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L. HORNBOSTEL ET AL
SUCTION ROLL HELPER DRIVE

2,392,150

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3 Sheets-Sheet 1

Fig. 1.

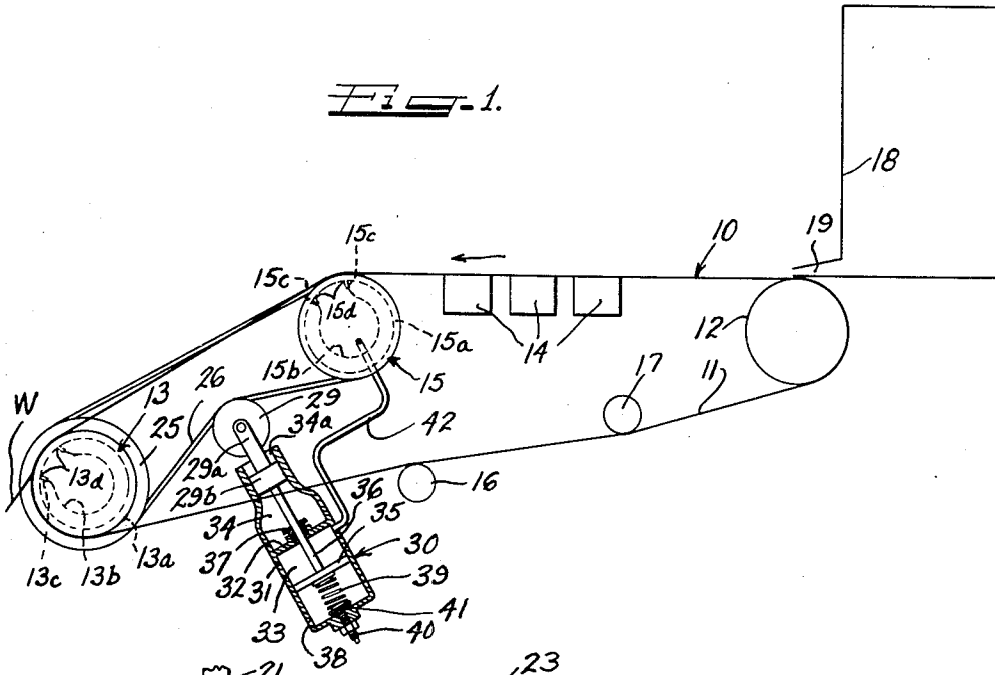
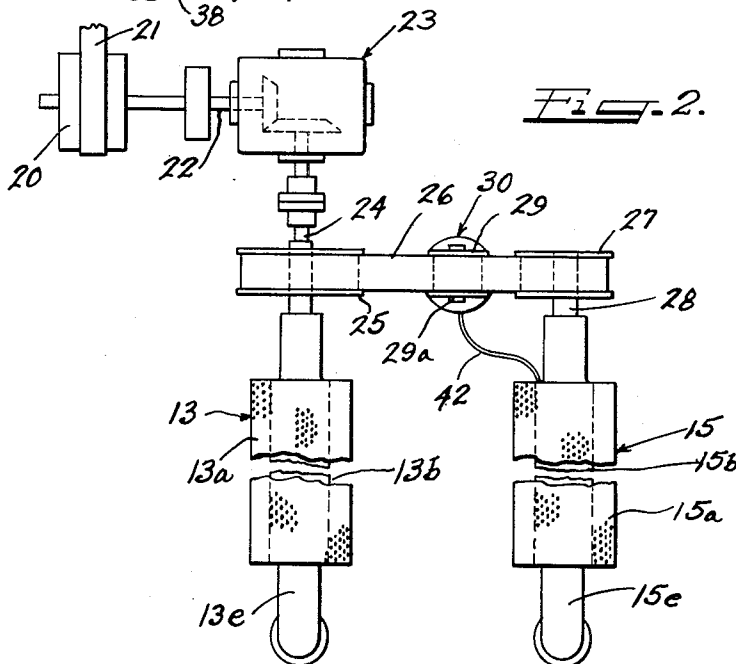


Fig. 2.



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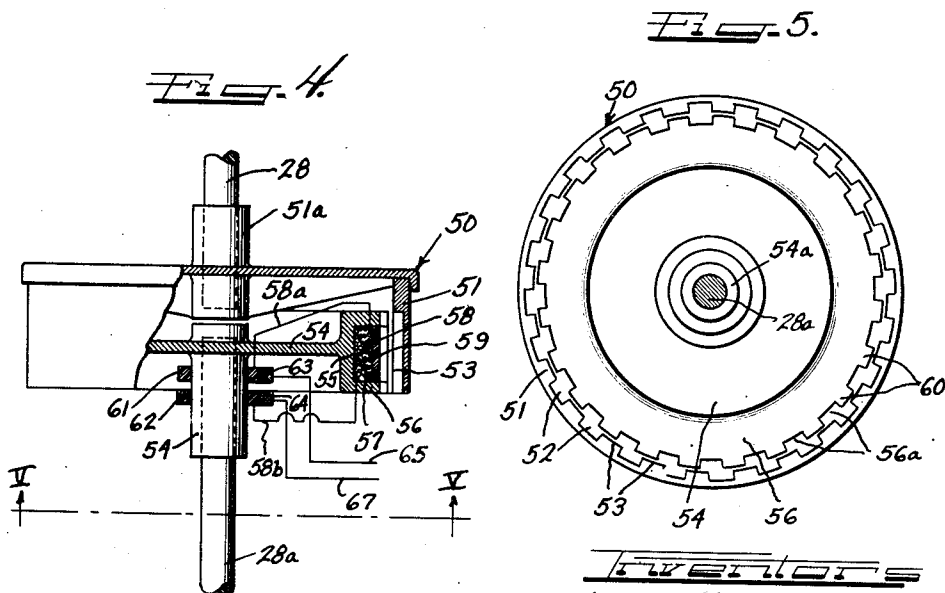
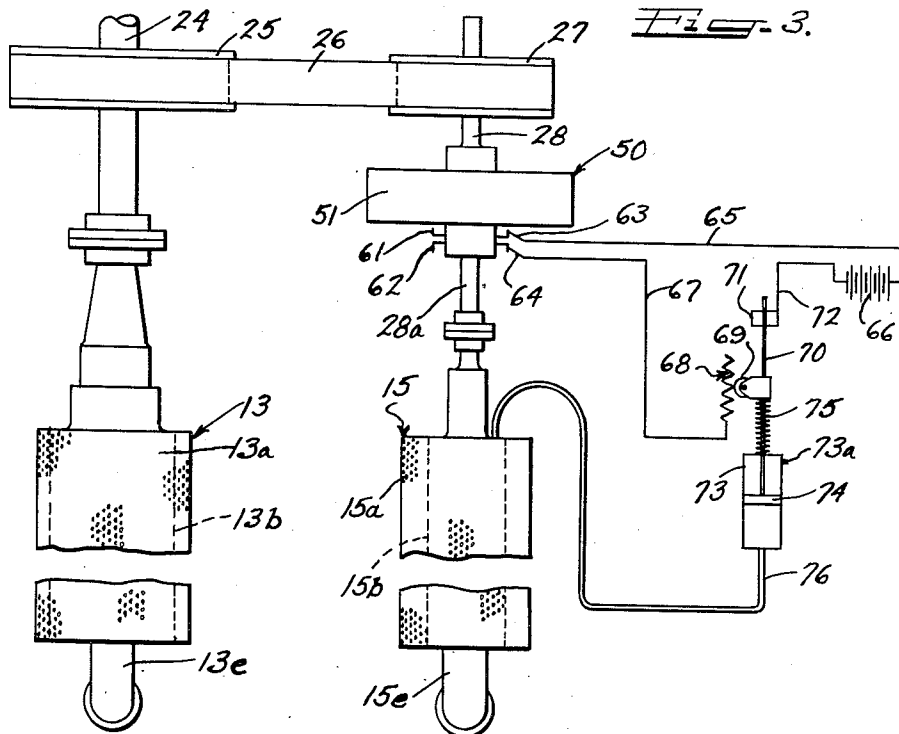
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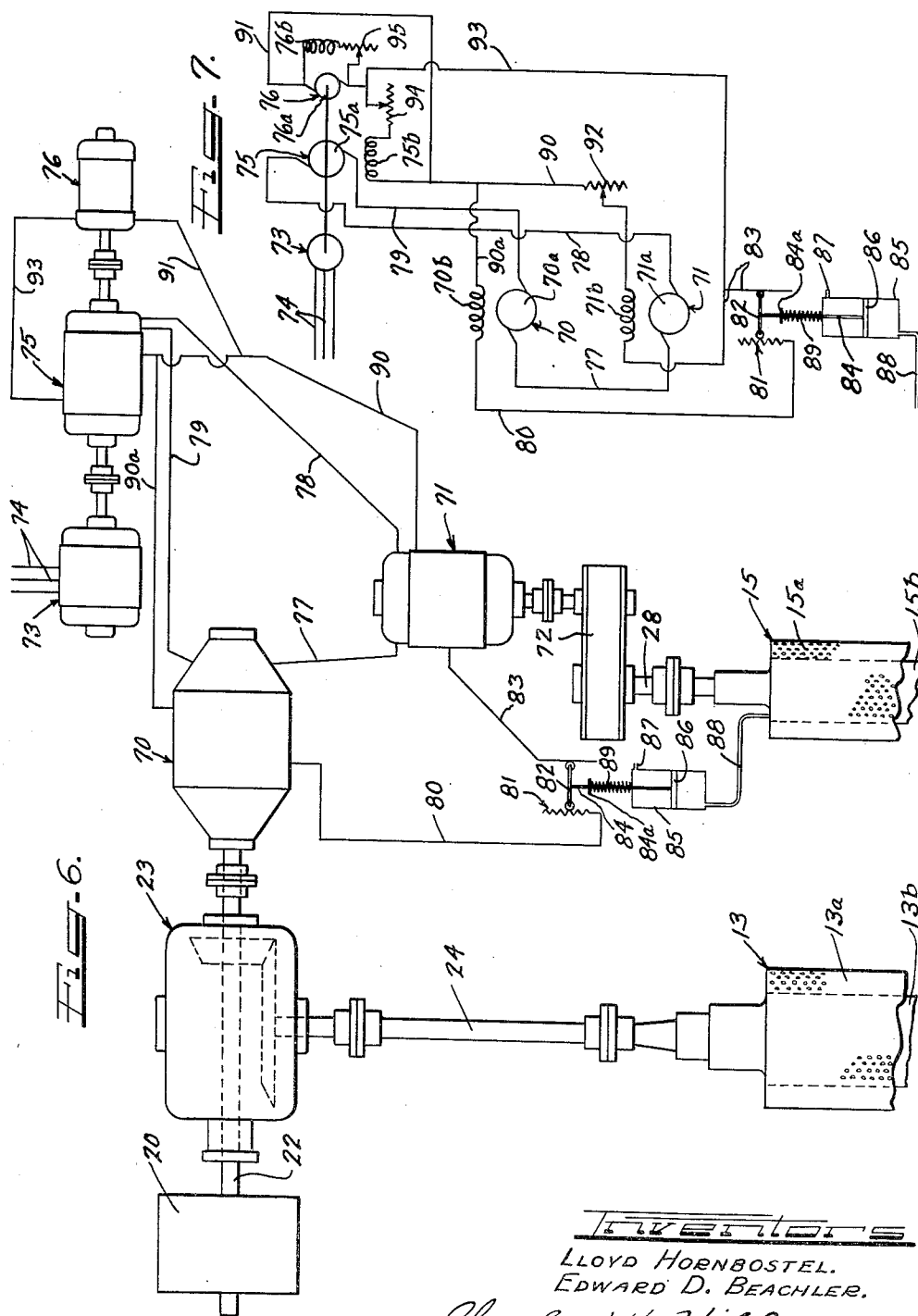
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SUCTION ROLL HELPER DRIVE

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3 Sheets-Sheet 3



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SUCTION ROLL HELPER DRIVE

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10 Claims. (Cl. 92-44)

This invention relates to suction roll drives controlled by the degree of vacuum in the driven suction rolls.

Specifically the invention relates to paper making machines having a main couch roll driven forming wire, a primary suction couch roll engaging the wire in advance of the main couch roll, and a helper drive for the primary suction couch roll driven by the main couch roll drive and automatically operating in accordance with the degree of vacuum in the primary suction couch roll.

In accordance with this invention a Fourdrinier type paper making machine having a looped forming wire driven by a main couch roll within the loop of the wire is equipped with a primary suction roll for acting on paper stock on the forming wire in advance of the main couch roll. This primary suction couch roll is disposed within the loop of the paper machine forming wire and has a suction area acting on stock deposited on the wire to extract liquids from the stock so that a more dehydrated web can be delivered from the forming part of the paper machine. This primary suction couch roll includes a rotating perforated shell in engagement with the forming wire. In order to prevent slippage between the rotating shell and the wire it is necessary to drive the shell at the wire speed. Since the main couch roll drives the wire, it is convenient to drive the primary suction roll from the main couch roll. However, the power input to the primary suction couch roll must vary independently of the speed of the main couch roll because the forming wire is actually somewhat elastic and will stretch at areas of great tension and contract at areas where this tension is released. In paper machines of this invention the forming wire tension just ahead of the primary suction couch roll is maximum because, at this point, the primary suction couch roll is pulling or dragging the wire over the stationary suction boxes which are conventionally positioned under the upper run of the wire. If the primary suction couch roll is driven, any power input to it effects a change in the wire tension, which, of course, results in less wire tension after the primary couch roll than ahead of it. As a result, the wire length "shrinks" between the primary couch and the main couch while the wire length stretches just ahead of the primary couch. Therefore, to maintain proper operating conditions the primary suction couch must be driven at a faster circumferential speed than the main couch.

As a result of these conditions, it is not possible to use a fixed type of drive for both the main couch and the primary couch and, in accordance with this invention, a helper type of drive is used for driving the primary couch.

This helper type of drive is, according to this invention, automatically controlled to vary the power input to the primary suction couch roll in accordance with the degree of vacuum maintained in the suction area of that roll. If no driving effort is imparted to the primary suction couch roll, its rotatable shell will, of course, impart a frictional drag to the wire, thereby damaging the wire by frictional wear. If, on the other hand, a large power input is supplied to the primary couch, the rotating shell thereof will spin faster than the speed of the wire to again effect wire wear. Since traction between the wire and the shell is largely dependent upon the amount of vacuum in the suction area of the primary couch, this vacuum is used to control the amount of helper drive input to the roll.

When the forming wire is driven with no stock on it, it is desirable to put some driving effort into the primary couch so that the forming wire is not called upon to start this roll. This helper driving effect should necessarily be quite small since there is little traction between the roll and the wire. However, as stock is deposited on the wire and the suction area of the roll is covered with the web of paper being formed from the stock, the vacuum in the primary couch can build up since it is no longer directly vented to the atmosphere. As a result of the increased vacuum in the suction area, more traction exists between the wire and the primary couch and more power input can be supplied to the couch without relative slippage between the couch roll shell and the wire. This is now automatically accomplished by the vacuum control of this invention.

At the same time, in the event the forming wire is operating at a certain speed with stock being deposited on the wire and, for some reason or other, the stock supply fails so that the suction area of the primary couch is not covered with stock, the vacuum will decrease and, in so doing, the helper drive input will automatically decrease. In the absence of such a graduated vacuum control on the primary couch drive, the roll would spin relative to the wire due to the loss of traction because of the decreased vacuum.

It is, then, an object of this invention to provide vacuum controlled helper drives for suction rolls,

A further object of the invention is to provide Fourdrinier type paper making machines with driven primary suction couch rolls.

A still further object of the invention is to provide drives for a plurality of rolls engaging a somewhat elastic band which drives are automatically controlled by the amount of traction between the rolls and the band.

A still further object of the invention is to provide a couch roll driven forming wire of a paper machine with a primary suction couch roll automatically receiving the proper amount of driving input from the couch roll so that slippage or frictional drag between the wire and the primary suction couch roll is eliminated.

Another object of the invention is to provide drives for suction rolls which are automatically controlled by the degree of vacuum in the rolls.

Other and further objects of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which, by way of preferred examples, illustrate three embodiments of the invention.

On the drawings:

Figure 1 is a diagrammatic side elevational view of a Fourdrinier type paper making machine equipped with a main couch roll and a primary suction couch roll which is driven with one form of helper drive from the main couch roll.

Figure 2 is a diagrammatic broken top plan view of the main couch roll, the primary suction couch roll, and the helper drive shown in Figure 1.

Figure 3 is a plan view similar to the view of Figure 2 but illustrating a second form of helper drive for the primary suction couch roll.

Figure 4 is an enlarged plan view, with parts broken away and shown in vertical cross section to illustrate underlying parts, of an eddy current clutch used in the helper drive of Figure 3.

Figure 5 is an end elevational view of the eddy current clutch taken along the line V—V of Figure 4.

Figure 6 is a diagrammatic fragmentary plan view of a third form of helper drive for the primary suction couch roll.

Figure 7 is a wiring diagram of the helper drive shown in Figure 6.

As shown on the drawings:

In Figure 1 the reference character 10 designates generally the wet end of a Fourdrinier type paper making machine including a looped forming wire 11 trained between a breast roll 12 and a main suction couch roll 13. A plurality of stationary suction boxes 14 are mounted within the loop of the wire 11 for acting on the upper run of the wire. In accordance with this invention, a primary suction couch roll 15 is also mounted within the loop of the wire 11 to act on the upper run of the wire after it has passed over the last suction box 14 and before it reaches the main couch roll 13.

As indicated, the wire 11 has the upper run thereof extending in a substantially horizontal plane from the breast roll 12 to the primary suction couch roll 15. The wire then slopes downwardly to the main couch roll 13 and passes around this couch roll 13 over a tensioning roller 16 and under a guide roller 17 back to the under side of the breast roll 12.

A head box 18 is provided adjacent the breast roll 12 and has an inlet 19 for discharging paper stock onto the upper run of the wire 11. Liquids

from this paper stock will drain through the wire, and this drainage will be augmented by suction in the suction boxes 14 so that, by the time the stock reaches the primary suction couch roll 15, it is formed into a loosely matted paper web. The primary couch roll 15 has a perforated cylindrical shell 15a receiving the wire thereover. A stationary suction box 15b is mounted within the shell 15 and has seals 15c engaging the inner surface of the shell to define therebetween a localized suction area 15d covered by the wire 11 and the paper web W on the wire. This suction area will extract additional amounts of liquids from the web W to feed a more dehydrated web to the main suction couch roll 13. Since the shell 15a rotates and, in accordance with this invention, is driven at speeds and with sufficient driving torque to prevent slippage between the wire and shell, it is possible to extract higher proportions of water from the web than can be extracted by the use of stationary suction boxes since the wire must be dragged over the boxes and, if the vacuum therein is too high, the wire will be damaged by the resulting high frictional drag.

The main couch roll 13 is also preferably a suction roll including a perforated rotating shell 13a and a stationary suction gland 13b with seals 13c defining therebetween a suction area 13d over which the wire 11 and web W pass.

Since the wire 11 is wrapped around about half of the circumference of the main couch roll shell 13a, and since this couch roll has a suction area 13d acting on the most dehydrated portion of the web W on the wire, excellent traction will be afforded between the wire and the shell 13a. It is, therefore, highly convenient to drive the wire 11 by driving the shell 13a.

As shown in Figure 2, a main drive pulley 20 driven by a belt or other prime mover 21 drives the input shaft 22 to a gear box 23 which, in turn, drives the intake shaft 24 to the shell 13a of the main couch 13. A pulley 25 is driven by the intake shaft 24 and drives a belt 26 for driving a pulley 27 on the intake shaft 28 to the shell 15a of the primary couch 15.

The belt 26, as shown in Figures 1 and 2, has the under run thereof trained over a tensioning pulley 29 freely rotatable in a yoke 29a.

A control device 30 is provided for actuating the pulley to automatically tighten and loosen the belt 26 in accordance with the amount of vacuum existing in the suction gland 15b of the primary couch 15. This device 30 includes a stationarily mounted casing 31 divided by a partition 32 into a lower chamber 33 and an upper chamber 34 having a mouth 34a in which a boss or block 29b of the yoke 29a is slidably mounted.

A piston 35 is slidably mounted in the chamber 33 and has a rod 36 extending therefrom through the partition wall 32, to the block 29b for actuating the block in accordance with movements of the piston. Packing 37 is provided in the partition wall 32 around the piston rod 36 to prevent leakage out of the chamber 33 between the piston 35 and the partition wall 32. The portion of the chamber below the piston 35 is vented to the atmosphere as at 38.

A coiled spring 39 is mounted in the chamber 33 between the bottom wall and the piston 35 to urge the piston in an upward direction. Spring pressure on the piston can be adjusted by means of a screw rod 40 threaded in the bottom wall of the casing 31 and having a seat 41 on its inner

end bottoming the spring 39. This spring 39 can therefore urge the pulley 29 against the belt with the desired amount of tension so that the belt will drive the pulley 27 and shell 15a even though no vacuum exists in the suction gland 15b.

A pipe or tube 42 connects the portion of the chamber 33 between the piston 35 and partition wall 32 with the interior of the suction gland 15b so that, as the degree of vacuum builds up in the suction gland 15b, the piston will be drawn toward the partition wall 32 and thereby effect movement of the idler pulley 29 to further tension the belt 26 and decrease slippage between the belt and pulleys 25 and 27. As a result of this control, the shell 15a will receive more driving effort from the main couch roll drive as the degree of vacuum in the shell increases. As the degree of vacuum decreases the piston 35 can drop in the chamber 33. When no vacuum occurs in the suction gland 15b, the spring 39 will be the sole urging medium acting on the idler pulley 29.

As shown in Figure 2, the suction gland 13b of the main couch roll 13 can be evacuated through a vacuum pipe 13c. Likewise the suction gland 15b of the primary suction couch roll 15 can be evacuated through a vacuum pipe 15e. The pipes 13c and 15e can be connected with a vacuum pump (not shown).

In the modification disclosed in Figures 1 and 2, therefore, a slip belt drive is provided between the main couch and the primary couch, and the amount of slippage between the belt and the pulleys for driving the primary couch is controlled in inverse proportion to the amount of vacuum in the suction gland of the primary couch.

It will be noted from Figure 2 that the pulley driven by the belt 26 is of smaller diameter than the pulley driving the belt 26 so that the shell 15a will be driven at higher circumferential or linear speeds than the circumferential speeds of the shell 13a. This speed differential is necessary since the wire 11 is at its point of greatest tension as it comes onto the shell 15a since it is being pulled along its upper run over the suction boxes 14 which impart a frictional drag thereto. As it passes beyond the shell 15a to the shell 13a, the wire is in a less stretched condition and therefore the shell 13a should be driven at a lower circumferential speed so that it will not again stretch the wire to the condition existing as the wire comes onto the shell 15a. When driving a stretchable belt, therefore, it is not feasible to directly couple a plurality of driving rolls.

In the embodiment of Figure 3, parts identical with parts described in Figures 1 and 2 have been marked with the same reference numerals. However, in Figure 3, the belt 26 driving the pulley 27 is taut at all times so that there will be no slip between the pulleys 25 and 27. In this embodiment the intake shaft 28 to the primary suction couch roll drives an electric slip coupling 50 which controls the amount of driving effort applied to the shell 15a.

As best shown in Figures 4 and 5, the slip coupling 50 is composed of a metal armature drum 51 driven by the shaft 28 and having interior transverse slots 52 in spaced relation around the inner periphery thereof to define inwardly projecting transverse teeth 53. The armature drum 51 has a hub 51a connected to the shaft 28.

A magnetic spider 54 is mounted within the armature drum 51 and has a hub 54a connected to a shaft 28a which is coupled directly with the shell 15a.

The spider 54 has a rim portion 55 with up-

standing end flanges 56 providing a chamber 57 in which is wound an annular coil of wire 58. The coil is covered with a non-magnetic plate 59, and the flanges 56 are transversely grooved as at 56a to define teeth 60 around the periphery of the spider. The teeth 60 on the spider and the teeth 53 on the armature drum do not engage.

A pair of current-conducting slip rings 61 and 62 are mounted in insulated relation on the hub 54 of the spider. One end 58a of the coil 58 is connected to the ring 61. The other end 58b of the coil 58 is connected to the ring 62.

The rings 61 and 62 rotate with the spider since they are fixedly secured on the hub thereof.

Brushes 63 and 64 contact the slip rings 61 and 62 respectively. These brushes are stationary with the brush 63 connected to a wire 65 leading to a battery 66 or other source of electrical power and with the brush 64 connected to a wire 67 leading to a rheostat 68. A roller or other contactor 69 is provided in the rheostat 68. This rider 69 is fixedly mounted on a piston rod 70 having one end thereof slidable through a conductor ring 71 which is connected by a wire 72 back to the battery or other source of current 66. The other end of the rod 70 extends into a casing 73 and has a piston head 74 mounted on the end thereof. The piston head is slidable in the casing 73 and a spring 75 disposed around the rod 70 between the casing 73 and the contactor 69 urges the piston toward the top end of the casing to move the contactor toward the end of the resistance element in the rheostat so that, when the spring is acting freely, only a small amount of current will pass through the rheostat to the slip coupling.

The bottom of the casing 73 is connected through a tube or pipe 76 to the interior of the suction gland 15b in the primary suction couch roll 15. As vacuum builds up in this suction gland 15b the piston 74 will be drawn toward the bottom of the casing against the pressure of the spring 75 to decrease the amount of resistance in the circuit to the slip coupling. The casing can be vented as at 73a between the top thereof and the piston 74 so that the piston can move in accordance with the differential pressures existing on opposite sides thereof.

The electric slip coupling 50 contains no frictionally engaging couplings members and coupling effect is obtained by energization or excitation of the coil 58 from the source of current 66 to create a magnetic field around the coil. This magnetic field induces eddy currents in the armature drum and field when there is any relative movement between them. The degree of excitation of the coil determines the amount of slippage of the parts. When the coil is deenergized the drum 51 can rotate freely around the spider without turning the spider therewith. When the coil is energized the magnetic flux will drag the spider with the drum. However, a certain amount of slippage will always occur within the coupling.

In the assembly of Figure 3 the drum 51 of the coupling will, of course, be driven by the inshaft and belt connection from the drive to the main couch roll 13 and the amount of driving effort applied from this inshaft to the shell 15a of the primary couch can be directly controlled in accordance with the amount of energization or excitation of the coil. Since the rheostat controls the amount of excitation of the coil, and since the rheostat, in turn, is itself controlled by the degree of vacuum in the suction gland 15b,

the driving torque or drive input to the shell 15a is automatically controlled by the vacuum.

The rheostat can be initially set so that it will permit slight excitation of the coil in the slip clutch whereby upon starting driving of the forming wire 11 by initiation of rotation of the main couch roll 13, the roll 15 will also start to rotate. However, if no vacuum exists in the roll 15, the torque input to the roll will be slight. Then, as vacuum builds up in the roll, the torque input will be increased in proportion to the degree of vacuum by virtue of automatic movement of the piston 74 which decreases the rheostat resistance and increases the excitation of the coil in the slip coupling. Therefore, as traction between the wire and roll builds up, the helper drive effect or power input to the roll automatically increases.

In the third embodiment of the invention, as shown in Figures 6 and 7 parts identical with parts described in Figures 1 to 5 have been marked with the same reference numeral.

As shown in Figure 6, the main couch roll 13 is driven as in Figure 2 from the gear box 23. In Figure 6, however, the gear box 23 also drives a generator 70. A motor 71 drives a belt 72 for driving the inshaft 28 to the primary suction couch 15.

A small motor 73 is driven from a source of power 74 and is coupled with a booster generator 75 for driving this booster generator. A small exciter 76 is also driven by the motor 73.

As indicated in Figures 6 and 7, the armature 70a of the generator 70 is connected in series with the armature 71a of the motor 71 and the armature 75a of the booster generator 75 by means of wires 77, 78 and 79.

The field 70b of the generator 70 is connected by a wire 80 to a vacuum-operated rheostat 81 having a piston-operated contactor or bridge 82 establishing contact to a wire 83 connected with the field 71b of the motor 71.

The contactor 82 is secured to a piston rod 84 extending into a casing 85. A piston 86 is slidable in the casing and is secured to the bottom end of the rod 84. The casing is vented as at 87 above the piston and the bottom of the casing is connected through a tube or pipe 88 to the suction gland 15b of the primary couch roll 15. A spring 89 surrounds the rod 84 and is compressed between a stop 84a on the rod and the casing 85 to urge the contactor 82 to a position for increasing the resistance effect of the rheostat in the field circuit.

A wire 90 connects the other end of the field coil 71b of the motor 71 to the field coil 75b of the generator 75 and a wire 90a is tapped from the wire 90 back to the field coil 70b. As shown in Figure 7, a variable resistance element 92 can be incorporated in circuit between the field coils 71b, 70b, and 75b.

The armature 76a of the exciter 76 has one end connected through a wire 91 to the wire 90 while the other end is connected through a wire 93 to the wire 83 and field coil 75b. A variable resistance element 94 can be included in the circuit to the field coil 75b. The field coil 76b of the exciter 76 is in shunt circuit with the armature 76a and a variable resistance element 95 can be included in this circuit.

Thus the field coils 70b, 71b, and 75b are in series arrangement with the armature of the exciter.

The generator 70 will generate current to drive the motor 71 for rotating the shell 15a of the

primary couch. However, the amount of current supplied to the motor 71 by the generator 70 will depend upon the amount of vacuum in the suction gland 15b. As the vacuum builds up in this gland the piston 86 will be drawn down to decrease the rheostat resistance in the circuit to the generator field and thereby increase power input to the motor.

The small booster generator 75 is used to circulate current through the generator 70 and the motor 71 even when the generator 70 is not driven. There is thus available a small amount of torque for driving the primary couch even though the couch is not turning. Just as soon as the drive device 23 is operating, however, and the main couch starts to turn, the primary couch will also start to turn. If it were not for the booster generator 75, there would be no torque applied to the primary couch 15 until after the main generator was turned sufficiently to generate current. This would result in slippage of the wire 11 over the primary couch when the wire is first started up.

The small exciter 76 is used to excite the fields of the booster generator 75, the main generator 70, and the motor 71. The degree of excitation can be controlled through the resistance elements 92, 94 and 95. The exciter 76 is a small direct current exciter.

Therefore in the third embodiment of the invention the primary couch driving motor 71 always has a small amount of torque applied thereto through the constantly running motor 73. This small amount of torque, however, is not sufficient to turn the shell 15a. Nevertheless, as soon as the main generator 70 starts to function by driving the main couch roll 13 there will be sufficient torque available to immediately start the shell 15a. After the shell 15a starts rotating the torque or power input thereto is automatically controlled in accordance with the amount of vacuum existing in the suction gland 15b. Thus, as traction between the wire 11 and the shell 15a builds up due to increased vacuum in the roll, the helper drive effect or power input to the shell automatically increases.

It should be understood that more than one primary suction couch roll assembly can be used in the loop of the forming wire and that the helper drives of this invention can be used in driving a plurality of suction rolls from a single main couch roll.

In all illustrated embodiments of the invention the helper drive is driven at speeds slightly greater than the direct drive speed to the main couch. In all illustrated embodiments of the invention the degree of vacuum in the primary couch automatically controls the power input to the primary couch.

It will, of course, be understood that various details of the invention may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

We claim as our invention:

1. In a Fourdrinier type paper making machine including a looped forming wire, a main couch roll within the loop of said wire, a primary suction couch roll within the loop of said wire for acting on stock deposited on the wire in advance of the main couch roll, means for driving said main couch roll to drive the wire, a helper drive between said means and said primary suction

couch roll, and pressure responsive control means controlled by the degree of vacuum in the primary suction couch roll for automatically varying the driving effect of said helper drive so as to correlate the amount of drive on said primary suction couch roll with the traction between said primary suction couch roll and the wire.

2. In a Fourdrinier type paper making machine including a looped forming wire, a main couch roll within the loop of said wire, a primary suction couch roll within the loop of said wire, means driving said main couch roll to drive the wire, a slip device driven by said means to drive the primary couch roll, and means including piston operated means movable in response to changes in pressure and controlled by the degree of vacuum in the primary couch roll for varying the drive effect of said slip device on said primary couch roll.

3. In a Fourdrinier type paper making machine, a looped forming wire, a main couch roll within the loop of said wire, a primary suction couch roll within the loop of said wire, said rolls being in engagement with said wire, an inshaft driving said main couch roll to drive the wire, an inshaft to said primary couch roll to drive the same, a slip connection between said inshafts, and means including a piston operated device movable in response to changes in pressure and controlled by the degree of vacuum in the primary couch roll for controlling the amount of slippage in said slip connection.

4. In a couch roll driven forming wire assembly of a paper making machine, a primary suction couch roll engaging the forming wire in advance of the wire driving, couch roll, inshafts for driving the shells of said rolls, pulleys on said inshafts, a slip belt connecting said pulleys in driving relation, an idler pulley acting on said belt to control the amount of slippage thereof, and means actuated by the degree of vacuum in said primary couch roll for actuating the idler pulley to tighten the belt as the degree of vacuum builds up in the primary couch roll.

5. In a couch roll driven forming wire assembly of a paper making machine, a primary suction couch roll within the loop of the forming wire in engagement therewith in advance of the wire driving couch roll, inshafts to both of said rolls, a driving connection between said inshafts, an electric slip coupling between said driving connection and said primary suction couch roll, and means including pressure control means controlled by the degree of vacuum in said primary suction couch roll regulating the electrical energization of said coupling for controlling the degree of slippage of said slip clutch so as to minimize slippage between said primary suction couch roll and forming wire.

6. In a paper making machine, a plurality of rolls including a suction roll for moving a band, means connecting said rolls for co-rotation, an electric slip clutch between said means and said suction roll for controlling the amount of drive from said suction roll to the band, a coil in said clutch, means for energizing said coil to control the amount of slippage therein, rheostat means to vary the energization of said coil, and a vacuum operated device controlled by the degree of

vacuum in said suction roll for operating said rheostat means so as to minimize slippage between the suction roll and band.

7. In a paper making machine, a plurality of rolls including a suction roll, an electric motor for driving said suction roll, means for driving another of said rolls, an electric generator driven by said means for supplying current to said motor to drive the same, and a vacuum operated rheostat actuated by the degree of vacuum in said suction roll in circuit arrangement with the field of the generator and the field of the motor to supply more driving torque to the motor as the degree of vacuum in the suction roll increases.

8. In a paper making machine, a pair of rolls including a suction roll, a motor for driving said suction roll, means for driving the other of said rolls, a generator driven by said means, the armature of said generator being connected in series with the armature of said motor, a booster generator having the armature thereof in series with the armature of said motor, a driving motor for said booster generator, a direct current exciter driven by said driving motor, a circuit connecting the fields of the generator and the motor, a vacuum operated rheostat in said circuit controlled by the degree of vacuum in said suction roll to increase the field strength in the generator as the vacuum in the suction roll increases, said booster generator circulating current through said generator to supply a small amount of torque to the motor for initiating rotation of the suction roll immediately upon initiation of rotation of said other roll.

9. In a Fourdrinier type paper making machine including a looped forming wire, a breast roll within the loop of said wire, a couch roll within the loop of said wire and spaced from the breast roll to cooperate therewith for training the wire to provide an upper forming run, said couch roll being arranged for driving the wire, a primary suction couch roll within the loop of said wire engaging the upper forming run of the wire in advance of the couch roll, means for driving said couch roll, and a helper drive from said means for driving the primary suction couch roll at higher circumferential speeds than the couch roll to accommodate stretch of the upper forming run of the wire between the breast roll and primary suction couch roll as well as shrinkage of said run of the wire between said primary suction couch roll and said couch roll.

10. In a paper making machine having a looped forming wire, a suction roll within the loop of the wire in driving engagement with the wire, driving means for rotating said suction roll to move the wire, and means for controlling the drive input of said suction roll from said driving means in accordance with the suction in said suction roll including pressure-responsive control means actuated by the degree of vacuum in the suction roll, and mechanism operated by said pressure-responsive control means for varying the amount of drive input from said driving means to said suction roll so as to substantially prevent slippage between said suction roll and the wire.

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