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I. L. LAIRD

SCREEN FOR PAPER MAKING

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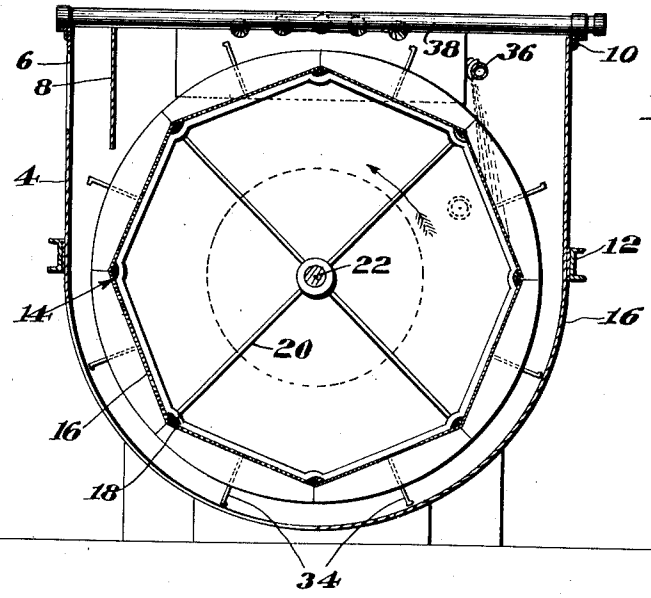
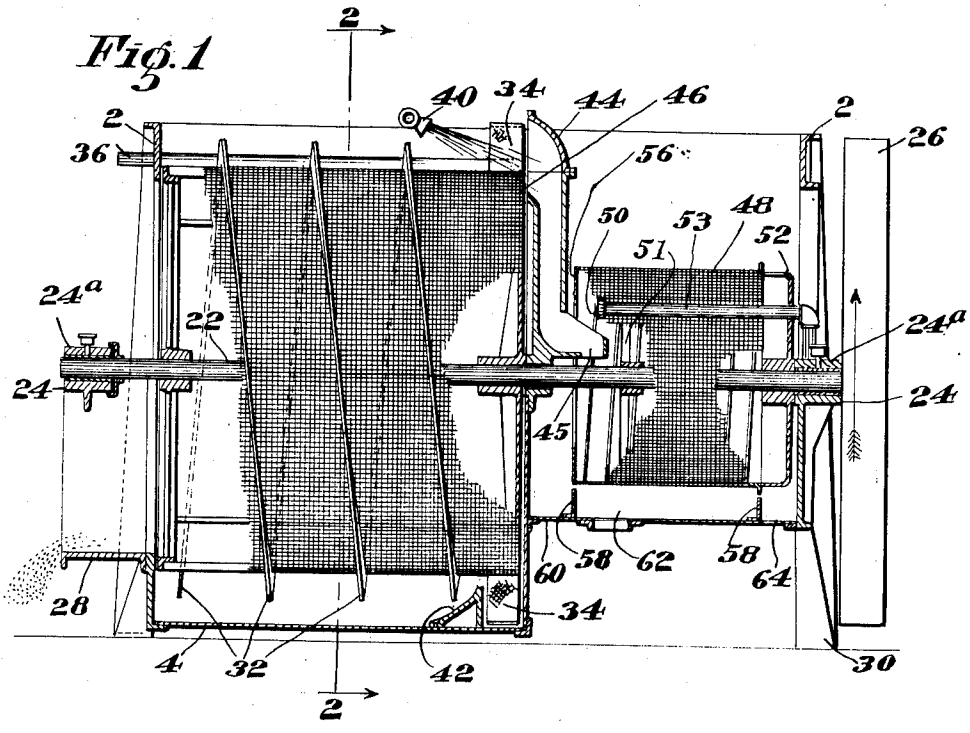


FIG. 2

FIG. 1



INVENTOR

Isaac Lamon Laird

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UNITED STATES PATENT OFFICE.

ISAAC LAUREN LAIRD, OF SOUTH WALPOLE, MASSACHUSETTS, ASSIGNOR TO BIRD MACHINE COMPANY, OF SOUTH WALPOLE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

SCREEN FOR PAPER MAKING.

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This invention relates to screens for use, primarily, in paper making, and is designed more particularly for the coarse screening of material suspended in a liquid. For the purpose of this explanation of its construction and operation, it may be considered as a knotter or coarse screen for removing the knots, slivers, and larger particles from wood pulp or paper stock.

The present invention has for its objects the provision of more efficient means for screening, and to improve upon knotters and other screens in present use.

An embodiment of the invention is illustrated in the annexed drawings, wherein,—

Figure 1 is a longitudinal cross-section, with various parts of the primary and secondary screen drums in elevation; and

Figure 2 is a transverse cross-section, taken on line 2—2 of Figure 1, looking with the arrows.

Referring to the drawings, the main body of the machine is supported on end stands 2, 2. The main vat or body 4, of sheet steel or other suitable material, is made up of pieces welded together or otherwise joined, and is attached to the end stands 2, for example, by bolts or rivets. An opening 6 is shown in the wall of the vat or body 4, through which the stock to be screened enters, the plate 8 being a guard to guide the stock downwardly and prevent splashing. The vat 4 may be stiffened by angle iron braces 10 and channels 12, as shown.

The first or primary screening unit, generally designated at 14, may be cylindrical or an irregular shape, but is preferably a prismatic or polygonal drum made up of flat, rectangular, perforated metal plates 16 (perforated plates are indicated as screen in the drawings), which form the screening means. The plates 16 are suitably attached, as by screws or clamps, on their longitudinal edges, to lateral supporting bars 18, which are in turn supported at their ends by and attached to spiders 20, which are affixed to and driven by the shaft 22, carried in bearings 24, in which the shaft 22 is held and suitably rotated, as by the pulley 26. The bearing at the left hand side of the machine, as viewed in Fig. 1, is here shown as integral with the discharge trough or flange 28, while the bearing at the other or right hand end of the machine is integral with the drive end stand 30. The bearing cap for each of these bearings is designated 24^a.

The screen drum 14 carries upon its outer surface an external worm 32, and also there is affixed adjacent one end of the screen drum a series of perforated tailing scoops 34, which constitute a series of longitudinal perforated blades. The screen plate cleaning shower 36 consists of a pipe supported in the vat 4, having suitable apertures or nozzles therein, so as to project jets of water down against the screen plates 16 of the drum 14, as best shown in Fig. 2. The blow-off shower pipe 38 consists of a pipe having affixed thereto a series of nozzles 40, which direct jets of water against the screen drum at the top of its travel, and against the plates 34. A tailing guide 42 is riveted or otherwise fastened to the bottom of the vat 4. The tailing chute 44, having a discharge opening 45, is affixed to the partition 46, which separates the primary and secondary screens. The chute 44 extending from above the top of the partition 46, thus forms a conduit for tailings from the first stage to the second stage of the apparatus.

The second screening stage consists of a washing drum, here shown as a perforated metal cylinder 48, which may, for example, be made up of two semi-cylindrical, perforated plates, bolted or otherwise clamped together, and supported upon a worm member 50, worm spider 51, and drive spider 52, all of which are carried by and keyed to the shaft 22. The screen drum 48 is here shown as provided with a cleaning shower pipe 53 in the same relative position as shower 36 and the main screen drum 14. An annular drum guard 56, with a center opening concentric with its periphery is fastened to the screen drum 48. This guard may be split on its diameter to simplify removal. Beneath the screen drum 48 are placed drip guards 58, which consist of semi-circular plates riveted to the vat extension or smaller vat 60. These guards prevent the recovered fibres and water from being mixed with the washed knots, so that the recovered fibres pass out through the opening 62 and the washed knots drop out through openings in the member 52, and then out through the opening 64.

In the operation of the device, the shaft and all the units attached thereto are ro-

tated. The stock to be screened enters through the opening 6 and is guided downwardly by the guard 8, which also prevents splashing. A larger part of the good fibres at once passes inwardly through the perforations in the plates 16, while the knots and slivers and a small percentage of the good fibres are carried to the tailing scoops 34 by the action of the external worm 32. In addition, this worm 32 serves to keep the unscreened stock in motion and the particles in suspension, giving a better screening condition. The screening action is enhanced by the motion of the unscreened stock which results from the rotation of the polygonal or irregularly shaped drum 14 in the body of unscreened stock in vat 4. The result is similar if a cylindrical but eccentrically mounted screen drum be employed. This action also tends to keep the screen plates clear and free from clogging. The accepted stock thus enters the inside of the screen drum, then flows by gravity over the discharge flange 28 and out. The clearance between the screen drum and the ends of the vat and its supporting frame are so small that very little stock escapes, but if desired a suitable packing may be applied.

The knots and slivers, together with a small percentage of good fibres, upon reaching the tailing guide 42, are carried over by the worm 32 and into the trough formed between and by the tailing guide 42 and the partition 46. From this trough, the knots, slivers, and good fibres, are picked up by the perforated tailing scoops 34, and carried to the top by the rotation of the screening drum, whence they are blown into the tailing chute 44 by the water emitted from the shower nozzles 40. Since the tailing scoops 34 are perforated, they also screen and allow good fibre to flow back into the vat and enter the inside of the screening drum. Another purpose of the perforations is to allow of better scooping action, since the draining of the liquid permits knots and slivers to remain, which would otherwise tend to wash off sidewise were the scoops made of flat solid plates. The water from the nozzles 40 also serves to dilute the tailings. If so desired, further dilution may be obtained by the addition of water within the tailing chute 44. However, in any case, the mixture of knots, slivers and good fibre will be carried downwardly by the water and find their way through the opening 45 and drop into the perforated washing drum 48. Here the internal worm 50 carries the knots and slivers toward the drive spider 52, during which passage they are washed clean of good fibres by the shower from the shower pipe 53. This shower water carries the reclaimed fibres from the perforated screen drum 48 to the bottom of a vat 60, from which the mixture flows by gravity through the opening 62, and is ready to join the main body of accepted stock. The knots and slivers reach the end of the washing drum and drop by gravity through the openings in the spider 52 and thence out through the opening 64.

Having disclosed my invention, what I wish to claim and secure by Letters Patent is:

1. A machine of the class described, having, in combination, a vat, a rotary screen of the inflow type located therein, a spirally arranged member carried by the screen upon its exterior, serving to urge coarser particles of the stock along the outside of the screen and lengthwise of the vat, and a series of perforate members upon the exterior of and carried by said screening drum, adapted to elevate and discharge said coarser particles into a second screening drum, adapted to again screen said coarser particles.

2. A machine of the class described, having, in combination, a vat, a rotary screen of the inflow type located therein, a spirally arranged member carried by the screen upon its exterior, serving to urge coarser particles of the stock along the outside of the screen and lengthwise of the vat, and a series of members rotated with said screening drum, adapted to elevate and discharge said coarser particles into a second screening drum adapted to again screen said coarser particles.

3. A machine of the class described, having, in combination, a vat, a rotary screen of the inflow type located therein, said screen being adapted to keep in motion the unscreened stock in said vat, means adapted to elevate the coarser particles of said stock, a shower to wash and dilute said coarser particles, and an outflow rotating screen adapted to screen said coarser particles.

4. A machine of the class described, having, in combination, a vat, a rotary screen of the inflow type located therein, adapted to keep in motion the unscreened stock in said vat, means serving to urge coarser particles of the stock along the outside and longitudinally of the screen and a shower to wash and dilute said coarser particles, and an outflow rotating screen adapted to screen said coarser particles.

5. A machine of the class described, having, in combination, a vat, a substantially polygonal rotary screen of the rotary inflow type located therein, means serving to urge coarser particles of the stock along the outside and longitudinally of the screen and a shower to wash and dilute said coarser particles, and an outflow rotating screen adapted to screen said coarser particles.

ISAAC LAUREN LAIRD.