

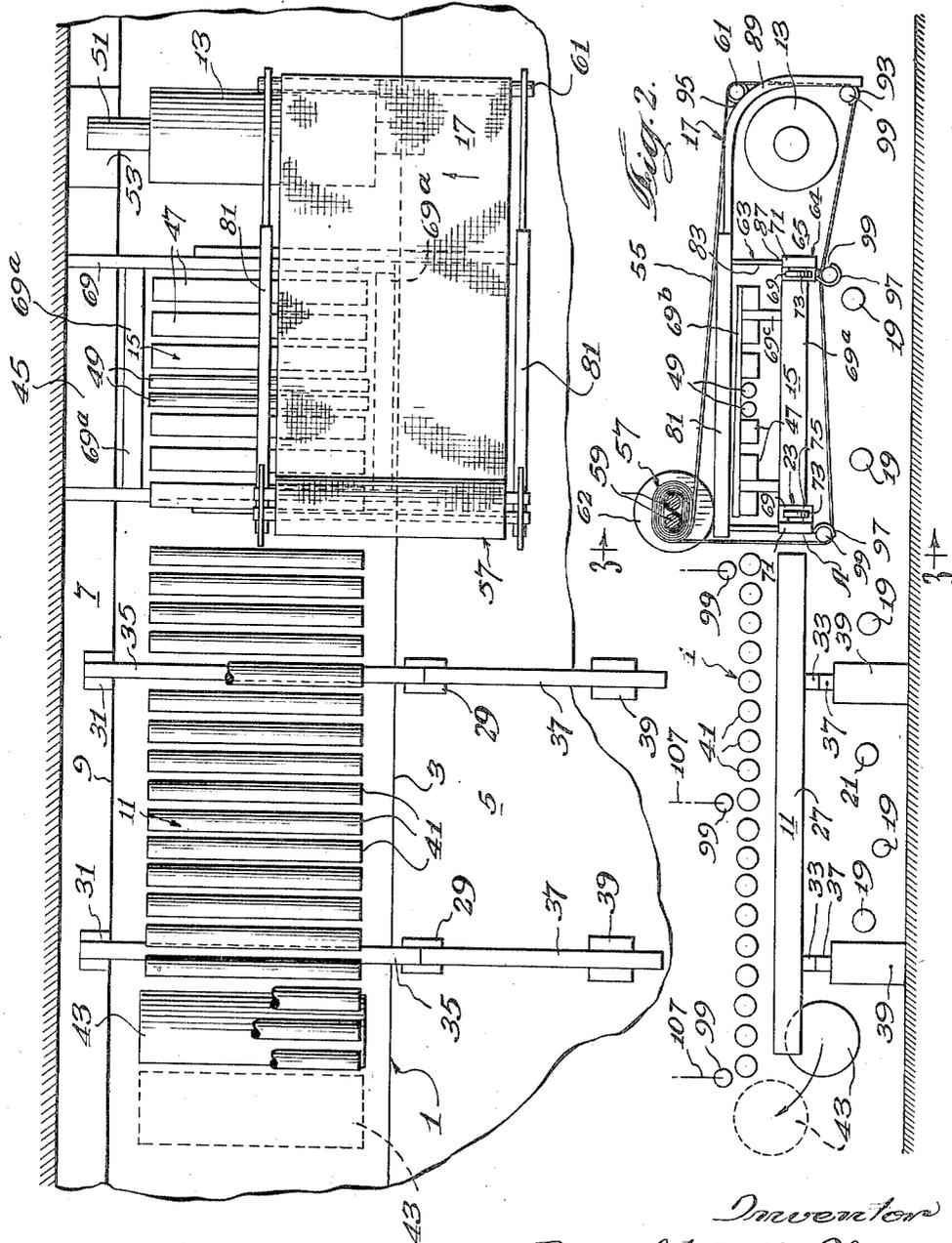
Feb. 1, 1955

D. B. DE NOYER  
METHOD AND APPARATUS FOR APPLYING  
A WIRE TO FOURDRINIER MACHINES

2,700,921

Filed Dec. 23, 1950

4 Sheets-Sheet 1



*Fig. 1.*

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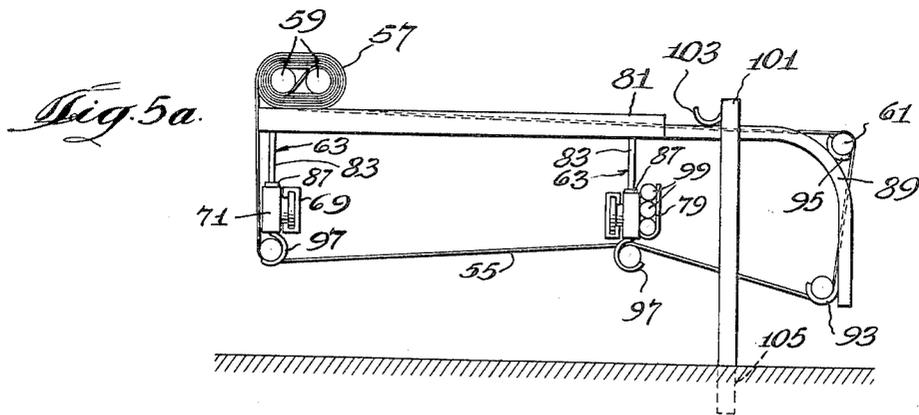
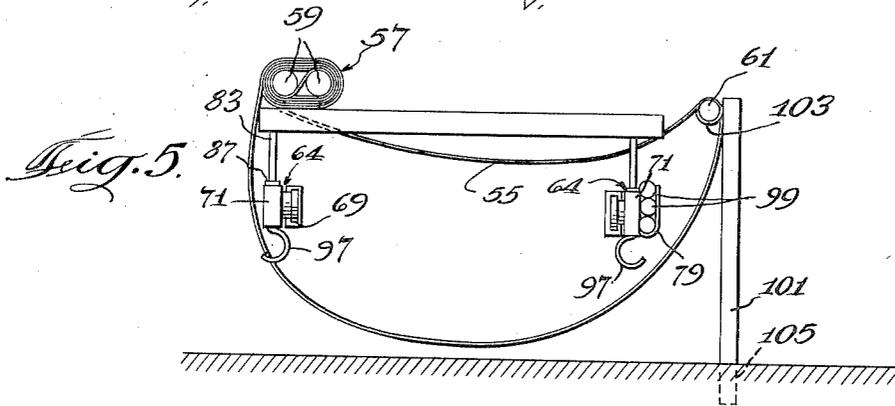
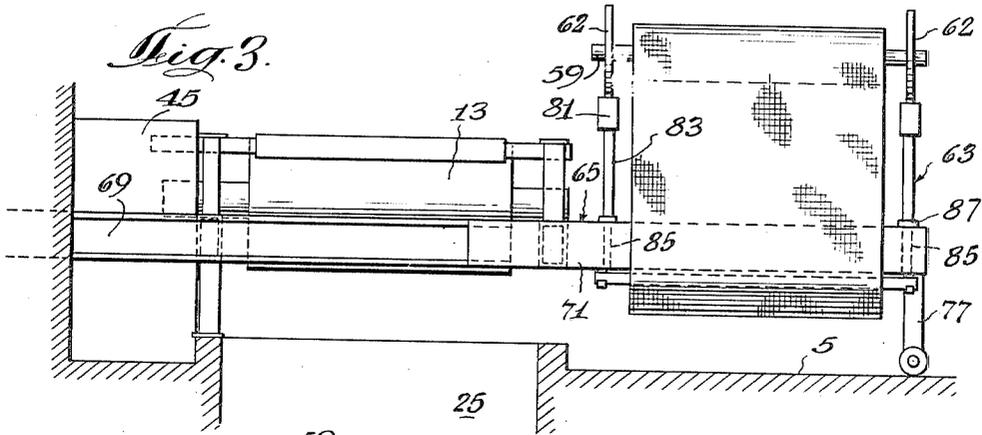
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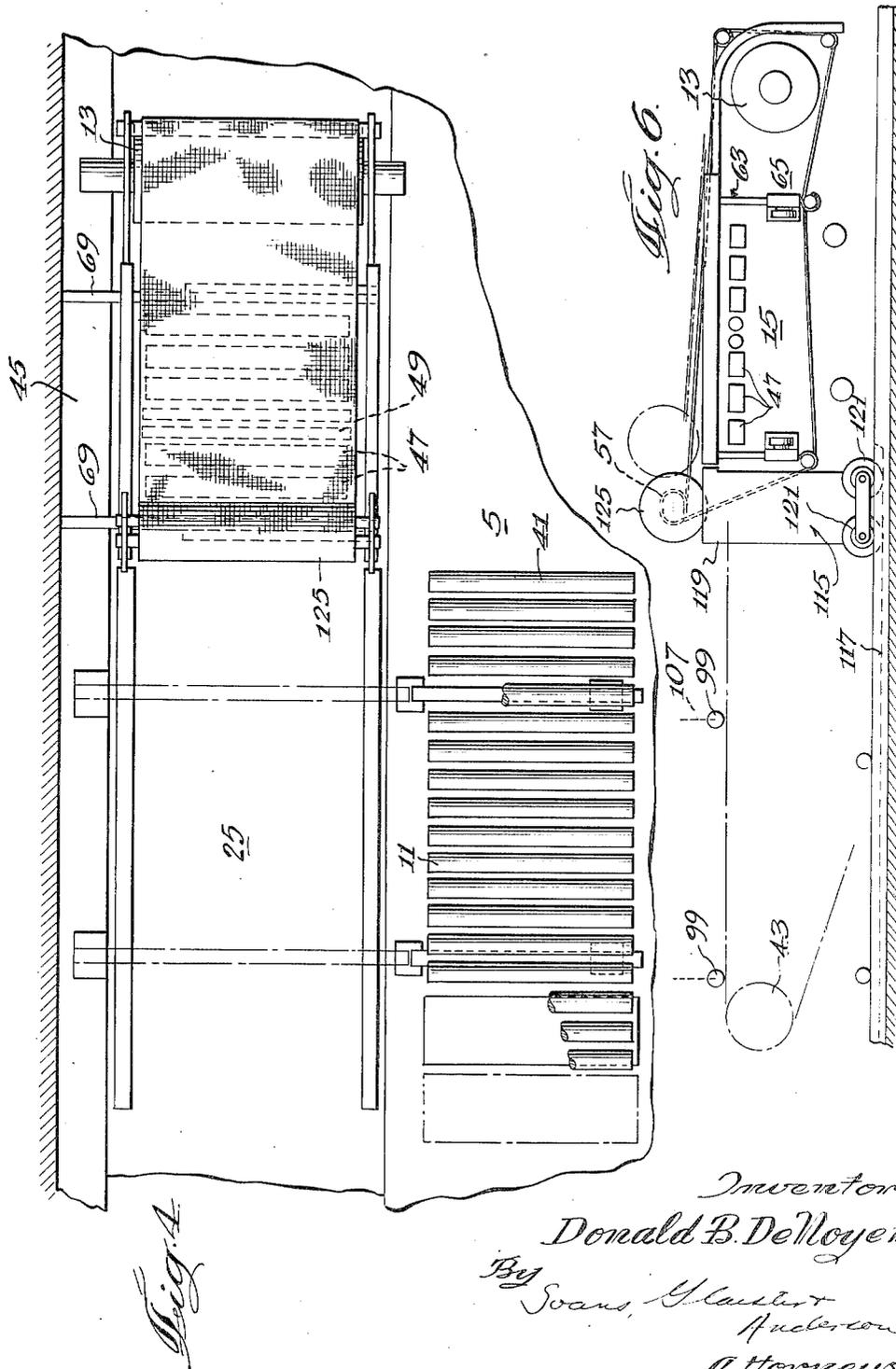
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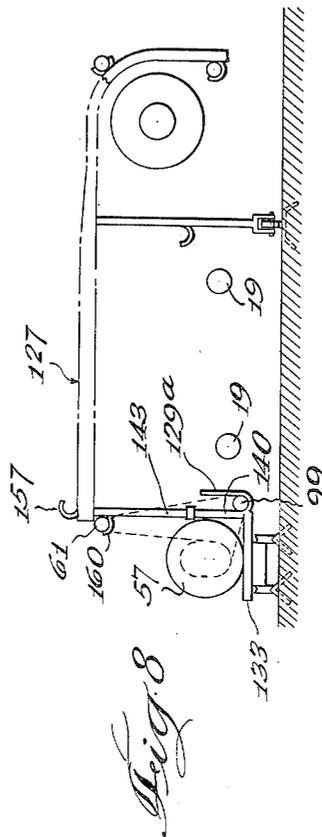
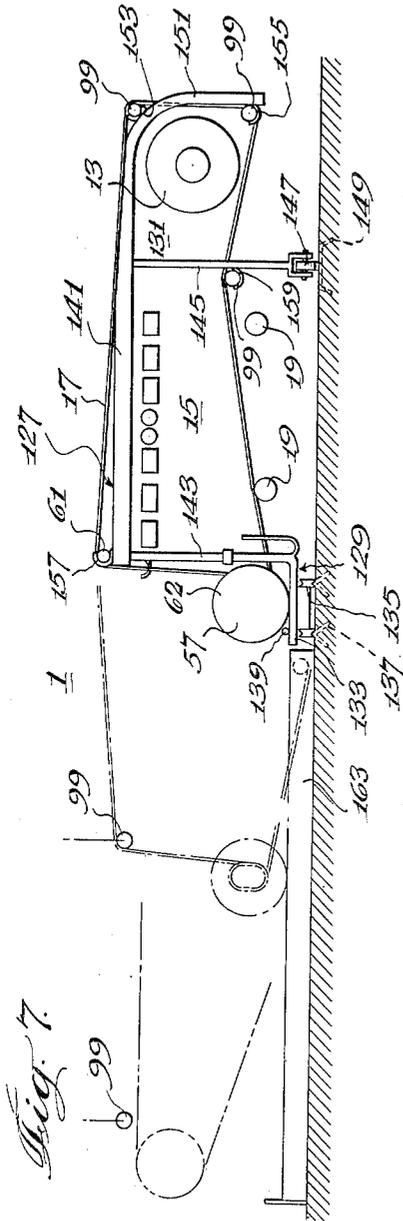
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4 Sheets-Sheet 4



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## METHOD AND APPARATUS FOR APPLYING A WIRE TO FOURDRINIER MACHINES

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2 Claims. (Cl. 92-44)

The present invention relates to Fourdrinier type paper-making machines and, more particularly, it relates to a method for applying a wire to Fourdrinier machines and an improved machine arrangement for facilitating application of the wire.

As is well known, a Fourdrinier machine is used in the papermaking field for the production of paper. The machine is essentially a device for converting an aqueous fiber pulp or suspension into a film of felted fibers which, after drying and finishing, results in a sheet of paper.

The Fourdrinier machine comprises five sections, the wet end, the press section, the drier section, the calender section, and the reel. The wet end includes an endless wire screen, hereinafter called the "wire," upon which the paper stock or suspension is spread from a headbox or flowbox. After the pulp is placed on the wire, the wire travels over several rolls and then a plurality of suction boxes so as to remove a substantial amount of water from the pulp. The wire is then trained around a suction or couch roll, returned to the end adjacent the headbox, and trained around a breast roll so as to be in position to receive stock from the headbox.

The wire is rather large and difficult to handle, and while the dimensions of the wire vary in different installations, the wire is not infrequently 200 inches wide and as much as 130 feet in total length. The wire is usually fabricated from fine strands of specially annealed copper, brass, or Phosphor bronze to form a web of 60 to 80 mesh, the term "mesh" referring to the number of strands to the inch. In view of the gauge of the wire, and the difficulties inherent in fabricating such fine strands into webs of around 70 mesh, the wires are quite expensive.

In the normal course of operation the wires deteriorate and, consequently, must be replaced. However, the replacement of a wire on a Fourdrinier machine is a difficult, if not tedious, task because of the character of the wire and the danger of damaging the delicate wire. At the same time, it is of primary importance that the wire be replaced in the least possible time so that the Fourdrinier machine may be returned to use with a minimum loss of production.

In the past several methods and machine arrangements have been disclosed for facilitating changing of wires on the wet end of Fourdrinier machines. However, these methods and arrangements have not always assured rapid wire replacement with a minimum possibility of damage.

Accordingly, the principal object of the present invention is to provide improved means for efficiently changing wires on Fourdrinier machines. Another object of the invention is to provide an improved arrangement of parts in a Fourdrinier machine, which arrangement greatly facilitates wire replacement. A still further object is the provision of a new method for changing Fourdrinier wires.

Additional objects and advantages of the invention will become apparent through reference to the accompanying drawings and following description of the invention.

In the drawings:

Fig. 1 is a schematic, fragmentary plan view of the wet end of a Fourdrinier machine, the view showing a step in the replacement of the wire on the machine.

Fig. 2 is a schematic, front elevational view of the wet end of the machine shown in Fig. 1;

Fig. 3 is a view taken along line 3-3 in Fig. 2 and shows the wire in position to be applied to a portion of the wet end of the machine;

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Fig. 4 is a schematic view similar to Fig. 1, the table section of the machine being shown in a position removed from the machine;

Figs. 5 and 5a are front views of a portion of the auxiliary structure employed for replacing the wire on the machine. The views illustrate successive steps in replacing the wire;

Fig. 6 is a schematic illustration showing another manner of applying the wire to the machine;

Fig. 7 is a side elevational view of still another manner for applying the wire to the machine; and

Fig. 8 is a side elevational view of a portion of the structure shown in Fig. 7.

The general construction of Fourdrinier machines is well known and, therefore, many of the elements of such machines have been omitted from the drawings for purposes of clarity, the drawings merely illustrating those elements of the wet end of a Fourdrinier machine which are thought necessary for a clear understanding of the invention. Accordingly, such well known parts of the wet end as deckle straps, drive means, dandy roll, wire shaking mechanism, etc., are not illustrated in the drawings but it will be understood that these elements will be employed when the machine is employed for the production of paper.

The wet end of the Fourdrinier machine, designated generally by the numeral 1, is located between the headbox and the press section which is adapted to remove additional water from the web after it leaves the Fourdrinier wire. The headbox and associated apparatus and the press section are not shown in the drawings but these may be any of the several arrangements which are well known to those familiar with the production of paper.

The machine 1 has a front side 3 which faces on a front aisle 5 provided for the machine tenders and for maintenance purposes. A rear aisle 7 extends along the rear side 9 of the machine 1, parallel to the front aisle 5, this aisle 7 usually providing access to the driving units of the machine 1 and other apparatus which are connected to the machine.

As shown in the drawings, the wet end of the Fourdrinier machine 1 includes a table section 11 which is located at the end of the machine adjacent the headbox, this end being referred to hereinafter as the "upstream" end. A couch or suction roll 13 is disposed at the other or "downstream" end of the machine and a suction box section 15 is disposed between the couch roll 13 and table section 11, the suction box section 15 being operable to positively draw water from the web.

A Fourdrinier wire 17 extends around the table section 11, suction box section 15, and couch roll 13. The wire 17 travels from the upstream end to the downstream end along the top of the machine 1, returning to the upstream end over guide rolls 19 and a stretch roll 21. In order to facilitate replacement of the wire 17 upon the wet end of the machine 1, the machine further includes wire replacing means, designated generally by reference numeral 23, which is associated in part with the suction box section 15.

The table section 11 is normally located over a pit 25 which is adapted to collect water removed from the stock passing over the table section 11 for return to and use in preparation of the stock. The table section 11 is laterally movable into the front aisle 5 and comprises a frame 27 supported upon pedestals, including a front pair and a rear pair of pedestals, 29 and 31, respectively. Wheels 33 are attached to the frame 27 in order to facilitate lateral movement of the table section 11, a pair of spaced tracks 35 being provided for the wheels. The tracks 35 extend transversely of the machine 1 across the pit 25 and may be permanently attached to the pedestals 29, 31 or removable as desired. Additional tracks 37 are temporarily aligned with the tracks 35 extending across the pit when the table section 11 is to be moved into the front aisle 5. These additional tracks 37 are supported between the front pair of frame supporting pedestals 29 and a pair of support blocks 39 which are temporarily disposed in the front aisle 5 when the table section 11 is to be moved laterally.

The frame 27 of the table section 11 supports a plurality of transversely extending table rolls 41 which are

located in spaced relation along the length of the Fourdrinier machine 1 and a longitudinally adjustable, transversely extending breast roll 43. The number of table rolls 41 varies in different installations and is determined in part by the character of the stock and the type of paper being produced. The breast roll 43 is preferably supported in roller bearings (not shown) and is usually light in weight and finely balanced, as it is driven by the wire 17. This roll is supported at the upstream end of the Fourdrinier wire upon a subframe (not shown) attached to the frame 27 of the table section 11, the subframe permitting the breast roll to be swung downwardly from the normal operating position shown by dotted lines in Figs. 1 and 2 to a position under the table rolls 41 (Figs. 1 and 2) and toward the downstream end of the machine in order to facilitate replacement of the wire 17. Various arrangements for supporting a breast roll 43 on a frame for such swinging movement are well known.

The suction box section 15 is located adjacent and downstream of the table section 11, this section including a support frame having a removable front section (not shown) and a rear section 45 of reinforced construction. The suction box section 15 further includes a plurality of transversely extending suction boxes 47, the number of boxes varying in different Fourdrinier machines. The boxes 47 are supported by the machine frame (not shown) during operation. When the wire 17 is changed, the boxes 47 are supported in a manner to be hereinafter described. The suction boxes 47 are connected to a source of vacuum through conduits (not shown). A pair of tube rolls 49 are shown intermediate the suction boxes 47, these rolls facilitating travel of the wire 17 over the suction box section 15 and used in conjunction with a dandy roll (not shown) disposed above the wire 17.

The couch roll 13, which is usually made of brass and carefully ground to provide a smooth, true surface, is located at the downstream end of the suction box section 15. This roll provides the drive for the wet end of the Fourdrinier machine and is often connected with a clutch to a driving cone or is driven directly by an electric motor. The roll 13 includes a transversely extending shaft 51 which is rotatably supported in a removable frame (not shown) at the front end and by a reinforced frame at the rear end 53, this latter frame section being adapted to cantilever the roll 13 so that it may be supported independent of the front frame when the wire 17 is being changed.

The guide rolls 19 are supported along the lower part of the machine, those located within the wire run during operation being journaled on the machine frame. The guide rolls 19 which are disposed outside the wire run are mounted on sole plates (not shown). In the machine 1 shown in the drawings, the wire 17 travels over the crown of the rolls located under the suction box section 15, and under the rolls adjacent the stretch roll 21 which is adjustably supported on the machine frame. It will be understood that this arrangement may be varied as desired.

The wire replacing means 23 is adapted to move a loop of wire which defines an area greater than that outlined by the suction boxes 47 and couch roll 13 when viewed in cross section inwardly over these elements of the Fourdrinier machine 1. The loop, shown at 55 in the drawings, is formed by unwinding a wire bundle or chuck 57 on which is wound a new wire 17. The bundle 57 is commercially available and includes a core of two wire poles 59, one end of the wire being looped around one pole and the wire being wound around the core. A third wire pole 61 is included in the bundle 57, the other end of the wire 17 being looped around this pole. A pair of circular members 62 may be attached to opposite ends of the poles 59 (Figs. 2 and 3) to facilitate unwinding of the wire 17. On the other hand, these circular members 62 may not be used (Figs. 5, 5a).

The wire replacing means 23 comprises a skeleton frame section 63 adapted to support the wire bundle 57 and a frame support 64 associated with the suction box section 15. The frame support includes a pair of longitudinally spaced, extensible beams 65 which are disposed transversely of the machine 1, each extensible beam 65 including a fixed member 69 which is cantilever supported by the rear frame 45 of the suction box section 15, as shown, and a transversely movable member 71 which is attached to the fixed member 69. The fixed

members 69 are interconnected by beams 69a which extend transversely thereof.

The fixed members 69 are adapted to support the suction boxes 47 and this is accomplished by supporting the boxes on rails 69b which are carried by posts 69c mounted upon the fixed beams 69.

The movable beam member 71 is slidably supported on the fixed member 69 so that it may be pulled into the front aisle 5, rollers 73 being attached to the movable member 71 which engage guideways 75 formed on the fixed member 69 to facilitate relative movement between the parts of the beam 65. The front ends of the beam 65 may be supported as by the detachable roller arrangement 77 shown in Fig. 3 so that undue strain is not placed upon the movable beam 71. The movable members 71 are preferably proportioned to extend into the front aisle 5 a distance greater than the width of the wire 17 and one of the members 71 supports transversely spaced storage brackets 79 so that poles will be convenient for use in replacing the wire 17 as will appear more clearly hereinafter. A plurality of poles (Fig. 5) are stored in these brackets 79 for use in replacing the wire 17.

The skeleton frame section 63 is adapted for assembly on the movable members 71 of the extensible beams 65 and includes a pair of spaced, longitudinally extending beams 81 which are supported upon the movable beam members by vertically extending posts 83, the posts being releasably attached to the extensible beams 65. In this connection, apertures 85 are formed in the movable section 71 of the beams 65 for receiving the posts 83, the posts being provided with collars 87 for supporting the posts in the apertures. Each of the longitudinally extending beams 81 supports an arcuate or curved tubular member 89 which extends from the downstream end of each beam 81 horizontally outwardly of the couch roll 13 and curves downwardly. Suitable attaching means are provided on the longitudinally extending beams 81 for supporting the arcuate members 89 and the drawings show that the beams 81 are provided with recesses proportioned to receive the arcuate members 89 whereby these members may be easily attached and detached from the beams 81 by insertion in and removal from the recesses.

Several pole receiving brackets are supported upon the skeleton frame section 63 including brackets 93 attached adjacent the lower ends of the arcuate members 89 and brackets 95 disposed along the curved edges of the arcuate members 89 which are positioned so that the wire 17 is held outwardly of the periphery of the couch roll 13 (Fig. 2). Additional brackets 97 are attached to the movable members 71 of the extensible beams 65. All of the brackets 93, 95, and 97 are generally semi-circular, being adapted to receive and support transversely extending wire poles 99 which support the wire loop 55 for movement over the suction box section 15 and couch roll 13.

The wire replacing means 23 further includes a pair of bracket supporting posts 101 which are temporarily disposed, when the wire 17 is being replaced, in the front aisle 5 downstream of the extensible beams 65 (Fig. 5). These posts 101 support brackets 103 adjacent their upper ends the brackets being proportioned to receive a wire pole which is usually the third pole 61 of the wire bundle 57. The posts 103 are transversely spaced in the front aisle 5 and are supported in vertical position in wells 105 provided in the aisle 5, it being understood that other supporting means may be employed.

In order to apply a new wire 17 to the wet end of the Fourdrinier machine 1, the bracket supporting posts 101 are first placed in the aisle 5, and the third pole 61 of the bundle 57 of new wire to be applied to the machine is placed in the brackets 103 on these posts 101. The wire bundle 57 is then unwound to form the loop portion 55 which is of sufficient size to receive the extensible beams 65 within the periphery of the wire 17 (Fig. 5). The movable members 71 of the extensible beams 65 are pulled outwardly into the loop 55 defined by the wire 17, whereupon the skeleton frame 63 is assembled thereon by first placing the posts 83 on the movable members 71 and then the longitudinally extending beams 81 are connected to the upper ends of the posts 83. These beams 81 are adapted to support the unextended portion of the wire bundle 57 and, consequently, the wire bundle 57 is placed on the beams 81 as shown in Fig. 5.

The arcuate tubular members 89 are then attached to

the longitudinally extending beams 81, and the third pole 61, which was temporarily supported on the bracket supporting posts 101, is moved downstream to the brackets 95 on the arcuate edge of the tubular members 89. The temporary posts 101 may then be removed.

It will be noted that when the extensible beams 65 are moved into the loop 55, wire poles 99 are also moved into the loop so as to be conveniently available for use in supporting the wire loop on the wire replacing means 23.

In order to shape the loop 55 to fit over the guide rolls 19, a wire pole 99 is removed from the pole supporting brackets 79 on one of the extensible beams 65 and is placed in the brackets 93 located at the lower end of the arcuate members 89 (Fig. 5a) and another pole 99, which is preferably outside the loop 55, is placed on the brackets 97 supported on the extensible beam 65 adjacent the arcuate member 89, the wire being trained around the wire pole 99 supported on the arcuate member 89 and over the wire pole 99 supported on the beam 65 (Fig. 2). Another pole 99 is then taken from the pole supporting brackets 79 and placed within the loop 55 on the brackets supported on the extensible beam adjacent the table section 11. As a result, a wire loop 55 of definite shape is defined which is adapted to fit over the couch roll 13, suction box section 15 and the guide rolls 19 disposed below the suction box section (Fig. 2).

By supporting wire poles 99 on the extensible beams 65, the poles 99 are located within the loop of wire so as to be readily available and this is a particularly advantageous feature in view of the fact that the front aisle 5 may be of minimum width because extra space is not needed to place the poles within the loop. In addition, by having the poles readily available within the loop the possibility of damaging the wire 17 is minimized, which damage might easily occur in moving the poles from a point outside the loop into the loop. This will be more apparent when it is noted that the wire poles 99 will often have to be over twenty feet in length due to the width of the wire 17.

It should be noted that all of the above operations may take place prior to shutting down of the Fourdrinier machine 1. This feature is of particular importance, because it substantially decreases the time loss and consequent expense in replacing the Fourdrinier wire.

In order to continue replacement of the wire 17, the machine 1 should be shut down, and the old and worn wire removed therefrom. It will be necessary to then move the front supports for the suction box section 15 and the couch roll 13, supporting the suction box section 15 on the cantilevered beams 69 by means of support members 69a, 69b, and 69a and cantilevering couch roll 13 whereupon the extensible beams 71 may be moved rearwardly, carrying the wire loop 55 and bundle 57 over the suction box section 15 and couch roll 13. The table section 11 should now be moved into the front aisle 5, the breast roll 43 retracted, and the wire bundle 57 completely unwound over the pit 25.

As the bundle 57 is unwound, wire poles 99 are placed, at spaced intervals, within the unwound wire 17 and supported by lines 107 from a deckle lift normally provided in the mill or other overhead structure of the mill. In this connection, the wire poles 99 used on the wire replacing means 23 may be removed and re-employed for hanging the remainder of the wire 17. The lines 107 support the wire 17 so as to define a loop of sufficient size to receive the table section 11. The table section 11 may then be moved into the loop defined by the unwound wire 17, the breast roll 43 moved outwardly to its normal operating position, and the stretch roll 21 adjusted to properly tension the wire 17 on the machine 1. The machine is then ready for operation.

The above described machine arrangement and method for replacing the wire 17 upon the machine 1 provides means for rapidly changing the wire 17 with a minimum loss of operating time and the least possible damage to the wire 17. It should be noted that in applying the wire to the machine in the above described manner, it is not necessary to slip the wire on the poles 99, which feature further decreases the likelihood of damage to the wire 17 when being placed upon the machine 1. In addition, the method described above for applying the wire 17 to the machine 1 only requires handling of a portion of the wire when unwound at any time and, as

a result, the wire may be more easily controlled and less labor is required to place the wire upon the machine.

Two modified arrangements for replacing the wire 17 on the machine 1 are shown in Figures 6, 7 and 8 of the drawings. The arrangement shown in Figure 6 is substantially the same as that previously described. However, in this arrangement a carriage 115 is provided for carrying the wire bundle 57 toward the upstream end of the machine 1 after the wire has been hung on the suction box section 15 and couch roll 13 in accordance with the above mentioned method. The carriage 115 is supported upon a pair of tracks 117 which extend longitudinally along each side of the pit 25.

The carriage 115 includes a frame section 119 fabricated from suitable angle and plate sections, and wheels 121 which are attached to the frame section 119 for movably supporting the carriage 115.

In order to facilitate unwinding of the bundle 57, a suitable arrangement should be provided on the carriage 115 for rotatably supporting the bundle 57. This arrangement may comprise a pair of circular sections 125 which are attached to the core poles 59 of the bundle 57 at opposite ends thereof. These circular sections 125 may be supported in arcuate sections attached to the frame section 119, thereby permitting the bundle 57 to be rolled in these arcuate sections as the carriage 115 is moved toward the upstream end of the machine 1. Of course, rollers may be provided to facilitate unwinding.

It will be understood that the table section 11 has been previously moved out prior to supporting the bundle 57 on the carriage and the loop for receiving the table section 11 is formed by moving the carriage toward the upstream end and inserting wire poles 99 under the wire to support it intermediate the suction box section and upstream end of the machine 1. These wire poles 99 which support the wire 17 may be connected to the conventional deckle lift provided in the mill. After the carriage 115 has been moved to the upstream end of the machine 1 and the wire 17 has been completely stretched, the carriage 115 should be removed from the tracks 117 and the table section 11 moved into the loop which has been previously formed.

The modified arrangement shown in Figures 7 and 8 may be substituted for the wire replacing means 23 previously described. The wire replacing means of the modified structure, designated generally by the numeral 127, and shown particularly in Fig. 8, includes a truck 129 upon which is supported a frame structure 131, the frame structure extending downstream from the truck 129.

The truck 129 includes a platform 133 which is movably supported on wheels 135 which are connected thereto by suitable means. The wheels 135 are supported upon tracks 137 which extend across the pit 25 and may extend into the front aisle 5 to permit transverse movement of the truck 129. The tracks 137 are located adjacent the upstream end of the suction box section 15 of the machine 1 and the truck 129 may be located on the tracks at all times. The platform 133 is adapted to support the wire bundle 57 which includes the circular end member 62 when the wire 17 is being placed upon the machine 1 and a stop 139 is supported on the platform to prevent the bundle 57 from rolling off this platform. The platform 133 also supports a frame supporting section 140.

The frame structure 131 is detachably connected to the truck 129 and includes a pair of transversely spaced, longitudinally extending beams 141 which are proportioned to extend from the upstream end of the suction box section 15 outwardly of the downstream end of this section, each of these beams being supported at one end by a post 143 attached to the frame supporting section 140 and being supported adjacent the other end by a vertical member 145 which is supported on a wheel 147. The wheel 147 is adapted to move on a channel section 149 which extends across the pit 25 and into the front aisle 5. The beams 141 connect to arcuate members 151 at the downstream end, the arcuate members extending outwardly and downwardly of the couch roll 13 and supporting brackets 153 along the curved portion of the arcuate members 151. Brackets 155 are also connected to the lowermost end of the arcuate members. Additional brackets 157 are attached to the beams 141 adjacent the upstream end of these beams and brackets 159 are connected to the vertical members 145 intermediate their ends.

When this modified arrangement 127 is employed for placing the wire 17 on the machine 1, the truck 129 is moved into the front aisle 5 and a wire bundle 57 placed upon the platform 133 of the truck. The bundle 57 is then unwound to provide a loop and the loop may be temporarily supported by the brackets 103 on the posts 101 in the same manner as previously described, i. e. pole 61 is placed in brackets 103. On the other hand, pole 61 may be temporarily supported in brackets 160 on posts 143 to provide a loop within which poles 99 may be carried. For the latter purpose, a storage bracket 129a may be carried by the truck 129. The frame structure 131 is then assembled on the truck 129, and wire poles 99 are placed in the brackets 153, 155, and 159, wire pole 61 being placed in brackets 157, to define a loop which is adapted to fit over the suction box section 15, the couch roll 13, and the guide rolls 19. The truck 129 and frame structure 131 are then moved rearwardly over the elements of the machine 1.

The table section 11 is then moved outwardly, and the wire bundle is rolled on the circular end members 62 toward the upstream end of the machine 1. These circular members 62 are rolled on curbs 163 disposed along opposite sides of the pit 25. Wire poles 99 are hung from a conventional deckle lift arrangement (not shown) provided in the mill so as to define a loop having a large enough size to fit over the table section 11. The table section 11 may be then moved into the loop, the breast roll 43 and stretch roll 21 being adjusted to properly tension the wire 17, whereupon the machine is ready for operation.

The features of the invention which are believed to be new are set forth in the following claims.

I claim:

1. A Fourdrinier machine comprising an elongated frame having a front side and a rear side, a table section movable transversely of said frame, a plurality of transversely extending suction boxes supported on said frame adjacent said table section, a couch roll disposed

downstream of and adjacent said suction boxes, means for cantilevering said suction boxes and said couch roll to said frame at the rear ends thereof, a pair of transversely extensible beams, means for cantilevering said beams at the rear end to said frame, a frame structure carried by and detachably connected to said beams, said frame structure including a pair of longitudinally extending beams which are disposed above said suction boxes and which extend downstream and outwardly of said couch roll, and transversely extending poles carried on said longitudinally extending beams.

2. A Fourdrinier machine having an upstream end and a downstream end comprising an elongated frame having a front side and a rear side, a plurality of suction boxes, a couch roll disposed downstream of said suction boxes, means for cantilevering said suction boxes and said couch roll at the rear end to support said suction boxes and said couch roll transversely of said frame, a pair of transversely extensible beams disposed below said suction boxes, means for cantilevering said beams on said frame at the rear end, a pair of transversely spaced, longitudinally extending beams attached to said extensible beams and disposed above said suction boxes, an arcuate member attached to each of said longitudinally extending beams and extending downstream thereof, said arcuate members being disposed outwardly of and downstream of said couch roll, transversely extending poles attached to said arcuate members and to said extensible beam to support a wire loop having an area greater than the cross-sectional area of said suction boxes and said couch roll.

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