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SCREENING MACHINE FOR PAPER PULP.

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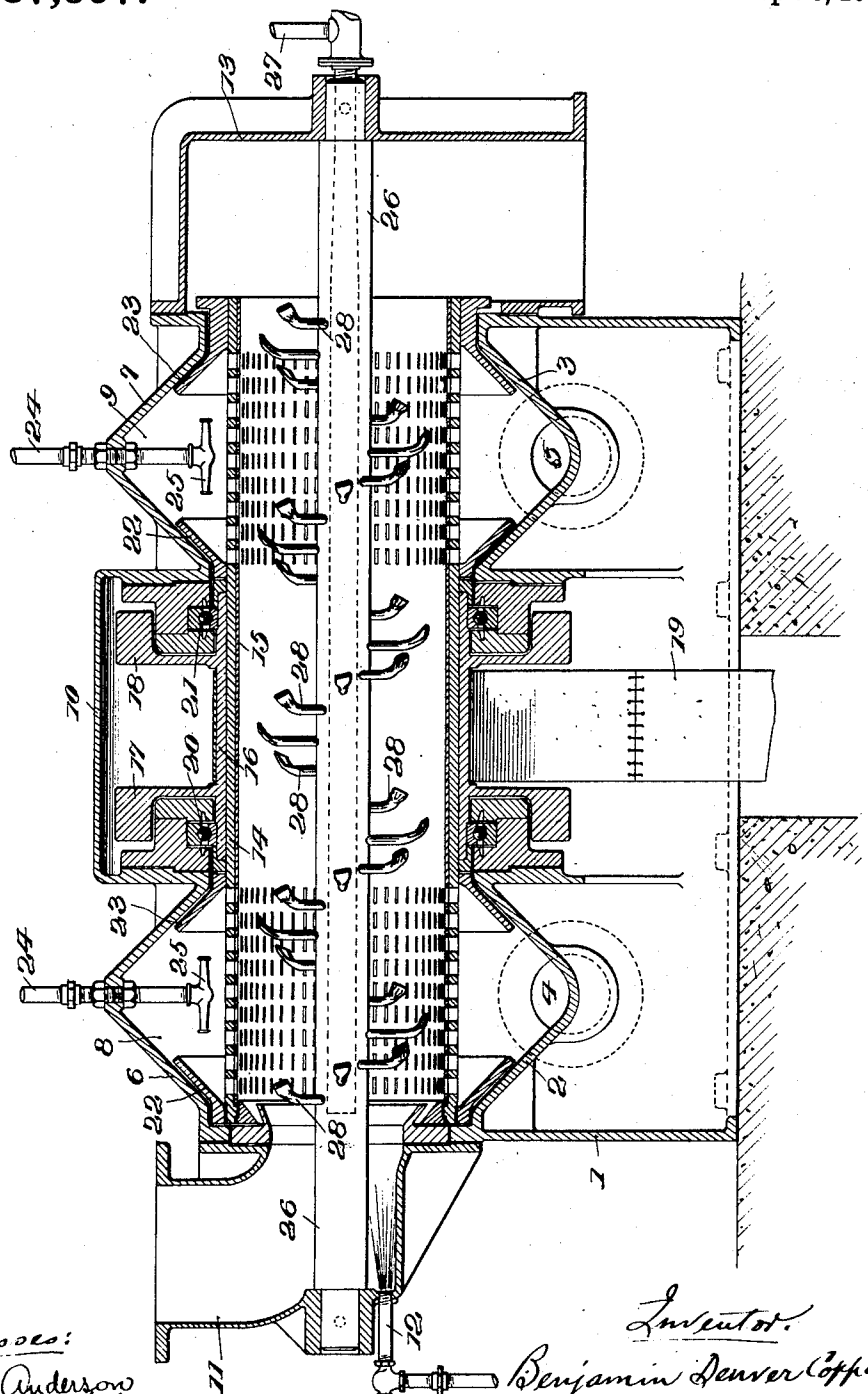
1,037,597. Patented Sept. 3, 1912.



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UNITED STATES PATENT OFFICE.

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SCREENING-MACHINE FOR PAPER-PULP.

1,037,597. Specification of Letters Patent. Patented Sept. 3, 1912.

Application filed November 9, 1911. Serial No. 659,310.

To all whom it may concern:

Be it known that I, BENJAMIN DENVER COPPAGE, of Wilmington, Delaware, have invented a new and useful Improvement in Screening-Machines for Paper-Pulp, which invention is fully set forth in the following specification.

The present invention is an improvement in screens for paper pulp stock, and particularly is an improvement in devices of this kind in which the screen is of cylindrical form and provided with a conveyer for feeding the stock longitudinally therethrough.

The objects of the invention are to provide a durable and efficient screen or separator of large capacity in which the course particles of the pulp stock will be rapidly passed longitudinally through the screen, the fine particles passing transversely out of the screen through the openings therein.

The invention will be better understood by reference to the accompanying drawing which is a longitudinal sectional view, partly in elevation, of an improved device.

Referring to the drawing, 1 is the main frame or base of the machine resting upon a suitable foundation of concrete or other material. At opposite ends this base has trough-like inclined walls 2 and 3, leading respectively to discharge openings 4 and 5. Secured on this base, as by means of bolts passing through contacting lips or flanges, is a semi-circular removable cap, the end portions 6 and 7 of which are trough-like or V-shape in cross section, and form continuations of similarly shaped portions of the wall of the base 1 and of the trough like walls 2 and 3, these walls of the base together with the end portions of the cap forming annular trough-like chambers 8 and 9 having the discharge openings 4 and 5 heretofore referred to. The central portion 10 of the cap serves with the main frame particularly to inclose the supporting bearings for the screen or separator and the parts associated therewith, hereinafter to be referred to.

At the intake end of the machine, there is a hopper or chute 11 which is secured to the frame or base in any suitable or desired manner. A water supply pipe 12 tapped into an opening in the end wall of said hopper serves to deliver therein a jet of water having sufficient pressure to wash into the screen or separator any particles of pulp which might collect on the bottom of the hopper. At the discharge end of the machine, there is a downwardly opening hood 13 bolted or otherwise secured to the base 1 and the semi-circular cap. From the hopper 11 the material is delivered into the open end of a rotatable perforated or foraminated screen, drum or cylinder, which for convenience is herein designated the "rotor". This rotor is made up of a heavy outer cylindrical shell 14, preferably of brass, and an inner closely fitting lighter cylindrical shell 15, preferably of brass or steel. Those portions of the opposite ends of the shell 14 which are surrounded by the annular chambers 8 and 9 are perforated with relatively large openings. Corresponding portions of the walls of the inner shell 15 are also perforated with slots or openings registering with the holes in the outer shell. The holes of the outer shell are preferably larger than those in the inner shell. The slots or perforations in the inner shell 15 are preferably arranged in regular annular series.

About the middle of the rotor, there is a sleeve or annular band constituting a hub 16 carrying two symmetrically positioned heavy flanges 17 and 18 constituting fly wheels. A driving belt 19, passed up from beneath the machine around the hub 16 between the flanges 17 and 18, serves to drive the rotor, the driving power thus being applied at the middle of the rotor in symmetrical relationship to its ends. Suitable driving connections other than a belt may be employed if desired. The rotor is supported in any suitable manner, preferably by two bearing elements, here shown as ball-bearings 20 and 21. Encircling and fixed to the shell 14 of the rotor, within the chambers 8 and 9, there are provided flanges 22 and 23, said flanges being flared toward each other and conforming to the inclination of the adjacent walls of said chambers. As shown, these flanges overhang certain of the perforations in the rotor and hence when the machine is in operation, they will deflect toward the deeper portions of the two chambers 8 and 9 the fine pulp which is screened through the rotor. Each chamber 8 and 9 may be provided with a water inlet pipe 24 to each of which a suitable nozzle 25 is secured. Extending centrally and longitudinally through said rotor or screen is a core 26, the opposite reduced ends of which

are respectively secured in openings in the end walls of the hopper 11 and hood 13. This core is perforated, and is connected with a pipe 27 leading to a suitable water supply. On this core there is mounted a plurality of nozzles or jets 28, the discharge ends of these nozzles or jets being bent forward in the direction of movement of the stock. These nozzles or jets are arranged spirally of the core 26, and the water ejected therefrom forms, therefore, a spiral water conveyer which feeds the paper pulp longitudinally through the screen or rotor, the fine particles of the pulp passing transversely through the slots or perforations in the screen or rotor and the coarse particles being discharged through the hood 13.

The operation of the device is as follows:—The screen or rotor being driven at the proper speed, that is to say, about five hundred revolutions per minute, which will be low enough to prevent centrifugal force holding the pulp too tightly to the screen, the paper pulp stock is introduced into the screen or rotor through the hopper 11. Part of the fine material passes through the slots or perforations nearest to the hopper or chute and out through the discharge opening 4. The remainder of the stock is fed longitudinally of the cylinder by the spiral water conveyer, the action of the conveyer in this respect being similar to that of a metal screw conveyer. More of the fine stock passes through the slots or perforations near the discharge end of the device, and the coarse stock finally passes out of the screen or rotor and through hood 13.

With devices of this character employing a solid screw conveyer, the danger of some foreign substance jamming the machine and interrupting its operation is always present, whereas with the spiral water conveyer described, this danger is obviated. Further, the life of the improved device is much increased over one employing a solid conveyer; and, in addition, more stock can be effectively screened in a given time because, with a water conveyer, there is no grinding action tending to jam up the slots or perforations, but, on the contrary, the jets of water which constitute the conveyer promptly wash out any stock which, unable to pass through the slots or perforations in the screen or rotor, becomes temporarily lodged therein. The power required to drive a screen or separator of this type is not materially different from that required to drive such devices employing a metal screw conveyer, there being no friction between the water jet conveyer and the cylinder but only the retardation due to the inertia of the water which is thown from the orifices upon the revolving screen.

What is claimed:—

1. In a screening device, the combination of a rotatable perforated cylinder, a plurality of nozzles or jets arranged longitudinally of said cylinder each of said nozzles or jets being bent forward in the direction of travel of the material acted on, and a source of liquid supply connected thereto whereby fine particles of the material acted on pass transversely through the perforations and coarse particles are carried by the water longitudinally through said cylinder.

2. In a screening device, the combination of a rotatable perforated cylinder, a plurality of spirally arranged nozzles or jets inclined in the direction of travel of the material acted upon, and a source of liquid supply connected thereto whereby fine particles of the material acted on pass transversely through the perforations and coarse particles are carried by the water longitudinally through said cylinder.

3. In a screening device, the combination of a rotatable perforated cylinder, a plurality of nozzles or jets arranged longitudinally and spirally of said cylinder inclined in the direction of travel of the material acted upon, and a source of liquid supply connected thereto whereby fine particles of the material acted on pass transversely through the perforations and coarse particles are carried by the water longitudinally through said cylinder.

4. In a screening device, the combination of a rotatable perforated cylinder, a plurality of stationary nozzles or jets arranged longitudinally and spirally of said cylinder, and a source of liquid supply connected thereto whereby fine particles of the material acted on pass transversely through the perforations and coarse particles are carried by the water longitudinally through said cylinder.

5. In a screening device, the combination of a rotatable perforated cylinder, a plurality of nozzles or jets arranged longitudinally and spirally of said cylinder, each of said nozzles or jets being bent forward in the direction of travel of the material acted on, and a source of liquid supply connected thereto whereby fine particles of the material acted on pass transversely through the perforations and coarse particles are carried by the water longitudinally through said cylinder.

6. In a screening device, the combination of a rotatable perforated cylinder, a plurality of stationary nozzles or jets arranged longitudinally and spirally of said cylinder, each of said nozzles or jets being bent forward in the direction of travel of the material acted on, and a source of liquid supply connected thereto whereby fine particles of the material acted on pass transversely through the perforations and coarse particles are carried by the water longitudinally through said cylinder.

7. In a device of the character described, the combination of a rotatable perforated cylinder, a hollow stationary shaft passing through said cylinder, a plurality of nozzles or jets arranged longitudinally and spirally of said cylinder, and a source of liquid supply connected thereto whereby fine particles of the material acted on pass transversely through the perforations and coarse particles are carried by the water longitudinally through said cylinder.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

BENJAMIN DENVER COPPAGE.

Witnesses:
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