Dec. 8, 1953 J. BAXTER, JR 2,661,664

PAPER MACHINERY

Filed July 21, 1951 2 Sheets-Sheet 1

Fig-1

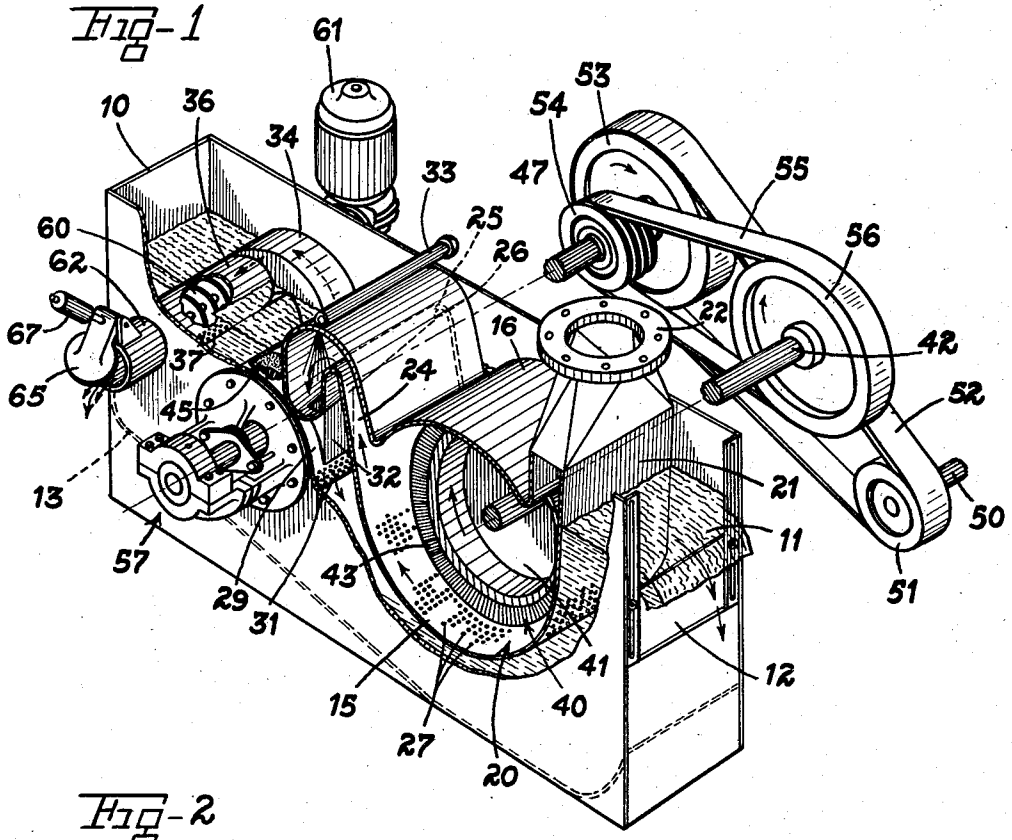
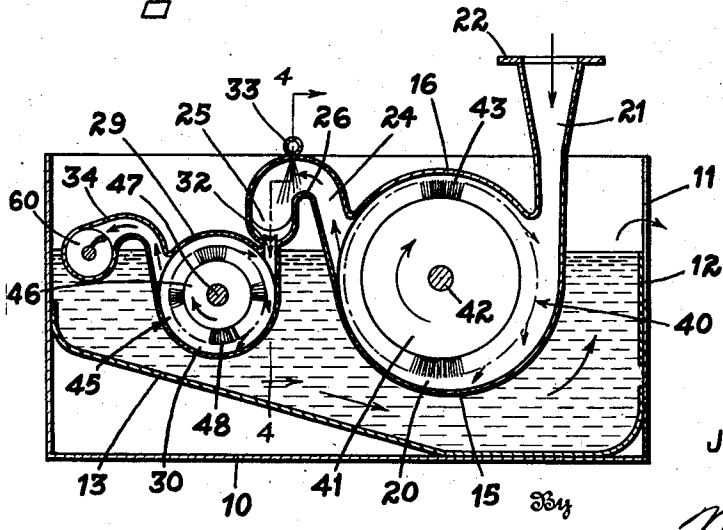


Fig-2



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Fig-3

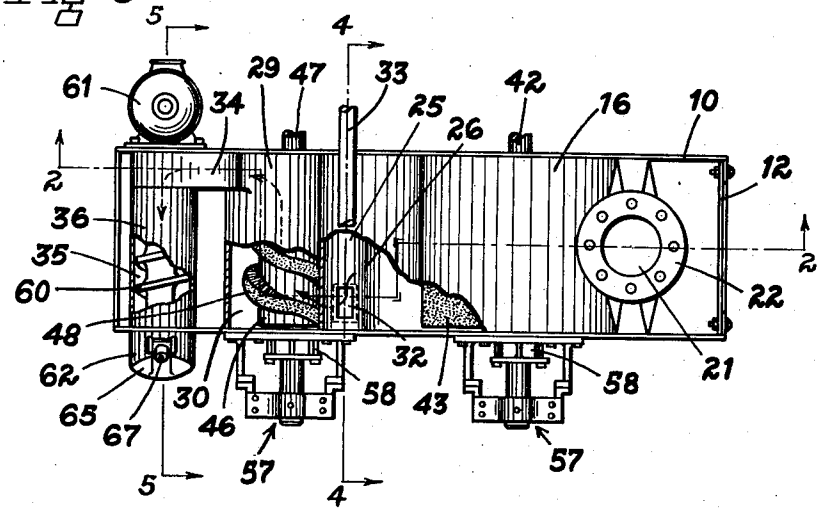


Fig-4

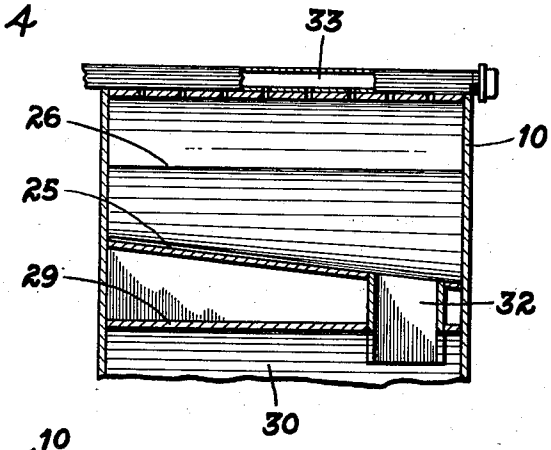
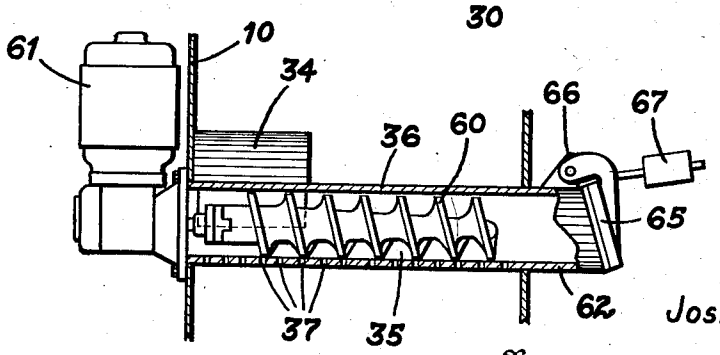


Fig-5



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UNITED STATES PATENT OFFICE

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PAPER MACHINERY

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Application July 21, 1951, Serial No. 238,001

12 Claims. (Cl. 92—20)

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This invention relates to apparatus for effecting combined screening and pulping operations on a liquid slurry stock such particularly as paper making stock.

The invention has special relation to the treatment of paper making stock for the dual purpose of reducing large particles of usable fiber to a suitably small size for refining and also for removing undesirably large particles such as floating trash from the stock, and one of the primary objects of the invention is to provide apparatus for this dual purpose in the form of a single compact unit having high operating capacity which will not only accomplish both pulping and screening of the stock in a single pass therethrough but which will also deliver the reject material in relatively dry condition for ready handling and disposal.

In accordance with the invention the screening and pulping apparatus includes a main tank having a plurality of chambers formed therein through which the stock is successively passed for treatment in successive stages, and these chambers have perforate wall portions for discharging into the surrounding portions of the tank the particles of desired small size, with the tank thus receiving and intermixing the discharged good stock from all the chambers. The first of these chambers is advantageously of comparatively large volume and contains an impeller of correspondingly large size which is preferably provided with multiple working edges such as are afforded, for example, by a cylindrical brush of comparatively large diameter equipped with relatively coarse bristles, thus giving a whipping action against the inertia of the stock for effective defibering. At the same time, since an impeller of large diameter has the advantage of relatively high peripheral speed for a comparatively low angular velocity, it imparts desired high velocity to the stock tending to drive the small particles through the perforate wall of the chamber and at the same time to throw the large particles into the connecting passage to the second chamber.

This second chamber in the tank is arranged to receive the particles of too large size for discharge through the perforate wall of the first

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chamber, and since such particles will form a minor fraction of the total stock initially supplied to the apparatus, the second chamber may be of substantially smaller volume provided with a correspondingly smaller impeller. Also, provision is made for prolonging the dwell of the stock therein in order to obtain maximum reduction of the large particles of usable fiber, which is readily accomplished by locating the inlet and outlet connections of the chamber at opposite ends thereof in order to force large particles in the stock to travel the full length of the chamber before reaching the outlet to the third chamber. If water is added to the stock in the second chamber, as is readily done by means of a suitable shower arrangement, the stock is maintained at a dilute consistency for a more effective beating and reduction of the usable particles therein, and desirable results are obtained by utilizing a brush in this chamber as well as in the first chamber, and particularly a brush having bristles arranged helically thereon to cause the desired travel of the large particles lengthwise of the chamber.

With the first two chambers constructed and arranged as described, the third chamber forms a reject collecting chamber, and it is provided with a conveyor screw which operates to compact the reject particles as they collect and thus to eliminate most of the water therefrom, this water being discharged through the perforate wall of the chamber into the surrounding portion of the tank. The third chamber may be provided with an outlet to the exterior of the tank, and if this outlet is equipped with a suitably counterweighted closure, the compacted reject will be gradually extruded by the screw in semi-dry condition for easy handling and disposal while the liquid stock is conducted away from the tank for further refining or other treatment as desired.

It is accordingly an object of the invention to provide screening and pulping apparatus as outlined above which is simple in construction for economical production and installation, which has high operating capacity with limited space and power requirements, which will effect substantially complete defibering of the fiber and separation thereof from useless reject, and which

will deliver this reject material in semi-dry condition for convenient disposal.

Another object is to provide screening and pulping apparatus of the above character which will operate in stages first to screen the major proportion of usable fiber from the large particles and reject material, then to beat the reject from the first stage in substantially more dilute form for effective salvaging of usable material therein, and finally to screen out useless reject and compact the same to semi-dry condition for ready disposal.

A further object is to provide multiple stage screen and pulping apparatus as outlined above which requires only a single inlet connection for the stock and a single outlet connection for the stock discharged during all stages of operation, and which does not require a sewer or like connection for reject material but delivers the reject in compacted and semi-dry condition for convenient manual disposal as by a shovel, wheelbarrow or the like.

It is also an object of the invention to provide multiple stage screening and pulping apparatus in which the impeller employed at one or more stages of the pulping operation is a brush-like member having multiple relatively coarse bristles giving comparatively high velocity agitation and also having a whipping action against the inertia of the stock for effective defibering with economical power requirements.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings, and the appended claims.

In the drawings—

Fig. 1 is a somewhat diagrammatic perspective view, partly broken away, showing screening and pulping apparatus in accordance with the invention;

Fig. 2 is a vertical section through the apparatus of Fig. 1, the view being approximately on the line 2—2 of Fig. 3;

Fig. 3 is a plan view of the apparatus with portions broken away to illustrate details of internal construction;

Fig. 4 is a fragmentary section on the line 4—4 of Fig. 2 and also of Fig. 3; and

Fig. 5 is a fragmentary section on the line 5—5 of Fig. 3.

Referring to the drawings, which illustrate a preferred embodiment of the invention, the apparatus includes a main casing 10 forming a tank adapted to be partially filled with liquid. This tank is provided with a discharge outlet 11 at one end controlled by an adjustable weir 12, and a false bottom 13 is positioned within the tank and slopes toward the discharge outlet as shown in Fig. 2. Walls 15 and 16 of sheet metal form a generally cylindrical chamber 20 located within the larger end of tank 10 and provided with a generally tangentially arranged inlet 21 extending upwardly therefrom and provided with a suitable flange 22 for connection to an inlet pipe. The walls 15 and 16 are also formed with a tangentially arranged outlet passage 24 from chamber 20 into a trough 25 which thus has an open connection with the interior of chamber 20 over the intervening wall portion 26. The wall 15 is provided with multiple perforations 27 along the lower portion thereof of selected size in accordance with the desired size of particles to be discharged therethrough, hole ⅛ inch in diameter being satisfactory, while the wall 16 is

imperforate to close the upper part of the chamber.

Below the trough 25 is a cylindrical shell 29 forming a chamber 30 of substantially smaller diameter than chamber 20, for example a diameter approximately one-half that of chamber 20, and the lower portion of the wall of chamber 30 is provided with perforations 31 of substantially the same size as the perforations 27 in wall 15. As shown in Fig. 4, the bottom of trough 25 slants downwardly from one end thereof to the other, and at its lower end it is provided with a downwardly extending inlet connection 32 to the chamber 30 for delivering thereto material discharged over the wall 26 from chamber 20. A shower pipe 33 is mounted to extend across tank 10 above trough 25 to supply additional water for diluting and washing down through inlet 32 the material delivered to trough 25. At the opposite end of chamber 30 from inlet 32 is an outlet connection 34 to the cylindrical chamber 35 at the smaller end of tank 10, the shell 36 which forms the chamber 35 being shown as of smaller diameter than chamber 30 and provided with small perforations 37 in the wall thereof.

Within the chamber 20 is an impeller 40 having multiple working edges, and this impeller is shown as a cylindrical brush comprising a core 41 mounted on a shaft 42 provided with multiple relatively coarse bristles 43. The bristles are preferably not too closely spaced in order to provide adequate impeller action on the stock within the annular space between the outer surface of the brush and the walls 15 and 16. Thus for example, if the brush is 24 inches in diameter, the bristles 43 may be formed of steel wires approximately 0.125 inch in diameter and spaced approximately 16 to the square inch at the outer surface of the brush.

Within the chamber 30 is an impeller 45 also having multiple working edges, and this impeller is shown as a brush of generally cylindrical outline comprising a core 46 mounted on a shaft 47 and provided with multiple relatively coarse bristles 48. Since the inlet and outlet connections 32 and 34 are spaced at opposite ends of chamber 30, the brush 45 is desirably formed to assure travel of large particles in the stock lengthwise of chamber 30, and this is readily effected by arranging the bristles 48 in a helical row along core 46 as shown. A common drive is provided for the impellers 40 and 45, shown as a main drive shaft 50 from a motor (not shown) which carries a pulley 51 connected through a belt 52 with a pulley 53 on the shaft 47 of impeller 45, and a pulley 54 on shaft 47 is in turn connected through belt 55 with a pulley 56 on the shaft 42 of impeller 40. The opposite ends of shafts 42 and 47 are shown as supported by suitable bearing units 57 mounted on the outside of tank 10 and incorporating suitable liquid tight seals 58.

The chamber 35 constitutes the collecting and compacting chamber for reject material such as floating trash which is too large in size for passage through the perforations in the walls of either of chambers 20 and 30. Accordingly, within the chamber 35 is mounted a conveyor screw 60 connected at its rearward end with a drive motor 61 mounted on the outside of tank 10. The forward end of the cylindrical shell 36 which forms chamber 35 extends through the wall of tank 10 to provide an outlet extension 62, and a closure door 65 for this outlet is pivoted in a bracket 66 at the top thereof and is provided

with a counterweight indicated diagrammatically at 67 for normally holding the closure door 65 in closed position.

With this arrangement in chamber 35, reject material reaching the interior of chamber 35 is picked up by screw 60 and carried towards its outlet 62. With the screw terminating at a position spaced from the closure door 65 by an appreciable distance as shown, for example 6 to 8 inches, the accumulated reject is first compacted into a relatively solid slug between the end of the screw and the door, with the water being squeezed out and discharged through the perforations 37 into the surrounding portion of tank 10. Then as additional reject accumulates and is forced against this slug, the door 65 will be opened against its counterweight 67 to effect gradual extrusion of the reject, but since there still remains a substantial slug of reject within the outlet passage which acts effectively as a seal, the discharge material is in the form of a damp sludge containing practicaly no more liquid than adheres to the individual particles therein.

In the operation of the device as a whole, the stock is initially supplied to the unit through the inlet connection 21, preferably after being treated in a suitable settling trough or other apparatus for removing grit and like heavy reject material therefrom. With the impeller 40 rotating at even a relatively moderate peripheral speed, such for example as 2400 feet per minute, the stock will be thoroughly thrashed within the chamber 20, with the ends of the bristles 43 effectively whipping against the inertia of the stock to tear apart the bundles of fibers and separate the usable fiber from the floating trash and other larger particles. The resulting smaller particles are discharged through the perforations 27 into the surrounding portion of tank 10, with the velocity imparted thereto by the impeller acting to drive them through the perforations. At the same time, the impeller 40 acts to sweep away from the inner surface of wall 15 particles too large for passage through the perforations, thus effectively preventing them from plugging or closing the perforations, and these large particles and floating trash will ultimately be thrown over the wall portion 26 into the trough 25, the portion of wall 15 leading up to the trough thus forming a backfall for impeller 40.

The reject delivered to chamber 30 from trough 25 will represent a relatively small proportion of the stock originally delivered to chamber 20, for example about 10%, and it will be relatively concentrated since the wall portion 26 is normally above the level of stock within the tank as determined by the adjusted position of the weir 12. Accordingly, additional water is added as described by way of the shower pipe 33 to dilute and wash down into chamber 30 the material collecting in trough 25. The impeller 45 is also rotated at a substantial peripheral speed to repeat the thrashing and whipping action on the stock therein in order to complete the desired defibering action and thus to salvage substantially all usable fiber, which is discharged through the perforations 31 for intermixing with the good stock discharged from a chamber 20. With the inlet and outlet connections 32 and 34 spaced at opposite ends of chamber 30 as shown, there will be a corresponding prolonged dwell for any given particle within the chamber to assure adequate working thereon, but ultimately particles of too great a size are carried along to the outlet for discharge into chamber 35, this action being facilitated by the helical bristle arrangement on impeller 45, as described. After the reject particles reach chamber 35, they are compacted as described by screw 60 and ultimately discharged in semi-dry condition for convenient disposal.

It will accordingly be seen that the present invention provides screening and pulping apparatus offering a number of important practical advantages. The unit as a whole is of simple construction, requiring comparatively little floor space and minimum piping connections. At the same time, it has comparatively high capacity, since the arrangement of circular screening walls makes it practical to construct these parts of comparatively thin plate material offering low frictional losses and which at the same time are self-supporting. Furthermore, since the action of the impellers in this construction will inherently minimize plugging of the screen holes either by good stock or by reject material, substantially all the perforations are used at times for maximum efficiency, and it will also be apparent that the screen portions can readily be formed as separately replaceable parts in the event of wear.

The arrangement of the several chambers and impellers in concentric relation minimizes vibrations and other stress on the equipment, giving smooth and relatively noiseless operation. Furthermore, with all of the chambers closed as shown, there is no problem of splashing of the stock, and also undesirable vapors such as might result during the treatment of hot stock are reduced to a minimum. Also the arrangement providing for delivery of the reject material in semi-dry condition for convenient disposal is highly desirable, and in practice it is found that the apparatus will salvage substantially all usable fiber in the stock and will at the same time effect substantially complete screening and removal of the floating trash and other undesired large particles.

While the form of apparatus herein described constitutes preferred embodiments of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, a shell forming a first chamber of substantial length within said tank having an inlet for said stock, said shell including a perforate lower wall for discharging particles below a predetermined maximum size into said tank, an impeller rotatable on an axis generally lengthwise of said first chamber causing essentially circumferential travel of said stock while reducing large particles therein, a second shell forming a second chamber within said tank separate from said first chamber, means forming a passage extending substantially the entire length of said first chamber and connecting with said second chamber for receiving by circumferential discharge from said first chamber particles of greater than said maximum size and delivering said particles to said second chamber, said second shell including a perforate lower wall for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large par-

ticles therein and discharge of the resulting smaller particles into said tank, means for effecting a prolonged dwell of said large particles in said second chamber, a third shell forming a third chamber within said tank connected to receive from said second chamber particles of a size too great for passage through said perforate second shell wall, means within said third chamber for compacting particles received therein, said third shell having a perforate wall for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

2. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of chambers within said tank, means for delivering stock into the first said chamber, an impeller mounted for rotation within said first chamber and arranged to cause essentially circumferential travel of said stock therewithin while effecting reduction of large particles within said stock, a portion of the wall of said first chamber being perforate to discharge particles below a predetermined maximum size into said tank, means forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, means for effecting a prolonged dwell of said large particles in said second chamber, means for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, means within said third chamber for compacting particles received therein, a portion of the wall of said third chamber being perforate for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

3. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of chambers within said tank, means for delivering stock into the first said chamber, said first chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said first chamber and arranged to cause essentially circumferential travel of said stock therewithin while effecting reduction of large particles within said stock, an inlet connection forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, means for adding liquid to the stock within said second chamber, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles and discharge of the resulting smaller particles into said tank, an outlet connection for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, said inlet and outlet connections being spaced adjacent opposite ends of said second chamber to provide a prolonged dwell for said stock within said second chamber, means within said third chamber for compacting particles received therein, said third chamber having a perforate wall portion for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

4. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of generally cylindrical chambers within said tank, means for delivering stock into the first said chamber, a generally cylindrical impeller mounted for rotation within said first chamber and having multiple working edges thereon and arranged to cause essentially circumferential travel of said stock therewithin while effecting reduction of large particles therein, said first chamber and said impeller being of relatively large diameter to provide substantial peripheral speed for said impeller, a portion of the wall of said first chamber being perforate to discharge into said tank particles below a predetermined maximum size, an inlet connection forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles into said tank, an outlet connection for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, said inlet and outlet connections being spaced adjacent opposite ends of said second chamber to provide a prolonged dwell for said stock within said second chamber, means within said third chamber for compacting particles received therein, said third chamber having a perforate wall portion for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

5. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of generally cylindrical chambers within said tank, means for delivering stock into the first said chamber, means forming a passage extending along the upper side of said first chamber and leading to the second said chamber, the wall of said first chamber below said passage being perforate to discharge into said tank particles below a predetermined maximum size, an impeller within said first chamber and arranged to cause essentially circumferential travel of said stock therewithin while effecting reduction of large particles therein, means for rotating said impeller in a direction to discharge small particles through said perforate wall and to sweep larger particles circumferentially upwardly along said wall into said passage for delivery into said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said sec-

ond chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, means for effecting a prolonged dwell of said large particles in said second chamber, means for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, means within said third chamber for compacting particles received therein, a portion of the wall of said third chamber being perforate for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

6. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of generally cylindrical chambers within said tank, means for delivering stock into the first said chamber, means forming a trough located within said tank, means forming a passage extending lengthwise of said first chamber and leading to said trough, said trough having the bottom located below the upper end of said passage, the wall of said first chamber below said passage being perforate to discharge into said tank particles below a predetermined maximum size, an impeller within said first chamber and arranged to cause essentially circumferential travel of said stock therewithin while effecting reduction of large particles therein, means for rotating said impeller in a direction to discharge said small particles through said perforate wall and to sweep larger particles upwardly along said wall into said passage for delivery into said trough, means forming an inlet connection extending from said trough to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, means for effecting a prolonged dwell of said large particles in said second chamber, means for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, means within said third chamber for compacting particles received therein, a portion of the wall of said third chamber being perforate for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

7. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of generally cylindrical chambers within said tank, means for delivering stock into the first said chamber, means forming a passage extending along the upper side of said first chamber and leading to the second said chamber, the wall of said first chamber below said passage being perforate to discharge into said tank particles below a predetermined maximum size, an impeller within said first chamber including a generally cylindrical brush having relatively coarse bristles thereon providing multiple working edges for effecting reduction of large particles in said stock upon rotation thereof, means for rotating said impeller in a direction to discharge small particles through said perforate wall and to sweep larger particles circumferentially upwardly along said wall into said passage for delivery into said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, means for effecting a prolonged dwell of said large particles in said second chamber, means for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, means within said third chamber for compacting particles received therein, a portion of the wall of said third chamber being perforate for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

8. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of chambers within said tank, means for delivering stock into the first said chamber, said first chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said first chamber and arranged to cause essentially circumferential travel of said stock therewithin while effecting reduction of large particles within said stock, an inlet connection forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an outlet connection for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, said inlet and outlet connections being spaced adjacent opposite ends of said second chamber to provide a prolonged dwell for said stock within said second chamber, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, said impeller having a plurality of bristles thereon arranged to cause said large particles to travel circumferentially of said second chamber while progressing from said inlet connection to said outlet connection as said impeller rotates, means within said third chamber for compacting particles received therein, said third chamber having a perforate wall portion for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

9. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of chambers within said tank, means for delivering stock into the first said chamber, an impeller mounted for rotation within said first chamber and arranged to cause essentially circumferential travel of said stock therewithin while effecting reduction of large particles within said stock, a portion of the wall of said first chamber being perforate to discharge particles below a predetermined maximum size into said tank,

means forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, means for effecting a prolonged dwell of said large particles in said second chamber, means for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, said third chamber being generally cylindrical, a conveyor screw mounted for rotation within said third chamber, means for rotating said screw to effect compaction of the particles within said third chamber, a portion of the wall of said chamber being perforate to discharge into said tank the liquid from said compacted particles, said third chamber having an outlet located exteriorly of said tank, and a counterweighted closure on said outlet for cooperation with said screw to effect said compaction of said particles and discharge of said compacted particles substantially free of liquid.

10. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of chambers within said tank, means for delivering stock into the first said chamber, said first chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said first chamber and including a generally cylindrical brush having relatively coarse bristles thereon providing multiple working edges for causing essentially circumferential travel of said stock within said chamber while effecting reduction of large particles in said stock, an inlet connection forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an outlet connection for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, said inlet and outlet connections being spaced adjacent opposite ends of said second chamber to provide a prolonged dwell for said stock within said second chamber, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, said impeller having a plurality of bristles thereon arranged to cause said large particles to travel circumferentially of said second chamber while progressing from said inlet connection to said outlet connection as said impeller rotates, means within said third chamber for compacting particles received therein, said third chamber having a perforate wall portion for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

11. Apparatus for screening and pulping a liquid slurry stock comprising a casing forming a tank adapted to be filled with liquid, walls forming a plurality of generally cylindrical chambers within said tank, means for delivering stock into the first said chamber, an impeller mounted for rotation within said first chamber and including a generally cylindrical brush having relatively coarse bristles thereon providing multiple working edges for causing essentially circumferential travel of said stock within said chamber while effecting reduction of large particles in said stock, a portion of the wall of said first chamber being perforate to discharge into said tank particles below a predetermined maximum size, an inlet connection forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an outlet connection for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, said inlet and outlet connections being spaced adjacent opposite ends of said second chamber to provide a prolonged dwell for said stock within said second chamber, an impeller mounted for rotation within said second chamber for beating said stock to effect further reduction of large particles therein and discharge of the resulting smaller particles into said tank, said impeller having a plurality of bristles thereon arranged to cause said large particles to travel circumferentially of said second chamber while progressing from said inlet connection to said outlet connection as said impeller rotates, means within said third chamber for compacting particles received therein, said third chamber having a perforate wall portion for discharging liquid from said compacted particles into said tank, and means for removing said compacted particles from said third chamber substantially free of liquid.

12. Apparatus for screening and pulping a liquid slurry stock comprising a tank adapted to be filled with liquid, walls forming a plurality of generally cylindrical chambers within said tank, means for delivering stock into the first said chamber, said first chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an impeller mounted for rotation within said first chamber and including a generally cylindrical brush having coarse bristles for causing essentially circumferential travel of said stock within said chamber while effecting reduction of large particles within said stock, an inlet connection forming a passage extending lengthwise of said first chamber for receiving therefrom particles greater than said maximum size and delivering said particles to said second chamber, said second chamber including a perforate wall portion for discharging particles below a predetermined maximum size into said tank, an outlet connection for conveying to the third said chamber particles of a size too great for passage through said perforate second chamber wall, said inlet and outlet connections being spaced adjacent opposite ends of said second chamber to provide a prolonged dwell for said stock within said second chamber, an impeller mounted for rotation within said second chamber for effecting further reduction of large particles therein and discharge of the resulting smaller particles into said tank, said impeller having a plurality of bristles thereon arranged to cause said large particles to travel circumferentially of said second

chamber while progressing from said inlet connection to said outlet connection as said impeller rotates, a conveyor screw within said third chamber, means for rotating said screw to effect compaction of the particles within said third chamber, said third chamber having a perforate wall portion to discharge into said tank the liquid from said compacted particles, said third chamber having an outlet located exteriorly of said tank, and a counterweighted closure on said outlet for cooperation with said screw to effect said compaction of said particles and discharge of said compacted particles substantially free of liquid.

JOSEPH BAXTER, JR.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
658,240	Cook	Sept. 18, 1900
905,374	Sherwood	Dec. 1, 1908
1,405,947	Shartle	Feb. 7, 1922
1,488,218	Shartle	Mar. 25, 1924
1,510,863	Rose	Oct. 7, 1924
1,582,351	Shartle	Apr. 27, 1926
2,013,115	Thorne	Sept. 3, 1935

FOREIGN PATENTS

Number	Country	Date
234,418	Germany	July 10, 1910