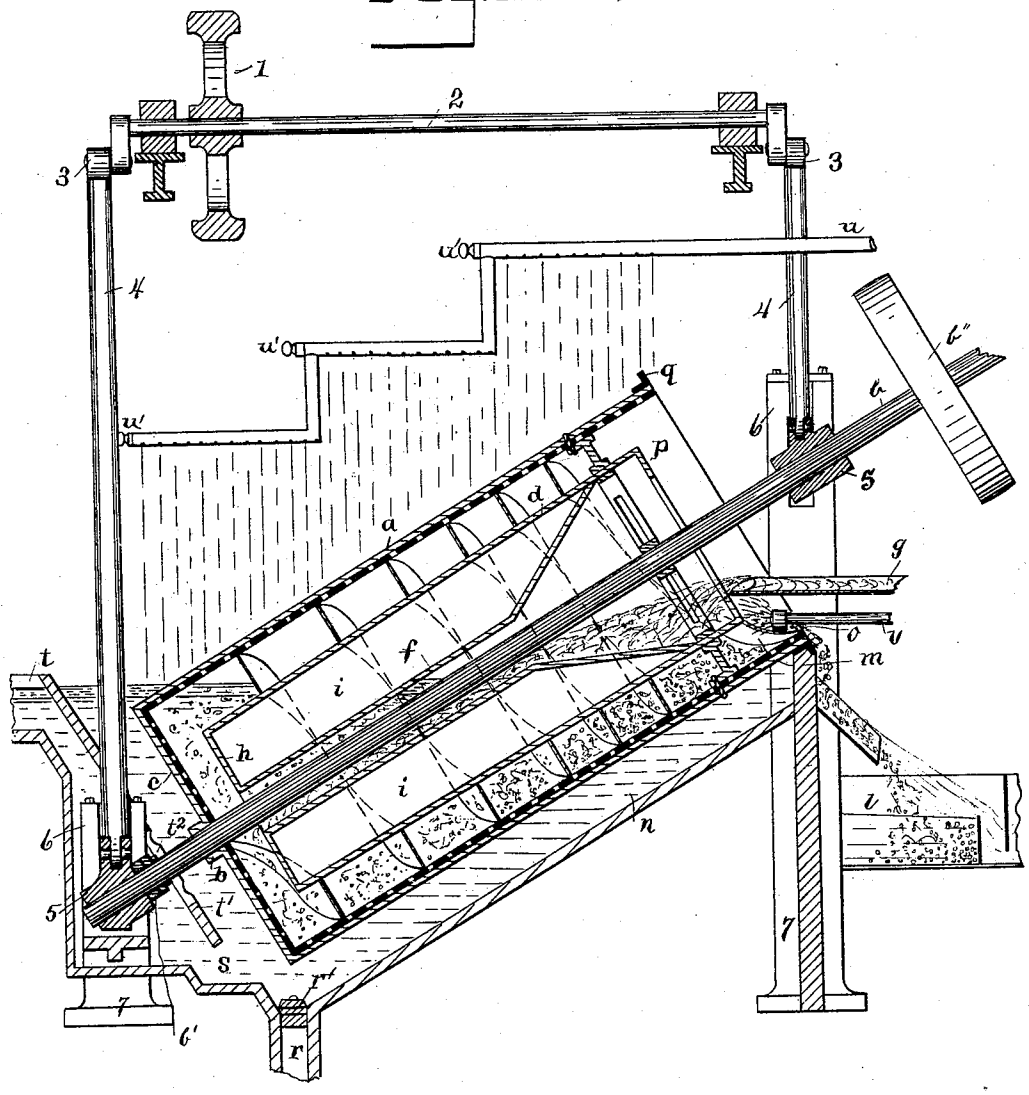
(No Model.) 4 Sheets—Sheet 1.

T. VOLSTORF.

ROTARY PULP STRAINER.

No. 483,030. Patented Sept. 20, 1892.

Fig. 1.



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(No Model.)

4 Sheets—Sheet 2.

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Fig. 4.

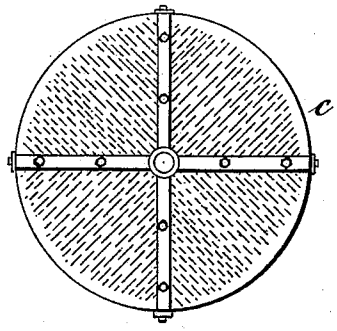
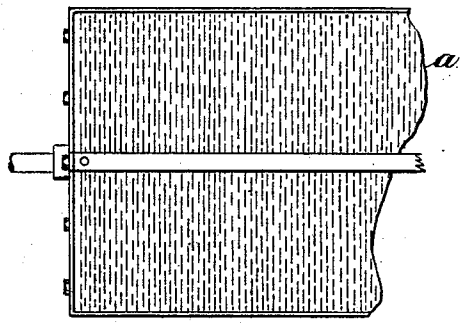


Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

T. VOLSTORF.

ROTARY PULP STRAINER.

No. 483,030. Patented Sept. 20, 1892.

Fig. 5.

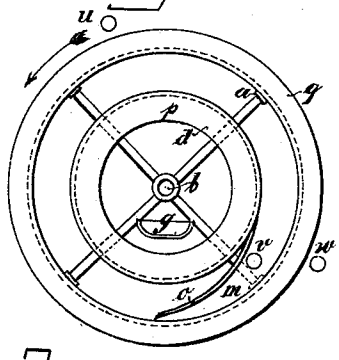
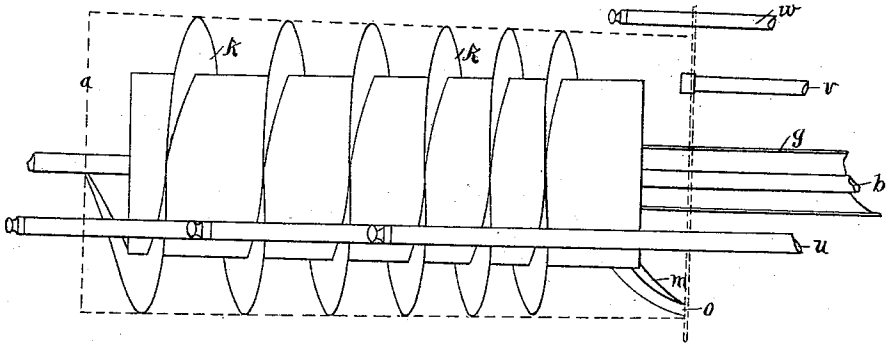


Fig. 3.



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ROTARY PULP STRAINER.

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Fig. 6

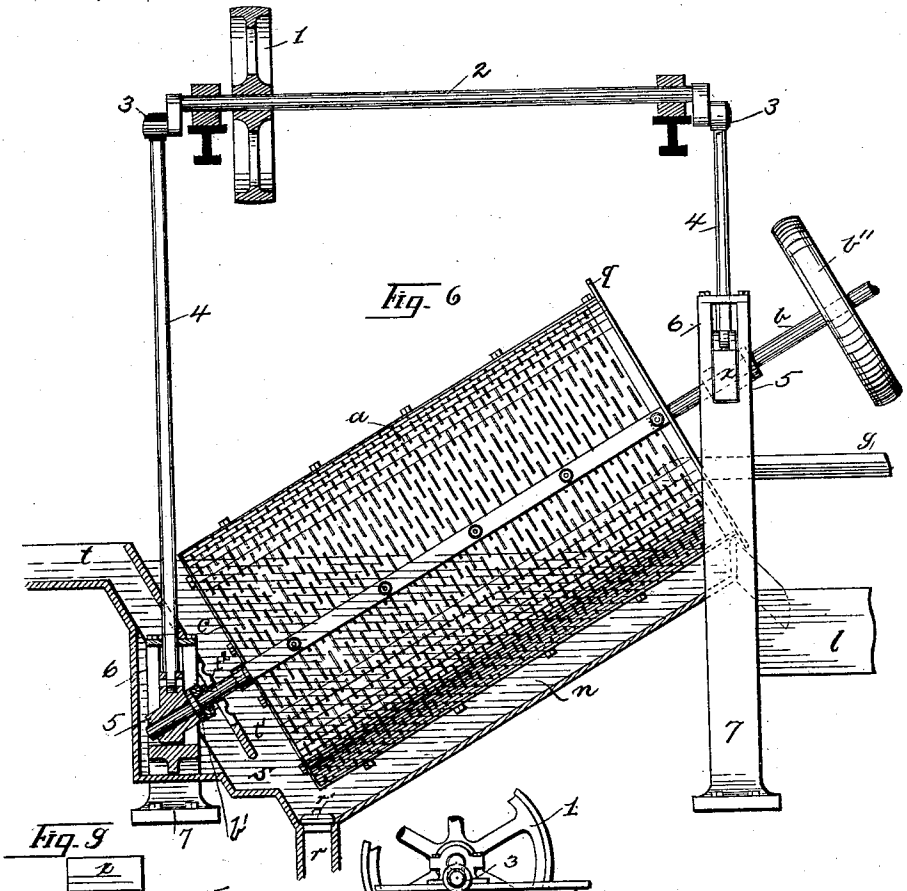


Fig. 9

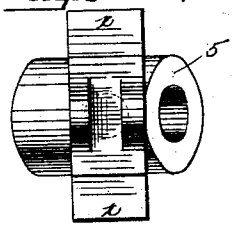


Fig. 7

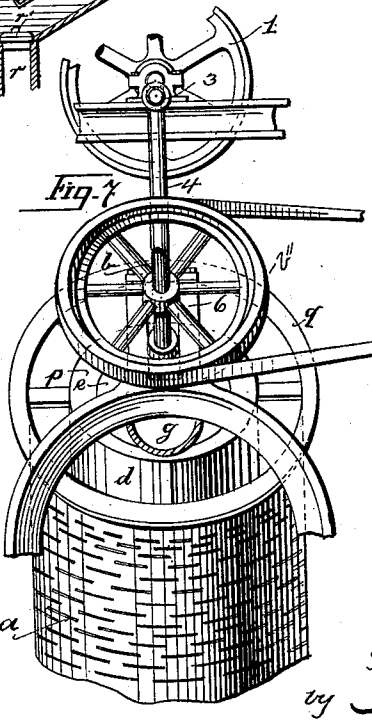


Fig. 8

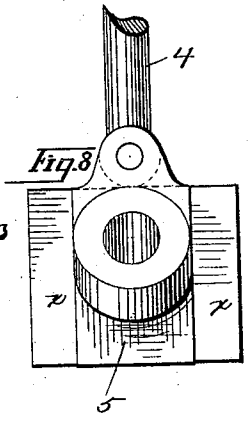
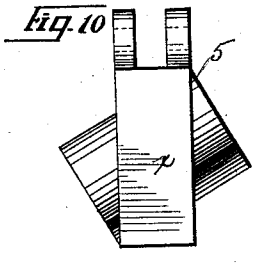


Fig. 10



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W. E. Knight.

Inventor:
Theodor Volstorf.
by Knight Bros.
Attys

UNITED STATES PATENT OFFICE.

THEODOR VOLSTORF, OF BERLIN, GERMANY.

ROTARY PULP-STRAINER.

SPECIFICATION forming part of Letters Patent No. 483,030, dated September 20, 1892.

Application filed October 11, 1889. Serial No. 326,710. (No model.) Patented in Germany September 4, 1889, No. 51,726; in England September 14, 1889, No. 14,494; in France September 14, 1889, No. 200,768; in Switzerland September 27, 1889, No. 1,446; in Belgium September 30, 1889, No. 87,897, and in Austria-Hungary January 2, 1890, No. 40,360 and No. 64,302.

To all whom it may concern:

Be it known that I, THEODOR VOLSTORF, of Berlin, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Rotary Pulp-Strainers, (for which I have obtained patents in Germany, No. 51,726, dated September 4, 1889; in Austria-Hungary, No. 40,360 and No. 64,302, dated January 2, 1890; in England, No. 14,494, dated September 14, 1889; in France, No. 200,768, dated September 14, 1889; in Belgium, No. 87,897, dated September 30, 1889, and in Switzerland, No. 1,446, dated September 27, 1889,) of which the following specification, taken in connection with the accompanying drawings, which form a part thereof, is a full, clear, and exact description.

My invention relates to an apparatus for straining paper pulp and removing lumps and knots therefrom in an effectual manner with a minimum waste of water.

With this end in view my improved apparatus consists of an inclined perforated straining-cylinder supported in suitable bearings in a washing tank or vessel, the construction and operation of which will be hereinafter fully described.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings, and then more particularly point out in the claims the novel points.

In the drawings, Figure 1 is a longitudinal section of my improved machine. Fig. 2 is a side elevation of a detached portion of the perforated cylinder. Fig. 3 is a side elevation of the internal cylinder with the worm thereon. Fig. 4 is an end view of the external perforated cylinder. Fig. 5 is an upper end view of the two cylinders in position. Fig. 6 is a similar view to Fig. 1, showing the manner of supporting the straining-cylinder in the tank. Fig. 7 is an end elevation of the device, showing the bearings of the straining apparatus. Figs. 8, 9, and 10 are front, top, and side elevations, respectively, of the vertically-reciprocating bearings.

The cylinder *a* is formed of a suitable metal framework covered over its circumference and lower end with perforated metal plates or gauze. It is mounted so as to rotate in the tank *n* on an inclined spindle *b*, which is supported, as shown in Figs. 1 and 6, with both ends journaled in sliding bearings 5, supported in the bifurcated ends 6 of the supports 7.

The construction of the sliding bearings 5 is clearly shown in Figs. 6 to 10, inclusive. Near the lower end of the spindle *b* is formed an annular flange *b'*, which rests against the upper inclined face of the lower bearing 5. The bearings 5 have portions *x x*, which fit in the bifurcated ends 6 of the supports 7 and form guides for the vertical reciprocation of the strainer-cylinder.

b'' is a band-pulley on the end of spindle *b* for rotating it.

The means for imparting a vertical reciprocation will be hereinafter described.

The lower end *c* of the cylinder is submerged, as shown in Figs. 1 and 6, while the upper open end of the cylinder is wholly above the level of the stock in the tank. Within the perforated cylinder *a* and mounted on the same spindle *b* is a smaller cylinder *d*, having a funnel-shaped mouth *e* at its upper end. This funnel-shaped mouth *e* terminates in the pipe or passage *f*, which is formed concentric with the cylinder *a* and surrounds the spindle *b*. The passage *f* conveys the material to the lower inner end of the perforated cylinder *a*, and for this purpose the sides of the funnel *e* are inclined at such an angle that the material which is introduced through the trough *g* flows naturally into the tube *f*. The cylinder *d* is closed at its lower submerged end by an annular plate *h*, so as to form a compartment *i*, which is hermetically sealed and filled with air to act as a float and relieve the weight of the rotating pulp-strainer. A spiral or worm *k*, of metal plate, is attached to the inner circumference of the cylinder *a* and fully occupies the space between the cylinder and the inner drum *d*, said drum *d* being formed slightly conical and forced into place. The pitch of the spiral *k* gradually decreases toward the upper end of the cylinder, as clearly illustrated in Fig. 1. The pitch of the extreme upper end, however, increases, as shown at *m*, so as to form a right angle with

the edge *o* of the cylinder and retain some of the jet-water to float the knots over the flange *q*. The paper stuff or pulp containing the knots is slowly raised by the worm *k*, the pulp leaving the cylinder through the perforations and the knots being discharged from the mouth of the cylinder into the knot-collecting box *l*. The cylinder *d* is furnished at its upper open end with an inner flange or rim *p* to prevent any overflow from the canal *g*, and the perforated cylinder *a* is provided with an outer flange *q*, the knots flowing back into the vessel *n*.

r is a sand-catcher fitted with a plug *r'*. *s* and *t* are passages through which the strained pulp is carried away, and *t'* is a partition slotted near its lower end for the passage and reciprocation of the shaft *b* and provided with a flexible diaphragm t^2, covering said slot and snugly surrounding the shaft *b*.

Sprinkling-pipes *u*, *v*, and *w* are arranged in connection with the apparatus, one of them *u* being arranged above the sieve-cylinder in steps, as clearly illustrated in Fig. 1. Each step is provided with a plug *u'*, whereby it can be readily cleaned. The pipe *v* discharges its water into the space between the upper ends of the two cylinders *a* and *d*, where the knots are led into the collector *l*, while the pipe *w* plays upon the upper end of the cylinder *a*.

To facilitate the escape of pulp through the perforated cylinder *a* while it is being raised by the worm *k*, a vertical reciprocation is imparted to the cylinder in addition to its rotation. This reciprocation is accomplished by the following mechanism: 1 is a band-pulley upon a shaft 2, which is journaled in suitable bearings supported above the straining apparatus. On each end of the shaft 2 is a crank 3, connected to a link or rod 4, which is attached to one of the sliding bearings 5. By this means it is obvious that the rotation of the pulley 1 will cause the straining-cylinder to be reciprocated up and down, which will greatly facilitate the escape of the pulp, while the knots are carried upward by the spiral *k*, which is slowly rotated with the cylinder *a* by the pulley *b''*. The higher the pulp is carried upward by the worm the more it is thinned by the water from the sprinklers *u*, *v*, and *w*, so that the knots are cleared of the last particles of adhering pulp when they reach the top of the cylinder and are passed into the box *l*. The thinned pulp then flows through the perforations in the cylinder *a* into the tank *n* at a different level from the pulp which has already been cleaned. The pulp which has been thinned by the jet-water mixes with the thicker pulp in the bottom of the vessel *n* and is carried away by the outlet-passage *t*.

By the employment of my improved apparatus the water which has been used in the manufacture can be again utilized both for the manufacture and for feeding the jet-pipes and is distributed in certain proportions. The water to be used for the jets is passed through fine sieves, so as to avoid as far as possible the risk of clogging up the jet-pipes. The apparatus keeps itself constantly clean, owing to the constant removal of the knots.

For the perfect cleansing of the apparatus the pulp-strainer is raised to a horizontal position by removing the bearings from the bifurcated ends of the supports 7 and supported above the tank. The end plates, which are secured by screws or bolts, are then removed and the inner cylinder *d* withdrawn from the spiral at the upper end, or the plates constituting the cylinder may be removed, and with them the attached portions of the spiral.

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

1. In a paper-pulp strainer, the combination of the tank *n*, the straining-cylinder *a*, closed at its lower end and supported on an incline in said tank, the worm *k* within said cylinder, means for supplying the pulp into said straining-cylinder, and means for imparting a rotary motion to said cylinder and worm, as herein set forth.

2. In a paper-pulp strainer, the combination of the tank *n*, the inclined cylinder *a*, and the worm *k* with a central conveyer-passage for leading the material to be treated to the bottom of the cylinder, as herein set forth.

3. In a paper-pulp strainer, the combination of the tank *n*, the inclined cylinder *a*, and the worm *k* with the central cylinder *d* and conveyer-passage *f*, as herein set forth.

4. In a paper-pulp strainer, the combination of the tank *n* and the inclined cylinder *a*, supported on spindle *b* by suitable bearings, with a central air-chamber for relieving the weight of the bearings, as herein set forth.

5. In a paper-pulp strainer, the combination of the tank *n*, the inclined cylinder *a*, supported on suitable bearings in the tank *n*, and a worm *k* inside of said cylinder with a central conveyer-passage *f* and a float between said passage and the worm, as herein set forth.

6. The combination, with a rotary paper-pulp strainer and a tank in which the strainer operates, of a conveyer spiral or worm *k*, having its upper termination of suddenly-increased pitch, so as to meet the mouth of the strainer at a right angle, as herein set forth.

7. The combination, with a rotary strainer and a tank in which the strainer operates, of a conveyer spiral or worm *k* of gradually-decreasing pitch from its lower to its upper end, as herein set forth.

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

THEODOR VOLSTORF.

Witnesses:
EMIL RIVNER,
F. VON VERSEN.