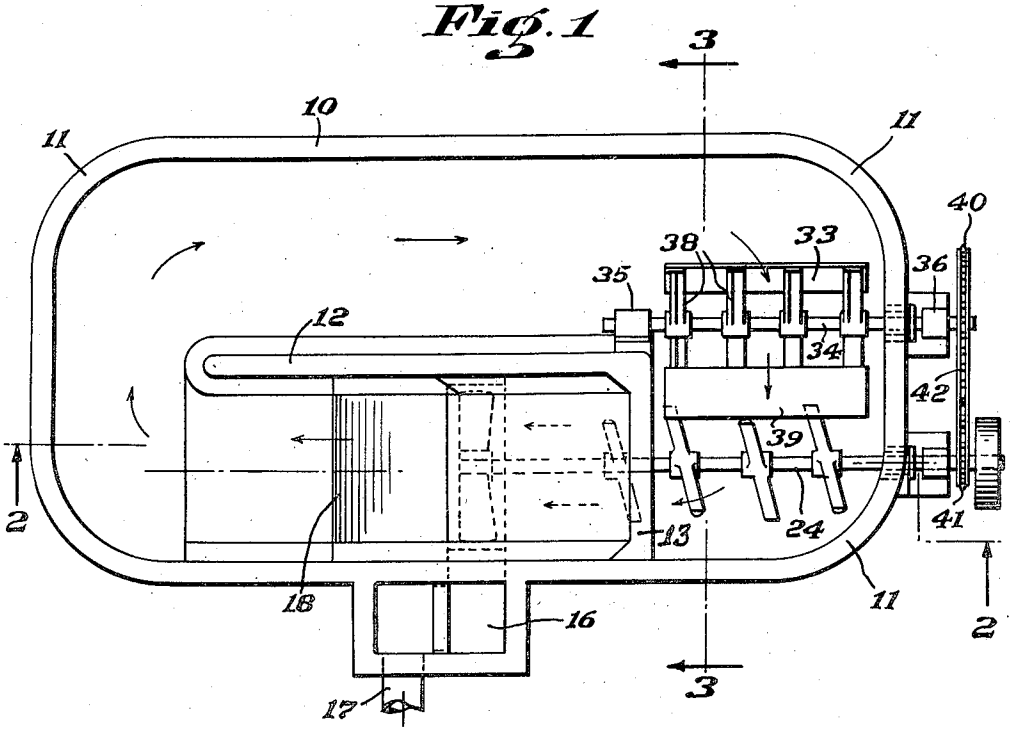
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PULPER

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Fig. 1



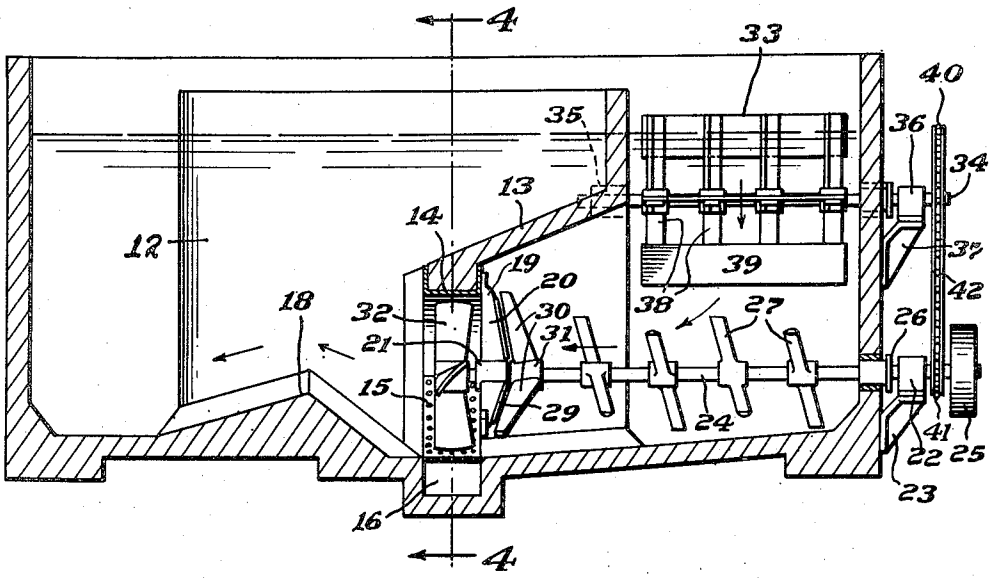


Fig. 2

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Fig. 3

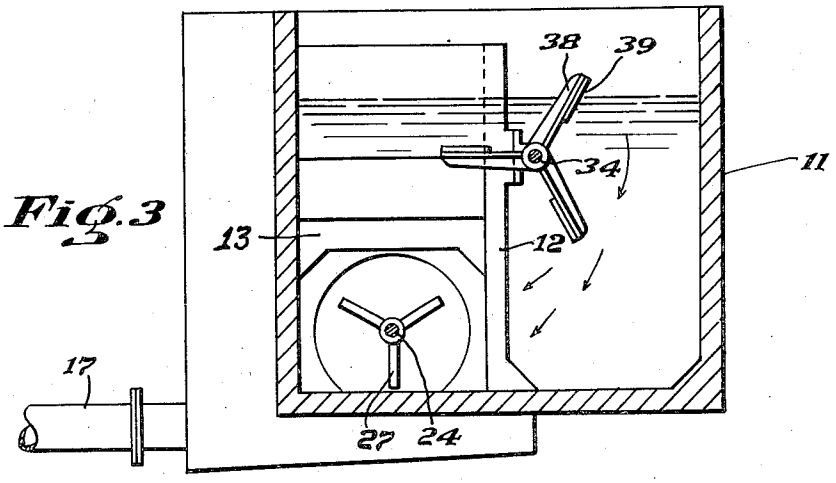
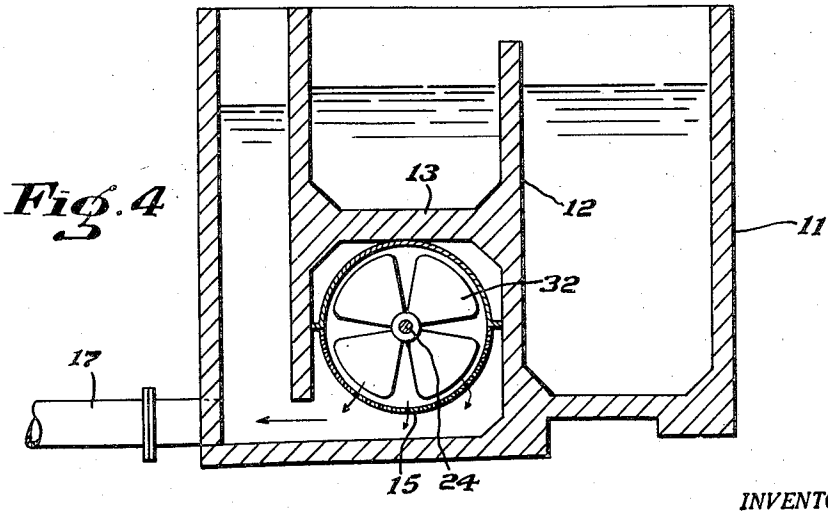


Fig. 4



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2,485,368

PULPER

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Application January 9, 1947, Serial No. 721,003

6 Claims. (Cl. 92—37)

1

My present invention relates to an improved method of, and apparatus for, repulping paper stock and like material.

Specifically the apparatus of the present invention is an improvement over that shown in Patent No. 1,726,874 granted to Walter Werner on September 3, 1929.

The chief object of this invention is to improve the hydraulic flow of the repulper and thereby improve the performance of the apparatus.

Another object is to improve the repulping and wetting of the paper stock before it is admitted to the extractor unit.

A further object is an improved method of and apparatus for repulping paper stock and like material.

A further object is an improved method of and apparatus for efficiently wetting and depulping a large class of materials heretofore unavailable for this type of apparatus.

A still further object is an improved method of and apparatus for handling dry material and effectively wetting the same for delivery to a breaking unit.

Other objects and novel features of both the method and the apparatus for practising the same will appear as the description of the invention progresses.

In the accompanying drawings wherein I have illustrated a preferred embodiment of my improved method of and apparatus for repulping paper stock:

Figure 1 is a plan view.

Figure 2 is a sectional elevation, taken on the line 2—2 of Fig. 1, and looking in the direction of the arrows.

Figure 3 is a sectional elevation, taken on the line 3—3 of Fig. 1, and looking in the direction of the arrows, and

Figure 4 is a sectional elevation, taken on the line 4—4 of Fig. 2, and looking in the direction of the arrows.

In the apparatus disclosed in the Werner patent aforesaid, the circulation of the pulped and unpulped stock was produced solely by means of a revolving roll having bars in the periphery of the roll which mated with a plate located under the roll. This limited the character of the dry material which can be supplied to the apparatus; for instance, large quantities of dry shavings will float on the surface of the liquid and be drawn or pushed between the roll and plate causing mechanical failure of the apparatus as well as requiring the use of large power units to drive the apparatus.

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According to my present invention I introduce the dry material to the apparatus and submerge this dry material thereby wetting it in its transit to the repulper units and by a continuing forward movement, effected by means of breaking units, give the starting material a preparatory treatment and mixing which effectively disintegrates the fibres.

Referring to the drawings, I have designated at 10 the usual tub, substantially rectangular in plan view, and with rounded corners 11 to facilitate the flow of the material to be worked upon.

Within the tub 10 and extending upwardly from the bottom thereof is the usual mid-feather 12, the ends of which are spaced apart from the end walls of the tub. At the end of the mid-feather 12 nearest the right hand end of the tub as seen in Fig. 1 is a cross wall 13, which connects said end of the mid-feather 12 to one side wall of the tub.

The cross wall 13 is provided near the tub bottom with an opening 14 which forms a passage for stock and which has side walls extending axially of the said opening 14 due to the thickness of the said cross wall 13. The lower part of the side walls of the opening 14 is perforated to provide a discharge outlet into chamber 16 and is further provided across the entrance to the said chamber with an extractor screen 15. A conduit 17 for carrying the pulped material to a paper making machine or to a suitable storage receptacle leads from the discharge chamber 16. Adjacent to the opening 14, and on or forming part of the bottom of the tub 10, and extending across the space between the mid-feather 12 and the adjacent wall of the tub is a back fall 18.

Secured to the inlet side of opening 14 is a stationary breaker unit member 19 provided with a plurality of arms 20 extending radially outward from a hub 21. In the hub 21 is formed a bearing which is alined with a bearing 22 mounted on a bracket 23 secured to the adjacent end wall of the tub 10. Rotatably mounted in the bearing in the hub 21 and in the bearing 22 is a shaft 24 provided at its outer end with a pulley 25 by means of which said shaft may be connected to any suitable source of power (not shown). The shaft 24 extends through a stuffing box 26 which is mounted in the adjacent end wall of the tub to prevent leakage of material from the tub.

Secured to shaft 24 within the tub is a series of spaced mixing units 27 comprising a multiplicity of spiral shaped arms deflected laterally in such a direction as to produce a lateral movement of the material being worked upon and cover in

their rotation a projected area equivalent to the pitch or deflection of the said arms. The units 27 are offset radially with respect to each other, thereby effecting a series of impacts on the material to be repulped in its passage longitudinally of the shaft 24 to the breaker unit 19 and extractor screen 15.

The stationary breaker unit member 19 has mounted on the arms 20 thereof renewable wearing plates 29 in operative relation with a multiplicity of spiral shaped laterally deflected arms 30 mounted on a hub 31 secured to the shaft 24 so as to rotate therewith. The breaker unit exerts a shearing cut on the material fed thereto by the series of mixing units 27 before it reaches the extractor screen 15.

Also secured to the shaft 24 to rotate therewith within the extractor screen 15 is a material propelling member 32, which, in conjunction with the extractor screen 15, exerts a tangential flow of the material over the extractor screen 15 to force all particles of such material as have attained the proper size through the screen 15 and into the discharge chamber 16. The rejected material passes over the back fall 18 for recirculation.

The inlet end of the chamber in which are located the mixing units 27 connects with the tub 10 in which is introduced the material to be repulped. In order to insure efficient delivery of the material to said mixing units, I may place near the upper end of such inlet end a submerging roll 33. This roll 33 is mounted on a shaft 34 journaled in a bearing 35 secured to the midfeather or wall 12 and in an alined bearing 36 secured to a bracket 37 fastened to the adjacent end wall of the tub 10.

The submerging roll 33 comprises, in addition to the shaft 34, a plurality of paddle arms 38 mounted on such shaft and blades or plates 39 attached to the spirally disposed ends of the arms. On the outer end of the shaft 34 is secured a sprocket wheel 40 which is in alignment with a sprocket wheel 41 secured to the shaft 24. Trained over the sprocket wheels 40 and 41 is a sprocket chain 42 by means of which rotary motion is imparted to the submerging roll 33 from the shaft 24.

In operation, the material to be repulped is introduced into the tub 10 which contains water, or a pulp mixture floats on the surface of the fluid contained in the tub 10 to the area of the submerging roll 33, where it is wetted and pushed downwardly (see arrows in Figs. 1 and 2) into position to be engaged by the mixing units 27. Here it is thrashed, and disintegrated, and further wetted, and propelled laterally, or to the left as viewed in Figs. 1 and 2, and into engagement with the breaking unit comprised of the members 19 and 30. Here the material is further disintegrated and is brought under the influence of the propelling member 32 within the extractor screen 15. Here the material undergoes a further disintegration and is swept over the surface of the extractor screen 15 where all particles of acceptable size pass through the screen 15 and into the discharge chamber 16. All oversize particles are forced outward through the opening 14, over the back fall 18 and into the tub 10 for recirculation in the direction of the arrows to pass again through the cycle described above.

The apparatus is particularly adapted to the repulping of various types of waste materials, such as wet pulp laps or broke, dry shavings, waste paper, roll slabs or pressed bales, because the wetting, thrashing, and breaking to which the material is continuously subjected after being thoroughly wetted and held within a restrained area and before passing to the propelling and extracting unit allows complete disintegration and prepares the material for acceptance by the extracting unit.

The method of the present invention is new and novel, and the apparatus herein described and claimed permits the practising of the method in the most economical manner.

The apparatus herein shown for practising my improved method is also new and comprises an assemblage of units each interdependent on the others and all units cooperating to produce a unitary result.

By lining the extractor opening 14 with a wire mesh screen of such fineness as to prevent the fibres from passing therethrough and out into pipe 17, the apparatus may be readily converted from an extractor to a washer.

Various other changes in the construction and arrangements of parts comprising my improved apparatus may be made without departing from the spirit of the invention, and I am therefore not to be limited to the details of the structure comprising such apparatus other than as required by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pulper comprising a tub including a bottom and sides, an upstanding midfeather mounted on the bottom but clear of the sides, a cross wall between the midfeather and tub side on one side of the said midfeather, the said cross wall being perforated to form an opening for the passage of stock through the said cross wall, side walls for the said opening extending axially of the said opening and perforated to form a discharge outlet, an extractor screen in said discharge outlet adjacent the side walls of the said opening, a shaft coaxial with and extending longitudinally of said opening, a propeller fast on said shaft to rotate therewith within said opening located with its blade ends passing in rotation adjacent to the said extractor screen, a breaker unit fixed to said cross wall adjacent the inlet side of said opening and comprising a stationary breaker member and a cooperating breaker member fast on said shaft to rotate therewith, and a plurality of longitudinally spaced mixing units fast on said shaft to rotate therewith in advance of said breaker unit.

2. The pulper of claim 1, and a rotatable submerging member mounted above the intake end of said passageway.

3. The pulper of claim 1, and a second shaft mounted above and parallel to said first-named shaft, and a submerging member fast on said second-named shaft at the intake end of said passageway.

4. A pulper comprising a tub having a bottom, sides and a cross wall extending from one side within the tub only part way to the other side, the said cross wall being perforated to form an opening for the passage of stock through the said cross wall, side walls for the said opening extending axially of the said opening and perforated to form a discharge outlet, a conduit leading from the said discharge outlet out of the tub, and extractor screen across said discharge outlet adjacent the side walls of the said opening, a shaft coaxial with said opening, a revoluble propeller

fast on said shaft and disposed within said opening in proximity to said screen, a breaker unit fixed to said cross wall adjacent the inlet side of said opening and comprising a stationary breaker member and a cooperating revoluble breaker member fast to said shaft, and a plurality of longitudinally spaced revoluble mixing units fast on said shaft in advance of said breaker unit.

5. A pulper comprising a tub having a cross wall provided with an opening, a side wall axially lining said opening and perforated to provide a discharge outlet, an extractor screen covering said discharge outlet, a shaft coaxial with said opening, a second shaft above and parallel to said first shaft, driving connections for said shafts, a revoluble propeller fast on said first shaft and disposed within said opening in proximity to said screen, a breaker unit fixed to said cross wall adjacent the inlet side of said opening and comprising a stationary breaker member and a cooperating revoluble breaker member fast to said first

shaft, a plurality of longitudinally spaced revoluble mixing units fast on said first shaft in advance of said breaker unit, and a submerging member fast on said second shaft above said mixing units.

6. The pulper of claim 5 wherein the first shaft is a drive shaft and the second shaft is driven from the first shaft.

GEORGE W. DODGE.

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