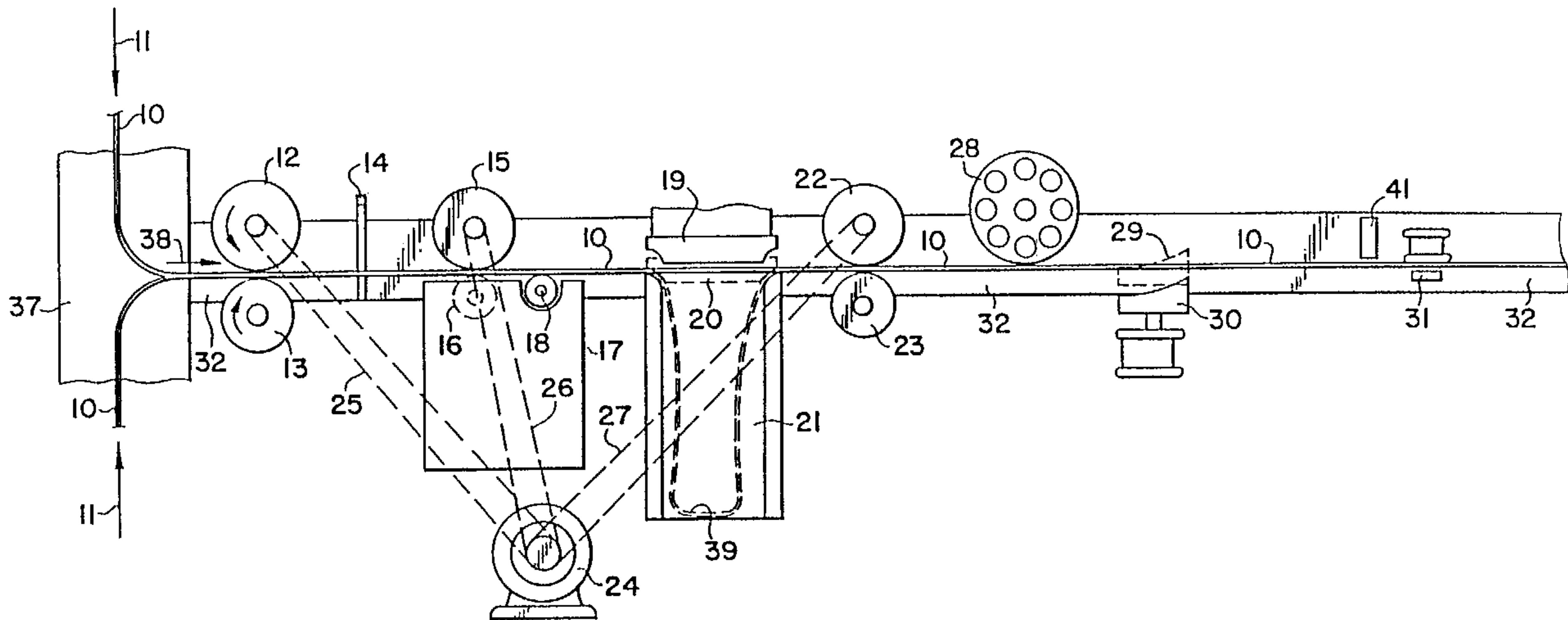




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(54) Titre : SYSTEME DE RUBAN DE COUPE POUR BANDE DE PAPIER EN MOUVEMENT  
 (54) Title: CUTTING TAPE SYSTEM FOR A MOVING PAPER WEB



(57) Abrégé/Abstract:

A system for feeding a cutting tape (10, 110, 31') for a paper wind up machine (12'-14') along a track (32, 111, 15') to apply a strip of adhesive to the forward end (19'), measure it and cut the tape (10, 110, 31') to a desired length, store it temporarily in the form of a hanging loop (36), feed the adhesive coated forward end to the exit end (20') of the track (32, 111, 15') adjacent a new roll (14') for wind up of a paper web (10'), and a brake (31, 22') to provide resistance to the tape (10, 110, 31') so as to tension same and to cut the web (10') of paper and transfer it to the new roll (14'). A cassette (113) applies a strip of double-sided adhesive carried by a backing layer (119) to a surface from a supply roll (114) and a transfer roller (116) temporarily receives the adhesive strip and applies the strip to the surface (110). A return bend surface (121) is provided near the transfer roller (116) for separating the backing layer (119).





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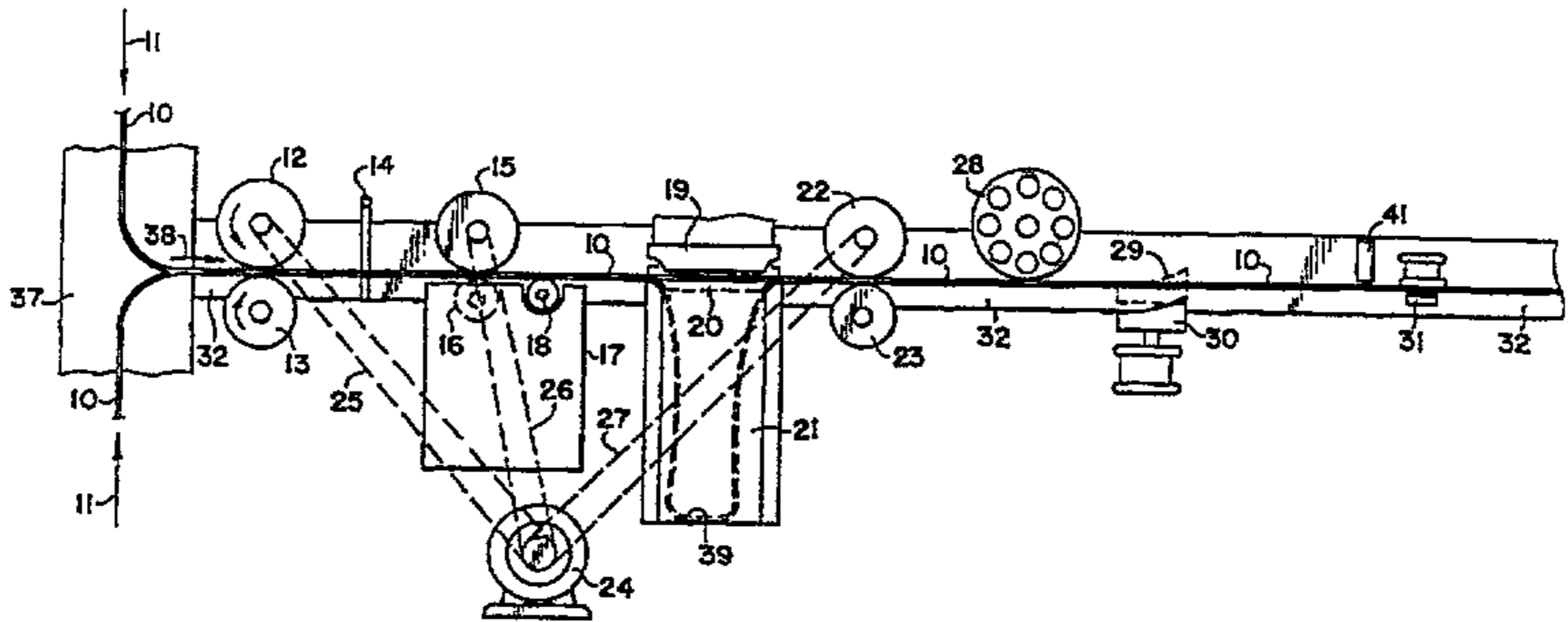
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<p>(21) International Application Number: PCT/US94/13062 (22) International Filing Date: 15 November 1994 (15.11.94)</p> <p>(30) Priority Data: 08/152,748 15 November 1993 (15.11.93) US 08/152,749 15 November 1993 (15.11.93) US 08/152,750 15 November 1993 (15.11.93) US</p> <p>(71) Applicant: SANDAR INDUSTRIES, INC. [US/US]; 1545 Main Street, Atlantic Beach, FL 32233 (US).</p> <p>(72) Inventors: RODRIGUEZ, Peter, A.; 1785 Selva Marina Drive, Atlantic Beach, FL 32233 (US). AUSTIN, Craig, R.; 5475 North River Road, Jacksonville, FL 32211 (US). RODRIGUEZ, Jason, C.; 1785 Selva Marina Drive, Atlantic Beach, FL 32233 (US).</p> <p>(74) Agents: YEAGER, Arthur, G. et al.; Suite 1305, 112 West Adams Street, Jacksonville, FL 32202-3853 (US).</p>	<p>(81) Designated States: AU, BR, CA, FI, JP, KR, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report.</i> <i>With amended claims.</i></p> <p style="text-align: right; font-size: 2em; font-weight: bold;">2176142</p>	

(54) Title: CUTTING TAPE SYSTEM FOR A MOVING PAPER WEB



(57) Abstract

A system for feeding a cutting tape (10, 110, 31') for a paper wind up machine (12'-14') along a track (32, 111, 15') to apply a strip of adhesive to the forward end (19'), measure it and cut the tape (10, 110, 31') to a desired length, store it temporarily in the form of a hanging loop (36), feed the adhesive coated forward end to the exit end (20') of the track (32, 111, 15') adjacent a new roll (14') for wind up of a paper web (10'), and a brake (31, 22') to provide resistance to the tape (10, 110, 31') so as to tension same and to cut the web (10') of paper and transfer it to the new roll (14'). A cassette (113) applies a strip of double-sided adhesive carried by a backing layer (119) to a surface from a supply roll (114) and a transfer roller (116) temporarily receives the adhesive strip and applies the strip to the surface (110). A return bend surface (121) is provided near the transfer roller (116) for separating the backing layer (119).

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CUTTING TAPE SYSTEM FOR A MOVING PAPER WEBTECHNICAL FIELD

This invention relates to a system for cutting a moving paper web being wound on one spool and transferring the web to an empty spool as the web continues to travel.

BACKGROUND ART

In the paper industry a wide web of paper is produced and wound onto rolls at a high rate of speed (200-4000 feet per minute). Intermittently, it is necessary to transfer the web to a new roll without interrupting the travel of the web. This has been done by using a "turn-up" tape such as that described in U.S. Patents Nos. 2,461,246; 3,599,888; 3,765,615; 4,659,029; and 4,783,018. In the Patent No. 4,659,029 there is a disclosure of a cutting tape made of a plurality of parallel strands of repulpable paper, and this tape has been found to be very useful in the above process for cutting the web and transferring the web to a new roll. Among the operations involved in the cutting and transferring is the use of a track to guide the tape across the wide expanse of the travelling web of paper. U.S. Patents 4,783,018 and 5,046,675 disclose improvements in track guides, but now there are further improvements to such tracks that are available to the public. Processing difficulties have arisen to indicate the need for improved procedures for handling and treating the tape so as to perform the cutting operation more efficiently. Among the operations involved in the cutting and transferring is the application of pressure-sensitive adhesive to one side of the tape. U.S. Patents 4,783,018 and 5,046,675 disclose improvements in applying adhesive to such a cutting tape by the use of a double-sided pressure-sensitive tape. There are now further improvements in applying adhesive by means of a double-sided pressure-sensitive tape.

The system of this invention provides improvements in applying a double-sided adhesive to a cutting tape, particularly by a replaceable cartridge without any complex driving or timing mechanism between the wind up element and the supply. The cutting tape with adhesive on the end is then guided across a web of paper by the improved track assembly with enhanced life and greater versatility in guiding and releasing it for the cutting operation. Prior thereto it is necessary to form a loop adjacent the rearward end of

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the cutting tape which is performed by the apparatus of this system in an improved and more efficient manner.

BRIEF DESCRIPTION OF THE INVENTION

This invention relates to a system for preparing a selected length of cutting tape to be used to cut a travelling web of paper being wound on a first roll and transferring the cut edge to a second roll to continue the wind up, the system comprising feeding an endless length of cutting tape into a track for guiding the tape; a friction drive first feed wheel in contact with the tape and causing the tape to move along the track; a means for applying a selected length of pressure-sensitive adhesive to a surface of the tape; a means for directing a rearward portion of the selected length into a temporary storage loop; a cutter for cutting the adhesive coated tape to a selected length; a friction drive second feed wheel for moving the cut length of adhesive coated tape along the track; an encoding wheel in contact with the tape for measuring the length of tape for cutting; a bypass means to direct tape with no adhesive coating away from the track; and a brake means to apply resistance to the passage of tape at a selected time.

In specific and preferred embodiments of the invention the tape, after having its forward end coated with an adhesive layer, is directed into a downwardly hanging loop for temporary storage before it is used to cut a moving web of paper. This step is accomplished by actuating a downwardly moving plunger which strips the tape from a short section of the track while leaving the tape ahead of and behind that section still in the track. The tape behind the section continues to move ahead and is diverted from the track so as to form a hanging loop of tape.

Other specific embodiments involve the adhesive coating operation which includes rollers, channel guides, and a brake lever all enclosed in a cassette-like cartridge to protect the adhesive from dust. The cartridge is replaceable when necessary. The cartridge includes a rotatable supply roll of composite tape consisting of a layer of double-sided pressure-sensitive adhesive adhered to a strippable backing layer, a rotatable transfer roller having a cylindrical outer surface having poor affinity for adhering to the adhesive tape. A stationary tapering nose is provided with a tip having a return bend surface spaced apart from the surface of the

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transfer roller about the thickness of the double-sided tape. A first channel leads from the supply roll to the tip and a second channel leads from the tip to a disposal site for the backing layer. A brake member is included with a friction face spring biased to bear against the transfer roller and inhibit rotation thereof, and a selective means releases the brake member.

In specific and preferred embodiments the cartridge hereof may be stationary and apply adhesive to a moving tape, or the device may be moved to apply adhesive to a stationary surface. In either instance, the device requires no internal driving mechanism to operate it, and it preferably is self-contained with all of the components in a cartridge or cassette container, except for a portion of the transfer roller extending outwardly thereof.

The track assembly of this invention for guiding the cutting tape beneath and transversely of a moving web of paper includes a track, a track carrier, and a carrier support. The track is an elongated member having an H-shaped transverse cross-section symmetrical about its longitudinal central axis, and having an upper and a lower longitudinal deep, broad groove, rectangular in transverse cross section. Adjacent to the bottom of each rectangular deep groove is a pair of shallow thin aligned grooves parallel to the central axis. The track carrier is a semi-cylindrical member having a longitudinal central axis and a longitudinal trough adapted to seat the elongated track thereon. The carrier support is an elongated hollow self-supporting structure having two parallel side walls joined to a concave top adapted to form a seat for the track carrier, and having spaced ledges along its walls on the inside surfaces facing each other and adapted to form shelves to fit over and contain an elongated load-supporting splicing beam, and intermittent stiffening bridges. The semi-cylindrical track carrier is adapted to be rotatably adjustable about the longitudinal central axis of the track and to be securely fastened to the concave top in any selected position.

In specific and preferred embodiments the track hereof is an extruded polyolefin article that can be turned upside down to use a second tape guide when the first one is worn, and the track can be twisted about its

longitudinal axis to provide selected positions for more conducive dynamics in the cutting tapes exit during the cutting operation. The assembly also provides protection against dust contamination in the track.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic front elevational view of the dispenser portion of the track which receives the cutter tape, treats it, and stores it for introduction into the downstream portion of the track which leads the tape close to the nip of the empty wind up roll to which the web of paper is to be introduced;

FIG. 2 is a side elevational view of the loop storage device of this invention;

FIG. 3 is a cross-section taken at 3-3 of FIG. 2;

FIG. 4 is an enlarged side elevational view of the portion of FIG. 2 marked "4";

FIG. 5 is a front elevational view of the tape cartridge as it might be employed to apply adhesive to a moving cutting tape;

FIG. 6 is a front elevational view of a first embodiment of tape cartridge in the form of a hand held applicator for applying adhesive to a surface;

FIG. 7 is a front elevational view of a second embodiment of tape cartridge when it is not in use applying adhesive to a surface;

FIG. 8 is another view of the cartridge of FIG. 7 when it is in use applying adhesive to a surface;

FIG. 9 is a schematic view in perspective of the track assembly for a cutting tape as used to cut a travelling web of paper and transfer it to an empty wind up roll;

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FIG. 10 is a transverse cross-sectional view of the track assembly of this invention; and

FIG. 11 is a cross-sectional view taken at 10-10 of FIG. 9.

DETAILED DESCRIPTION OF THE INVENTION

The features and improvements of this invention are best understood by reference to the attached drawings. In the previous patents U.S. 4,659,029; 4,783,018; and 5,046,675 it can be seen that there are three sections of the track guide that directs a cutting tape from the proximal side of the web of paper and the wind up rolls to the distal side thereof. The operator is generally positioned at the proximal side so as to operate and control the preparation and feeding of the cutting tape to the distal side where it is introduced to the nip between a driving roll and an empty wind up roll. The three sections of track may be referred to as the dispensing section, the cross machine section, and the curved section. The dispenser section is that which is a portion of the present invention and which includes the controls and treatment devices on the proximal side of the web of paper. The cross machine section is essentially a straight section of track to guide the tape from the proximal side to the distal side underneath the travelling web of paper. The curved track section connects the distal end of the cross machine track to the end of the track positioned close to the nip between the driving roll and the empty wind up roll so as to permit the forward end of the tape to be extended outwardly from the end of the track and be caught in the nip. Once the tape is caught in the nip it will stick to the empty wind up roll, and be wrapped around that roll in a helical path. The proximal end of the tape is restrained by a brake which causes the tape to be pulled taut, cutting the web of paper where the tape and the web intersect, and leading the cut edge to the empty wind up roll which then continues to wind up the web until it is time to repeat the cutting and transfer to still another wind up roll.

The dispensing section of the track, along with its associated controls and treating devices is illustrated in FIG. 1. Cutting tape 10 is introduced into track 32 through feed guide 37. For use in cutting a web of paper it

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is preferred that tape 10 be that described in the U.S. Patent No. 4,659,029 as a plurality of (about 10-20) parallel strands of repulpable paper fiber adhered to each other in a flat layer about 0.5-1.0 inch wide and 0.02-0.05 inch thick. Other types of tapes are completely operable in this system and are intended to be included in this system.

Tape 10 can be introduced into feed guide 37 from a roll or any other storage device. It is a preferred means to employ rolls of tape in an enclosed package so as to maintain as much cleanliness and dust-free condition as possible. Such packages can be cartridges or cassettes that can be replaced and the tape ends spliced together or fed into the system after the previous roll of tape is completely consumed, as needed. Tape 10 enters track 32 which normally is a horizontally positioned covered track through which the tape can travel in a horizontal position in the direction of arrow 38, i.e. from left to right in FIG. 1. The remaining description of wheels, rollers, etc. are in the order shown in FIG. 1 from left to right. That order may be modified in actual practice so as to save space or be more convenient. In only a few instances, which will be noted, is sequence or a particular order of placement of any importance.

Main drive wheel or first drive wheel 12 is pressed against the upper surface of tape 10 while drive press wheel 13 provides the counteracting force against tape. The turning of wheels 12 and 13 in the direction of the arrows as shown moves tape 10 along track 32 from left to right.

Cutter 14 cuts tape 10 at a specified time so as to have a specific length of tape 10 ahead of (to the right of in FIG. 1) cutter 14. That length is whatever is necessary to have the forward end of tape 10 at the distal end of track 32 while the rearward end of tape 10 is sufficiently behind (to the left of) brake 31 so as to keep tape 10 taut as it cuts the web of paper. Cutter 14 can be any type of cutter although it is preferred for it to be a guillotine cutter wherein a moving knife blade cuts completely across tape 10 in one quick movement. Cutter 14 is controlled through encoder wheel 28 which actually measures the length of tape 10 passing by. At a selected length cutter 14 is activated.

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Next in line is the adhesive coating component involving adhesive applicator roll 16 pressing against the bottom of tape 10 while press roll 15 provides the counteracting force against the upper surface of tape 10. This component is more fully described in connection with FIGS. 5-8 which will follow hereinbelow. This component includes a roll of double-sided pressure-sensitive tape adhered to a backing layer; a channel leading to adhesive applicator roll 16, a channel to guide the stripped backing layer away for disposal and a spring-biased brake lever adapted to prevent adhesive applicator roll from rotating until the brake lever is released. All of these components are housed in a cassette-type container 17 to keep the adhesive layer free from dust and other contamination until pressed against the lower surface of tape 10. As a cassette or cartridge 17, the entire mechanism and supply of composite tape can be replaced readily without a necessity to rethread the composite tape.

Adhesive detector wheel 18 follows closely upon adhesive applicator roller 16. Wheel 18 has a surface pressed lightly against the lower surface of tape 10 by roller 16. If there is adhesive on tape 10, wheel 18 will be contacted thereby and will rotate as the layer of adhesive passes by. If for any reason the adhesive layer is not present, wheel 18 will not turn. A sensor, not shown, detects the rotation of wheel 18 and signals to the relevant components, e.g., tape bypass 30 that all is okay for the tape to proceed to the distal side to do its job of winding onto an empty wind-up roll. If the sensor does not detect any rotation of wheel 18, the procedure must be aborted until an adhesive coated forward end of tape 10 can be assured. This can be done by manually applying adhesive to the forward end of tape 10, or the tape can be removed and thrown away, while a new length of tape is processed from the beginning. Generally, the sensor controls the operation of tape bypass 30, which will be discussed below.

Tape 10 with its forward end coated with adhesive on its lower surface for a short length of about 6-12 inches proceeds through track 32 above loop storage container 21. Longer lengths of adhesive are operable but generally are wasteful of adhesive. When the forward end of tape 10 reaches the distal end of track 32 adjacent the empty wind up roll, brake 31 is applied, and plunger 19 is activated and moves from its up position 19 (solid lines) to its down position 20 (dotted lines). This forces the

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rearward portion of tape 10 which is contacted by plunger 19, 20 out of the confines of track 32. Main drive wheel 12 continues, to run and thereby feed more of tape 10 forward to be diverted downwardly into a hanging loop 39. The bottom of container 21 is closed and the tape entering container 21 forms into one or more loops for temporary storage  
5 there. The face of plunger 20 is contoured to function as a lead-in and a lead-out of track 32; and, therefore, tape 10 is held in track 32 just ahead of and just beyond plunger 20. When first drive wheel 12 has pushed a preselected length of tape 10 forward, it stops and cutter 14 is activated to cut tape 10. This produces a finite selected length of tape 10, some of which is stored in loop 39.

10 Second drive wheel 22 cooperates with second drive press wheel 23 to drive the cut length of tape 10 ahead when it is ready to cut the web of paper and transfer the cut edge to a new empty wind up roll. Second drive wheel 22 and second drive press wheel 23 are essentially the same in operation and design as wheels 12 and 13. Wheels 12, 15, and 22 must be driven by some coordinated source. Generally it is preferred to drive each by a  
15 single motor 24 with some form of belt drives 25, 26, and 27, respectively. In some circumstances, wheel 15 may be passive and not driven when the adhesive being applied to the cutting tape 10 does not require rigorous application techniques.

Encoder wheel 28 is a distance or length measuring device in contact with tape 10 so as to measure directly how much length of tape 10 has passed by. It is important to control  
20 when to use cutter 14 and also when to stop the forward movement of adhesive-coated forward end of tape 10 when it reaches the distal end of track 32.

Tape bypass device 30 is a simple switching mechanism which is movable from its noninterfering position 30 (in solid lines) to its bypass position 29 (in dotted lines). This device is employed when adhesive detector wheel 18 fails to detect any adhesive coating  
25 on tape 10. Bypass device 30 is activated to move its switch surface to position 29 which strips tape 10 from track 32.

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Brake 31 may not be directly a part of the dispenser section in a strict sense, but it can best be considered so for the purposes of this invention. Brake 31 is capable of clamping tape 10 so that it cannot move, but normally the clamping pressure is to provide a resistance to the passage of tape 10 during cutting of the travelling web of paper (not shown). Brake 31 can be merely a pair of opposing pads which clamp against opposite surfaces of tape 10. Brake 31 is clamped after the forward end of tape 10 enters into the nip and thereby begins the web cutting and web transfer operations. When the forward end of tape 10 is caught in that nip, it begins to wrap itself around the wind up roll, and tape 10 must be held taut in order to perform its operations of cutting and transferring. For this purpose brake 31 is clamped so as to provide sufficient frictional resistance to the otherwise rapid removal of tape 10 from track 32. This is a somewhat vigorous action by tape 10 since it actually is ripped out of the top of track 32, rather than rapidly moving through track 32 to its end.

Cutter tape sensor 41 is located closely upstream of brake 31. Sensor 41 is needed to sense the presence of tape 10 in the track 32 immediately short of brake 31. It is possible that tape 10 might break due to the tensile forces produced when brake 31 tightens onto tape 10 when it is cutting the web of paper and being wound onto the wind up roll. If tape 10 breaks it will do so downstream of brake 31 leaving some unused tape 10 in track 32 upstream of brake 31. In order for the operator to prepare a new length of cutting tape and position it for the next cutting and winding operation track 32 must be unobstructed. Hence sensor 41 tells the operator that unused tape 10 is still in track 32 and must be removed before the next cutting and winding operation track 32 must be unobstructed.

FIGS. 2-4 show the details of loop container 21, which is merely a four sided container. At the top end plunger 19, 20 can move up and down to clear track 32 or to interrupt it. It may be seen in FIG. 4 that plunger 19,20 is thin enough to move up and down between lips 33 which support tape 10 in a thin, flat rectangular tunnel 40. When plunger 19 moves to position 20 it causes tape 10 to bend downwardly with its two edges resting

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on lips 33, until it bends sufficiently to slip past lips 33. Tape 10 then is removed from track 32 and will fall freely into loop 36 as shown in FIG. 3.

In FIG. 5 there is shown a portion of track 111 for guiding a cutting tape 110 from left to right in the direction of arrow 112. As the tape 110 passes by the device of this invention in a cartridge or cassette container 113 it applies a strip of adhesive to the bottom surface of tape 110 by contact with transfer roller 116. The adhesive is supplied from a composite tape 115 which includes a double-sided strip of pressure sensitive adhesive adhered to a layer of strippable backing tape 119. A supply roll 114 of the composite tape 115 feeds tape 115 to transfer roller 116 with contact between tape 115 and roller 116 being made at the tip 121 of a stationary nose built into the container 113. Nose tip 121 separates a first channel 117, leading from supply roll 114 to transfer roller 116, and a second channel 118 leading from transfer roller 116 to a disposal site for backing layer 119. Nose tip 121 is a sharp reverse bend so as to enhance the separation of backing layer 119 from the double-sided pressure-sensitive adhesive clinging to transfer roller 116. In order to assure this separation, a doctor knife edge 122 is positioned closely adjacent to nose tip 121 and slightly downstream of it. Knife edge 122 is positioned very close to the surface of transfer roller 116 such that the adhesive layer on roller 116 will pass by knife edge 122 but the backing layer 119 will be deflected. Backing layer 119 is stripped away from the adhesive layer on transfer roller 116 and falls into second channel 118 where it eventually, by gravity and/or the force of backing layer 119 pushing on previously stripped backing layer 119, passes through exit port 120 to a waste receptacle or merely hangs downwardly until gathered by an operator for waste disposal. Backing layer 119 is normally a silicone treated paper having poor adherence to the pressure-sensitive adhesive, but may also be a plastic film such as a polyolefin, such as polyethylene or polypropylene, polyacetal, polyvinyl halide, polyvinyl ester, rubbers of various types, such as silicone rubber, etc. Transfer roller 116, likewise, is a material of poor affinity to the adhesive and preferably has a cylindrical surface of silicone rubber.

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A brake mechanism is employed to stop the application of adhesive when desired. The brake mechanism shown here includes a pivotable brake lever 123 having a pivot point 125 and a friction face 124 to bear against transfer roller 116 so as to prevent it from rotating. The embodiments illustrated are based on a friction face 124, spring biased  
5 against applicator roll 116, but the braking action may be accomplished by engagement of teeth arranged as a rack and pinion. Spring 126 bears against arm 144 of brake lever 123 so as to bias friction face against roller 116. Thus, at rest, the brake mechanism is spring biased to prevent rotation and prevent application of adhesive to tape 110. In  
10 order for the device to operate brake lever 123 must be forced to release friction face 124 from contact with transfer roller 116. This is accomplished by the downward movement of plunger 127, which is not an element of this device, but rather is a part of the paper windup machine to which the device of this invention is attached. Plunger 127 moves up and down as member 143 moves up and down. Pressure roller 128 in its down position bears against the upper surface of cutting tape 110 directly opposed to transfer roller 116  
15 and provides the force to transfer the strip of adhesive from transfer roller 116 to tape 110 by reason of the fact that the adhesive sticks much more firmly to tape 110 than it does to transfer roller 116. By enabling automatic controls the operator may cause the movement of member 143, which normally is up with no contact between pressure roller 128 and tape 110. When the machine is to prepare a length of tape 110 with adhesive  
20 thereon, member 143 automatically moves downwardly to apply the force of pressure roller 128 to tape 110 and to release the brake mechanism by pushing downwardly on brake lever arm 123 so as to disengage friction face 124 at rest is shown in solid lines in FIG. 6, and when pushed downwardly by plunger 127 to release the brake, their positions are shown in dotted lines.

25 One step in the operation of using the cutting tape to cut a moving web of paper and to transfer the cut web to a new windup roll is to push the forward end of the cutting tape, with adhesive on its bottom surface, across the width of the moving web of paper. An adhesive detector roll 132 is employed on the tape transfer machinery to which the device 113 of this invention is attached. Adhesive detector roll is positioned very close  
30 to the lower surface of tape 110 which moves by from left to right. Roll 132 has a

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surface which has a slight affinity to the pressure-sensitive adhesive and will, therefore, be moved by the contact with the adhesive strip in tape 110. This will cause roll 132 to rotate which, in turn, is detected by rotation sensor 133. If roll 132 fails to rotate, sensor 133 will signal a control 30 in FIG. 1 to divert tape 110 away from the track that leads it across the width of the travelling web of paper to the vicinity of the new wind up roll. The operator is signaled with that information so that he may abort the faulty tape 110 and begin a new cycle to apply adhesive to tape 110 and send it across the web to the new wind up roll. It is emphasized that the adhesive detector roll 132 and rotation detector 133 are not part of the cartridge. The cartridge includes all that is within the bounds of container 113 and including transfer roller 116 which has a small portion of its perimeter extending outwardly of container 113 so as to contact the surface to which adhesive is to be applied, in this case the lower surface of tape 110.

FIGS. 6-8 depict an adhesive dispenser having all of the components and features of the device of FIG. 6 except that the device of FIGS. 6-8 is designed to be used manually to apply adhesive to a surface rather than be attached to a machine to do the same. The device of FIG. 6 is an embodiment that includes a collection space 135 to collect the backing tape stripped from its adhesive layer. In FIGS. 7-8 the backing layer is discharged to the outside of the device, as in FIG. 5, with no specific receptacle to collect the backing tape.

In FIG. 6 the supply roll 114 of composite tape 115 leads the tape to transfer roll 116 which is pressed downwardly against surface 136 and pulled from left to right in the direction of arrow 145 to deposit a strip of adhesive thereon. The operator's hand fits around pistol grip 134 so as to direct the movement of the device. This embodiment has a brake member 123 with a friction face 124 and a pivot 125. Arm 144 of brake member 123 is fashioned with a pin 138 that is engaged in slot 139 in the structure of handle grip 134. Grip 134 is pivoted around pin 137. When the operator with his hand around grip 134 pushes downward to apply force to press transfer roller 116 against surface 136 it causes grip 134 to pivot about pin 137 which presses downwardly on slot 139 and pin 138. This movement causes friction face 124 to move away from transfer roller 116 and releases

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it to rotate. In the view as shown in FIG. 6 the device is moved in the direction of arrow 145 to lay down a strip of adhesive on surface 136, which may be any type of reasonably smooth surface, and could, for example, be a cutting tape 110, as described above with respect to FIG. 5. It may be seen that channel 118 leads to space 135 which receives backing layer 119 after being deflected by sharp edge 122. Space 135 could be periodically emptied by constructing an access door in one of the walls of space 135 or be emptied by constructing an access door in one of the walls of space 135 or be emptied by opening cartridge 113 to remove tape 119 and also to replace a spent roll 114 with a new roll 114 of composite tape 115.

The embodiments in FIGS. 7 and 8 are similar to that of FIG. 6 in all respects except that channel 118 leads to exit port 120 which directs tape 119 to the outside of device 113 rather than to a specific receptacle for tape 119. Arrow 141 shows the direction of movement to cause handle grip 134 to release brake member 123. Arrow 142 shows the direction of movement of device 113 to lay down a strip of adhesive on surface 136. Arrow 140 shows the movement of friction face 123 when the braking action is released by pressing handle grip 134 down in the direction of arrow 141. FIG. 7 shows the positions of all components when device 113 is at rest. FIG. 8 shows those same positions in dotted lines, and in addition shows the positions in solid lines when the device 113 is handled and operated to lay down a strip of adhesive on surface 136.

In FIG. 9 there is shown the way in which this invention is used in the paper industry to cut a moving web of paper being wound up on a roll, and transferring the cut edge of the paper to an empty wind up roll without having to stop the paper movement. The web of paper 10' is moving in the direction of the arrow 50' under a lead-in roller 11', and over drive roller 12' to wind up roll 13'. Drive roll 12' is driven by an outside source, and it drives wind up roll 13' by frictional contact. When wind up roll 13' becomes large enough (i.e., contains enough wound up paper 10'), it is necessary to cut the paper web and start it winding on a new roll. In this case, new, empty wind up roll 14' is lowered vertically until it contacts drive roll 12'. All rolls 11', 12', 13' and 14' turn in the direction of the indicated unnumbered arrows. In order to cut the moving paper web 10' and start it winding onto roll 14', a cutting tape 19', at

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terminal end 20' of tape track 24' is moved forward and is caught in the nip 18' of rolls 12' and 14'. Tape 19' is wrapped helically around roll 14' as roll 14' turns, and in so doing tape 19' cuts through paper web 10' until roll is full and the entire operation is repeated to cut and transfer the web to a new, empty wind up roll. Soon after web 10 is transferred to roll 14', full roll 13' is moved away from drive roll 12', and roll 14' is moved down to the previous position of roll 13'.

Tape 19' is introduced into a track in the dispensing section 16' where it is treated to apply a coating of pressure-sensitive adhesive to the forward section of the tape, the tape is cut to a finite length and pushed along until the tip 19' is at terminal end 20', and the tape is then stopped and held in position until an operator decides it is time to cut and transfer the web to a new roll 14'. The track assembly herein is shown at 15' in FIG. 9 of the drawings. It abuts the end of the track in dispensing section 16', and continues across the web 10' from proximal end 51' to distal end 52'. The track 24' continues from distal end 52' through an upward curving and twisting section 17' to a terminal end at 20'. The adhesive coating applied in dispensing section 16' is on the bottom of tape 19' as it crosses through track assembly 15', and must be twisted to be on top when it is fed to roll 14' so as to stick to roll 14' and carry along with it the cut edge of paper web 10'. The present invention relates to the track and carrier from proximal end 51' to distal end 52' and the extended track and its appurtenances from distal end 52' to terminal 20'.

FIG. 9 includes brake 22' which is a clamping device to apply a variable resistance to tape 19' in preventing or inhibiting its movement through track assembly 15'.

Movement is stopped when the tape is first moved into position with its forward tip 19' at terminal end 20'. When the time for cutting the web of paper 10' occurs, tip 19' is fed into nip 18' and the tape is suddenly accelerated to a high speed by its contact with roll 14' which causes the tape to be jerked out of track assembly. At this time the brake is applied to provide resistance but not to prevent movement of the tape. As soon as the tip 19' starts to wind around roll 14' the brake resistance causes the tape to become taut and cut web 10' as it is moved across web 10' because of being wound helically on roll 14'. The tape will be pulled rapidly and upwardly out of track 24', and brake 22' must be

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applied properly for this to happen with control and without breakage of the tape.

Sensor 23 is employed merely to be sure there is no tape in track 24' after the cutting operation is finished. If the tape breaks, there may be some pieces of tape in track 24' that will impede the next setup of placing a tape, with adhesive on the forward end ready for the next cutting and transferring operation. Brake 22' and sensor 23' are more properly components of dispensing section 16', and are mentioned here merely as context.

FIGS. 10-11 show the details of the track assembly 15'. FIG. 11 shows the extended track in the curved and twisted section 17' leading to terminal 20'. The assembly 15' includes track 24', track carrier 25', and track carrier support 25'. Track 24' is generally an H-shaped article, preferably an extrusion of a polyolefin, e.g., high molecular weight polyethylene. Such a material is strong, stiff, and has a low surface friction which will permit the tape to slide easily on a surface of this material. The H-shape comprises two parallel vertical legs 53' joined to a cross bar 54'. This shape provides two deep U-shaped channels or grooves on opposite sides of track 24'; upper deep groove 32' and lower deep groove 33'. In each of deep grooves 32' and 33' there is a pair of shallow grooves 34' and 35', respectively, adjacent the bottom of deep grooves 32' and 33'. Shallow grooves 34' and 35' are intended to function as ledges to support cutting tape 31' at its lateral edges, with the center of the tape spanning the deep groove between such edges so as not to touch the strip of pressure-sensitive adhesive placed there in dispensing section 16'. Track 24' is symmetrical about both of its horizontal and vertical axes. In actual use with track 24' positioned such that its top face is 39' and its upper deep groove 32' is vertically above lower deep groove 33', shallow grooves 34' will serve to carry and guide cutting tape 31'. When it becomes necessary to replace shallow grooves 34' because of wear and tear, track 24' can be turned upside down so as to use shallow grooves 35' to support and guide cutting tape 31'. In normal operation, however, lower shallow grooves 35' empty or are filled with a strip 36' of steel or other stiff material to provide an additional stiffness to track 24' and some protection against contamination.

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Track carrier 25' is an elongated semi-cylindrical structure which carries track 24' in its operational position. Generally carrier 25' will be aluminum, although other materials are suitable. Carrier 25' has a central axial lengthwise rectangular groove in which track 24' is seated. Preferably this groove is fitted with a cover 38' of a rubbery or resilient material to protect upper deep groove 32', cutting tape 31', and other faces of track 24' from dust and other contaminants that might prevent efficient handling of tape 31' or hamper its cutting action.

The carrier 25' is primarily intended to enclose and protect the track 24' along the length of track 24' that is directly beneath paper web 10'. As seen in FIG. 1, the cutting tape 31' must be conveyed to track terminus 20' near the nip point 18' between rolls 12' and 14'. Practical considerations will generally prevent the use of track carrier 25' from distal end 52' to track terminus 20' through the twist and arch necessary to face the adhesive coating on cutting tape 31' toward roll 14' at nip point 18'. As it is still desirable to protect track 24', cutting tape 31', and all interior track surfaces through the curve from distal end 52' of track carrier 25' to track end 20', a rubber sheath 37' is attached to track 24' by uniformly spaced clips 40' and screws 41' on both sides of track 24'. Rubber sheath 37' may be installed as one piece and then split to provide an exit for the cutting tape 31' or sheath 37' may be installed as two overlapping pieces. The major consideration in the design of rubber sheath 37' is that it will provide groove 32' and cutting tape 31' with protection from falling or airborne debris. The design of sheath 37' may vary with respect to its profile opening attachment to track 24'. Additionally, track 24' may be stiffened to better support itself between distal end 52' and end support 21' by use of a stiff metal strip 36' inserted into the shallow grooves 35' in deep groove 33' on the side of profile 24' opposite that which carries cutting tape 31'. Metal strip 36' also protects shallow grooves 35' and deep groove 33' from damage, preserving them for subsequent use when the track 24' is reversed.

Track carrier 26' is a structure designed to support carrier 25' in the desired position underneath paper web 10'. Legs or side walls 47' together with ledges 48' provide for stiffness of the support so it may be mounted from its ends at either side of the web. The horizontal axis 30' of track

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carrier 26' passes through the center of tape 31' resting in shallow grooves 34'. The curved outer surface 28' of track carrier 25' resting in the concave upper surface 29' of support 26' permits track carrier 25' to be rotated about axis 30' so as to tilt upper face 39' of track 24' in either direction as shown by arrows 43'. Generally the maximum amount of tilt 43' is about 35 degrees on either side of vertical centerline 42'. This tilting provides for positioning track 24', and thereby cutting tape 31', in positions more conducive to efficient cutting of web 10' in confined installations of the turn-up equipment. Stops 46' on the perimeter of surface 28' prevent tilting to any greater degree than that chosen for angles 43'. Spaced set screws 44' along the length of track assembly 15' will fix the tilt at whatever angle is chosen. Track carrier 25' is secured to track carrier support 26', by regularly spaced screws 44' to cause the two profiles to reinforce each other and to fix track carrier 25' at any desired angle.

Legs 47' and ledges 48' are so designed to accept I-beam 42' with a sliding fit. A short section of I-beam 42' is then attached to the paper machine producing web 10' or other convenient structure at either side of the web 10' by any of a number of support means, in order to provide a means by which to support both ends of track carrier support 26', which is slipped over I-beam 42' at each end. The slip-fit of I-beam 42' in track carrier support 26' also provides for mounting equipment to the proximal end 51' of the track assembly 15' as would be required to dispense and control the cutting tape 31'. The most significant advantage of designing the slip-fit of I-beam 42' in track carrier support 26' is that it allows the adjustment of the turn-up system to suit varying widths of web 10' in the same machine. If track support 21' is fastened to track carrier support 26', and that track carrier support 26' may slide over its end supports made of I-beam 42', it can be seen that the position of track end 20' may be adjusted by an operator located near proximal end 51' by moving the entire track assembly 15' on its end mounting points.

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## THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A system for preparing a selected length of cutting tape to be used to cut a travelling web of paper being wound on a first roll and transfer the cut edge to an empty roll to continue the wind up, the system comprising means for feeding an endless length of cutting tape into a track for supporting and guiding the tape; a friction drive first feed wheel in contact with the tape for causing the tape to move along the track, a vertically movable means for applying adhesive to a lower surface of the tape, means for contacting the tape and directing a rearward end portion of said selected length of tape into a temporary storage loop vertically disposed offset from said track, a cutter upstream of said storage loop for cutting the tape to said selected length, a friction drive second feed wheel for moving the cut length of tape along said track to push its forward end into contact with said empty roll, and a brake means to apply resistance to the passage of said tape at a predetermined time.
2. The system of claim 1 wherein said means for directing tape into a temporary storage loop includes a housing and a plunger adapted to be moved to push a short portion of said tape through a passageway transverse to and below said track and to guide said tape moving toward said passageway into said housing for temporary storage
3. The system of claim 2 wherein said plunger remains in its position directing said tape through said passageway until after said tape is removed from said housing by cutting of the travelling web.
4. The system of claim 1 which additionally includes a sensor wheel immediately following said means for applying adhesive, said sensor wheel being rotatable by contact with said adhesive on said tape and being nonrotatable by contact with said tape having no adhesive thereon, bypass means to direct tape with no adhesive away from said track.
5. The system of claim 1 further comprising an encoding wheel movable by movement of said tape, said encoding wheel being a disc with its perimeter in contact with said tape and adapted to measure the length of said tape passing thereunder and to signal said cutter when to cut said tape to a selected length.

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6. The system of claim 5 wherein said encoding wheel signals said brake means to apply resistance to said tape and selectively to release same.

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7. The system of Claim 1 wherein said means for applying adhesive is enclosed in a cartridge and includes applying a strip of double-sided pressure-sensitive adhesive to the lower surface of said tape as it moves horizontally in said track.
8. The system of Claim 1 wherein said means for applying adhesive includes a portable container for applying a strip of double-sided pressure-sensitive tape to said cutting tape, said container having a rotatable supply roll of composite tape consisting of a layer of double-sided pressure-sensitive adhesive adhered to a strippable backing layer, a rotatable transfer roller having a cylindrical outer surface having a portion exposed outwardly of said container, said transfer roller receiving said adhesive layer and applying same to said cutting tape, said outer surface having poor affinity for adhering to said adhesive tape, a stationary tapering nose having a tip with a return bend surface spaced apart from the surface of said transfer roller about the thickness of said double-sided adhesive, a first channel leading from said supply roll to said tip and a second channel leading from said tip to a disposal site for said backing layer, a brake member bearing against said transfer roller for inhibiting rotation thereof; and selective means for releasing said brake member.
9. The system of Claim 8 which additionally includes a sharp edge positioned transversely to the movement of said double-sided adhesive tape and positioned downstream from said nose tip and very close to the double-sided adhesive temporarily adhering to said transfer roller, said sharp edge being adapted to assure separation of said backing tape from said double-sided adhesive layer.
10. The system of Claim 8 which additionally comprises a doctor knife edge positioned closely adjacent to said return bend surface and positioned to assure stripping of said backing layer from said composite tape temporarily adhered to said transfer roll.
11. The system of Claim 8 wherein said transfer roll includes a cylindrical surface of material having a positive but poor adherence to said layer of pressure-sensitive adhesive.

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12. The system of Claim 8 wherein said brake member includes a spring biased pivotable lever having said frictional face as a component thereof and which includes movable member adapted to overcome said spring bias and move said frictional face away from contact with said transfer roll.
13. The system of Claim 12 wherein said movable member is a plunger separate from said cassette container and adapted to automatically apply a force contrary to said spring bias when it is desired to apply said adhesive layer to said receiving surface.
14. The system of Claim 1 wherein said track includes a guideway means, a track carrier, and a carrier support, said guideway means including an elongated member having a cutting tape extending along its longitudinal centerline throughout its length, said member having an elongated space beneath said guideway whereby adhesive applied to an underside surface of said cutting tape may unimpededly traverse said guideway, said track carrier including a semi-cylindrical member having a longitudinal centerline and a longitudinal trough for receiving and seating said elongated track therein, said carrier support including an elongated cylindrical upper surface for forming a seat for said semi-cylindrical member, means for fastening said semi-cylindrical member being supported on said cylindrical upper surface in any selected position rotated about said longitudinal centerline of said elongated member.
15. The system as defined in Claim 14 further comprising a flexible flap overlying said guideway.
16. The system of Claim 14 further comprising a support beam extending along and engaged with said carrier support for positioning said carrier support beneath a moving web of paper and adjacent and along an elongated drive roll driving an elongated take-up roll upon which a moving web of paper is to be wound.
17. The system as defined in Claim 14 wherein said elongated member includes an auxiliary guideway, an elongated strip of substantially the same cross-sectional dimension as that of said cutting tape being disposed in selected portions of said auxiliary guideway.

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18. The system as defined in Claim 17 further comprising spaced screw means for affixing said member within said trough to said semicylindrical member.

19. The system of Claim 14 having a distal end spaced away from an operator and a proximal end adjacent an operator, said track being made of extruded polyolefin extending outwardly of said distal end and curved to terminate adjacent said wind up roll for said paper web, said brake mechanism being adjacent said proximal end, and a short length of said track being modified to render same more wear-resistant than said extruded polyolefin, said short length of track being made of a hard-surfaced aluminum coated with a polyolefin material.

20. The system of Claim 14 wherein said track extending outwardly of said distal end is substantially enclosed in a sheath of rubbery material with a lengthwise split in said sheath adjacent said cutting tape and extending from said distal end to its termination adjacent said wind up roll.

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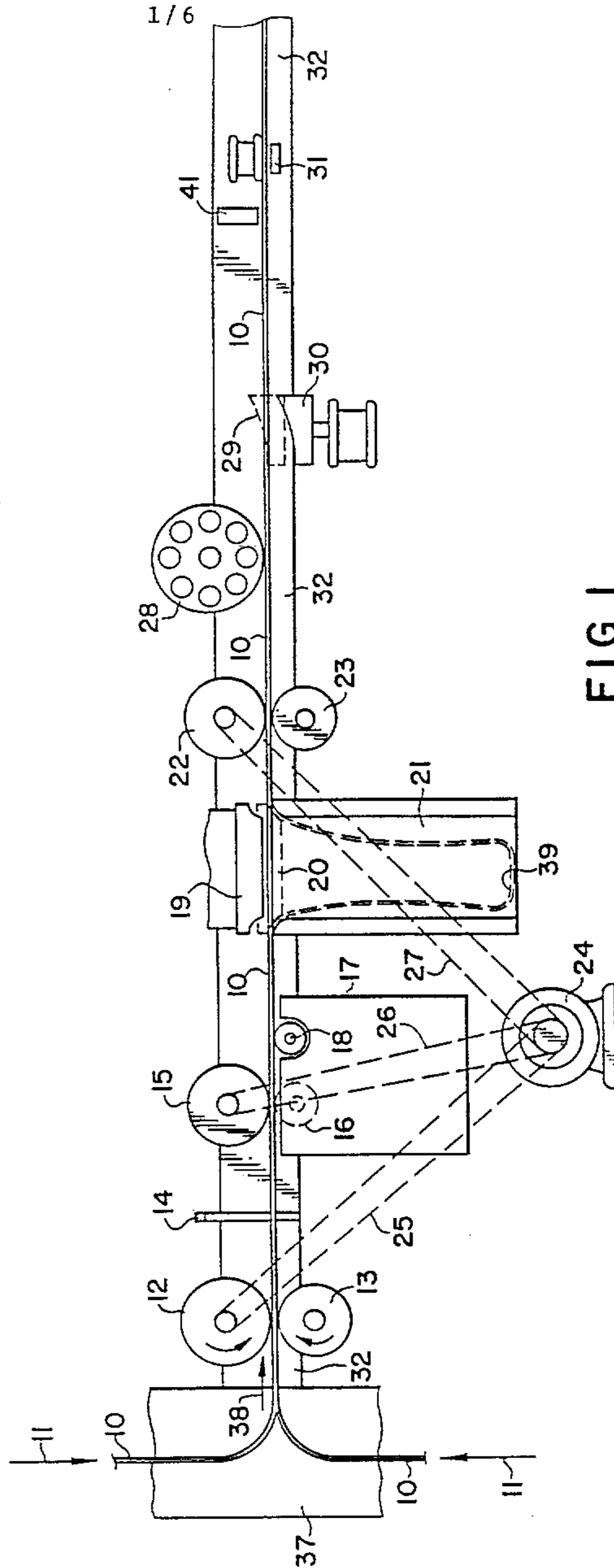


FIG 1

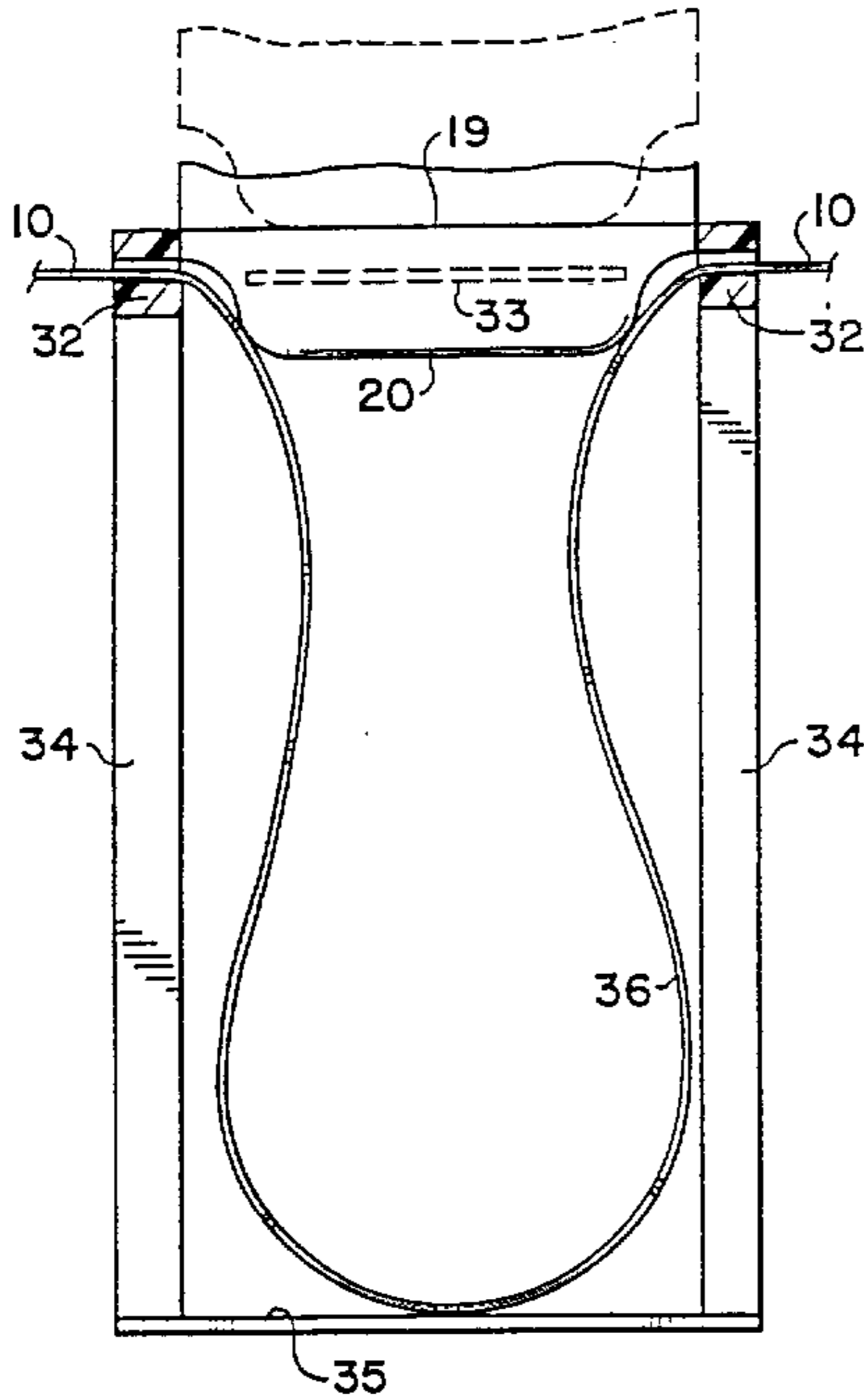


FIG 3

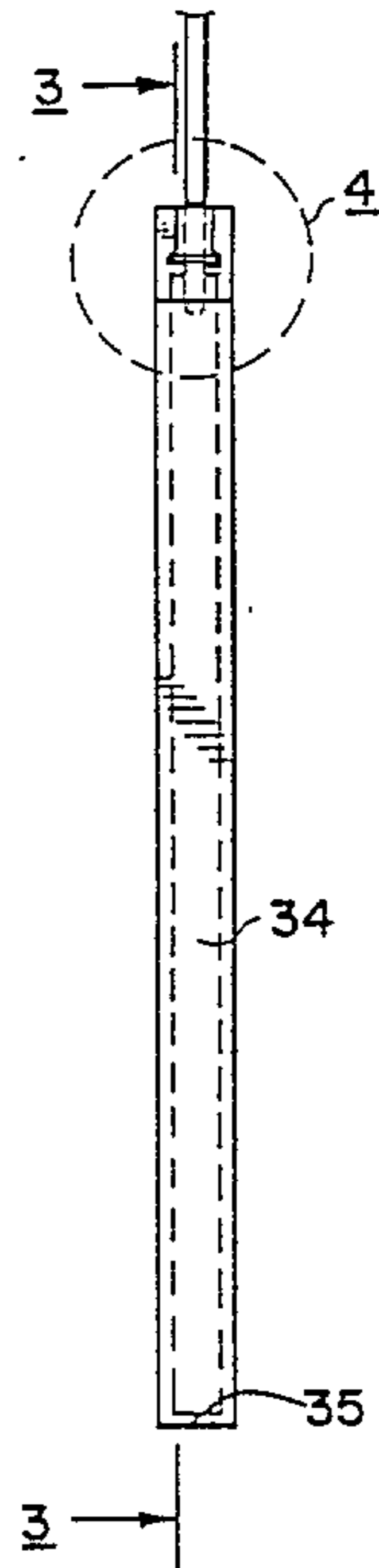


FIG 2

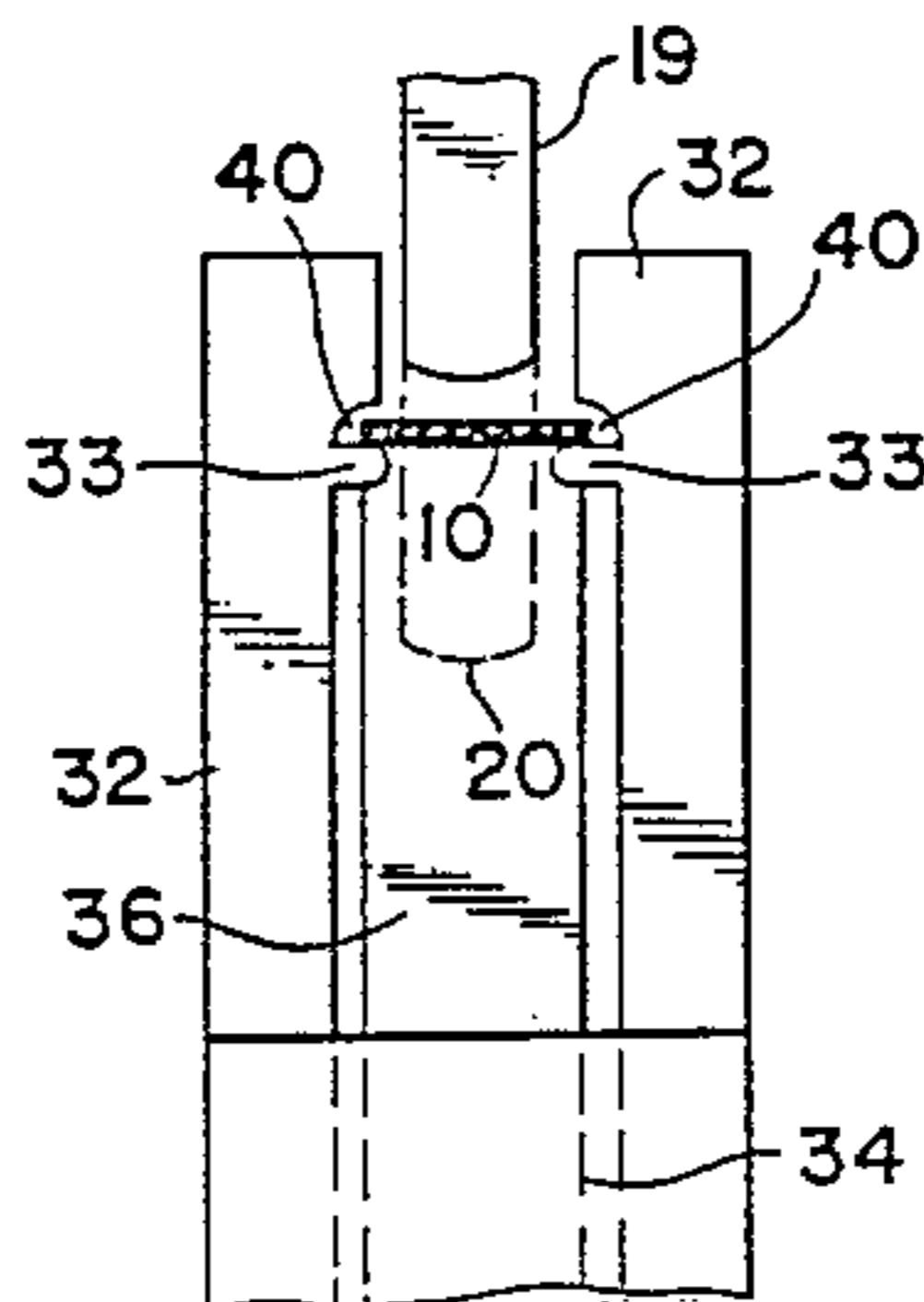


FIG 4

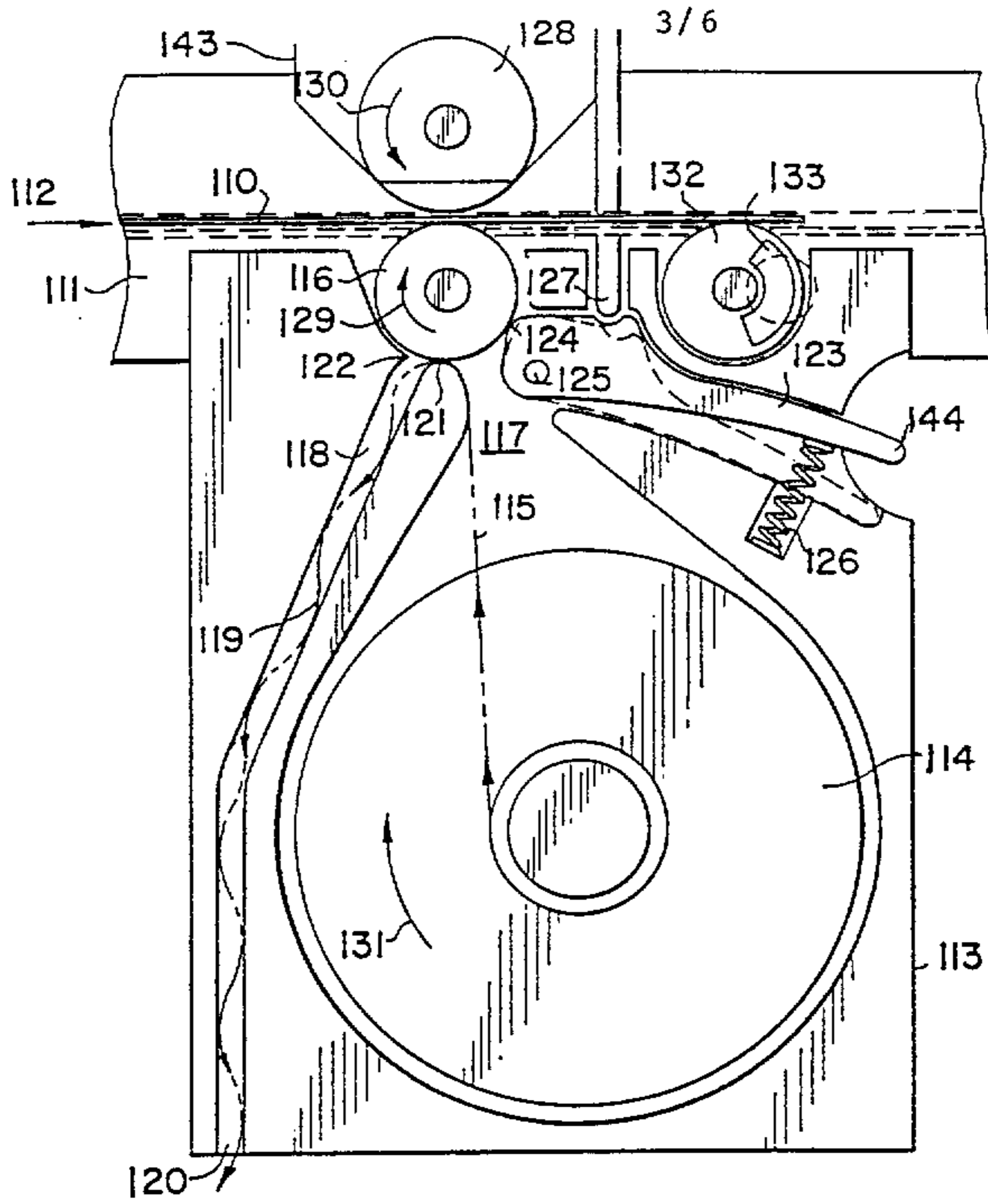


FIG 5

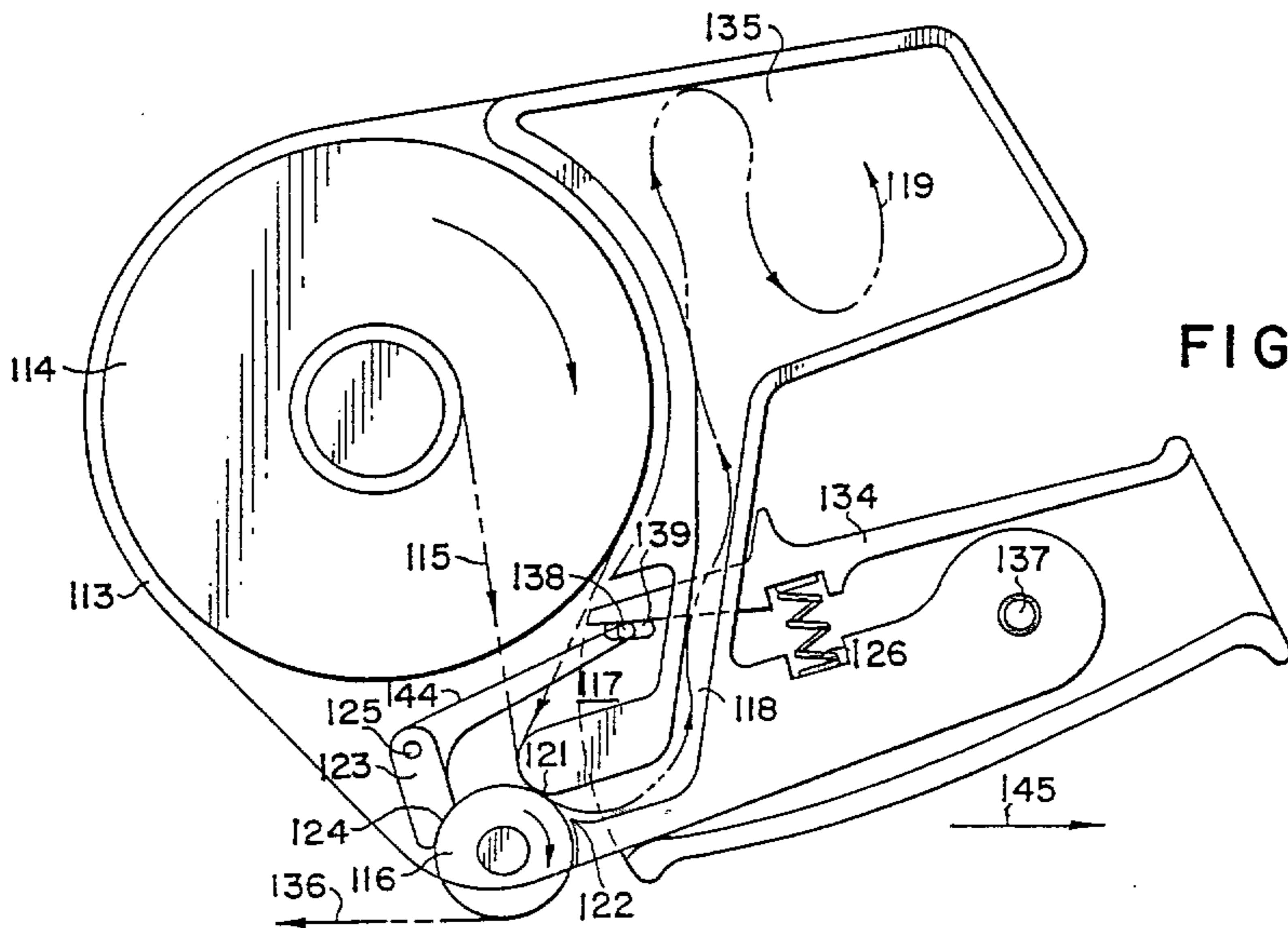


FIG 6

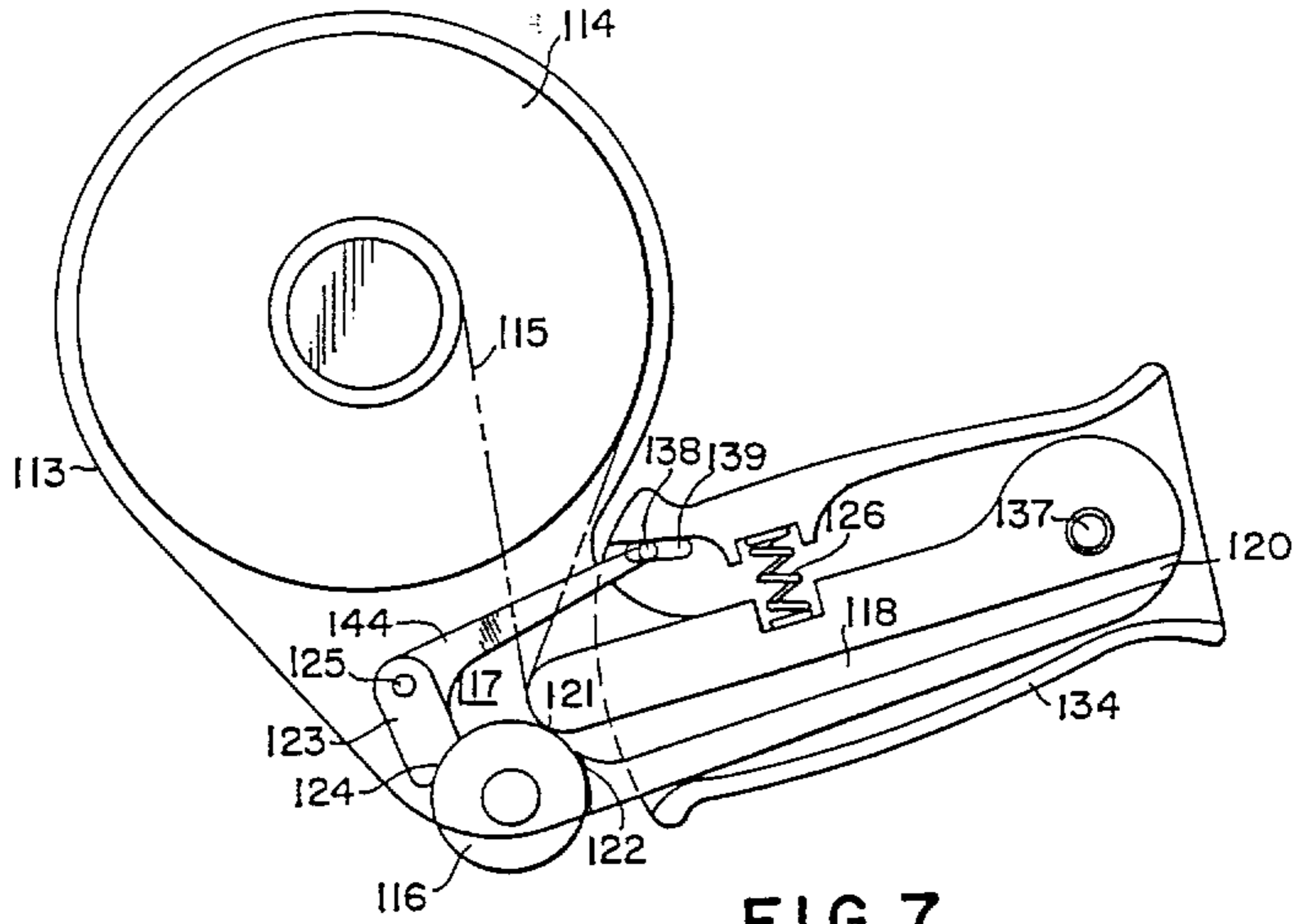


FIG 7

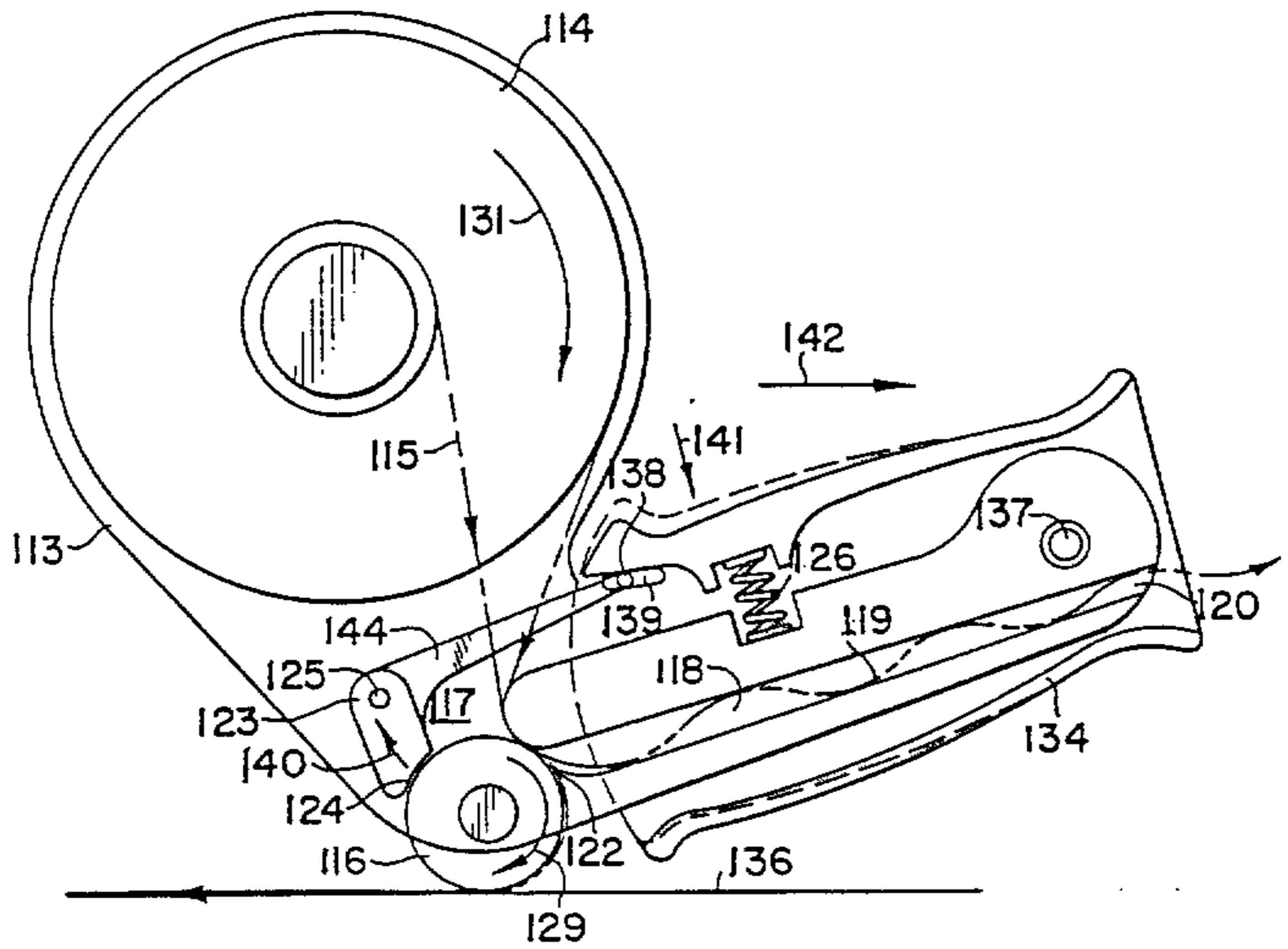


FIG 8



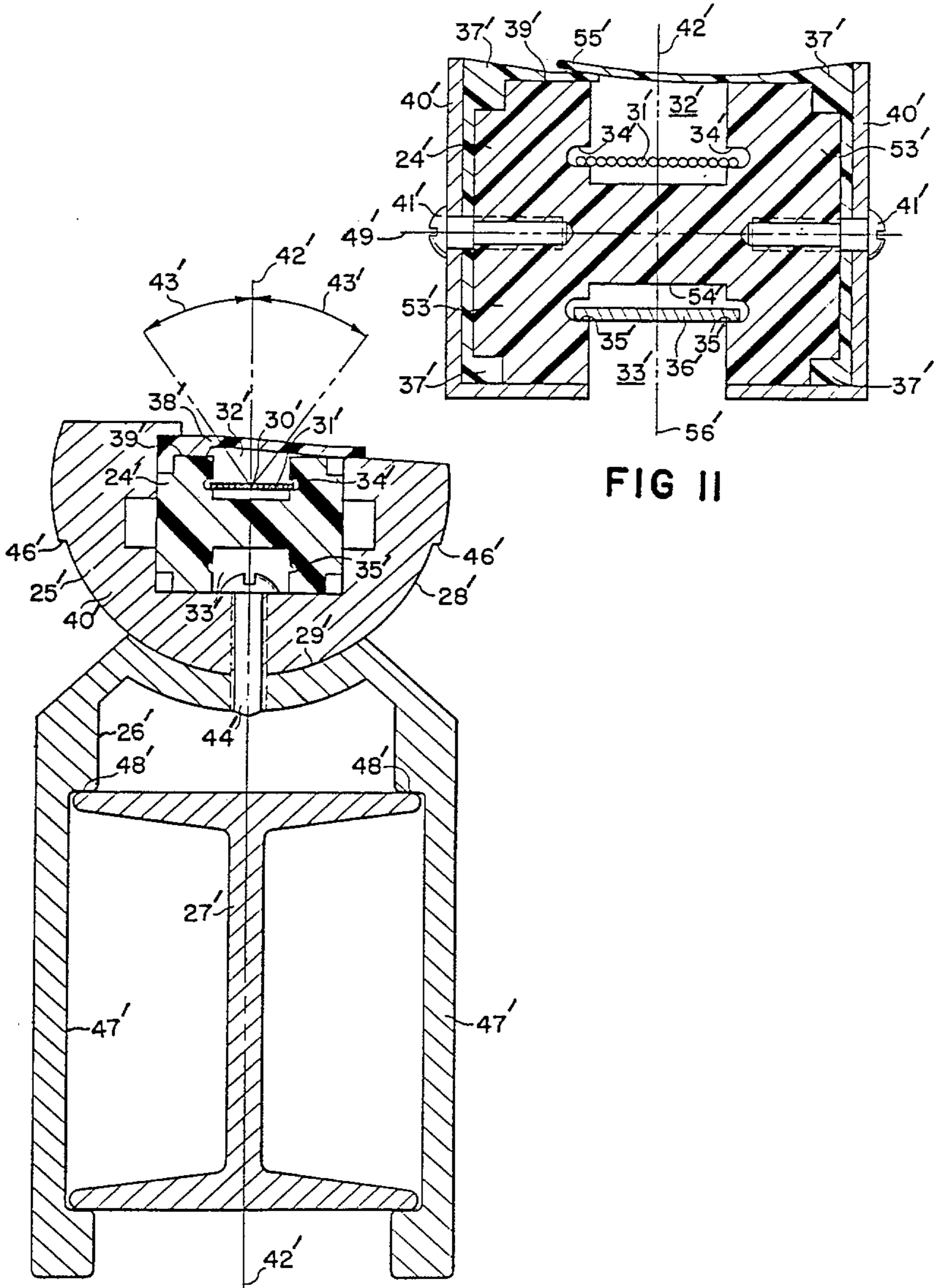


FIG II

FIG 10

