July 28, 1931. J. A. WHITE 1,816,754

FOURDRINIER MACHINE

Filed Nov. 20, 1930 4 Sheets-Sheet 1

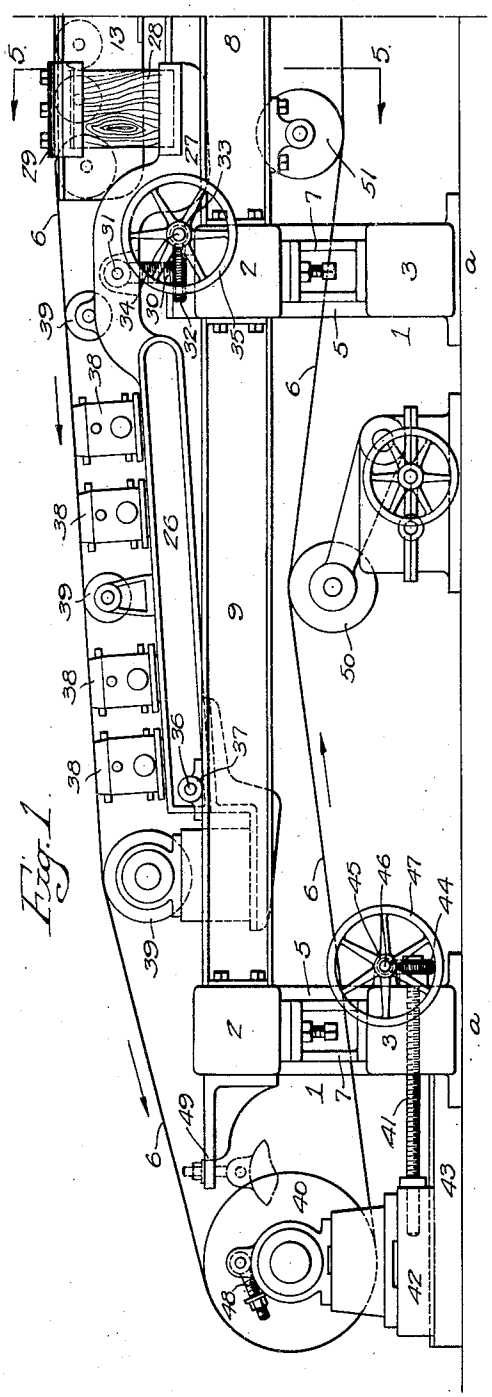


Fig. 1.

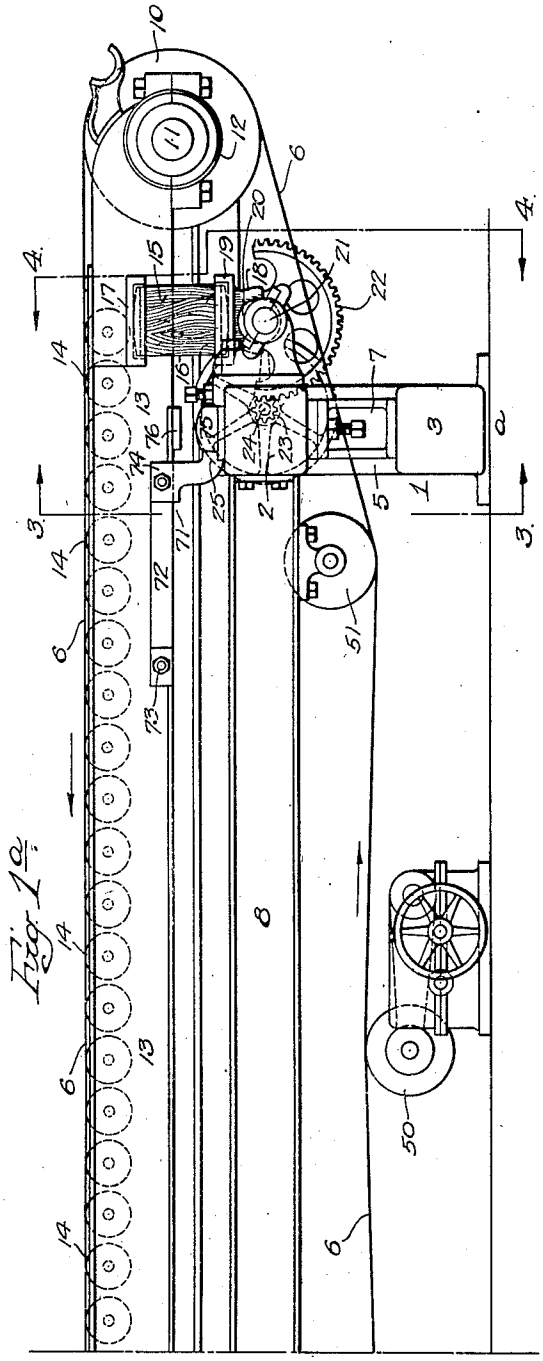


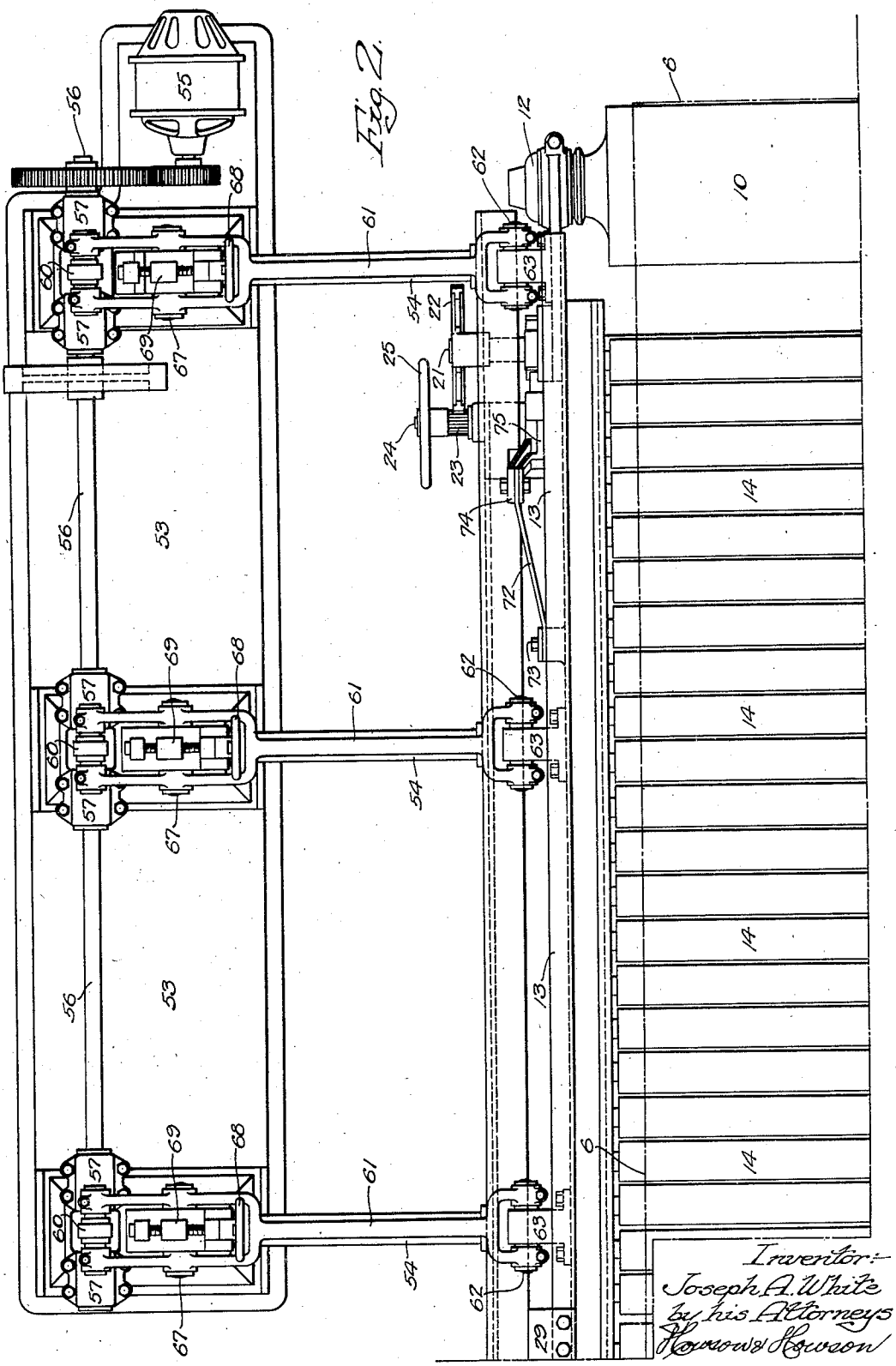
Fig. 1a.

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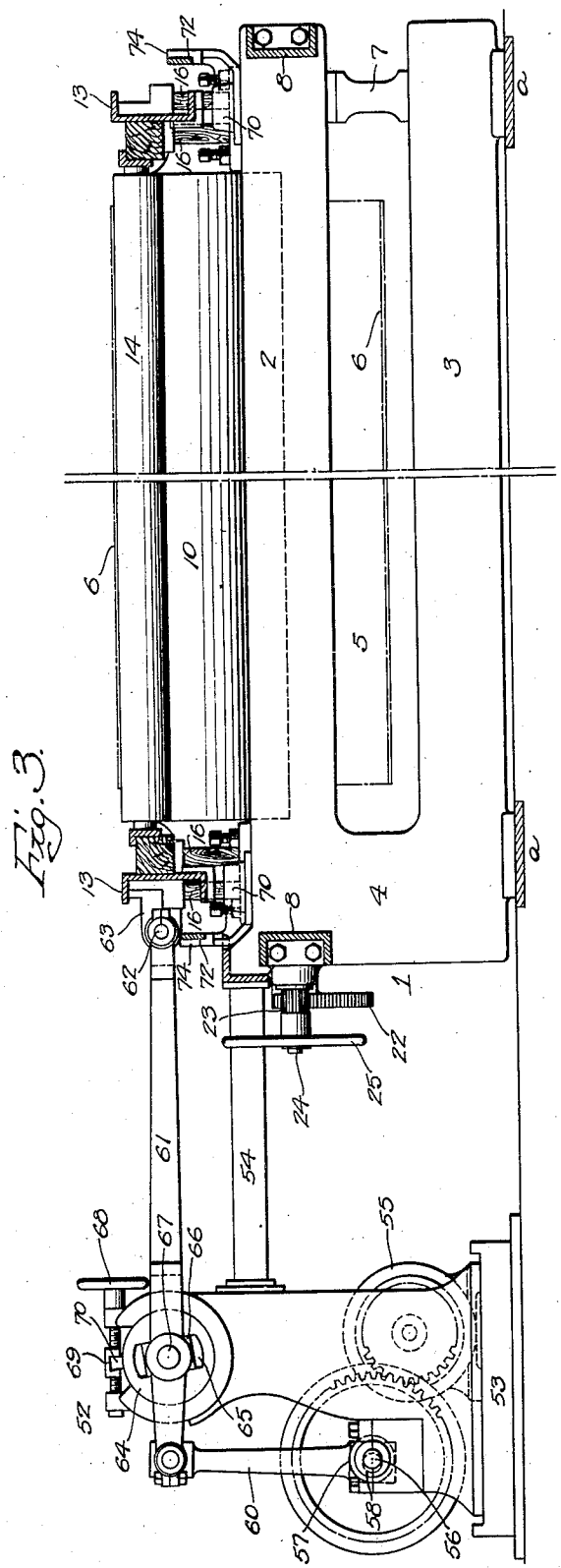


Fig. 3.

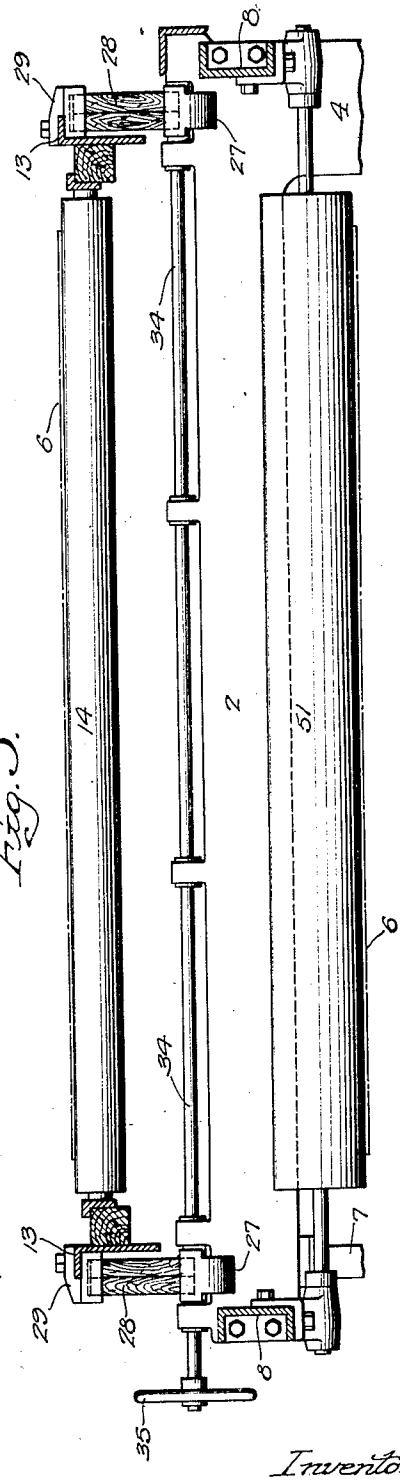


Fig. 5.

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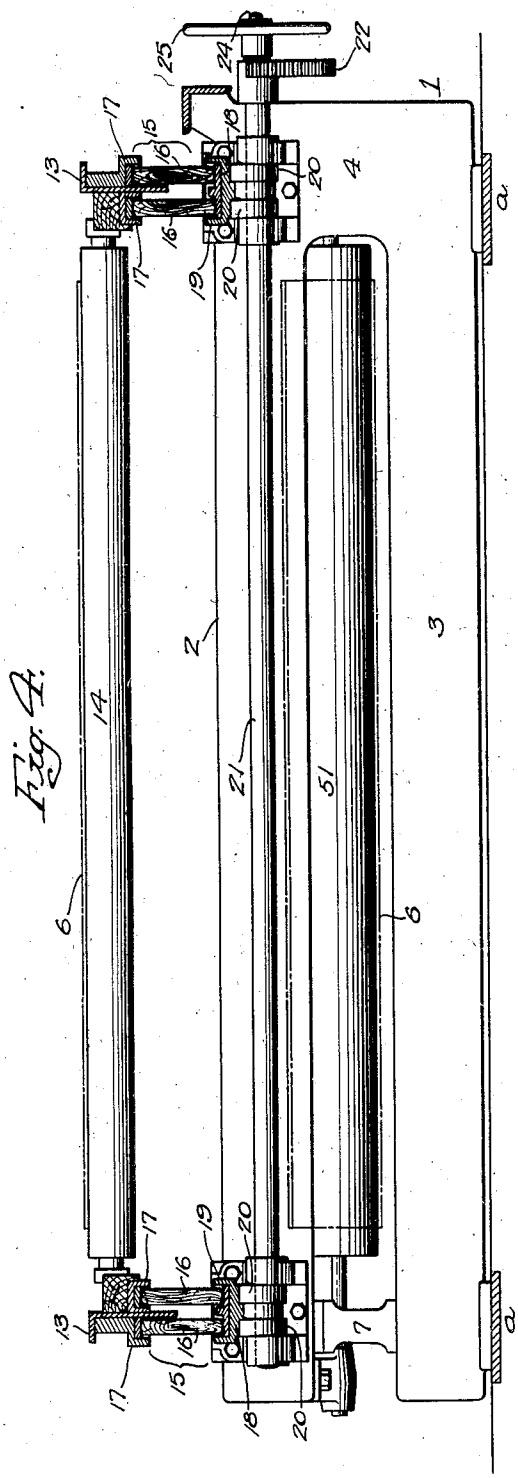


Fig. 4.

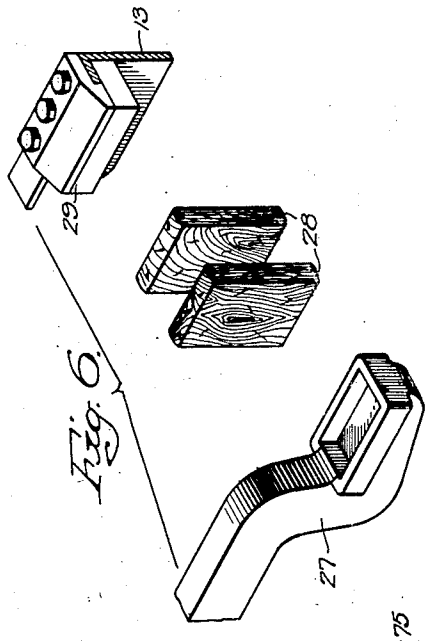


Fig. 6.

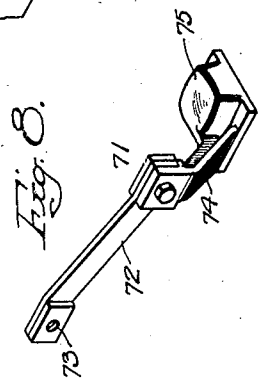


Fig. 8.

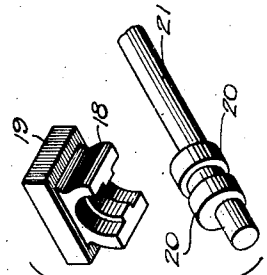


Fig. 7.

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Patented July 28, 1931

1,816,754

UNITED STATES PATENT OFFICE

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FOURDRINIER MACHINE

Application filed November 20, 1930. Serial No. 497,039.

My invention relates to certain improvements in paper-making machines of the "Fourdrinier" type.

One object of the invention is to improve and simplify the construction of a Fourdrinier paper-making machine so that the paper-making section of the machine can be readily adjusted at two points, one point at the breast roll and the other point between the making section and the suction box section.

Another object of the invention is to make the machine in two sections, in which the delivery end of the paper-making section is supported by the suction box section.

A further object of the invention is to provide rockers at the breast roll end of the machine supported on one of the beams of the frame of the machine, and rockers at the delivery end of the paper-making section supported by the suction box section.

A still further object of the invention is to make the supporting frames for the machine in the form of heavy castings, each casting having a deep throat through which the return run of the wire extends.

A further object of the invention is to so design the frames that they can be mounted on the ordinary foundations of a Fourdrinier machine.

A still further object of the invention is to prevent the spring or whipping of the side rails of the machine.

And a still further object of the invention is to so construct the shaking mechanism that the movement of one end of the table can be of a different length than at the opposite end of the table.

A further object of the invention is to provide a series of shaking mechanism for shaking the paper-making section of the frame, and to provide means for adjusting the shaking mechanism so as to regulate the radial movement of the frame.

In the accompanying drawings:

Figs. 1 and 1*a* are side views of a Fourdrinier machine illustrating my invention;

Fig. 2 is a plan view of one end and one side of the machine and illustrating the shaking mechanism;

Fig. 3 is a transverse sectional view on the line 3—3, Fig. 1;

Fig. 4 is a transverse sectional view on the line 4—4, Fig. 1;

Fig. 5 is a transverse sectional view on the line 5—5, Fig. 1;

Fig. 6 is a detached perspective view of one of the rocking elements at the delivery end of the paper-making section of the machine;

Fig. 7 is a detached perspective view of part of the supporting cam and base plate of the rocker at the suction box end of the machine; and

Fig. 8 is a detached perspective view of one of the devices which prevent longitudinal movement of the making frame.

1 are the supporting beams for the machine. Three are shown in the present instance. These beams extend the full width of the machine and rest on the foundations *a*. In the present instance, these foundations may be the foundations of a standard machine so that if the improved machine is substituted for a machine of an older type, the original foundations can be used. Each supporting beam is made in the form of a single hollow casting having upper members 2 and lower members 3. These members are connected at one end only by a vertical member 4, and the upper and lower beams are spaced apart to form an extended throat 5, which is deep enough to allow the return run of the forming wire 6 to pass therethrough as shown clearly in Fig. 3. When the machine is running, the outer end of the upper overhanging section 2 is supported on the outer end of the lower section 3 by a block 7, which will prevent the upper section from vibrating, but when it is wished to change the wire, this block is removed and there is sufficient strength in the structure to allow the overhanging portions 2 of the beams to support the load. The beams are connected by longitudinal side members 8 and 9, forming a heavy rigid structure for supporting the machine.

10 is a breast roll, the trunnions 11 of which are mounted in bearings 12, secured to the side rails 13 of the making section of

the machine which carries the rollers 14, over which the making wire 6 travels, these side bars and connections forming the carrying frame for the wire. The frame is supported at the breast roll end by rockers 15. The rockers consist of two pairs of wooden blocks 16, spaced apart, and each rocker is slightly rounded at the upper and lower end as shown in Fig. 6, and the rockers are supported on edge by a base plate 19, Figs. 4 and 7, having a semi-circular bearing 18 which rests on the cams 20, on a cam-shaft 21, extending across the machine as shown in Fig. 4. The cams are spaced apart in the present instance, and are separated by a semi-circular rib in the bearing 18, so as to keep the bearing in position on the cams. On the end of the cam-shaft is a segmental gear-wheel 22, which meshes with a pinion 23 on a shaft 24 on which is a hand-wheel 25, so that on turning the hand-wheel the cams can raise or lower the rockers 15. The upper ends of the rockers are mounted in cap plates 17, which are secured to the side rails 13 of the paper-making section of the machine. The object of this adjustment is to raise or lower the feed end of the paper-making section of the machine. The opposite end of the wire supporting frame is carried by the suction box frame 26, which has a portion 27 which extends under the making wire frame and forms the base support for rocking blocks 28, similar in construction to the blocks 16. The upper ends of the blocks 28 are mounted in cap plates 29 secured to the side bars 13 of the making wire frame.

In order to adjust the suction box frame 26, a heavy screw 30 is pivoted at 31 to the arched portion of the extension 27 of the frame, and this screw extends through a nut 32 supported by the intermediate beam 1, and on the periphery of each nut are teeth which are engaged by a worm 33 on a shaft 34 extending across the machine and mounted on the support 1, and this shaft is turned by a hand-wheel 35, so that on turning the hand-wheel the forward portion of the suction box frame can be raised and this in turn raises the outer portion of the making wire frame. Otherwise the two frames are entirely independent one from the other. The outer end of the suction box frame is pivoted at 36, the pivot being adapted to suitable bearings 37 on the side members 9. 38 are the suction boxes of the ordinary type, and 39 are supporting rollers for the wire.

In order to prevent the longitudinal movement of the making frame, a flexible connection 71, Fig. 8, is provided at each side of the machine. Each flexible mechanism consists in the present instance of a flat spring bar 72 connected at 73 to the making frame and to a bracket 74 on a block 75 mounted on the forward transverse member of the main frame, so that while the making frame is free to vibrate laterally it is prevented from moving longitudinally independently of the main frame. Above the block 75 is a shoe 76 secured to the making frame so that when the rockers 16 are removed from under the bearings of the breast roll, the shoes 76 will rest upon the blocks 75 of the main frame and support the forward end of the making frame when the making wire is to be removed and a new wire placed in position.

At the delivery end of the machine is a couch roll 40, around which the making wire 6 passes. This couch roll in the present instance can be adjusted towards and from the supporting beam by means of screws 41 mounted in the beam 1, and each screw engages a sliding bearing 42, which supports the roll 40. Each bearing slides on a base plate 43, and the screw has a worm wheel 44 at one end meshing with the worm 45 on the shaft 46, which extends across the machine, and on which is a hand wheel 47 by which it is turned. On each bearing 42 is a pivoted bolt 48, which when the roller is moved to a position close to the beam 1, can be turned up to engage a slotted bracket 49 on the beam 1, so that the base portion of the bearing 42 can be removed, allowing the couch roll to hang from the brackets. The return run of the making wire 6 is supported on adjustable carrying rollers 50, which hold the wire against the bearing rollers 51, so that when the wire is in place the slack of the wire can be taken up by adjusting the rollers 50. The means for adjusting these rollers are of the well known type and need not be described, the rollers being shown simply in diagram. When it is wished to remove the wire, all that is necessary is to remove the blocks 7 and lower the rollers 50, and adjust the couch roll bearings so that the couch roll will be moved toward the frame at the delivery end of the machine. This allows sufficient slack in the making wire so that it can be removed laterally from the machine and another wire placed in position, after which the several parts are reassembled and the slack in the wire taken up.

The means for shaking the making frame of the paper-making machine is as follows: 52 are three shaking stands in the present instance. These stands are mounted on a base 53 and they are spaced apart as shown, so that one stand will shake the stand near the breast roll, and the second stand will shake the middle of the frame, and the third stand will shake the stand near the delivery end of the frame. Each frame is rigidly connected to the main frame of the machine by a strut 54, so that any independent vibration of the stand will be prevented, as it is essential that after the shaking mechanism has been set, the vibrations will be steady and of a given length. 55 is an electric motor in the present instance, which is geared to a

shaft 56, mounted in suitable bearings 57. These bearings are mounted on the several stands. On the shaft are eccentrics 58, one located at each shake stand, and each eccentric actuates a rod 60, which in turn vibrates a forked lever 61, which is connected to the side frame of the paper-making section of the machine by a pin 62, which is adapted to bearings 63. In order to vary the vibration of the frame of the making section of the machine, a disk 64 is mounted in each stand as shown, and this disk has a slot 65 therein, in which is a block 66 having a pin 67, which engages the forked end of the lever 61. This disk can be turned in its bearings in the stand by a screw 68. On this screw is a block 69, which is engaged by a lug 70 on the disk, so that when the screw is turned, the disk is turned in its bearings, and the position of the block 66 is altered. As the levers are fulcrumed on the pin 67, the position of the slots will vary the longitudinal movement of the levers which impart the shaking motion to the frame of the paper-making section of the machine. The outer ends of the levers 61 will give a vertical movement by the eccentrics 58, through the rod 60, so that by this means the eccentrics are all set alike on the shaft 56, and the vertical movement of the three levers is the same. By adjusting the disks of each stand so that the slots therein will be at different angles, the vibratory movement imparted by the mechanism can be varied at each stand independently. As an example, the shaft 56 rotates from 200 to 500 revolutions per minute and the stroke of the lever 61 nearest the breast roll is about 3/8", while the stroke of the lever at the intermediate stand is 1/4", and the stroke of the lever nearest the delivery end of the making section is about 1/8", through which a positive vibratory motion is imparted to the frame, and there is a greater movement at the breast roll than at the delivery end of the paper-making section. By the above description it will be seen that the making section and suction box section of the machine are firmly supported on heavy beams, which are connected together, and that the making section of the machine is independent of the suction box section, and can be vibrated to any desired extent without interfering with the suction box section, and the breast roll end of the machine can be raised and lowered independently of the delivery end, and the delivery end is raised and lowered with the suction box section. The parts are so proportioned that by simply retracting the couch roll and dropping the tension rolls 50, there is enough slack provided in the wire to allow for the removal of one endless wire and substituting a new wire therefor, and as the making section of the machine is supported on vertically arranged blocks, preferably of wood, and rounded at their ends, the making section of the machine can be shaken accurately and by providing the three shaking stands any amount of lateral motion can be given the carrying frame of the making section of the machine. The adjusting means are so arranged that adjustments can be made while the machine is running and the shaking mechanism can also be adjusted while the machine is running. While I have illustrated a preferred construction, in which three shaking stands are provided, it will be understood that two stands may be used in some instances, or more than three if desirable.

I claim:

1. The combination in a paper-making machine of the Fourdrinier type, of supporting beams extending from one side of the machine to the other, each supporting beam having upper and lower members, connected at one end only, to form an elongated throat for the return run of the making wire; longitudinal side members connecting the several supporting beams; and a making frame mounted above the base frame formed by the beams and longitudinal side members.

2. The combination in a paper-making machine, of the Fourdrinier type, of a series of transverse supporting beams having upper and lower sections, connected at one end only, and forming an elongated throat for the return run of the making wire; longitudinal side members connecting the several supporting beams; a removable block supporting the upper member at the open end of the throat; paper-making frames mounted on the beams; means for vibrating the making section of the frames; and means attached to one of the beams and making frames, preventing longitudinal movement of the frame.

3. The combination in a paper-making machine of the Fourdrinier type, of a base frame; a making frame mounted above the base frame and having rockers; a suction box frame having suction boxes thereon, the suction frame extending under the forward delivery end of the making frame and supporting the delivery end of said making frame; a breast roll on the making frame; a couch roll; and an endless wire extending over the making frame and suction box frame, and returning under said frames.

4. The combination of a base frame made up of a series of transverse supporting beams, each beam having an elongated throat for the return wire; longitudinal side members connecting the beams; a making frame mounted above the forward end of said frame; a breast roll carried by the making frame; rockers supporting the frame near the breast roll; means for removably holding the rockers in position; a suction box frame pivoted to the main frame at the delivery end, and the forward end of said frame extending

under the delivery end of the making frame; rockers between the extension of the suction box frame and the delivery end of the making frame; a couch roll at the delivery end of the machine; and an endless wire extending around the breast roll and over the making frame and suction box frame, and around the couch roll, returning through the throats of the transverse supporting beams.

5. The combination in a Fourdrinier paper-making machine, of a making frame having a series of rollers thereon; a suction box frame independent of the making frame; a couch roll at the forward end of the making frame; rockers mounted between the base frame and the making frame near the couch roll; and a second set of rockers mounted under the delivery end of the making frame.

6. The combination in a Fourdrinier paper-making machine, of a making frame; a suction box frame separate from the making frame and pivoted at the delivery end; means for vertically adjusting the forward end of the suction box frame; rockers supporting the delivery end of the making frame on the forward end of the suction box frame; a breast roll at the forward end of the making frame; and rockers mounted near the breast roll.

7. The combination in a Fourdrinier paper-making machine, of a making frame; a breast roll at the forward end of the making frame; a suction box frame with suction boxes thereon; a base frame supporting both the making frame and the suction box frame, said suction box frame being pivoted at the delivery end to the main frame; means for vertically adjusting the suction box frame, said frame extending under the making frame; a rocker at each side of the machine supported by the suction box frame and supporting the delivery end of the making frame; rockers under the frame near the breast roll; flexible means connecting the making frame with the main frame; and means for vibrating the making frame.

8. The combination in a Fourdrinier machine, of a main frame; a making frame mounted above the main frame, having bearings at the forward end; a breast roll mounted in the bearings; a suction box frame pivoted to the main frame at the delivery end and extending under the delivery end of the making frame; means for vertically adjusting the suction box frame; rockers on the forward end of the suction box frame and supporting the delivery end of the making frame; adjustable rockers supporting the breast roll end of the making frame; and means for supporting the making frame on the main frame when the rockers at the breast roll end of the machine are removed.

9. The combination in a Fourdrinier paper-making machine, of a base frame; a making frame mounted above the base frame; a suction box frame pivotally mounted on the main frame and extending under the delivery end of the making frame; a pair of wooden rockers mounted between the forward end of the suction box frame and the making frame; and a pair of wooden rockers mounted on each side of the machine at the breast roll end of the making frame.

10. The combination in rocking mechanism for Fourdrinier paper-making machines, of two wooden rockers placed side by side; an upper bearing plate into which the rockers extend; a lower bearing plate for the rockers; means for vertically adjusting the lower bearing plates; and a making frame supported by the upper plates of the rocking mechanism.

11. The combination in a paper-making machine of the Fourdrinier type, of a main frame; a making frame mounted on the main frame; a paper-making section mounted on the main frame; two shaking stands; a driving shaft; eccentrics on the shaft at each stand; two sets of levers, one at one stand and the other at the other stand; an eccentric rod actuated by the eccentric of each stand and connected to the outer end of its lever; and means on each stand for varying the longitudinal movement of the levers by which lateral vibrating motion is imparted to the making section of the machine.

12. The combination in a base frame, of a making wire section mounted on the base frame; a series of rocker stands located at one side of the machine; an eccentric on each rocker stand; means for rotating said eccentrics; a lever extending from each rocker stand to the making section of the machine; eccentric rods connecting the eccentrics with the outer ends of their levers; and means for varying the longitudinal movement of each lever, so that the vibratory movement at one end of the paper-making section of the machine will be different from that at the opposite end of the said section.

13. The combination in a Fourdrinier paper-making machine, of a base frame; a making section mounted on the base frame; three rocker stands located at one side of the machine; an eccentric at each rocker stand; means for rotating said eccentrics in unison; a lever extending from each shaking stand to the side of the making section of the machine; an adjustable disk mounted in each stand, having a slot therein; a block mounted in each slot, having a pin on which a lever is pivoted; an eccentric rod connecting the eccentric at each stand to the end of its lever; and means for adjusting each disk so as to vary the longitudinal movement of the several levers, so that the lateral shaking movement of the making frame will be greater at the feed end of the frame than at the delivery

end thereof, the three levers imparting a positive motion to the said frame.

14. The combination in a Fourdrinier machine, of a base frame; a making frame mounted on the base frame; rockers supporting the making frame, whereby lateral movement of the frame is permitted; a shaking stand; levers extending from the stand to the making section of the machine; means for imparting a longitudinal movement to the levers to shake the making frame on its rockers; and a strut extending from the base frame of the machine to the rocker stand, rigidly connecting the rocker stand with the base frame.

15. The combination of a base frame; a making frame mounted above the base frame; two sets of rockers supporting the said making frame; a breast roll at one end of the making frame, the rockers at the breast roll consisting of vertically arranged blocks located at each side of the machine; base plates and cap plates, each lower block being mounted in a base plate and the upper ends of the blocks being mounted in the cap plates secured to the making frame, the base plates having segmental recesses therein; a cam shaft extending across the machine; cams thereon adapted to the segmental recesses of the base plates, the bearings for the said shaft mounted on the base frame of the machine; and means for turning the shaft to raise and lower the base plates.

16. The combination of a base frame; a making wire section having a breast roll at one end; a suction box section; and two sets of rockers, one set of rockers at the breast roll end of the machine being mounted on the main frame, the other set of rockers being mounted on the suction box section of the machine, the rockers of each set being arranged in pairs.

17. The combination of a base frame; a making wire section having a breast roll at one end; a suction box section; and two sets of rockers, one set of rockers at the breast roll end of the machine being mounted on the main frame, the other set of rockers being mounted on the suction box section of the machine, the rockers of each set being arranged in pairs, the rockers being rounded at the upper and lower ends and adapted to rock in base plates and cap plates.

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