F. P. MILLER.

APPARATUS FOR TREATING PAPER STOCK.

APPLICATION FILED FEB. 17, 1920.

1,432,774.

Patented Oct. 24, 1922.

2 SHEETS—SHEET 1.

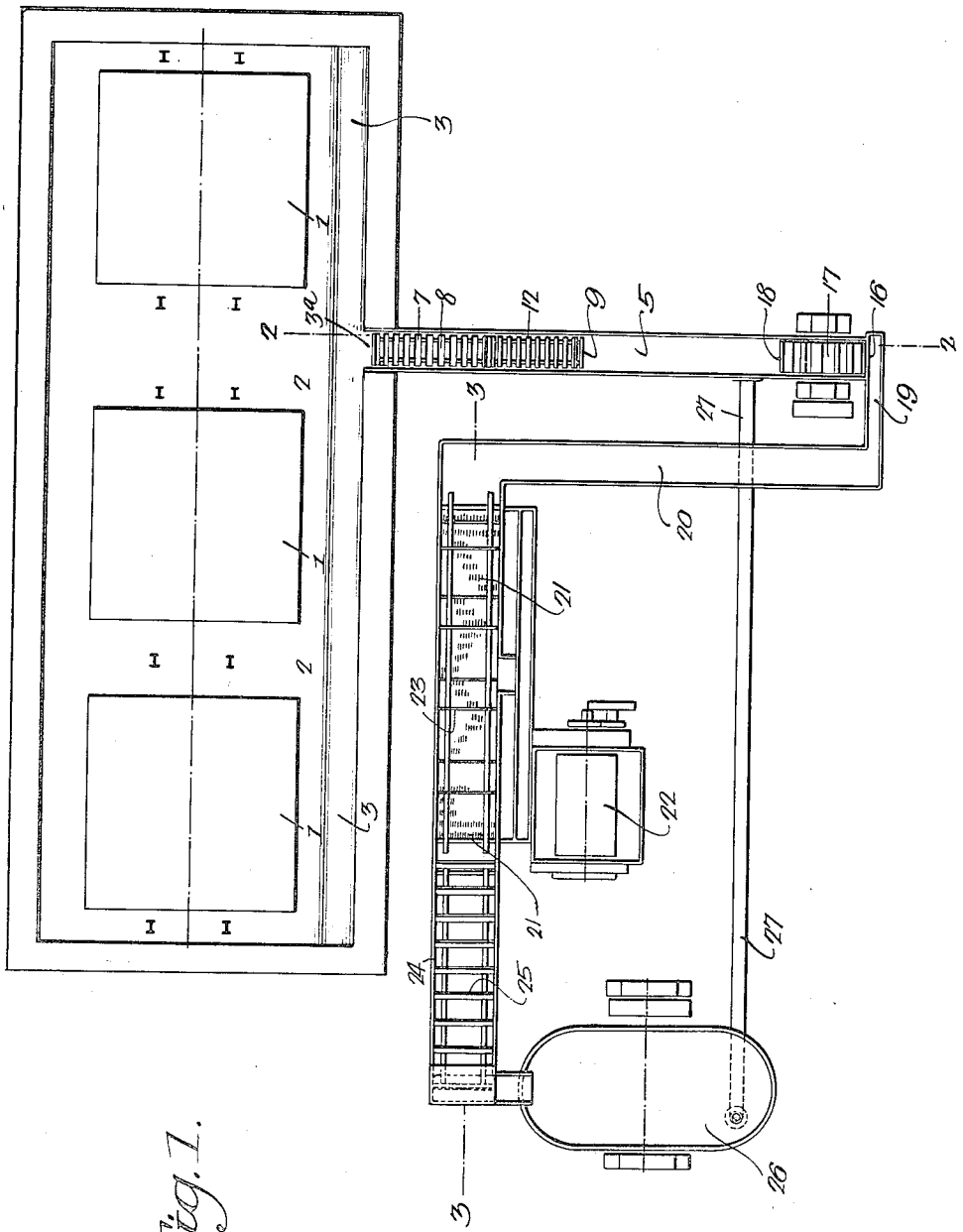


Fig. 1.

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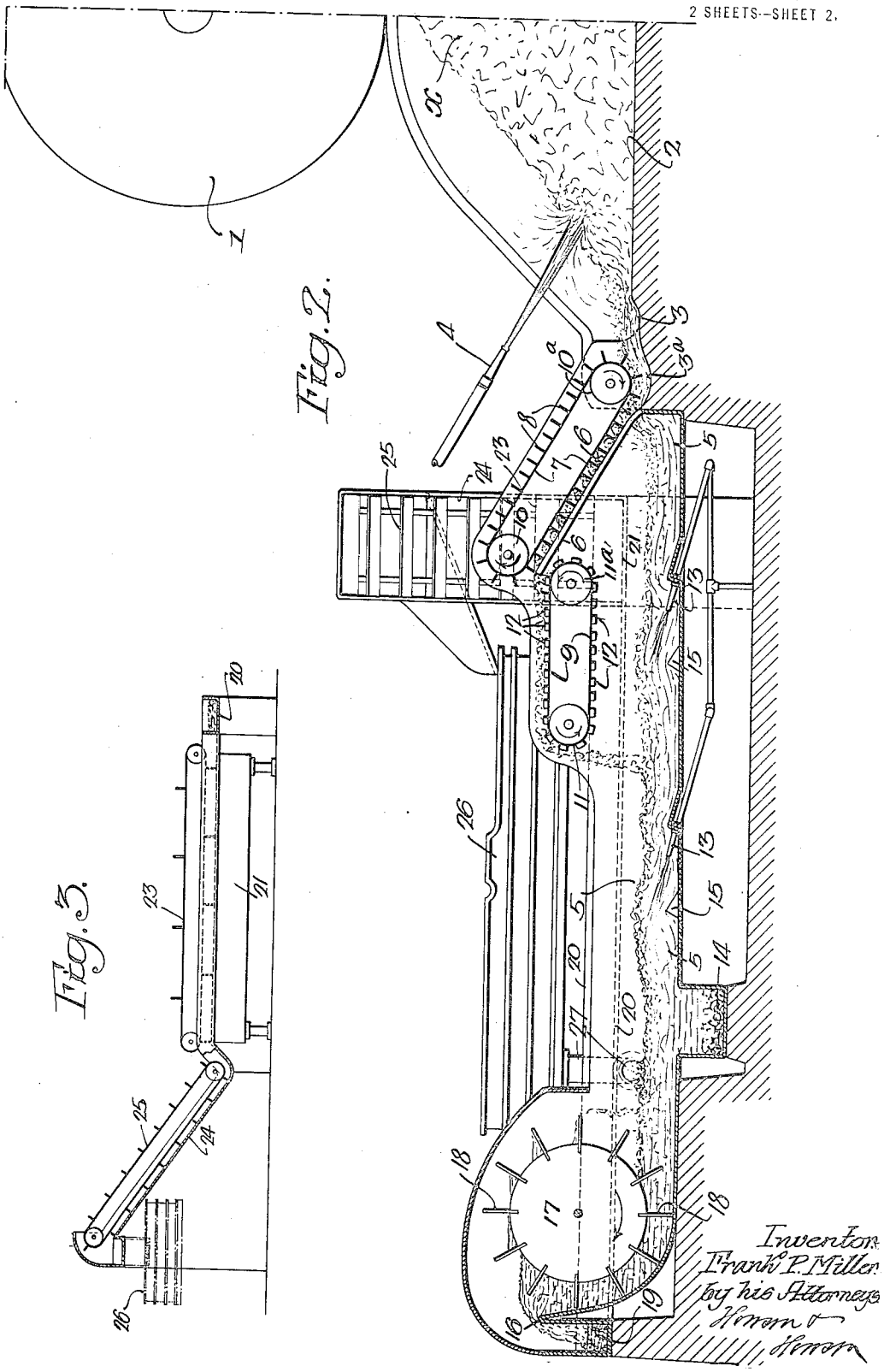
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# UNITED STATES PATENT OFFICE.

FRANK P. MILLER, OF DOWNINGTOWN, PENNSYLVANIA.

## APPARATUS FOR TREATING PAPER STOCK.

Application filed February 17, 1920. Serial No. 359,220.

*To all whom it may concern:*

Be it known, that I, FRANK P. MILLER, a citizen of the United States, residing in Downingtown, Chester County, Pennsylvania, have invented certain Improvements in an Apparatus for Treating Paper Stock, of which the following is a specification.

My invention relates to certain improvements in apparatus for carrying out a process for reducing paper stock for which application for patent was filed by me of even date herewith, under Serial No. 359,221.

One object of the invention is to provide an apparatus which will separate finely divided particles of paper stock and fibre from the coarse stock before the coarse stock is subjected to the reducing action of a beating engine.

A further object of the invention is to separate any foreign matter from the paper stock and to provide a moving platform upon which the coarse particles of material will pass so as to allow an operator to remove strings and other particles which are not desired in the manufacture of paper board. My invention also relates to certain details which will be described hereafter.

In the accompanying drawings:

Figure 1 is a plan view illustrating in diagram my improved apparatus for treating paper stock;

Fig. 2 is a sectional view on the line 2—2, Fig. 1, drawn to an enlarged scale, and

Fig. 3 is a sectional view on the line 3—3, Fig. 1.

Referring to the drawings, 1, 1, are rotary digestors of the ordinary type into which the paper stock is placed with hot water, and the material remains in the digestors until the sizing has been dissolved and the majority of the fibres of the paper liberated so as to form a body of pulp. The paper and pulp are then discharged from one of the digestors onto a floor 2 to form a pile *x*. At the end of the floor is a gutter 3. Water under pressure from a nozzle 4 is played upon the pile so as to loosen the particles and further reduce the stock and open the fibres and thin the pulp. This nozzle is preferably attached to a hose held by an operator so that the water can be played on any portion of the pile and the nozzle can be moved along the floor to attack piles of pulp discharged from any one of the series of digestors.

As the pulp is discharged from the pile it flows, with the water, into a gutter 3 to a point where it flows through a gutter $3^a$ into a trough 5 and through a screen 6. The screen consists, in the present instance, of a series of bars spaced a given distance apart so as to separate the coarse stock from the fine stock. The particles of paper and other material that do not pass through the screen are carried up the screen by an endless conveyer 7 having flights 8 of any suitable form which will engage the paper and carry it to the upper end of the screen, discharging it onto a horizontal conveyer 9 forming a sorting table.

It will be noticed that the short connecting gutter $3^a$ is shaped so that its bottom is some distance from the flights. This construction allows any large particles of material to pass freely to the screen. In the event of this material being engaged by the flights the chain will yield between the two sprocket wheels 10, $10^a$. The conveyer 9 passes around two sprocket wheels 11, $11^a$, and consists of a series of slats 12 attached to chains at each side of the conveyer. The slats allow the water to pass freely from the stock discharge onto the conveyer, carrying with it any small particles of pulp and fibre that have been discharged onto the conveyer 9. At this point an operator removes any strings or sticks, or coarse material which is not desirable. The remaining coarse stock is then discharged over the end of the conveyer 9 and into the trough 5 where it mixes with the previously screened stock.

In order to agitate the stock in the trough 5, I locate in the bottom of the trough one or more nozzles 13 for directing jets of water under pressure into the stock and water. This agitation also tends to separate any heavy foreign particles from the stock. These heavy particles, such as metal, will collect in a pocket 14 from which they can be removed at intervals. Ribs 15 may be formed in the bottom of the trough, as shown, which increase the agitation of the material to a certain degree, but these ribs may be dispensed with in some instances. At the discharge end of the trough is a weir 16, and in front of the weir is a wheel 17 having blades 18 for elevating the material from the trough 5 and discharging it over the weir 16 and into a transverse trough 19 which communicates with a longitudinal trough 20, in the present instance, and which

carries the material to the feed end of a screen 21. This screen is shown in diagram, as it may be any one of the standard screens used in screening paper stock. The pulp that passes through the screen is carried to a thickener 22 of the ordinary type, from which it is conveyed by any suitable means to the stuff chest of a paper making machine. This paper making machine, in the present instance, is a machine for making what is known as "paper board." The raw stock is the ordinary used papers consisting of newspapers, wrapping paper and box papers, although it will be understood that my process may be carried out in connection with any suitable stock that requires a reduction such as could be accomplished in the apparatus hereinbefore described.

In the present instance, the material flows onto the screen 21, and the usual flight conveyer 23 conveys the coarse material over the screen and to the lower end of an inclined trough 24. A flight conveyer 25 travels over this trough and lifts the material, discharging it through a chute to a beating engine 26 of any ordinary type, where it is reduced. The stock is circulated in the beating engine until it is reduced to the desired extent. When the material is discharged from the beating engine through a pipe 27 to the trough 5, it is mixed with the first-mentioned stock and flows with this stock to the screen 21 and is re-screened. By this means, a thorough mixture of the pulp that did not require reduction by the beating engine is obtained with the stock that had been reduced by the beating engine. In some instances, the reduced stock from the beating engine may be re-screened and the stock that has been sufficiently reduced may pass directly to the stuff chest of a paper making machine independently of the material that has been screened in the first instance.

It will be seen by the above construction that I am enabled to remove a large percentage of finely divided fibres and pulp from the paper stock that has been treated in a digestor, or equivalent apparatus, and which has been subjected to the jet of water under pressure and which can be used in the manufacture of paper, and like material, without passing through a beating engine, as I find that where this fine stock is further reduced by passing through a beating engine, it loses considerable of its strength, and the capacity of the mill is reduced as it occupies a certain percentage of room in the beating engine which can be used to a greater advantage in the reduction of coarse stock.

I claim:

1. The combination in an apparatus for treating paper stock, of a digestor; a floor on which the material is discharged from the digestor; means for projecting a stream of water onto the material while on the floor; a screen over which the material flows to separate the fine particles from the coarse particles of the stock; and a trough into which the separated fine particles flow.

2. The combination in apparatus for treating paper stock, of a digestor; a floor onto which the material from the digestor is discharged; means for projecting a stream of water onto the stock on the floor; a screen for separating the fine particles of stock from the coarse particles; a trough for receiving the fine particles; means for conveying the coarse stock; a sorting table for receiving the stock from the conveyer, said table being so located that the stock, after the foreign matter has been removed therefrom, will pass into the trough.

3. The combination in apparatus for treating paper stock, of a digestor; a floor onto which the stock is discharged from the digestor; means for projecting a jet of water under pressure onto the paper stock so as to continue the reduction of the stock and to separate the fine particles from the coarse particles; and a screen for screening the fine particles from the coarse particles.

4. The combination in apparatus for treating paper stock, of a digestor; a floor for receiving the stock from the digestor; means for diluting the stock with water so that it will flow; a trough for receiving the stock; a screen at the trough for separating the fine stock from the coarse stock; means for conveying the coarse stock over the screen; an endless slat conveyer in the form of a table onto which the coarse stock is deposited from the conveying means so as to allow the foreign matter to be removed from the coarse stock before it flows back into the trough; a screen for finally separating the fine stock from the coarse stock; and means for directing the fine stock to the stuff chest of a paper making machine and the coarse stock to a beating engine.

5. The combination in apparatus for treating paper stock, of a floor on which the material is discharged after being previously reduced to pulp; means for projecting water onto the pile of material on the floor so as to open up the pulp and allow the material to flow; a screen for primarily separating the fine stock from the coarse stock; a trough into which the fine particles flow after passing through the screen; a horizontal conveyer onto which the coarse stock is discharged, the conveyer having openings to allow the water and fine stock to flow directly into the trough, the conveyer discharging the coarse stock into the trough after it has been examined and undesirable particles removed therefrom.

6. The combination in apparatus for treating paper stock, of a floor for receiving the paper stock that has been partially reduced to pulp; means for projecting a jet

of water onto the material while on the floor; a gutter at the edge of the floor into which the material flows with the water; a screen at a given point for separating the fine particles of material from the coarse particles; and a sorting table arranged to receive the coarse particles, said table discharging the material into the trough after the foreign matter has been removed therefrom.

7. The combination in apparatus for treating paper stock, of a digestor; a floor for receiving the stock from the digestor; means for supplying water to the stock; a screen for screening the fine stock from the coarse stock; a trough under the screen for receiving the fine stock; a sorting table for receiving the coarse stock so arranged that the table will discharge the stock into the trough; a weir at the discharge end of the trough; a wheel having blades located at the front of the weir to elevate the stock and discharge it over the weir; a trough for receiving the stock; a screen with which the trough communicates for finally separating the fine particles from the coarse particles; a beating engine; means for carrying the coarse stock from the screen to the beating engine; and means for returning the reduced stock from the beating engine to a point in front of the last-mentioned screen.

8. The combination in an apparatus for treating paper stock, of a trough; a screen; means for directing paper stock and water to the screen, the fine stock and water passing through the screen and into the trough; and a nozzle in the lower portion of the trough through which water under pressure is projected into the trough to keep the water and pulp agitated.

9. The combination in an apparatus for treating paper stock, of a trough arranged to receive paper stock and water; nozzles at the bottom of the trough through which water under pressure is projected into the trough; riffles in the bottom of the trough; and a pocket into which heavy particles of material will be carried.

FRANK P. MILLER.