

[54] **THREADING MECHANISM**

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[51] Int. Cl. **B65h 17/34**

[58] Field of Search 226/7, 97, 170, 172,
226/91, 95; 34/162; 162/287; 198/184, DIG.
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[56] **References Cited**
UNITED STATES PATENTS

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Primary Examiner—Richard A. Schacher
Attorney—Dexter N. Shaw et al.

[57] **ABSTRACT**

Threading mechanism for a treatment plant which includes a band of flexible material folded upon itself to grip the leading end of the web material, the fold being closed on the web material adjacent the entrance end of the plant and separated from the web material at the discharge end of the plant. The mechanism includes a guiding surface or roller positioned adjacent the discharge end having a profile to open the folded band more than 180°, along with a drive roller for pulling the band around the profiled surface. The mechanism also includes jet elements for positively engaging the web material being treated into the fold of the band prior to its re-entry into the chamber. In one embodiment of the invention the profiled surface and the guide roller are mounted a substantial distance below the exit and entrance rollers for the folded band.

9 Claims, 3 Drawing Figures

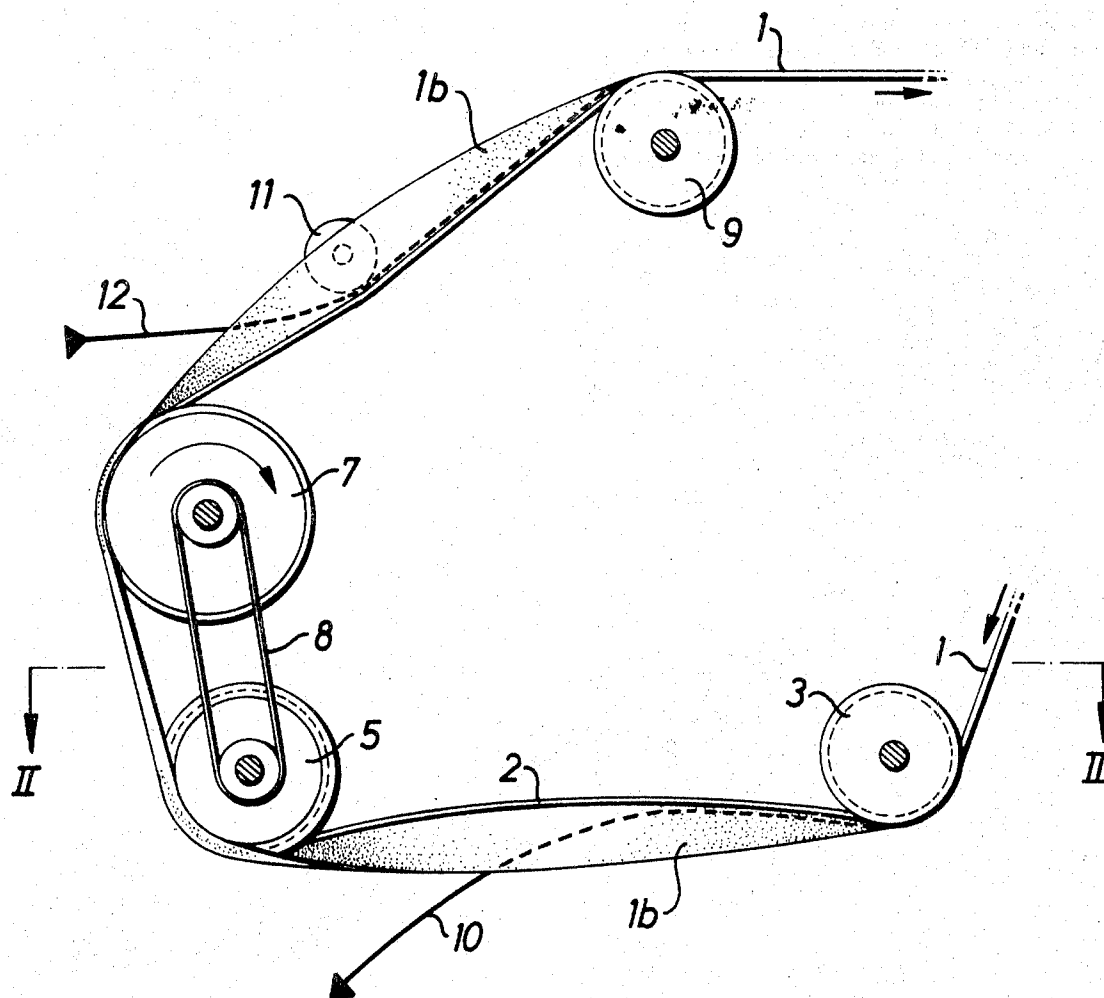


Fig. 1

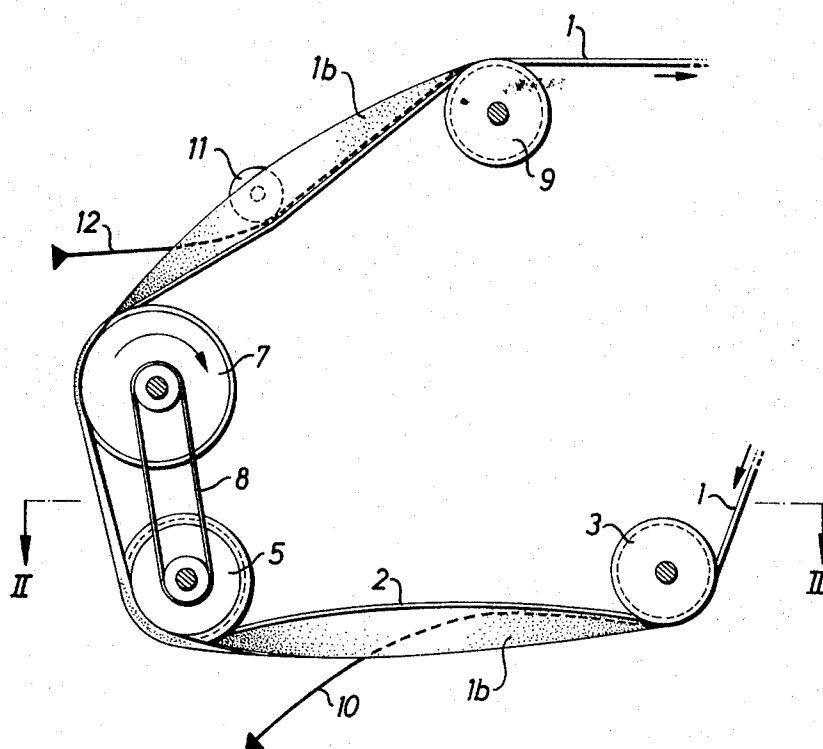


Fig. 2

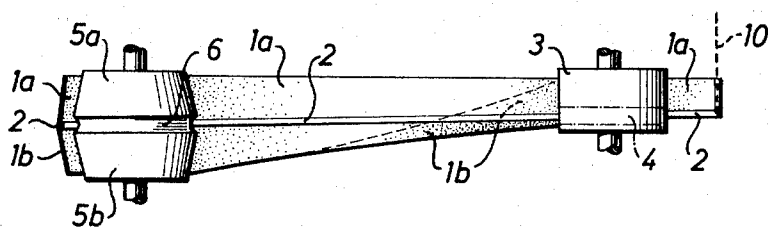
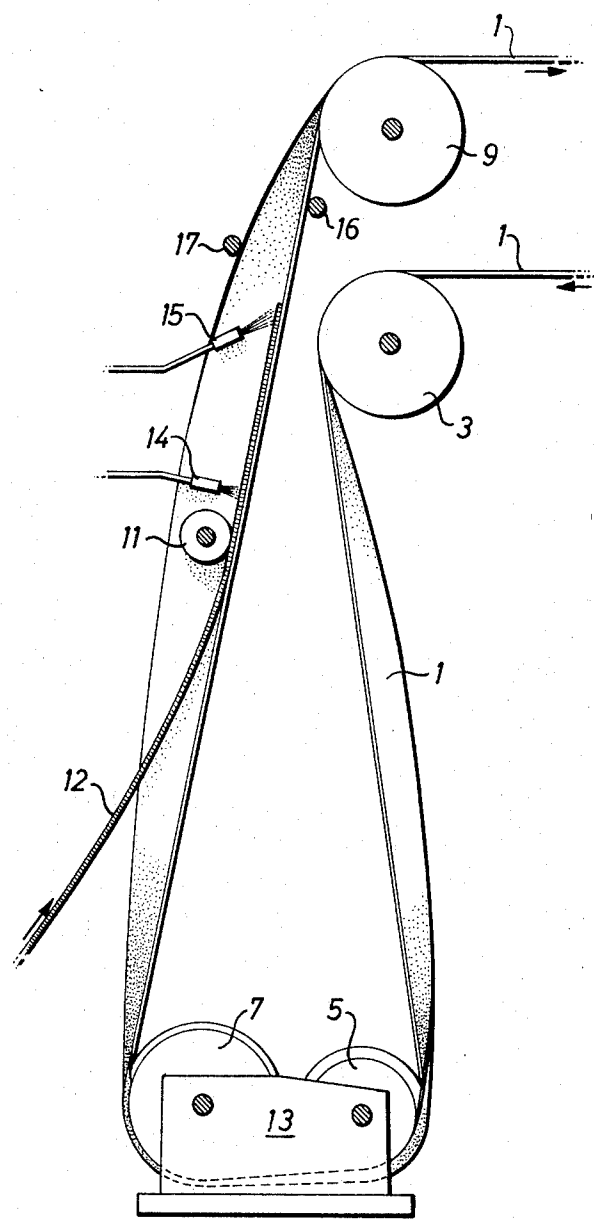


Fig. 3



THREADING MECHANISM

Web material adapted to a belt feeder, e.g., moist cellulose or paper material which is of considerable width and which is to be fed through a processing installation, e.g., a pulp drying machine with air blow-in, must initially be conveyed through the process installation's conveyor system by means of an auxiliary conveyor. The normal method to accomplish this is by first feeding in a small portion of the material or "strip" to the auxiliary conveyor, which is placed beside, albeit outside, of the actual conveyor path for the web material. For many years endless chains or wires have been employed in the auxiliary conveyor, between whose segments the strips have been secured or which has been equipped with special means of transport.

More recently there has been a proposal for an auxiliary conveyor having two main flat segments connected at their outermost edges with which the strips would be carried forward through the processing installation pressed tight between the segments. Should the web material consist of cellulose or moist paper, for example, it would be necessary, due to the poor tensile strength of the material, to take special measures for reliable feeding into, as well as discharge from, the conveyor. In practice these will require that the conveyor belt segments be separated for intake and discharge.

It has been suggested that the conveyor belt be opened by letting it pass from a first roller, over which the belt passes folded, to a following cylindrical roller, which is placed some distance away, over which the belt passes completely unfolded. According to this proposal the longitudinal direction of the belt will form an angle with the axis of the roller for the purpose of effecting a definite opening without the formation of wrinkles. It is realized, however, that in the process the belt will bear in helical form against a portion of the roller jacket surface, and this in its turn must cause side thrust on the belt thereby resulting in play along the longitudinal direction of the roller, if special measures are not taken. In practice the proposed device will, therefore, be unreliable at relatively high speeds and when using rigid belts; moreover, spatial requirements would be considerable.

In the case of the present invention as indicated in the characterization of the main claim, the device for opening the belt is instead constituted and arranged so that this procedure requires that the belt, from its folded conveying position, be spread apart more than 180° over a guiding surface or guide roller.

In accordance with the operational design of the invention presented here a guide roller is used. This roller is connected with the following roller in such a manner that the periphery speed of the guide roller is less than that of the following roller. This has proved to contribute significantly to the functioning of the device, and the guide roller can be said to "force" the belt parts to separate without the risk of wrinkles.

Normally the parts of the belt can be connected by means of a strong seam or bulb, and as seen in another operational design of the invention, at least the guide roller is provided with a guide track suitable for the seam or bulb in order to effectively fix the belt against lateral play on the guide roller.

These and other distinguishing specifications of the invention, as well as advantages connected thereto, will

be presented in more detail in the following description and drawings.

Accordingly a more detailed description of the invention and an accompanying skeleton drawing showing an operative model of the device in accordance with the invention are presented in the following sections.

FIG. 1 shows the device as seen from the side, while

FIG. 2 shows the device in FIG. 1 as seen from above at section II—II,

FIG. 3 shows likewise as in FIG. 1 an operative model with vertical upward feeding.

From the processing installation, e.g., pulp drying machine (not illustrated), the endless belt 1 comes out folded. Belt 1, which is preferably made of a strong, woven textile material with little elasticity, consists of two segments 1a and 1b which are essentially the same and which at one edge are joined by a strong seam or bulb 2. The invention requires that belt 1, moving toward the device, in order to separate the segments, continue over a cambered roller 3 which may have a track 4 at one of its edges for seam 2.

At an interval from roller 3 is a guide roller 5, which in accordance with the invention is designed with peripheral track 6 in the centre section for seam 2 and which on both sides of track 6 is designed with outwardly tapering sections 5a and 5b, which together from guide surfaces for "forcing" apart segments 1a and 1b. It is desirable that sections 5a and 5b are completely conical as indicated in the operative model with a 15 percent inclination. As regards pulleys for driving belts, a similar procedure is employed to keep the belt centred and the degree of tapering or convexity is usually given as the camber of the pulley. To the extent that the guide surfaces for separating the segments in the case of the device under invention are of pulley-like construction as with roller 5, this is indicated by guide track 6 for the seam or bulb, as well as by the fact that its taper is considerably greater than is the case with normal pulleys. Thereby, parts 1a and 1b, having formerly been virtually parallel to one another, as seen transversely before pulley 3, will gradually be separated by more than 180°.

After roller 5 follows another roller 7 with a greater diameter and considerably less taper. It is preferable that roller 7 be directly driven by the conveyor belt, although it may also be motor-driven. In either case a unit must be fitted between roller 7 and roller 5 which is constructed and adapted in such a way as to ensure a certain tension in the belt between rollers 5 and 7. Such tension is essential to the intended function of the device, i.e., so that the belt definitely opens. As seen in the special operative model of the invention presented here, there is a chain- or belt-driven transmission between rollers 5 and 7, and the transmission gearing is selected, in relation to the diameter of the rollers, so that roller 5 has a circumferential velocity that is 10–30 percent lower (preferably 20 percent lower) than that of roller 7. However, the invention is not restricted just to that speed ratio, and it is impossible to provide general rules for the dimensions of the device, since this will be determined to a great extent by the rigidity, breadth and elasticity of the belts, as well as by the belt velocity. The details presented here should, therefore, be considered primarily as guidelines for a typical operative model of the invention for feeding cellulose strips through a pulp drying machine.

In order to bring together segments 1a and 1b of the belt, it is essential to provide a sufficient interval between roller 7 and the next roller 9, which can very well be like roller 3, so that the belt has space in which to come together. To guard against defects in the belt or irregular operation, guide pins 16 and 17 (showed in FIG. 3 but not FIGS. 1 and 2) are appropriately placed to brush against the belt and when necessary to prevent the belt from folding in the wrong way.

Where the belt segments separate between 3 and 5, pulp strip 10 can be released from engagement between parts, 1a and 1b.

Feeding the pulp strips into the device as invented can be easily accomplished, i.e., by placing roller 11, the periphery of which is in contact with the inside of segment 1a, in the interval between rollers 7 and 9. Pulp strip 12 is fed in between the roller and the belt segment and finally at roller 9 is firmly secured between the two belt segments. Special note should be made of the fact that with the invented device the interval between the feeding point and roller 9 can be relatively great and under all circumstances should be sufficient to avoid any risk in case of manual feeding of pulp strip 12. Even if someone's hand should come between roller 11 and belt segment 1a while feeding in the pulp strips, there is no risk of injury as the contact pressure between the belt part and the roller is low, and the distance to the real nipping point at roller 9 is so long that there would be no difficulty in removing the hand in the space after roller 11.

For the sake of illustration, the discharge point is shown in direct connection with the feeding point, but it should be understood that in practice these two points are usually much further apart from each other, in particular so that an arrangement analogous to rollers 5 and 7 opens the belt at the discharge point, in order again to close the belt and allow it to go folded to the feeding point before which there are likewise installed rollers 5 and 7. For the expert, however, all this is simply a matter of adjustment and not per se essential to the invention.

The device of the invention has in practice proved itself to be especially suited for what is known as "vertical feeding" of pulp strips, which allows for a more compact construction of the installation, and consequently considerable savings. With the type of paper dryers using the air drying method whereby air is blown in for drying, it is advisable to have the drying installation relatively high and narrow. In the case of the device under invention, however, it is important that the free interval between the rollers where the belt divides and comes together is relatively great; the normal distance is 2 metres.

In FIG. 3 is shown a schematic construction of the belt feeding device as invented for vertical feeding. The same designations as in FIGS. 1 and 2 have been employed, but the proportions between the individual parts of the machine are more satisfactory as a practical operative example of a feeding device for the strips on a belt in accordance with the invention for verticle feeding. The total height of the device can be in the range of 2 metres, while it is possible to limit the width to approximately ½ metre. Rollers 5 and 7 can sit very close together, preferably in the same holding frame 13, which should be appropriately fastened to a baseplate or the floor. The prominent feature of the device, as seen in FIG. 3, is the almost verticle orientation of

the belt at the feeding point. In such a manner for which there are no further details here and which per se is not the object of the application, the strips are fed mechanically or manually between the belt segment 1a and roller 11. To prevent the strips from loosening from the belt before it comes into contact with roller 9, it is recommended in the presented operative model of the invention that pneumatic jets 14 and 15 be adjusted so that the first pneumatic jet 14 is placed virtually at right angles to the belt at roller 11, while the following pneumatic jet is placed nearer roller 9, where it should be inclined upwards toward the roller. With these jets it is possible for short periods or continuously to blow compressed air onto the belt when pulp strips are being fed in, thereby causing the strips to be pressed against the inner side of belt segment 1a in order to keep the strips from loosening from it.

To ensure that belt 1 folds correctly over roller 9, the operative example provides rods 16 and 17, which are in contact with the outer surfaces of segments 1a and 1b and guide the segments together at the angle intended.

In conclusion, it is not intended that the invention be restricted to verticle feeding. This method of feeding can be used with almost any angle desired between belt 1 at the feeding point and the horizontal plane. Of course, it will be obvious to the expert that the described method of using compressed air in conjunction with FIG. 3, whether verticle or other feeding is used, can be modified in many ways. Naturally it is possible to modify the device as described in other respects and adapt it to various applications as required without deviating from the following patent claims for the indicated invention.

We claim:

1. Device for feeding web material through a processing installation by means of a folded conveyor belt (1), which runs along at the side of the haulage way and which consists of two essentially flat segments (1a and 1b) joined at their outermost edges (2) and has means to separate the segments at the points where the strips are fed in and discharged, as well as means to bring the segments together again following feeding and discharge, wherein the means for opening the belt (1), consists of a guiding surface (5), having such a profile (camber) and located at such a considerable distance from the preceding roller (3), over which the belt proceeds folded, that the belt opens more than 180° from its folded condition, and a direct following driven roller (7) with significantly less camber.

2. Device, according to claim 1 wherein the surface is comprised of a guide roller (5) for opening the folded belt (1), the guide roller (5) and the following roller (7) being joined by means of a transmission (8) constructed and positioned so that the peripheral speed of the guide roller is less than that of the following roller (7).

3. Device, according to claim 2, in which both segments (1a and 1b) of the conveyor belt are connected along the edge by means of a strong seam or bulb (2), wherein the guide roller (5) is designed with a guide track (6) for the bulb (2).

4. Device, according to claim 1 wherein at considerable distance from guide surface and the following roller, another roller (9) is arranged over which the belt (1) is to pass folded and including between the lat-

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ter two rollers a unit (11) adapted to facilitate feeding of the strips of web material (12).

5. Device, according to claim 4, wherein the unit to facilitate the feeding of strips consists of a rotary roller (11), which is journaled in bearings and the periphery of which is in contact with the inner surface of the belt segment (1a), which passes practically untwisted through the device.

6. Device, according to claim 4 wherein the belt moves practically vertical at the point where the strips are fed in and including elements (14 and 15) placed after the feeding unit in order to ensure that the web material (12) which is fed in follows the belt until it comes together.

7. Device, according to claim 6 wherein said elements comprise pneumatic jets (14 and 15), which are

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adapted to blow the strips of material (12) against the lower belt segment and/or to blow the strips in the direction of the place where the belt comes together.

8. Device, according to claim 2 including a frame unit (13) mounting the guide roller (5), the following roller (7), and the transmission (8) separate from the processing installation and secured to the floor or to a low-level machine foundation.

9. Device, according to claim 8, wherein the exit and entrance rollers for the folded belt in the processing installation are placed in proximity of one another but at considerable distance from and directly above, the frame unit (13), whereby the belt is opened as it runs downwardly to said frame unit and is closed as it runs upwardly away from said frame unit.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,759,434 Dated September 18, 1973

Inventor(s) Lindstrom; Citron; Nelenius; Karlsson and Rosby

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading and in the listing of the inventors,

"Lindstrüm" should be --Lindström--;

In the heading, the address of the inventor Karlsson should be --Vaxjo--;

In the heading, the name of the Assignee should be

--Aktiebolaget Svenska Flaktfabriken--;

In the heading before [52] U.S. Cl., the following should be added:

[30] Foreign Application Priority Data

November 1, 1971 Sweden.....13 867/71

Column 1, line 45, "considerab" should be --considerable--;

Column 2, line 17, "stlong" should be --strong--.

Signed and sealed this 12th day of February 1974.

(SEAL)
Attest:

EDWARD M. ELETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents