

G. MOORE.
PROCESS OF TREATING PULP.
APPLICATION FILED JAN. 23, 1915.

1,207,978.

Patented Dec. 12, 1916.

2 SHEETS—SHEET 1.

Fig 1

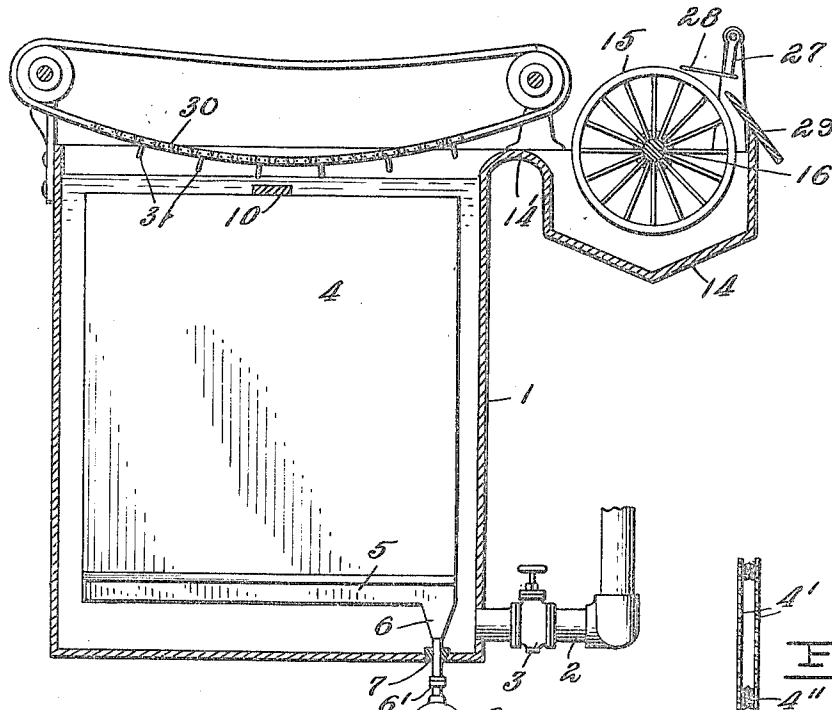


Fig 5

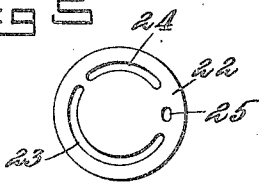


Fig 6

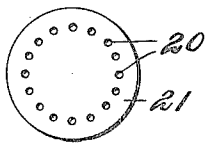
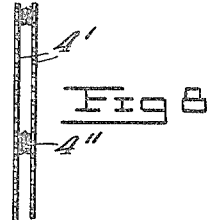
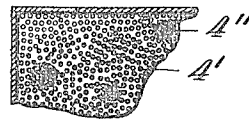


Fig 7



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Fig 2

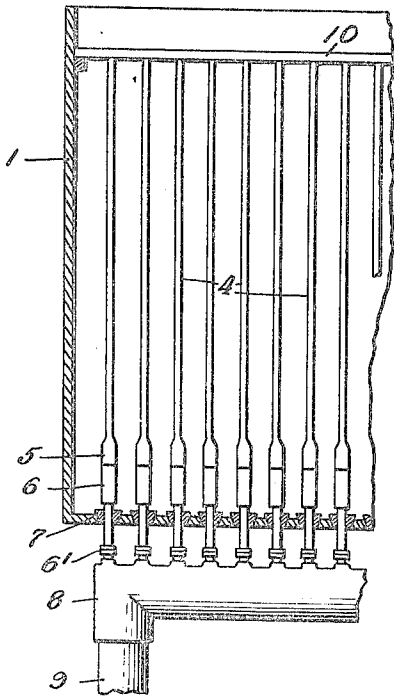


Fig 3

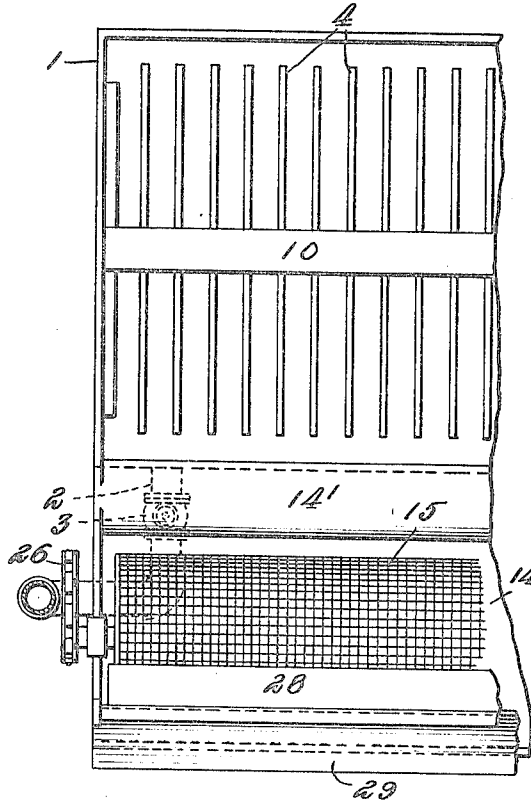
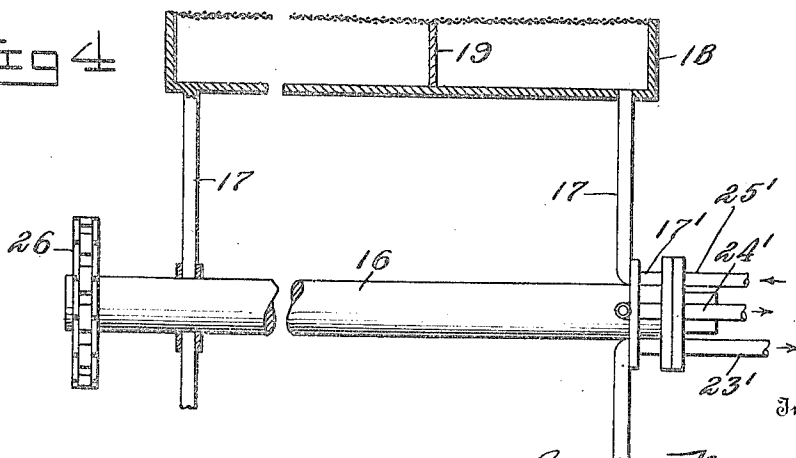


Fig 4



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UNITED STATES PATENT OFFICE.

GEORGE MOORE, OF JOPLIN, MISSOURI.

PROCESS OF TREATING PULP.

1,207,978.

Specification of Letters Patent.

Patented Dec. 12, 1916.

Application filed January 23, 1915. Serial No. 4,022.

To all whom it may concern:

Be it known that I, GEORGE MOORE, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented certain new and useful
5 Improvements in Processes of Treating Pulp; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others
10 skilled in the art to which it appertains to make and use the same.

This invention relates more particularly to the art of recovering paper pulp and especially wood pulp, from waste water from
15 paper making machines.

It is well known that large quantities of valuable paper pulp are flowed off from paper making machines, the lost pulp being suspended in the water in such finely divided
20 state as to render difficult its recovery in a sufficiently rapid manner as to render such recovery profitable, and it is also known that the paper pulp possesses characteristic differences from other forms of pulp, one of
25 which is its lack of stability when deposited in the form of a layer or cake, which lack renders it difficult to move a support sustaining a vertical layer or deposit of such pulp, so that proposed methods of coating a
30 strainer or filter surface with such pulp and then moving the surface to a point of deposit have been fraught with difficulties, and it is one of the objects of the present invention to overcome all of these difficulties and
35 to render the recovery of such waste pulp rapid and profitable.

In carrying out the present improved process, it is preferable to employ certain apparatus, and a detail understanding of the
40 process may be had most readily by reference to the structure and operation of such apparatus, so that I have to this end shown an embodiment of such apparatus in the accompanying drawing, in which,

Figure 1 is a view partly in section and partly in elevation. Fig. 2 is a similar view taken at right angles to the plane of observation of Fig. 1. Fig. 3 is a top plan view thereof with the conveyer omitted. Fig. 4 is an enlarged detail fragmentary view of a portion of the rotary screen. Figs. 5 and 6 are front elevations respectively of two plates of the distributing valve. Fig. 7 is a fragmentary elevation of a part of one of the foraminous
55 plates of one of the strainer leaves or cells.

Fig. 8 is a vertical section taken on the plane indicated by line 8, 8, of Fig. 7.

Referring to the drawing by numerals, 1 indicates a tank into which the waste water from paper making machines is delivered
60 through a pipe 2, controlled by a valve 3, the pipe 2 leading from a source of supply at a sufficient elevation for filling tank 1 when the valve 3 is opened. Arranged within the tank 1 are filter leaves or cells 4, 4, each made
65 up of a pair of spaced foraminous sheets or plates of metal 4', or other appropriate reticulated sheets may be employed as, for instance, a fine mesh screen. The plates 4' are closed in around their edges and connected at
70 various points by solder 4'', so that water entering the space between the plates can approach only through the openings in the plates. Extending along the lower edge of each cell 4 is a passage-way 5, which is
75 merely an enlargement provided by the spacing of the lower portion of the plates so as to accommodate the flow of water along the lower edge of the cell to the discharge pipe 6, a discharge pipe 6 being provided
80 for each cell 4 and each pipe extending with the water-tight joint through a tapering plug 7, designed to fit a corresponding aperture in the bottom of tank 1. Each pipe 6 extends to a header 8, which communicates
85 with the discharge pipe 9. Each pipe 6 also is provided with a union or other detachable joint 6' between the header and the bottom of tank 1. The aperture in the bottom of the tank 1 occupied by each plug 7 is of a
90 size sufficient to allow the passage of a section of the joint 6' so that when the joint is disconnected, the particular leaf 4 may be withdrawn from the tank, the upper section of the joint passing through the aper-
95 ture which is normally closed by the respective plug 7. The several cells 4 may be retained in position in any of various ways, as, for instance, by a cross plate or bar
100 fixed to the upper portion of the side walls of tank 1 and extending across and fixed to the upper edge of the several cells 4.

A reverse current supply pipe 9' communicates with pipe 9 and is valved as at 9''. The source of the reverse current is not indicated but may be either water or air under
105 sufficient pressure. The lower end of the discharge pipe 9 extends into a water seal 11, and the said discharge pipe is provided with a controlling valve 12. The water
110

from the tank or water seal 11 is decanted through a launder 13 or otherwise appropriately disposed of.

Arranged at one side of tank 1 is a tank 14 in which is journaled a rotary screen 15. The screen consists merely of a shaft 16 journaled on the walls of tank 14 at the upper edge thereof and having radial spokes 17, 17 carrying a peripheral screen portion 18, divided into sections by partitions 19. The spokes 17 at one end of the drum or rotary screen are all tubular and are arranged with one of the tubular spokes in communication with each peripheral compartment, the several tubular spokes being turned as at 17' at the point of engagement with shaft 6, and extended into an appropriate aperture 20 in the disk 21 of a pressure controlling valve consisting of said disk and a co-operating disk 22. The disk 22 is provided with segmental grooves 23 and 24, and an opening or very short groove 25. The groove 23 communicates with a pipe 23' which connects with a suction pump or gravity column of water, while the groove 24 communicates with a pipe 24', connected with a suction pump, and the aperture or groove 25 communicates with a pipe 25' connected with a source of air supply for delivering a blast of air traveling in converse direction to the travel of current in pipes 23' and 24'. The pumps mentioned and the source of compressed air are not illustrated since they may be of any well known form. It should be clear that as the rotary screen 15 revolves, being driven by belting 26, from any source of power not illustrated, the several openings 20 will be caused to successively register with the grooves 23, 24 and 25, so that while the sections of screen are within the fluid in tank 14, they are subjected to suction through pipe 23', and when the particular section of screen passes above the liquid level in tank 14, the respective aperture 20 is brought into register with groove 24, whereby water is drawn from the cakes and if air is drawn in, it does not reduce suction of main line acting on submerged sections. When a section approaches scraper 27, the respective aperture 20 comes into register with groove or aperture 25 and an instantaneous blast of air is directed outward through the screen section so that the coating of pulp solids will be lifted by the air blast and directed to the upper surface of the scraper 28, from which it falls to a chute 29, and is thereby directed to any appropriate point of disposal.

An endless conveyer 30 is arranged above tank 1 with its lower lap provided with pendant plates or scrapers 31, disposed to engage the thickened pulp solids floating on the surface of the liquid in tank 1 and move the same over a guide-way 14' between tank 1 and tank 14. Instead of the rotary

screen, any other dewatering device may be employed, such as an endless screen traveling over hoppers to which suction is applied.

In practising the process by employing the apparatus just described, the tank 1 being filled with the waste water, the water is drawn off through the several cells 4, and discharged through the pipe 9. The flow of water into each of the cells is caused by the difference in pressure between the exterior and the interior of the cell, which difference in pressure may be maintained in various ways, as will be apparent, that shown being principally incident to the difference in level between the intake points of the cells and the discharge point for water seal 11. This discharging of water is continued and the supply is kept up through pipe 2 for maintaining the liquid level in tank 1 above the cells 4 until cakes of pulp have formed on the faces of the several cells. Thereupon, the supply is cut off by closing valve 3 while the discharge of water through pipe 9 continues until the cakes of pulp on the sides of the filter cells are exposed to the air, the continued discharge of the water through pipe 9 serving to suck air in through the several cakes and thus aerating the particles of paper pulp, usually wood pulp. The valve 12 is then closed, and the supply to pipe 2 restored by the opening of valve 3. After the cells have been submerged, the valve 3 is again preferably closed and the valve 9' is opened, admitting a reverse or counter current into the several cells acting outward and throwing off the pulp collected thereon. The particles of pulp having been aerated and retaining air bubbles, are rendered buoyant, and immediately upon their discharge from the filter cells, they rise to the conveyer 13, which collects and drags them over the partition 14' and discharges them into tank 14. As soon as the collected pulp discharged from the filter cells has arrived at the surface of the water in tank 1, the valve 9 is closed, and valves 3 and 12 are opened, and that portion of the process involved in the collection of solids on the filter cells repeated.

The conveyer 30 continues to collect the floating pulp and to discharge the same into tank 14, where the rotary screen 15 is revolving and acting to remove a large portion of the moisture remaining in the pulp. As the screen 15 revolves, a cake of pulp is built on each submerged section by the difference in pressure between the exterior and interior of the section, the difference being maintained preferably by suction applied to the respective section through the valve arrangement above described, which operates after the manner set forth in detail in my Patent, No. 746,552, dated December 8, 1903, the present valve

structure, however, having two suction pump connections, one for building the cakes and one for dewatering the cakes. The built-up cakes are prevented from falling off by the suction until they reach the point of the scraper, where they are removed by the scraper aided by a blast of air discharging outwardly from within the respective section of the screen. In working some pulp, it may be found sufficient to omit the air blast and depend merely upon the scraper for removing the cakes.

What I claim is:

1. In a process of recovering paper pulp from water bearing suspended pulp solids, submerging a filter cell in such water, passing water through the cell for depositing solids of pulp thereon while maintaining the cell submerged until a coat of solids is formed on the cell, aerating the solids forming such coating, and discharging the solids coating from the cell while submerged.

2. In a process of recovering paper pulp from water bearing suspended pulp solids, passing water of such waste water through a filter cell while maintaining the cell submerged in waste water for depositing a cake of pulp solids on the filter cell, exposing the coated cell to the atmosphere, drawing air through the coating into the cell, re-

submerging the cell, and discharging the coating while thus submerged.

3. In a process of recovering paper pulp from water bearing suspended pulp solids, thickening the pulp in a body of such water, delivering the thickened pulp to a body of such pulp, forming a cake of solids of such body of pulp on a screen by difference in pressure at one side of the screen from that at the other, moving the thus formed cake from the body of pulp into the atmosphere, maintaining the cake in position on the screen by a like difference in pressure, dewatering the cake, and reversing the difference in pressure for discharging the cake from the screen beyond the body of thickened pulp.

4. In a process of recovering paper pulp from waste water, thickening pulp in a body of water, aerating the thickened pulp, and causing the pulp to float on a body of water.

5. Thickening paper pulp in water, and floating the pulp by means of bubbles.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE MOORE.

Witnesses:

L. DUNCANSON,

M. T. SHEA.