(No Model.) 3 Sheets—Sheet 1.

E. F. MILLARD.

SULFITE FIBER SEPARATOR.

No. 523,048. Patented July 17, 1894.

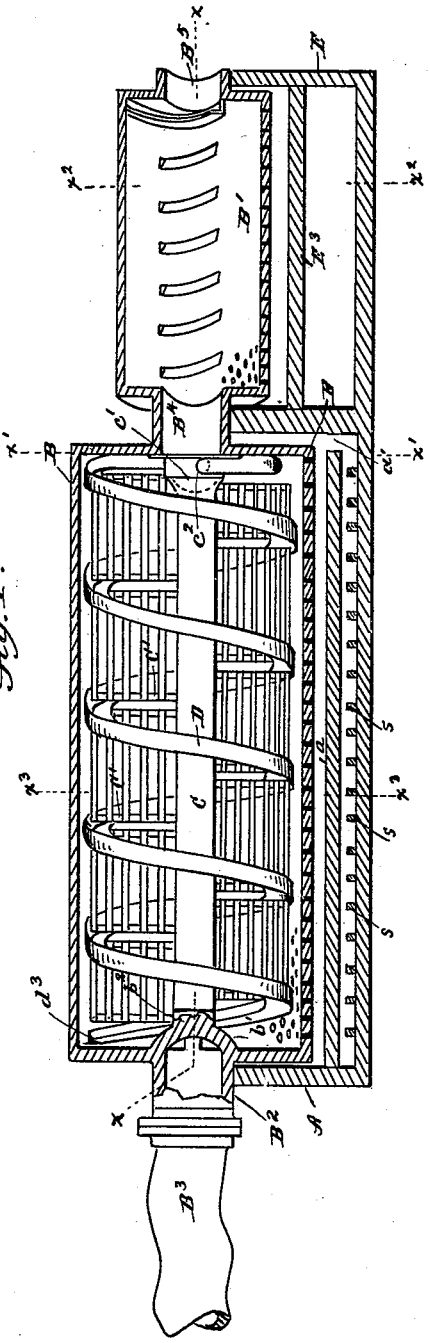

Fig. 1.

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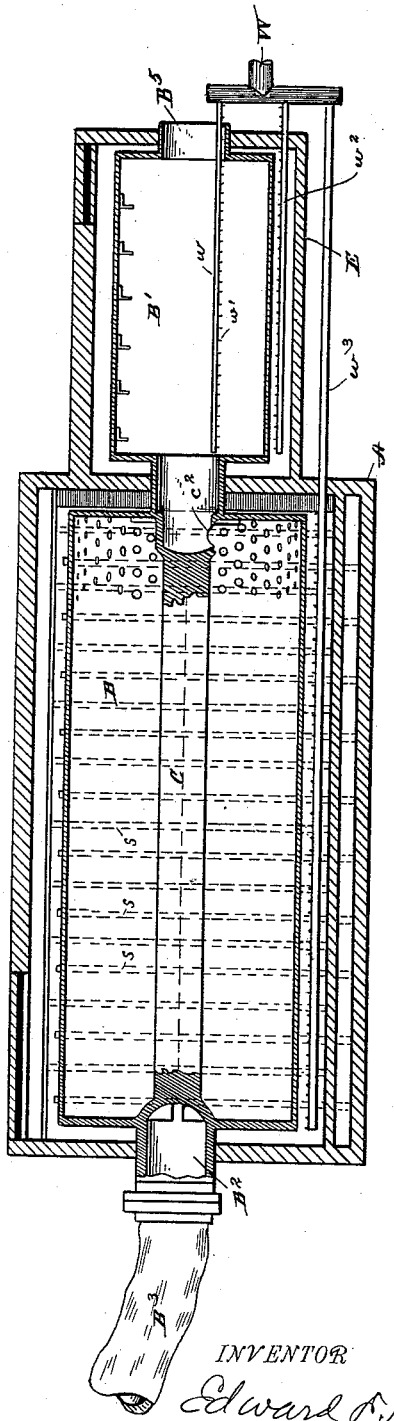

Fig. 2.

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3 Sheets—Sheet 3.

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Fig. 3.

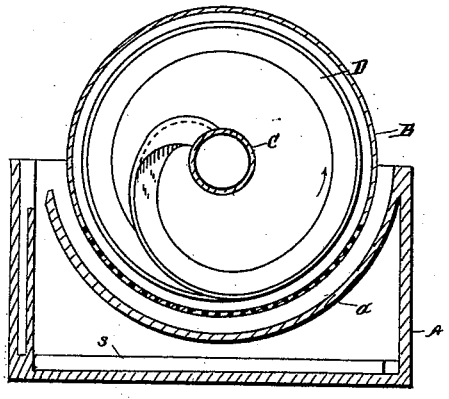
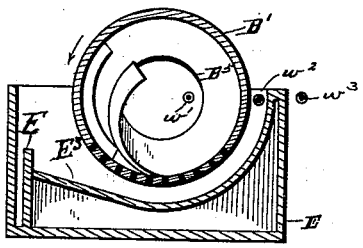


Fig. 4.



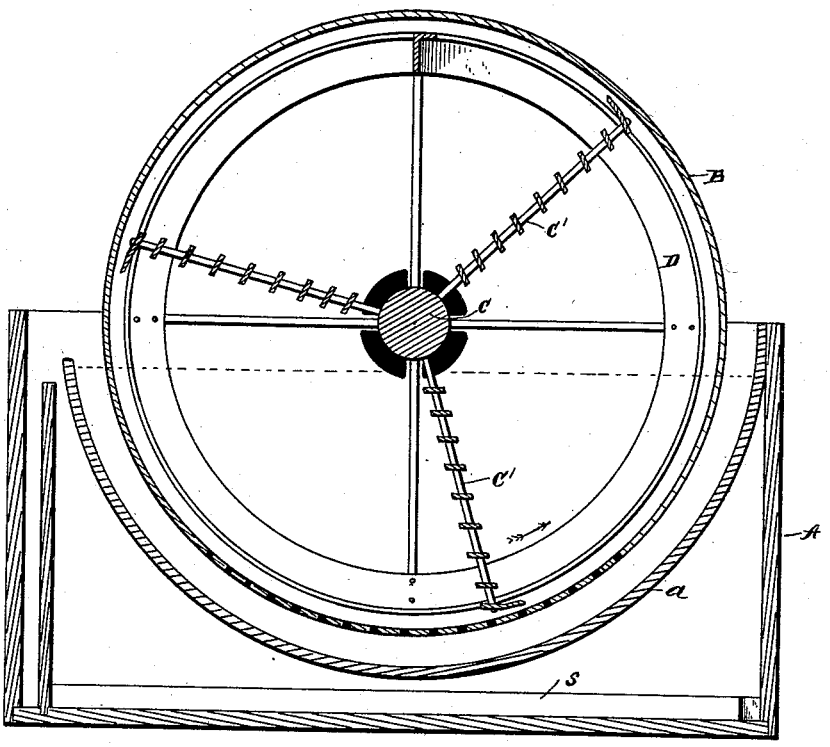


Fig. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD F. MILLARD, OF JACKSON, MICHIGAN.

SULFITE-FIBER SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 523,048, dated July 17, 1894.

Application filed July 18, 1893. Serial No. 480,812. (No model.)

To all whom it may concern:

Be it known that I, EDWARD F. MILLARD, a citizen of the United States, residing at Jackson, county of Jackson, State of Michigan, have invented a certain new and useful Improvement in Sulfite-Fiber Separators; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

The machine hereinafter described is a modification of an improvement upon a machine described in Letters Patent to me dated August 4, 1891, No. 457,089, which said improvement is also the subject of a contemporaneous application, Serial No. 480,813, filed by me for improvements in wood pulp separators. This modification is specially adapted to the manipulation of sulphite fiber.

In the drawings, Figure 1 is an elevation of my machine, partly in section. Fig. 2 is a sectional plan view on line x—x of Fig. 1, with the worm omitted. Fig. 3 is a sectional view on line x'—x' of Fig. 1. Fig. 4 is a sectional view on line x^2—x^2 of Fig. 1. Fig. 5 is a sectional view through the drum and worm on line x^3—x^3 of Fig. 1.

Similar letters refer to similar parts.

In carrying out my invention, A represents a case or trough which is constructed so as to be water tight.

B represents a metallic foraminous drum, the holes therein being of such size and shape as is best adapted to perform the work of the device, although it is not intended to confine this invention to any special sized or shaped holes.

C is a shaft carrying by means of appropriate supports or spokes an internal worm D.

E is a supplemental or continuation of the case, and carries within it a secondary foraminous drum B′. This is constructed substantially like the drum B, except that preferably the holes are smaller.

The drum B has at B^2 a hollow trunnion or bearing upon which it is supported. The head of the drum B is perforated centrally, and from the edges of the perforations project inwardly arms b', which are cast integral with the head. These arms unite in a hub b^2, into which the shaft C is keyed in the usual form. Attached to the hollow trunnion B^2 by an appropriate stuffing box is an inlet tube B^3, adapted to receive the material to be operated upon by the apparatus, but convey it to the interior of the drum B.

In the case A there is a trough a, which does not extend quite to the end of the casing at the tail of the machine, leaving an opening a'. This trough is concentric with the drum B, and is separated therefrom by a small space of an inch or more. This is shown in cross section in Fig. 3. Below the trough a is a series of transverse slats, s, s, s, extending alternately nearly across the width of the casing A, as shown in Figs. 2 and 5.

At B^4 is another hollow trunnion, which is enlarged and serves as the head to the drum B. At its opposite end it is also enlarged, making a head for the drum B′, the whole being preferably cast in one piece. The shaft C is flanged at the corresponding end, and at c is firmly attached to the head B^4. The extreme end of the shaft at c' is hollow, as shown by the dotted lines, and, entering therein, it has an opening at the side c^2, as shown in Fig. 1, into which the extreme end of the worm D enters. The worm D is angular in cross section, which is shown at d^3, one flange being concentric and the other flange being perpendicular to the periphery of the drum. The perpendicular flange is always toward the head of the machine. This form makes a right angled trough, and, as the drum rotates in the direction of the arrow, the perpendicular flange continually forces material from the head toward the tail of the machine, and, as heavy material settles in the pulp, it is caught by the longitudinal flange and held in the angle between the two until it is ultimately carried to the tail end of the shaft, where it is discharged at d^2 out through the hollow trunnion B^4 and into the second drum B′. Attached to the shaft C and at right angles thereto, are rods or bars C′ C′. Between these bars are located slats having a rectangular cross section. They are constructed so that the plane of the slats is at an angle with the perpendicular radii from the center of the shaft C. They are all located alike, and in the same direction as shown in Fig. 5. As the shaft and drum worm and the slatted ex-

tensions turn in the direction of the arrow in Fig. 5, and as the water line is at the dotted line in Fig. 5, it is obvious that the action of the slats upon the water, by virtue of the angle which they make with the radii as aforesaid, is to drive the solid material from the outer portions of the drum toward the center. In Fig. 1, but two of these slatted extensions are shown; it is the intention, however, to place them between each convolution of the worm throughout the whole extent of the shaft.

The drum B′, as hereinbefore stated, is smaller in diameter than B, and is carried by a hollow journal at its outer end at B^5. This is made a portion of the cast head of the drum B′, and forms an outlet for the discharge of material as hereinafter stated. Upon the inner surface of the drum B′ are attached blades extending inwardly a short distance and located substantially as though they were portions of a true screw. They are so adjusted that the rotation of the drum in conjunction with the blades forces the material that is in the bottom of the drum toward the tail of the machine.

At the hollow journal B^5, and inside of the drum B′, is located a screw conveyer in the form of a cycloid, the inner end commencing at the inner surface of the drum B′, the front side being flanged and thence carried in a cycloidal form until its discharging end is brought toward the axis of the drum coincident with the inner surface of the hollow journal. The drum B′ also revolves in a concave trough E^3, of which one side is carried up, substantially conforming to the convexity of the drum, until it joins the case; the opposite side is raised but slightly and joins a dam F, as shown in Fig. 5. The height of this dam may be made adjustable by any of the well known means for such adjustments. The space between the dam and the case E forms a receptacle from whence preferably, in practice, the material carried over the dam may be conveyed back to the inlet at the head of the whole machine, although that is not essential.

The washing device is provided, the plan of which is shown in Fig. 2, which consists of a water pipe W which is connected with any convenient source of water supply having a head. Extending therefrom and located inside of the foraminous drum B′ and parallel with its axis, is a pipe w, which is closed at its extreme end. Upon the side of this pipe w, and facing the interior of the drum, is a series of small jet holes w'. Parallel with the exterior of the drum B′ is another jet pipe of similar construction, w^2. Extending from the common source of supply is another pipe which faces the exterior of the drum B, and is marked w^3; this also has a series of jet holes similar to the others. Each of these pipes is controlled by an appropriate stop-cock which permits of the force of the jets to be regulated at will. The jets serve to keep clear the perforations in the drums, and at the same time to furnish water to supply that which is carried over the dams, and thus keep the mixture within the drums in the proper state of dilution. Appropriate means is provided whereby the drums B and B′ are rotated, but about which there is nothing new, and which may readily suggest itself to any one acquainted with the state of the art, and which therefore is not shown or described.

The mode of operation of this device is as follows: Material consisting of sulphite fiber mingled in water, is admitted through the hollow journal at the head of the drum B at B^2. After passing through the hollow trunnion B^2, it fills the drum B up to a level of the lowest point of the interior surface of the hollow trunnion, and very nearly to the shaft. The finer portions, together with the water, will pass through the perforations of the drum into the trough a. The rotation of the drum carrying the worm, operating in conjunction with the angular slats, continually forces the larger particles in the mixture simultaneously toward the center or axle, and longitudinally toward the tail of the machine, so that the center is formed into a current carrying the larger particles toward the tail, while at the same time the finer particles are carried through the openings in the drum into the trough, as hereinbefore stated. The heavier, larger portions are caught by the worm and carried forward until they, with the other larger portions that are too light to fall through the water, are carried out through the hollow bearing B^4, and over into the secondary drum B′. Some of the finer and available material for manufacture is also carried out through the hollow bearing B^4; for the purpose of saving this, I provide the second drum B′. As already stated, this, having perforations of a smaller size than the drum B, permits the finer material only to pass through it into the concave underneath, whereas, the coarser portions are worked to the tail of the machine by the flanged screw projections and by the so-called trough; thence they pass out through the tail of the machine at B^5. The finer particles carried by water, after passing through the perforations in the drum B, pass out of the trough a into the bottom of the case A. At this point, it is compelled to circulate around and over the slats $s\ s\ s$, and, as the water level is of the height of the dam F, it finally rises in the interior of the case and runs in a thin stream over the dam F, and thence to its appropriate receptacle. The object of the slats is to permit the settling of any small but hard gritty substances or metallic scales, such as are necessarily incident to the manufacture of sulphite fiber. This separation is assisted also by taking out the material over the dam at the highest point of the water level.

Thus it will be seen that a continual separation of fine from coarse stock is being continuously carried on without any forcing;

hence, the stock is rendered cleaner from slivers, chips, or gritty particles than is possible in any device when the current is carried through a strainer, as this results in a direct inducement for the particles to pass through, and it is well known that much larger and longer particles will pass through the meshes of a strainer under the force or pressure of a current than there will where the inducement to do so is of the gentlest description.

What I claim is—

1. In combination with a rotary screen drum carried upon tubular journals, an angular conveyer therein and rotating therewith, giving a forward impulse to the pulp liquor within the screen toward the tail, a vat in which the rotary screen is partially submerged, an elevator which lifts the tailings and delivers them into the discharge opening formed in one of the tubular journals, and slatted wings moving simultaneously with the screen drum, the slats thereof being so arranged with reference to the direction of motion that the inclosed material is continually being worked toward the axial center of the drum, substantially as described.

2. In combination with a rotary and partially submerged screen drum, a rotating internal spiral conveyer, and rotating wings consisting of a series of slats parallel with the axis of the drum, the planes of which are angular with reference to the tangents of their described circles, substantially as described.

3. In combination with a vat having an overflow a rotary and partially submerged screen drum, a rotating internal spiral conveyer, rotating wings consisting of a series of slats parallel with the axis of the drum, the planes of which are angular with reference to the tangents of their described circles, and a settling basin interposed between the vat and overflow, substantially as described.

4. In combination with a rotary and partially submerged screen drum, a rotating internal spiral conveyer, rotating wings consisting of a series of slats parallel with the axis of the drum, the planes of which are angular with reference to the tangents of their described circles, and a settling basin interposed between the vat and an overflow, said settling basin having therein a series of longitudinal slats abutting alternately on opposite sides thereof and leaving each alternate end free, whereby a zig zag passage is created in the bottom of said settling basin, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

EDWARD F. MILLARD.

Witnesses:

W. J. WILLETS,

E. H. HENDERSON.