gripping jaws is arranged, of which the lower jaw is provided with an elastic strip so that in the gaps between two rods or wall sections it bears on the edge of the sheet metal guide. This elastic strip spans the gap between the gripping jaws and the sheet metal guide in order to prevent jamming or hooking of the end of the web which is freely moved past.

It is convenient for the lower jaw of the pair of gripping jaws to be able to be lowered and raised.

In accordance with a further embodiment of the invention, the edge of the sheet metal guide nearer the stacking station has an elastic strip secured to it, which extends through the gap between the rods or wall sections in a radial direction. This elastic strip on the one hand spans the gap between the sheet metal guide and the stacking station, or the rear edge of the stacking table of the stacking station, and on the other hand during rotation of the tube it sweeps over the trailing part of the web section. Using this ensures a more effective cooling of the bottom weld seam.

Furthermore it is convenient if the stack is formed so that its rear end hangs freely downwards between the tube and the rear edge of the stacking table. As soon as the trailing parts of the stacked sections have been released, by rotation of the tube, from the entraining rods or wall sections, they will hang/fall with the downwardly depending part of the stack in the course of formation.

One working embodiment of the invention will now be described in the following with reference to the drawings in more detail, in which:

Figure 1 shows a device for the production of bags in a diagrammatic side elevation;

Figure 1a is a plan view of a tubular section having top and bottom welds, side gusset folds, and stack holes;

Figure 1b is a plan view of the bag stack which is further provided with cutouts to constitute a tie handle bag; and

Figures 2-7 show a diagrammatic side elevation of the transverse welding and detaching station and the stacking station of the device in accordance with Figure 1 on a greater

scale and in different working positions. The blowing air plenum which is constituted by a piece of sheet metal in the form of a cylindrical shell and connected with the lower side of the sheet metal guide is only illustrated in Figure 7.

In the device illustrated in Figure 1 a pair of feed rolls 1 draws a double web or a flattened tubular film web, of thermoplastic synthetic resin, for instance, from a supply roll, in timed steps. This pair of feed rolls is followed by a welding device 2, by which individual bags are detached from the film web. The individual bags (as in Figure 1a) are then supplied via a transfer device 3 to a stacking station 4. When the stack has attained a predetermined size it is engaged by a gripper carriage 5 and supplied to a stamp 6, by means of which the stack is cut so that a stack of tie handle bags 7 results (see Figure 1b), which is then deposited on a removing conveyor belt 9 with the individual stacks 10 placed in overlapping relationship. Such a system may be conventional apart from the transfer device 3. In the following this transfer device will be described with reference to Figures 1 through 7 regarding only the design and function of the transfer device.

A welding device 2 in Figure 2, has an upper and a lower welding beam 11 and 12 respectively which may be moved towards each other. The two welding beams each have a central groove 13 and 14; a severing knife 15 is arranged in the upper groove 13, which is able to enter the lower groove 14 and sever or detach the tubular film web held between the welding jaws. Each welding beam 11 and 12 has two welding jaws 17, 18 and, 19, 20 arranged in parallel to each other so that during the welding operation two weld seams extending parallel to each other are formed, between which the detaching cut is then produced. In Figure 2 in this respect the leading top weld is

referenced 21, whereas 22 denotes the trailing bottom weld. The following bottom weld 22 is in this case located on a section 23 of bag which has already been impaled on pins 32.

It is furthermore to be seen from Figure 2 that the welding device 2 has associated gripper jaws 24 and 25 so that the film is held during the welding operation securely between the gripper jaws 24 and 25 and the pair of feed rolls 1. In the area between the welding device 2 and the stacking station 4 there is a transfer device comprising tube 26 extending across the full breadth of the machine. It is rotatably supported in a manner which is not illustrated, and has two broad, oppositely arranged slots 27 and 28. In the interior of this tube a sheet metal transfer member 29 is arranged, which may be fixedly mounted in the side frames of the machine.

As shown in Figure 7 it is possible in accordance with a preferred working embodiment, for an arcuate sheet metal member, preferably in the form of a partially cylindrical shell, to be connected with the lower side of the sheet metal guide 29, such arcuate member constituting a blowing air plenum closed off by the sheet metal guide 29. The arcuate sheet metal member is provided with rows of holes, which constitute blowing nozzles from which blowing air issues as indicated by the arrows. The sides of the elongated blowing air plenum are sealed; one terminal sealing member being provided with a connection for the supply of blowing air. The supply of blowing air is expediently switched synchronously so that air is blown out of the nozzles each time a trailing section or bag end coming clear of the lower outer surface of the tube 26 has to be flown onto the depending part of the stack being formed.

As shown in Figure 2 in this respect a strip 30 is fixed to the lower gripper jaw 25, such strip consisting of elastic material

as for instance Teflon tape. This strip 30 spans the small distance between the lower gripper jaw 25 and the transfer sheet metal member 29. On the side of the transfer sheet metal member 29 opposite to this strip 30 the member 29 has a further strip 31, also of elastic material, fixed to it, which spans the space between the end of the transfer sheet metal member 29 and the stacking station 4.

The operation of the device as described in the above will now be explained in more detail. In Figure 2 the situation is illustrated in which two pieces of bag have been impaled in the stacking station 4. The last bag 23 impaled is however not yet hanging freely, and in fact the trailing part is still partially wrapped on the lower outer surface 26' of the tube 26. At this moment the pair of feed rolls 1 (of Figure 1) is operated so that the tubular web is advanced, with the head seam 21 leading, the actual amount corresponding to the desired bag length. The end of this advancing movement is to be seen in Figure 3. As shown in Figure 3 the pins 32 are arranged at a level where they do not interfere with the feed of the film web. The film web is moved between the two slots 27 and 28 in the tube 26 and rests partly on the sheet metal transfer member 29. After feed the two gripping jaws 24 and 25 move towards each other so that adjacent to the welding device 2 the film web is gripped on the one hand by the gripping jaws 24 and 25 and on the other hand by the pair of feed rolls 1. During the movement of gripping jaws 24 and 25 towards each other the rail 33 of the stacking station 4 moves downwards so that the tubular film web is impaled on the pins 32. As soon as this has happened the two welding beams 11 and 12 are moved towards each other so that two weld seams 21 and 22 are produced between which the tubular film web is transversely cut by the knife 15. The position of the parts is illustrated in Figure 5. Then directly after this the welding beams 11 and 12, and

the gripping jaws 24 and 25, move apart, the tube 26 simultaneously rotates in the clockwise direction. As shown in Figure 6 the bag which was impaled prior to the last welded bag begins to disengage itself from the tube 26 so that its trailing part comes clear of the outer surface part 26'' of the tube 26 and the bag is able to drop downwards and come to rest on the stack 34. During the transfer of web sections or bag pieces the leading edge 21 of the web section comes into contact with the previous bag piece 23 at the rail 33 which moves up and down to secure the leading edge 21 of each bag piece 23 onto the pins 32 and against the stack of previous bag pieces 23. This situation is illustrated in Figure 7. In Figure 7 the next web section cannot enter the tube 26 until it rotates to Figure 3. During the further, ensuing rotation of the tube 26 in the clockwise direction, the tube will reach the position illustrated in Figure 2, following which the bar 33 is lifted. In a similar manner these steps are repeated each time for the welding of a series of bags.

Owing to the use of the tube 26 the device as described above ensures that the bottom weld seams 22 have sufficient time to cool down before being laid against the bottom seams 22 of the bag pieces which are already stacked onto the pins 32 in the stacking station 4.

The use of the transfer sheet metal member 29 in the rotatable tube 26 assists in providing a satisfactory transfer of the leading piece of bag from the detaching device to the stacking station 4. In order to facilitate transfer, the strips 30 and 31 are provided, which must more particularly be present if the apparatus is operated with a comb, comprising jets of air, by which the film is removed from the feed roll pair. The strips 30 and 31 then stop any air turbulence occurring adjacent to the tube 26. The sheet metal guide 29 is angled downwards on

the side facing the welding device 2, so that the strip 30 rests on the sheet metal transfer member 29 even when the gripping jaw 25 is lowered.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An apparatus for producing sections including at least one transverse weld seam and a detaching cut or weld seam, from an intermittently advanced tubular or semi-tubular web of thermoplastic synthetic resin, and for assembling stacks of the sections comprising:

(i) a transverse welding and transverse detaching station for detaching sections provided with weld seams from the web;

(ii) a transfer device including a tube, able to be intermittently rotated about a transverse axis in step with welding operations having at least two rotating wall sections comprising partial cylindrical shells, and at least two openings in the tube, between the partial cylindrical shells, providing a free passage through the tube in step with the advance of individual web sections; and

(iii) a stacking station which is provided with means for retaining the supplied sections in a stack;

wherein the web intermittently advanced through the transverse welding and transverse detaching station is transferred through a diversionary cooling path in the transfer tube to the stacking station.

2. An apparatus for producing sections including at least one transverse weld seam and a detaching cut or weld seam, from an intermittently advanced tubular or semi-tubular web of thermoplastic synthetic resin, and for assembling stacks of the sections comprising:

(i) a transverse welding and transverse detaching station for detaching sections provided with weld seams from the web;

(ii) a transfer device including a tube, adapted to be intermittently rotated about a transverse axis in step with welding operations, and having at least two rotating rods

comprising partial cylindrical shells, and at least two openings in the tube providing a free passage through the tube in step with the advance of individual web sections; and

(iii) a stacking station which is provided with means for retaining the supplied sections in a stack;

wherein the web intermittently advanced through the transverse welding and transverse detaching station is then transferred through a diversionary cooling path in the transfer device to the stacking station.

3. The apparatus as claimed in Claim 1 wherein the tube is provided with two opposite wall parts having the form of cylindrical shells.

4. The apparatus as claimed in Claim 1 or 2 wherein the sections are bag pieces.

5. The apparatus as claimed in Claim 1 wherein a sheet metal guide is arranged generally in a horizontal plane within the enveloping cylinder of the tube.

6. The apparatus as claimed in Claim 5 wherein a longitudinal plenum in connection with an air duct is provided on the lower side of the sheet metal guide, and a lower wall of the plenum being provided with air discharge nozzles.

7. The apparatus as claimed in Claim 5 wherein the part of the sheet metal guide nearest the transverse welding and transverse detaching station is angled downwardly.

8. The apparatus as claimed in Claim 5 wherein a pair of gripping jaws are arranged between the transverse welding and transverse detaching station, a lower jaw thereof carrying an

elastic strip in such a manner that it bears on the edge part of the sheet metal guide through the gaps in the tube.

9. The apparatus as claimed in Claim 8 wherein the lower jaw of the pair of jaws is further adapted to be lowered and raised.

10. The apparatus as claimed in Claim 5 wherein an elastic strip is arranged on the edge part of the sheet metal guide facing the stacking station, which strip extends out of the tube in a radial direction.

11. The apparatus as claimed in Claim 1 wherein the stack in the course of formation is set with a free end hanging freely downwards between the tube and the edge of the stacking station.

FIG. 1

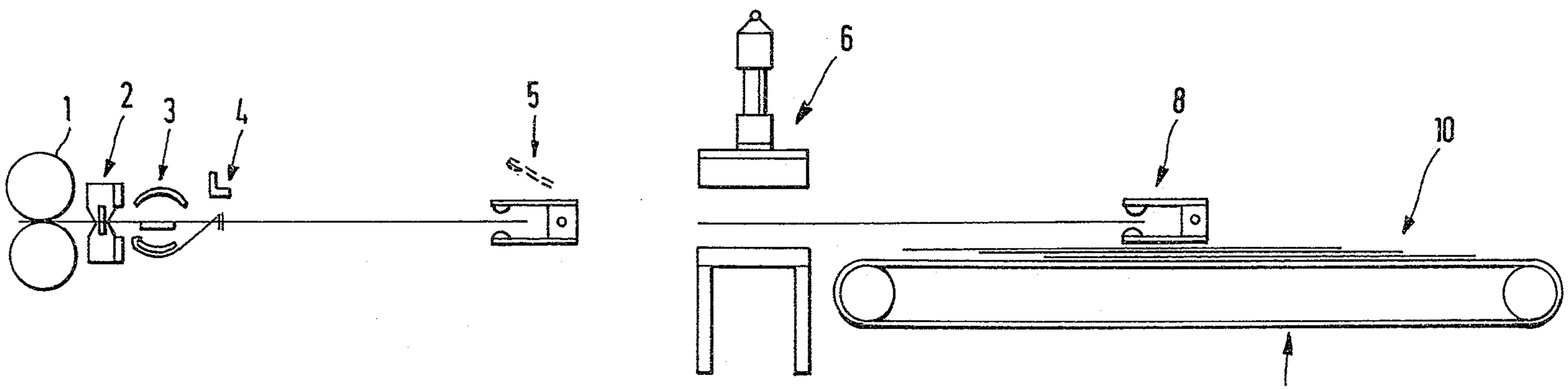
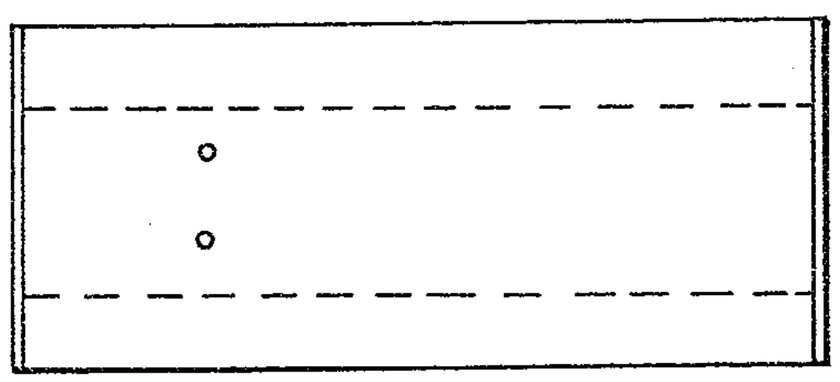


FIG. 1a



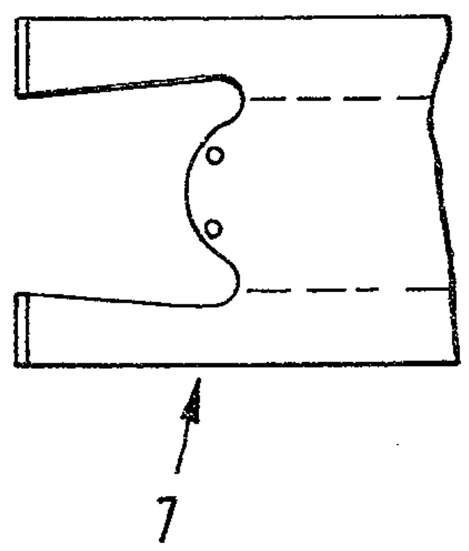


FIG. 1b

FIG. 2

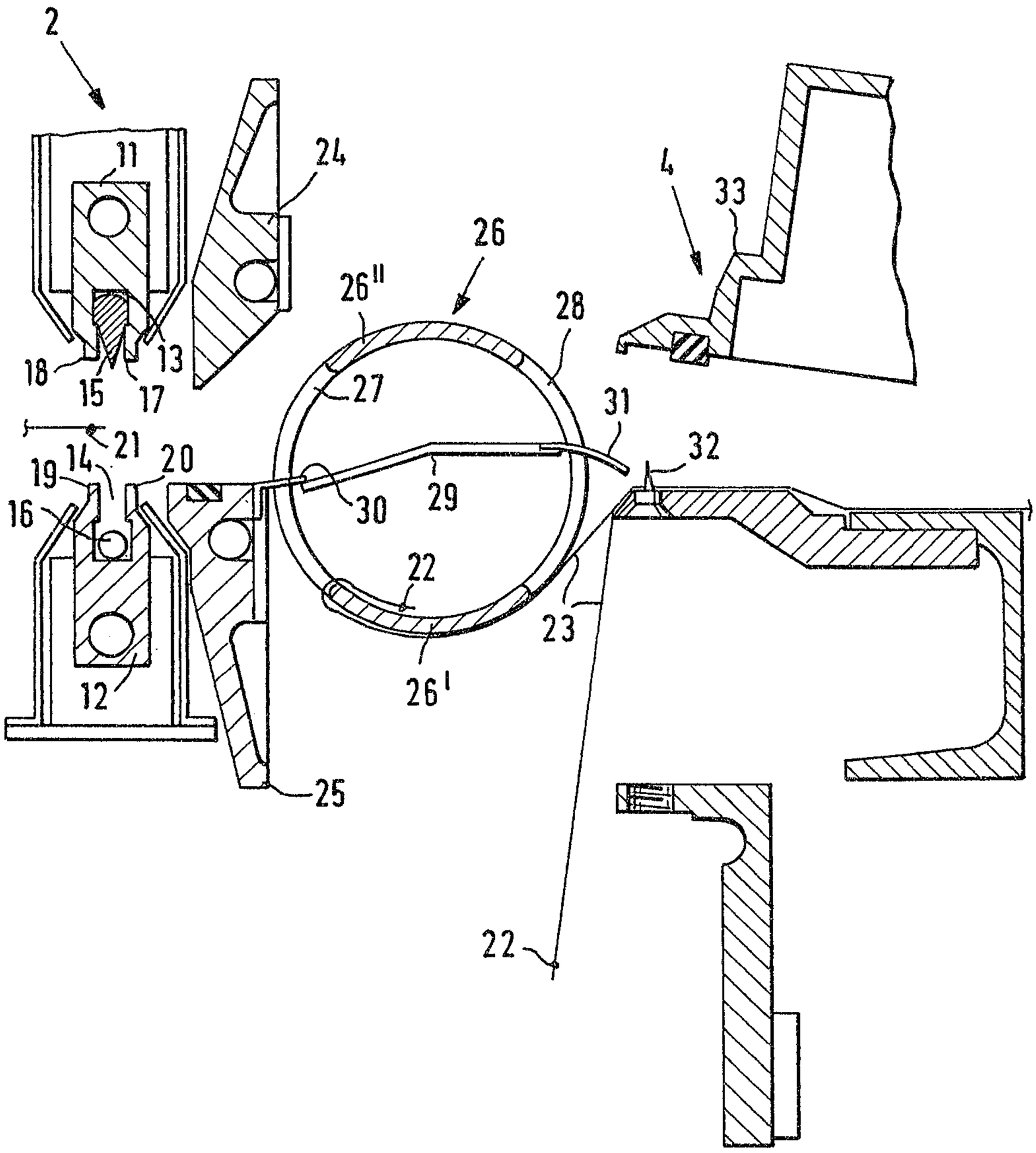

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FIG. 3

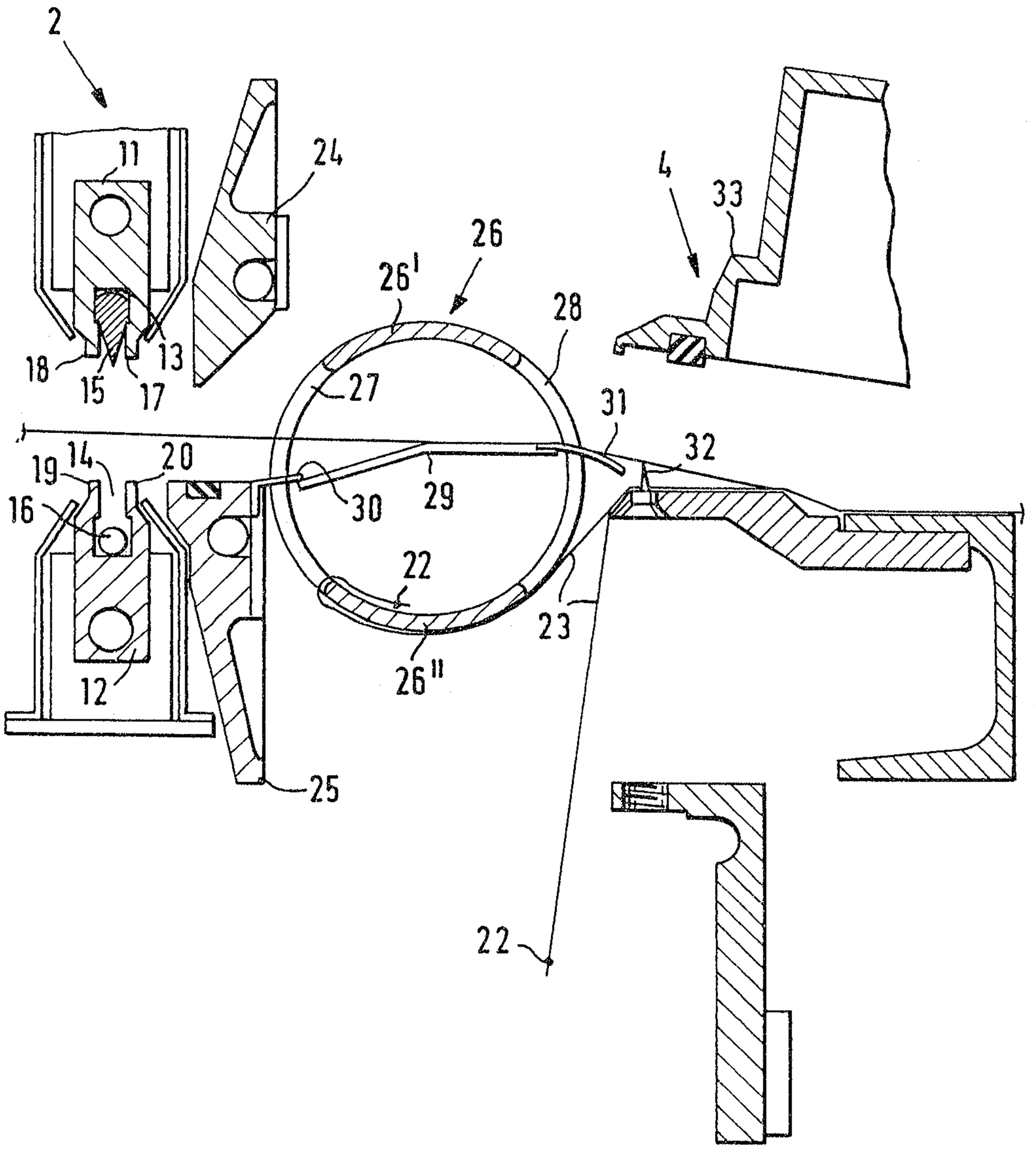

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FIG. 4

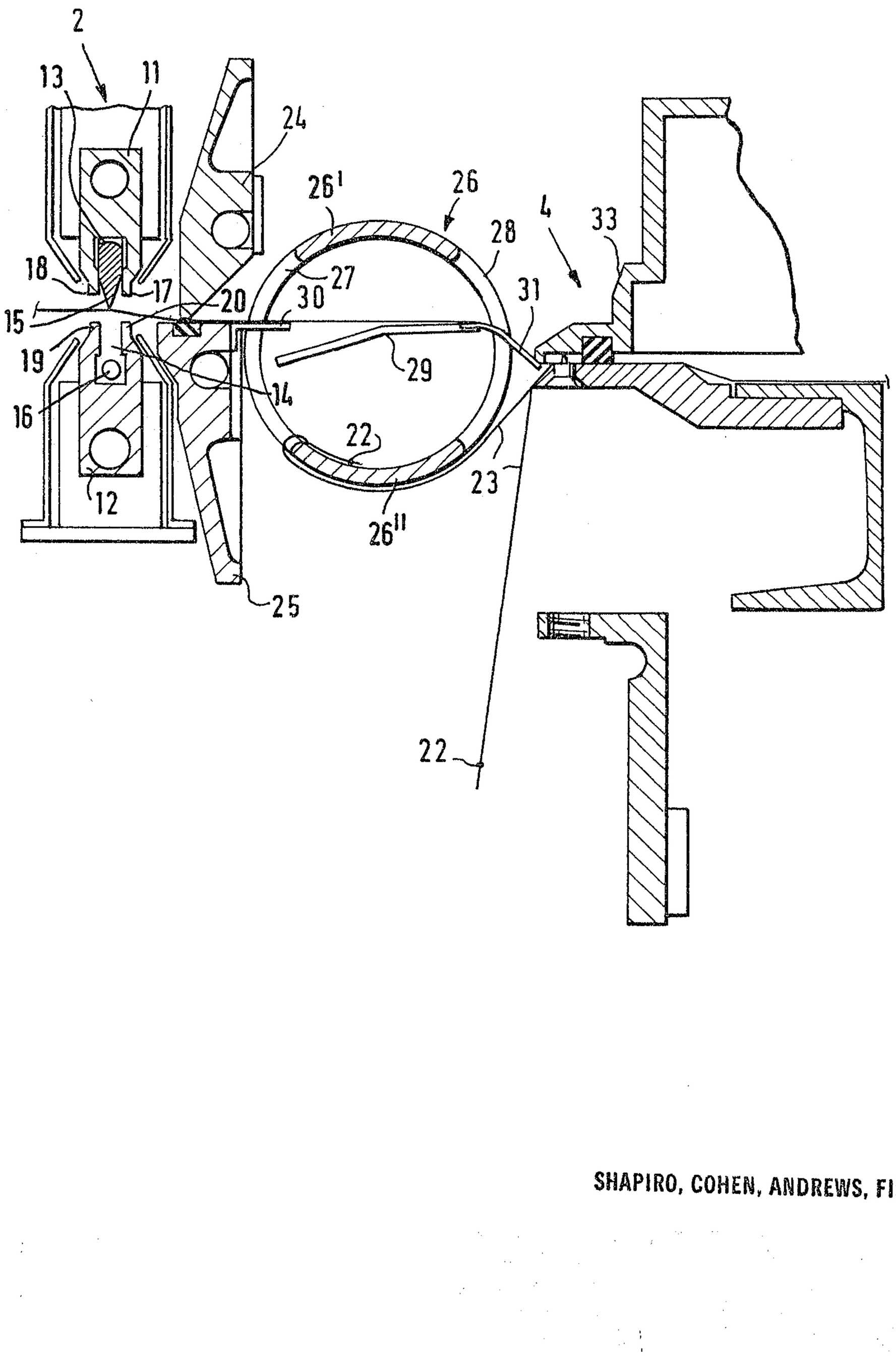
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FIG. 5

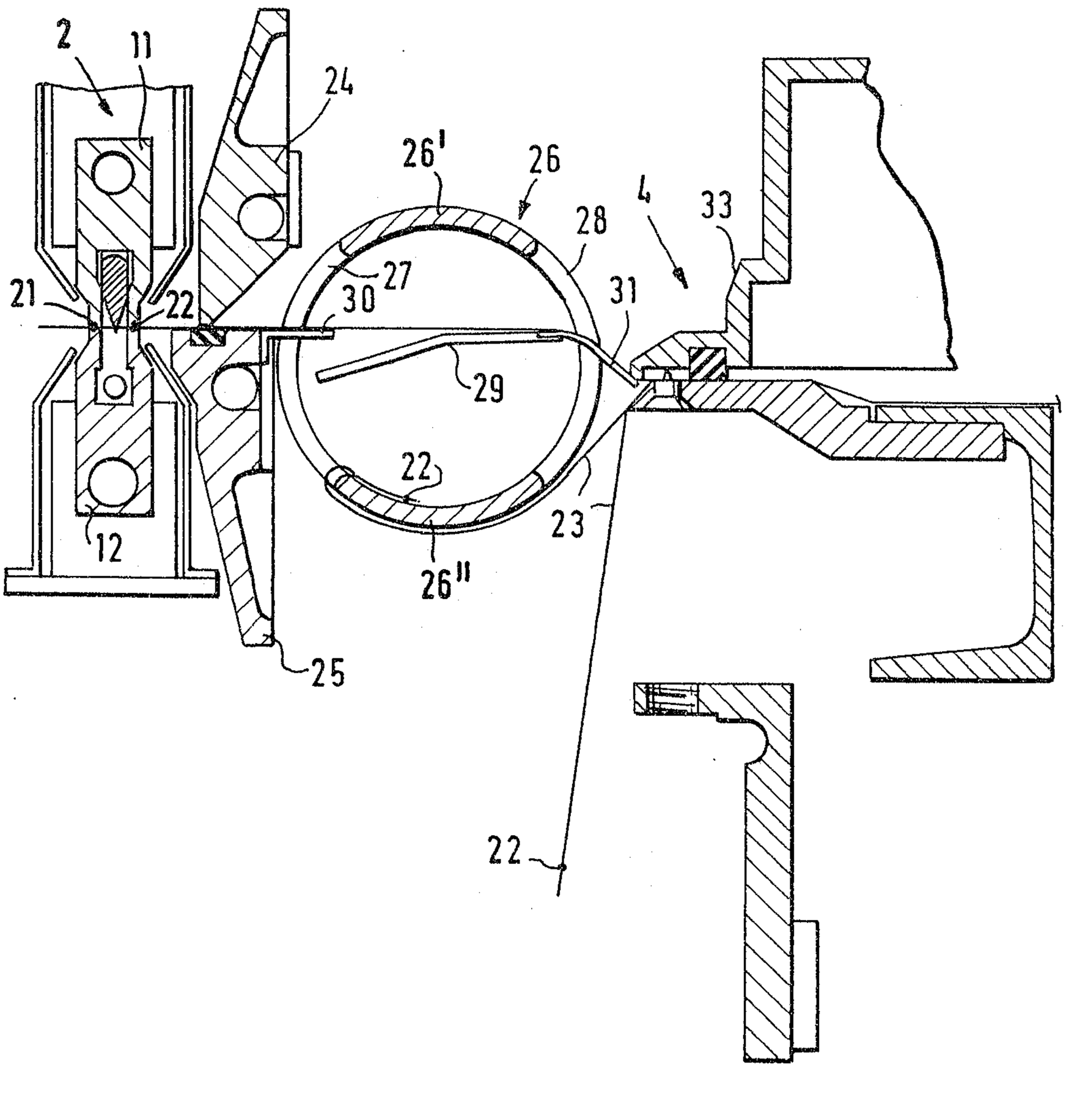


FIG.6

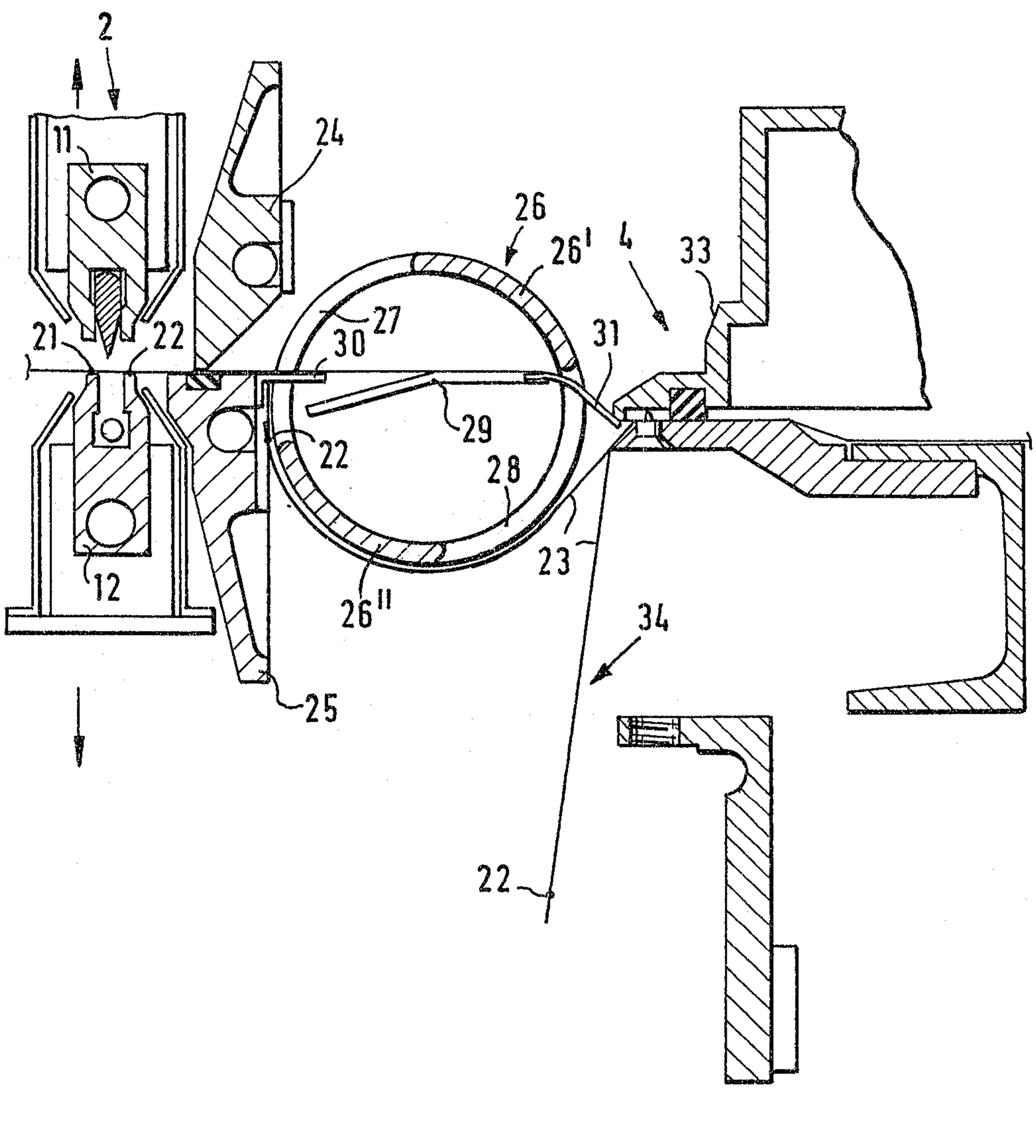
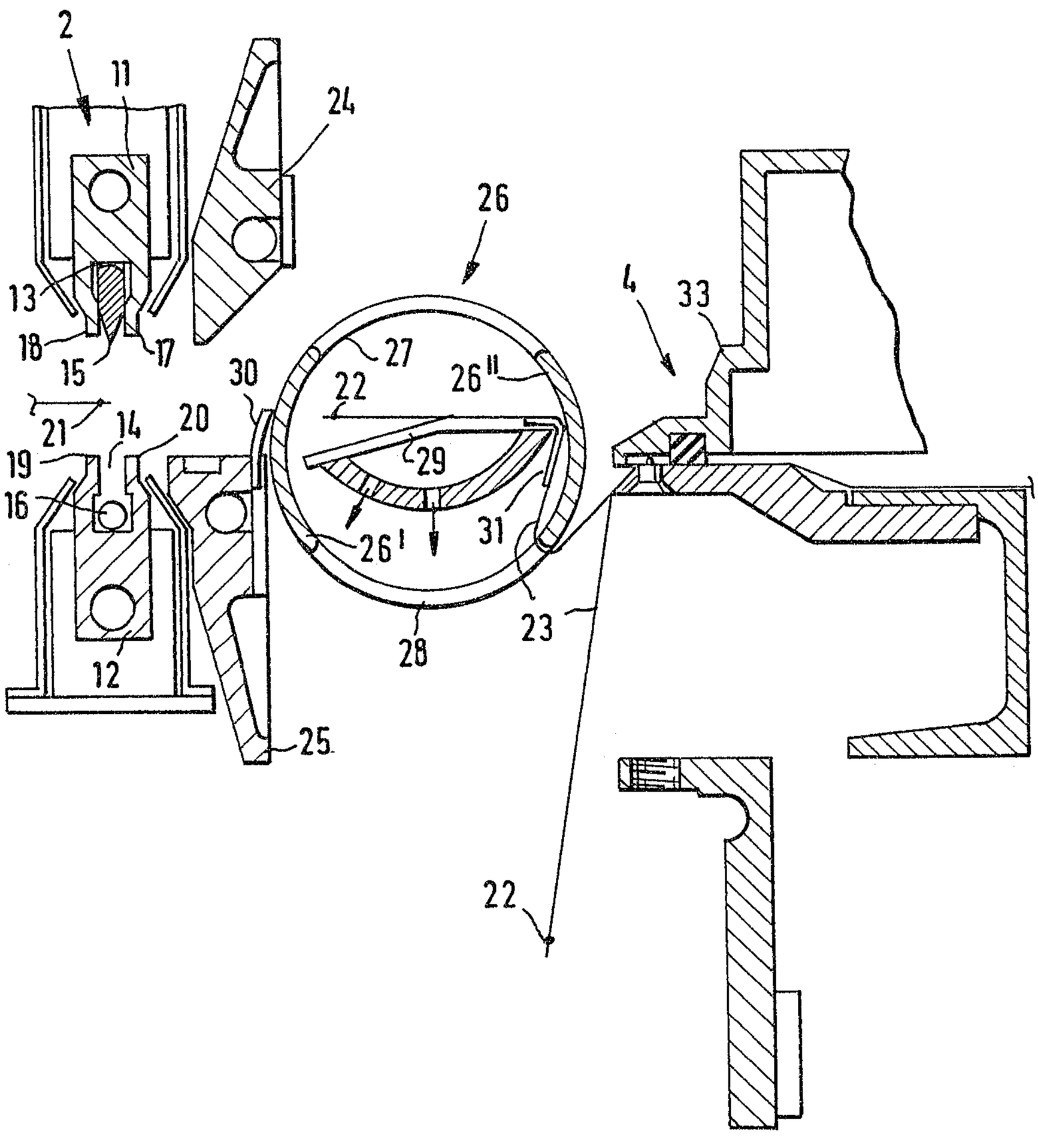


FIG.7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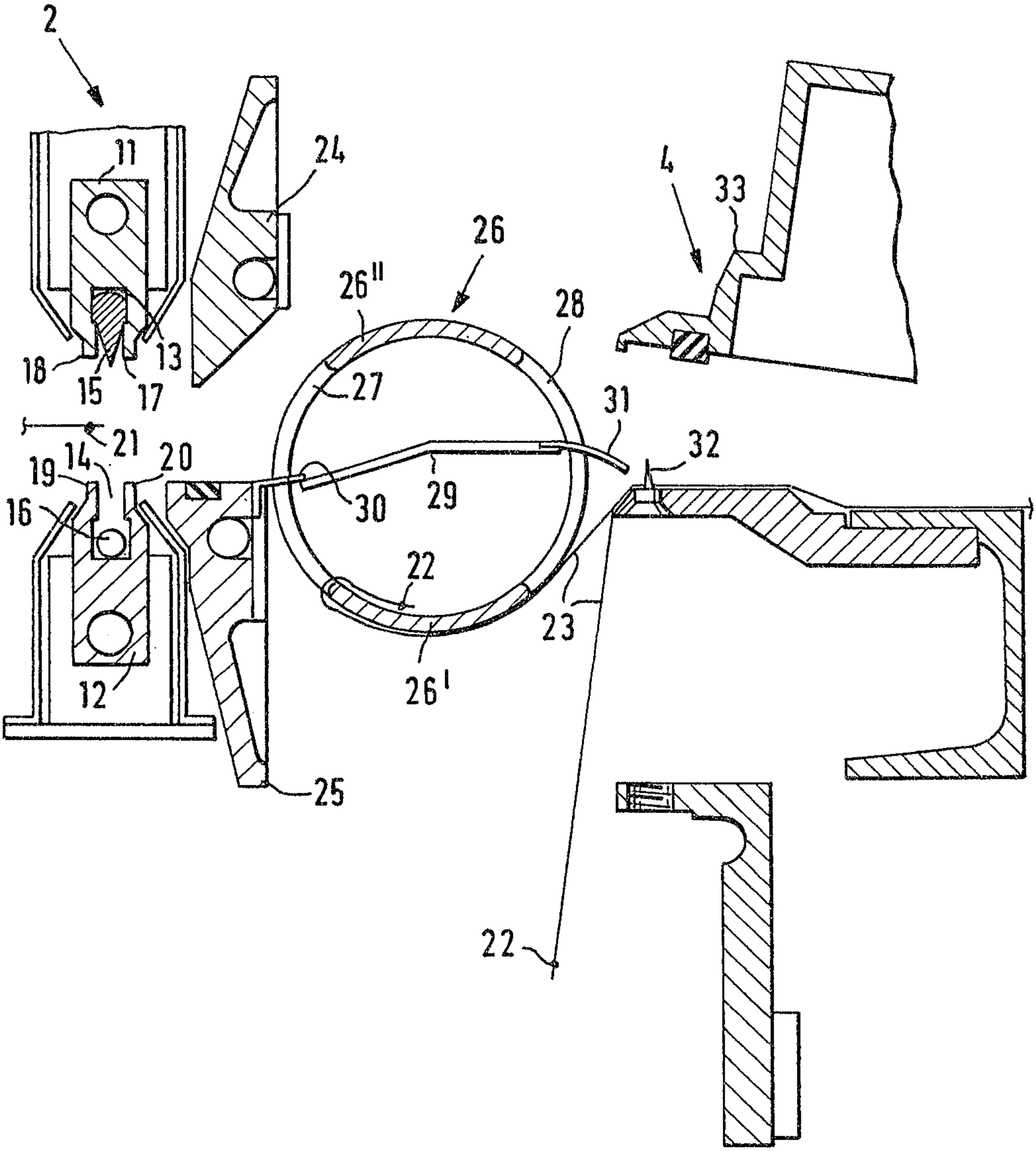
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