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Marchal

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[45] **Jan. 2, 1973**

[54] **TREATMENT OF CONTINUOUS SHEET MATERIAL**

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[73] Assignee: **Midland-Ross Corporation,** Cleveland, Ohio

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Related U.S. Application Data

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[52] **U.S. Cl.**.....**24/252 R,** 34/120

[51] **Int. Cl.**.....**F26b 13/06,** A44b 21/00

[58] **Field of Search**...24/248 SB, 252 R, 243 K, 243 N,

24/252 CD, 252 T, 252 PC; 162/255, 193; 34/120

[56] **References Cited**

UNITED STATES PATENTS

644,114	2/1900	Venen	24/243 N UX
1,300,482	4/1919	Petranich	24/243 N X
2,476,635	7/1949	Southwick	24/252 R

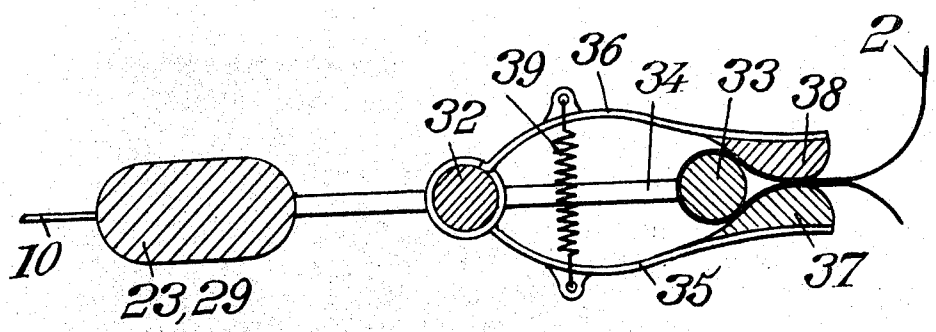
Primary Examiner—Donald A. Griffin

Attorney—Alfred L. Patmore, Jr.

[57] **ABSTRACT**

This disclosure pertains to a multi-pass web-treating apparatus particularly adapted for drying a paper web. The web is transferred between passes or zones by turning rolls. A threading device associated with the dryer utilizes turning sheaves which are associated with each turning roll over which at least one threading rope or tape travels. An attachment device is fixed to the tape to hook or unhook the end of a paper web to be threaded through the dryer.

1 Claim, 11 Drawing Figures



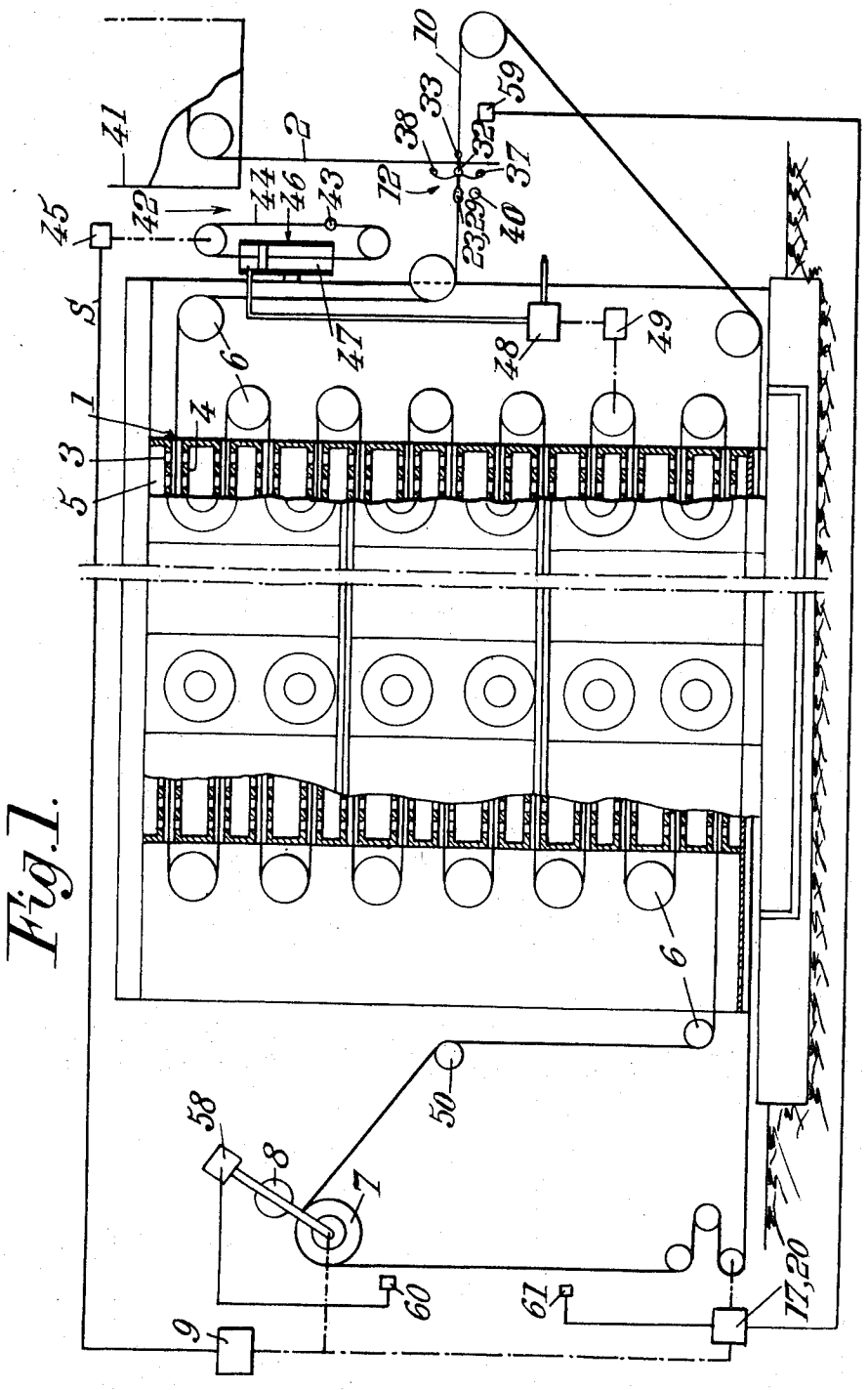

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17,20

Fig. 1.

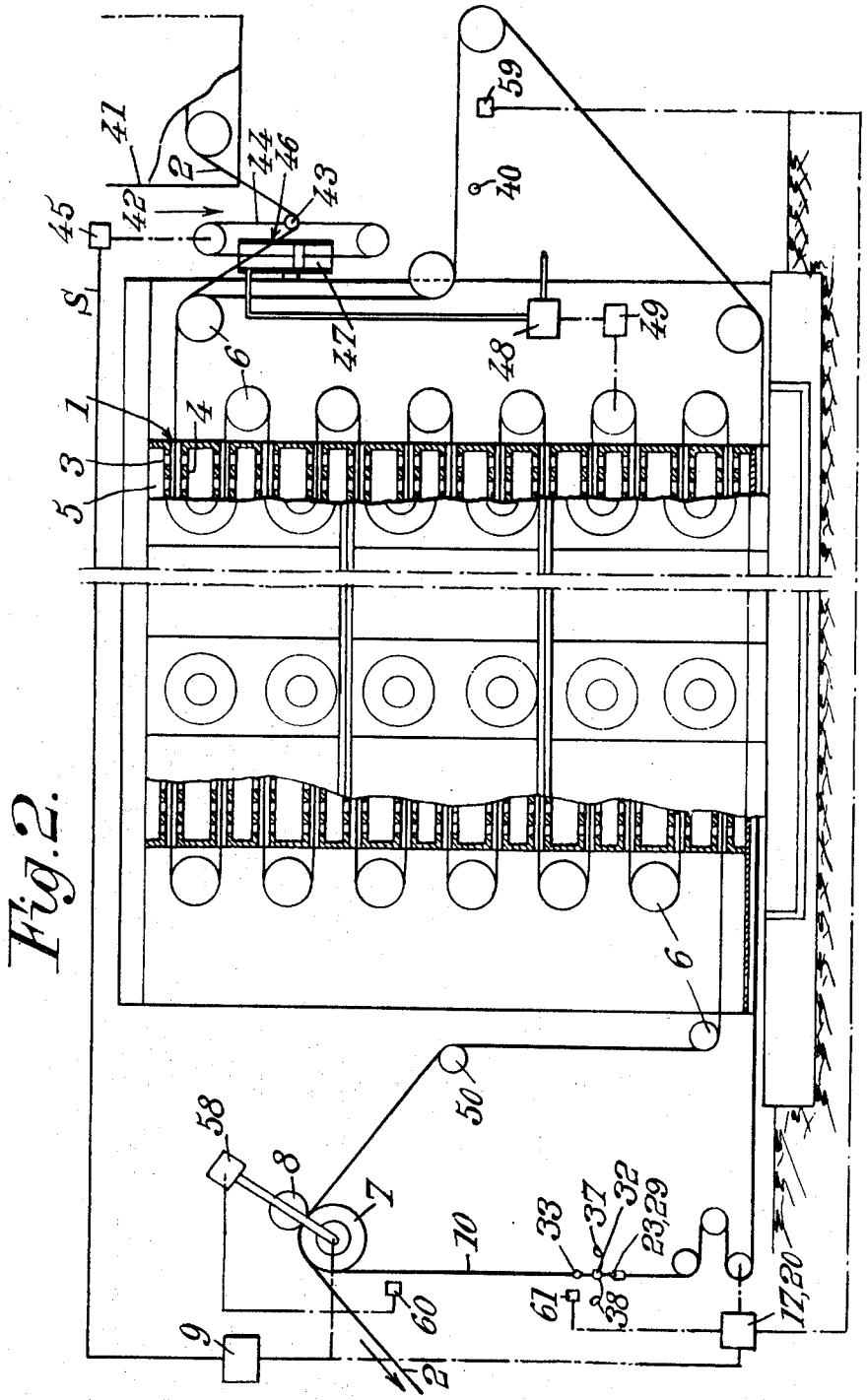

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Fig. 2.

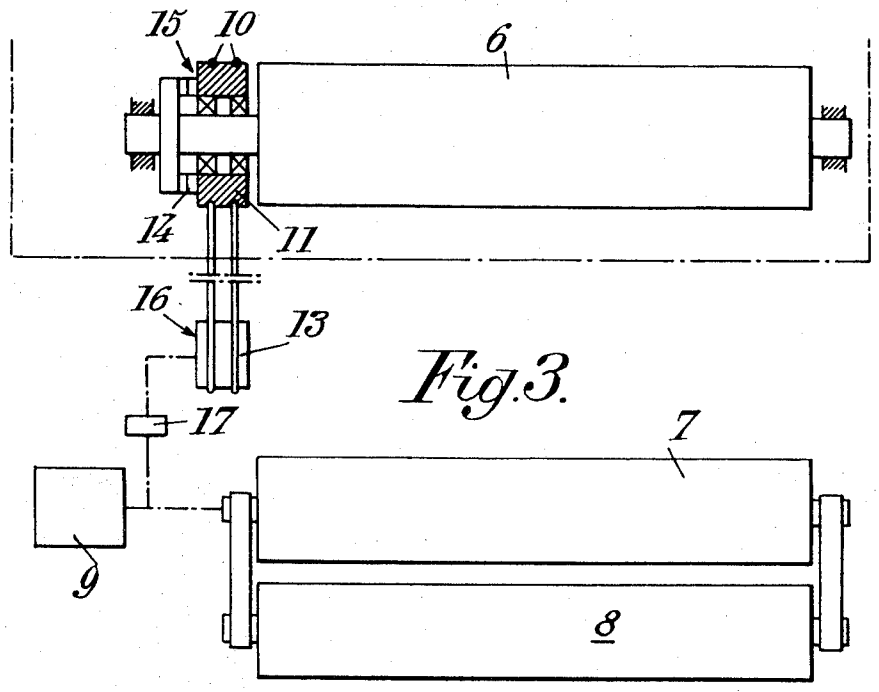


Fig. 3.

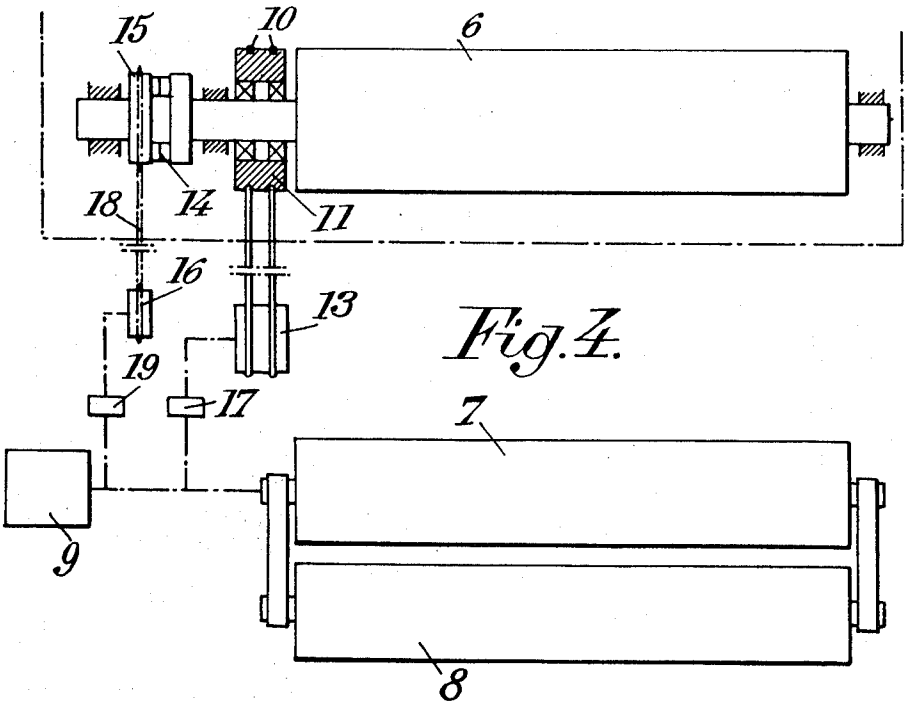


Fig. 4.

Fig. 5.

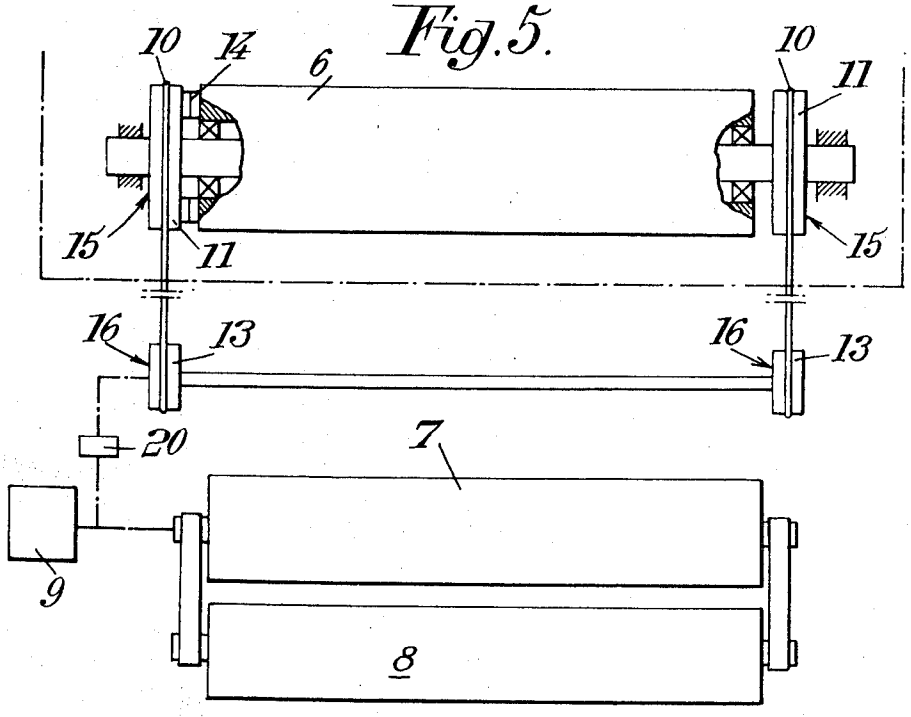
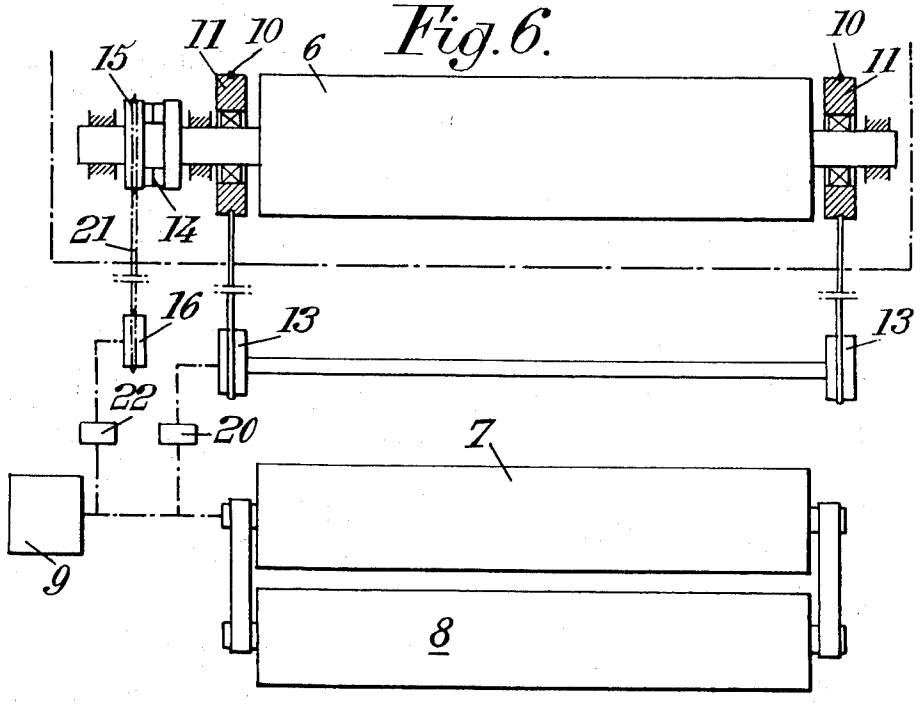

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Fig. 6.


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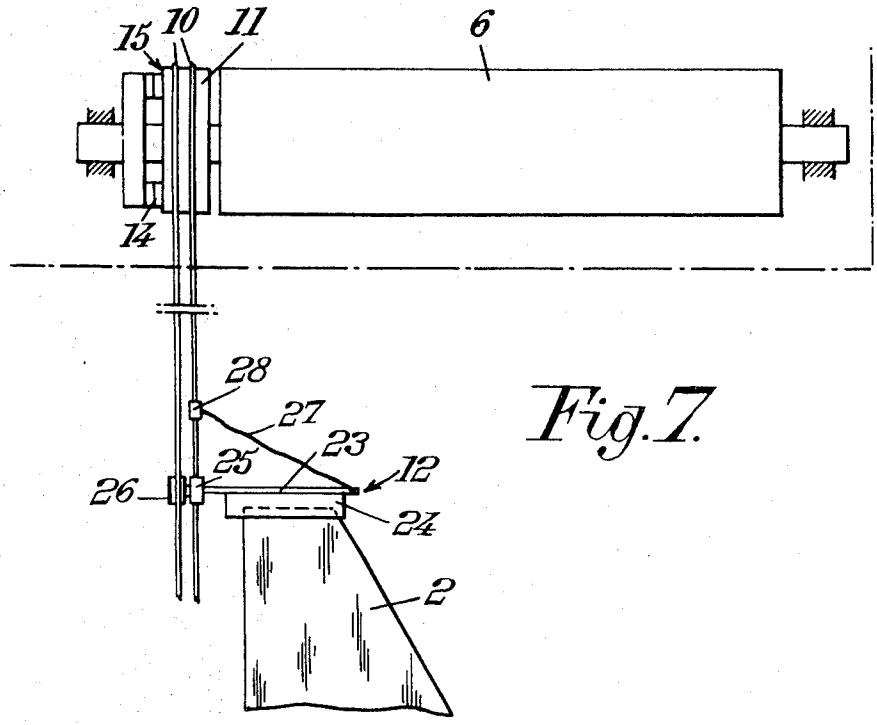

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Fig. 7.

Fig. 8.

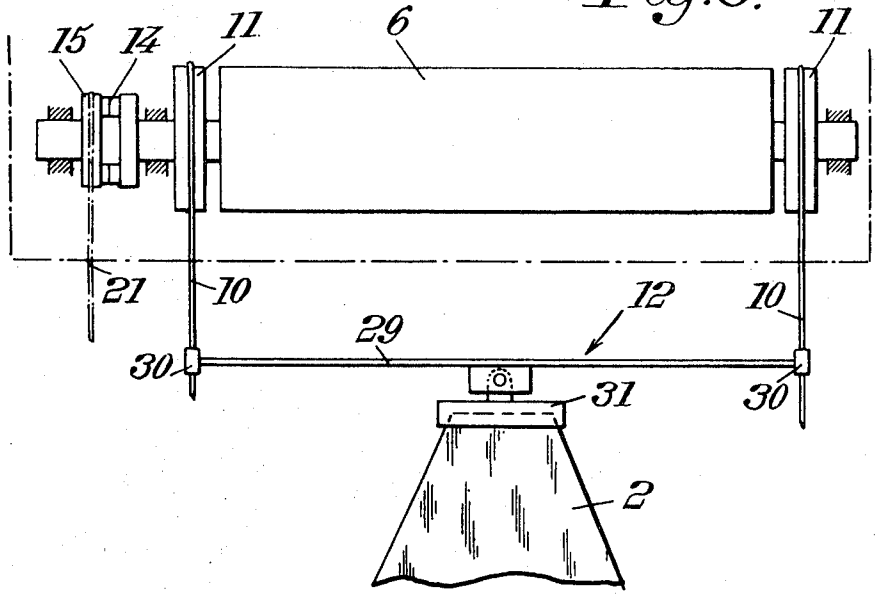

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Fig. 11.

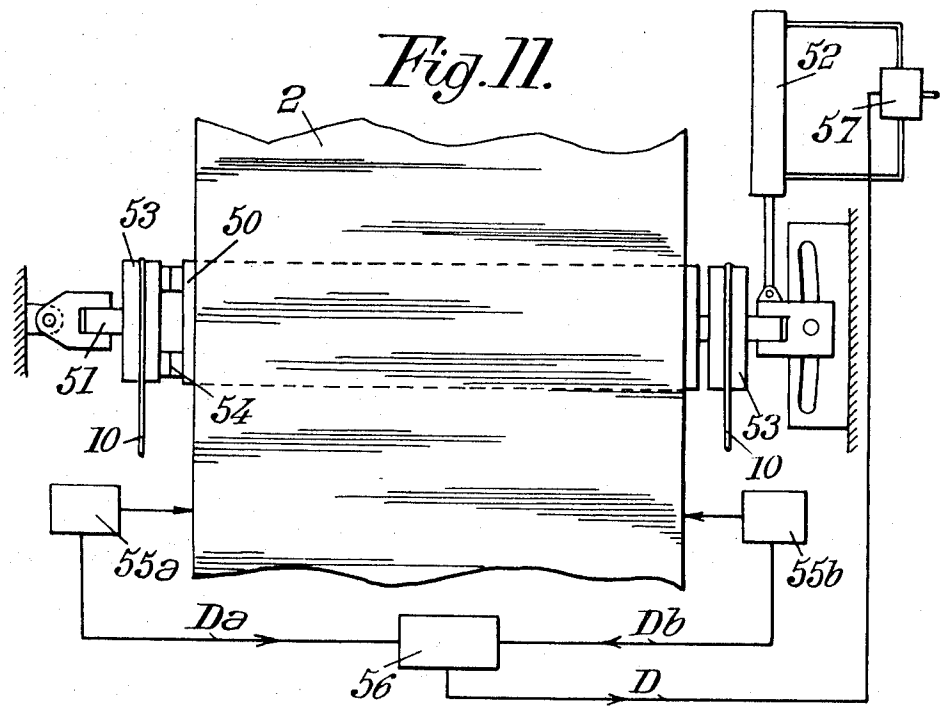


Fig. 10.

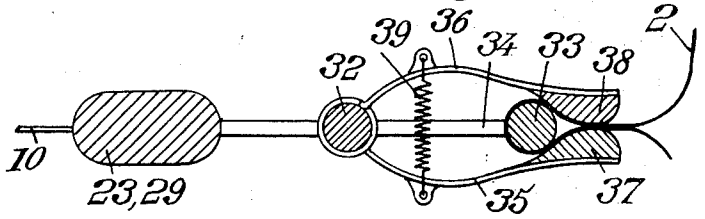
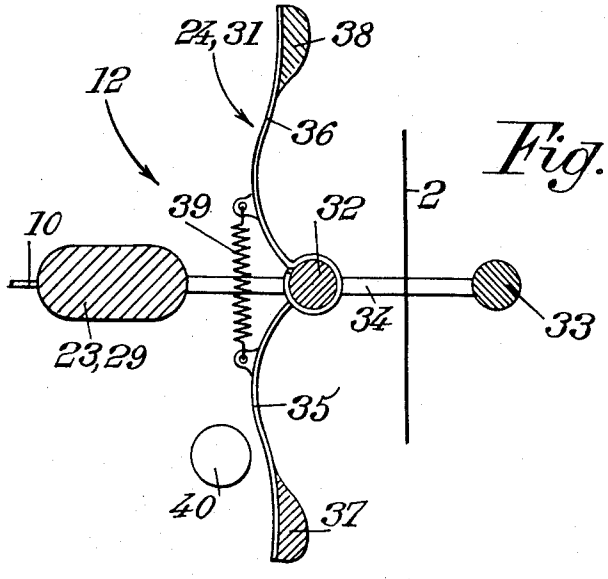


Fig. 9.



TREATMENT OF CONTINUOUS SHEET MATERIAL

This application is a division of application Ser. No. 886,835, filed Dec. 22, 1969 and now U.S. Pat. No. 3,643,343 issued Feb. 22, 1972.

This invention is related to apparatus for physically, chemically or physically and chemically treating web products in gaseous atmosphere, and in which the product web is supported in the treatment zones by air jets escaping from orifice or nozzle headers or plenums located in each zone. The invention is more particularly related with the drying of web products.

In the field of web drying, there have been many new developments in horizontal pass dryers wherein a gaseous fluid serves as the aerodynamic carrier for the product web as well as the drying agent, this type of dryer is commonly referred to as a "floater." Such installations are well known and their principle is described as in the French Pat. No. 1,398,809. Many web treating apparatuses and most web dryers have several zones which can be horizontally or vertically oriented. These zones are generally parallel-mounted having turning rolls to reverse the web direction from one zone to the next. The web travels from the exit of one zone to the inlet of the following zone by making a change in direction of 180° around turning rolls. During the operation of a typical "floater" dryer, the product web is supported and conveyed by the aerodynamic flow of gaseous fluid in the different treating zones and by mechanical effect of the turning roll outside of the treating zones. The web is normally pulled through the dryer or other web treating apparatus by an extracting mechanism generally made of two pinch rolls in between which the web is fed; one of these rolls is generally driven by a motor.

In order to start the operation of such a device, it is necessary to thread the web being treated therethrough. While it has been common to manually thread or guide and feed the web from the entrance of the first zone or pass to the last zone where the product web is then introduced into the extracting mechanism, it is an object of this invention to motorize this threading operation.

It is, therefore, a primary object of this invention to provide an improved motorized or automatic system of threading web treating apparatus in order to effectively operate in conjunction with associated equipment such as rapid cutting devices which allow the cutting of the paper web introduced to the web treating apparatus.

To accomplish this primary object of this invention, I utilize at least one endless band or belt traveling on as many turning sheaves as turning rolls, each of these sheaves being coaxially mounted with an associated turning roll and having substantially the same diameter as the turning roll. This endless or continuous band or belt may take the form of an endless cable, rope, chain, tape or the like. As hereinafter used herein, such endless band or belt shall be generically referred to as a tape.

Also attached to this endless tape is a device mounted at 90° with the endless tape which is capable of attaching then detaching the end of the product web which must be threaded through the treating apparatus.

Driving means is also provided for driving the endless tape at a speed commensurate to the time during which the product web must be exposed to the treating zones of the apparatus.

There is also provided a clutch of the free-wheeling or over-running type which is installed between each turning roll and a driving wheel. The driving wheel may itself be the turning sheave driven by the endless tape driving means or it may be a separate driving wheel driven by a secondary driving means synchronized with the first mentioned driving means. The direction in which these clutches transmit the movement is such that the surface or peripheral speed of each turning roll is equal to the linear speed of the endless tape or, if required, the peripheral speed can be greater than the linear speed of the endless tape. It can be easily seen that when the attachment device travels around a turning roll, it travels at the same linear speed as the cylindrical surface of the turning roll, but when the product web passes around a turning roll, the product web might travel at a linear speed which is greater than the linear speed of the endless tape and thus communicate this linear speed to the cylindrical surface of the turning roll. Such increase in linear speed of the product comes from the longitudinal shrinking introduced by the drying treatment to the product web. Allowing the product web to travel at a greater speed than the speed of the endless tape allows a free transmission of the tension of the product web towards the inlet of the apparatus.

This invention has other objects and mechanisms for accomplishing them which are used in conjunction with the foregoing apparatus as will be discussed more in detail later.

The following description is directed specifically to the drying of product web where the fluid provides aerodynamic floating of the product web as well as drying it. It will be obvious to the skilled artisan that this apparatus and the principles of operation thereof and their equivalents apply to other web treating systems.

The invention will be understood better by using the following description together with the drawings. These descriptions and drawings are related to preferred mode of realization but are not limited to these modes.

FIG. 1 is a schematic elevation partially in section wherein the different elements of this apparatus are shown in a position before the threading of the web to be treated in the apparatus;

FIG. 2 is similar to FIG. 1 but showing the different elements in a position once the web is threaded through the apparatus;

FIG. 3 is a schematic view of a portion of the apparatus shown in FIGS. 1 and 2 illustrating a first embodiment of the invention;

FIG. 4 is similar to FIG. 3 illustrating a second embodiment of the invention;

FIG. 5 is similar to FIG. 3 illustrating a third embodiment of the invention;

FIG. 6 is also similar to FIG. 3 illustrating a fourth embodiment of the invention;

FIG. 7 is a partial view of the apparatus shown in FIGS. 3 and 4;

FIG. 8 is a partial view of the apparatus shown in FIGS. 5 and 6;

FIG. 9 shows a section on an enlarged scale of an improved web engagement means, the engagement means shown in pre-threading, stopped position;

FIG. 10 is similar to FIG. 9 showing the engagement means in a moving position; and

FIG. 11 is a plan schematic view showing a particular arrangement of the invention.

Referring to FIGS. 1 and 2, several parallel treatment zones are shown in which the paper web is supported by the aerodynamic effect of many air jets issuing from orifices 3 mounted in wall 4 of the header or plenum 5, these headers being installed throughout the treating zones. Turning rolls 6 are installed to support the paper web when it passes from one zone to the other. The web 2 travels from the exit end of one zone 1 to the entering end of the next zone by making a change in direction of 180° around the turning rolls. Other turning rolls 6 can be placed at the entering and leaving end of the apparatus. When the apparatus is in operation, the web 2 is supported by the aerodynamic effect of the air jets in the different zones and by the mechanical effect of the turning roll 6 outside of the zones. The web 2 is extracted from the treating zones by an extracting mechanism having two pinch rolls 7 and 8 between which the web travels. At least one of these rolls is driven, for example, the pinch roll 7 may be driven by drive motor 9.

Referring also to FIGS. 4–8, there is provided at least one endless tape 10 traveling over as many turning wheels or sheaves 11 as turning rolls 6, each of these turning sheaves 11 being installed at the end of the corresponding turning roll and having the same basic diameter as the corresponding turning roll.

An attachment device 12 is affixed perpendicularly to this endless tape 10, and the attachment device is capable of hooking and unhooking the end of the paper web 2 which must be threaded through the treating zones 1. There is a primary or first driving means 13 provided to run the endless tape 10 at a speed corresponding to the time during which the paper web must be exposed to the treating zones 1 of the apparatus. There is also a clutch of the free-wheeling or over-running type installed between each turning roll 6 and a corresponding driving sprocket 15. The driving sprocket 15 is driven by secondary or second driving means 16 which is synchronized with the above mentioned primary driving means 13. The direction in which clutch 14 transmits the movement is such that the peripheral speed of the turning roll 6 is normally equal to the linear speed of the endless threading tape 10, but this peripheral speed can become greater if necessary. It can be readily understood that when the attachment device passes around a particular turning roll 6, it travels at the same linear speed as the outer surface of the turning roll 6, but when the paper web goes around the turning roll 6, this web can be going at a linear speed which is faster than the linear speed of the threading tape 10, and the linear speed of the web is communicated to the outer surface of the turning roll 6. Such an increase in linear speed from the paper web comes from the longitudinal shrinkage due to the drying of the web.

This freedom of the paper web to run at a greater speed than the speed of the threading tape 10 permits an unrestrained transmission of the tension of the web from the point of its attachment to the attachment means 12 towards the inlet of the apparatus. To accomplish this purpose I can advantageously use two embodiments of the invention respectively illustrated in FIGS. 3 and 4 wherein only one threading tape 10 is used which is located at one end of the turning roll 6, this endless tape 10 is made of a double cable.

In the embodiment illustrated in FIG. 3, each driving sprocket 15 is actually the turning sheave 11 itself, and the clutch 14 is installed between the above mentioned turning sheave 11 and the turning roll 6 itself. The first and second driving means 13 and 16 are one single main wheel around which tape 10 is passed. This main wheel is rotated by motor 9 through the intermediate clutch device 17; the same motor 9 also drives the pinch roll 7.

In the arrangement illustrated in FIG. 4, each driving wheel or sprocket 15 is independent of its associated turning roll 6 and freely mounted on the shaft of its associated turning roll 6. The clutch means 14 is installed between the driving sprocket 15 and the turning roll 6. A chain transmission or drive 18 is used between each of the sprockets 15 and the second driving means 16. This second driving means 16 is rotated by motor 9 preferably through a clutch 19. The motor 9 also drives the pinch roll 7 as in the case of the arrangement illustrated in FIG. 3. The primary drive means 13 comprises a wheel around which the endless tape passes, the primary drive means being rotated by motor 9 through a clutch 17.

The apparatus illustrated in FIG. 4 has the advantage over that shown in FIG. 3, in that it does not rotate the whole group of turning rolls 6 through the endless tape. The rotation of all turning rolls, for which inertia may be very considerable in the case of a great number of these turning rolls and a fairly wide web, is accomplished by the chain drive 18.

I can also use one of the two arrangements illustrated respectively in FIGS. 5 and 6 where two endless tapes 10 are installed, one at each end of the turning rolls, these endless tapes 10 advantageously being made in the form of cables.

In the apparatus illustrated in FIG. 5, there is no driving wheel or sprocket 15; the two sheaves 11 affixed to the turning roll shaft at each end of the turning roll 6 serve the dual function of driving the turning roll and guiding the threading tape 10. The clutch means 14 is installed between one of the above mentioned sheaves 11 and the turning roll 6 itself. The first and second means of driving 13 and 16 are tied together on a common shaft in a manner to drive a tape 10 at each end of turning roll 6; and the common shaft is driven by the motor 9 through a clutch 20; this motor also drives the pinch roll 7.

In the apparatus illustrated in FIG. 6, the driving wheel or sprocket 15 is independent of the two sheaves 11 which are free to rotate on the turning roll shaft, and the clutch 14 is installed between the driving sprocket 15 and the turning roll 6. A chain 21 may be provided between the driving sprocket 15 and the second driving means 16. The second driving means 16 is driven by motor 9 through a clutch 22. The motor 9 also drives the pinch roll 7 as in the case of the apparatus illustrated in FIG. 5. The first driving means 13 is made up of the two main sheaves around which are passed respectively both endless tapes 10, and these two main sheaves are driven by the motor 9 through a clutch 20. The arrangement illustrated in FIG. 6 has the advantage over FIG. 5 that it does not rotate the group of the turning rolls 6 using the endless tapes 10. The rotation of all the turning rolls, which may have considerable inertia as in the case of a great number of turning

rolls and wide paper web, is achieved by the chain drive 21.

Referring again to the apparatus illustrated in FIGS. 3 and 4, we will describe the construction of the attachment device or outrigger 12, used with these drive arrangements. This attachment device 12 is shown in FIG. 7 for which the same reference numbers are used to indicate the different components as used in FIG. 3. Attachment device 12 is made of a rigid beam 23 affixed perpendicularly to the endless tape 10, in the form of an outrigger; there is also a clamp 24 which may be closed or opened to hook or unhook the end of the product web 2, the width of this clamp 24 being a function of the resistance of the product web 2.

When the endless tape is a double cable, the beam 23 is fixed on the inside cable by fixation means 25 and guided on the outside cable by guiding means 26. Such an assembly permits uneven speed of the cables of the endless tape 10. Preferably a flexible wire or rope 27 is used between the outer end of the beam 23 and the inside cable to which the rope is affixed by means of fixing means 28. In threading, the web is first cut at an angle before being attached to the device 12.

Referring to the arrangement illustrated in FIGS. 5 and 6, I will now describe the construction of this attaching device 12 used in conjunction therewith. This attaching device 12 is shown in FIG. 8 on which cross-reference numbers indicate same components as in FIG. 6. Beam element 29 is mounted perpendicularly to the two endless tapes 10 by a connecting means 30. Clamping device 31 is pin-mounted on the center of the beam 29 and may be closed or opened to hook or unhook the end of the paper web; the width of the clamp is determined by the resistance of the paper web.

It should be noted that for the beam 29 to be perfectly perpendicular to the two endless tapes 10, the connecting means 30 must be adjustable at least at one end of the beam 29 and preferably at both ends. This adjustment may be made manually or automatically after each threading operation.

This attachment device 12 allows central threading of the paper web. Before threading, the paper web is first cut at an angle symmetrical to its longitudinal axis.

The clamp 24 or 31 of the attachment device is shown in detail in FIGS. 9 and 10. This clamp is mounted in such a way that it will close automatically when the endless tape 10 is started. Forward rod 32 having a length slightly longer than the width of the tail of the web is mounted parallel to the beam 23 or 29 of the attaching device. Another rod 33 having a length equal to the forward rod 32, is parallel mounted to the rod 32 and is attached to it. Both rods are attached together by means of a flexible blade 34 at each end.

At each end of the rod 32 there are two arms 35 and 36 of equal length; they are hinged on the rod 32. A jaw 37, 38 is mounted at the end of each arm 35, 36, respectively. A spring 39 is provided to hold the arms 35 and 36 either open or closed. The open position is shown in FIG. 9, and the closed position is shown in FIG. 10. The length of the arms 35 and 36 is such that when the arms 35 and 36 are closed by the spring 39 the jaws 37 and 38 come close to each other, behind the rod 33, as shown in FIG. 10. Anchoring of the paper web is thereby achieved efficiently because the web 2 is wrapped around almost the whole peripheral surface of the rod 33 and then pinched between the two jaws 37 and 38. A fixed latching rod 40 preferably collapsible is mounted in the path of one of the two arms 35 or 36 to close the clamp when the endless tape 10 is started.

Referring again to FIGS. 1 and 2, the preferred embodiment deals particularly with installation where the zones are horizontally mounted and where the aerodynamic effect of the air jets issued from orifices 3 in the headers 5 achieves the floating of the paper web. Before entering into the treatment zones, the paper web is cut from the supply machine 41; the web at the exit end of the treating zone is extracted by pinch rolls 7 and 8 one of which is driven by motor 9 which in turn is controlled by a motor (not shown) delivering the web from the machine 41. Under these conditions the tension variations in the paper web come principally from the longitudinal shrinkage or stretch in the band during drying and also from the loss of height that the paper web has to go through from one pass to the other from top to bottom. Due to the teaching of this invention the tension of the web 2 is transmitted freely towards the inlet end of the dryer.

As shown in FIGS. 1 and 2, at the entering side of the installation a tensiometer 42 is provided which senses the position of the paper web before entering into the first pass or zone 1. This tension control 42 transmits a signal S which varies the speed of the motor 9, in proportion to the speed of the motor delivering the paper web from the machine 41. This tension controller 42 consists of a dancer roll 43 horizontally mounted and movable vertically, attached to a transmitter 45 by means of cable and pulleys. The transmitter 45 can be, for example, a potentiometer delivering the signal S. The lower position of the dancer roll 43 corresponds to a high speed of the motor 9, while the higher position of the dancer roll 43 corresponds to a low speed of the motor 9. The dancer roll 43 exerts a tension on the paper web during the threading operation due to its own weight. Under these conditions, when the paper web 2 enters at the top of the dryer and leaves at the bottom of the dryer the tension exerted by dancer roll 43 is always either equal to or slightly higher than the weight corresponding to the projected vertical height of the paper web between the entering and leaving ends of the installation. The speed regulation of motor 9 is thus highly desirable. To take into consideration the drop in height which is imposed on the paper web 2 from one pass to the next lower one, it is advantageous to have a compensating device 46 acting on the pulley cable system 44 to increase the apparent weight of the dancer roll 43 as the drop in height takes place.

This compensating device 46 can be made of pneumatic cylinder 47, for example, whose piston rod is fixed to the cable system 44. This cylinder 47, is fed by a positioner 48, which receives its signal from a detector 49. This detector 49 follows the course of the paper web through the installation or dryer as the web is initially threaded therethrough. This detector 49 can be a revolution counter mounted on the shaft of one of the turning rolls. This compensation in apparent weight of the dancer roll 43 permits controlling the tension on the paper web at the level where it is attached to the clamping device 12, and during the threading operation, the compensating device 46 continuously in-

creases the tension exerted by the dancer roll **43** up to a value reached at the end of the threading operation.

In an installation using this invention, utilizing either horizontal or vertical passes, there should be provided a means for centering the paper web symmetrically on its theoretical path. One way of centering, used in this invention, is illustrated in FIG. **11**. A guide roll **50** at the exit of the last zone or pass, located, for example, between the last turning roll **6** and the pinch rolls **7** and **8**, is pivotally fixed at one end **51** and movable at its other end. The movable end of this roll is equipped with a motor **52**. The guide roll **50** is rotated by means of a pulley **53** mounted at one or both ends of the roll. The diameter of pulley **53** is the same as the roll itself, and the endless tape in passing over pulley **53** drives the roll **50**. A free-wheeling clutch **54** is installed between the pulley **53** and the roll **50** to permit a faster speed of the guide roll **50** than the speed of the pulley **53**. The motor **52** that positions the guide roll **50** may be pneumatic, hydraulic or electric. Two detectors **55A** and **55B** are used on each side of the sheet. Two signals D*a* and D*b* coming from these detectors are fed into a differential relay **56**. The output D of relay **56** is transmitted to the pneumatic motor **52** positioning the guide roll. When signals D*a* and D*b* are equal, the differential signal D is zero, and the pneumatic motor **52** does not move. If the sheet **2** is not centered, one of the two signals will be higher than the other, and the differential signal D will be applied to the pneumatic motor **52** via positioner **57**. The pneumatic motor **52** will then operate to change the position of the guide roll **50** and bring the sheet **2** into a new position in order to obtain a zero signal again from the relay **56**. The two detectors **55A** and **55B** can be mechanical, electric or optical usually transmitting an electrical output. This arrangement permits centering of the paper web in its theoretical path.

This is particularly important to maintain quality of production in the case where the paper web has a transverse shrinkage. It should be noted that such means of centering with symmetrically mounted detectors gives a null (zero) signal when there is no paper web on the machine. This is particularly desirable in the case of center threading as shown in the embodiments of the invention illustrated in FIGS. **5**, **6** and **8** wherein a threading rope is located on each side of the turning rolls. In the absence of paper web, which means during the threading operation, the guide roll must be parallel to the last turning roll in order to provide even travel length for both threading ropes. The centering means of FIG. **11** will automatically come into service when the paper web reaches the minimum detecting width after the passage of the attachment device **12**. The paper web will then increase in width symmetrically behind the attachment device **12** until it reaches maximum width.

Referring to FIGS. **1** and **2**, the threading operation will be explained. Referring first to FIG. **1**, the attachment device **12** is brought to a level where the paper web **2** is coming off the machine **41**, preferably in a vertically downward direction at the exit of machine **41**. The clamp **24** of the attachment device **12** is open, and the paper web travels between the rod **32** and the rod **33** of the clamp. The pinch roll **8** is maintained open and away from the pinch roll **7** through the action of the mechanism **58**. Motor **9** is then started, and pinch roll **7** runs at a peripheral speed slightly higher than the speed at which the paper web is delivered by the machine **41** since the dancer roll **43** is in its lower position. In the embodiments illustrated by the FIGS. **4** and **6** clutch **19** or **22** respectively is engaged which allows motor **9** to rotate the turning rolls **6**. A switch is operated at station **59** which engages the clutch **17** or **20** and which allows the motor **9** to start the threading tape or tapes **10**. The clamp **24** will close as soon as one of the arms **35** or **36** hits latching rod **40**, and the attachment device **12** pulls the paper web into the dryer. We will note that the sag in the paper web at the beginning of the operation is rapidly absorbed because of the over-speed of motor **9** caused by the lower position of the dancer roll **43**.

The product web then reaches under the dancer roll **43**, and starts to raise it which brings the motor **9** toward a speed such that there is synchronism between the speed of the threading tape **10**, pulling the attachment apparatus **12** and the paper web **2**, and the speed at which the web **2** comes out of the machine **41**.

The attachment device **12** passes over the turning roll **6** without changing its speed. During this threading, the drying of the web creates a longitudinal shrinkage of the web which generates a tension which is immediately sensed at the dancer roll **43** which starts to rise. The speed of the motor **9**, and consequently the linear speed of the threading tape or tapes will decrease, and the point of attachment of the web will be subjected to a low tension which is very important in the case of a fragile product. When the sheet **2** comes out of the last pass **1**, the attaching device **12** moves over the pinch roll **7** on turning wheel or wheels (not shown) mounted on the pinch roll driver. One of the arms **35** or **36** of clamp **24** then operates an electrical contact **60**, which actuates the mechanism **58** which in turn brings the pinch rolls **7** and **8** together and takes over extraction or driving of the paper web **2** without any change in speed.

The attachment device **12** next actuates an electrical contact **61** which disengages clutch **17** or **20** and stops the threading rope **10**. In the embodiments illustrated in FIGS. **4** or **6** the clutch **19** or **22** is also disengaged which stops the turning rolls **6** through motor **9**. The threading operation of the web is then completed as shown in FIG. **2**.

The attachment device **12** now being stopped can be detached from the paper web tail by opening the clamp **24**. The attachment device **12** can now be reused for the next operation. To commence the next threading operation, the attachment device **12** is then repositioned near machine **41** by manually engaging clutch **17** or **20**.

Whichever embodiment of the invention is used there is a drying apparatus for web products, in which the threading device of the paper web is efficient, fast and sure. This threading device may be made entirely automatic. Moreover, the threading device has the advantages of not submitting the paper web to any high tension, particularly at the attachment point. A relatively fragile paper web may be threaded easily. The invention is not limited to the above specific embodiments shown in this application, nor to the different arrangements of its different components, but it also in-

cludes all sorts of variations within the spirit of the annexed claims.

What is claimed is:

1. A clamping device particularly adapted for grasping a web tail for threading a multi-pass web treating apparatus, comprising in combination: an attachment beam, first and second rods of substantially the same length mounted parallel to said attachment beam by blade means; a pair of arms of equal length hinged on each end of said second rod, the free ends of said arms having jaws thereon; a spring attached to each arm intermediate said jaws and the hinge points so that the arms are held in an open position when the spring is located between the second rod and the beam and the jaws are held in a closed position when the spring is located between said first and second rods, said arms being of such a length that when they are closed by means of said spring, their respective jaws are closed together over said first rod.

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