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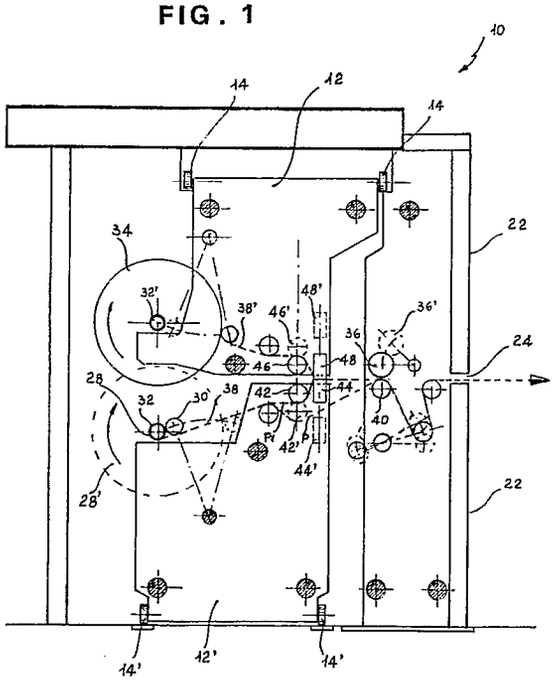
(54) Double decoiler connectable to cutting and rewinding machines.

(57) A double decoiler (10) connectable to conventional cutting and rewinding machines comprising two superposed moving trucks (12, 12') in which are loaded alternately the reels (28, 34) of tape to be decoiled and, for each truck, means of cutting and splicing the tapes (38) of the reel (28) being exhausted with that (38') of the new reel to be decoiled.

The means of splicing the tapes comprise bars (44,48) and moving cylinders (42,46) for drawing them near and away from the table on which runs the tape being decoiled. The bars (44,48) are provided with suction holes (66) to keep the tape in adherence to the bar and blades (52) for cutting the tapes coming from the reels being exhausted, said blades being covered with a retractable shield (54).

FIG. 1



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The present invention relates to a decoiler connectable to cutting and rewinding machines.

More specifically the present invention relates to a decoiler connectable to cutting and rewinding machines with quick change devices for the reels being decoiled.

In the industrial production of rolls of taped material there is a requirement for replacing with systematic frequency the reel from which the tape of material is unwound when it is exhausted. As is known, the tape of material is unwound from the reel, cut longitudinally at several points by means of suitable machines and devices and rewound on small cores for the formation of, for example, rolls of adhesive tape and the like.

The reel replacement operation, which takes place when the wound material is approaching exhaustion, traditionally has various shortcomings.

The first and basic shortcoming is the need to stop the production cycle of the cutting and rewinding machine for a relatively long period of time. Indeed, from 7 to 10 minutes are generally required for removal of the core from the decoiler, on which the material is no longer present, and positioning on said decoiler a new full reel. Said new reel is generally taken and brought to the point of the operation by a forklift truck and subsequently positioned near the cones with which the decoiler is equipped.

Said cones are then inserted in the heads of the core on which the tape is wound.

These are particularly voluminous and heavy reels with diameters up to 800 mm and weight of 900 kg and more. Thus it is understandable that the handling and accurate positioning thereof cannot be done quickly on conventional machines.

Another shortcoming concerns the splice or point of connection of two tapes of material of the exhausted reel and the new full one respectively, which must be connected to ensure continuous decoiling of the tape.

As is known, to perform said splicing operation, the end portion of material which is being unwound from the now exhausted reel is cut, aligned transversely with the initial part of the tape of the new reel and constrained thereto, again transversely, with an adhesive tape which acts as the end splicing element. A relatively wide adhesive tape, in general several centimetres wide, is generally used since it is necessary to assure splicing especially at the moment of the initial traction which occurs upon restarting of the rewinding machine. It is clear that the transverse adhesive tape, winding onto the cores which constitute the support for the finished tape rolls, creates thereon an extensive zone of interruption which, upon use, requires elimination of a portion of tape. In addition, the splicing operation, which is done manually, contributes substantially to lengthening of the time required for restarting processing.

The object of the present invention is to obviate the above mentioned shortcomings.

More specifically, the object of the present invention is to provide a decoiler connectable to the known cutting and rewinding machines which would allow very fast reel changing. Another object of the present invention is to provide a decoiler which would eliminate the use of adhesive tape for splicing the ends of the tapes, consequently eliminating all manual intervention for said operation in the case of tapes adhesivized on one side.

These and other objects are achieved by the features in the characterizing part of claim 1.

The decoiler of the present invention in particular comprises two alternately extractable superposed trucks for preliminary housing of a new replacement reel with the machine operating and opposed devices for splicing, each leading to a reel and consisting of a bar and a moving cylinder for drawing near and away from the table on which the tape runs, said bars being provided on one side with holes or slits for suction through suitable ducts to create a vacuum at the table on which the tape is laid, with one or more blades extended longitudinally along the head facing the arriving tape and with a retractable shield projecting below them.

Additional characteristics and advantages of the decoiler of the present invention will be better understood from the following detailed description wherein reference is made to the figures of the enclosed drawings representing a preferred and nonlimiting embodiment of the decoiler in accordance with the invention and wherein -

FIG. 1 shows a schematic side view of the decoiler of the present invention which illustrates the arrangement of the reels, the tape stopping system and the components for tape splicing,

FIG. 2 shows a schematic side view of the decoiler of FIG. 1 with both trucks exposed,

FIG. 3 shows a schematic perspective view of the opposed assemblies during the tape splicing operation,

FIG. 4 shows a partial schematic perspective view of the lower bar with holes for creation of the air vacuum,

FIG. 5 shows a schematic view of the head part of the upper bar, and

FIG. 6 shows a schematic view of the rollers through which pass the tapes for reinforcement of the splice.

With particular reference to FIGS. 1 and 2, the decoiler (10) comprises two superposed trucks (12,12') like drawers in which are housed two reels positioned on the same vertical axis. Each of said trucks (12,12') is provided above and below with running members (14,14') in the form of wheels for

example. Said members (14,14') run along the guides (16), which are made in the frame of the decoiler (10) and extend outwardly. Each truck (12,12') is provided with supports (18) in the form of cones for example which are inserted in the core (32) of the reel. During operation of the rewinding machine (not shown) including the decoiler (10), one or the other of the trucks (12,12') is withdrawn from the structure so that there can be positioned therein, and thus have available in advance, a replacement reel. The decoiling speed of the tape being particularly high, during the operating phase the noise level is quite high. To attenuate these noises the decoiler has on the front a transparent shield (22) in which is made only the slit (24) for passage of the tape coming to the rewinder, and other shields opposite the truck compartment, after the trucks have been withdrawn.

In particular said trucks (12,12') have rear bulkheads (26,26') designed to mate from the inside with the frame of the corresponding compartment when said trucks (12,12') are exposed. In this manner the noise level is held to quite tolerable and steady levels.

By keeping these trucks (12,12') alternately withdrawn it is possible to arrange a new replacement reel on the winder which, in any case, can operate with the other reel being unwound, thus reducing considerably the time conventionally required.

The operations which lead to preparation of a new replacement reel on one of the trucks (12,12') can be summarized as follows:

a) withdrawal of the truck and elimination of the core, if any, of the exhausted preceding reel;

b) placing of a new reel on the withdrawn truck opposite the supports (18),

c) insertion of the supports (18) in the opposite heads of the new core placed on the truck.

The truck bearing the new reel is then returned into the structure at the time the new reel is to be unwound or with some anticipation before exhaustion of the reel being unwound.

The decoiler (10) also comprises devices for connection of the tapes which allow further shortening of the time normally required fo this operation, and also to avoid recourse to application of a new transverse adhesive band at the splice in case the reels to be connected consist of tape adhesivized on one side.

FIG. 1 and FIGS. 3-6 illustrate a device for connection of the tapes.

It comprises members for stopping, moving, holding and cutting the tape being exhausted as described below.

In the figures is represented the moment when the tape has been almost totally unwound from the reel positioned on the lower truck (12').

In this situation the rubberized contact roller (30) is positioned substantially in contact with the core (32). The full reel (28'), in its original size as concerns diameter, is shown in broken lines in FIGS. 1 and 3. The decoiler is stopped and the upper truck (12), bearing the new reel (34) wound on the core (32') is pushed toward the inside of the structure. This operation can be performed before stopping of the decoiler if the new reel (34) finds ample housing in the decoiler (10), the lower reel (28) nearing exhaustion or completely exhausted. Adequate and known mating means (not shown) provide for stopping of the truck (12) and accurate positioning of the reel (34) so that the tape is placed precisely on the path of the existing tape. At this point there intervenes any known brake to stop the axle of rotation of the reel (28). Said operation is immediately followed by moving of a stopping roller (36), preferably rubberized, which moves from a position (36') away from the tape (38) to a position in contact with said tape so as to stop the tape (38) in a pincer movement against the counter-roller (40).

As may be seen in FIG. 1, the decoiler (10) is provided with rollers (42) and (46) and bars (44) and (48), both moving, arranged along the path of the tape (38).

The alternate positions which said members assume during the operation of decoiling of the tape (38) coming from one or the other of the reels are shown in broken lines and indicated by reference numbers (42'), (44'), (46') and (48').

There are thus two distinct operating units comprising substantially a roller (42,46) and a bar (44,48), both moving, leading to the upper reel (34) and lower reel (28) respectively.

Independent moving of each roller (42,46) and bar (44,48) can be performed by any known element, for example, the bars (44,48) can be moved by compressed air cylinders (60,62) and guided in their travel running along the sections (70) constrained to the structure of the decoiler (10). During said travel of the bars (44,48) the length of the tapes (38) is not changed and this is a fundamental aspect which makes it possible to avoid breaking of the tapes if too tight or swelling if too loose.

The alternate path of the tape or tapes (38,38') during the travel of the bars (44,48') and rollers (42,46) is illustrated in FIG. 1 with reference to the assembly leading to the reel (28). P indicates the path of the tape (38) during continuous decoiling while P' indicates the path of said tape (38) at the moment when the roller (42) and bar (44) are moved so that said bar (44) is arranged substantially in contact with the table on which the tape (38) runs. This operation is performed after the tape (38) being unwound from the reel (28) has been pinched between the rollers (36) and (40) and

after activation of the brake which stops rotation of the reel (28). The operation consists of arranging the various members to perform the splicing between the ends of the tape (38) decoiling from the reel (28) now nearing exhaustion and the initial part of the tape (38') coming from the new reel (34) already arranged on the decoiler (10). For this purpose the bars (44,48), one of which is shown in detail in FIG. 4, are provided with suction ducts (64) (see FIG. 3) so that inside said bars it is possible to create a vacuum, especially on the surface in contact with the tape (38,38') when it is on said bar.

Said surface, optionally covered with antiadhesive material such as polytetrafluoroethylene or the like, is provided with a plurality of holes (66) so that the tape (38), when on said holes, is sucked and held in position. To each bar (44,48) is constrained a blade (52) which extends longitudinally along the head facing the arriving tapes. Each of said blades is protected by a moving shield (54) preferably made of laminated plastic with rounded ends or such as to not interfere with the running of the tapes during decoiling. The shields (54) are arranged in such a manner as to prevent contact between the tape (38) and the blade (52) during decoiling of the tapes. When each of said shields is backed off, for example by means of general-purpose compressed air cylinders, one or the other of the tapes (38,38') goes into direct contact with the corresponding blade and is cut as shown in FIG. 5.

After positioning of a new replacement reel (34) on the decoiler (10) and stopping of the tape (38) by the rollers (36) and (40) and braking of the axle of the reel (28) being exhausted, the operations leading automatically to splicing of the tapes (38) and (38' are the following.

A) The roller (42) and the bar (44) are moved from the decoiling position (42',44') to the position in which they are in virtual contact with the table on which runs the tape (38) from the reel (28) being unwound. With this moving the path of the tape (38) changes from P to P'.

During this phase the device for creation of the vacuum inside the bar (44) is activated so that the tape (38) lying thereon is sucked and held in position of constant alignment.

B) After raising of the bar (44) the tape (38) goes into contact with the initial portion of the tape (38') of the new reel (34) which was preliminarily arranged on the pierced table of the second bar (48) and held there by a vacuum created inside said bar (48).

C) The tape (38) coming from the reel (28) and the tape (38') coming from the new reel (34) held by the bars (44,48) overlap, adhering to each other, since the lower side of the tape (38') is adhesivized. The tape (38) does not adhere to the bar (44) since it is coated with a nonadherent material.

D) The shield (54) of the bar (44) is backed off so that the tape (38) upstream of the finished splice comes into direct contact with the blade (52).

E) The roller (42) is backed off with preferably inclined return, as more fully explained below, and led back to the original position (42'). Said roller entrains the tape (38) which is thus cut upstream of the finished splice.

F) The bar (44), immediately afterward, is also backed off after exclusion of the vacuum until it resumes the original winding position (44').

G) The roller (46) and the bar (48) are in turn backed off until they reach the decoiling position (46',48') respectively.

In this manner there is completed automatic splicing between the end portion of the tape (38) decoiling from the reel (28) and the initial portion or head of the tape (38') decoiling from the new reel (34). The path followed by the tape (38') in the subsequent decoiling when the machine is reactivated is identical and opposite to that followed by the tape (38) of the reel (28) and indicated by P. The turns of tape remaining on the core (32) of the reel (28) after cutting will be removed together with the core while the truck (12') will be withdrawn to allow installation thereon of a new reel which, if necessary, will replace the reel (34) when exhausted.

FIG. 5 illustrates by way of example the tape cutting operation upstream from the splice. The tape, indicated by (38') if the reel reaching exhaustion is the top one, directly contacts the blade (52) due to backing off of the shield (54) while the tape indicated here by (38) unwinds from the new reel positioned below.

Since the cutting operation may require considerable force if performed simultaneously over the entire length of the tape, it is preferable that the backing off of the roller (46) take place with an inclined descent, as mentioned under para. E. This is made possible by separate activation of the members (e.g. compressed air cylinders) which regulate said backing off. The same applies of course for the roller (42) if the reel to be replaced is (28) as shown in FIGS. 1 and 3.

In this case, in the succession of operations the first operation is backing off of the roller (42) and bar (44) and subsequently exposition of the blade (52) constrained thereto and so forth.

There is another aspect to be considered relative to the tape cutting operation. It is possible that, after cutting, said tape will have a small raised tail due to raising above the blade. This situation is illustrated in FIG. 6 in which is seen the tail (68) of

the cut tape (38') slightly raised.

Since it is preferably that the tapes be coupled as accurately as possible and that the splice be well strengthened, the rubberized roller (36) is raised and returned to the initial position (36') only after the spliced tapes have passed and been compressed between roller (36) and roller (40) brought together, i.e. still in the position which pinching of the tape had produced in the tape arriving from the reel (28). In this manner, in addition to strengthening the splice, the result is achieved of perfect adhesion of the tail (68) of the cut tape (38') to the underlying tape (38) being unwound from the new reel. After completion of the splice as described above the decoiler (10) is activated first with reduced speed of feed, then at full speed.

As may be seen from the above, the advantages of the invention are clear and multiple. The decoiler is structured in such a manner as to operate continuously save interruptions, which are however limited to a few seconds, necessary for automated splicing of the tapes.

If the tapes are not adhesivized on one side, the union between them may be provided in the same manner with only the addition of a manual operation taking a few seconds for application of adhesive or biadhesive tape at the splice. Provision of superposed trucks bearing interchangeable tape reels which can be positioned with the machine operating substantially accelerates reel changing. In addition, the bars, which actually provide union of the ends, given the presence of a vacuum and their movement together with that of the associated rollers, contribute in a decisive manner to quick changing of the tape being unwound.

Finally, it is evident that many alternatives and variations to the device, such as in materials and dimensions, will be apparent to those skilled in the art in light of the foregoing description. Accordingly, the invention is intended to embrace all of the alternatives and variations that fall within the spirit and scope of the invention. For example, the vacuum bars can be replaced with rollers or other equivalent means. The cutting blades can consequently have a different configuration.

Especially with unadhesivized tapes, the above mentioned bars can also have, opposite the supporting side of the tape or tapes, a soft coating in the form of felt, for example, to reduce formation of prints on the tape at the suction holes. Said holes can also have an arrangement different from that shown in the figures or the shape of slits or slots can be arranged variously and alternately. The system for cutting the tape or tapes can also be changed, for example the use of a moving blade so that it can be exposed or retracted, in replacement of the protective shield.

Claims

1. Double decoiler connectable to cutting and rewinding machines comprising means of quick change of the reels being unwound and means of cutting the tape coming from the reels reaching exhaustion and splicing said tape with the tape coming from the replacement reel, characterized in that the quick change means for the reel being unwound comprise two trucks (12,12') mounted one over the other and running along guides (16) which extend outwardly from the decoiler (10), each truck (12,12') being provided with opposing supports (18) for insertion of the core (32,32') of each reel (32,34) and in that the tape cutting and splicing means are arranged at each truck (12,12') and each mean comprises a bar (44,48) and a cylinder (42,46) arranged along the path of the tape and moving to bring them near and away from the table on which the decoiling tape runs, said bars (44,48) being provided on the surface in contact with the tape with holes (66) or slits for air suction to hold the tape in adherence with said surface and one or more blades (52) extended longitudinally along the surface facing the tape or tapes and a shield (54) retractable and projecting in relation to the surface of said blade or blades.

2. Decoiler in accordance with claim 1 characterized in that each truck (12,12') is provided with a rear bulkhead (26,26') and the decoiler is proved at the front with a transparent shield (22) having a slit (24) for passage of the tape being unwound.

3. Decoiler in accordance with claim 1 or 2 characterized in that each truck (12,12') is provided with limit stops for accurate positioning of the reel on the same vertical axis in the two trucks and for alignment of the new tape being unwound with the existing one coming out of the slit 24.

4. Decoiler in accordance with any of the above claims characterized in that it comprises a stopping roller (36) moving from a position (36') away from the tape (38) being unwound to a position in contact with said tape in such a manner as to block said tape against a counter-roller (40).

5. Decoiler in accordance with any of the above claims characterized in that the rollers (42,46) and the bars (44,48) are moved by compressed air cylinders and run along sections

(70) fixed to the structure.

6. Decoiler in accordance with any of the above claims wherein the movement of backing off of each roller (42,48) takes place in an inclined manner in relation to the table where the tape runs, activating separately the roller moving members.

7. Decoiler in accordance with any of the above claims wherein the bars (44,48) are coated with an antiadherent material at least on the surface in contact with the tape (38,38').

8. Decoiler in accordance with any of the above claims characterized in that the shield (54) is moved by compressed air cylinders.

9. Decoiler in accordance with any of the above claims characterized in that the tape decoiling from the reel (28) reaching exhaustion is pinched between rollers (36) and (40) simultaneously with stopping of the rotation axle of the reel and preliminarily movement of the bar (44,48) and roller (42,46).

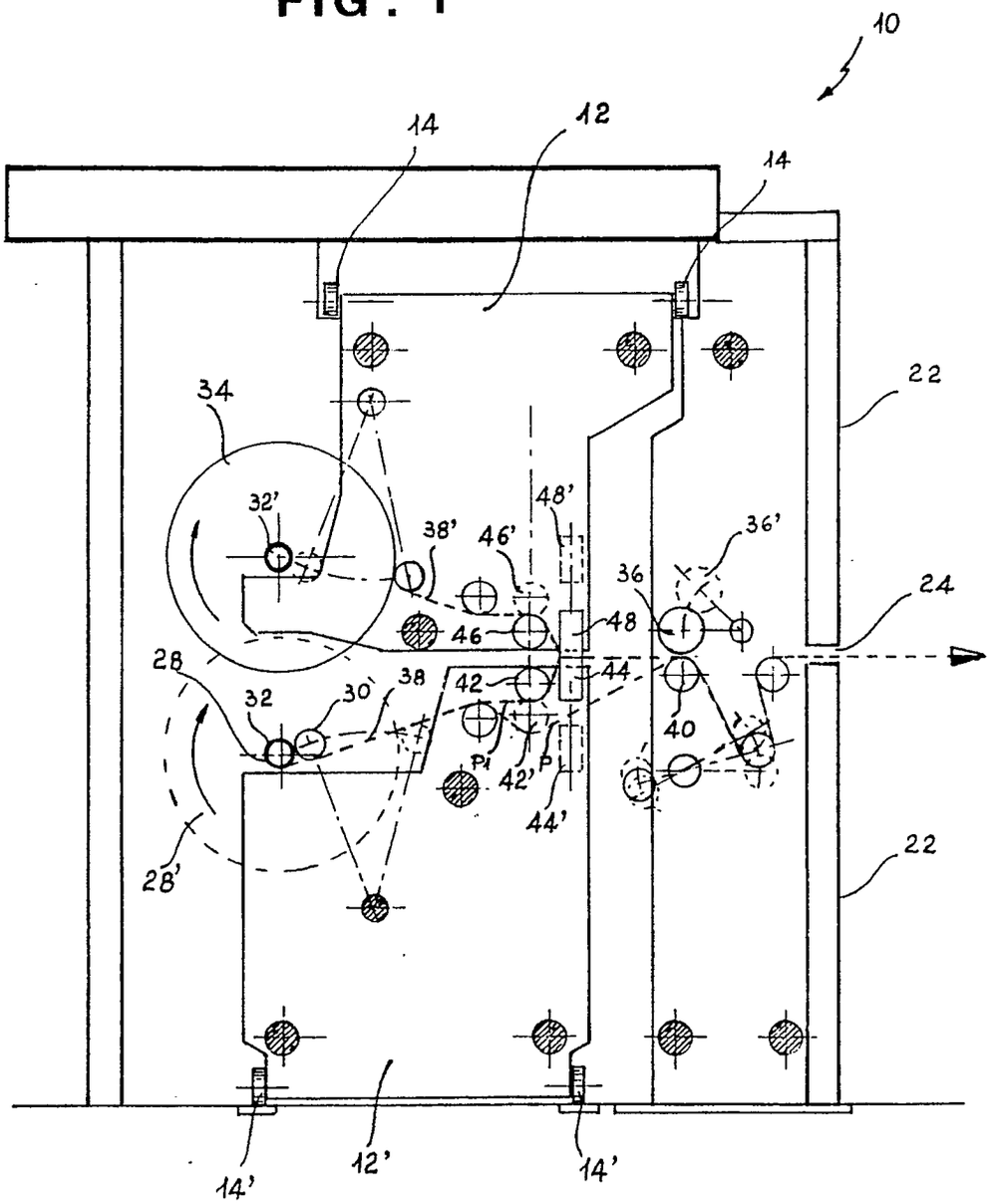
10. Decoiler in accordance with any of the above claims characterized in that the tapes (38,38') are sucked against the pierced surface of the bar (44,48) preliminarily to their splicing and to the approach of at least one of said bars and associated roller (42,46) to the running table.

11. Decoiler in accordance with any of the above claims characterized in that the bars (44,48) mutually approach the tape running table bearing on their pierced surface the tapes (38,38') of the reel nearing exhaustion (28) and the new replacement one (34) respectively and said tapes, held by the vacuum, overlap and adhere to each other.

12. Decoiler in accordance with any of the above claims characterized in that the blade (52) of each bar (44,48) contacts the tape (38,38') at the moment the shield (54) is retracted.

13. Decoiler in accordance with any of the above claims characterized in that the spliced tapes (38,38') are compressed by the rollers (36,40).

FIG. 1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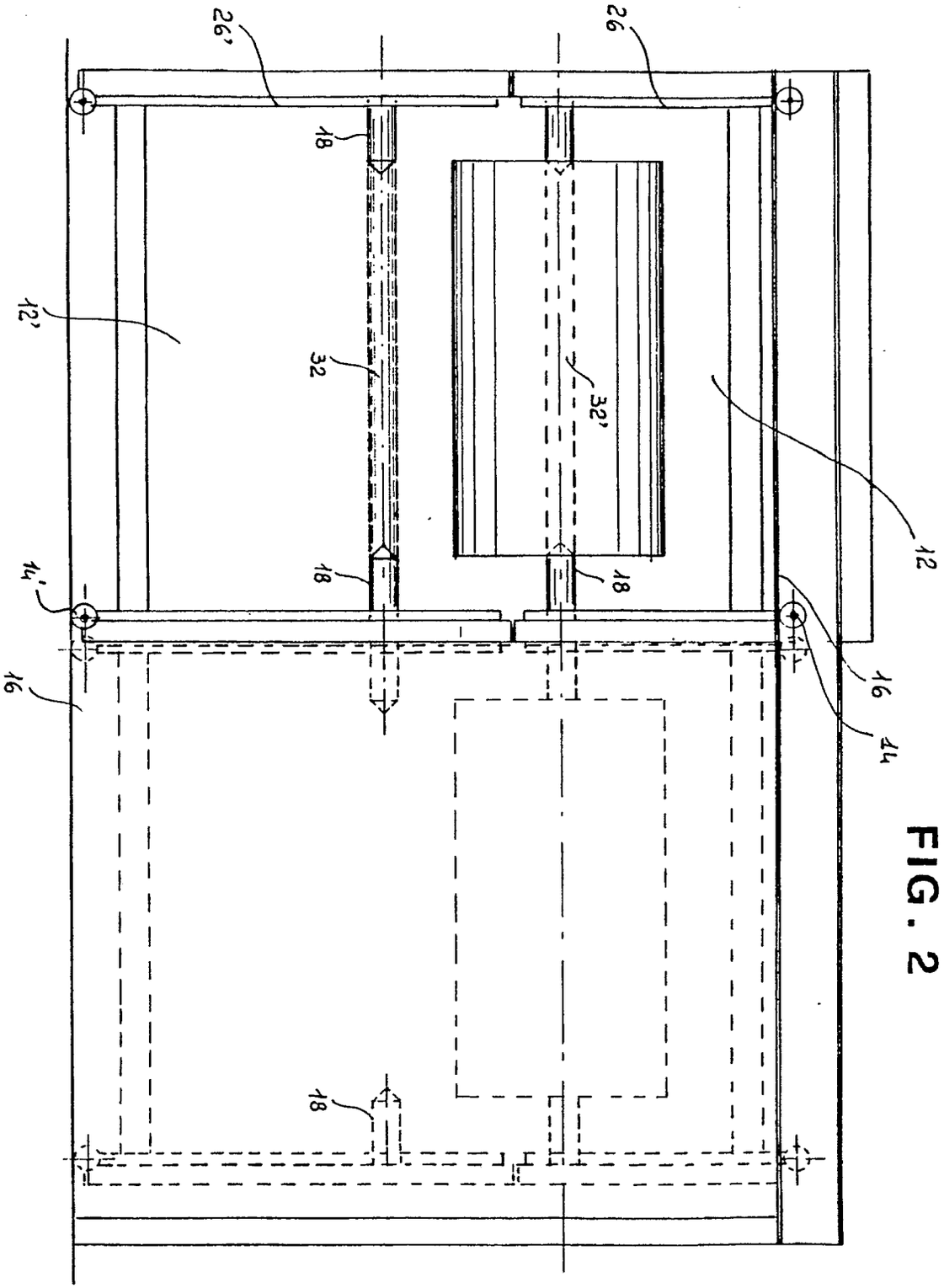
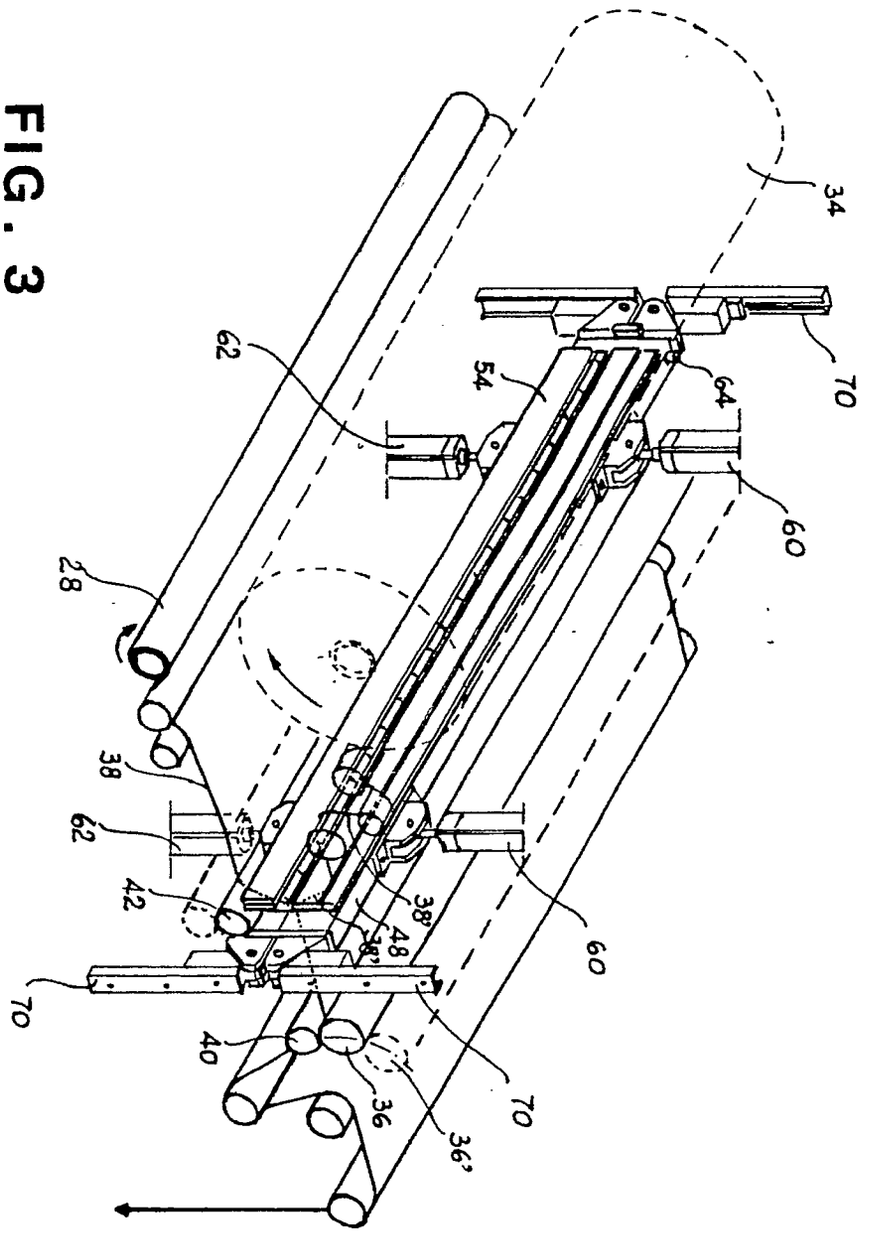


FIG. 2

FIG. 3



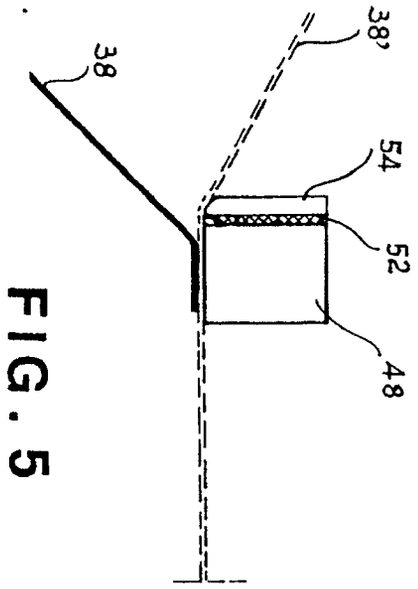


FIG. 5

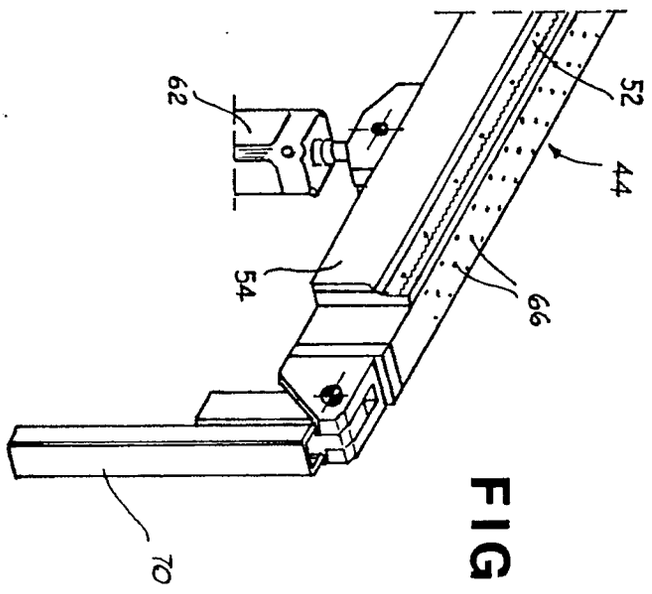


FIG. 4

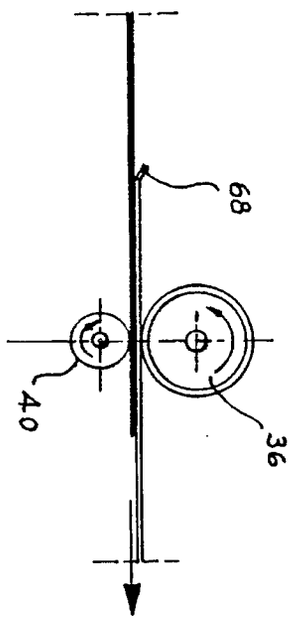


FIG. 6