May 28, 1935. E. E. BERRY 2,003,103

MEANS AND METHOD OF STRINGING A FOURDRINIER WIRE

Filed Aug. 20, 1932 4 Sheets-Sheet 1

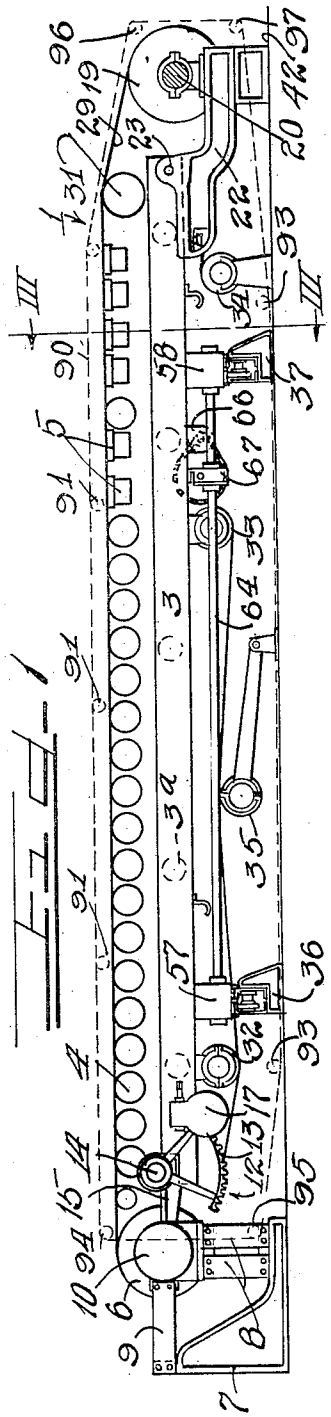

Fig. 1

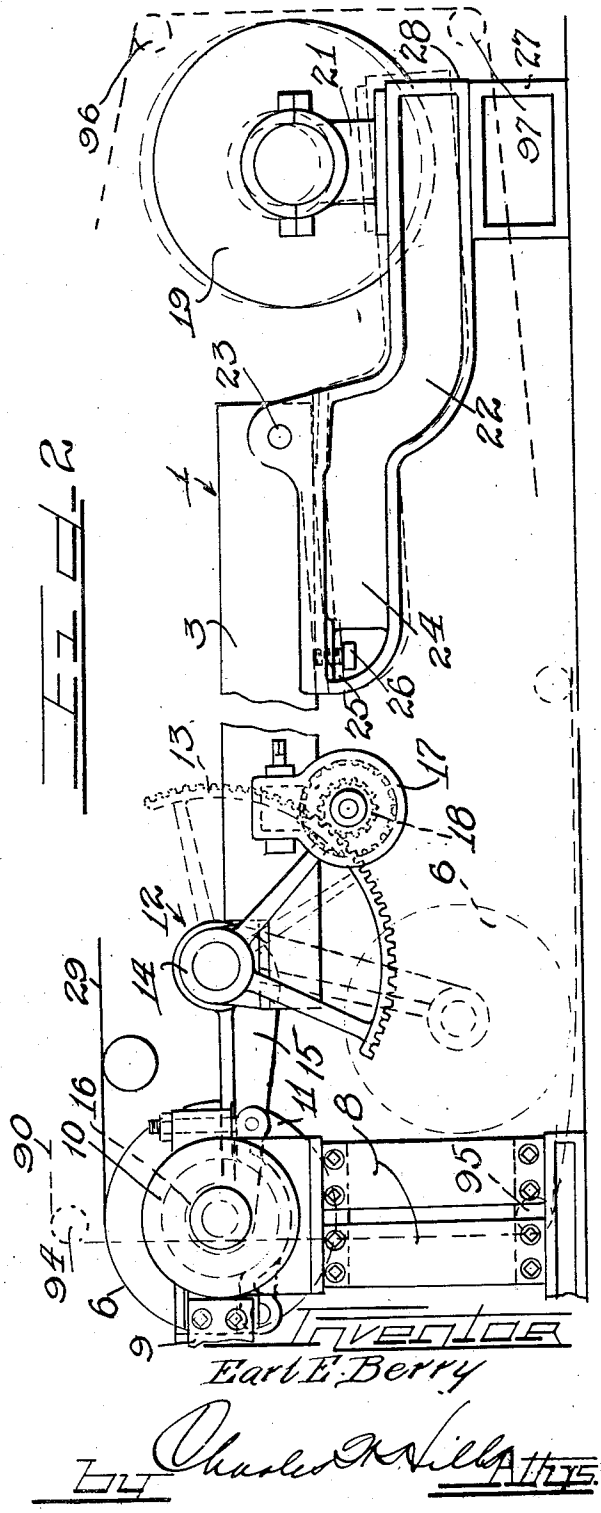

Fig. 2

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MEANS AND METHOD OF STRINGING A FOURDRINIER WIRE

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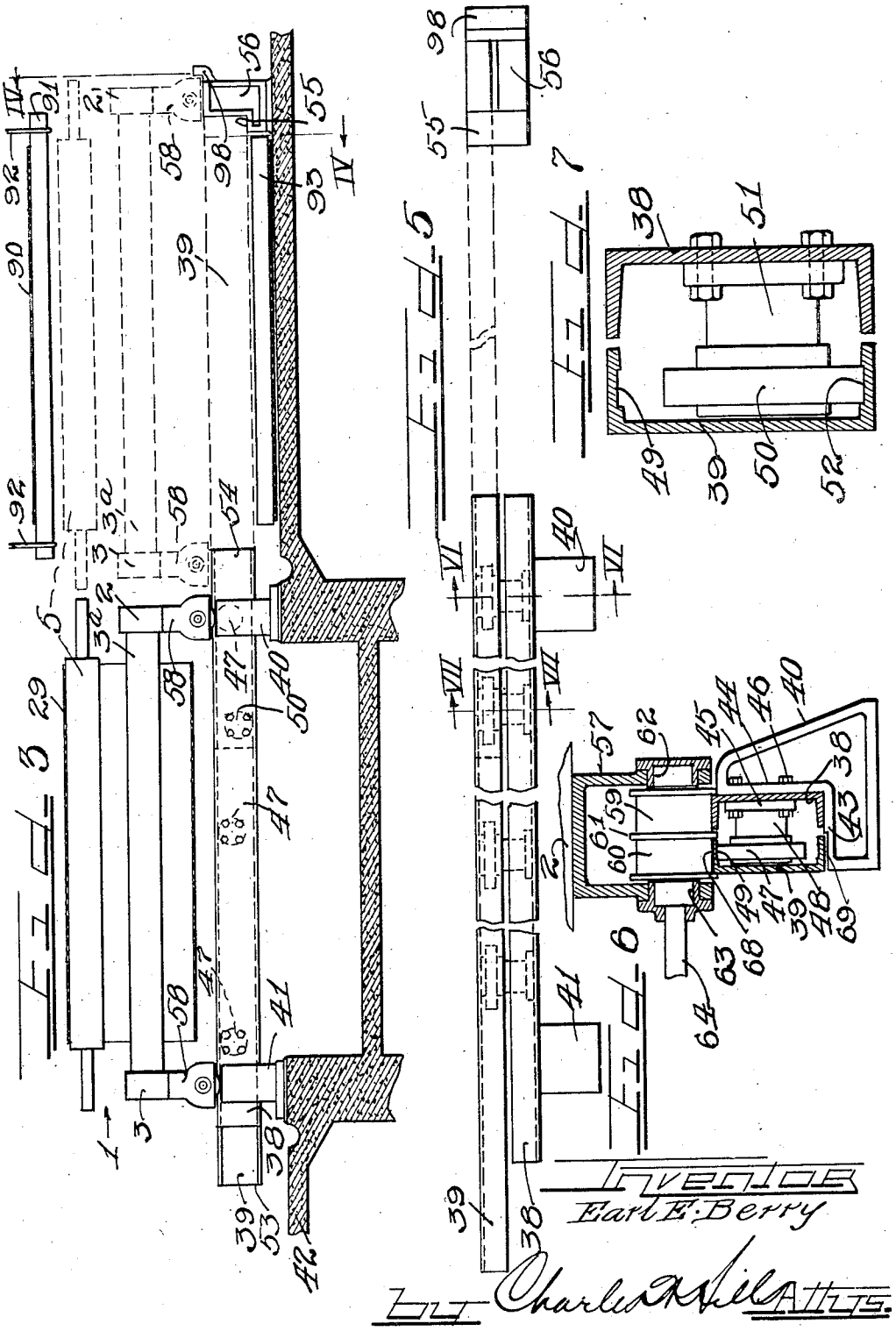

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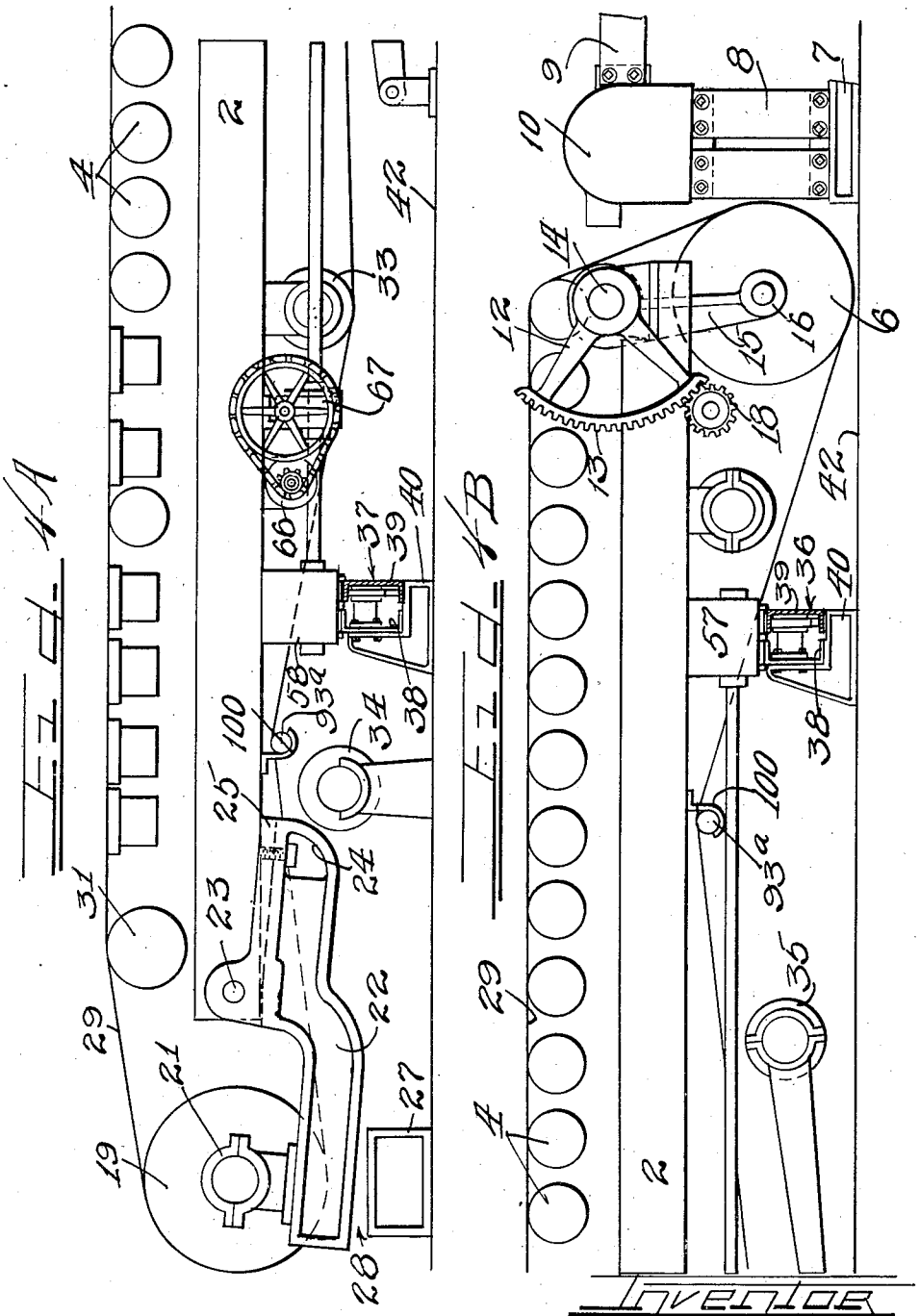
MEANS AND METHOD OF STRINGING A FOURDRINIER WIRE

Filed Aug. 20, 1932 4 Sheets-Sheet 3



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MEANS AND METHOD OF STRINGING A FOURDRINIER WIRE

Filed Aug. 20, 1932 4 Sheets-Sheet 4

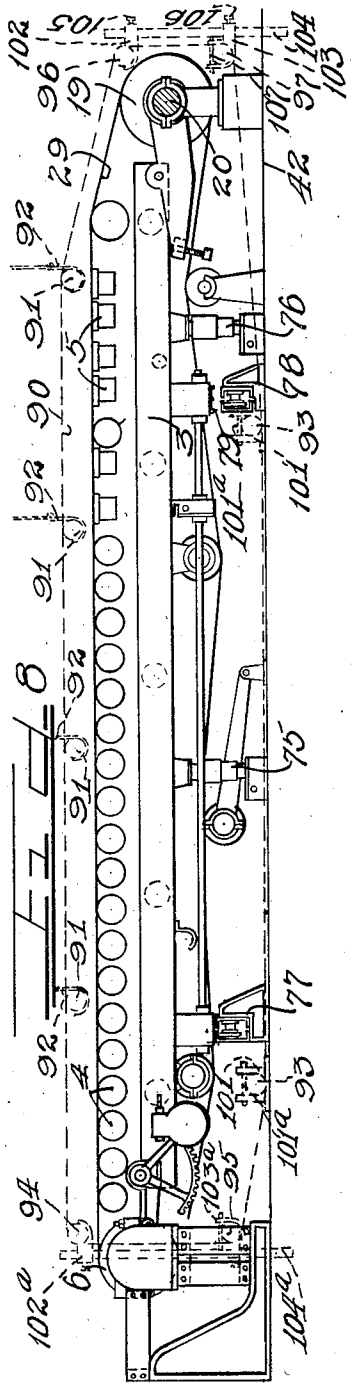

Fig. 8

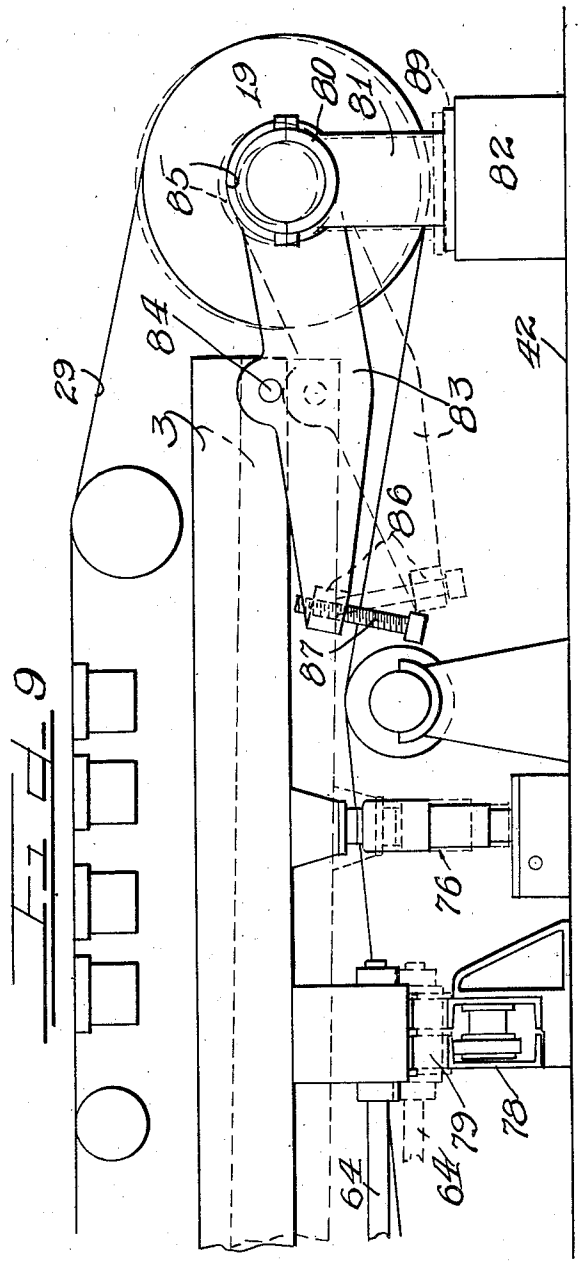

Fig. 9

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2,003,103

UNITED STATES PATENT OFFICE

2,003,103

MEANS AND METHOD OF STRINGING A FOURDRINIER WIRE

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Application August 20, 1932, Serial No. 629,716

45 Claims. (Cl. 92—44)

This invention relates to a means and method of stringing a Fourdrinier wire on a paper making machine of the Fourdrinier type provided with a laterally removable table structure.

In one of the heretofore known and generally practiced methods of replacing an old wire with a new Fourdrinier wire on a removable type of Fourdrinier paper machine, the old wire is first removed from the table structure and the table structure moved out laterally from the machine; the new wire is then suspended in an open loop in line with the machine, between the sills thereof; and the table structure is run back into place within the loop of the new wire. The wire is then tightened in place on the table structure, with the elements thereof properly arranged in operating position. While there are various modifications of this general method of stringing a new wire, all of the practical methods, so far as I am aware, involve the stringing of the wire in the line of the machine.

The operation of unwinding a roll or spool of a new Fourdrinier wire, especially on a big machine where the Fourdrinier itself may be over twenty feet wide and over a hundred feet long, consumes a considerable amount of time, because the wire must be handled very carefully in order not to wrinkle it or otherwise damage it. There have been several schemes devised for pulling the wire over the Fourdrinier frame structure, but this is a very delicate operation, and almost impossible to perform on a large machine without damaging the wire. In such an operation, both the top and bottom runs of the wire must be pulled at exactly the same rate of speed at several points for its entire length, for if it is pulled on slightly faster in one place than in another, the wire is liable to be wrinkled. It is also necessary, in this class of operation, to slide the wire over some stationary support and this gives rise to many difficulties.

My present invention obviates the difficulties of the heretofore methods of stringing a new wire on a removable type Fourdrinier and at the same time greatly reduces the amount of time lost in the stringing operation. One of the principal features of my invention is the provision of means for stringing the new wire in an open loop alongside of the operating position of the Fourdrinier frame structure. By my method, the new wire can be suspended in looped position while the machine is still running, and then after the old wire has been removed from the Fourdrinier frame structure, the latter can be run out into the loop of the new wire, the wire tightened thereon and the Fourdrinier frame structure run back into position in the machine. In this way, the amount of productive time lost in the changing of a wire on a paper machine is considerably reduced.

It is therefore an object of this invention to provide a means and method for stringing a new wire on a laterally removable type of Fourdrinier paper machine, according to which the disadvantages and difficulties present in heretofore known practices are largely eliminated or reduced and a saving in the productive time of operation of the machine is effected.

It is a further object of this invention to provide a means and method for stringing a new wire on a removable type Fourdrinier paper machine, in which the new wire is suspended in an open loop in the aisle of the machine room outside of the operating line of the machine and means are provided for laterally moving out the Fourdrinier frame structure into the loop of the wire and for returning the Fourdrinier frame structure into operative position with the new wire in place thereon.

It is a further important object of this invention to provide a novel manner of mounting and supporting a couch roll to permit the couch roll to be moved out laterally with the Fourdrinier frame structure and to permit the couch roll to be supported in operative position independently of the pitch of the Fourdrinier frame structure.

It is a further important object of this invention to provide a novel arrangement of tracks for supporting the Fourdrinier frame structure in operative position and for lateral removal thereon during the operation of changing the wire.

It is a further important object of this invention to provide a Fourdrinier frame structure capable of adjustment as to pitch and an arrangement of tracks for supporting the Fourdrinier frame structure when lowered thereon for lateral removal and means including said tracks for supporting the entire weight of the Fourdrinier frame structure during lateral removal and in its removed position.

A further important object of this invention is to provide means for stringing a new wire on a laterally removable Fourdrinier paper machine that includes a laterally removable Fourdrinier frame structure and means for supporting both the breast roll and couch roll therefrom for removal therewith as a unit.

It is a further important object of this inven-

tion to provide means for suspending a loop of a new Fourdrinier wire outside of the line of operation of the paper machine and a track structure and external support so arranged as to support the Fourdrinier frame structure within the loop of the new wire and out of contact therewith when the Fourdrinier frame structure is moved into its laterally removed position.

It is a further important object of this invention to provide sets of tracks, each including a fixed and a movable track, with the tracks normally position below the lower run of the wire and the movable tracks freely movable when the Fourdrinier frame structure is supported on the fixed tracks and when the frame structure is in laterally removed position supported jointly by the fixed tracks and external supports.

Other and further important objects of this invention will become apparent from the following description, the drawings and appended claims.

The invention (in a preferred form) is illustrated in the accompanying drawings, in which

Figure 1 is an elevational view of the rear or back side of the Fourdrinier portion of a paper machine of the constant pitch type, illustrating more or less diagrammatically the construction embodying the principles of my invention and showing in dotted lines the position of a new Fourdrinier wire suspended in an open loop alongside and out of the operating line of the machine.

Figure 2 is an enlarged broken view of the breast roll and couch roll ends of the Fourdrinier frame structure showing in dotted lines the operation preparatory to moving the frame structure out of the machine in the stringing of the new wire.

Figure 3 is a transverse sectional view taken substantially along the line III—III of Figure 1 with parts in elevation, showing in dotted lines the method of operation, with the frame structure in removed position and means suspending the new wire in an open loop outside of the line of the machine for receiving said frame structure.

Figure 4A is a sectional view taken substantially along the line IV—IV of Figure 3, showing the couch roll half of the Fourdrinier frame structure in laterally removed position and Figure 4B is the same view of the breast roll half of the frame structure, showing the wire tightened in place on the frame structure preparatory to moving the same back into the machine.

Figure 5 is an enlarged top plan, broken view of one set of track structures and external supports therefor, showing the operation in dotted lines.

Figure 6 is an enlarged sectional view taken substantially on line VI—VI of Figure 5, with parts in elevation.

Figure 7 is an enlarged sectional view taken substantially on line VII—VII of Figure 5, with parts in elevation.

Figure 8 is a side elevational view of a modified form of construction of the Fourdrinier part of a paper machine, embodying the principles of my invention in connection with a variable pitch type of machine, showing in dotted lines means for suspending the new wire in an open loop for receiving the machine therein.

Figure 9 is an enlarged, fragmentary view of the couch roll end of the Fourdrinier frame structure shown in Figure 8.

The reference numeral 1 (Figures 1 to 7 inclusive) indicates generally a Fourdrinier frame structure forming a part of a Fourdrinier paper machine of the constant pitch type. Said Fourdrinier frame structure comprises a pair of longitudinally extending side beams, a front side beam 2, and a rear side beam 3, and suitable cross beams and braces 3a. The usual table rolls 4 and flat suction boxes 5 are supported in the usual manner from the side beams 2 and 3. A breast roll 6 is mounted upon supports 7 in such manner as to be shakable independently of the Fourdrinier frame structure. The particular manner of mounting and the construction of the associated parts for supporting the breast roll 6 are best shown in my U. S. Patent No. 1,880,685, granted October 4, 1932. Only so much of the mounting of the breast roll 6 will be described here as is necessary to an understanding of the present invention.

Said breast roll 6 is mounted separately from the Fourdrinier frame structure upon spring supporting members, including vertical spring members 8 and horizontal spring members 9. Said spring members 8 and 9 are suitably secured to bearing boxes, indicated generally by the reference numeral 10, for supporting the front and rear ends of the breast roll 6. Each of said bearing boxes 10 is provided with a lower hinged section 11 that can be released to provide an opening through which the journals of the breast roll 6 may pass in the direction of the table structure.

A mechanism, indicated generally at 12, is provided on the Fourdrinier frame structure for supporting the breast roll 6 at the ends thereof and for moving said breast roll from its normal operating position to a position depending from the Fourdrinier frame structure, as indicated in dotted lines in Figure 2. Said mechanism 12 comprises a sector gear 13 mounted at each end of a transverse shaft 14 supported from said side beams 2 and 3. Said shaft 14 also carries, at each end, an arm 15 rigidly keyed thereto and having at its outer or free end a yoke 16 encircling but not tightly engaging the shaft of the breast roll 6.

A suitable drive mechanism 17, including pinion gears 18 meshing with the gear segments 13, serves to actuate the shaft 14 to move said arms 15 with the breast roll 6 supported thereon from operating position to the depending position indicated in dotted lines in Figure 2 and in full lines in Figure 4B. When in the latter position, the breast roll 6 is entirely supported from the movable Fourdrinier frame structure, clear of the vertical supports 8.

A couch roll 19 is mounted at the opposite end from the breast roll. Said couch roll 19 may be of the plain or suction type, but preferably is a suction couch roll provided with a clutch operated driven shaft, as indicated at 20 (Fig. 8) and with sectional, or otherwise detachable suction pipe connections. The ends of the suction couch roll 19 are journalled in bearing boxes 21, which, in turn, are supported upon auxiliary frame members 22. Said frame members 22 are pivoted as at 23 to the side beams 2 and 3 adjacent the ends thereof. Each of the auxiliary frame members 22 is provided with an integral extension 24 having a laterally offset portion 25 that extends beneath the lower edge of a side beam. A bolt 26 is threaded through said offset portion 25 to bear against the lower side of the corresponding adjacent side beam 2 or 3. In operation, the bolts 26 normally do not bear against the underside of

the beams 2 and 3 but the outer ends of the auxiliary frame members 22 rest directly upon supporting members or pedestals 27, which thus bear the entire weight of the couch roll 19.

As will later be explained in greater detail, however, when it is desired to remove the table structure laterally, the bolts 26 are turned up against the underside of the side beams 2 and 3 to raise the extended ends of the auxiliary frame members 22 about the pivot axis 23 so as to provide a clearance, indicated at 28, (Figures 2 and 4A), between the lower sides of the auxiliary frame members 22 and the pedestals 27. This elevated position of the couch roll 19 is indicated in dotted lines in Figure 2 and in full lines in Figure 4A.

When the machine is in normal operation, a wire 29 extends around the breast roll 6 and couch roll 19, with the upper run of the wire supported by the table rolls 4, suction boxes 5 and auxiliary roller 31. The lower run of the wire 29 is properly guided and tensioned by means of guide rollers 32, 33, and 34, and a tension roller 35. All of said rollers 32, 33, 34 and 35 are so mounted and positioned that the lower run of the wire 29, in operation, lies above and clears track members 36 and 37 that are provided for supporting the Fourdrinier frame structure in operating and laterally removed position.

Each of the sets of tracks 36 and 37, comprises a stationary track 38 and a movable track 39, as best shown in Figs. 3 to 7 inclusive. Each of the stationary tracks 38 is supported at its front and rear ends by pedestals 40 and 41, respectively. Said pedestals 40 and 41 rest directly upon the flooring or other support 42 that forms the supporting base for the paper machine.

Each of the supports 40 and 41 is of substantially the same construction and comprises a casting formed with a foot or extension 43 and an upright portion 44 (Fig. 6). Each stationary track 38, which may suitably be formed from a channel beam, is attached to an upright portion 44 of a pedestal by means of a plate 45 and bolts 46, with the web of the channel beam held against the vertical face of the upright portion 44 and the lower leg of the channel beam resting upon the foot 43. Each of the tracks 39, which may also be a channel beam, is mounted in parallel, spaced relationship to a fixed or stationary track 38 and is supported and guided by rollers carried by said stationary track 38. One of said rollers 47 (Fig. 6) is rotatably mounted upon each of a plurality of stub shafts 48 carried from a stationary rail 38. Said rollers 47 support the movable tracks 39 through their upper webs, which are provided on their inner faces with longitudinally extending grooves 49 into which the faces of the rollers 47 extend.

Each of the sets of tracks 36 and 37 is also provided with at least one roller 50 (Fig. 7) that is positioned near the front side of the machine and supported similarly to the rollers 47, as by means of a stub shaft 51 from a stationary track 38, except that each roller 50 is placed at a lower level in order that its face may run in a groove 52 extending longitudinally of an inner face of a lower web of a track 39.

Each of said movable tracks 39 is considerably longer than the corresponding stationary track 38, so that in normal position it extends beyond the end of the corresponding track 38 at the rear side of the machine, as at 53 (Fig. 3). Both ends of the movable and stationary tracks, in normal position, extend slightly beyond the forward pedestal 40 to terminate together as at 54.

When the movable tracks 39 are pulled out on the front side of the machine into their extended positions, indicated in dotted lines in Figures 3 and 5, they are supported in cantilever fashion by the lower rollers 50 bearing against the lower webs of the channel members and certain of the upper rollers 47, at the front side of the machine, bearing against the upper webs of said channel members. In fully removed position, the forward ends of the movable tracks 39 are adapted to rest upon seats 55 of permanent pedestals or abutments 56, which rest upon the flooring 42. In laterally removed position, the tracks 39 are supported in this manner appreciably above the surface level of the flooring 42.

Each of the longitudinally extending side beams 2 and 3 of the Fourdrinier frame structure, as best shown in Figures 1, 3, 4A, 4B and 6, carry, in aligned relation to the tracks 36 and 37, housings 57 and 58, respectively, which are secured to the underside of said beams. Each of said housings provides a support for a pair of rollers 59 and 60, separated by a peripheral flange 61. Said housings 57 and 58 at both sides of the machine provide bearings 62 and 63 for the ends of a shaft 64 that extends along the side beams between said spaced housings 57 and 58. Said shafts 64 are adapted to be driven from a motor 66 carried from the front side beam 2, through suitable drive means and reducing gears indicated at 67. The rollers 59 and 60 in the housings 57 and 58 are keyed or otherwise fixed on said shafts 64 so as to be driven therewith from the motor 66.

In order to prevent binding between the faces of the webs on the movable track members 39 and the faces of the rollers 60 cooperating therewith, a slight clearance, as at 68, is provided (Fig. 6). Similarly, the upper surfaces of each of the feet 43 of the pedestals 40 are cut away as at 69 to provide clearances beneath the lower faces of the movable track members 39. Because of these provisions, the track members 39 can be readily moved in and out while the rollers 59 bear against the upper webs of the stationary track members 38. The weight of the Fourdrinier frame structure, when in operating position, is thus seen to rest upon and be supported by the stationary track members 38.

In Figures 8 and 9, there is shown a modified form of Fourdrinier frame structure with respect to the manner of mounting and supporting said structure to permit the pitch of the wire to be varied. The structure shown in Figures 1 to 7 inclusive, which has already been described, is that of a constant pitch type of Fourdrinier, whereas the modified construction of Figures 8 and 9 provides for adjustability as to the pitch of the wire and supporting frame structure. Otherwise, the two constructions are much the same and therefore similar reference numerals will be used to indicate corresponding parts of the two structures that are identical or substantially so, and only the modified portions of the structure that permit the adjustability as to pitch will be further described.

As shown in Figures 8 and 9, the Fourdrinier frame structure, in operating position, is supported wholly or in part by means of a plurality of tower jacks 75 and 76, which are spaced along each longitudinally extending side beam of the frame structure to bear against the undersides of said side beams and support said frame struc-

ture. Two sets of tracks 77 and 78, in general similar to those already described, are positioned at suitable levels to permit the jacks 75 and 76 to operate to adjust the frame structure and wire through the desired variations in pitch. For this purpose, the tracks 78, which are those nearer the couch roll end of the frame structure, are positioned at a lower level than the tracks 77 near the breast roll end, so that when the frame structure is at any position other than that of its greatest pitch, there is a clearance, as indicated at 79, between the tracks 78 and the cooperating rollers.

The jacks 76 may be operated, either alone or in conjunction with the jacks 75, to vary the pitch of the wire and supporting frame structure through a distance permitted by the clearance 79, as indicated in dotted lines in Figure 9. When the frame structure is to be removed laterally out of the line of operation of the machine, both sets of jacks 75 and 76 are operated to lower said frame structure onto the sets of tracks 77 and 78.

The provision of adjustable means for varying the pitch of the wire makes necessary also a slight modification in the manner of supporting the couch roll. The general arrangement and manner of mounting the couch roll, however, is the same as that previously described. As best shown in Figure 9, the couch roll 19 is mounted in bearings 80 which are fixedly carried by supporting members 81. Said supporting members 81 normally rest upon, but are not secured, except by removable means, to supporting bases 82. Said bases 82 may be suitable permanent abutments or the like that rest directly upon the flooring 42.

A pair of arms 83 are mounted from the couch roll ends of the side beams 2 and 3 upon pivot pins 84. Said arms 83 are provided with yokes 85 that encircle the journals of the couch roll shaft in such manner as to permit free rotation of the shaft during operation. The other ends of said arms 83 are provided with offset portions 86 that extend under the corresponding side beams 2 and 3 and are bored to receive relatively long bolts 87. Said bolts 87 are adapted to be turned to bear against the undersides of the beams 2 and 3 when it is desired to support the weight of the couch roll 19 from the frame structure and lift it off of the supporting bases 82. To permit free adjustability of the frame structure and wire as to pitch, the bolts 87 are made longer than the bolts 26 previously described in connection with the structure shown in Figures 1 and 2.

When the Fourdrinier frame structure of the modified form shown in Figures 8 and 9 is to be laterally removed, the bolts 87 are threaded up against the undersides of the beams 2 and 3 until the couch roll 19 and the supporting standards 81 have been raised sufficiently to provide a gap as indicated at 89 (Fig. 9) between the standards 81 and the base supports 82. The Fourdrinier frame structure is then free to be moved out over the tracks 77 and 78, with the couch roll 19 and the breast roll 6 both supported from the frame structure, as previously described.

Irrespective of whether the Fourdrinier frame structure is of constant pitch or of adjustable pitch, the manner of suspending a loop of new wire alongside and out of the line of operation of the machine, in accordance with my present invention, is the same. Prior to the removal of the old wire from the machine, a new wire 90 (Figures 1, 2, 3 and 8) is unreeled and strung up in the form of an open loop, while the machine is still operating. This is done in the aisle or other space on the front side of the machine.

The upper run of the loop of new wire 90 is supported on a plurality of spindles 91, which are suitably suspended from an overhead structure by means of hooks 92. The lower run of the loop of the new wire is held in position along the flooring 42 but out of direct contact therewith by means of other spindles 93. At the breast roll end of the machine, the loop of the new wire 90 is supported by means of spindles 94 and 95 (Figs. 2 and 8) so that said end of the wire loop lies outside of the breast roll 6 in its suspended position, to provide ample clearance between said breast roll and the suspended new wire. Similarly, spindles 96 and 97 hold the couch roll end of the loop of the new wire so that the couch roll will clear the same when the frame structure is moved into the loop of the wire.

As shown in Figure 8, the spindles 93 along the lower run of wire 90 are held in position near the floor 42 by means of U-shaped stands 101 secured to the floor. The stands 101 are provided with removable pins 101a to retain the ends of the spindles 93 in the stands. The spindles, while they may rotate freely, are thus held in position. When the wire 90 is to be drawn up on the machine, the pins 101a are removed and the spindles are withdrawn from the stands.

The spindles 96 and 97 (Fig. 8) at the couch roll end of the machine are supported in brackets 102 and 103 respectively. The brackets 102 and 103 are carried by pipe stands 104 anchored in the floor 42 and are vertically adjustable thereon, being clamped into position by set screws 105 and 106. The lower bracket 103 is equipped with a removable pin 107 to hold the spindle 97 therein. The pin 107 is required to prevent the spindle from being raised out of position due to the uppull of the wire 90 at this point.

Similar brackets 102a and 103a, carried by a pipe stand 104a (Fig. 8) are provided for spindles 94 and 95 at the breast roll end of the machine.

It should be understood that similar supporting stands and brackets are used to support the spindles for wire 90 in the constant pitch machine although these means are only shown in Fig. 8 of the drawings.

The operation in changing a wire on a paper machine embodying the principles of my invention is as follows. When it becomes apparent that a new wire must be put on the machine, and preferably while the machine is still running with the old wire, a new wire 90 is strung up on the spindles 91, 93 to 97 inclusive in any convenient manner well known to those familiar with this art. New Fourdrinier wires are ordinarily mounted on a plurality of spindles in the form in which they are purchased and the wire is adapted to be unrolled by merely supporting one of the spindles in the position indicated by spindles 94 or 96 and then unrolling the loop of the wire lengthwise of the machine. As the wire is unwound, other spindles are suspended from hooks, such as the hooks 92, to support the upper run of the new wire. Likewise, the spindles such as the spindle 93 are placed inside of the loop of the wire near the bottom thereof to hold the lower run of the wire more or less taut. When in completely suspended position, the loop of the new wire takes the form indicated on the drawings thus providing within the loop sufficient

room for the entire frame structure and supported breast and couch rolls to be run into said loop.

After the new wire has been suspended in the form of an open loop, ready to receive the frame structure, the paper machine is then shut down and the old wire removed in any suitable fashion. Next, the breast roll bearing sections 11 are released and swung downwardly and the transfer mechanism 12 operated to move the breast roll 6 from its normal supported position into the suspended position indicated in dotted lines in Figures 2. In this position, the entire weight of the breast roll 6 is supported from the Fourdrinier frame structure on the arms 15. The forward set of vertical spring supporting members 8 is so arranged that the breast roll 6 in this suspended position will clear the supporting members when the frame structure is moved out as a unit.

If the machine is of the constant pitch type shown in Figures 1 and 2, the couch roll 19 may be raised by operation of the bolts 26 to clear the supporting pedestals 27, without any preliminary operation. However, if the Fourdrinier frame structure is adjustable as to pitch, as shown in Figs. 8 and 9, the jacks 75 and 76 are first operated to lower the frame structure onto the tracks 77 and 78 and to clear the tops of said jacks from the underside of the front side beam 2. The bolts 87 are then turned up to exert pressure against the underside of said side beams and thereby raise the couch roll 19 about the pivot pins 84, to provide the necessary clearance 89 between the supporting members 81 and the pedestals 82.

The movable rails 39 are next pulled out into their extended position indicated in Figs. 3 and 5 in dotted lines. As previously pointed out, clearance is provided above and below the movable rails 39 to permit the rails to be pulled out easily by hand or by suitable power means. During this step, the movable rails are, of course, supported by the upper set of rollers 47 and also, toward the ends of their outward travel, by the lower set of rollers 50. In completely extended position, the movable rails 39 are supported at their free extremities upon the feet 55 of the permanent pedestals 56. As thus supported, the rails 39 lie inside the loop of the new wire 90 and out of contact with the lower run of said wire.

The motor 66 is then started up to drive the shaft 64 and roll the frame structure out over the permanent tracks 38 and the extended tracks 39. When the frame structure is in its fully removed position, lying inside of the loop of the new wire 90 as indicated in dotted lines in Figure 3, the foreward sets of rollers rest directly upon the upper faces of the pedestals 56, off of the rails 39. Stops 98 are provided on said pedestals 56 to prevent the rollers from moving beyond the supporting surfaces of the pedestals 56. Further, the rollers at the rear side of the frame structure remain supported on the projecting ends of the stationary tracks 38, thereby leaving the movable tracks 39 free to be moved back into place in the line of the machine.

After the movable tracks have been moved back into the line of the machine, the temporary supporting spindles 91, 94 to 97 inclusive are removed and the spindles 93, or two of them are moved into positions 93a, (Figs. 4A and 4B) where they are supported in brackets 100 on the undersides of the side beams 2 and 3. In these positions the spindles 93 support the wire 90 so that its lower run lies above and clears the tracks 36 and 37. Also said spindles serve to take up the slack in the new wire 90 and tighten it around the breast and couch rolls. The lower run of the new wire 90 is thereby brought into a position above the level of the tracks 38 and 39, so that the movable tracks 39 can now be run out again into their extended positions clear of the lower run of the new wire.

The frame structure with the associated new wire is then run back over the tracks 38 and 39 into place in the operating line of the machine. The movable tracks 39 are moved into their normal position under the frame structure and the spindles 93a are withdrawn from the brackets 100 to give the necessary slack to permit the breast and couch rolls to be moved into normal position. The couch roll 19 is lowered into normal position by means of the operation of the bolts 26 or 87 and the breast roll transferred to the supports 7 by operation of the mechanisms 12. The tensioning roller 35 is finally adjusted to give the proper tension on the wire. The paper machine is now ready to be started up again.

It is obvious that one of the principal advantages of my present invention is that it makes possible a considerable saving by increasing the productive operating time of the machine. As previously pointed out, a very considerable portion of the time required to change a wire is consumed in unrolling the new wire and suspending it in the form of a loop. Since, according to my invention, the new wire can be suspended in looped form outside of the normal line of operation of the machine and while the machine is still operating, all of the time necessary for this single step is saved.

In general, my method of suspending the loop of the new wire outside of the line of the machine and in a position such that the Fourdrinier frame structure as a unit may be moved laterally within it, is made possible by the novel construction and arrangement of the track members and also by the provision of means for shortening the overall length of the frame structure by supporting the breast roll and couch roll directly from said structure in closer relationship to each other than they normally occupy. This novel arrangement and construction, in only slightly modified form, also permit the same advantages to be obtained in the case of a Fourdrinier of adjustable pitch.

It is obvious that in describing the present invention, standard and well known constructions of Fourdrinier paper machines and parts thereof are intended unless otherwise specified. Also, it is intended that the usual driving devices, or any suitable driving means, and other associated elements and mechanisms usual in paper making machines can be employed on a machine of my invention. For instance, it is contemplated that some suitable form of shaking mechanism will be associated with the table structure to shake the breast roll and table rails either together or separately, and the shaking mechanism may either be carried partly or wholly by the table structure for removal therewith or may be removably connected thereto at suitable points.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than is necessitated by the prior art.

I claim as my invention:

1. The method of stringing a new wire on a laterally removable Fourdrinier paper machine, which comprises suspending a new wire in a loop at one side of the Fourdrinier table structure, moving said table structure laterally into said loop of wire, supporting said wire on said table structure, tightening the wire on the table structure and moving said table structure back into operating position in the machine with said wire supported thereon.

2. The method of changing the wire on a Fourdrinier paper making machine comprising stringing the wire in an open loop at one side of the machine, moving the machine table with its breast and couch rolls laterally into said loop, tightening the wire on the table around the breast and couch rolls and then moving the table with the wire thereon laterally back to its operative position.

3. The method of stringing a new wire on a laterally removable type of Fourdrinier paper machine, which comprises suspending a new wire in an open loop alongside of the Fourdrinier frame structure, mounting the breast roll and couch roll on said frame structure in position closer than the operative positions thereof, moving said frame structure and supported rolls as a unit into said loop of wire, tightening said wire on said frame structure around said rolls and replacing said frame structure in operative position in said machine.

4. The method of stringing a new wire on a laterally removable type of Fourdrinier paper machine, which comprises suspending a new wire in an open loop alongside of the Fourdrinier table structure while the machine is still in operation, stopping the operation of the machine, removing the old wire therefrom, moving the table structure with the breast and couch rolls supported therefrom in said open loop of wire, tightening the wire thereon around said rolls and moving said table structure, rolls and associated wire back into operative position.

5. The method of replacing a wire on a laterally removable Fourdrinier paper machine, which comprises stringing a wire in an open loop alongside the table structure, supporting the breast roll and couch roll from the table structure so as to reduce the overall length thereof, moving said table structure out into the loop of wire with clearances therearound, tightening the wire on the table structure around said rolls while in removed position, moving said table structure with wire thereon back into operative position in said machine, loosening said wire on said table structure and moving said breast and couch rolls into operating positions, thereby again tightening said wire.

6. In a method of stringing a new wire on a paper machine of the laterally removable Fourdrinier type, the steps which comprise suspending a new wire on temporary supports in an open loop alongside of the Fourdrinier frame structure and transversely moving said frame structure in a shortened condition entirely within said open loop.

7. In a method of stringing a new wire on a paper machine of the laterally removable Fourdrinier type, the steps which comprise suspending a new wire on temporary supports in an open loop alongside of the Fourdrinier frame structure and transversely moving said frame structure in a shortened condition entirely within said open loop, and removing certain of said temporary supports and moving others of said supports into supported relation with respect to said frame structure to support said wire thereon.

8. In combination with a laterally removable type of Fourdrinier paper machine including a movable table structure and tracks for supporting the same in operating and removed positions, means for temporarily supporting a new wire in looped position at one side of the machine with the lower run of the loop below the level of said tracks, whereby said table structure may be run directly on said tracks into the loop of the wire and supported within said loop clear thereof.

9. In a removable type of Fourdrinier paper machine, a table structure, a breast roll, a couch roll, means for supporting said breast roll from said table structure for removal therewith, means for supporting said couch roll for removal therewith, means for supporting said table structure and supported rolls during lateral removal and in removed position and means for suspending an open loop of a wire alongside said machine to receive said table structure and associated rolls when the same are moved laterally out of the line of the machine.

10. In a removable and adjustable pitch Fourdrinier paper machine, a Fourdrinier frame structure, a breast roll and couch roll connected therewith, means supporting said breast roll independently of variations in the pitch of said frame structure, means for supporting said couch roll independently of the pitch of said frame structure, means for adjusting the pitch of said frame structure during operation of said machine and track means onto which said frame structure may be lowered by said adjusting means for lateral removal thereof.

11. In a removable and adjustable pitch Fourdrinier paper machine, a Fourdrinier frame structure, a breast roll and couch roll associated therewith, means supporting said breast roll independently of variations in the pitch of said frame structure, means for supporting said couch roll independently of the pitch of said frame structure, means for adjusting the pitch of said frame structure during operation of said machine, track means onto which said frame structure may be lowered by said adjusting means for lateral removal thereof, means for supporting said breast roll from said frame structure for lateral removal therewith and means for supporting said couch roll on said frame structure for lateral removal therewith.

12. In a Fourdrinier and adjustable pitch Fourdrinier paper machine, a Fourdrinier frame structure, breast and couch rolls connected thereto and removable therewith as a unit, and means for adjustably supporting said frame structure for varying the pitch thereof independently of said breast and couch roll connections.

13. In a removable and adjustable pitch Fourdrinier paper machine, a Fourdrinier frame structure, breast and couch rolls connected thereto and removable therewith as a unit, means for adjustably supporting said frame structure for varying the pitch thereof independently of said breast and couch roll connections, and means for supporting said frame structure for rolling movement laterally of said machine when said adjustably supporting means are not supporting said frame structure.

14. In a removable and adjustable pitch Fourdrinier paper machine, a Fourdrinier frame structure, breast and couch rolls connected thereto and removable therewith as a unit, means for

adjustably supporting said frame structure for varying the pitch thereof independently of said breast and couch roll connections, and means for supporting said frame structure for rolling movement laterally of said machine when said adjustably supporting means are not supporting said frame structure, said means including fixed and laterally extensible tracks and fixed supports for the extended free ends of said extensible tracks lying outside of said machine.

15. The combination with the table structure of a removable Fourdrinier paper machine, of a couch roll, stationary means supporting said couch roll in operative position, and means normally connecting said couch roll and said table structure operable to support said couch roll from said table structure during lateral removal thereof.

16. The combination with the table structure of a removable Fourdrinier paper machine, of a couch roll, stationary means supporting said couch roll in operative position, members pivotally mounted on said table structure and connected to said couch roll and means operable to move said members to support said couch roll from said table structure during lateral removal thereof.

17. The combination with the table structure of a removable Fourdrinier paper machine, of a couch roll, stationary supporting means therefor, movable members connected to said table structure and to said couch roll, and operatively supporting said couch roll upon said stationary means and means for actuating said members to raise said couch roll from said stationary supporting means and to support said couch roll directly from said table structure for removal therewith.

18. The combination with the table structure of a removable Fourdrinier paper machine, of means operatively supporting said table structure, means for varying the pitch of said table structure, a couch roll and means for supporting said couch roll in operative position independent of the pitch including members connected to said table structure for supporting said couch roll directly therefrom during lateral removal of said table structure.

19. In a removable Fourdrinier paper machine, a table structure, a couch roll, a support for said couch roll independent of said table structure and means associated with said table structure for lifting said couch roll from said support and carrying said couch roll upon said table structure for lateral removal therewith.

20. In a removable Fourdrinier paper machine, a table structure, a couch roll, a detachably connected driving means therefor, a support independent of said table structure for said couch roll and means associated with said table structure for lifting said couch roll from said support when said driving means is detached, and carrying said couch roll upon said table structure for lateral removal therewith.

21. In combination, a laterally removable table structure, a couch roll, members pivotally mounted on said table structure and connected to said couch roll and means associated with said members to support said couch roll directly from said table structure for lateral removal therewith as a unit.

22. In combination, a laterally removable table structure, means for varying the pitch thereof, a couch roll and means connecting said table structure and couch roll for holding said couch roll in operative position independently of the pitch of said table structure and for supporting said couch roll from said table structure for lateral removal therewith.

23. In a laterally removable Fourdrinier paper machine, track members for supporting the Fourdrinier frame structure for lateral removal comprising fixed tracks extending transversely of the machine below the lower run of the wire in normal operating position, longer movable tracks laterally extensible of said machine in parallelism to said fixed tracks, and means for supporting said movable tracks for free movement, while the Fourdrinier frame structure is supported on said fixed tracks.

24. In a laterally removable Fourdrinier paper machine, track members for supporting the Fourdrinier frame structure for lateral removal comprising fixed tracks extending transversely of the machine below the lower run of the wire in normal operating position, longer movable tracks laterally extensible of said machine in parallelism to said fixed tracks, means for supporting said movable tracks for free movement, while the Fourdrinier frame structure is supported on said fixed tracks, and means limiting the outward movement of said movable tracks and forming a support for the extended ends thereof.

25. In a removable type Fourdrinier paper machine, track members for supporting the Fourdrinier frame structure in the line of the machine and during lateral removal thereof comprising fixed tracks extending transversely below said frame structure and projecting beyond the same at the front side, movable tracks of greater length normally projecting beyond said frame structure at the rear side thereof, and means carried by said fixed tracks for supporting said movable tracks for free movement in parallelism to said fixed tracks.

26. In a removable type Fourdrinier paper machine, track members for supporting the Fourdrinier frame structure in the line of the machine and during lateral removal thereof comprising fixed tracks extending transversely below said frame structure and projecting beyond the same at the front side, movable tracks of greater length normally projecting beyond said frame structure at the rear side thereof, means carried by said fixed tracks for supporting said movable tracks for free movement in parallelism to said fixed tracks, means limiting the outward movement of said movable tracks and providing supports for the outer ends thereof in extended position, said means and the projected ends of said fixed tracks forming the support for said Fourdrinier frame structure in fully removed position.

27. In a removable type Fourdrinier paper machine, track members comprising fixed tracks having upper flanges, movable tracks having upper and lower flanges and rollers supported in spaced relation and at varying levels and bearing against the inner surfaces of said upper and lower flanges of said movable tracks to support the same during movement laterally of said machine.

28. In a removable type Fourdrinier paper machine, track members comprising fixed tracks having upper flanges, movable tracks having upper and lower flanges provided with longitudinally extending grooves on the inner surfaces thereof and rollers supported in spaced relation and at varying levels and extending into said grooves of said movable tracks to support the same during movement laterally of said machine.

29. In a removable type Fourdrinier paper machine, a laterally removable frame structure, rollers carried on the underside thereof, fixed tracks extending transversely of said frame structure for supporting the same in the line of said machine, and during rolling movement thereover, and movable tracks supported from said fixed tracks clear of said rollers to permit free extension thereof laterally of said machine.

30. In a removable type Fourdrinier paper machine, a laterally removable frame structure, rollers carried on the underside thereof, fixed tracks extending transversely of said frame structure for supporting the same in the line of said machine and during rolling movement thereover, movable tracks of channel cross section and rollers mounted from said fixed tracks in laterally and vertically spaced relation for bearing against the flanges of said movable tracks to support the same from said fixed tracks clear of said first mentioned rollers to permit free extension thereof laterally of said machine.

31. In a removable type of Fourdrinier paper machine, a plurality of sets of tracks, each set comprising a pair of channel beams mounted with the flanges thereof in spaced opposed relation and rollers carried by one of said tracks for supporting the other of said tracks through the flanges thereof.

32. In a removable type of Fourdrinier paper machine, a set of tracks comprising a pair of channel beams positioned with their flanges in spaced opposed relation, one of said tracks being fixed and the other movable.

33. In a removable type of Fourdrinier paper machine, a set of tracks comprising a pair of channel beams positioned with their flanges in spaced opposed relation, one of said tracks being fixed and the other movable, and rollers carried by said fixed track and supporting said movable track through the flanges thereof.

34. In a removable type of Fourdrinier paper machine, a set of tracks comprising a pair of channel beams positioned with their flanges in spaced opposed relation, one of said tracks being fixed and the other movable, and rollers carried by said fixed track and supporting said movable track through the flanges thereof, said movable track having longitudinally extending grooves along the inside of said flanges for receiving the faces of said rollers.

35. In a removable type of Fourdrinier paper machine including a laterally removable table structure, sets of tracks for supporting said table structure, each comprising a stationary track and a laterally movable track, means for supporting the extended end of the movable track in removed position and having surfaces for supporting said table structure independently of said movable track.

36. In a removable type of Fourdrinier paper machine including a laterally removable table structure, sets of tracks below the table structure in normal operating position for supporting said table structure, each comprising a stationary track and a laterally movable track, means for supporting the extended end of the movable track in removed position and having surfaces for supporting said table structure independently of said movable track, and rollers for supporting said movable track in normal position and for supporting said movable track in cantilever position during lateral removal.

37. In a removable type of Fourdrinier paper machine, a table structure, fixed tracks adapted to support said table structure when in operating position, movable tracks extensible laterally of said machine and supports for the extended ends of said movable tracks having surfaces for supporting said table structure independently of said movable tracks.

38. In a removable type of Fourdrinier paper machine, a table structure, means for adjustably supporting said table structure to vary the pitch thereof and track members including permanent tracks for supporting said table structure in the line of said machine and laterally extensible movable tracks for supporting said table structure during lateral removal thereof.

39. In a removable type of Fourdrinier paper machine, a laterally removable table structure, permanent tracks for supporting said table structure in the line of said machine and fixed means outside the line of said machine cooperating with said fixed tracks to support said table structure in laterally removed position.

40. In a removable type of Fourdrinier paper machine, a laterally removable table structure, permanent tracks for supporting said table structure in the line of said machine, fixed means outside the line of said machine cooperating with said fixed tracks to support said table structure in laterally removed position, and movable tracks extensible laterally of said machine for partly supporting said table structure during lateral removal thereof.

41. In a removable type of Fourdrinier paper machine, a table structure, fixed tracks adapted to support said table structure when in operating position, movable tracks extensible laterally of said machine, supports for the extended ends of said movable tracks having surfaces for supporting said table structure independently of said movable tracks, means for suspending an open loop of a wire alongside said machine, and means for moving said table structure out over said tracks into said open loop of wire to be supported therein by said fixed tracks and said supporting surfaces.

42. The method of stringing a new forming wire on a laterally removable Fourdrinier paper machine, which comprises suspending a new wire in a loop at one side of the Fourdrinier table structure, moving said table structure laterally at right angles to the operating direction of the machine into said loop of wire, supporting said wire on said table structure and moving said table structure back into operating position in the machine with said wire supported thereon.

43. The method of stringing a new wire on a laterally removable type of Fourdrinier paper machine, which comprises suspending a new wire in an open loop alongside of the Fourdrinier frame structure, mounting the breast roll and couch roll on said frame structure in position closer than the operating positions thereof, moving said frame structure and supported rolls as a unit laterally at right angles to the operating direction of the machine into said loop of new wire, tightening the wire on said frame structure around said rolls, and replacing said frame structure in operative position in the machine.

44. In a method of stringing a new wire on a paper machine of the laterally removable Fourdrinier type, the steps which comprise suspending a new wire on temporary supports in an open loop alongside of the Fourdrinier frame structure parallel with the operating position of the wire and moving said frame structure later-

ally at right angles to the operating direction of the machine entirely within said open loop.

45. The method of changing the forming wire on a Fourdrinier type of paper machine having fixed and laterally extensible tracks below the frame structure in normal operating position and fixed supports alongside the frame structure in spaced relation therefrom which comprises forming an open loop of the new wire, extending the movable tracks into said loop to join with said fixed supports, moving the frame structure with the couch and breast rolls mounted thereon into the open loop of the wire, supporting said frame structure on said fixed supports, sliding the movable tracks back into the normal operative line of the machine, tightening the loop on the frame structure so that its lower run is above the tracks, again extending the movable tracks to the fixed supports, rolling the frame structure with the new wire thereon over said tracks back into operative position and again sliding the movable tracks under the frame structure.

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