June 4, 1946. A. I. BLACK 2,401,603

PAPER MAKING MACHINERY

Filed April 27, 1944

FIG. 1

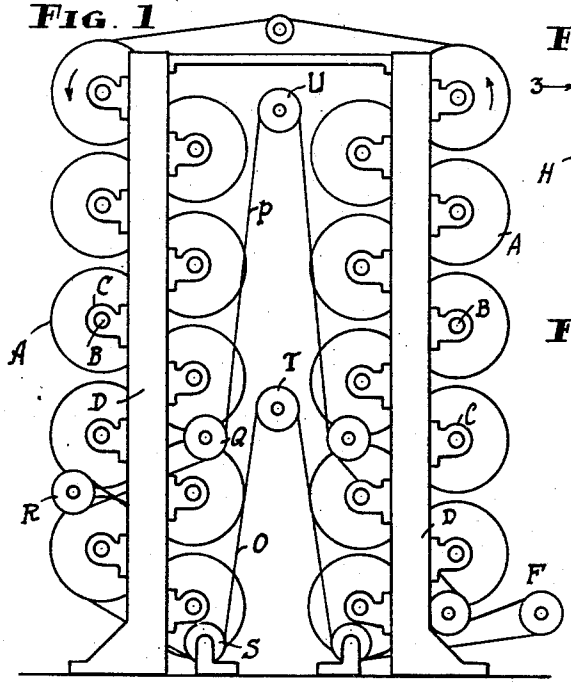


FIG. 2

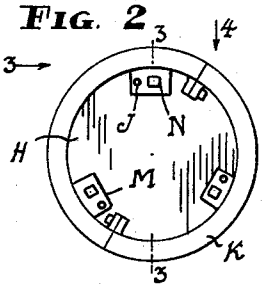


FIG. 3

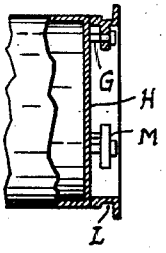


FIG. 4

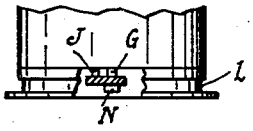


FIG. 11

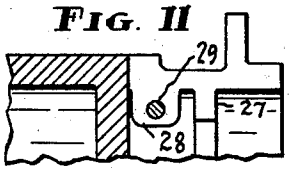


FIG. 5

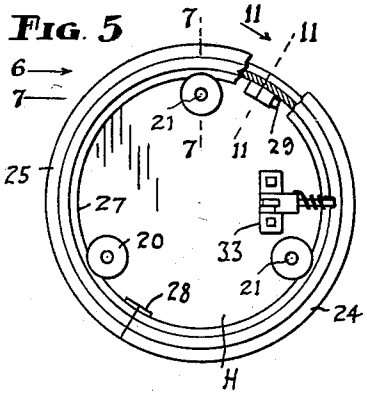


FIG. 6

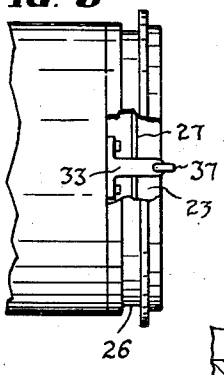


FIG. 7

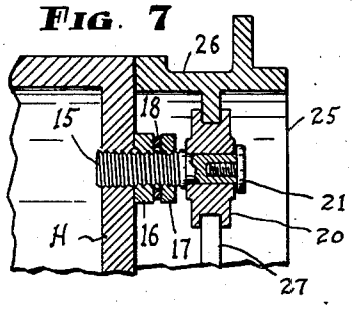


FIG. 10

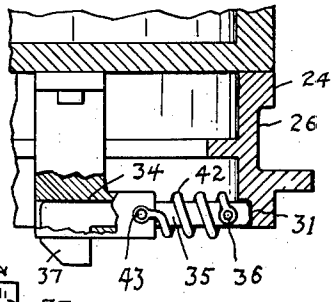


FIG. 8

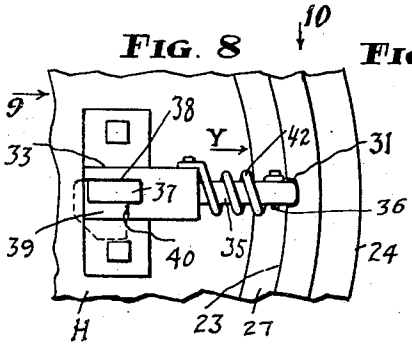
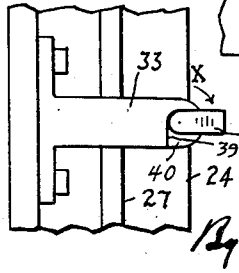


FIG. 9



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UNITED STATES PATENT OFFICE

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PAPERMAKING MACHINERY

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Application April 27, 1944, Serial No. 533,035

4 Claims. (Cl. 34—120)

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This invention relates to improvements in drier apparatus used in connection with paper making plants, such an apparatus comprising horizontal rotatively driven steam heated cylindrical drier rolls arranged in staggered order and in successive tiers, the rolls of each tier being journaled at their axles in suitable bearings provided therefor in upright frame members.

Upon the surface portions of the rolls of one tier, and upon the surface portions of the rolls of the adjacent tier, travels (for the purpose of drying) the web of pulp (hereinafter referred to as the paper sheet) which is brought to the apparatus on a transport belt operated therefor, from the source of supply.

Arranged in connection with each of said drier rolls, at what may be termed its front or head end, is a grooved annular sheave which is of diameter substantially the same as that of the roll. Running over these sheaves, one to the other, are endless ropes lying side by side, maintained at proper tension, and which function to effect the feeding to the initial drier roll of the first tier of rolls, the said paper sheet. The said sheaves are required to operate at the same speed as that of the rolls. Accordingly the grooves of the sheaves are of suitable depth so that the outer surfaces of the ropes may be substantially flush with the periphery of the roll. Driving relation between the roll and the sheave is in some instances established directly, and in other instances is established indirectly, as by devices interconnecting the roll and the sheave, and which said devices are so arranged and are capable of such control, that said driving relation may be suspended.

Due to the severe conditions which are incident to the fumes, moisture of condensation, and to the heat of the rolls, and which said conditions are constantly present in manufacturing operations involving apparatus of the above description, the ropes become prematurely impaired, and breakage of same is the result. Attending such breakage is serious loss and damage because of the impossibility of detaching the broken rope or ropes and replacing same, without stopping the operation of the drier rolls and the associated portions of the manufacturing plant.

In the present invention my object is to provide an annular sheave and bearings therefor that are applicable to a conventional roll, said bearings to support the sheave concentrically of and for rotative movement synchronously with the roll, and a device secured to the roll and operable to lock the sheave to the roll, and operable to unlock the sheave from the roll, said device

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being adapted to be manually actuated at any time during the operating of the machine.

The aforenamed broadly stated object, as well as other and more specific aims of the invention and which have to do with improvements in construction and arrangement leading to economy of manufacture and facility of use, are accomplished by, and my invention is embodied in the new construction, combination and arrangement of parts described in the following specification and illustrated in the accompanying drawing.

The several parts of the invention are identified by suitable characters of reference applied to them in the different views in the drawing, in which—

Figure 1 is an elevational diagrammatic view of two sets of drier rolls, same constituting a portion of a drier apparatus of a high speed paper making machine comprising a number of such sets successively arranged, and to which said apparatus my invention is applicable.

Figure 2 is an enlarged front view of one of the rolls of said sets, removed.

Figure 3 is a vertical central longitudinal cross section view taken on the broken line 3—3, in the direction of arrow 3 in Figure 2.

Figure 4 is a top plan view taken in the direction of arrow 4 in Figure 2, a portion of the sheave being broken away.

Figure 5 is a detailed elevational view of a drier roll with which is embodied a sheave of new construction, and certain new parts combined with said sheave and with the drier roll, in accordance with my invention.

Figure 6 is a side view in the direction of arrow 6 in Figure 5, a portion of the sheave being broken away.

Figure 7 is an enlarged detailed cross section view, taken on broken line 7—7 in the direction of arrow 7 in Figure 5.

Figure 8 is an enlarged detached frontal view of the locking device appearing in Figure 5.

Figure 9 is a view taken in the direction of arrow 9 in Figure 8.

Figure 10 is a view taken in the direction of arrow 10, in Figure 8.

Figure 11 is an enlarged cross section view taken on the broken line 11, in the direction of arrow 11 in Figure 5.

In the typical set of drier rolls, indicated in Figure 1, each of the drier rolls A has its axle B journaled in a pillow block C which is supported by the upright member D of the machine frame.

Rigidly secured, suitably spaced threaded stems G protrude from the head end H of each drier

roll, as indicated in Figures 2 and 3. Adjacent to each of said stems G is a stud J. Annular sheave K has peripheral groove L.

Each of similar, spaced, inwardly directed lugs M which are integral with said sheave, is provided with a hole in which the said stem G is received; and is also provided with a hole in which the said stud J is received, when the said sheave is applied to position united with the head end of the drier roll. By means of nuts N which are screwed home on the stems G the said sheave is retained fixedly secured to the said drier roll.

The ropes O and P by which the paper sheet (not shown) is fed into the drier rolls, as at F (see Figure 1), travel side by side in the groove L of said sheaves, and over idlers Q, R, and S, and they are kept constantly at tension by weighted or spring pressed idlers T and U. Each of the said rolls constitutes a chamber into which steam is supplied by conventional means (not shown). Driving power is supplied to gearing (not shown) connected with each roll at its rear end, to operate the rolls in the direction indicated by the arrow in Figure 1.

The ropes, traveling as they do, in unison with the power propelled drier rolls, it is obvious that a break of the rope results immediately in such derangement and tangle, that continued travel of the rope is liable to result in injury to the paper sheet. Stoppage of the operation of the rolls therefore becomes necessary, and there follows a disturbance of the entire manufacturing operation.

The present embodiment of my invention is typical, and it is of form and construction applicable to drier apparatus of the kind above referred to. It consists of the several parts constructed, combined and arranged as follows.

I provide similar spindles 15 spaced equidistant from each other, and equidistant from the axis of the drier roll. Each of said spindles embodies a threaded shank which is provided with a securing nut 16, lock nut 17, and lock washer 18 whereby when the spindle is screwed into the threaded hole provided therefor in the head H of the drier roll, and the nuts 16 and 17 are adjusted, the said spindle will have been made secure.

The said spindles 15 may, as in the present instance, be secured in the holes from which the stems G of the drier roll will have been removed. It will be understood that in such instance, the studs J of the drier roll will have been removed.

My new sheave consists of semicircular half sections 24 and 25, each having peripheral groove 26 and integral inner rail 27. Each of the ends of these half sections embodies a lug 28, as indicated in Figure 11, and in Figure 5.

The faces of the opposed meeting half sections are machined, as also are the lateral faces which are in registration with the rim portion of the head of the drier roll. By binding means such as the bolts 29 at the said lugs 28, the said half sections are secured together, the rail 27 of the sheave so formed being received in the grooves of the rollers 20 that are journaled on said spindles 15, and are there retained as by cap screws 21. Thus, the sheave while being retained in concentric relation to and in engagement with the front end of the drier roll, is free, and the motion of the drier roll may be independent of the motion of said sheave. Recess 31 in the internal face of the outer portion of said sheave will presently be referred to.

In combination with the drier rolls and the new annular sheaves associated therewith, as above described, I provide means whereby to couple one of the sheaves to, and whereby to uncouple it from the drier roll with which it is associated, consisting of the parts as follows. Secured to the head H of one of the drier rolls is a head block 33 provided with longitudinal guideway 34, said block being so positioned that its said guideway is directed radially. A bolt 35 slidingly retained in said guideway is provided at its rear end portion with an integral lateral lug 37 of formation as indicated in Figure 10, and which is received in a notch 38 provided therefor in the said head block. Communicating with the guideway and said recess 38 is an offset 39 which constitutes a space to receive the said lug when the bolt is moved to completely retracted position and shifted rotatively, and which also constitutes a seat 40 against which said lug will have bearing. (See Figure 8.)

A helical protractile spring 42 retained on said bolt is connected at its forward end, to said bolt, as by a cross pin 36, and its other end is secured, as by anchor screw 43 to the said head block. Anchor screw 43 is set at such position that a torque urge is exerted against the bolt in the direction of arrow X indicated in Figure 9. At the same time the said spring exerts an urge against the said bolt longitudinally, as indicated by arrow Y in Figure 10, so that the forward end of said bolt is normally in engagement with the recess 31 of the sheave, and which is the status of the bolt after it will have been released from the fully retracted and held position. The said sheave is thereby coupled to the head H of the drier roll and it will rotate in unison with the rotation of and by the power of said drier roll.

The said parts in their coupled status appear as in Figures 5 and 8. To cause the bolt to become disengaged from the said sheave, thereby the movement of the sheave being arrested, a blow, as by a hammer or other implement applied by the operator, to the said lug 37 in direction opposite to arrow Y (see Figure 8) frees the pawl from recess 31 and at the same time dislodges the lug from its notch 38 whence by the torque strain exerted by the spring 42, the lug is shifted rotatively and into the offset 39 wherein it rests with its forward edge against the seat 40. The bolt is now held in retracted position disengaged from recess 31 of the sheave, and accordingly there is no driving connection between the drier roll and said sheave.

My invention may be embodied in the construction of the drier apparatus as supplied by the manufacturer, or it may be supplied in the form of an attachment or equipment for the drier rolls of paper making machinery already in use. Installing of my invention consists of the procedure as follows.

The conventional sheaves (see Figure 2) are detached from all of the drier rolls and are discarded, and the stems G and studs J are removed. Then the spindles (see Figure 7) are secured in the head plate H of each of the said drier rolls. Next, the rollers 20 are disposed on the bosses of said spindles and where they are retained in journaled status by the cap screws 21. Sheave half sections 24 and 25 now are united, the annular rail 27 being received in the grooves of the rollers, and the said half sections being secured together by the bolts 29. Thus the sheave is concentric with, supported immediately adjacent to, and is rotatable independently of the rotative motion of the drier roll. Finally, on the head plate of one of the

drier rolls selected, (the roll so selected being one that is nearer the floor, or one that is nearer the deck or platform (not shown) from which the operator or supervisor of the machine has charge) the head block 33 is secured in a fixed position related to the said sheave, as indicated in Figure 5 and Figure 8. The bolt 35 will have been set at retracted position indicated by the broken lines in Figure 8, and in which said position, the forward end of the bolt is clear of the internal face 23 of the sheave.

It will be understood that the bolt 35 will have been set at the retracted position indicated by the broken lines in Figure 8 and clear of the inner face 23 of the sheave. The operator now moves the sheave to position wherein recess 31 is in registration with the bolt. Then by applying a hammer or wrench to the lug 37 thus moving said lug in the direction of arrow X, the bolt is released from seat 40 and, by the urge of the protractile spring 42 is shot forwardly, its end being received in the recess 31 of the sheave. The said sheave thereby is coupled with that drier roll. At the same time the said sheave is capable of being unlocked from said coupled engagement. To this feature further reference will be made in my describing the operation of the invention.

The paper making machine having been thus equipped, the ropes of the usual length and arrangement may now be threaded on the drier rolls of the series, for example (as indicated in Figure 1) and on the idler wheels over which the said ropes are carried and by which they are tensioned for the purpose hereinbefore described.

In the operating of the machine equipped with my invention, the ropes are traveling as usual, the train of said rolls being rotatively actuated by the power imparted by the coupled sheave. In case it may appear that a rope is becoming impaired to the point of possible failure, or that it may have unraveled or broken; the operator, with a hammer or like suitable implement, strikes the lug by a blow applied in direction opposite to the arrow Y in Figure 8, the bolt thereby being moved to retracted position indicated by the broken lines and to the zone of the offset 39 whence, by the torque urge of spring 42 the said lug becomes engaged with the seat 40 and the pawl is thereby held disengaged from the recess 31 of the sheave. The said sheave thus having become unlocked from its coupled status, it now, like the other sheaves of the series will have become idle and, whereas the rotating of the drier rolls continues without disturbance, all of the sheaves are at rest, and travel of the ropes will have ceased. Repairs and replacement of the rope or ropes may now be made.

When the rope or ropes will have been repaired and rearranged on the sheaves, and operations are to be resumed, the said bolt is dislodged from the said seat 40, as by the use of a wrench or hammer whereupon, by the protractive urge of the spring 42, said bolt is shot to the projected position. Upon the arrival of the head block 33 (carried as it is, by the drier roll) at position in line with the said recess 31, the pawl clicks into said recess, the sheave thereby becoming coupled and the travel of the ropes resumed.

For convenience of having the invention capable of being practiced from more than one location, an additional drier roll may be equipped with the head block 33 and bolt. For example one drier roll at a lower plane, and one drier roll

at a higher plane would be so equipped. Also, it is practicable to have a series or succession of recesses 31, whereby the coupling of the sheave would occur within a shorter period of travel of the drier roll.

It will be understood that the invention is subject to modification in its several features, within the scope of the invention as it is defined in the claims, without departing from the spirit or principle of the invention.

What I claim as my invention is:

1. In a drier apparatus including drier rolls, spaced anti-friction bearings provided on the sheave end of each of the drier rolls, said bearings of each roll being equidistant from the axis thereof, an annular carrier-sheave retained rotatively on said bearings, a head block secured to the end of one of the rolls and having a guideway directed toward the internal face of the sheave of that roll, and having a notch opening into the rear end of said block and a transverse offset thereat, a bolt loose in said guideway and having a lateral lug at its rear end to engage said notch and to protrude beyond the side face of said block, and means to urge said bolt projectively and also rotatively, whereby said bolt is pressed to engagement with said sheave to hold the latter against rotative movement and when retracted by a force externally applied to and dislodging the lug from said notch, is automatically turned into said offset and is there held in retracted position and disengaged from the sheave, and whereby when dislodged by a force externally applied to the lug dislodging it from said offset, is automatically projected to engagement with said sheave.

2. In a drier apparatus including drier rolls, spaced anti-friction bearings provided on the sheave end of each of the drier rolls, said bearings being equidistant from the axis of said roll, an annular carrier-sheave retained rotatively on said bearings, a head block secured to one of the rolls and having a guideway directed toward the internal face of the sheave of that roll, said face having a recess therein, and said guideway having a notch communicating with the rear end of said guideway and there being a transverse offset thereat, a bolt slidable in said guideway and having a lateral lug to engage said notch and to protrude beyond the side face of said block, and a helical spring interconnecting the bolt and the block to urge said bolt projectively and also rotatively.

3. In a paper drier machine including drier rolls, spaced spindles secured to the sheave end of each of the drier rolls, a grooved roller journaled and retained against longitudinal movement on each spindle, a divided annular sheave having a recess in its outboard portion and being provided at its internal face with an endless track rail, the half sections of said sheave adapted to be reposed in engagement with the said rollers, means to secure said half sections in united relation, a head block integrated with the head of one of the rolls and having a guideway directed radially of said roll and in line with the path of the recess of said sheave, a bolt slidingly retained in said guideway and having a lateral lug at its rear end to abut against the rear end of said block and to protrude beyond the side face thereof, and a helical spring interconnecting the bolt and the block to urge said bolt projectively and rotatively.

4. In a drier apparatus of paper making machinery including drier rolls, in combination with

a sheave that is journaled axially of and immediately adjacent to the front end of each of said rolls, a device operable to couple with and to uncouple from one of the rolls, the sheave thereof, said device consisting of a head block secured to said roll and having a guideway directed toward the internal face of the sheave of that roll, there being a notch opening into the

rear of said block and a transverse offset thereat, a bolt loose in said guideway and having a lateral lug to engage said notch and to protrude beyond the side face of said block, and a helical spring interconnecting the bolt and the block to urge the said bolt projectively and also rotatively.

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