

No. 675,072.

Patented May 28, 1901.

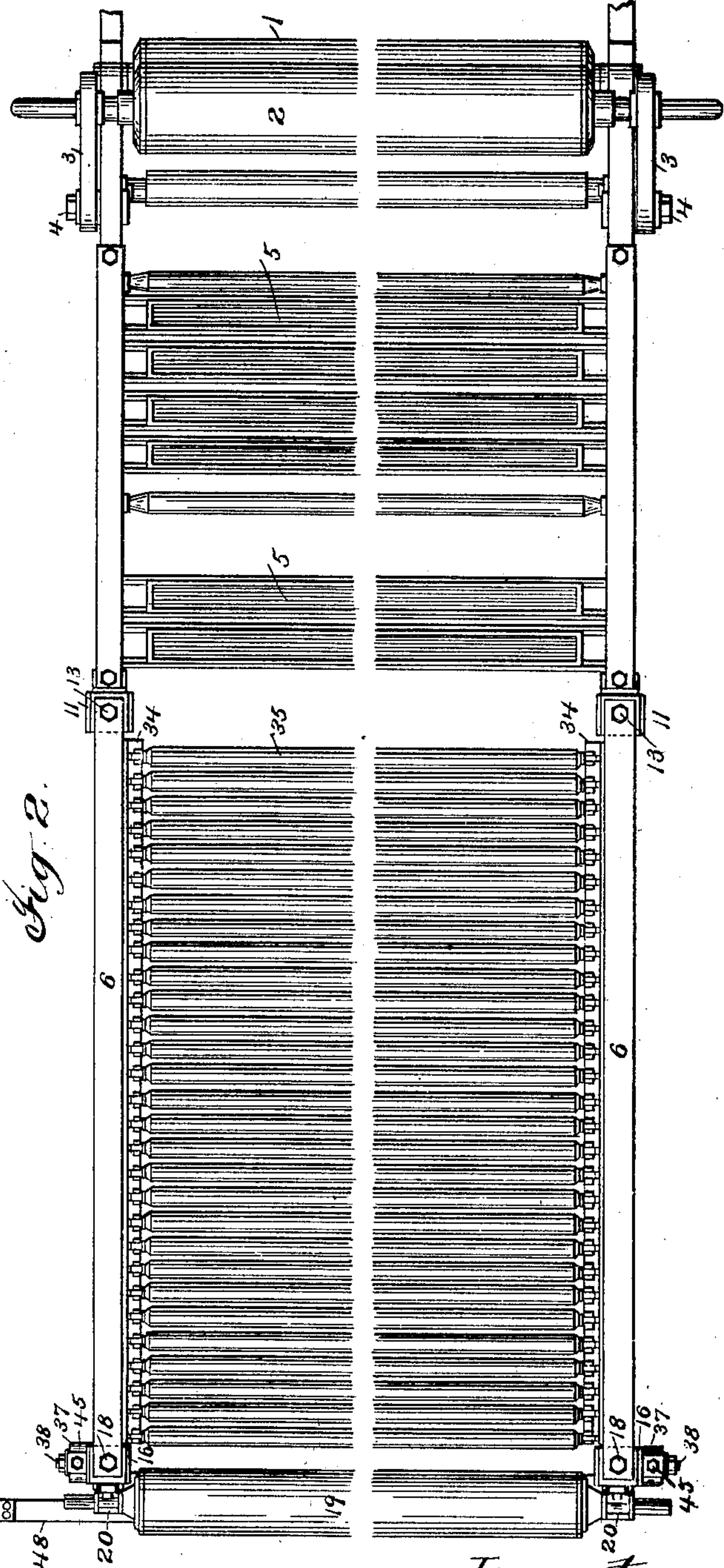
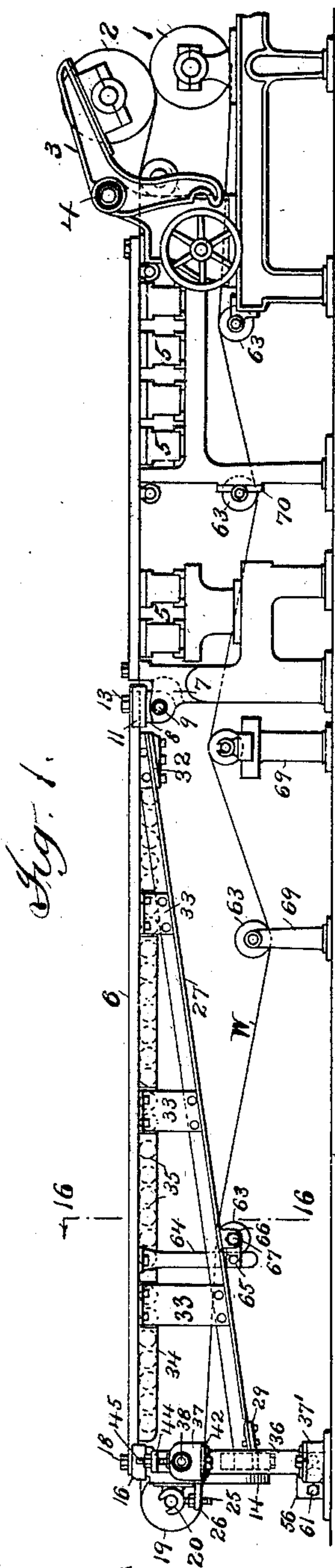
T. H. SAVERY.

SHAKING SECTION FOR PAPER MAKING MACHINES.

(Application filed Jan. 31, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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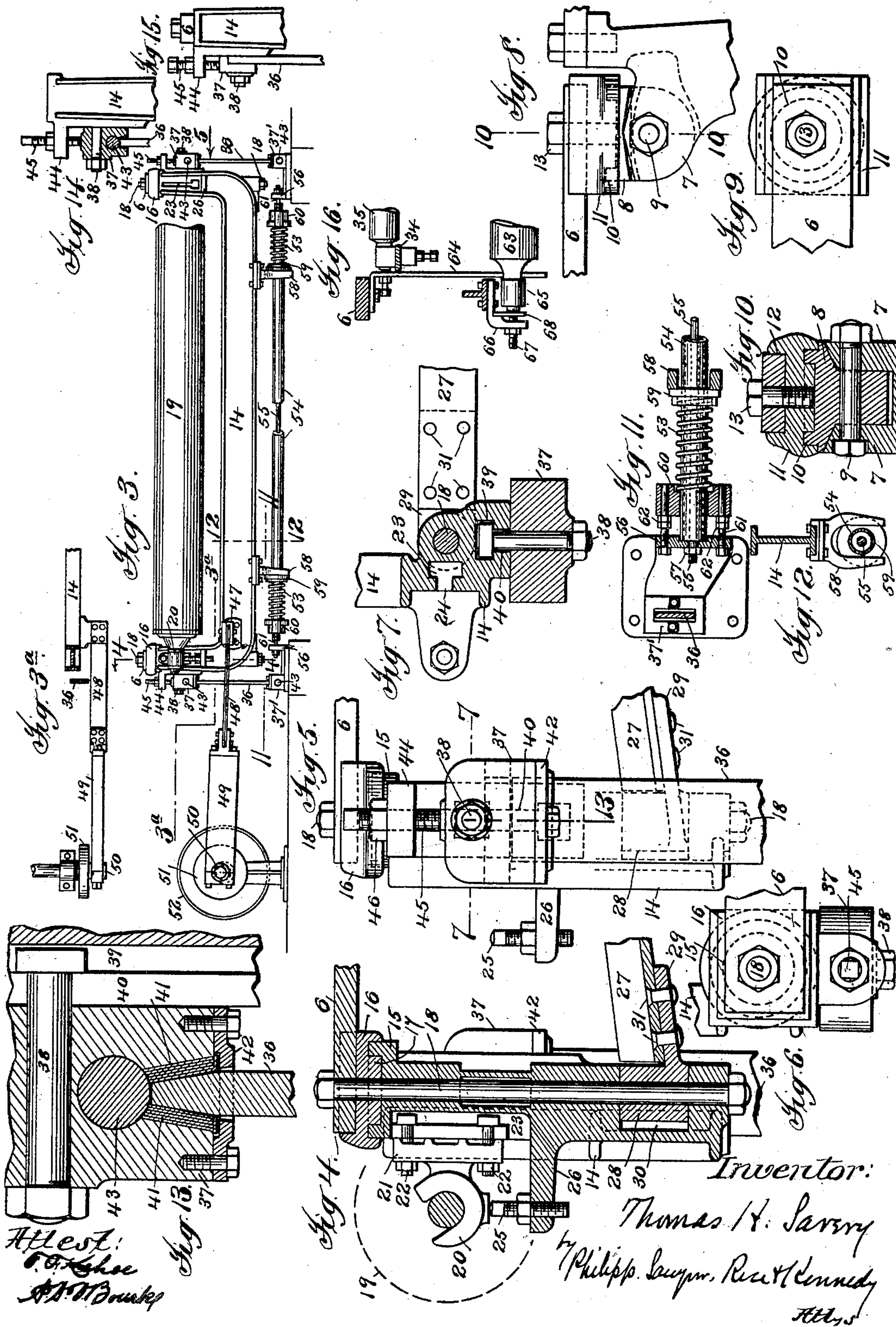
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2 Sheets—Sheet 2.



UNITED STATES PATENT OFFICE.

THOMAS H. SAVERY, OF WILMINGTON, DELAWARE.

SHAKING-SECTION FOR PAPER-MAKING MACHINES.

SPECIFICATION forming part of Letters Patent No. 675,072, dated May 28, 1901.

Application filed January 31, 1901. Serial No. 45,420. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. SAVERY, a citizen of the United States, residing at Wilmington, county of Newcastle, and State of Delaware, have invented certain new and useful Improvements in Shaking-Sections for Paper-Making Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in Fourdrinier paper-making machines, and more particularly to the shaking-sections which are used in connection therewith. The shaking-section of Fourdrinier paper-making machines as ordinarily constructed consists of a frame, said frame being pivoted to the machine-frame at one end and including two longitudinal side rails. The table-rolls over which the wire-cloth runs are mounted in suitable bearings carried by the side rails, and the breast-roll is supported on that part of the frame which connects the free ends of the rails. This shaking-section is vibrated laterally at a high rate of speed, usually about two hundred and fifty times a minute. The amplitude of vibration of the breast-roll, which is carried at one end of the shaking-section, is usually about a quarter of an inch. Since the side rails are of great length and necessarily more or less elastic and the impulses are imparted to the shaking-section at the breast-roll end, it has been found that a sinusoidal or compound movement of the rails is liable to occur near the pivoted end of the section, the result of which is that the shaking-section is not given a simple homogeneous movement throughout its entire length. Furthermore, unless the shaking-section is heavily braced there is liability that the strain imparted to the breast-roll by the wire-cloth which runs over it will spring the same backward, which is of course objectionable.

In one of the best constructions of shaking-sections the frame which connects the ends of the rails is supported on one side by a link which is pivoted to the frame and to a suitable support, and on the other side by a bell-crank lever which is pivoted to the frame and to a suitable support, the vibrations being imparted to the shaking-section by a cam operating on the end of the bell-crank lever.

While this construction is satisfactory in many respects, it is open to the objection that the pivots or bearings which are necessarily employed are exposed to the action of the water used in paper-making processes, and they corrode and wear.

Constructions have been proposed in which the breast-roll end of the shaking-section frame is suspended on pendulous springs, which are connected at their upper ends to a standard and at their lower ends to the side pieces of the frame which connects the ends of the rails of the shaking-section, the vibration of the section being effected by means of an eccentric-rod, which is pivoted to one of the side pieces of the frame. While this construction does away with part of the pivotal connections before referred to, it is objectionable because the surface of the frame moves in a concave line, and, furthermore, because it is difficult to so adjust the pendulous springs as to properly obtain and control the vibration. It is desirable, furthermore, to provide for a vertical adjustment of the breast-roll end of the shaking-section, so that this section may lie in a horizontal plane or above or below such plane, according to the stock which is being handled and the character of the product desired. Some manufacturers desire to have the shaking-section in one position with relation to a horizontal plane and some another.

It is one of the objects of this invention to produce a shaking-section the frame of which shall be exceedingly stiff and rigid, so as to avoid any compound movement of the shaking-section due to the elasticity of the rails and to further avoid the tendency of the breast-roll to be dragged or pulled backward by the wire-cloth which runs over it.

A further object of the invention is to produce a simple, cheap, and efficient construction of shaking-section for paper-making machines which shall be free from objectionable pivotal joints or bearings.

A further object of the invention is to produce an improved construction of shaking-section in which the section shall be capable of a vertical adjustment with respect to the frame of the machine.

With these and other objects in view the invention consists in certain constructions

and in certain parts, improvements, and combinations, as will be hereinafter fully described and then specifically pointed out in the claims hereunto appended.

5 In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a side view of a Fourdrinier paper-making machine provided with the improved construction of shaking-section. Fig. 2 is a plan view of the construction shown in Fig. 1. Fig. 3 is an end view of the construction shown in Fig. 1, one end of the breast-roll being broken away. Fig. 3^a is a detail
10 plan view of the mechanism employed for shaking the section. Fig. 4 is a sectional view, on an enlarged scale, on the line 4 4 of Fig. 3. Fig. 5 is a detail side elevation, on an enlarged scale, of the top of one side of a U-shaped frame looking in the direction of the arrow 5
20 in Fig. 3. Fig. 6 is a plan view of the construction shown in Fig. 5. Fig. 7 is a sectional plan view on the line 7 7 of Fig. 5. Fig. 8 is a detail view of the connection between the shaking-section rails and the frame proper of a Fourdrinier machine. Fig. 9 is a plan view of the construction shown in Fig. 8. Fig. 10 is a vertical section on the line 10 10 of Fig. 8. Fig. 11 is a detail plan view on the line 11 11
30 of Fig. 3. Fig. 12 is a section on the line 12 12 of Fig. 3. Fig. 13 is a detail sectional view, on an enlarged scale, illustrating one form of the connection between the spring supporting-bar and the shaking-section frame. Figs. 14 and 15 are modifications of the construction shown in Fig. 13; and Fig. 16 is a detail sectional view on the line 16 16 of Fig. 1, illustrating the construction by which one of the rolls which support the under run of the making-wire is mounted.

Referring to the drawings, which illustrate a preferred embodiment of the invention, 1 indicates the lower couch-roll of a Fourdrinier paper-making machine of ordinary construction. The upper couch-roll 2 is carried in bent arms 3, pivoted to the frame of the machine at 4, this construction being an ordinary well-known form: Ordinary suction-boxes are indicated at 5.

50 The shaking-section of the machine includes a pair of longitudinal side rails 6, the inner ends of which may be supported in any suitable manner. In the construction shown (see Fig. 8) the machine-frame is provided on each side with a pair of ears 7, and between
55 each pair of ears is pivoted a support, which in the preferred form of the construction consists of a block 8, the upper face of which is formed as a plate, the connection being formed by means of a bolt 9, which passes through the ears and the block or in any other suitable manner. This construction permits the shaking-section rails, which are connected to the supports in the manner to be hereinafter
60 described, to have a vertical adjustment, the supports during such adjustment turning on the bolts 9 as pivots.

In order to provide for the lateral movement of the rails 6 produced by the vibrating means hereinafter described, the rails are preferably pivotally connected to the supports. The construction by which the rails are pivotally connected to the supports may be varied within wide limits. As shown, however, each block 8 is provided with an upwardly-extending annular projection 10, which engages a similarly-formed recess in a cap-piece 11, the lower face of which forms a plate. This cap-piece (see Fig. 10) is preferably formed with a socket 12, and the ends of the rails 6 extend into these sockets and fit snugly therein, the rails being held in position in the sockets by means of bolts 13 or in any other suitable manner.

By the construction which has just been described it will be seen that each of the rails is so supported as to be capacitated to receive a vertical movement and a horizontal movement. This connection, therefore, provides for the shaking movement of the side rails and also for a vertical adjustment of the outer end of the same, as will be hereinafter described.

The outer ends of the side rails 6 are connected by a frame which preferably consists of a U-shaped casting 14, similar to that shown and described in Patent No. 635,511, granted to me October 24, 1899. The connection between the ends of the rails and the ends of the casting may be effected in any suitable manner. In the construction shown, however, the upper ends of the U-shaped frame are formed with sockets 15, in which are mounted cap-pieces 16, having downwardly-extending projections 17, which engage the sockets. These cap-pieces 16 are formed with sockets, into which the forward ends of the side rails 6 extend, the sockets being so constructed that the rails fit snugly therein. The parts of the structure may be tied together in any suitable manner. Preferably, however, long bolts 18 are employed, which extend through the rails, the sockets, and the upwardly-extending legs of the U-shaped frame.

The U-shaped frame 14 is provided with suitable bearings for the breast-roll 19. In the construction shown (see Figs. 4 and 7) these bearings are formed by brackets 20, which extend from plates 21, secured to the U-shaped frame by bolts 22. In the preferred form of the construction the heads of these bolts are contained in recesses 23, the stems of the bolts extending through slots 24, which communicate with the recesses. The brackets 20 rest upon adjusting-screws 25, which are tapped through ledges 26, cast on the upwardly-extending legs of the U-shaped frame. While the construction which has just been described is a very effective one for the purpose and forms a means by which the position of the breast-roll can be readily adjusted, it is to be understood that any other suitable form of bearing may be substituted for it.

In order to stiffen the shaking-section,

suitable struts 27 are employed, (see Fig. 1,) said struts being connected at one end to the U-shaped frame and at the other end to the rails 6. The connection between the struts 5 and the U-shaped frame 14 may be effected in any suitable manner. As shown, (see Figs. 4 and 7,) sleeves 28 are provided, said sleeves having formed in one piece therewith flanges 29. These sleeves 28 are located in recesses 10 30 in the legs of the U-shaped frame and are held in position by the long bolts 18, which pass through perforations in the sleeves. The struts 27 are connected to the flanges 29 by means of rivets 31 or in any other suitable 15 manner. The opposite ends of the struts are bolted to the under side of the side rails, filling-blocks 32 being preferably interposed to form a good bearing therefor. To further stiffen the structure, intermediate braces 33 20 are preferably employed. Any suitable number of these braces may be used; but three are shown. It is to be noted that these braces do not serve to support the side rails, as these rails are supported at one end by the machine- 25 frame and at the other end by the U-shaped frame, the rails and the U-shaped frame being tied together by the struts. The function of these intermediate braces is, as before stated, simply to stiffen the structure.

30 Each of the side rails 6 (see Fig. 16) is provided with a bracket 34, these brackets serving to support the bearings in which the table-rolls 35 are mounted. The particular manner of mounting these table-rolls is fully set 35 forth in my Patent No. 635, 511, above referred to, and inasmuch as this construction has no particular relation to the present invention a fuller description of it is unnecessary.

While the shaking-section so far described 40 may be supported at the breast-roll end in any suitable or desired manner, it will preferably be mounted on spring supporting-bars 36. The connection between the bars and the U-shaped frame may be effected in any suitable 45 manner. Preferably, however, each of the upwardly-extending legs of the U-shaped frame is provided with a bearing-block 37. These blocks are secured to the legs in any suitable manner; but they will preferably be adjust- 50 ably secured by means of bolts 38, which pass through the blocks. The heads of these bolts are located in recesses 39, formed in the legs, communication being had with these recesses by means of slots 40. The upper ends 55 of the bars 36 are preferably made wedge-shaped, as clearly shown in Fig. 13, and extend into similarly-formed openings or cavities in the blocks 37. The blocks are preferably bored at right angles to the openings 60 which receive the ends of the bars, and hardened turned pins 43 are inserted into the bores, the ends of the bars bearing against the pins.

The openings or cavities which receive the 65 ends of the bars 36 are preferably tapered and are made larger than the bars. A plurality of thin metallic plates 41 are packed in said

openings on each side of the bars. These plates are arranged so that they fit tightly together at their inner ends, thus holding the 70 bars snugly in position. At their outer ends, however, the plates are slightly loose, so as to permit the proper movement of the bars. These plates when used may be held in position in any suitable manner. As shown, the 75 inner plates of the series are provided with flanges which overlap the remainder of the plates, and a perforated cap 42 is employed to hold the plates in position, said cap being secured to the block 37 by means of screws 80 or in any other suitable manner.

While the construction which has just been described is the preferred form, any other suitable construction may be substituted therefor. In Fig. 14 there is illustrated a modification. 85 In this modification the tapered openings are not employed and the plates 41 are omitted. In this case, therefore, the bars 36 rest directly on the turned pins 43. In Fig. 15 I have illustrated another modification of this part of 90 the construction. In this form the turned pins 43 are omitted and the blocks 37 are of a slightly-different shape. Furthermore, the bolts 38 in this case pass directly through the upper ends of the bars.

The lower ends of the bars 36 may be supported in any suitable manner. Preferably, 95 however, as indicated in Fig. 3, they will be supported by blocks 37', which are the same in all respects as the blocks 37, before described, and of which, therefore, a detailed 100 description is unnecessary.

Means are preferably employed to vertically adjust the shaking-section so as to bring the making-wire W into different posi- 105 tions with respect to a horizontal plane, according to the character of the stock employed. While any suitable means may be used to effect this adjustment, as shown, the upper ends of the legs of the U-shaped frame 110 are provided with ears 44, through which are tapped screws 45, these screws bearing at their lower ends on the tops of the blocks 37. Suitable locking-nuts 46 may be employed, if desired. It will be noted that the screws 115 45 form a very efficient, speedy, and accurate means of obtaining the desired adjustment, especially when used in connection with the means heretofore described for pivotally supporting the other end of the shaking-section 120 rails.

Any suitable means may be employed for vibrating the shaking-section. In the construction shown, however, the U-shaped frame is provided with a lug or extension 47, 125 and to this extension is bolted a spring-bar 48. The other end of this bar 48 is suitably connected to a bar 49, which is made of wood. This bar 49 is connected to a crank-pin 50, carried on a crank-disk 51, mounted on a 130 shaft which is rotated by a suitable pulley 52 or in any other suitable manner. By the use of this construction a pivotal connection between the bar and the shaking-section is

rendered unnecessary, as the bar 48 will spring sufficiently to permit the movement of the crank-pin, which rotates in a circle having a comparatively small radius.

5 By mounting the shaking-section on spring-bars in the manner described a better shaking action is obtained than is the case where the shaking-section is suspended from spring-bars. In the latter case the shaking-section
10 moves in a concave line. The shaking-section is consequently moving upward when its movement is checked at each end of its reciprocation. The inertia of the paper stuff causes it, therefore, to tend to continue its
15 upward movement after the movement of the shaking-section and wire is stopped—that is to say, this inertia tends to cause the paper stuff to leave the wire. Furthermore, the tendency of the water contained in the stuff
20 is to move in the same direction as the stuff, and therefore to remain in it. By mounting the shaking-section, however, on spring supporting-bars the movement of the wire is in a convex line. The wire is consequently moving
25 downward when its movement is checked at each end of its reciprocation, and the inertia of the paper stuff causes it to move toward the wire at this time. The inertia of the stuff tends, therefore, to cause it to continue its downward movement after the movement of the shaking-section has been checked,
30 and consequently causes the stuff to hug the wire. The water which is contained in the stuff tends, therefore, to move downward and
35 out of the stuff through the wire.

While the spring-supports and the vibrating mechanism before referred to may be alone
relied upon to effect a shaking movement of the section, additional springs are preferably
40 employed to assist in this action. While the construction by which the additional springs are utilized may be varied widely, as shown, (see Fig. 3,) two such springs 53 are employed. These springs may be supported in
45 any suitable manner; but in the construction shown a long sleeve 54 is provided, supported on a rod 55, extending across beneath the shaking-section, said rod finding its bearing at each end in brackets 56, to which brackets it
50 is secured by means of nuts 57. Suitable bearings are provided by which the force of the springs is made effective on the shaking-section. The position of these bearings will of course depend upon the location of the
55 springs 53. In the construction shown, which is the preferred form, these bearings will consist of forks 58, which are secured to the under side of the horizontal part of the U-shaped frame, collars 59 being interposed between the
60 bearings and the ends of the springs. The other ends of the springs rest against collars 60, which may be made adjustable in order to vary the tension of the springs. While any suitable device may be employed for adjusting these collars, in the preferred form of the
65 construction each collar is supported by two screws 61, which are preferably secured, by

means of nuts or in any other suitable manner, to the brackets 56. These screws 61 extend into perforations in the collars 60, the
70 position of the collars being determined by lock-nuts 62. This construction forms a simple and ready means of adjustment and has the advantage that the adjustment may be varied without stopping the operation of the
75 machine.

While in the preferred construction the frame is mounted on supporting-bars, such as have been described, and additional springs will be used to assist in the movement of the
80 shaking-section and steady its movement, it will be understood that the additional springs alone might be depended on, in connection with the vibrating means, to give the shaking-section its movement. 85

The wire W after leaving the breast-roll 19 is led back over supporting-rolls 63, part of which are preferably mounted so as to partake of the movement of the shaking-section. One of these rolls is shown as mounted in this
90 manner. While the construction by which the roll which moves with the shaking-section is supported may be varied, as shown, hangers 64 are arranged to depend from the under side of the rails 6. These hangers carry bear-
95 ings 65 for the roll, said bearings being adjustable on the hangers. In order to prevent any sidewise movement of the roll 63 in its bearings, the under side of the struts 27 are provided with downwardly-depending sup-
100 ports 66, through which are tapped stop-screws 67. Wear-plates 68 are or may be interposed between the ends of the screws and the journals of the bearings 65. With this construction it will be seen that the roll 63 is sup-
105 ported entirely by the top rails of the shaking-section and that this roll must partake of the action of the section. The rest of the rolls 63 are supported in any suitable manner, as
110 by uprights 69 and bearings 70.

While the construction which has been described embodies the preferred form of the invention, it is to be understood that the invention is not to be limited to the specific details thereof. 115

What is claimed is—

1. In a shaking-section for paper-making machines, the combination with the side rails carrying the table-rolls, of a frame to which
120 said rails are connected, a breast-roll mounted on the frame, and struts extending from the frame to the rails, substantially as described.

2. In a shaking-section for paper-making machines, the combination with the side rails
125 carrying the table-rolls, of a U-shaped frame to the ends of which the rails are connected, a breast-roll mounted on the frame, and struts extending from the frame to the side rails, substantially as described. 130

3. The combination with a pair of shaking-section rails, of means for pivotally supporting one end of each of said rails, table-rolls mounted on the shaking-section, a frame to

which the other ends of the shaking-section rails are connected, means for supporting said frame, a breast-roll mounted on said frame, struts connecting said frame and the rails, braces between the rails and the struts, and means for vibrating the shaking-section, substantially as described.

4. The combination with a pair of shaking-section rails, of means for pivotally supporting one end of each of said rails, table-rolls mounted on the shaking-section, a frame to which the other ends of the shaking-section rails are connected, means for supporting said frame, a breast-roll mounted on said frame, struts connecting said frame and the rails, braces between the rails and the struts, wire-supporting rolls, part of which are carried by the rails, and means for vibrating the shaking-section, substantially as described.

5. In a paper-making machine, the combination with a pair of shaking-section rails, of means for pivotally supporting one end of each of the rails, table-rolls carried by the rails, a frame to which the other end of each rail is connected, a breast-roll mounted on said frame, spring supporting-bars, connections between said frame and the upper ends of the bars, means for supporting the lower ends of the bars, and means for vibrating said shaking-section, substantially as described.

6. In a paper-making machine, the combination with a pair of shaking-section rails, of means for pivotally supporting one end of each of the rails, table-rolls carried by the rails, a frame to which the other end of each rail is connected, a breast-roll mounted on said frame, spring supporting-bars, adjustable connections between said frame and the upper ends of the bars, means for supporting the lower ends of the bars, and means for vibrating the shaking-section, substantially as described.

7. In a paper-making machine, the combination with a pair of shaking-section rails, of means for pivotally supporting one end of each rail, table-rolls carried by said rails, a U-shaped frame to which the other end of each rail is connected, a breast-roll mounted on said frame, struts between said frame and the rails, braces between the struts and the rails, spring supporting-bars, adjustable connections between said frame and the upper ends of the bars, means for supporting the lower ends of the bars, and means for vibrating the shaking-section, substantially as described.

8. In a paper-making machine, the combination with a shaking-section, of pivotally-mounted plates supporting the inner ends of said section, pivotal connections between the plates whereby the section is permitted to move in two directions, means for supporting the outer end of the shaking-section, means for giving the outer end of the shaking-section a vertical adjustment with respect to its support, and means for vibrating the section, substantially as described.

9. In a paper-making machine, the combination with a pair of shaking-section rails, pivotally-mounted plates for supporting the inner end of each of said rails, pivotal connections between the plates whereby the rails are permitted to move vertically and horizontally, table-rolls mounted on the rails, a frame to which the other end of each rail is connected, a breast-roll mounted on said frame, supports for said frame, means for giving the frame a vertical adjustment with respect to its support, and vibrating means, substantially as described.

10. In a paper-making machine, the combination with a pair of shaking-section rails, of means for pivotally supporting the inner end of each of said rails so as to permit the rails to move vertically and horizontally, table-rolls supported on the rails, a U-shaped frame to which the other end of each rail is connected, a breast-roll mounted on this frame, spring supporting-bars to the upper ends of which the frame is connected, means for supporting the lower ends of the bars, means for giving the U-shaped frame a vertical adjustment with respect to the supporting-bars, struts connecting said frame with the rails, braces between the struts and the rails, and vibrating means, substantially as described.

11. In a paper-making machine, the combination with a pair of shaking-section rails, of means for pivotally supporting the inner end of each of said rails, table-rolls mounted on the rails, a frame to which the outer end of each rail is connected, a breast-roll mounted on said frame, struts connecting said frame and the rails, braces between the rails and the struts, spring supporting-bars, connections between the upper ends of said bars and the frame, means for supporting the lower ends of the bars, a spring-bar connected to the frame, and means for operating the bar to vibrate the frame, substantially as described.

12. In a paper-making machine, the combination with a pair of shaking-section rails, of means for pivotally supporting the inner end of each of said rails so as to permit them to move vertically and horizontally, table-rolls mounted on the rails, a U-shaped frame to which the outer end of each rail is connected, a breast-roll mounted on said frame, struts connecting said frame and the rails, braces between the rails and the struts, spring supporting-bars, adjustable connections between the upper ends of said bars and the frame, means for supporting the lower ends of the bars, a spring-bar connected to the frame, and means for operating the bar to vibrate the frame, substantially as described.

13. In a paper-making machine the combination with the pair of shaking-section rails of pairs of plates pivoted together and each pair of plates being pivotally supported, said plates forming supports for the inner ends of the rails, means for giving the other ends of

the rails a vertical adjustment, and vibrating means substantially as described.

14. In a paper-making machine, the combination with a pair of pivotally-mounted supports, a pair of shaking-section rails, pivotal connections between one end of said rails and the supports, a frame connected to the other end of the shaking-section rails, spring-supports for the frame, adjustable connections between the frame and said supports, and vibrating means, substantially as described.

15. In a paper-making machine, the combination with a pair of pivotally-mounted supports, of a pair of shaking-section rails, pivotal connections between one end of the rails and the supports, table-rolls mounted on the rails, a frame to which the other end of the shaking-section rails is connected, a breast-roll mounted on said frame, spring supporting-bars, connections between the frame and the upper ends of said bars, means for supporting the lower ends of the bars, means for giving the frame a vertical adjustment with respect to the bars, and vibrating means, substantially as described.

16. In a paper-making machine, the combination with a pair of pivotally-mounted supports, of a pair of shaking-section rails, pivotal connections between one end of the rails and the supports, a U-shaped frame to which the other end of the shaking-section rails is connected, a breast-roll carried by said frame, struts connecting the frame and the rails, a pair of spring-bars, connections between the frame and the upper ends of the bars, means for supporting the lower ends of the bars, means for giving said frame a vertical adjustment with respect to the bars, and vibrating means, substantially as described.

17. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the rails are connected at one end, supports for the frame, means for vertically adjusting the frame with respect to its supports, a pair of pivoted supports for the other end of the rails, a cap-piece between the end of each rail and the support therefor, pivotal connections between the cap-pieces and the supports, and vibrating means, substantially as described.

18. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the rails are connected at one end, supports for the frame, means for vertically adjusting the frame with respect to its supports, a pair of pivoted supports for the other end of the rails, a socketed cap-piece between the end of each rail and the support therefor, pivotal connections between the cap-pieces and their supports, and vibrating means, substantially as described.

19. In a paper-making machine, the combination with a pair of pivotally-mounted supports, of a pair of shaking-section rails, a pair of pivoted cap-pieces for the rails, each cap-piece being pivoted to a support, a U-shaped frame to which the other ends of the shaking-

section rails are connected, a breast-roll carried by the frame, struts connecting the frame and the rails, a pair of spring-bars, connections between the frame and the upper ends of the bars, means for supporting the lower ends of the bars, means for giving the frame a vertical adjustment with respect to the bars, and vibrating means, substantially as described.

20. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the outer ends of said rails are connected, supports for the frame, vibrating means, connecting means between the vibrating means and the frame, and springs operating in connection with said vibrating means, substantially as described.

21. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the outer ends of said rails are connected, spring-supports for the frame, vibrating means, connections between the vibrating means and the frame, and springs operating in connection with said vibrating means, substantially as described.

22. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the rails are connected, supports for said frame, vibrating means, a pair of oppositely-acting springs, and bearings for said springs connected with the frame, substantially as described.

23. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the rails are connected, spring-supports for said frame, vibrating means, a pair of oppositely-acting springs, and bearings for said springs connected with the frame, substantially as described.

24. The combination with a pair of shaking-section rails, of a U-shaped frame to which the ends of the rails are connected, a pair of supports for the frame, vibrating means, a pair of oppositely-acting springs, and bearings for the springs connected with the U-shaped frame, substantially as described.

25. The combination with a pair of shaking-section rails, of a U-shaped frame to which the ends of the rails are connected, a pair of spring-supports for the frame, vibrating means, a pair of oppositely-acting springs, and bearings for the springs connected with the U-shaped frame, substantially as described.

26. The combination with a pair of shaking-section rails, of a U-shaped frame to which the rails are connected, supports for the frame, vibrating means connected to the frame, bearings connected to the under side of the frame, and a pair of springs acting against said bearings, substantially as described.

27. In a paper-making machine, the combination with a pair of shaking-section rails, of a U-shaped frame to which the outer ends of said rails are connected, means for supporting the inner ends of the rails so as to permit them to move vertically and horizontally, a

pair of spring-supports for the U-shaped frame, adjustable connections between the frame and the supports, vibrating means, bearings connected to the U-shaped frame, and springs operating against the bearings, substantially as described.

28. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the outer ends of the rails are connected, supports for said frame, vertically-adjustable connections between the frame and the supports, means for supporting the inner ends of the rails so as to permit a movement thereof both vertically and horizontally, a spring-bar connected to the frame, mechanism for operating the bar, bearings connected to the frame, and springs operating against the bearings, substantially as described.

29. In a paper-making machine, the combination with a pair of shaking-section rails, of a U-shaped frame to which the outer ends of the rails are connected, spring-supports for said frame, vertically-adjustable connections between the frame and the supports, means for supporting the inner ends of the rails so as to permit a movement thereof both vertically and horizontally, a spring-bar connected to the frame, mechanism for operating the bar, bearings connected to the frame, and springs operating against the bearings, substantially as described.

30. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the outer ends of the rails are connected, a pair of blocks, vertically-adjustable connections between the frame and the blocks, a pair of spring-bars, the upper ends of which engage cavities in the blocks, means for supporting the lower ends of the bars, and vibrating means, substantially as described.

31. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the outer ends of the rails are connected, a pair of blocks, vertically-adjustable connections between the frame and the blocks, a pair of spring-bars, the upper ends of which engage cavities in the blocks, pins located in the blocks against which the upper ends of the bars bear, means for supporting the lower ends of the bars, and vibrating means, substantially as described.

32. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the outer ends of the rails are connected, means for supporting the in-

ner ends of the rails, supports for the frame, vibrating means, bearings connected to the frame, springs resting against the bearings, collars abutting against the opposite ends of the springs, and means for adjusting the collars, substantially as described.

33. In a paper-making machine, the combination with a pair of shaking-section rails, of a frame to which the outer ends of the rails are connected, means for supporting the inner ends of the rails, struts connecting the frame and the rails, hangers depending from the rails, bearings supported by the hangers, a wire guiding and carrying roll mounted in the bearings, brackets carried by the struts, and means supported by the brackets for preventing endwise movement of the roll with respect to its bearings, substantially as described.

34. In a paper-making machine, the combination with a pair of shaking-section rails, of a U-shaped frame to which the outer ends of the rails are connected, means for supporting the inner ends of the rails, struts connecting the frame and the rails, hangers depending from the rails, bearings supported by the hangers, a wire guiding and carrying roll mounted in the bearings, brackets carried by the struts, and means supported by the brackets for preventing endwise movement of the roll with respect to its bearings, substantially as described.

35. In a paper-making machine, the combination with a pair of shaking-section rails, of a U-shaped frame to which the outer ends of the rails are connected, spring supporting-bars for said frame, adjustable connections between the upper ends of the bars and the frame, means for supporting the lower ends of the bars, a spring-bar connected to the frame, means for operating the bar to vibrate the frame, bearings connected to the frame, a support passing through the bearings, springs surrounding the support and having one end resting against the bearings, collars against which the other ends of the springs abut, means for adjusting the collars, and means for supporting the inner ends of the shaking-section rails so as to permit them to move vertically and horizontally, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

THOMAS H. SAVERY.

Witnesses:

WM. H. WALKER,
SAMUEL F. SMEDLEY.