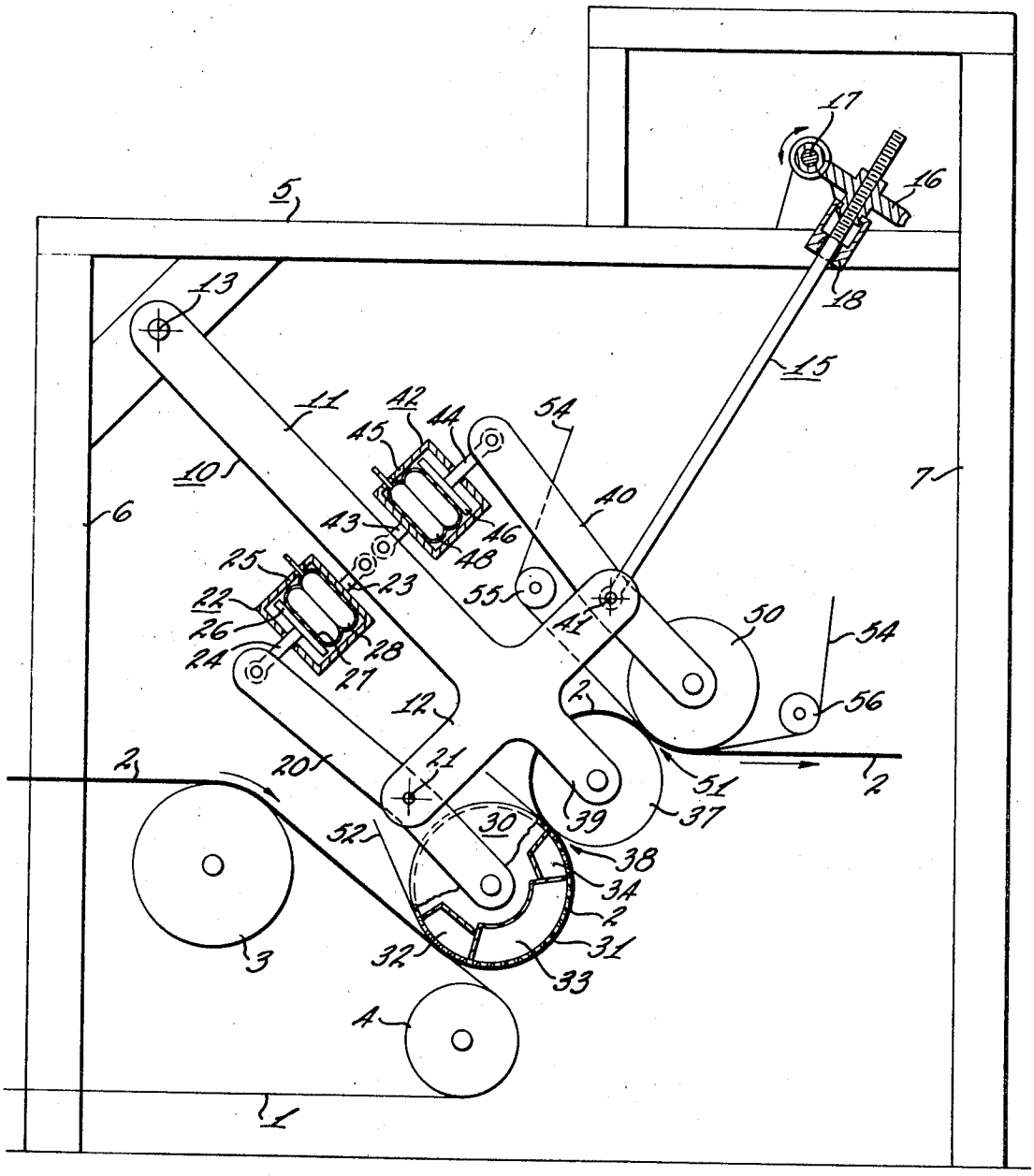
June 2, 1970 G. E. REYNOLDS ET AL 3,515,637

PAPERMAKING MACHINE PRESS SECTION

Filed March 27, 1967



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United States Patent Office 3,515,637 Patented June 2, 1970

3,515,637

PAPERMAKING MACHINE PRESS SECTION

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Filed Mar. 27, 1967, Ser. No. 626,308
Int. Cl. D21f 3/06
U.S. Cl. 162—360 5 Claims

ABSTRACT OF THE DISCLOSURE

A portion of a papermaking machine is disclosed where a newly formed web of paper is lifted from a Fourdrinier type web forming wire and passed between a first and second press nip to press water out of the newly formed web. The first and second press nips are defined by a stack of three rolls, with the lower roll being a suction pickup roll and the two upper rolls being press rolls. The entire assembly of three rolls can be raised and lowered to adjust the pressure of the pickup roll (i.e. the bottom roll) on the Fourdrinier wire. Additionally, the bottom and top rolls are carried by pivotable arms that provide for adjusting the pressure of the first and second press nips. Raising or lowering the bottom roll (i.e. the web pickup roll) to adjust the first nip between the bottom and middle roll of course changes the pressure of the bottom roll on the Fourdrinier wire. The pressure of the bottom roll on the wire is therefore readjusted after an adjustment of the first nip to restore the pressure of the bottom roll on the wire to that desired by the operator.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to an improved suction pickup and press assembly for a papermaking machine and in particular to a stacked pickup and press arrangement incorporating a novel arrangement for supporting and adjusting the position of pickup and press rolls in a stack assembly.

Description of the prior art

The concept involved in this invention is that of using a suction pickup roll to not only pick up a wet web from a forming wire, but to also act with one or more additional rolls, arranged in a stack, to press water from the wet web. The evolution of this concept to one present day form is illustrated by U.S. Pats. 1,701,226 issued in 1929; 2,186,171 issued in 1940; 2,748,671 issued in 1956; and 3,265,559 issued in August 1966. In a stack assembly such as shown in U.S. Pat. 3,265,559, a provision is made for allowing a slight upward or downward pivotal movement of the pickup roll about a horizontal axis spaced apart from the rotational axis of the pickup roll. Thus, when the suction pickup roll moves downwardly, its pressure on the wet web and forming wire is increased, but simultaneously the pressure applied in a first press nip defined by the pickup roll and a press roll arranged above and slightly forward of the pickup roll is correspondingly decreased. These two pressure changes are inherently opposite in nature and do not, therefore, accommodate the possible desire of an operator to increase or decrease both the pressure of the pickup roll on the forming wire and the pressure applied at the first press nip.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a new and improved arrangement for supporting a suction pickup roll and a first press roll to define therebetween a first press nip, with provision for accommodating an operator's desire to increase the pressure of the pickup roll on the wet web and forming wire, and increase the pressure at the first nip between the pickup roll and first press roll; or vice versa to decrease the pressure of the pickup roll on the wet web and forming wire, and decrease the pressure at the first nip.

Another object of the present invention is to provide a new and improved arrangement for supporting a suction pickup roll, a first press roll adjacent the pickup roll to define a first press nip, and a second press roll adjacent the first press roll to define a second press nip, with provision for accommodating an operator's desire to change one or both of the nip pressures and operate with the pickup roll applying the same pressure to the web and wire as was applied prior to the adjustment of nip pressure.

A pickup and press roll assembly according to a preferred embodiment of the present invention includes a yoke mounted for pivotal movement in vertical plane about a first horizontal axis spaced above the level of a top web forming strand of a Fourdrinier wire. An end of the yoke remote from the first horizontal axis is hung from support structure by a first link of adjustable length, to a position near the wire. A first journal arm is pivotally connected to the yoke and a second link of adjustable length is connected between the first journal arm and the yoke. A suction pickup roll is journaled in the first journal arm and positioned to pick up a wet web of newly formed paper from the forming wire of the Fourdrinier. A first press roll is mounted on the yoke relative to the pickup roll to define therebetween a first press nip passage spaced around the circumference of the pickup roll from Fourdrinier wire. The press of the first nip can be adjusted by changing the length of the second link. The pressure of the pickup roll on the forming wire can be adjusted by changing the length of the first link and this adjustment does not affect the positions of the pickup roll and first press roll relative to each other. The pressure of the pickup roll on the wire and the pressure applied in the first press nip can therefore both be exactly as desired by the operator.

A second press roll can be provided according to the present invention to define with the first press roll a second press nip passage spaced around the circumference of the first press roll from the first nip. The second press roll is journaled in a second journal arm pivotally connected to the yoke. A third link of adjustable length is connected between the second journal arm and the yoke. The press of the second nip can be adjusted by changing the length of the third link and this adjustment does not affect the press of the first nip nor does it affect the pressure of the pickup roll on the forming wire. The pressure of the pickup roll on the wire and the pressure applied in both the first and second press nips can therefore be exactly as desired by the operator.

BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawing shows, in side elevation, a portion of the couch roll end of a web former of the Fourdrinier type and a web pickup and press assembly according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing a looped forming wire 1 whereon a web 2 is formed, travels over a couch roll 3 and then around a turning roll 4. The turning roll 4 is both forward of the couch roll 3 and below the horizontal level of the couch roll 3 and thereby guides the wire 1 and

web 2 along a downwardly inclined forward run from the couch roll 3 to the turning roll 4.

A web pickup and press apparatus assembly is provided for lifting the web 2 from the run of wire 1 forward and downwardly from couch roll 3 to turning roll 4. The assembly has apparatus support structure 5 including vertical members 6, 7 projecting upwardly to a level spaced above the wire 1 and couch roll 3. The reference character number 5 in the drawing is underlined to indicate that the reference character number 5 refers to the entire support structure including members 6 and 7. The apparatus includes a T-shaped yoke 10 formed by a tongue 11 and a crossbar 12 transverse and preferably perpendicular to the tongue 11. The end of tongue 11 remote from crossbar 12 is pivotally connected to the support structure 5 for pivotal movement in a vertical plane and about a first horizontal axis 13 vertically spaced above couch roll 3. A first adjustable link 15 connects the upper end of crossbar 12 to support structure above and forward (in the direction web 2 travels) of crossbar 12 to support the yoke 10 in a position with the tongue 11 depending from pivot axis 13 at an inclined angle relative to a horizontal plane such as the horizontal plane defined by the portion of web 2 approaching the couch roll 3. The link 15 is threaded to engage threads in the bore of a gear 16. A cross shaft 17, which is rotated by means not shown has worm gearing engaging gear teeth on the periphery of gear 16. A support 18 beneath gear 16 is pivotally connected to support structure 5. Link 15 passes through support 18 and when cross shaft 17 rotates to turn gear 16 then link 15 is raised or lowered, depending on which direction gear 16 is turned. Suitable assemblies of this type for raising or lowering yoke 10 are available from the Duff-Norton Company of Pittsburgh, Pa., and are identified as worm gear jactuators.

A first journal arm 20 is pivotally connected with the lower end of crossbar 12 at a second horizontal axis 21 passing through crossbar 12 and intermediate the ends of journal bar 20. A second adjustable length link 22 connects tongue 11 to the end of arm 20 on the same side of crossbar 12 as tongue 11 and link 22 positions arm 20 generally parallel to the tongue 11. Link 22 comprises a pair of rods 23, 24. Rod 23 is connected on one end to tongue 11 and has on the opposite end a cage 25. Rod 24 is connected on one end to arm 20 and has a piston 26 on the other end slidably arranged within cage 25. The piston 26 has a surface 27 on the side of piston 26 opposite from rod 24. An inflatable, expansible and contractible air bag 28 is arranged within cage 25 between surface 27 and the rod 23. Inflating bag 28 applies force to piston 26 in a direction away from rod 23 for a purpose that will appear as the description of the invention proceeds.

A suction pickup roll 30 iournaled in the end of the journal arm 20 on the opposite side of crossbar 12 from the adjustable link 22. The roll 30 has a perforated cylindrical shell 31 and three internal suction boxes 32, 33 and 34 for a purpose that will appear when the operation of the apparatus is described.

A press roll 37 is mounted on yoke 10 relative to pickup roll 30 to define a press nip 38 between rolls 30, 37. The press roll 37 is journaled in a bracket 39 projecting from crossbar 12 in the opposite direction and preferably at least substantially in line with tongue 11. The roll 37 is preferably grooved or described in U.S. Pat. 1,517,036 dated Nov. 25, 1924 to R. E. Wagner and in particular as described with reference to FIG. 4 of that Wagner patent. That is, the roll is provided with circumferential grooves (not shown herein) transverse to the turning axis and the grooves are deep enough to receive the water pressed out of the web 2 and narrow enough so that the web is not pressed into the grooves. This means that the grooves will be approximately not much greater than 0.75 millimeter (i.e., 0.03 inch) as a maximum width because, as Wagner explains in another of his patents, U.S. 1,552,098 issued Sept. 1, 1925, with groove widths of 0.75 millimeter (i.e., 0.03 inch) or wider, he found the web may enter the grooves. It is preferred that with the present invention the web not enter the grooves and so the grooves should, according to Wagner teaching, be not much greater than 0.03 inch in width and perhaps less in some installations.

A second journal arm 40 is pivotally connected with the upper end of crossbar 12 at a third horizontal axis 41 passing through crossbar 12 and intermediate the ends of the second journal bar 40. A third adjustable length link 42 connects tongue 11 to the end of arm 40 on the same side of crossbar 12 as the second adjustable length link 22. Link 42 positions the second journal bar 40 generally parallel to the tongue 11 and the first journal arm 20. Link 42 may be constructed similarly to the link 22. That is, link 42 comprises a pair of rods 43, 44. Rod 43 is connected on one end to tongue 11 and has on the opposite end a cage 45. Rod 44 is connected on one end to arm 40 and has a position 46 on the other end and within the cage 45. An inflatable bag 48 similar to bag 28 is arranged between piston 46 and rod 43 so that link 42 can be adjusted in the same manner as the previously described link 22.

A second press roll 50 is journaled in the end of the second journal arm 40 on the same side of crossbar 12 as the first press roll 37 and relative to press roll 37 to define a second press nip 51 between rolls 37 and 50.

A first press belt 52 is arranged around pickup roll 30 and a second press belt 54 is guided by guide rolls 55, 56 to pass between press roll 37 and 50 in a manner that is conventional and disclosed in U.S. 3,265,559 and other of the patents hereinbefore referred to.

The assembly shown in the drawing has been decsribed with reference to but one end of each of the rolls 30, 37 and 50. Both ends of these rolls must of course be similarly supported.

In the operation of the described assembly gear 16 is turned to adjust the vertical position of link 15 to place the suction pickup roll 30 in contact with the newly formed web 2 on the Fourdrinier wire 1. A relatively high vacuum of from about 7 to 12 inches of mercury is applied to the box 32 to pick up the web from wire 1. A vacuum of about 3 to 7 inches of mercury is applied to the box 33 to turn the web from the pickup box 32 toward the first nip 38 and a vacuum of about 7 to 15 inches of mercury is applied to the press suction box 34. The first press roll 37 carries the web 2 into the second press nip 51 between rolls 37 and 50.

The pressure applied to web 2 as the web passes through the nips 38 and 51 is adjusted by adjusting the air pressure in the inflated bags 28 and 48. The press of nip 51 can be adjusted to be exactly as desired by the operator, by adjusting the air pressure in bag 48. Any adjustment of nip 38 of course changes the pressure of roll 30 on wire 1 when the pick up of the web occurs. Therefore, after an adjustment of nip 38 a readjustment of link 15 is required to restore the pressure of roll 30 on the web 2 and wire 1 to that desired by the operator. However, after this is accomplished the pressure of roll 30 on web 2 and wire 1, and the press at both nips 38 and 51, will be exactly as desired by the operator.

From the foregoing detailed description of the present invention has been shown how the objects of the present invention have been attained in a preferred manner. However, modification and equivalents of the disclosed concepts such as readily occur to those skilled in the art are intended to be included in the scope of this invention. Thus, the scope of the invention is intended to be limited only by the scope of the claims such as are or may hereafter be appended hereto.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. For a papermaking machine of the Fourdrinier type having a forward run of forming wire from a couch roll to a forward turning roll, a pickup and press apparatus assembly for lifting a paper web from the forward run of

forming wire and pressing water therefrom, said assembly comprising:

support structure including vertical members;

a T-shaped yoke including a tongue and crossbar;

a first pivotal connection between the tongue and said support structure providing for pivotal movement of said yoke in a vertical plane;

a first adjustable link connected on one end to said yoke at a location spaced from the first pivotal connection and supported on the opposite end by a portion of said support structure in said vertical plane and spaced from the first pivotal connection for pivoting said yoke about the first pivotal connection upon adjustment of the position of the first link relative to the support structure;

a journal arm conected to the crossbar by a second pivotal connection;

a second adjustable link connected on one end to a portion of said tongue spaced from said crossbar and the opposite end of said second link connected to a portion of said journal arm spaced from said second pivotal connection for pivoting the journal arm about the second pivotal connection upon adjustment of the position of the end of said second link connected to the journal arm, relative to said tongue;

a suction pickup roll journaled in an end of said journal arm spaced from both said second link and said second pivotal connection; and

a first press roll mounted on said yoke relative to said pickup roll to define a press nip passage therebetween, said second adjustable link thereby providing for the adjustment of a press applied between the press roll and pickup roll and said first adjustable link thereby providing for the adjustment of the position of said pickup roll and press roll relative to said support structure with the press of said nip remaining unchanged by the said adjustment of the first link.

2. In an apparatus according to claim 1, a second journal arm connected to the crossbar by a third pivotal connection, a third adjustable link connected on one end to a portion of said tongue spaced from said crossbar, and the opposite end of said third link connected to a portion of said second journal arm spaced from said third pivotal connection for pivoting the second journal arm about the third pivotal connection, and a second press roll journaled in said second journal arm at a location spaced from said third pivotal connection and relative to the first press roll to define a second press nip passage therebetween, said third adjustable link providing for the adjustment of a press applied at said second nip independently of and in addition to the adjustments afforded by said first and second links.

3. For a papermaking machine of the Fourdrinier type having a forward run of forming wire from a couch roll to a forward turning roll, a pickup and press apparatus assembly for lifting a paper web from the forward run of forming wire and pressing water therefrom, said assembly comprising:

support structure including vertical members;

a yoke including a tongue and crossbar;

a first pivotal connection between the tongue and said support structure providing for pivotal movement of said yoke in a vertical plane; and said crossbar being transverse to said tongue and connected to the end of said tongue opposite said first pivotal connection;

a first adjustable link connected on one end to the crossbar end of said yoke and supported on the opposite end by a portion of said support structure above said crossbar and spaced from said first pivotal connection, for pivoting said yoke about the first pivotal connection upon adjustment of the position of the first link relative to the support structure;

a journal arm connected to an end of said crossbar by a second pivotal connection intermediate the ends of said journal arm;

a second adjustable link connected on one end to said tongue intermediate the ends of said tongue, and the opposite end of said second link connected to a portion of said journal arm for pivoting the journal arm about the second pivotal connection upon adjustment of the position of the end of said second link connected to the journal arm, relative to said tongue;

a suction pickup roll journaled in the end of said journal arm on the opposite side of said crossbar from said second link; and

a first press roll mounted on said yoke relative to said pickup roll to define a press nip passage therebetween, said second adjustable link thereby providing for the adjustment of the press of said nip, and said first adjustable link providing for adjustment of the vertical position of said pickup roll and press roll relative to said support structure with the press of said nip remaining unchanged by the said adjustment of the first link.

4. In an apparatus according to claim 3, said yoke being supported by said first link in a position with said tongue depending from said first pivotal connection at a downwardly inclined angle therefrom, said crossbar being perpendicular to said tongue with an end projecting downwardly therefrom, said second pivotal connection being at the downwardly projecting end of said crossbar, and said journal arm being substantially parallel to said tongue.

5. In an apparatus according to claim 4, said crossbar also having an end projecting upwardly from said tongue, a second journal arm connected to the upwardly projecting end of said crossbar by a third pivotal connection intermediate the ends of said second journal arm, a third adjustable link connected on one end to said tongue intermediate the ends of said tongue, and the opposite end of said third link connected to a portion of said second journal arm, and a second press roll journaled in the end of said second journal arm on the opposite side of said crossbar from said third link and relative to the first press roll to define a second press nip passage therebetween, said third adjustable link providing for the adjustment of a press applied at said second nip independently of and in addition to the adjustments afforded by said first and second links.

References Cited

UNITED STATES PATENTS

3,265,559	8/1966	Means	162—358 XR
2,415,351	2/1947	Hornbostel et al.	162—358 XR

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U.S. Cl. X.R.

100—164, 168; 162—306