May 11 , 1926. 1,583,981

H. LIEBECK

FOURDRINIER PAPER MAKING MACHINE

Filed Dec. 7, 1921 2 Sheets-Sheet 1

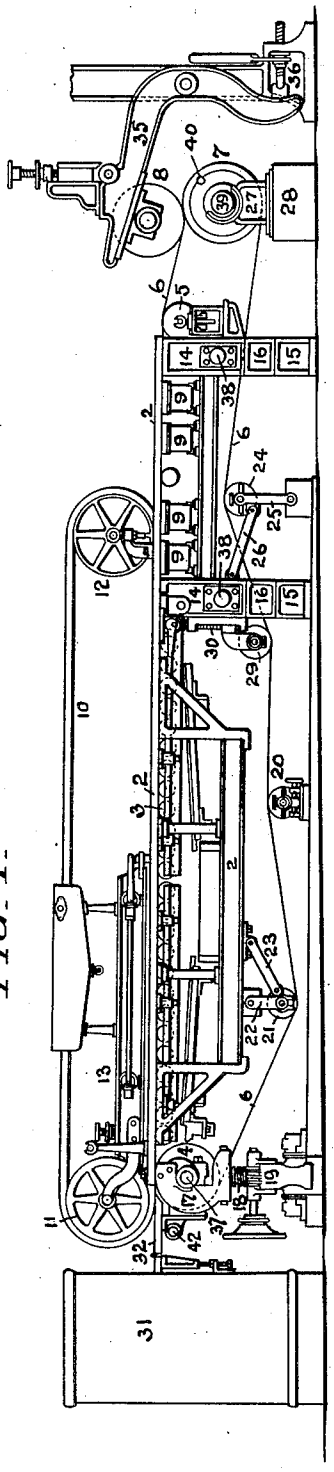


FIG. 1.

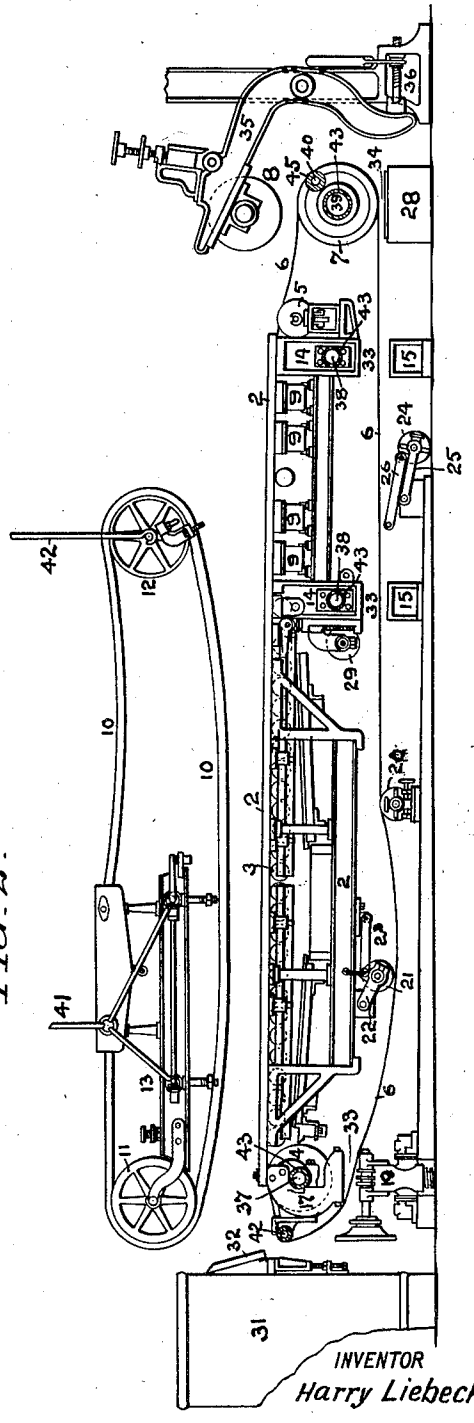


FIG. 2.

INVENTOR
Harry Liebeck

BY

ATTORNEY

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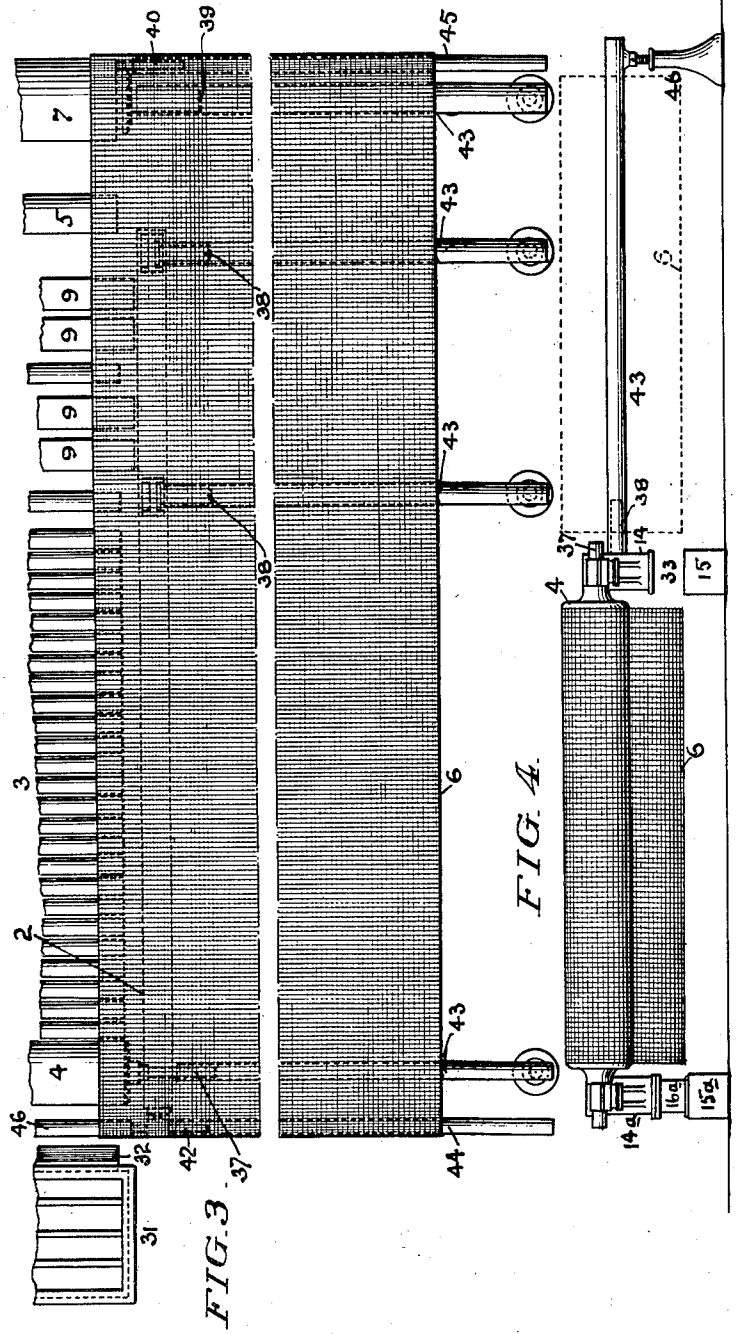


FIG. 3.

FIG. 4.

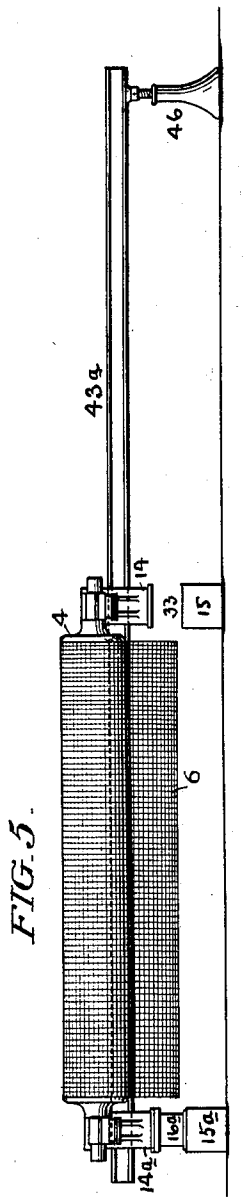


FIG. 5.

INVENTOR
Harry Liebeck

BY

ATTORNEY

Patented May 11, 1926. 1,583,981

UNITED STATES PATENT OFFICE.

HARRY LIEBECK, OF SWARTHMORE, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SCOTT PAPER COMPANY, A CORPORATION OF PENNSYLVANIA, INCORPORATED IN 1922.

FOURDRINIER PAPER-MAKING MACHINE.

Application filed December 7, 1921. Serial No. 520,476.

The object of my invention is, more particularly, to provide a construction of Fourdrinier machines, constituting a part of a paper making machine, which will permit the replacing of the endless woven wire apron of the sheet forming part of the machine in a manner whereby great saving in time and labor is accomplished and the danger of injury to the apron is greatly reduced, as compared to the methods heretofore in use.

In paper making machines of this class, the woven wire endless aprons of the Fourdrinier machine must be replaced frequently and, as is well known, practically all of the wet end of the machine must be dismantled to permit replacement of the wire apron, requiring in this operation the removal of many rolls, suction boxes, trays, etc., and subsequent replacement thereof. In replacing aprons in this manner, it not infrequently happens that a heavy roll or other part is dropped, with the result that a new wire apron (costing from one hundred dollars to four hundred dollars) is destroyed, causing further delay in repairs in addition to the loss of the apron and also necessitating that the labor and cost of the attempted replacement become more or less of a further source of loss. In other forms of machines, the wet end has been specially constructed so that one or several parts carrying the operative elements of the machine are capable of being rolled out of the machine frame to provide access to the working parts whereby, after the old apron has been removed and a new apron substituted, the said parts of the machine may be rolled back into position to be properly in association with the new apron. Such improvements are, however, objectionable in that the operative parts of the machine must be separated and moreover the construction is costly and complicated.

My invention has been devised to overcome all of the objections incident to the above methods of replacing the woven wire aprons, the construction being such that all working parts of the machine are left in place, though slightly moved in relative adjustment to relieve the tension on the apron and to permit the old wire apron to be cut and removed or otherwise shifted laterally out of the machine where it is to be preserved and a new apron moved laterally in a reverse direction into position preliminary to the re-adjustment of the operative parts, the whole being accomplished with great rapidity and without danger to the apron itself or even to the old apron where it is to be removed and preserved for future re-use.

Broadly considered, my invention consists of the method comprising the following steps, namely: The deckle straps and their operative means are bodily lifted to leave a space between them and the upper level of the apron supporting rolls; the lower tension rolls are released to remove the tension from the apron; one side of the main frame of the Fourdrinier is loosened at the pedestals and supporting lever arms or porter bars secured to the frame and lifted by screw jacks or other equivalent means to permit a gap or lateral opening between the main frame and the supports adjacent to the floor at a level below the rollers which support the upper portion of the apron, the said gap being enlarged if desired by removable pedestal blocks; the couch rolls are separated and a lever or porter bar is applied to one end of the lower couch roll (about which the apron passes) and by means of a screw jack or other suitable device, the said end of the couch roll is raised or supported clear of its bearing, which may be removed to provide greater space; the apron may then be removed sidewise from the supporting rolls and pass laterally between the deckle straps and the said rolls and also pass from beneath the main frame of the Fourdrinier to the lever supports, taking a position between the main frame and supporting screw jacks; the apron is also simultaneously shifted laterally from about the couch roll to and upon the supporting lever arm or porter bar sustaining the couch roll; next blocking the main part of the machine and couch roll in their adjusted positions, loosening the screw jacks and removing the apron from the levers or porter bars; thereafter substituting a new apron over the levers or bars, reinserting the screw jacks, removing the blocks to provide the open gap for the lateral movement of the apron; shifting the apron laterally into position

upon the supporting rolls; reinserting the pedestals and bearing of the couch roll and lowering the same into position; lowering the deckle straps into operative relation; removing the screw jacks and the levers; and finally readjusting the tension rolls for the apron. Aside from the method employed, involving the removal and replacement of the apron, my invention also comprehends details of construction of the machine whereby the said method may be carried into effect, all of which is more fully described hereinafter and more particularly defined in the claims.

Referring to the drawings: Fig. 1 is a side elevation of a Fourdrinier machine having a portion of my improved apparatus shown thereon; Fig. 2 is a side elevation of the same showing the machine when the parts are adjusted for the removal of the apron; Fig. 3 is a plan view showing the levers applied for supporting the main frame and rolls and also the couch roll during the act of replacing an apron; Fig. 4 is a transverse sectional view illustrating diagrammatically more or less, one method, involving the slight raising and opening of the side of the Fourdrinier in the act of replacing the apron; and Fig. 5 is a similar view showing a modification of the same.

While there are many varieties or special designs of the Fourdrinier type of machine, my invention is applicable to them all and for purposes of explaining my invention, I have shown one design by way of example, but without any intent or purpose of being limited to the construction of the machine itself outside of what is essential for the carrying of my invention into practice.

2 represents any suitable framing in which are journaled the table rolls 3, guide roll 5 and breast roll 4, and in addition thereto, said frame carries the suction boxes 9 and the usual trays and boxes below the table rolls for receiving and collecting the water. Travelling over the table rolls and suction boxes and also about the breast roll 4 and over the guide roll 5 is an endless woven wire apron 6, the same passing about the lower couch roll 7 at the end most distant from the head box 31 and its apron board 32. The lower part of the endless apron 6 is guided under guide rolls 21 and 29 and over guide rolls 20 and 24, and by adjustment of which tension may be put upon the apron whereby it is stretched to the desired degree. The guide roll 21 is hung by links 22 and retained in guiding position by brace links 23 which may be detached when relieving the tension on the apron 6, as indicated in Fig. 2. The roll 29 is adjustable vertically by an adjusting screw 30 and may be raised, as indicated in Fig. 2, for removing its tension from the apron 6. The roll 24 is supported at the upper end of links 25 and is positioned for tension by the links 26, which may be disconnected when desired so that the tension roll may be turned downward out of contact with the apron, as indicated in Fig. 2. Ordinarily, the rolls 20, 21 and 24 are definitely positioned, as indicated in Fig. 1, and thereafter the tension roll 29 is lowered to take up the looseness in the apron 6. The main frame 2 is provided also with downwardly projecting leg portions 14 which rest upon blocks or removable sections 16 and these in turn are directly supported upon the foundation blocks 15. At the end of the machine adjacent to the head box 31, the bearings 17 for the breast roll 4 are adjusted vertically and supported by adjusting screws 18 which constitute a portion of screw jacks 19 forming a permanent part of the machine for not only sustaining the weight thereof adjacent to the head box, but also permitting vertical adjustment thereof in relation to the apron board.

Arranged above the table rolls 3 and wire apron travelling thereon are the usual deckle straps 10, the same passing about the guide wheels 11 and 12 which, together with the deckle frame 13 normally supported upon the main frame of the machine, may be lifted bodily into suspended condition above the apron and table rolls, as indicated in Fig. 2, the suspension being secured by any suitable crane or hoisting apparatus provided with the hooked links 41 and 42 detachably connected with the deckle frame and the axle of the rear deckle guide wheel 12. Any suitable manner of temporarily raising the deckle frame and deckle straps may be employed.

The lower couch roll is journaled on bearings 27 resting upon the foundation 28, said bearings 27 being removable when desired. This couch roll is further provided at one end with a projecting hub 39 and also with a laterally projecting pin 40, the purposes of which will be later referred to. The upper couch roll 8 is journaled in a pivoted frame 35 which by means of adjusting devices 36 may be oscillated for lifting the upper couch roll clear of lower couch roll, as indicated in Fig. 2. From the couch rolls, the paper is transferred in the usual manner to travelling felts which convey it over the drying cylinders and ultimately to the press or calender rolls.

In addition to the general description above given, the leg portions 14 of the main frame are provided with laterally extending hubs 38 at one side of the machine; and furthermore, the breast roll 4 is provided on one end with an extended hub 37. In addition to these projecting portions, each of the bearings 17 of the breast roll may be provided with a bracket or an extension on the side next to the head box for tem-

porarily supporting a piece of pipe or other suitable guide 46 (Fig. 3), and one of these brackets is provided with a laterally extending hub portion 42. It is to be understood that all of the hub portions 37, 38, 39 and 42 are arranged at one side of the Fourdrinier machine and their purpose will now be described.

Porter bars 43 formed of tubes or otherwise provided with suitable socket portions at one end, respectively fit over the extended hub or pin portions 37, 38 and 39 of the Fourdrinier machine; and similarly, pipe section 44 may be applied to the projection 42 adjacent to the breast roll 4 and pipe 45 applied to the pin or projection 40 on the end of the couch roll 7; all of which will be understood by reference to Figs. 3 and 4. The outer ends of the porter bars 43 are sustained upon screw jacks 46 or by other means which may cause the outer ends of said bars to be raised and thereby lift the entire adjacent side of the main frame and its connections including the breast roll and the couch roll and thereby permit the removal of the blocks 16, the bearing 27 of the couch roll, and the lowering of the screw 18 from beneath the bearing of the breast roll, said removals being performed only at the side of the machine to which the porter bars are connected. The other side of the machine is permitted to remain definitely upon its supporting parts 14^a, 16^a and 15^a or other supporting parts, as generally indicated in Fig. 4. In other words, after the lifting of the deckle frame and deckle straps clear of the apron, the supporting parts at one side of the machine may then be slightly lifted and sustained while supporting parts are removed to provide a suitable gap throughout the length of that side of the machine and through which the lower part of the apron may be guided laterally to a position below the porter bars while at the same time the upper portion of the apron is moved laterally to a position above the porter bars, the act of such shifting of the apron being indicated in Fig. 3, and in dotted lines in Fig. 4.

When the apron is thus removed from the machine proper, out to a position in association with the porter bars (and which removal is facilitated by the further use of the tubes or bars 44, 45 and 46, as before described), the blocks 16 are again inserted, the screw 11 moved up to support the bearing of the breast roll, and the bearing 27 replaced for supporting the couch roll; thereafter, the screw jacks 46 are lowered and removed and the apron 6 withdrawn over the ends of the porter bars or the porter bars are removed and the apron drawn forward in the direction of its length. Thereafter, the new apron to be applied is moved into place along the side of the machine and the porter bars inserted between the upper and lower layers of the apron and fitted to the projecting portions 37, 38 and 39 of the machine, as before described; the screw jacks 46 are then applied and the porter bars lifted so as to remove the strain upon the parts 16 and 27. These parts 16 and 27 are then removed and the screw 18 lowered. In addition to this, the bars 44, 45 and 46 are replaced and the new apron 6 is shifted laterally into position, the lower ply or layer passing through the opening provided by the removal of the parts 16 and 27 and lowering of the screw 18, while the upper layer or ply is moved over the table and table rolls 3 and also about the couch roll 7 and breast roll 4 and assuming the position indicated in Fig. 2. Thereafter, the screw 18 is raised, the blocks 16 reinserted and the bearing 27 replaced, the screw jacks 26 lowered and the porter bars 43, together with the bars 44 and 45, are removed, and in addition thereto the guide tube 46 is withdrawn so that the apron may come in direct contact and be supported by the breast roll 4. Furthermore, the rolls 21 and 24 may be adjusted in position and held there by the respective links 23 and 26 and the tension roller 29 lowered to put the requisite tension upon the apron. Thereafter, the deckle frame, together with its wheels 11 and 12 and deckle straps 10, are lowered into position and the couch roll 8 is likewise lowered into operative relation to the couch roll 7 and the entire machine is once more in operative adjustment, as clearly shown in Fig. 1. At the time of removing and substituting the aprons, the pivoted apron board 32 is turned up against the head box 31, as indicated in Fig. 2, but when the new apron has been put in place, this apron board 32 is turned down into operative position, as shown in Fig. 1, before the deckle straps are lowered into position.

In the description above given, wherein the porter bars 43 are connected only to the projecting portions 38 of the main frame at one side of the machine, it is obvious that, if desired, these porter bars may be extended so as to continue across the machine below the table rolls, suction boxes, and other parts, and make engagement with the main frame at the other side of the machine so as to constitute a lever, as shown at 43^a in Fig. 5. In this construction, the result is the same as that shown in Figs. 1 to 4, but there is less strain upon the general framing of the machine, since the side of the machine which is to be open to provide the gap 33 will be directly sustained upon a continuous beam acting as a lever. Where this construction of Fig. 5 is employed, it will be understood that one of these bars 43^a may be employed in the neighborhood of the breast roll as well as at other parts and thus obviate the necessity of a porter bar on the end of the breast roll. In the case of the couch roll, however,

there being no special provision for inserting a long supporting bar 43ª, it would be more convenient to employ the porter bar as first described. Figs. 4 and 5 are rather intended to be graphic illustrations of the principle involved in supporting the frame and mechanism of the machine rather than to be considered as illustrating identically the details of the machine shown in Figs. 1, 2 and 3, as I do not confine myself to any particular character of Fourdrinier machine as there are many modifications of this general type of paper making machine, it being kept in mind that my invention pertains more to the method and means for replacing the wire apron and not to special designs in the Fourdrinier machine per se.

While my invention is primarily intended for use in connection with a paper making machine, I do not wish to be restricted thereto as the method and means constituting the essential parts of my invention may, broadly considered, be employed in removing and replacing large endless aprons in machines generally.

I have described my improved method and means in that particularity which I deem to be the best exposition of my invention, and that which I prefer in commercial practice, but I do not restrict or confine myself to the minor or secondary details, as such are susceptible of modification, which may be resorted to as matters of mechanical skill and without a departure from the spirit of the invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The herein described method of replacing an apron in a Fourdriner machine, the same consisting in raising the deckle straps and associated parts clear of the roll supporting frame and rolls thereof, upwardly lifting the entire length of said roll supporting frame together with its rolls and operative parts along one side of the machine and opening said side of the machine along its whole length from the breast roll to and including the couch roll supports at points below the wire supporting rolls and supporting frame therefor without disturbing the relation of the operative parts in the direction of the length of the machine, moving an endless apron sidewise into operative position above and below the table rolls and about the breast and couch rolls and while doing so moving its lower portion laterally through the opening in the side frame of the machine and its upper portion over the table rolls and their supporting frame and during such movement holding the apron in its fully extended condition, and thereafter adjusting the main frame to a normally closed condition by lowering the table rolls and supporting frame for the whole length of the same and readjusting the deckle straps and associated parts into their operative positions.

2. The method according to claim 1, when further characterized by raising the deckle straps and associated parts to a greater distance than the raising of the table rolls and supporting frame therefor to provide a clear lateral space between the deckle straps and table rolls at the time that the said table rolls and their supporting frame are raised for the lateral introduction of the apron.

3. The method of applying a wire to a Fourdrinier machine which consists in tilting the frame of the machine to permit the wire to be moved thereon edgewise.

4. In a Fourdriner machine, the combination of a roller-carrying frame and supporting stands therefor, said frame being pivotally connected at one side of the machine to said stands so as to be held thereby against transverse movement; and adapted to be raised from the supporting stands at the opposite side of the machine to receive the wire.

5. In a Fourdrinier machine, the combination of suitable supporting stands, a roller frame connected at one side of the machine to the stands and adapted to be raised therefrom at the opposite side of the machine to receive the wire, a series of bars adapted to engage the said frame and project laterally therefrom, and lifting means associated therewith.

6. In a Fourdrinier machine, the main frame so constructed along one side as to provide an open passage throughout its length from and between the normal operative positions of the breast roll and couch roll and at a level intermediate between the floor and the upper portion of the main roll supporting frame, combined with means for temporarily lifting the roll supporting upper portion of the main frame which is above the open passage in the side of said frame and sustaining it against the action of gravity, and an endless wire apron adapted to be introduced when fully extended through the open passage in the side of the main frame whereby a portion of the apron extends over the table rolls, breast roll and couch roll and the remaining portion is recived through the open passage below the said table rolls, breast roll and couch roll.

7. In a Fourdrinier machine, means for permitting the wire apron to be shifted transversely relatively to and into position upon the supporting rollers, suction boxes, and about the couch roll, and wherein there are means for temporarily sustaining the couch roll at one end clear of its bearing, combined with a detachable guide for the extreme end of the apron when being shifted over or upon the couch roll, said guide being detachably connected with one end of the

couch roll in substantial alinement with its peripheral surface whereby the apron may be transferred from the roll to the guide or from the guide to the roll, as the case may be, without objectionable bending.

8. In a Fourdrinier machine, the main frame provided with supporting and guiding rolls and suction boxes and so constructed as to provide means for permitting the wire apron to be shifted transversely into position upon the said supporting and guide rolls and suction boxes, a couch roll about which the apron also extends and relatively to which it is laterally adjustable, and wherein the main frame of the Fourdrinier at its end most distant from the couch roll is provided with a breast roll and immediately beyond the same with a transverse removable guide parallel to the breast and guide rolls, and a guide bar extended transversely beyond the side of the main frame for guiding the extreme end of the apron during its removal or replacement and whereby objectionable bending may be avoided .

9. In a Fourdrinier machine, a main frame and wire supporting rolls therefor, said frame along one side being so formed that the rolls thereat are sustained against gravity and along the other side being divided throughout its whole length from and between the normal positions of the breast and couch rolls whereby the upper portion of the frame at that side and the rolls supported thereon are capable of being lifted, and means independent of the main frame for lifting and sustaining the upper portion of the divided frame and rolls thereat, whereby an upward pressure is applied for the purpose of providing an opening along the line of division of the main frame so that an endless apron may be shifted laterally into place through the open space thus provided in the side of the machine.

10. The invention according to claim 9, wherein further, the means for lifting and sustaining the roll supporting frame and rolls against gravity and providing an upward movement thereto are detachably secured to the upper movable portion of the roll supporting frame, and the side of the main frame which is divided along its length is provided immediately along the line of its division with removable portions for increasing the size of the opening.

11. In a Fourdrinier machine, the main frame so constructed along one side as to provide an open passage throughout its length located between the level of the floor and the supporting means on the main frame for the wire apron, means for sustaining the open side of the main frame of the machine against depression by gravity, and an endless wire apron adapted to be introduced into position on the Fourdrinier through the open passage whereby part of the apron extends over the roll supports of the Fourdrinier and the remaining portion is received below said supports, and wherein the means for sustaining the open side of the main frame of the machine against depression by gravity is adjustable, whereby said open side may be raised or lowered, and wherein further there is provided removable supports constituting abutments upon which the main frame may rest for normal operation and which close the open passage along its length temporarily provided for the introduction of the apron.

12. In a Fourdrinier machine, the main frame so constructed along one side as to provide an open passage throughout its entire length from and between the normal operative positions of the breast and couch rolls and located between the level of the floor and the supporting means on the main frame for the wire apron, combined with means for temporarily lifting and sustaining the upper side portion of the main frame above the open passage throughout its length, and an endless wire apron adapted to be introduced when fully extended through the open passage in the side of the main frame whereby part of the apron extends over and the remaining portion is received below the supporting means on the main frame for the apron.

In testimony of which invention I hereunto set my hand.

HARRY LIEBECK.