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(54) **system for cutting and expelling trimming strips generated by longitudinal cutting of a film or web of plastic material in a winder for the formation of rolls**

(57) In a winder for the formation of rolls of plastic film, a cutting and expelling system for the trimming strips generated by longitudinal cutting of the film is provided, the system comprising at least one controlled cutting device (10) comprising at least one cutting blade (15) acting directly on a cutting roller (5, 7) for longitudinal cutting of the film (3) to form at least one trimming strip (16, 46, 56) and at least one suction device (20)

comprising a suction mouth (21) disposed downstream of the cutting device to take in the trimming strip generated by the cutting device, the suction mouth (21) comprising a stop plate (25) that engages in abutment against a stop block (27) disposed in front of the suction mouth, the stop plate (25) thus acting as a stopping surface for the trimming strip so as to facilitate suction of the trimming strip inside the suction mouth (20).

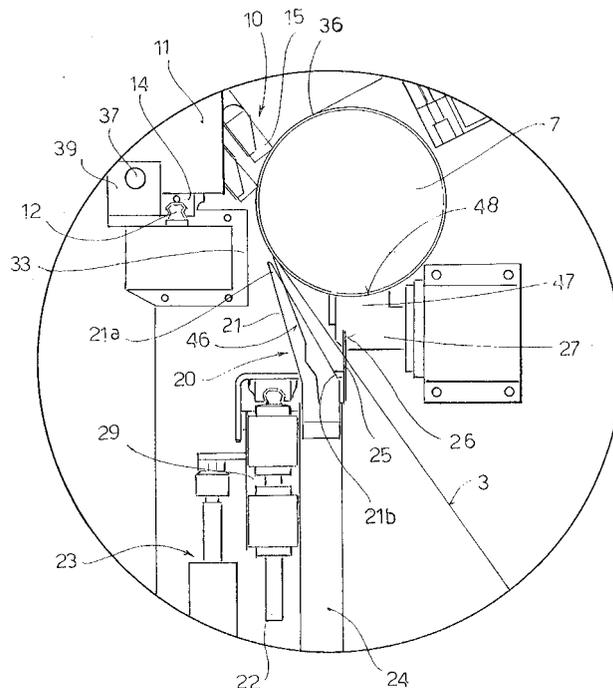


FIG. 1B

Description

[0001] The present invention refers to a system for cutting and discharging trimming strips generated by longitudinal cutting of a film or web of plastic material in a winder for the formation of rolls of sheet material.

[0002] Winders are generally used to wind film or sheet material onto preloaded cores to obtain rolls of sheet material suitable to be placed on the market. For this reason winders are generally positioned downstream of an extrusion unit to wind the film leaving an extrusion head.

[0003] The film entering the input to the winder generally has a certain transverse width, which is cut longitudinally into a plurality of web bands that will be wound onto respective cores carried by a mandrel, so as to obtain a plurality of rolls. Furthermore the side edges of the film entering the winder have an irregular profile, and for this reason further longitudinal cuts must generally be provided, to remove the side strips or trimmings of film.

[0004] In order to obtain a space between two successive web bands a separation must be made between the bands downstream of the longitudinal cut. This separation is generated by various spreading devices.

[0005] Free longitudinal cutting of the web, by means of a cutting blade, generally requires adjustments and gives rise to unevenness of cutting and unevenness of the web tensions. To overcome this drawback a longitudinal trimming strip cutting system is generally adopted. That is to say, a thin longitudinal strip, called a trimming strip, is cut and subsequently removed by means of a suction tube.

[0006] The trimming strip system also presents drawbacks, especially when cutting of the trimming strip is lost, or when the film has imperfections such as holes or tears in the cutting area. In fact in these cases the strip does not enter the suction tube, and consequently the speed of the machine has to be slowed and an operator must redirect the trimming strip into the suction tube by suitable means such as a hooked device.

[0007] Furthermore, the trimming-strip cutting system presents drawbacks from the point of view of machine automation. In fact, each time a work cycle is started, the operator with the hooked device has to direct the strip inside the suction tube. This system is very precise in the definition of the space between bands, but is not acceptable especially in fast winders, if it compromises the reliability thereof.

[0008] The object of the present invention is to eliminate the drawbacks of the prior art, providing a system for cutting and removing trimming strips that is extremely efficient and precise and able to ensure a high cutting quality.

[0009] Another object of the present invention is to provide such a trimming strip cutting and removal system that is able to work with winders with a high production rate, eliminating manual intervention by the opera-

tor.

[0010] Yet another object of the present invention is to provide such a trimming strip cutting and removal system that is extremely reliable and able to limit problems of jamming of the winder and consequent slowing of the production rate.

[0011] These objects are achieved in accordance with the invention with the characteristics listed in appended independent claim 1.

[0012] Advantageous embodiments of the invention will be apparent from the dependent claims.

[0013] The trimming strip cutting and removing system according to the invention comprises at least one cutting device comprising at least one cutting blade for longitudinal cutting of the film, able to form at least one trimming strip, and at least one suction device comprising a suction mouth disposed downstream of the cutting device to suck the strip generated by the cutting device.

[0014] The fundamental characteristic of the system according to the invention is represented by the fact that the cutting blade acts directly on a cutting roller of the winder on which the film is driven and the suction mouth comprises a stop plate that protrudes forward from the entry end thereof wherein the trimming strip must enter to engage in abutment against a stop block disposed opposite the entry of the suction mouth.

[0015] In this manner not only do the cutting blades acting on the roller make a precise longitudinal cut, but the stop plate also acts as a stopping surface for the end of the trimming strip so as to ensure that in any case the strip enters the suction mouth.

[0016] Furthermore, the stop block against which the stop plate abuts, can be in the form of a scraper that enters a groove of the roller and scrapes on the surface of the cutting roller causing detachment of any trimming strips that may remain stuck to the surface of the cutting roller, thus facilitating intake of the trimming strip into the suction mouth. In this manner any possibility of losing the trimming strip, which in any case is taken into the suction mouth, is eliminated.

[0017] Furthermore, the stop plate has a sharp-edged end surface to perform transverse cutting of the strip, for example each time the work cycle is restarted. In this manner it is ensured that the end of the strip enters the suction mouth without any intervention by the operator.

[0018] Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplary and therefore non-limiting embodiment thereof, illustrated in the appended drawings, in which:

Figure 1 is a side elevational view diagrammatically illustrating a winder for a film of plastic material comprising a trimming strip cutting and removing system according to the invention;

Figure 1A is an enlargement of the detail enclosed in the circle A in Figure 1, illustrating a trimming strip

cutting and suction system applied to the trimming strips of the outer sides of the film;

Figure 1B is an enlargement of the detail enclosed in the circle B in Figure 1, illustrating a trimming strip cutting and suction system applied to the intermediate trimming strips of film;

Figure 2 is a diagrammatic cross sectional view along the sectional plane II-II of Figure 1, in which the rollers of the winder have been omitted and the trimming strip cutting and expelling systems according to the invention are illustrated.

[0019] Figure 2C is an enlargement of the detail enclosed in the circle C in Figure 2, illustrating the trimming strip cutting and expulsion system applied to the intermediate strips of the film;

[0020] Figure 3 is a diagrammatic perspective view illustrating a suction device according to the invention.

[0021] The trimming strip cutting and expulsion system according to the invention will be described with the aid of the figures.

[0022] Figure 1 shows a winder, denoted as whole with reference numeral 1. The winder 1 comprises a main frame consisting of a base integral with the ground and two side panels or shoulders 2. A web or film 3, coming from an extrusion head disposed upstream of the winder 1, enters the winder 1 and is transferred by a spreading or stretching roller 4 disposed transversally in the rear top part of the shoulders 2. The spreading roller 4 is able to produce transverse forces on the film 3 to eliminate any longitudinal creases.

[0023] The film 3 is thus drawn by the motorized drawing rollers 5 and 6 and transferred by idle rollers 7 and 8. Respective presser rollers 5' and 6' mounted on rocking arms to regulate the pull on the film 3 are provided in contact with the drawing rollers 5 and 6.

[0024] In a per se known manner which therefore is not shown in Figure 1, the film 3 leaving the idle roller 8 is wound around cores supported by a mandrel which is set in rotation in a winding area for formation of rolls of film on cores.

[0025] The trimming strip cutting and expelling system according to the invention comprises a plurality of cutting devices, denoted by reference numeral 10, able to perform longitudinal cutting of the film 3, so as to generate trimming strips. Each cutting device is coupled to a respective suction device, denoted as a whole by reference numeral 20 and able to suck in the trimming strip generated by the cutting device in order to expel the strip from the winder.

[0026] With reference to Figure 2, in particular, the winder 1 comprises:

- a first trimming strip cutting and expelling system, denoted by reference numeral 100, for cutting and expulsion of the side trimming strips of the web;

- a second trimming strip cutting and expelling system, denoted by reference numeral 101, for cutting and expulsion of the intermediate trimming strips of the web; and
- 5 - a third trimming strip cutting and expulsion system, denoted by reference numeral 102, for cutting and expulsion of the central trimming strip of the web.

[0027] In this manner four strips suitable for winding on four cores supported by a mandrel in the winding area are obtained from the film 3.

[0028] Accordingly, the first strip cutting and expelling system 100 comprises a pair of cutting devices disposed in proximity to the ends of a first supporting bar 13 fixed transversally to the shoulders 2 of the machine frame in the top rear area of the winder 1. In this manner the pair of cutting devices 10 of the side trimming strip cutting system 100 can act directly on the drive roller 5 (Figure 1) of the winder, which hereafter will be called the first cutting roller 5.

[0029] The third trimming strip cutting and expelling system 102 comprises a cutting device 10 disposed in a central position of a second supporting bar 33 fixed transversally to the shoulders 2 of the machine frame in a position slightly below the first bar 13. In this manner the cutting device 10 of the cutting system 102 of the central trimming strip acts directly on the roller 7 (Figure 1) of the winder, which will hereafter be called the second cutting roller 7.

[0030] The second trimming strip cutting and expelling system 101 comprises a pair of cutting devices 10 disposed in an intermediate position between the centre and the end of the second supporting bar 33. In this manner the pair of cutting devices 10 of the cutting system 102 of the intermediate trimming strips can act directly on the second cutting roller 7 of the winder.

[0031] The cutting device 10 and in particular the cutting device for cutting of an intermediate trimming strip will now be described with reference in particular to Figures 1B and 2D.

[0032] The cutting device 10 comprises a blade carrier 11, slidably mounted on a guide rail 12 mounted integrally in an intermediate position on the second supporting bar 33 which advantageously has a substantially rectangular cross section. The blade carrier 11 has a guide 14 shaped like an upturned C which engages in the rail 12, so that the blade carrier 11 can slide along the rail 12 to be adjusted in position.

[0033] The blade carrier 11 is moved by means of a screw 37 which threads therein and passes there-through maintaining its axis parallel to the rail 12. The screw 37 is supported rotatably at its ends by two supports 39 integral with the second transverse bar 33. A rev counter 38 is mounted on one of the supports 39 to position the blade carrier 11 along the rail 12.

[0034] Two cutter blades 15 are mounted in each blade carrier 11 to perform longitudinal cutting of the web 3. The cutting blades 15 are disposed at a suitable

distance from each other, so as to obtain an intermediate trimming strip of the desired width.

[0035] Even two or more blade carriers 11 can be mounted on the rail 12, so that one blade carrier is used for cutting and the others are left in reserve to replace the first, in the eventuality of the blades of the first carrier having deteriorated.

[0036] The blade carrier 11 can also have a single blade. In this case two blade carriers 11 will be mounted on the rail 12, disposed at a suitable distance according to the width of the trimming strip that is to be obtained.

[0037] As shown in Figure 1B, the blades 15 of each blade carrier 11 of the second cutting system 101 for cutting of the intermediate strips, act in a respective groove or throat 36 provided on the second cutting roller 7. The second cutting roller 7 can be a drive roller or even an idle roller. The protrusion of the blades 15 from the blade carrier 11 is adjusted so that the sharp corner of the blade 15 acts in the groove 36 of the second cutting roller 5 generating the longitudinal cut in the web 3.

[0038] As shown in Figure 2C, as the web 3 is transferred on the second cutting roller 7 the pair of blades 15 performs a longitudinal cut, generating an intermediate trimming strip 46.

[0039] The suction device 20 will now be described also with reference to Figure 3, with particular reference to the suction device for intake of the intermediate trimming strips 46.

[0040] The suction device 20 comprises a suction mouth 21 connected to a suction tube 24 connected to the pneumatic system of the machine for formation of a vacuum so as to suck the trimming strip 46 generated by the cutting device 10 into the suction mouth 21.

[0041] The suction mouth 21 has a substantially cylindrical or frusto-truncated conical shape, hollow on the inside and at its entry end it is cut along a substantially sloped plane with respect to the axis of the suction mouth 21. In this manner the suction mouth 21 has a more protruding end rim 21a diametrically opposite a less protruding end rim 21b.

[0042] A stop plate 25 which protrudes outward and axially from the less protruding rim 21b of the suction mouth is mounted on the outer surface of the suction mouth 21. The stop plate 25 is substantially rectangular in shape and slightly smaller in width than the width of the corresponding trimming strip.

[0043] The stop plate 25 engages in a slot 26 formed in a stop block 27, cutting the trimming strip originally stretched up to winding. In this manner, if by chance the intermediate trimming strip 46 is not sucked in by the suction mouth 21, said intermediate trimming strip 46 comes to rest against the stop plate 25 or against the stop block 27 which prevent it from proceeding. Thus the stop plate 25 and the stop block 27 allow the passage of the strips of web 3, but do not allow the passage of the intermediate trimming strip 46. Consequently, the intermediate trimming strip 46, which has remained resting against the stop plate 25 or the stop block 27, is eas-

ily sucked by the suction mouth 21.

[0044] As shown in Figure 3, the end 28 of the stop plate 25 which enters the slot 26 in the stop block 27 is sharp or preferably serrated to transversally tear the intermediate trimming strip 46.

[0045] In this manner, in an initial condition the stop plate 25 is at a distance from the stop block 27 and the intermediate trimming strip 46 passes in the gap between the sharp end 28 of the stop plate 25 and the stop block 27. When a work cycle is started the stop plate is brought into engagement against the stop block 27, causing transverse cutting of the trimming strip, so as to direct the end of the cut trimming strip into the suction mouth 21.

[0046] In particular the stop block 27 is in the form of a scraper 47 which acts in the grooves/throats made on the surface of the second cutting roller 7 in proximity to the groove/throat 36. The scraper 47 has an end surface 48 with a profile shaped as an arc of a circle to enter into contact with the surface of the throat/groove 36 of the second cutting roller 7, so as to scrape on the roller 7. The scraping surface 48 of the scraper blade 47 can have a serrated profile that couples with a complementary serrated profile provided in the groove 36 of the second cutting roller 7.

[0047] In fact, the intermediate trimming strip 46 can remain stuck to the second cutting roller 7, without being sucked into the suction mouth 21. In this case, the intermediate trimming strip 46 remains attached to the roller 7 until it encounters the scraper 47 which detaches it from the surface of the roller 7 so as to cause it to be sucked in by the suction mouth 21.

[0048] The suction mouths 21 of the suction system 201 for suction of the intermediate strips are disposed in proximity to the second cutting roller 7 immediately downstream of the respective cutting devices 10.

[0049] As shown in Figure 1B, the suction mouth 21 is supported by a support 29 slidably mounted on a vertical guide 22 to be able to translate vertically in order to move toward/away from the web 3. The support 29 of the suction mouths is driven by a linear actuator 23 to be able to translate on the guide 22.

[0050] The first trimming strip cutting and expelling system 100 applied to the outside edge trimming strips of the web 3 will now be described with specific reference to Figures 1A and 2. In this case, as shown in Figure 2, the blade carrier 11 of the cutting device 10 of the cutting system 100 for the side trimming strips has a single blade 15. In fact the side trimming strip is delimited by the edge of the film 3 and by the cut made by the blade 15.

[0051] In this case the suction device 20 is substantially the same as that described previously. The only difference lies in the fact that the stop block 27 does not have the scraper and instead acts as a guide for the side trimming strip 16.

[0052] Furthermore, in this case the translating movement of the suction mouth 21 to move toward/away from

the web 3 is not vertical as in the previous cases but horizontal.

[0053] The present embodiment is illustrated in the case of a winder 1 which has five cutting devices 10 and five respective suction devices 20 for longitudinal cutting of the web for formation and suction of five trimming strips, that is to say two outside edge trimming strips 16, two intermediate trimming strips 46 and a central trimming strip 56. In this manner four web bands each having the same width are created and wound onto four cores supported by a mandrel in a winding area, so as to form four rolls of sheet material for each work cycle.

[0054] Nevertheless, a winder with a different number of trimming strip cutting and suction devices disposed in different positions can be foreseen, without thereby departing from the scope of the invention.

[0055] Various modifications of detail within the reach of a person skill in the art can be made to the present embodiment of the invention, without thereby departing from the scope of the invention set forth in the appended claims.

Claims

1. A cutting and expelling system for the trimming strips generated by longitudinal cutting of a film or web of plastic material in a winder for the formation of rolls of sheet material comprising:
 - at least one cutting device (10) comprising at least one cutting blade (15) for longitudinal cutting of a film (3) so as to form at least one trimming strip (16, 46, 56) and
 - at least one suction device (20) comprising a suction mouth (21) disposed downstream of said cutting device (10) to suck in the trimming strip generated by the cutting device,

characterized in that

 - said cutting blade (15) acts directly on a cutting roller (5, 7) on which the film (3) is transferred, and
 - said suction mouth (21) comprises a stop plate (25) protruding forward at the entry end of the trimming strip to engage in abutment against a stop block (27) disposed in front of the entrance of the suction mouth, each stop plate (25) acting as a stop surface for the trimming strip so as to facilitate intake of the trimming strip into the suction mouth (21).
2. A trimming strip cutting and expelling system according to claim 1, **characterized in that** said stop plate (25) has a sharp-edged free end (28) to generate transverse cutting of a trimming strip.
3. A trimming strip cutting and expelling system according to claim 2, **characterized in that** said sharp-edged end (28) of said stop plate has a serrated shape.
4. A trimming strip cutting and expelling system according to any one of the preceding claims, **characterized in that** said stop block (27) comprises a slot (26) wherein said stop plate (25) engages.
5. A trimming strip cutting and expelling system according to any one of the preceding claims, **characterized in that** said stop block (27) comprises a scraper blade (47) able to enter into grooves in said cutting roller (7) so as to allow detachment of the trimming strip from the surface of the cutting roller if necessary in order to facilitate suction of the trimming strip into the suction mouth (21).
6. A trimming strip cutting and expelling system according to an one of the preceding claims, **characterized in that** said cutting roller (5, 7) comprises at least one throat or groove (36) in correspondence with the cutting blade (15) of the cutting device (10) to effect longitudinal cutting of the film along said groove (36).
7. A trimming strip cutting and expelling system according to any one of the preceding claims, **characterized in that** said suction mouth (21) is mounted on a support (29) operated in translation by a linear actuator (23) to pass from a position wherein the stop plate (25) is detached from the stop block (27) to a position wherein the stop plate (25) is in abutment against the stop block (27).
8. A trimming strip cutting and expelling system according to any one of the preceding claims, **characterized in that** said cutting device (10) comprises at least one blade carrier (11) slidably mounted on a guide rail (12) or mounted on a transverse supporting rod (13, 33) forming part of the frame of the winder.
9. A trimming strip cutting and expelling system according to claim 8, **characterized in that** said blade carrier (11) is moved to be adjusted in position by means of a screw (37) which threads therein, said screw (37) having its axis parallel to the guide rail (12).
10. A winder (1) for the formation of rolls of plastic film, **characterized in that** it comprises at least one trimming strip cutting and expelling system according to any one of the preceding claims.

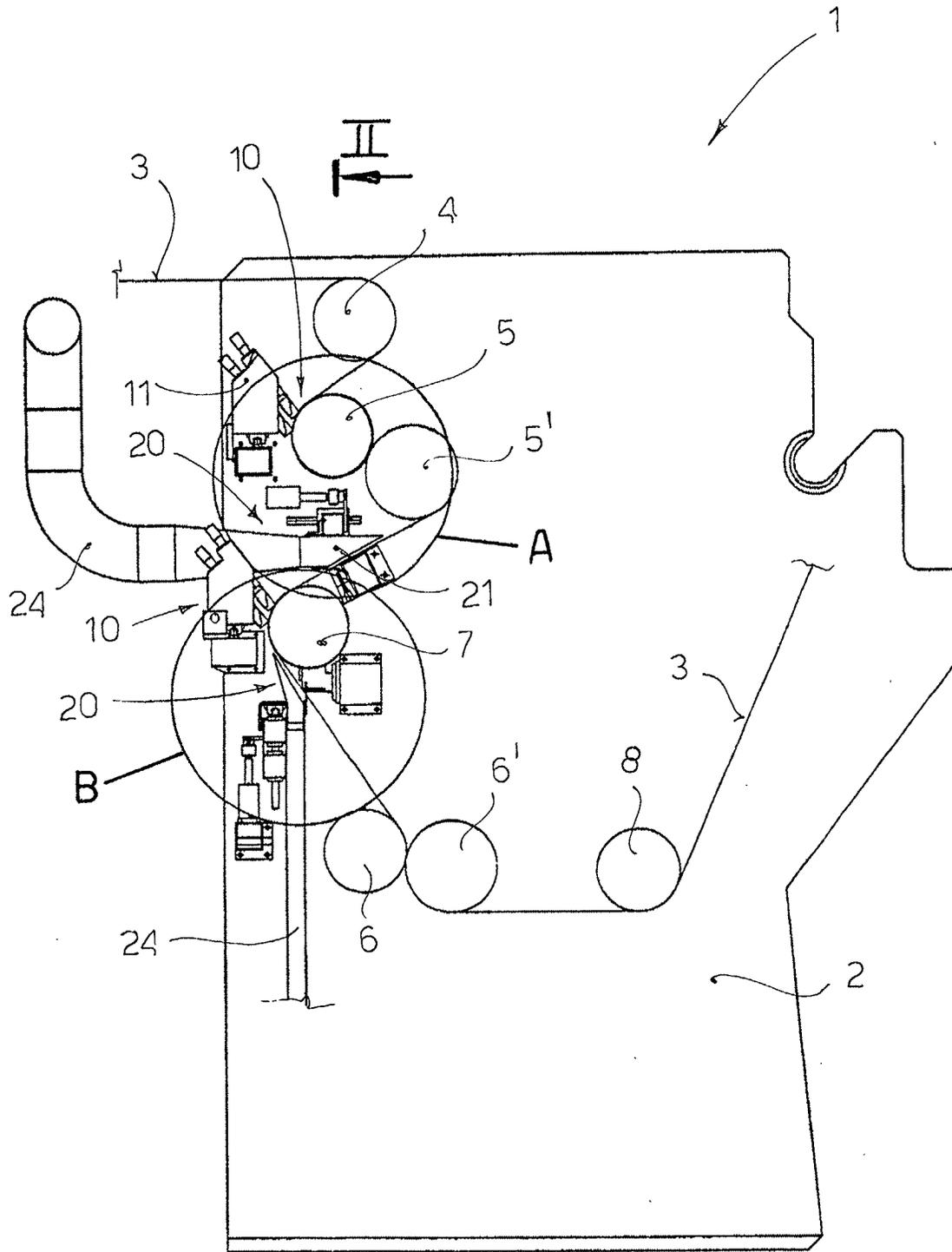


FIG. 1

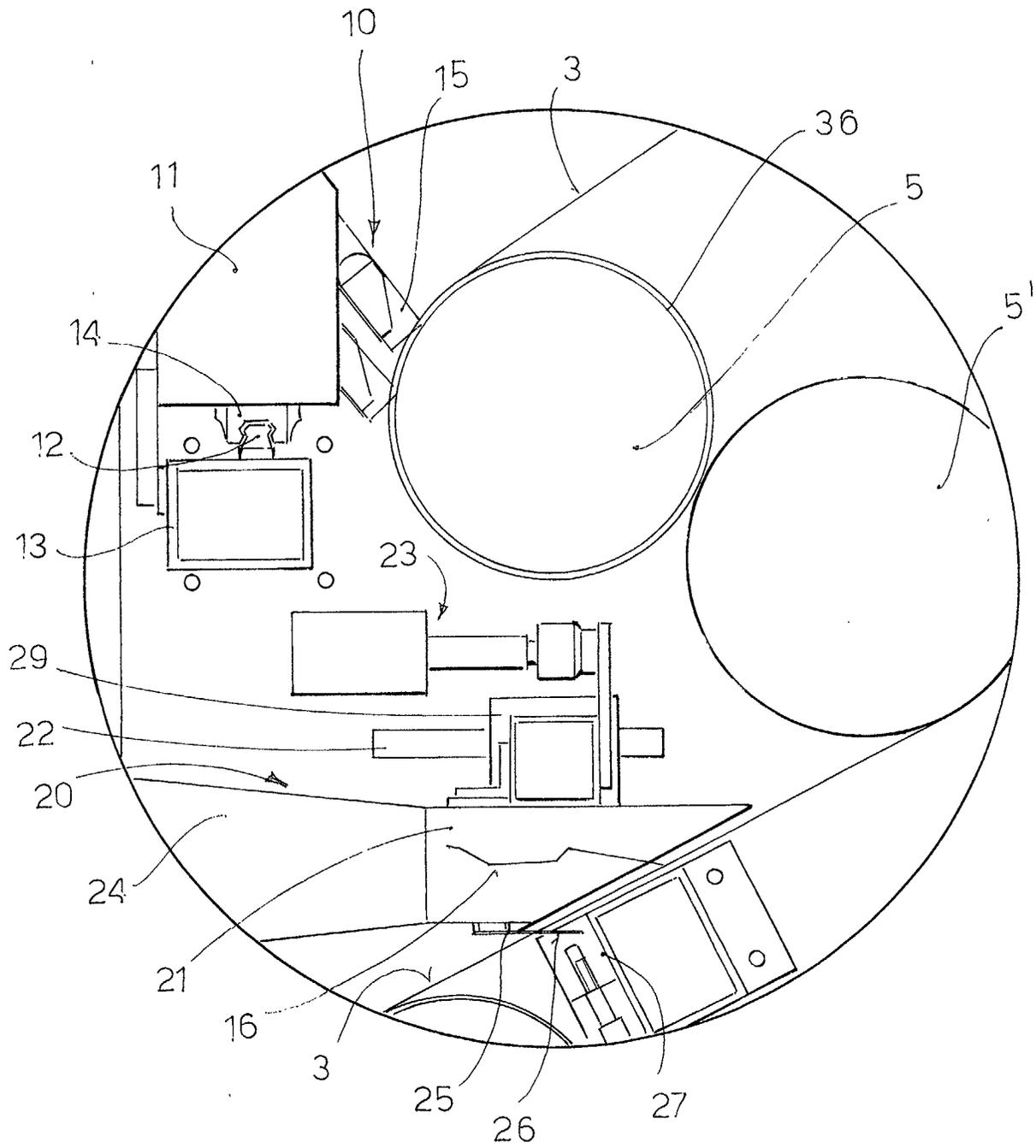


FIG. 1A

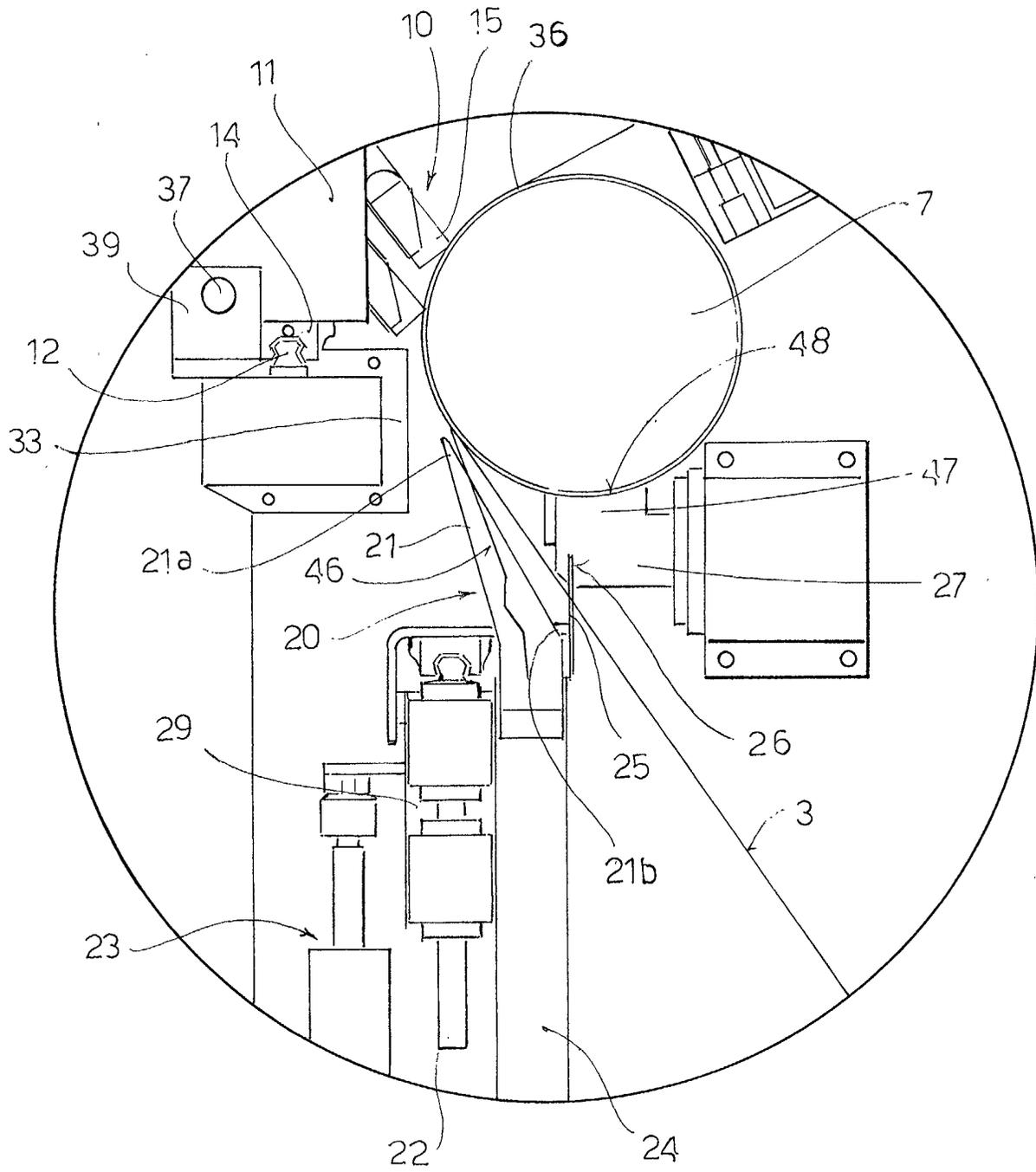


FIG. 1B

FIG. 2

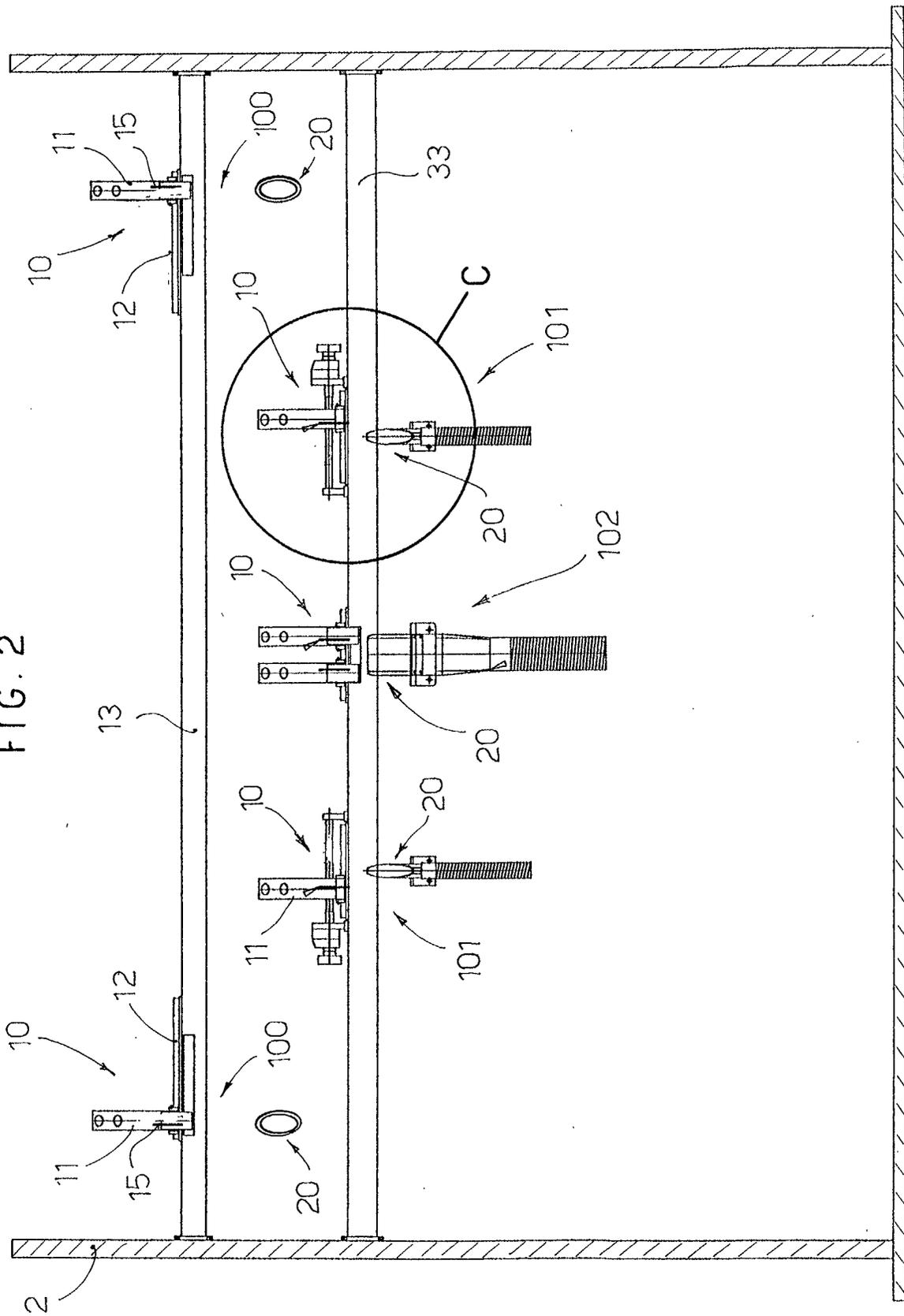
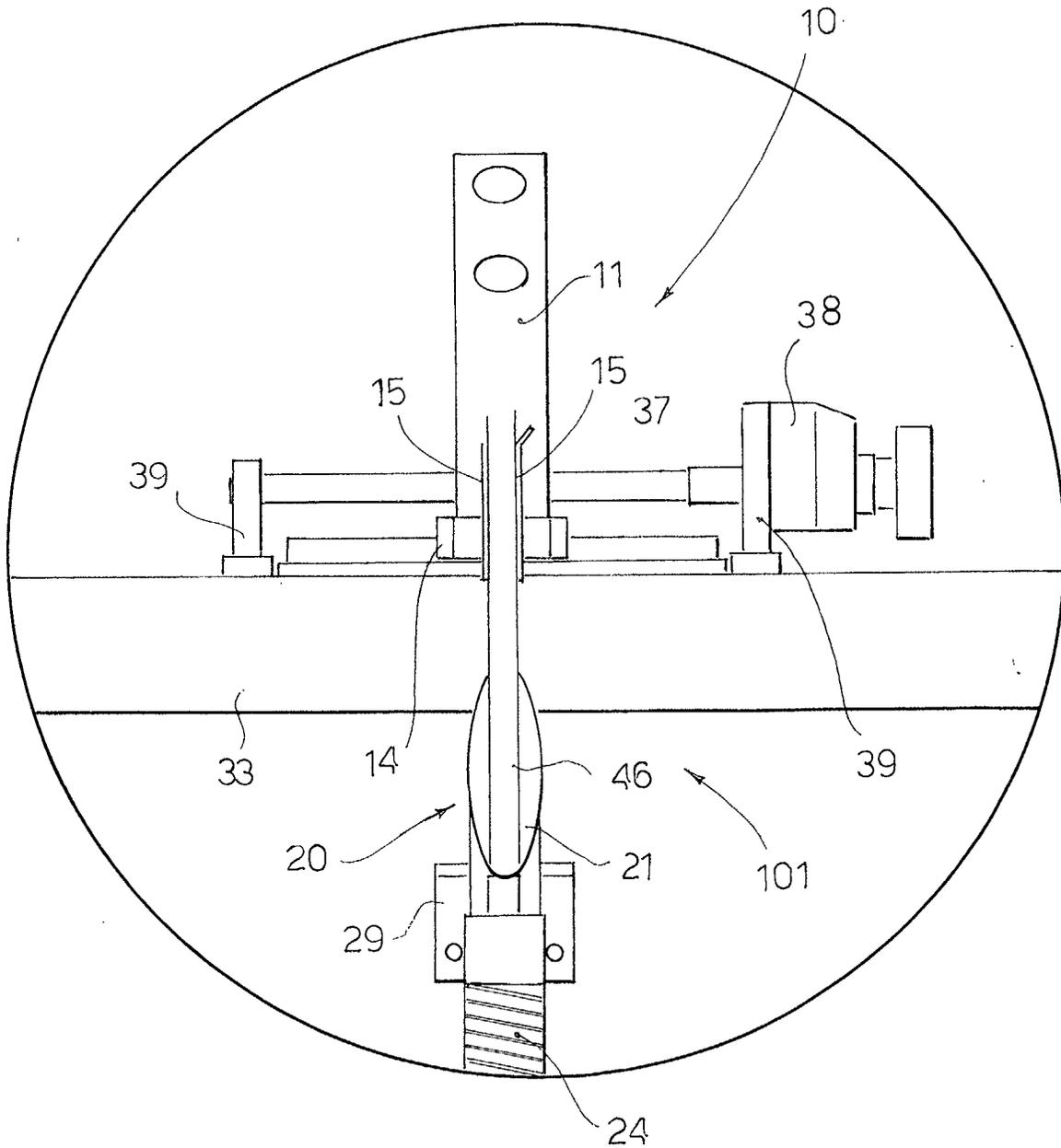
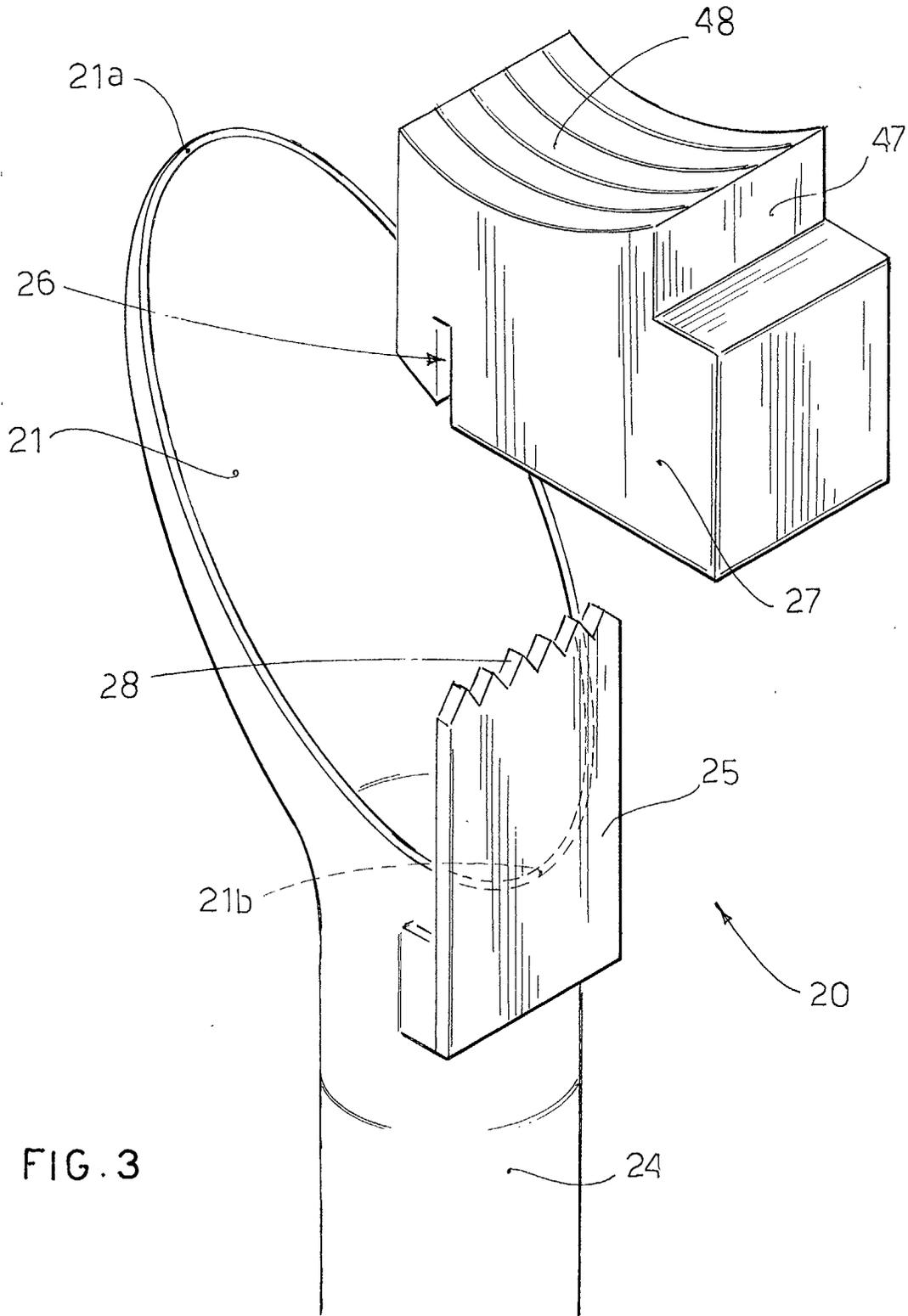


FIG. 2C







European Patent
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EUROPEAN SEARCH REPORT

Application Number
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