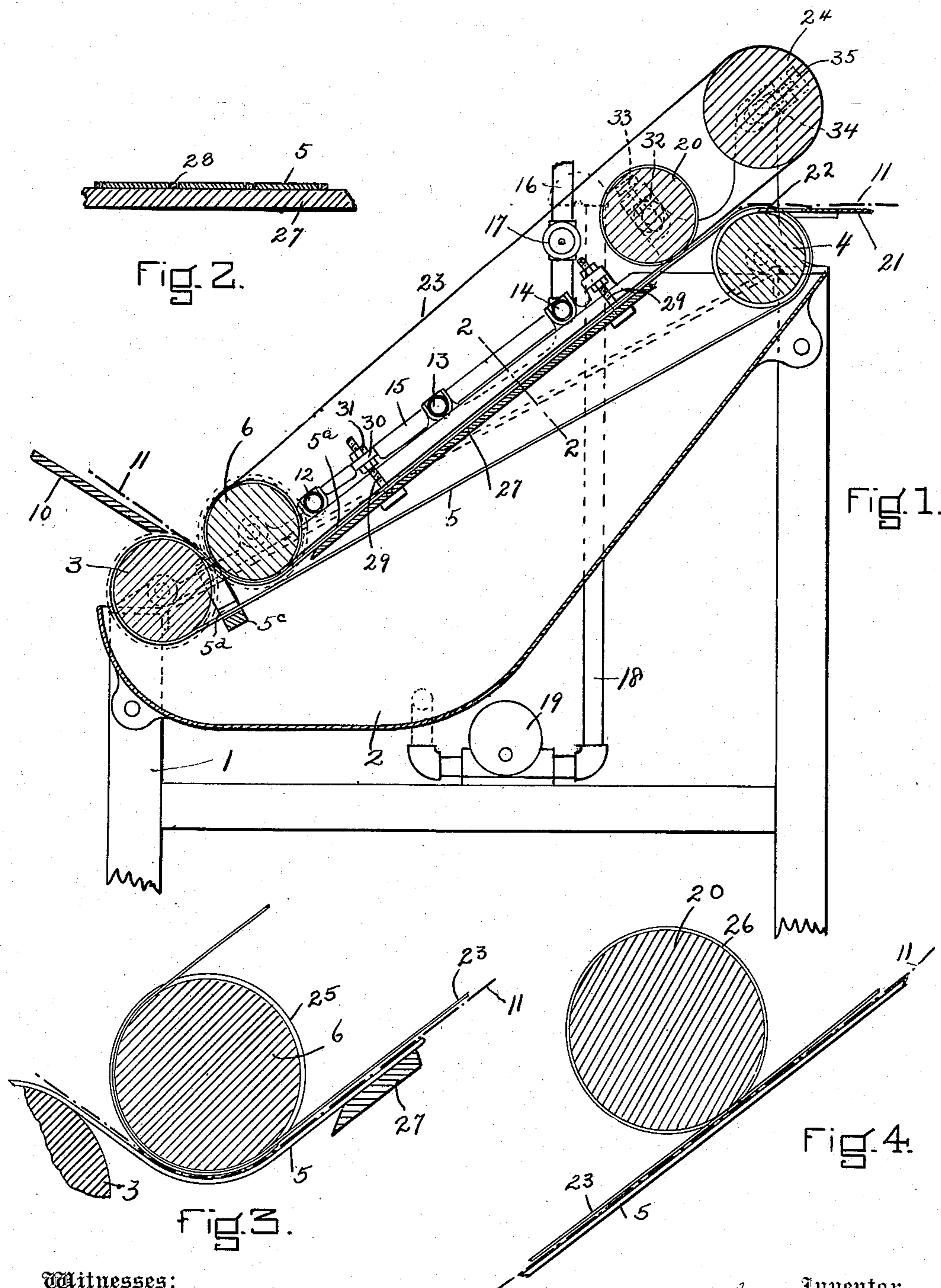


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MACHINE FOR WASHING SHEET MATERIAL.
APPLICATION FILED JULY 1, 1907.

899,424.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.



Witnesses:
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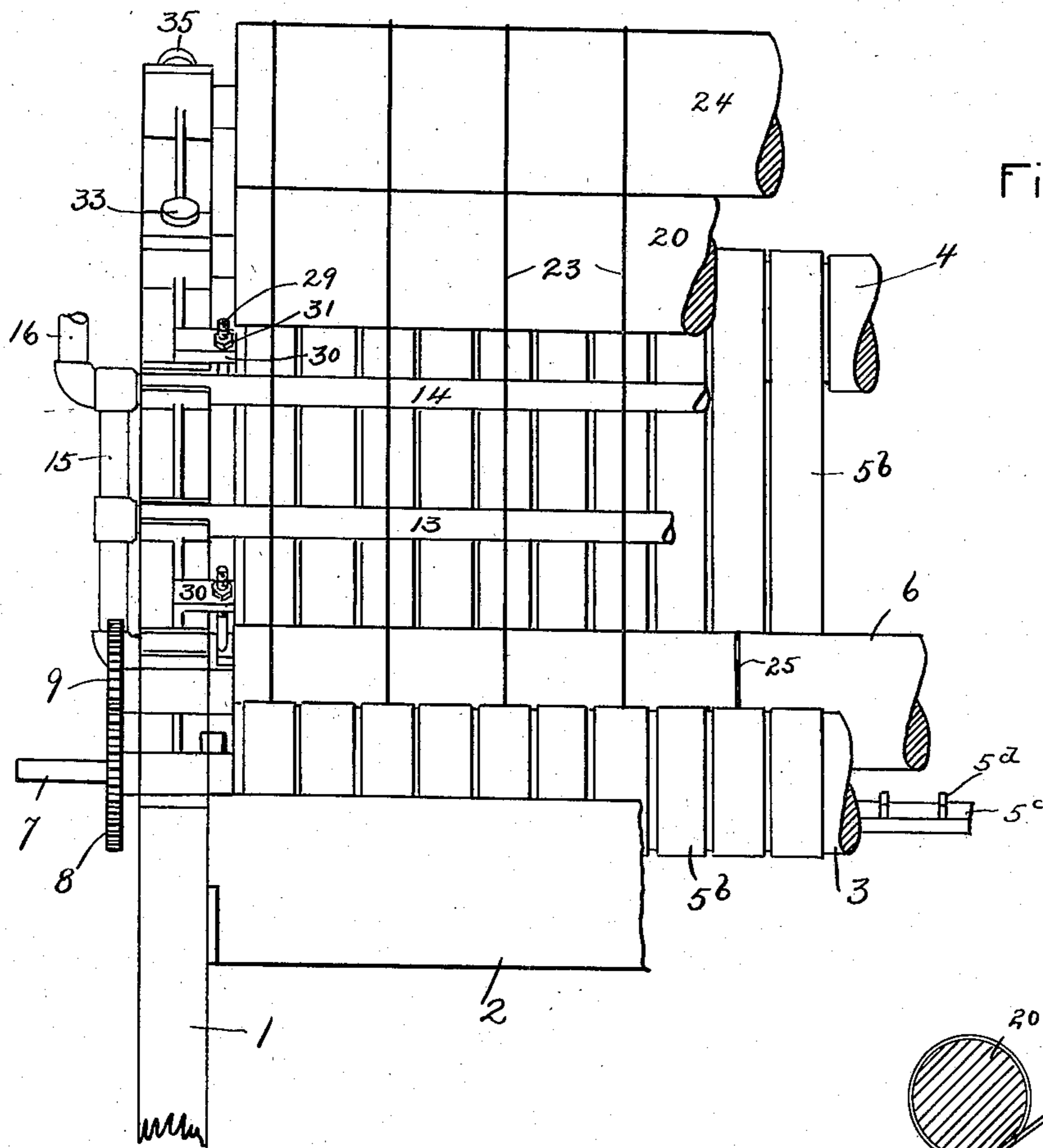


Fig. 5.

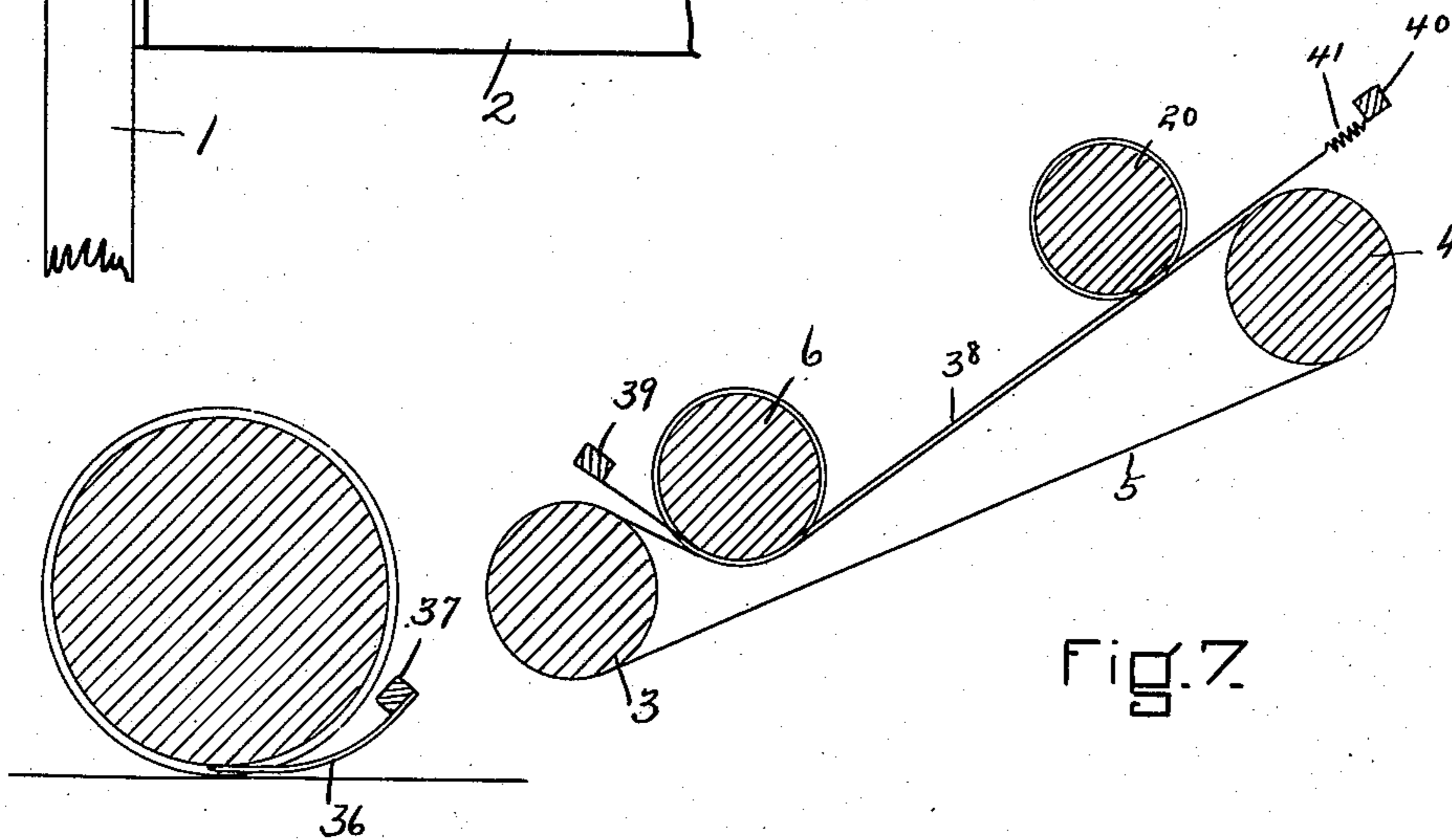


Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR WASHING SHEET MATERIAL.

No. 899,424.

Specification of Letters Patent.

Patented Sept. 22, 1908.

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To all whom it may concern:

Be it known that I, CHARLES E. MOSS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Washing Sheet Material, of which the following is a specification.

This invention relates to an apparatus by which sheet material may be washed, and has special reference to washing blue print paper and other photographic prints after having been exposed, so as to remove those portions of the sensitized coating which had not become fixed by the action of the light.

The chief object of the invention is to carry the sheets past spraying means where they are subjected to the action of water or other washing fluid projected against one side only with sufficient force to remove all the soluble coating, to provide supports for the sheets and the conveyers by which they are carried, so that the sheets will be held flat and will not be liable to puckering, wrinkling or tearing under the force of the water, to provide feeding and squeezing rolls, and strippers to prevent the sheets adhering to and being wrapped around such rolls, and to provide for certain removal of the sheets from the conveying means by having the latter arranged with intermediate spaces and mounting a delivery table which has tongues entering such spaces so as to lift and guide the advancing edges of the sheets away from the conveying means. The details of an apparatus by which these objects are attained are described and claimed in the following specification and illustrated in the drawings forming a part thereof.

Figure 1 represents a longitudinal section of a machine in which the principles of my invention are embodied. Fig. 2 represents a detail cross-section on line 2—2 of Fig. 1. Figs. 3 and 4 represent on an enlarged scale, detail sectional views of the sheet-feeding and liquid-expressing devices, together with the strippers. Fig. 5 represents a front elevation of part of the machine illustrated in Fig. 1. Fig. 6 represents a view of part of the machine, showing a modified arrangement of stripper device for separating the sheets to be washed from the feeding and squeezing rolls. Fig. 7 represents a sectional view of the sheet-conveying means with a different form of stripper.

The same reference characters indicate the same parts in all the figures.

Referring to the drawings, 1 designates the frame of a washing machine, and 2 represents a tank or trough for receiving washing fluid after having been sprayed against the sheets. Near the opposite ends of the tank are rolls 3 and 4 over which conveying belts 5 pass. The rearward roll 4 is at a higher elevation than the front roll in order that the stretch 5^a of the conveyer which carries the sheets to be treated may pass upward at a considerable angle to allow the washing fluid to run off.

6 is a roll bearing against the conveyer close to the roll 3 and pressing the conveyer downward so as to hold the sheets to be treated firmly against the latter and assist in feeding them onward. The roll 3 is driven by a shaft 7 turned by any suitable source of power, and may conveniently be connected by gearing 8 and 9 with the roll 6 so as to cause the latter to turn in unison with it, but the friction of the conveyer alone may be depended on to cause the latter to turn. Above and in front of the roll 3 is a guide plate or table 10 on which sheets 11 which are to be washed are placed, and from which they are fed by hand or gravity to the tapered throat between the rolls 3 and 6. The rolls 3 and 4 thus constitute driving and supporting rolls for the conveyer and sheets, while the roll 6 is an auxiliary feeder.

Extending upwardly and to the rear from the roll 6 is a series of water-discharging means consisting of pipes 12 13 and 14 which are perforated on the side next to the stretch 5^a of the conveyer so as to discharge water or other suitable fluid or wash in a spray or a number of fine streams. These spraying pipes are connected by piping 15 to which water is supplied from a supply pipe 16 regulated by a valve 17. The water may enter the pipe 16 either from a pressure main or from a connection 18 which takes the water which has already been used from the bottom of the tank and through which it is forced by a pump 19.

After passing beyond the fluid-discharging means, the sheets are subjected to the pressure of a squeezing roll 20 which expresses the surplus water from them. This roll is located intermediate the supporting rolls 3 and 4, so that it acts on the sheets before they reach the rearmost roll, and is therefore opposed only by the pressure due to the tension of the conveyer and not to the rigid opposition of the roll 4. I have found that it is impossible to pass wet paper sheets be-

tween wringer rolls which bear directly upon each other without danger of puckering and wrinkling them, but when the squeezing roll bears only against a length of the conveyer, which is flexible and yielding, the sheets invariably pass through smoothly, and as much of the water is pressed out as can be extracted by pressure alone.

In rear of the roll 4 is a delivery table 21 upon which the sheets are fed by the continued motion of the conveyer. In order that the sheets may with absolute surety be removed from the conveyer, and any liability of their being carried around the roll 4 into the tank avoided, I form the conveyer of a plurality of belts 5^b placed side by side, separated by narrow spaces, as shown in Fig. 5, into which extend tongues 22 on the delivery table. The belts are sufficiently narrow and the spaces and tongues numerous enough to enable the latter to lift the moist sheets at a great number of adjacent points so that the adhesion of the sheets to the belts will not be strong enough to tear the sheets. At the same time, it is necessary to have the belts of greater width than the spaces between them so that they will support the sheets over the greater proportion of the area of the latter and furnish sufficient adhesion to carry the sheets upward against the downward wash of the water. A guide consisting of a cross bar 5^c having blades 5^d preserves the correct distance between the belts.

Since the roll 6 depresses the belts, it forms a pocket in which the water discharged from the spraying pipes collects before it can run off at the sides of the sheets into the tank, and by which the sheets are well moistened before they receive the direct impingement of the water ejected from the pipes. Consequently the sheets are wet as soon as they pass beyond the point where the roll 6 separates from the conveyer, and also as they pass beyond the squeezing roll 20. There is thus a tendency for the advancing foremost edge of a sheet to adhere to either roll and to be carried around with it, thereby causing the sheet to become wrapped around the roll, instead of to travel forward as intended, with the conveyer. To guard against this contingency, I provide strippers which consist of wires 23 passing around the roll 6, and an upper guide roll 24, which is so located that one stretch of the wires extends from the roll 6 to and beyond the roll 20, between these rolls and the conveyer belts. Thus as the strippers diverge from the rolls, they supplement the tendency of the sheets to adhere to the conveyer and separate them from the rolls without tearing or puckering them. Those portions of the rolls 6 and 20 with which the wires come into contact have grooves 25 and 26 of greater depth than the diameter of the wires, so that the latter are entirely sunken within the periphery and do

not come into contact with the sheets where they are pressed upon by the rolls. Therefore there is no tendency for the wires to make indented lines in the sheets.

Below the stretch 5^a of the conveyer is a backing plate 27 which supports that portion against which the washing fluid is projected. The backing plate has ribs 28, as shown in Fig. 2, of a height substantially equal to the thickness of the belts which enter the spaces between the latter and fill them. The filler bars or ribs thus supplement the belts and form with the latter a continuous supporting surface which sustains the sheets so as to receive the pressure of the water discharged upon them. No spaces are left between the belts and ribs wide enough to permit the water to displace any parts of the sheets and indent or tear them, while those portions of the plate 27 which extend under the belts sustain the latter and prevent any unequal yielding under the water jets which would have a similar effect. Thereby the sheets are kept perfectly smooth in all stages of the washing and squeezing operation.

The backing plate is supported by bolts 29 passing through lugs 30 in the sides of the machine frame and adjusted by nuts 31. The roll 20 is also adjustably mounted to vary the squeezing pressure, having its journals contained in guides 32 and adjustable by a screw 33. The roll 24 is similarly mounted in a guide 34 and adjustable by a screw 35 to regulate the tension of the stripper wires 23 and take up any stretch therein.

Fig. 6 is intended to show a modification of stripper in which the wires 23 are omitted, and in place thereof are substituted pins 36 carried by a cross bar 37 which may be suitably mounted on the sides of the machine frame. This form of stripper is intended to be mounted behind each of the rolls 6 and 20.

In Fig. 7 is shown a form of stripper which in some respects is preferable to either of those before described. Separate wires 38 extend from a cross bar 39 partly around the roll 6 and beyond the roll 20 to a cross bar 40 with which they are connected by springs 41. The wires are thus stationary but as they are of such small superficial area and bear so lightly against either the rolls or the sheets that their friction opposes practically no resistance to the operation of the machine. The springs 41 also automatically preserve the required tension in the wires and avoid the necessity of the guide roll 24 and the adjusting means for the latter.

I claim:—

1. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, and means for projecting washing fluid against the material while so supported, said conveyer consisting of a series of parallel sections separated from

one another to permit escape of the washing fluid, whereby the conveyer is cleansed.

2. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, means for projecting washing fluid against the material while so supported, a rigid backing for sustaining the conveyer and sheet material against the force of the fluid, and a support or table upon which the material is delivered by the conveyer.

3. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, means for projecting washing fluid against the material while so supported, a rigid plate on the opposite side of the conveyer from the fluid-projecting means for sustaining that portion thereof against which the fluid is directed, and a support or table upon which the material is delivered by the conveyer.

4. A machine for washing sheet material, comprising a plurality of endless conveyers placed side by side and separated by narrow spaces, rolls over which said conveyers are passed, a feed roll cooperating with said conveyers to advance sheet material, pipes arranged to discharge fluid against said conveyers and the sheets supported thereby, a backing plate for holding the conveyers up against the force of the discharge and fillers contained within the spaces between the conveyers to provide therewith a continuous supporting surface for the sheets, and a delivery table having projections sunk into the spaces between the conveyers to remove the sheets therefrom.

5. A machine for washing sheet material, comprising a plurality of endless conveyers placed side by side and separated by narrow spaces, rolls over which said conveyers are passed, a feed roll cooperating with said conveyers to advance sheet material, pipes arranged to discharge fluid against said conveyers and the sheets supported thereby, a backing plate for holding the conveyers up against the force of the discharge and having ribs extending into the spaces between the conveyers and of a height substantially equal to the thickness of the latter, whereby to prevent the sheets from being pressed into such spaces by the force of the fluid discharge, and a delivery table having tongues extending into the spaces between the conveyers to remove the sheets therefrom.

6. A machine for washing sheet material, comprising a flexible sectional conveyer having longitudinal spaces between its sections, whereby escape of the washing fluid and cleansing of the conveyer are permitted, devices for directing jets of washing fluid against the conveyer and the sheets thereon, and devices parallel to the sheet-supporting

stretch of the conveyer contained in the spaces between the sections for preventing displacement of the sheets into such spaces.

7. A machine for washing sheet material, comprising a flexible sectional conveyer having longitudinal spaces between its sections, whereby escape of the washing fluid and cleansing of the conveyer are permitted, devices for directing jets of washing fluid against the conveyer and the sheets thereon, a rigid back supporting the conveyer against distortion and deflection from the force of the impinging fluid, and means carried by said back entering the spaces between the conveyer sections to maintain the continuity of the sheets across such spaces.

8. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, a feed roll bearing against the conveyer between the points at which the latter is supported to cooperate therewith in gripping and feeding sheets, and strippers interposed between the conveyer and feed roll and extending with the conveyer beyond said roll to prevent the foremost edge of a sheet being wrapped about the roll.

9. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, a feed roll bearing against the conveyer adjacent to the entering point for the sheet material to cooperate therewith in gripping and feeding sheets, and strippers consisting of rods or wires held in close contact with the feed roll and extending beyond the same in substantial parallelism with the conveyer to separate the foremost edge of an advancing sheet from the roll and prevent the sheet becoming wrapped about the roll.

10. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, a feed roll bearing against the conveyer at the point where the sheets are first engaged with the conveyer to cooperate therewith in gripping and feeding sheets, and strippers consisting of rods or wires held in close contact with the feed roll and extending past the same parallel with the conveyer to separate the foremost edge of an advancing sheet from the roll and prevent the sheet becoming wrapped about the roll, the roll being grooved where engaged by the strippers, whereby the latter are sunken within the feeding surface and enabled to remain out of contact with the sheet.

11. In a machine of the character described, having a conveyer and a cooperating gripping feed-roll, stationary stripper wires held at their ends and passing between the roll and conveyer, approximately parallel to the latter.

12. In a machine of the character described, having a conveyer and a cooperating gripping feed-roll, stationary stripper wires held at their ends and passing between the roll and conveyer, approximately parallel to the latter, the support for one end of the wires being resilient to absorb the stretch thereof.

13. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, supporting rolls over which the conveyer is passed, means for discharging fluid against the conveyer and the sheets carried thereby, and a presser roll bearing against the conveyer intermediate the supporting rolls and upon an unsupported portion thereof for removing the excess of fluid from the sheets.

14. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, supporting rolls over which the conveyer is passed, means for discharging fluid against the conveyer and the sheets carried thereby, a presser roll bearing against the conveyer intermediate the supporting rolls for removing the excess of fluid from the sheets, and strippers arranged to separate the sheets from the presser and to cause the sheets to travel with the conveyer past the presser.

15. A machine of the character described, comprising a flexible conveyer adapted to support the sheet material over the greater part of the area of the latter, supporting rolls over which the conveyer is passed, means for discharging fluid against the conveyer and the sheets carried thereby, a presser roll bearing against the conveyer intermediate the supporting rolls for removing the excess of fluid from the sheets, and separated strippers of slight width extending beyond the presser in the direction of movement of the conveyer and entering peripheral grooves in the presser, whereby they are enabled to separate the advancing sheets from the presser and cause the same to continue with the conveyer, without being caused to indent the sheets.

16. A machine for washing sheet material comprising means for discharging water, an endless traveling conveyer belt extending past said discharging means, driving and supporting rolls for said belt, a cooperating feed roll pressing against the belt in advance of the water-discharging means, a squeezing

roll bearing against the belt in rear of the discharging means and between the supporting rolls for expressing surplus water, and separated stripper wires extending from the feed roll to and beyond the squeezing roll to separate the advancing edge of a sheet therefrom and cause the same to continue in contact with the conveyer.

17. A machine for washing sheet material, comprising means for discharging water, an endless traveling conveyer belt extending past said discharging means, driving and supporting rolls for said belt, a cooperating feed roll pressing against the belt in advance of the water-discharging means, a squeezing roll bearing against the belt in rear of the discharging means and between the supporting rolls for expressing surplus water, and separated stripper wires extending from the feed roll to and beyond the squeezing roll to separate the advancing edge of a sheet therefrom and cause the same to continue in contact with the conveyer, said wires being contained in peripheral grooves in the rolls, whereby the latter are enabled to press upon the sheets without causing indentation thereof by the wires.

18. In a machine of the character described, water-discharging means, a plurality of conveyer belts for carrying sheets of material to be washed past said discharging means, and a table upon which the sheets are deposited by the belts, said belts being separated from each other and the table having tongues entering the spaces between them to pick up the advancing edges of the sheets.

19. In a machine of the character described, water-discharging means, a plurality of conveyer belts for carrying sheets of material to be washed past said discharging means, a table upon which the sheets are deposited by the belts, said belts being separated from each other and the table having tongues entering the spaces between them to pick up the advancing edges of the sheets, and filling bars located between the belts adjacent the water discharging means for supporting the sheets and preventing the same from being pressed between the belts or torn by the force of the water discharged against them.

In testimony whereof I have affixed my signature, in presence of two witnesses.

CHARLES E. MOSS.

Witnesses:

ARTHUR H. BROWN,
P. W. PEZZETTI.