Nov. 27, 1934. F. S. McDONNELL 1,982,349

FOURDRINIER PAPER MACHINE

Filed April 18, 1931 5 Sheets-Sheet 1

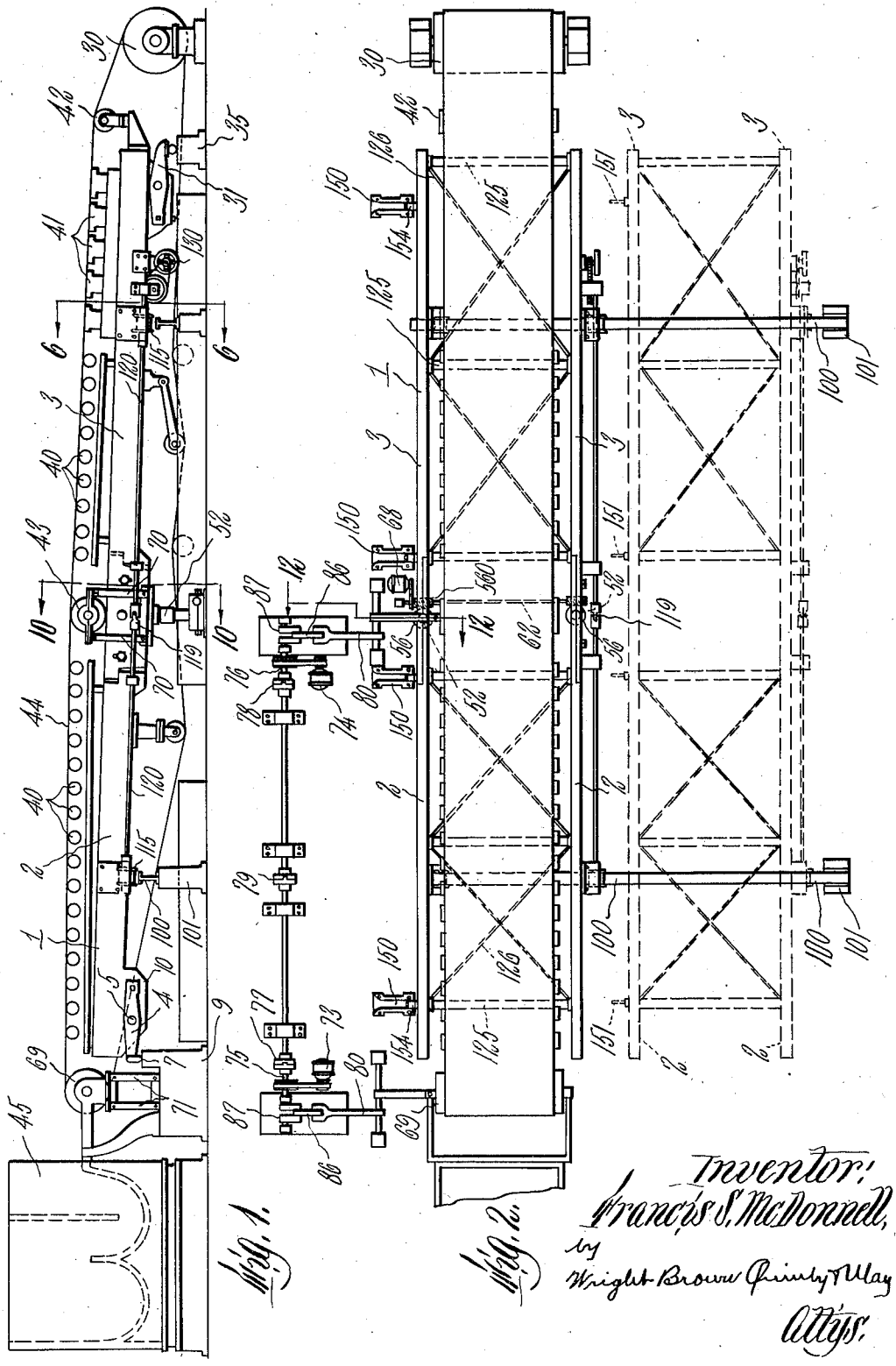


Fig. 1.

Fig. 2.

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FOURDRINIER PAPER MACHINE

Filed April 18, 1931 5 Sheets-Sheet 2

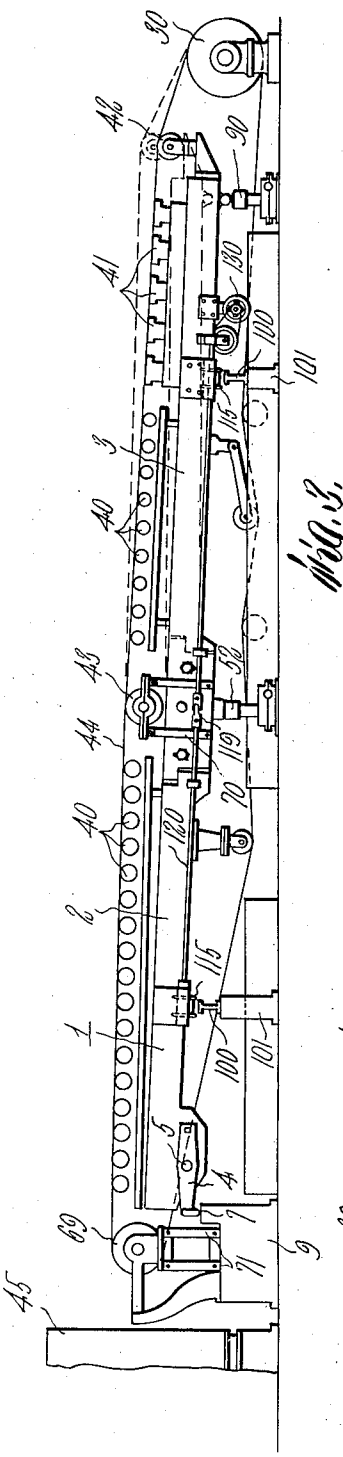


Fig. 3.

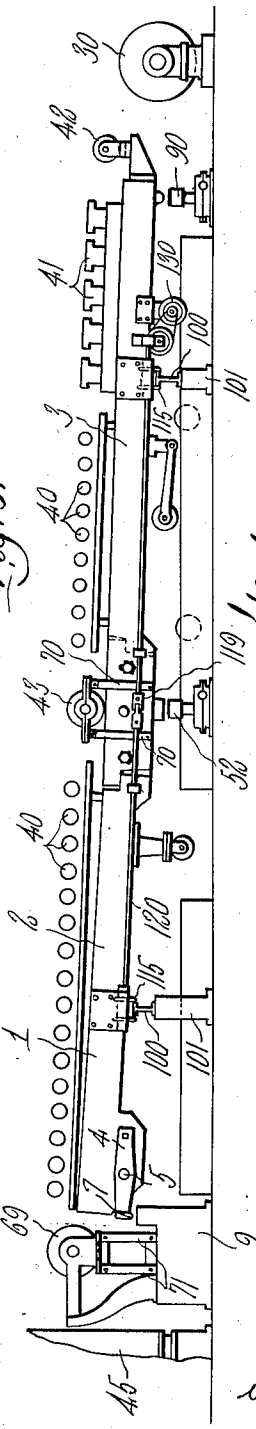


Fig. 4.

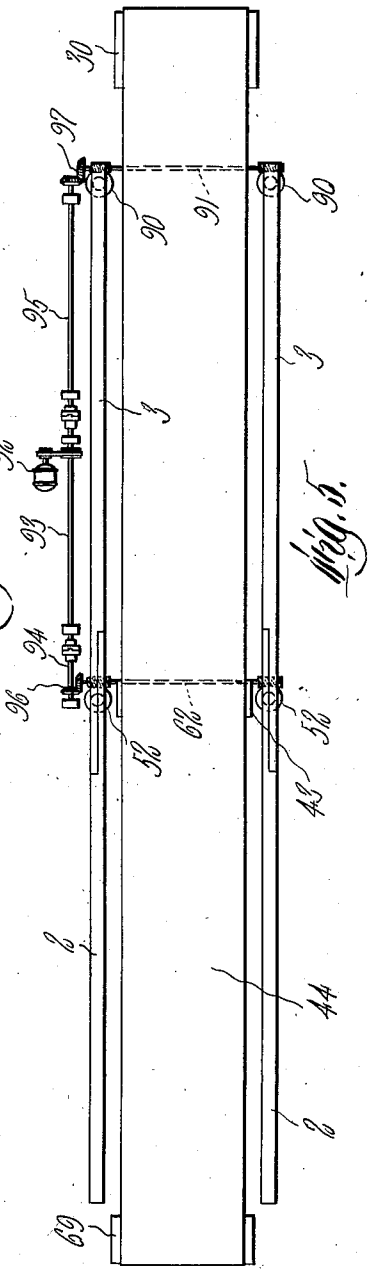


Fig. 5.

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FOURDRINIER PAPER MACHINE

Filed April 18, 1931 5 Sheets-Sheet 3

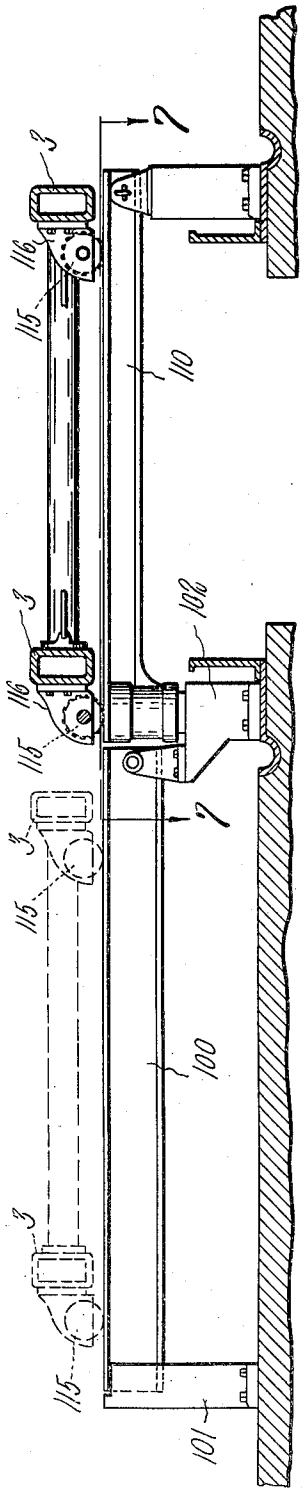


Fig. 6.

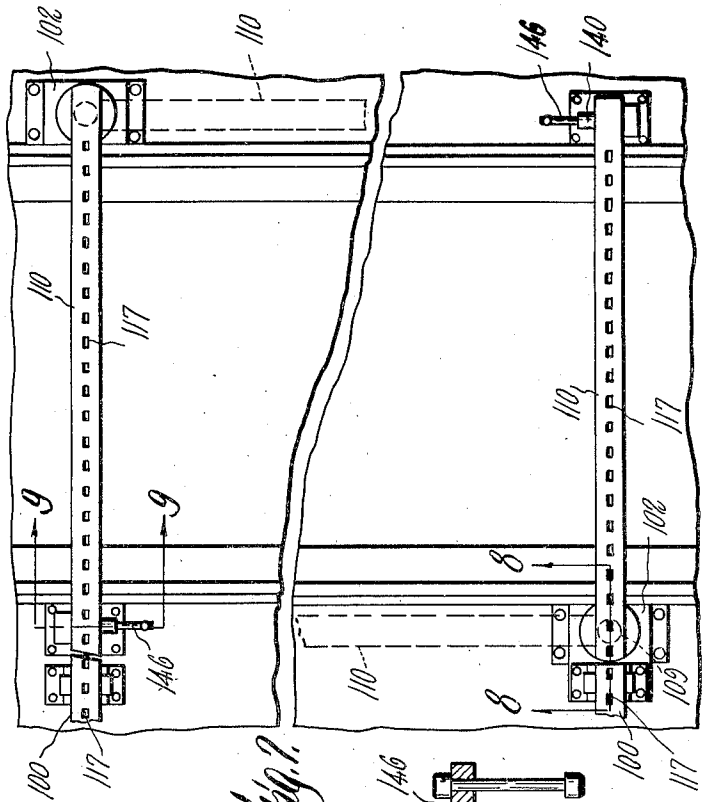


Fig. 7.

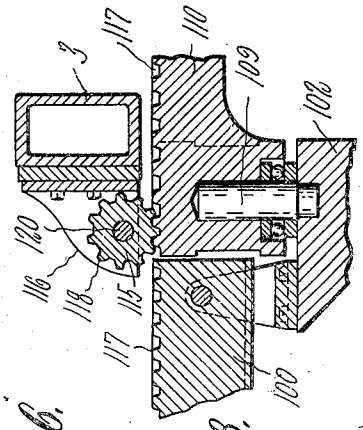


Fig. 8.

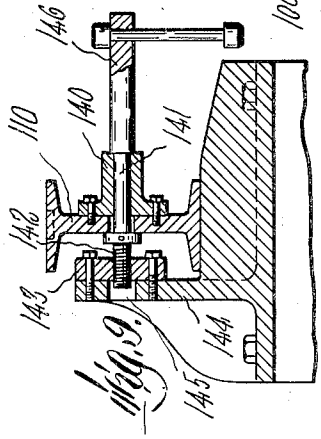


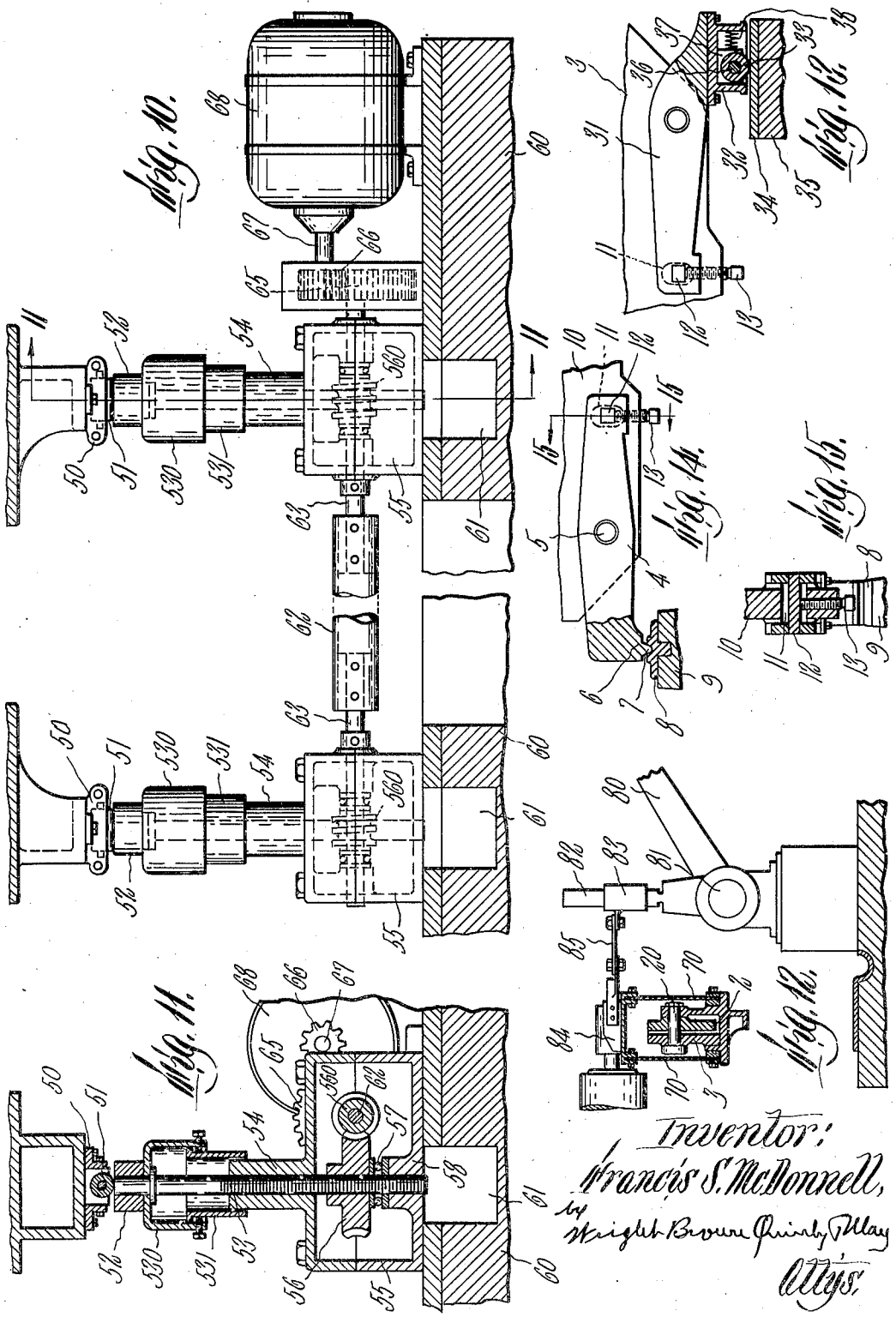
Fig. 9.

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Filed April 18, 1931 5 Sheets-Sheet 5

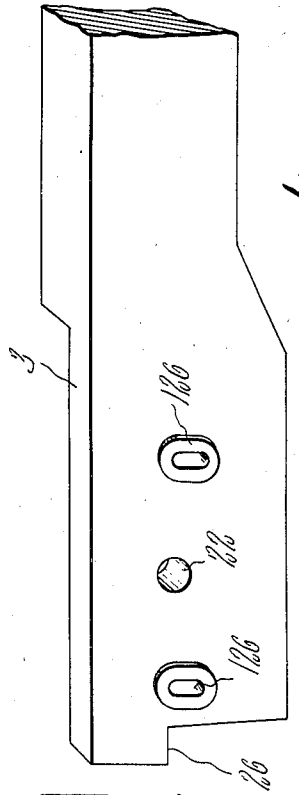


Fig. 17.

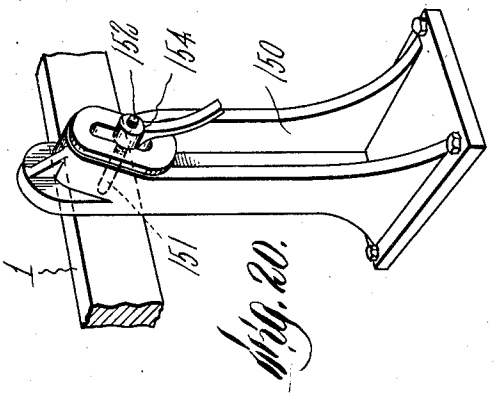


Fig. 20.

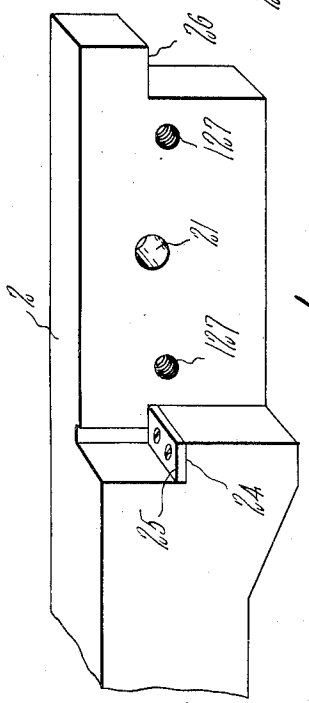


Fig. 16.

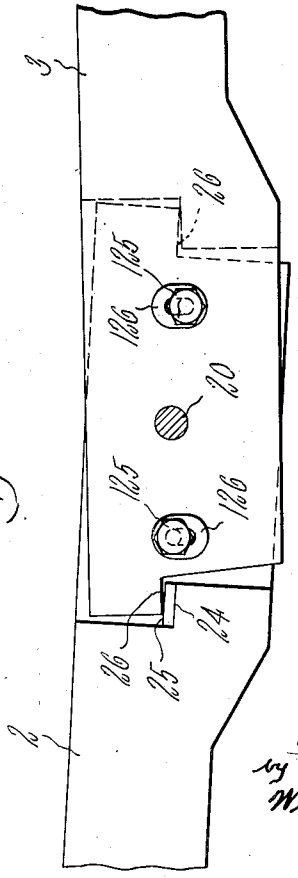


Fig. 18.

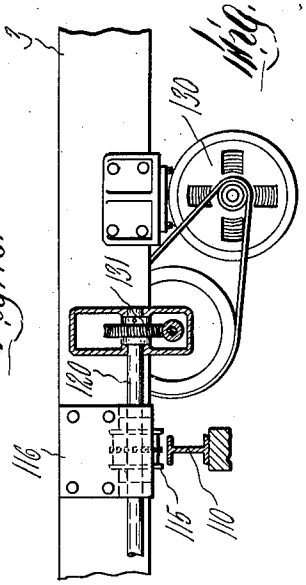


Fig. 19.

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Patented Nov. 27, 1934

1,982,349

UNITED STATES PATENT OFFICE

1,982,349

FOURDRINIER PAPER MACHINE

Francis S. McDonnell, Milton, Mass., assignor to Herbert A. Baker, Norwood, Mass., trustee

Application April 18, 1931, Serial No. 531,154

51 Claims. (Cl. 92—45)

When paper is made on a Fourdrinier paper machine and the paper is of such a character that it can be formed at high speed, it has been found desirable to arrange the wire with considerable "pitch", that is, downward slope forwardly of the slices, and to cause the wire to travel at a relatively high rate of speed. In the making of other types or grades of paper where the formation is slower, less pitch is desirable and the wire is run at a slower rate. Paper machines on which it is intended to make various grades of paper commonly have some means, therefore, by which the slope of the wire may be adjusted to best suit the particular grade of paper being made and at the speed desired at any given time. Either of two methods has generally been followed to effect this adjustment. Both of these give rise to serious difficulties. According to one of these methods the breast roll end of the wire has been made vertically adjustable with or independently of the flow box. Where the flow box is adjustable with the breast roll, it is necessary, ordinarily, to move a very considerable weight in making the adjustment, since beside the weight of the box itself, its stock contents must also be moved. This movement of the flow box also requires the use of flexible pipe connections in order that the stock may be supplied thereto from an outside stationary source. When the flow box is not adjusted vertically with the breast roll there is great difficulty in providing for the desired flow from the box to the wire at all of the various elevations. This difficulty increases rapidly with increase in the extent of adjustment provided. In accordance with the second method heretofore used, the vertical adjustment has been produced at the opposite end of the Fourdrinier section. A relatively small range of adjustment is possible here as it soon interferes seriously with the functioning of the wire guide roll which must operate in an angular bend or gable in the wire, and with the delivery of the web of paper to the blanket beyond the end of the wire portion of the machine. Combinations of the two methods hereinbefore described involve the difficulties inherent in both.

It has also been proposed to joint the side frames of the Fourdrinier section between the usual table rolls and the suction boxes and raise or lower at the joint. This joint, however, is relatively near the couch roll end of the frame and distant from the breast roll so that a relatively large adjustment is necessary to produce material differences of pitch, in this respect this construction being a somewhat, though not very great, improvement over changing the elevation of the end portions of the frames.

In accordance with the present invention the raising and lowering is effected intermediate the ends of the table roll section and preferably about midway between the ends of the frame, changing the relative slopes of the wire between the raised and lowered portion and opposite ends of the frame. The distance through which the slope or pitch of the wire is of material importance in aiding the interfelting of the fibers is included between the breast roll and this point of adjustment and with a given change of elevation of the vertically adjustable part, the angular change of the wire is substantially double that which can be effected by a vertical adjustment of either end. This adjustment at an intermediate point in the frame may be done without encountering the difficulties which are present when the adjustment is produced at either end. As, however, a stock which should be run slowly and with the wire elevated at the raising and lowering point to produce little or no initial pitch, or even an upward pitch, may still be in highly fluid condition when it reaches this point, it is important that the wire shall not be inclined downwardly too sharply as it moves beyond this point. For this reason it may be desirable, when the range of pitch adjustment is considerable, to provide means for raising and lowering the wire at the suction boxes as well as at a point substantially centrally of its length. While this manner of adjusting the pitch of the wire is not limited to any particular type of machine, it is of ready applicability to a machine provided with the improved shake shown and described in my Patent No. 1,839,158, granted December 29, 1931, and both this shake and the raising and the adjustment of pitch may be embodied, if desired, in a machine provided with a frame laterally movable to facilitate changing the wire. This application is a continuation in part of my application Serial No. 441,559, dated April 4, 1930 for Fourdrinier paper machine.

For a more complete understanding of this invention, reference may be had to the accompanying drawings in which:

Figure 1 is a side elevation of a Fourdrinier machine embodying this invention.

Figure 2 is a fragmentary plan of the same showing in dotted lines the laterally moved position of the frame.

Figure 3 is a view similar to Figure 1 but showing a modification.

Figure 4 is a view similar to Figure 3 but show-

ing the parts adjusted for lateral movement of the frame.

Figure 5 is a fragmentary plan of the machine shown in Figures 3 and 4 but with parts omitted.

Figure 6 is a section to a larger scale on line 6—6 of Figure 1.

Figure 7 is a section on line 7—7 of Figure 6.

Figures 8 and 9 are detail sections on lines 8—8 and 9—9, respectively, of Figure 7.

Figure 10 is a section to a larger scale on line 10—10 of Figure 1.

Figure 11 is a section on line 11—11 of Figure 10.

Figure 12 is a detail section on line 12—12 of Figure 2.

Figures 13 and 14 are details partly in elevation and partly in section of the frame supports at opposite ends.

Figure 15 is a detail section on line 15—15 of Figure 14.

Figures 16 and 17 are perspectives to a larger scale of adjacent end portions of a side frame.

Figure 18 is a fragmentary side elevation showing the lapping portions of the side frames in position for lateral movement of the frame.

Figure 19 is a detail side elevation showing the mechanism for producing lateral movement of the frame.

Figure 20 is a perspective showing a frame securing stand.

Referring first to the construction illustrated in Figures 1 and 2, 1 indicates a frame for the Fourdrinier section of a paper machine which comprises side frame sections 2 and 3 which are arranged with portions overlapping and pivotally connected substantially centrally of the length of the frame. The breast roll end of the frame is shown adjustably supported at opposite sides on pairs of levers 4 pivoted to the side frames as at 5. One of these pairs of levers is shown in detail in Figure 14. One end as 6 is provided with a foot 7 which engages in a grooved support 8 on the upper face of a foundation member 9. The levers 4 are arranged in pairs on the opposite sides of a web 10 of the side frame which is slotted at 11 to receive a cross bar 12 fixed at opposite ends in the two levers 4 of each pair. An adjusting screw 13 is threaded through the web 10 beneath the slot 11 and the upper end of this screw bears against the lower face of the cross bar 12. By this means each pair of levers may be adjusted independently of the other so as to provide for leveling the frame laterally at this end of the machine.

As shown best in Figures 16, 17 and 18, the side frame members 2 and 3 have their end portions of reduced thickness so that they may be arranged in lapping relation, a pin 20 engaging in holes 21 and 22 of the overlapped portions pivotally connecting them together. Each of these frame portions where it is cut away is provided with a stepped end face 24 preferably provided on the upper face of each step with a separable wear plate 25 against which an extension edge portion 26 at the end of the mating member may engage, as shown in Figure 18, when the central pivot 20 is lowered to a predetermined extent, the parts being then in the position shown in Figure 18. When in this relation any further rocking of the frame members 2 and 3 relative to each other to raise their outer ends higher above the pivot 20 is prevented so that the side frames become for all practical purposes vertically rigid frame members. This, as will later appear, facilitates the holding of the frames in proper relation during their lateral displacement from normal position for the removal or replacement of the Fourdrinier wire.

The opposite end of the frame adjacent to the couch roll 30 is shown as mounted on leveling levers 31 somewhat similar to the levers 4 at the breast roll end, but in order to permit raising and lowering of the pivoted overlapped portions of the side frames while the breast roll end of the frames are held against lateral motion, each pair of levers 31 has fixed at its outer ends a box portion 32 housing a roller 33 which rests on the wear plate 34 on the upper face of a foundation block 35. The roller 33 is shown as journaled on an axle 36 supported in a block 37 which is normally held against the one face of the box portion 32 as by means of a spring 38. Each of these pairs of levers 31 is mounted for vertical adjustment in the same manner as the inner ends of the pairs of levers 4 by an adjusting screw 13.

The frame 1 supports the table rolls 40 and the suction boxes 41, and at 42 is shown the usual guide roll. While the table rolls may be of any preferred construction and be mounted on the frame in any desired way, as shown they are mounted without capacity of lateral shake and with a shake roll 43 intermediate the ends of the series of table rolls and within the middle zone of active interfelting of the fibers which are supplied to the Fourdrinier wire 44 from the flow box 45. The shake roll to be within the middle zone of active interfelting of the fibers, should be at least one-quarter of the distance between the breast roll 69 and the couch roll 30 from the breast roll and should be a substantial distance back of the first suction boxes, say, at least five feet. This shake roll 43 is so arranged with reference to the table rolls 40 that the Fourdrinier wire bends thereover so that an increased frictional grip between the wire and the shake roll is produced, and the shake roll is preferably surfaced with a frictional material such as a felt blanket or a ribbed rubber covering, or the like, so that as this roll is shaken axially the Fourdrinier wire is given a lateral shaking motion, sliding over the non-shaking table rolls 40, this being in accordance with the disclosure in my Patent No. 1,839,158 granted December 29, 1931, for Paper machines to which reference has heretofore been made and in which this particular arrangement of shake mechanism is more fully described and claimed. It should be understood, however, that the raising and lowering arrangement for the central portion of the side frames may be used with other arrangements of shake mechanism if desired.

As shown best in Figures 10 and 11, the overlapped portions of the side frames may be raised or lowered with reference to the end portions of the frame. These overlapped portions of the side frames are, as shown in Figures 10 and 12 supported on a central plate portion 50 in one side of which the pivot pin 20 is carried provided with a roller 51 which rests on the upper face of the jack indicated generally at 52. While the jack may be of any desired form, as shown in Figure 11, it is provided with a threaded central post 53 guided for vertical movement in a hollow standard 54 of a gear casing 55. Within this gear casing a worm wheel 56 has threaded engagement with the post 53 which is supported on antifriction bearings 57 on a pedestal portion 58 within the casing 55. A foundation portion 60 has a recess 61 within which the lower end of the standard 53 may extend when the central portion of the frames is lowered. The upper end of the post 53 may be

covered by telescopically arranged sleeves 530 and 531. Each of the side frames is provided at its overlapped portions with one of these jacks and they are connected for simultaneous operation by means of a pipe 62 connected at opposite ends to the shafts 63 which extend through the gear casing 55 and are provided with worms 560 engaging the respective worm wheels 56. One of the shafts 63 may be extended through the gear casing and have fixed thereto a gear 65 with which meshes a pinion 66 on the shaft 67 of a motor 68. By this interconnection the central portions of both side frames are raised or lowered simultaneously thus to control the pitch of the wire from the breast roll to the shake roll 43, where such a shake roll is used, and at least to substantially the center of length of the wire-supporting frame. As shown the shake roll, which is positioned within the middle zone of active interfelting of the fibers on the wire, is located substantially above the pivot point between the side frames. A location which is generally quite suitable is substantially at the center of length of the side frames which brings it substantially above the pivot point about which the slope adjusting of the wire is made. The shake roll 43 as shown is mounted on the upper ends of leaf springs 70 and as shown the breast roll 69 is similarly mounted on springs 71 so that both of these elements may be shaken.

In Figure 2 at 73 and 74 are shown variable speed electric motors, each driving alined counter shaft sections as at 75 and 76. These may be coupled together, if desired, through the clutches 77, 78 and 79 so that one motor may be used to drive both shake mechanisms, or either may be used alone to drive its own shake mechanism. Such shake mechanisms may be of any desired type but are preferably independently adjustable for amplitude of shake. In Figure 12, for example, one form of shake head is illustrated in which rocking motion is imparted to an arm 80 carried by a rock shaft 81. An arm 82 also carried by this rock shaft has vertically adjustable thereon a sleeve 83 which is connected to a portion 84 joining the upper ends of the spring arms, shown in this figure as the spring arms 70, by a flexible strap connection at 85. Each of the arms 80 may be connected through a link 86 to a crank 87 on its respective shaft 75 and 76. By this means the amplitude and rate of vibration of the breast roll and the shake roll may be adjusted independently of each other or they may be shaken at the same rates by the use of a single motor such as 73 or 74 but with amplitudes independently adjustable by the adjustment of the collars 83 on the shake arms 82.

Where a considerable range of adjustment of the wire slope is desired it may be found necessary or desirable to adjust the height of the couch roll end of the frame as well as the central portion thereof, as the slope of the wire from the shake roll 43 toward the couch roll must not be excessive. The stock passing over this portion of the wire, particularly where the stock is suitable for operation with little initial slope and at slow speed, may still be very wet and in condition where its formation would be seriously impaired should the wire slope be excessive. For this reason provision may be made to adjust the height of the couch roll end of the frame as well as the middle portion and either simultaneously with or independently thereof. A further reason for providing for adjustment of the height of the couch roll end of the frame is that it permits adjustment of the slope of the wire from the shake roll toward the couch roll and thus adjustment of the arc of contact of the Fourdrinier wire over the shake roll and thereby the frictional grip therebetween for any given slope of wire between the breast and shake rolls. Such an arrangement is illustrated in Figure 3, the support for the couch roll end of the frame, instead of being the fixed pedestal 35 shown in Figure 1, being a jack as shown at 90 in Figures 3, 4 and 5. These jacks may be of the same construction as shown in Figures 10 and 11 and those at opposite sides may be connected for simultaneous operation in the same manner as through a connecting shaft 91. A motor, as at 92, may be connected to drive a jack shaft 93 which may be selectively coupled to either or both of the shaft sections 94 and 95, the shaft section 94 being geared as at 96 to actuate the jacks 52 and the shaft 95 being similarly geared as at 97 to actuate the jacks 90.

Means may also be provided by which the frame may be moved laterally in order to facilitate the removal or replacement of the Fourdrinier wire. To this end a pair of track rails 100 may be supported at one side of the normal position of the frame. The outer ends of these rails may be fixed on suitable supports 101 and their inner ends on pedestal blocks. One of these pedestal blocks as at 102 has pivoted thereon on a pivot 109 to swing horizontally a rail section 110 which may be swung from a position in alinement with a rail 100, as shown in full lines in Figure 7 to a position at right angles thereto and parallel to the side frames 1 or 2. One of these rails 110 is pivoted at one side of the frame and the other is pivoted at the opposite side and when both are in the full line position shown in Figure 7 they are in alinement with the rails 100 so that wheels 115 journaled in brackets 116 fixed to the side frames may be supported thereon and the whole frame moved laterally into the dotted line position shown in Figures 2 and 6 supported entirely by the rails 100. The upper faces of these rails are preferably formed with rack teeth as 117, the wheels 115 being formed with mating teeth 118 and the wheels 115 at one side of the frame have their supporting shafts 120 connected together through a universal coupling 119. This universal coupling permits the vertical adjustment of the center of the frame to adjust the slope, while maintaining the fixed angular relationship desired between the wheels 115. By rotation of these wheels the frame may be driven along the rails 100 and 110 into or out of the normal operative position. The side frames 2 and 3 are cross connected at suitable points as by the cross braces 125 and the tie rods 126 so that they may be moved readily as a unit. A motor as at 130 secured to one frame portion as 3 and driving one of the shafts 120 through suitable reduction gearing 131 may be employed to produce the desired rotation of the wheel 115 to move the frame laterally.

Under normal machine operating conditions the wheels 115 are out of contact with the rails 110 but by lowering the central pivotal portions of the frame these wheels are lowered onto the rails 110 and the end portions of the frame are lifted out of contact with their end supports, as shown in Figure 3. In this position of the parts the stepped portions of the side frames are in the position shown in Figure 18. The side frames are further connected together so that when they are in this position they are in substantially rigid relation by bolts 125 which pass through slots 126 in one of the side frames as

3 and are engaged in threaded holes 127 in the mating frame portions 2.

The rails 110 when swung about their pivots into alinement with the rails 100 may be secured in position by any suitable means such as shown, for example, in Figure 9. The free end portion of the rail 110 is shown as provided with a bearing portion 140 within which is journaled a shaft 141. On one end of this shaft 141 is a threaded portion 142 which may be engaged in a threaded opening in a plate 143 fixed to a supporting standard 144 provided with an opening 145 through which the threaded end of the shaft 141 may extend. The opposite end of the shaft 141 is provided with a suitable handle 146 by which it may be turned. When the rail 110 is swung over toward alinement with the mating rail 100 this shaft 141 has its threaded portion engaged in the opening in the plate 142, whereupon by turning the handle 46 in one direction the rail 110 is firmly secured in alined position with its mating rail 100.

When the frame is in its normal position for machine operation it is desirable that it be held firmly against vibration by the shaking mechanism. For this reason a plurality of stands such as 150 may be provided on that side of the frame opposite to the rails 100 and to which the frame may be firmly secured. To this end the side frame may be provided with a series of bolts 151 secured thereto, the outer thread extremities 152 of which may be extended through slots in the upper ends of the stands 150 and threaded locking handles 154 may be engaged therewith by the tightening of which the frames may be secured rigidly to the stands. The slots 150 of the stands are so angularly formed as to permit the desired vertical adjustment of the center portion of the frame, or the center and couch roll ends as may be desired, the handles 154 having been previously loosened to permit such action.

By permitting the slope of the wire to be adjusted substantially centrally of the length of the frame the angular adjustment of this slope for a given vertical movement of the adjusting means may be substantially double that where this vertical movement is provided for either end portion of the frame. It is during the first portion of the wire from the breast roll to this point of vertical adjustment that the pitch of the wire is effective. Beyond that it is of no value except that the slope must not be excessive where the stock is still in a highly fluid condition as when a stock requiring slight or no slope or a rising slope and slow speed of the wire is being run.

From the description of embodiments of the invention shown it should be evident to those skilled in the art that various other changes and modifications might be made without departing from the spirit or scope of this invention as defined by the appended claims.

I claim:

1. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section and suction boxes adjacent to said couch roll for supporting said wire, and means substantially midway between said breast roll and couch roll and spaced at least about five feet from said suction boxes for adjusting the pitch of said wire between the breast roll and means.

2. In combination, a Fourdrinier paper machine having a Fourdrinier wire, a breast roll and table rolls supporting said wire, side frames supporting said table rolls, means for applying shake to said wire at a point in the middle zone of active interfelting of the fibers independent of the breast roll, table rolls and side frames, and means for raising and lowering the wire at said point so as to alter the pitch of the wire between said point and said breast roll.

3. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, means substantially midway between said rolls for adjusting the elevation of said wire to thereby adjust the pitch of said wire between said breast roll and means, and means for adjusting the elevation of said wire near said couch roll.

4. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, means within the middle zone of active interfelting of the fibers for adjusting the elevation of said wire to thereby adjust the pitch of said wire between said breast roll and means, and means for adjusting the elevation of said wire near said couch roll.

5. A Fourdrinier section of a paper machine having a Fourdrinier wire, a series of table rolls and a series of suction boxes for supporting said wire, and means intermediate the ends of said series of table rolls for adjusting the height of said wire and the slope of the wire in opposite directions therefrom.

6. A Fourdrinier section of a paper machine having a Fourdrinier wire, side frames having table rolls and suction boxes for supporting said wire, said side frames each comprising sections pivoted together on horizontal axes substantially centrally thereof and within the middle zone of active interfelting of the fibers, and means for adjusting the elevation of said pivotal connection relative to one end of each frame.

7. A Fourdrinier section of a paper machine having a Fourdrinier wire, side frames having table rolls and suction boxes for supporting said wire, said side frames each comprising sections pivoted together on horizontal axes substantially centrally thereof, means for adjusting the elevation of said pivotal connection relative to one end of each frame, and means for adjusting the elevation of one end of each frame.

8. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, a breast roll at one end of said section and about which said wire passes, table rolls for supporting said wire forwardly of said breast roll, said table rolls being arranged in a plurality of sets each of a plurality of rolls, suction boxes forwardly of said sets of table rolls, and means located between a pair of adjacent sets of table rolls for adjusting the elevation of said wire.

9. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, a breast roll at one end of said section and about which said wire passes, table rolls for supporting said wire forwardly of said breast roll, said table rolls being arranged in a plurality of sets, means located between a pair of adjacent sets of table rolls for adjusting the elevation of said wire, and means for imparting lateral shake to said wire between said pair of sets.

10. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, a breast roll at one end of said section and about which said wire passes, table rolls for supporting said wire forwardly of said breast roll, side frames for supporting said table rolls, each side frame compris-

ing a pair of endwise positioned portions, means for pivotally supporting the remote ends of said portions, means for vertically adjusting their adjacent ends, and means for imparting lateral shake to said wire substantially at said adjacent ends.

11. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section and about which said wire passes, a pair of sets of table rolls for supporting said wire between said breast and couch roll, side frames for supporting said table rolls, each side frame comprising a pair of endwise positioned portions each portion supporting one end of each table roll of a set, means for pivotally supporting the remote ends of said portions, means for vertically adjusting the adjacent ends of said portions, a shake roll positioned between said sets of table rolls in engagement with said wire and vertically adjusted with the adjacent ends of said frame portions, and means for imparting lateral shake to said shake roll.

12. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section and about which said wire passes, a pair of sets of table rolls for supporting said wire between said breast and couch rolls, side frames for supporting said table, each side frame comprising a pair of endwise positioned portions, each portion supporting one end of each table roll of a set, means for pivotally supporting the remote ends of said portions, means for vertically adjusting the adjacent ends of said portions, a shake roll positioned between said sets of table rolls and over which said wire bends, said shake roll being vertically adjustable with said adjacent frame portions, and means for imparting lateral shake to said shake roll.

13. A Fourdrinier section of a paper machine comprising a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section and about which said wire passes, a pair of sets of table rolls for supporting said wire between said couch and breast rolls, side frames for supporting said table rolls, each side frame comprising a pair of endwise positioned portions of substantially equal lengths and having their adjacent ends overlapping, each portion supporting one end of each table roll of a set, means for pivotally supporting the remote ends of said portions on horizontal axes, and means for adjusting said overlapping portions vertically, said overlapping portions interfitting to limit their relative pivotal movement in one direction.

14. A Fourdrinier section of a paper machine comprising a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section and about which said wire passes, a pair of sets of table rolls for supporting said wire between said couch and breast rolls, side frames for supporting said table rolls, each side frame comprising a pair of endwise positioned portions having their adjacent ends overlapping, each portion supporting one end of each table roll of a set, means for pivotally supporting the remote ends of said portions on horizontal axes, means for adjusting said overlapping portions vertically, a wire shaking element supported by a pair of said overlapping ends, and means for imparting shake to said element.

15. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, means including a breast roll and a shaking element spaced from said breast roll for supporting said wire, means for adjusting said shaking element vertically independently of said breast roll so as to alter the slope of the wire between said breast roll and means, and means for imparting shake to said element and to said breast roll laterally of the wire.

16. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, means including a breast roll and a shaking element spaced from said breast roll for supporting said wire, means for adjusting said shaking element vertically independently of said breast roll so as to alter the slope of the wire between said breast roll and means, and means for imparting shake to said element and to said breast roll laterally of the wire selectively independently or in unison.

17. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, means including a breast roll and a shaking element spaced from said breast roll for supporting said wire, means for adjusting said shaking element vertically with respect to said breast roll, and means for imparting shake to said element and to said breast roll laterally of the wire selectively independently or in unison and with independently adjustable amplitudes and rates.

18. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, means including breast, couch and table rolls for supporting said wire, sectional side frames for supporting said table rolls, said sections of each side frame being pivotally connected within the middle zone of active interfelting of the fibers, means located adjacent to said connections for shaking the wire independently of said frames, and means for adjusting the adjacent ends of said frames and said shaking means relative to the remote ends of said sections to adjust the pitch of said wire between said breast roll and shaking means.

19. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, means including breast, couch and table rolls for supporting said wire, sectional side frames for supporting said table rolls, said sections of each side frame being pivotally connected within the middle zone of active interfelting of the fibers, means located adjacent to said connections for shaking the wire independently of said frames, means for adjusting the adjacent ends of said frames and said shaking means relative to the remote ends of said sections to adjust the pitch of said wire between said breast roll and shaking means, and means for vertically adjusting the couch roll ends of said frames.

20. A Fourdrinier machine of the removable type, comprising a frame formed in sections hinged together within the middle zone of active interfelting of the fibers, means for adjusting the height of said hinged portion relative to the ends of said frame, and means for facilitating laterally removing said frame as a unit.

21. A Fourdrinier machine of the removable type comprising a Fourdrinier wire, a frame, means including a shaking element intermediate the ends of said frame for shaking said wire independently of said frame, means for adjusting the height of said element and thereby the longitudinal slopes of said wire on opposite sides thereof, and means for laterally removing said frame and said shaking element.

22. In a removable type Fourdrinier paper machine, a frame formed in two hinged sections for carrying wire supporting elements, means for adjusting the height of said frame at its hinged

points, means for supporting the end portions of said frame, laterally extending rails positioned between said supporting means and said hinged points, and elements carried by said frame and cooperating with each of said rails when said hinged points are lowered to support said frame on said rails and lift said end portions from said supporting means, said elements and rails cooperating to facilitate laterally removing said frame as a unit.

23. In a removable type Fourdrinier paper machine, a frame formed in two hinged sections for carrying wire supporting elements, means for adjusting the height of said frame at its hinged points, means for supporting the end portions of said frame, laterally extending rails positioned between said supporting means and said hinged points, and elements carried by said frame and cooperating with each of said rails when said hinged points are lowered to support said frame on said rails and lift said end portions from said supporting means, rail sections each hinged at one end to one side of said frame and movable about their hinge axes from positions parallel to said frame to positions transversely of said frame to form continuations of said rails, said elements, rails and rail sections cooperating to facilitate laterally removing said frame as a unit.

24. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, means for adjusting the elevation of said wire substantially midway between said rolls and the relative slopes of said wire in opposite directions lengthwise of the wire from the location of such adjustment to thereby adjust the pitch of said wire between said breast roll and means, and means for adjusting the elevation of said wire near said couch roll.

25. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, means for adjusting the elevation of said wire within the middle zone of active interfelting of the fibers and the relative slopes of said wire in either direction from the location of said adjustment, and means for adjusting the elevation of said wire near said couch roll.

26. A Fourdrinier section of a paper machine having a Fourdrinier wire, a series of table rolls and a series of suction boxes for supporting said wire, and means intermediate the ends of said series of table rolls for adjusting the height of said wire and the relative lengthwise slopes of said wire on either side of the location of such adjustment.

27. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, a breast roll at one end of said section and about which said wire passes, table rolls for supporting said wire forwardly of said breast roll, said table rolls being arranged in a plurality of sets each of a plurality of rolls, suction boxes forwardly of said sets of table rolls, and means located between a pair of adjacent sets of table rolls for adjusting the elevation of said wire and the relative slopes of said wire on said adjacent sets of table rolls.

28. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, a breast roll at one end of said section and about which said wire passes, table rolls for supporting said wire forwardly of said breast roll, said table rolls being arranged in a plurality of sets, means located between a pair of adjacent sets of table rolls for adjusting the elevation of said wire and the relative slopes of said wire on said sets of table rolls, and means for imparting lateral shake to said wire between said pair of sets.

29. A Fourdrinier section of a paper machine, comprising a Fourdrinier wire, means including a breast roll and a shaking element spaced from said breast roll for supporting said wire, means for adjusting said shaking element vertically independent of said breast roll to alter the slope of the wire between said breast roll and element, and means for imparting shake to said element.

30. A Fourdrinier machine of the removable type comprising a Fourdrinier wire, table rolls for supporting said wire, a frame for supporting said table rolls, means including a shaking element intermediate the ends of said frame for shaking the wire independently of said table rolls, and means for laterally removing said frame, table rolls and shaking element.

31. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, and means acting on the wire within the middle zone of active interfelting of the fibers for adjusting the elevation of said wire and the relative slopes of said wire between said breast roll and means and from said means toward said couch roll.

32. A Fourdrinier machine having a Fourdrinier wire, two sets of non-shaking wire supports and a roll therebetween over which roll said wire bends for supporting said wire, means for shaking said roll, and means for adjusting the level of said roll and the adjacent ends of said sets of supports relative to their opposite ends.

33. A Fourdrinier machine having a Fourdrinier wire, two sets of non-shaking table rolls, and a roll therebetween over which roll said wire bends for supporting said wire, means for shaking said roll, and means for adjusting the level of said roll and of the adjacent ends of said sets of table rolls relative to their opposite ends.

34. A Fourdrinier machine having a Fourdrinier wire, two sets of non-shaking wire supports and a roll therebetween over which roll said wire bends for supporting said wire, means for shaking said roll, means for adjusting the level of said roll and the adjacent ends of said sets of supports relative to their opposite ends, and means for adjusting the level of the opposite end of one of said sets of supports.

35. A Fourdrinier machine having a Fourdrinier wire, two sets of non-shaking table rolls, and a roll therebetween over which roll said wire bends for supporting said wire, means for shaking said roll, means for adjusting the level of said roll and of the adjacent ends of said sets of table rolls relative to their opposite ends, and means for adjusting the level of the opposite end of one of said sets of rolls.

36. A Fourdrinier machine having a Fourdrinier wire, means including a laterally shakable element positioned intermediate its ends for supporting said wire, means for shaking said element and means for adjusting the height of said element and thereby the relative longitudinal slopes of said wire on opposite sides of said element.

37. A Fourdrinier machine having a Fourdrinier wire, means including a roll positioned intermediate its ends and over which said wire bends for supporting said wire, means for adjusting the elevation of said roll and thereby the relative longitudinal slopes of said wire on opposite sides thereof, and means for shaking said roll.

38. A Fourdrinier machine having a Fourdrinier wire, means including a roll positioned in

the middle zone of active interfelting of the fibers and over which said wire bends for supporting said wire, and means for adjusting the elevation of said roll and thereby the relative longitudinal slopes of said wire on opposite sides thereof.

39. A Fourdrinier machine having a Fourdrinier wire, means for supporting said wire, and means for adjusting the elevation of said wire acting on the wire within the middle zone of active interfelting of the fibers and adjusting the relative slopes of said wire longitudinally from the location of said adjustment in opposite directions.

40. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, a shake element over which said wire bends between said breast and couch rolls, means for imparting shake to said element, and means for adjusting the extent of bending of said wire thereover.

41. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, a shake element over which said wire bends between said breast and couch roll, means for imparting shake to said element, and means for adjusting the slope of the wire from said shake element toward said couch roll independently of the slope of the wire from said shake element toward said breast roll.

42. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, a shake element over which said wire bends between said breast and couch roll and within the middle zone of active interfelting of the fibers, and means for adjusting the slope of the wire from said shake element toward said couch roll independently of the slope of the wire from said shake element toward said breast roll to adjust the extent of such bending and therefore the grip between said shake element and wire.

43. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, a shake roll over which said wire bends between said breast and couch rolls, means for imparting shake to said shake roll, and means for adjusting the elevation of said wire between said couch roll and said shake roll to adjust the extent of such bending and thereby the grip between said shake roll and wire.

44. A Fourdrinier section of a paper machine having a Fourdrinier wire, a breast roll and a couch roll at opposite ends of said section, a shake roll over which said wire bends between said breast and couch rolls and within the middle zone of active interfelting of the fibers, means for imparting shake to said shake roll, and means for adjusting the elevation of said wire between said couch roll and said shake roll to adjust the extent of such bending and thereby the grip between said shake roll and wire.

45. A Fourdrinier machine having a breast roll, a couch roll, a guide roll, suction boxes, a series of tube rolls disposed between the suction boxes and the breast roll, a sieve table upon which the tube rolls are mounted, and a wire passing over the breast roll, the tube rolls, the suction boxes, the couch rolls, and back to the breast roll, that portion of the sieve table from the breast roll rearward for a certain distance less than the distance between the breast roll and the suction boxes being upwardly inclined, the remainder of the wire to the suction boxes being at an angle to the forward portion of the wire.

46. In a Fourdrinier machine, a breast roll and a sieve table formed in two sections, that section of the sieve table adjacent the breast roll being relatively short and being pivoted to the rear section of the table at a distance from the forward suction box of the machine, and means for raising or lowering the forward end of the rear section of the table to thus change the inclination of the forward section of the table relative to the rear section thereof.

47. In a Fourdrinier machine, a breast roll, a sieve table, and suction boxes coacting with the sieve table at a point remote from the breast roll, the table from the breast roll to a point between the breast roll and the suction boxes being disposed at an upward and rearward inclination, the remainder of the sieve table extending rearward to the suction boxes at an angle to the forward portion of the sieve table.

48. In a Fourdrinier machine, a breast roll, a sieve table, suction boxes disposed remote from the breast roll, the sieve table extending upward and rearward at a predetermined inclination from the breast roll to a point approximately one-third of the distance between the breast roll and the suction boxes and then extending rearward to the suction boxes at an angle to the forward portion of the sieve table.

49. In a Fourdrinier machine, a breast roll, a sieve table and suction boxes disposed remote from the breast roll, the sieve table being formed in two sections, the forward section, adjacent the breast roll, being pivoted to the rear section at a point between the suction boxes and the breast roll, this forward pivoted section being vertically adjustable, and means for adjusting the forward section into an angular relation to the rear section.

50. In a Fourdrinier machine, a breast roll, a sieve table, a member extending longitudinally beneath the sieve table, a roll supporting frame mounted upon said member and formed of a relatively short section adjacent the breast roll and a relatively long section extending rearward to the suction boxes, the forward section of the table adjacent the breast roll being angularly adjustable with reference to the rear section of the table, and means for adjusting the angularity of the section of the table.

51. In a Fourdrinier machine, a breast roll, a sieve table, a member extending longitudinally beneath the sieve table, a roll supporting frame mounted upon said member and formed of a relatively short section adjacent the breast roll and a relatively long section extending rearward to the suction boxes, the forward section of the table adjacent the breast roll being angularly adjustable with reference to the rear section of the table.

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