No. 834,596. PATENTED OCT. 30, 1906.

J. W. WALTERS.

PULP STRAINER.

APPLICATION FILED FEB. 9, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

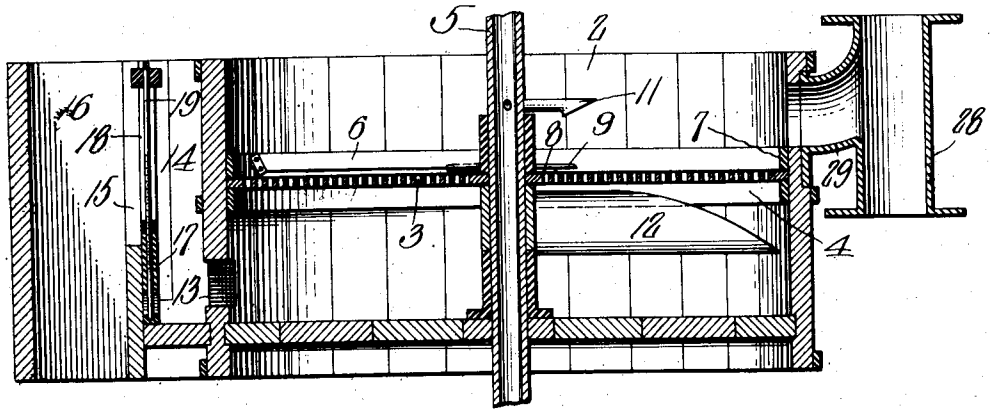
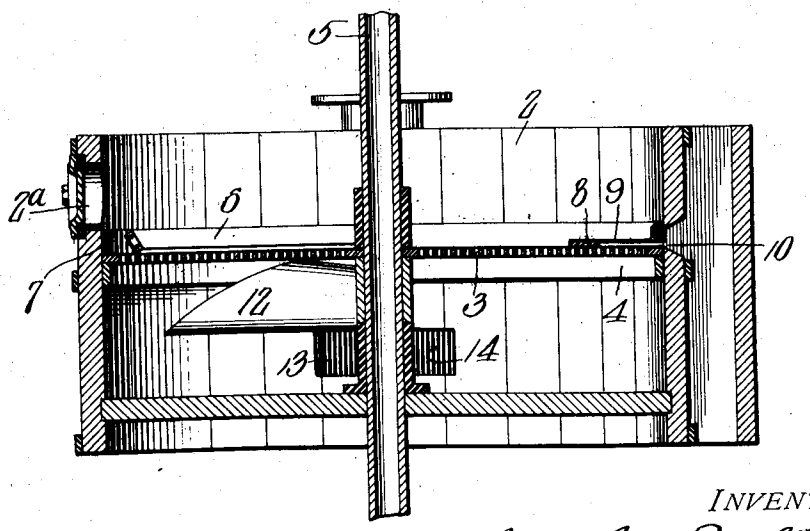


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

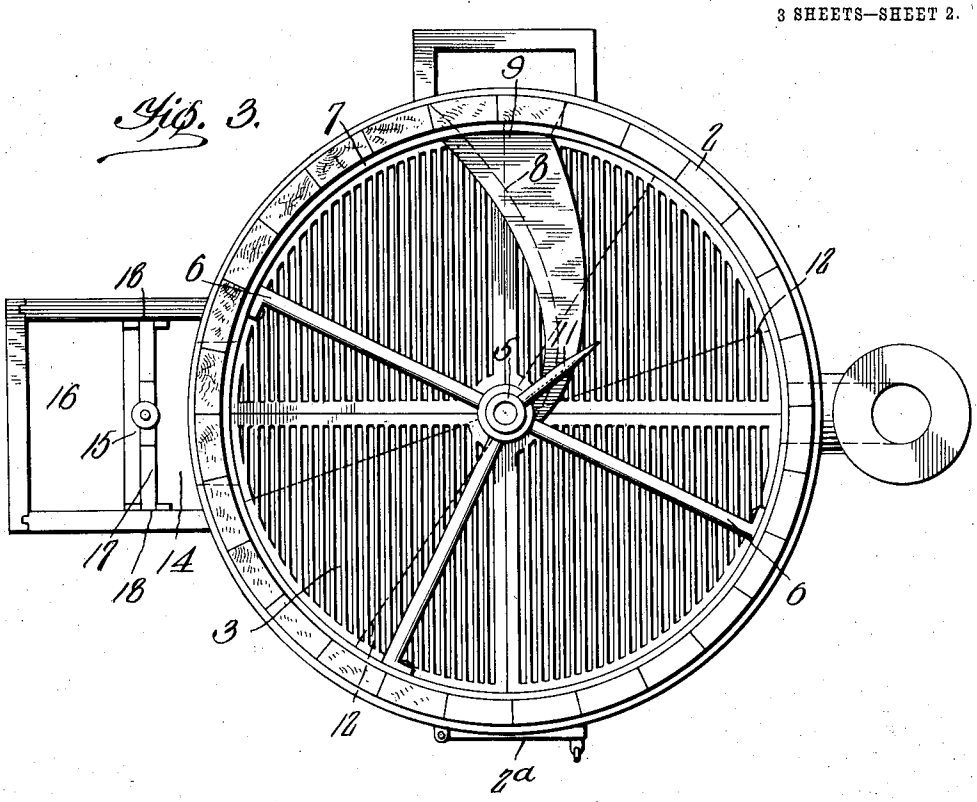
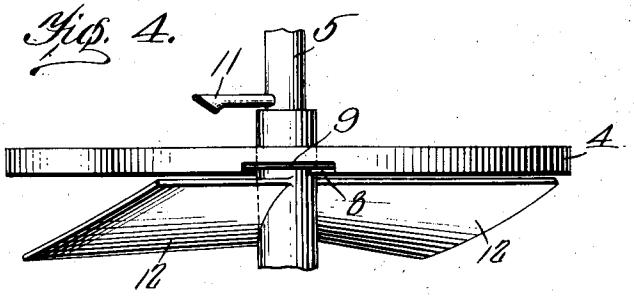


Fig. 4.



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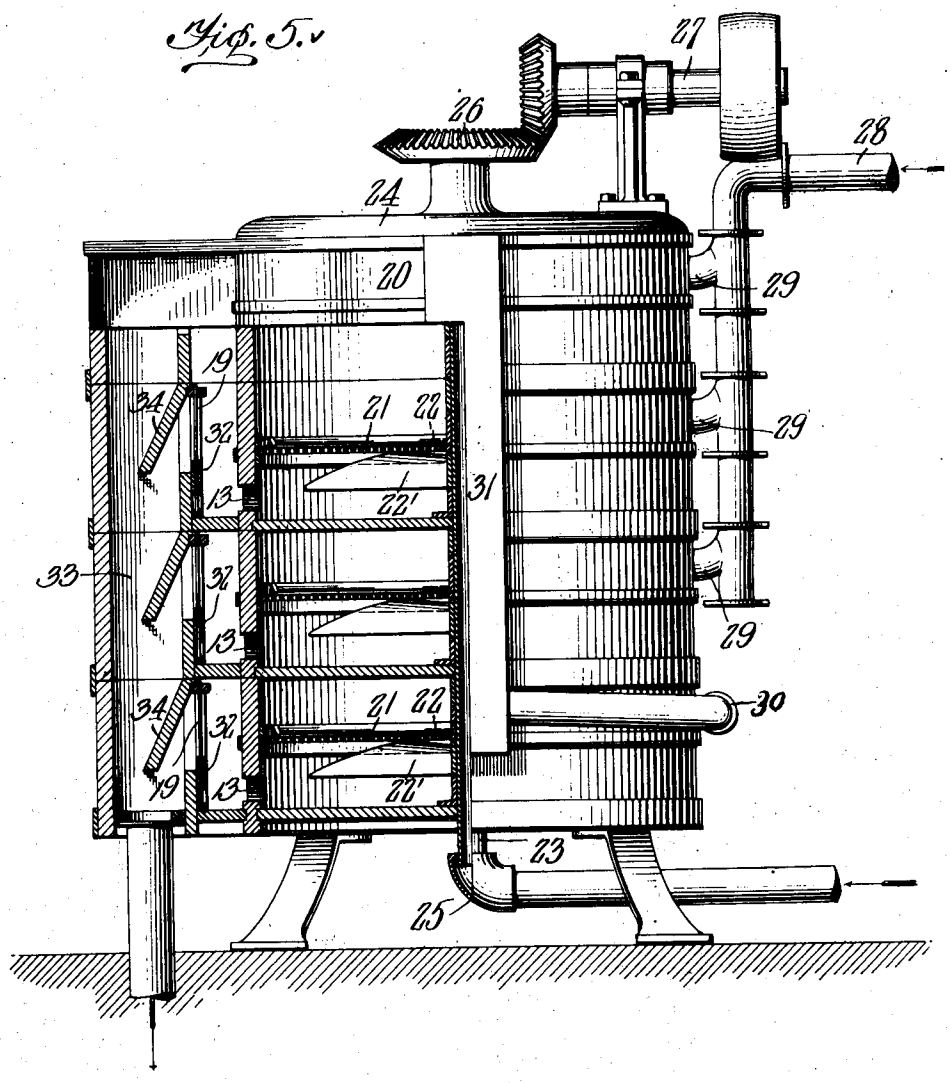
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3 SHEETS—SHEET 3.

Fig. 5.



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UNITED STATES PATENT OFFICE.

JULIUS WM. WALTERS, OF GLENS FALLS, NEW YORK.

PULP-STRAINER.

No. 834,596. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed February 9, 1906. Serial No. 300,248.

To all whom it may concern:

Be it known that I, JULIUS WM. WALTERS, a citizen of the United States, residing at Glens Falls, in the county of Warren and State of New York, have invented new and useful Improvements in Pulp-Strainers, of which the following is a specification.

The present invention relates to pulp-strainers, and has for its object the provision of a strainer which will receive the pulp as it comes from the digester or grinder, hydrate or impregnate it with water and screen it thoroughly, remove from the pulp all unground slivers or foreign substances, keep the screen plates or grids always clear of clogging substances, to the end that the flow of pulp through the thoroughly-screened and hydrated saturated pulp in regulated quantity to the delivery-passage.

Stated generally and briefly, the strainer comprises in its simplest form a suitable vat or tub within which is mounted a horizontal screen, a suitable inlet-pipe being provided to deliver the pulp to the vat above the screen. Mounted centrally of the vat and screens is a hollow revolving shaft connected with a suitable supply of water, said shaft having a spray-pipe extending radially therefrom above the screen, by means of which the pulp may be hydrated or saturated with water and brought to the proper screening consistency. The central shaft carries a ring or frame closely adjacent to the screen, which supports a hooded scraper arranged in close proximity to the upper surface of the screen and adapted to scrape up all the slivers and foreign substances which fail to pass through the screen and eject them through a suitable opening in the side of the vat. Beneath the screen and supported and driven by the central shaft are two or more propeller-like blades or fans, the number of which must be equal, as the line of effort or pitch-line of these blades is counterpoised to one another, or, in other words, they are placed upon the shaft in a position to create alternate downward and upward movement upon the air and hydrated pulp descending upon them through the screen-plate, so as to produce a uniform progressive wave movement of the pulp and cause the same to be intermittently forced upwardly to dislodge any clogging substances from the screen or grid interstices and prevent filling of the screen. The vat is provided at its bottom with a lateral outlet, through which the screened pulp is delivered, an adjustable dam being provided for said outlet by means of which the pulp-delivery may be regulated.

In order that the invention may be clear to those skilled in the art, I have illustrated my invention in the accompanying drawings and in the detailed description hereinafter shall refer to said drawings by suitable reference-numerals, like numbers indicating like parts in the several views.

In said drawings, Figure 1 is a central vertical section of a strainer embodying my invention. Fig. 2 is a sectional view to show the sliver-delivery openings. Fig. 3 is a plan view of the strainer. Fig. 4 is a detail view of the strainer-shaft and its associated parts. Fig. 5 is a view of a form of my invention in which a plurality of screen-plates are used.

Referring to the drawings, 2 indicates a circular pulp-receptacle or receiving-vat of any suitable construction and dimensions provided with suitable hand-holes and covers 2^a to permit inspection of the strainer interior. Mounted within said receptacle or vat 2 is a screen 3. Said screen 3 is supported by ring-cleats 4, secured to the vat, and has suitable screening perforations or interstices.

Mounted centrally of the vat 2 and passing through the screen 3 is a hollow shaft 5, which is supported in any suitable bearings and driven by any suitable or usual driving mechanism, said shaft 5 being connected with a suitable water-supply. Secured to said shaft 5 in close proximity to the upper surface of the screen 3 is a wheel 6, the rim 7 of which fits closely the angle formed by the upper-screen surface and the wall of the vat, as clearly shown in Figs. 1 and 2. Carried by said wheel 6 is a flat sliver collecting and ejecting blade or scraper 8, preferably having a curved edge, as shown in Fig. 3, which blade lies against the upper surface of the screen and has a beveled edge, the more readily to pick up any unscreened particles or slivers lying upon the screen-surface as the scraper sweeps over it. In order that any particles picked up by the scraper 8 may not simply slide over it and escape, I provide a hood 9, which projects forwardly of the scraper and serves to retain any matter collected during the sweep of the scraper over the screen-surface.

From the foregoing it will be seen that as

the shaft 5 is rotated during the operation of the strainer the wheel 6 and scraper 8 carried thereby will be revolved and scraper 8 will gather beneath the hood 9 all slivers and foreign substances upon the screen. It is apparent that owing to centrifugal action the tendency of the slivers and particles gathered by the hooded scraper will be to travel outwardly along the scraper, and the scraper 8, as above stated, is preferably curved along its edge, as shown, to augment and aid this centrifugal travel of the scraped-up material. It will be observed, furthermore, that the hood 9 is outwardly flared or wider at its outer end, so that as the bulk of the scrapings increases at the outer end of the scraper the capacity of the hood will be sufficient to prevent escape of any of the scrapings into the pulp.

In order that the scrapings from the screen-surface may be ejected, the vat 2 is provided with a sliver-discharge opening 10 on a level with the screen-surface, to which discharge-opening the hooded scraper 8 will deliver its picked up matter at each revolution of the shaft 5. The ring 7 of the wheel 6 is cut away at the point where the scraper 8 is secured to it, (see Fig. 2,) so as not to obstruct the opening 10 at the time the scraper sweeps past it, but to permit the ejectment of the foreign substances, while at all other times the closely-fitting ring 7 will close and prevent the escape of pulp through said opening.

In order that the pulp may be thoroughly hydrated and brought to the proper screening consistency, a spray-pipe 11 is provided above the screen, the end or nozzle of the pipe 11 being preferably flattened, as shown, and cut away at an angle in order to secure the proper trajectory and uniform radial distribution of the jet.

Below the screen 3 and fixed to the shaft 5 are fans or propeller-blades 12, which as the shaft 5 is rotated will produce a swirling or wave-like motion of the pulp beneath the screen. The effect of this wave movement is to intermittently force the pulp upwardly through the interstices or perforations of the screens 3. The result of this is to clear the screen perforations or grids of any clogging substances that may become lodged therein, which are forced up onto the surface of the screen 3 and swept up and ejected by the scraper 8 in the manner hereinbefore described.

The vat 2 is provided near its bottom with an opening 13, through which the screened pulp passes to a chamber 14, having a pulp-delivery outlet 15, leading to a pulp-delivery passage 16. The said outlet 15 has a regulating-dam consisting of a plate 17, which slides in vertical ways 18, Figs. 1 and 3, a screw-rod 19 being provided to secure adjustment of the said plate 17 and regulate the flow of pulp as desired.

It is sometimes desirable to economize floor-space without reducing the capacity of the pulp-strainer, and in order that this may be done and yet preserve all the valuable features of the strainer which I have invented the form shown in Fig. 5 of the drawings herewith is provided, which resembles in all its general features the strainer hereinbefore described, but in which instead of a single screen of large dimensions a plurality of screens of relatively small dimensions are mounted one above the other, suitable pulp inlets and outlets being provided for each screen of the battery and sliver scraping and ejecting and screen-clearing instrumentalities, similar to those described above in connection with the single-screen strainer, being provided for each of the screens in the stack or battery of superposed screens.

Referring to the form of the invention shown in Fig. 5, 20 indicates a vat similar in all respects to that shown in the other figures and hereinbefore described, except that it is smaller in diameter, so as to occupy a minimum amount of floor-space, and is increased in height to compensate for this reduction in diameter. Within this vat 20 are mounted a number of screens 21, similar in all respects to the screen hereinbefore described, each screen being provided with the hereinbefore-described hooded scraper 22 to collect the slivers on the upper screen-surface and having below the counterpoised fans to produce the progressive wave movement in the pulp and clear the grids of the screen. The said scraper 22 and fans 22′ are carried by a vertical hollow revolving shaft 23, which is suspended from the top 24 of the vat 20 and is connected at its lower end by a rotating water-joint 25 with a suitable water-supply, the said shaft 23 having at its upper end a bevel-gear 26, which connects with any suitable driving-shaft 27.

A pulp-inlet pipe 28 is provided, which pipe has a plurality of delivery branches 29 leading to the vat above the several screens, so as to give a proportionate amount of pulp to each of the screens, this pulp when delivered to the screens being subject to the same screening and sliver-collecting action described hereinbefore.

The sliver collecting and ejecting instrumentalities 22 deliver to a sliver-box 31, arranged vertically on the side of the vat, as shown, so that the sliver scraping and ejecting blades will deliver the material collected through their individual sliver-delivery openings in the side of the vat to this sliver-box, and the accumulated mass of slivers, together with any small amount of pulp which may be ejected by the sliver-collecting instrumentalities, will pass down the sliver-box 31 and be delivered to the lowermost screen of the series through a suitable conduit 30, this lowermost screen being preferably not con-

nected with the pulp-inlet pipe 28, as this bottom screen is designed to take the tailings from the other screens and subject them to a second straining operation in order that there may be no loss of pulp.

Each of the screens is provided with separate outlet-gates 32, so that each unit delivers its screened pulp, the said outlet-gates leading to a common pulp-outlet or delivery-passage 33, and in order that the pulp from the upper screens of the series may pass down the delivery-passage 33 without obstructing or interfering with the pulp-delivery from the lower screens I preferably provide the downwardly and outwardly inclined guard or deflector plates 34 at the mouth of each pulp-delivery opening, which deflect the descending body of pulp in the passage 33 away from the pulp-outlets 32, and so prevent interference with or damming of the pulp as it flows from the screens.

While I have shown particular embodiments of my invention, I do not confine myself to the precise constructions herein shown and described, as all equivalent expedients and mechanical variations within the skill of the mechanician are obviously within the purview of my invention.

Having described my invention, I claim—

1. In a pulp-strainer, the combination with a receiving-vat, of a horizontally-arranged screen in said vat, sliver collecting and ejecting means above said screen, and means beneath said screen for clearing the screen-openings.

2. In a pulp-strainer, the combination with a receiving-vat, of a screen in said vat, sliver collecting and ejecting means in operative relation to the screen on one side, and means on the opposite side of said screen for clearing the screen-openings

3. In a pulp-strainer, and in combination, a screen, means on one side of the screen for collecting and ejecting the unscreened material lodged on the screen-surface, and means on the opposite side of the screen to clear the screen-openings and force the retained matter into the path of the collecting and ejecting instrumentalities.

4. In a pulp-strainer and in combination, a receiving-vat, a screen, and a sliver collecting and ejecting scraper rotatable over the surface of said screen.

5. In a pulp-strainer and in combination, a receiving-vat, a screen, and a hooded sliver collecting and ejecting scraper rotatable over the surface of said screen.

6. In a pulp-strainer and in combination, a receiving-vat, a screen, and a rotatable sliver collecting and ejecting scraper having a curved edge.

7. In a pulp-strainer and in combination, a receiving-vat, a screen, a rotatable sliver collecting and ejecting scraper, and an outwardly-flaring hood for said scraper.

8. In a pulp-strainer and in combination, a receiving-vat having a sliver-delivery opening, a screen in said vat, a rotatable sliver-collecting scraper to sweep the screen-surface and eject the unscreened matter through said opening, and means to prevent the escape of pulp through said sliver-ejectment opening.

9. In a pulp-strainer and in combination, a receiving-vat having a sliver-delivery opening, a screen in said vat, a rotatable scraper to sweep the screen-surface and eject the unscreened matter through said opening, and means to close said opening except at the time of delivery through it of the unscreened matter.

10. In a pulp-strainer and in combination, a receiving-vat, having a sliver-delivery opening, a screen in said vat, a rotatable scraper to sweep the screen-surface, and eject the unscreened matter through said opening, and a rotatable ring to close said opening except at the time of delivery through it of the unscreened matter.

11. In a pulp-strainer and in combination, a receiving-vat, having a sliver-delivery opening, a screen in said vat, a centrally-placed shaft traversing said vat, a scraper carried by said shaft and adapted to sweep the surface of said screen and eject the unscreened matter through said opening, and a ring supported by and rotatable with said shaft to close said opening against the egress of pulp, said ring having a cut-away portion in radial alinement with said scraper to permit the scraper to eject the unscreened matter.

12. In a pulp-strainer, the combination with a circular receiving-vat, of a horizontal screen mounted therein, a vertical rotary shaft traversing said vat, and means carried by said shaft below said screen for imparting a progressive wave movement to the body of pulp below the screen to force it upwardly through the screen-perforations.

13. In a pulp-strainer, the combination with a circular receiving-vat, of a horizontal screen mounted therein, a vertical rotary shaft traversing said vat and fan-blades mounted on the said shaft below said screen for imparting a progressive wave movement to the body of pulp below the screen to force it upwardly through the screen-perforations.

14. In a pulp-strainer, the combination with a circular receiving-vat, of a horizontal screen mounted therein, a rotatable hollow shaft traversing said vat, a spray-pipe carried by said shaft and delivering above the screen, a sliver collecting and ejecting scraper to sweep the upper surface of said screen, and a fan carried by said shaft below the screen for imparting a wave movement to the pulp, and intermittently force it upwardly through the screen-perforations.

15. In a pulp-strainer, the combination of a receiving-vat, a horizontal screen mounted in said vat, a centrally-placed hollow shaft

traversing said vat, and a spray-pipe projecting radially from said shaft.

16. In a pulp-strainer, the combination of a receiving-vat, of a horizontal screen mounted in said vat, a centrally-placed hollow shaft traversing said vat, and a spray-pipe projecting radially from said shaft and having a flattened inclined nozzle.

17. In a pulp-strainer, the combination of a circular receiving-vat, a plurality of horizontal screens in said vat, means for feeding pulp to each of said screens, means above said screens for collecting unscreened material from the screen-surfaces, means below said screens for clearing the screen-openings, and pulp-outlets for each of said screens.

18. In a pulp-strainer, the combination of a circular receiving-vat, a plurality of horizontally-arranged screens in said vat, means for delivering pulp to each of said screens, a rotatable shaft traversing said vat, and screens, means carried by said shaft above said screens to collect the unscreened material from the screen-surfaces, means carried by said shaft below said screens to clear the screen-openings, and pulp-outlets for each of said screens.

19. In a pulp-strainer, the combination of a receiving-vat, of a plurality of horizontal screens in said vat, a pulp-feed pipe having a plurality of branch pipes, one for each screen, a pulp-delivery pipe, and independent screen-outlets delivering to said delivery-pipe.

20. In a pulp-strainer, the combination of a receiving-vat, a plurality of horizontal screens therein, a plurality of pulp-inlets, one for each of said screens, a plurality of pulp-outlets, one for each of said screens, means for collecting and ejecting the unscreened material on the screen-surfaces, and a common sliver-passage to which the unscreened material is delivered.

21. In a pulp-strainer and in combination, a receiving-vat having a plurality of pulp inlets and outlets, a plurality of horizontal screens in said vat, means for collecting the unscreened material from the screen-surfaces and ejecting it through sliver-outlets in the vat, and means for conveying the unscreened material to one of the screens of the series for rescreening.

22. In a pulp-strainer and in combination, a receiving-vat having a plurality of pulp inlets and outlets, a plurality of horizontal screens in said vat, means for collecting the unscreened material from the screen-surfaces and ejecting it through sliver-outlets in the vat and means for conveying the unscreened material to the lowermost screen of the series for rescreening.

23. In a pulp-strainer and in combination, a receiving-vat, having a plurality of pulp-delivery outlets, a common pulp-delivery passage to which said outlets deliver, and means to deflect the descending body of pulp in said passage away from said outlets.

24. In a pulp-strainer and in combination, a receiving-vat having a plurality of pulp-delivery outlets, a common delivery-passage to which said outlets deliver, and downwardly and outwardly inclined deflector-plates covering each outlet to divert the descending body of pulp in said passage away from said outlets.

25. In a pulp-strainer and in combination, a circular receiving-vat, a pulp-screen in said vat, a centrally-placed rotatable shaft traversing said vat, and two or more fan-blades on said shaft below said screen, the blades being set so as to secure an alternating pitch-line and create a progressive upward and downward movement of the material.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JULIUS WM. WALTERS.

Witnesses:
JOHN H. SHEEHAN,
HENRY W. WILLIAMS.