Nov. 29, 1938. K. A. THORSEN 2,138,715

APPARATUS FOR TREATING PAPER PULP AND THE LIKE

Filed April 24, 1936 2 Sheets-Sheet 1

Fig. 1.

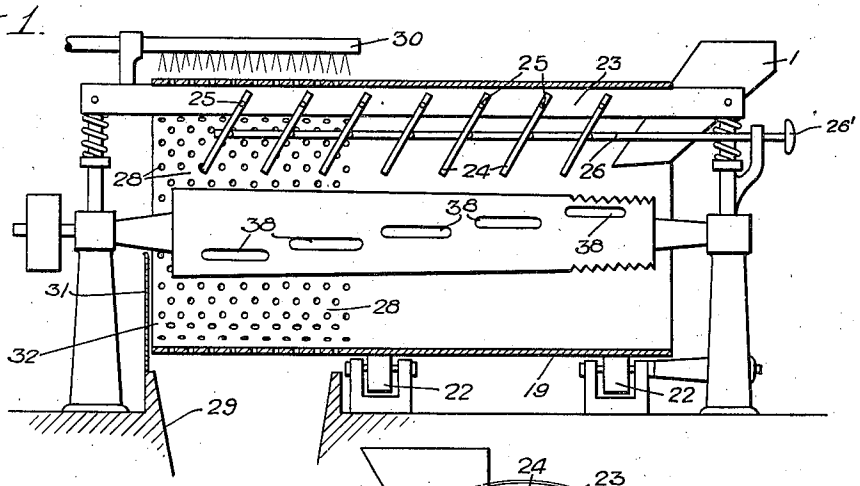


Fig. 2.

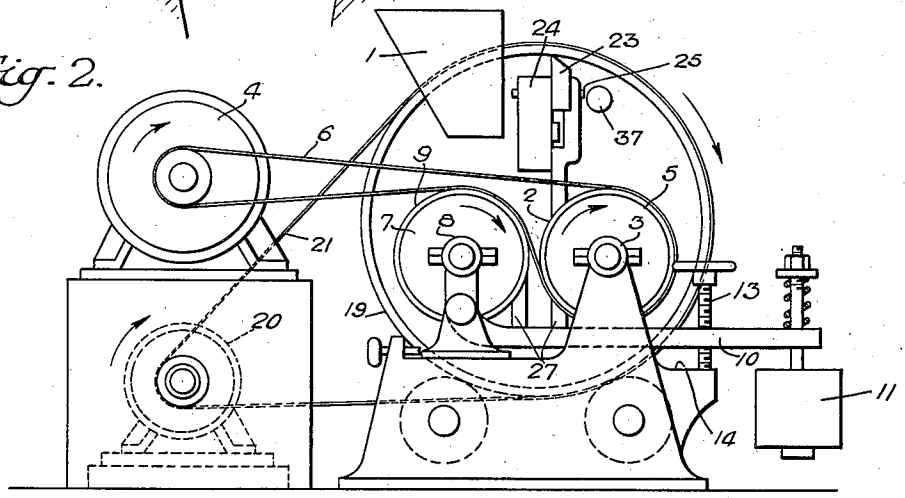
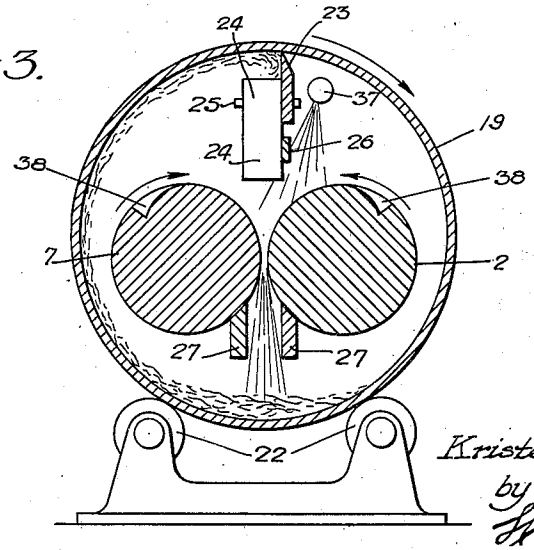


Fig. 3.



Inventor:—
Kristen Andreas Thorsen
by his Attorneys
Howson & Howson

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Fig. 4.

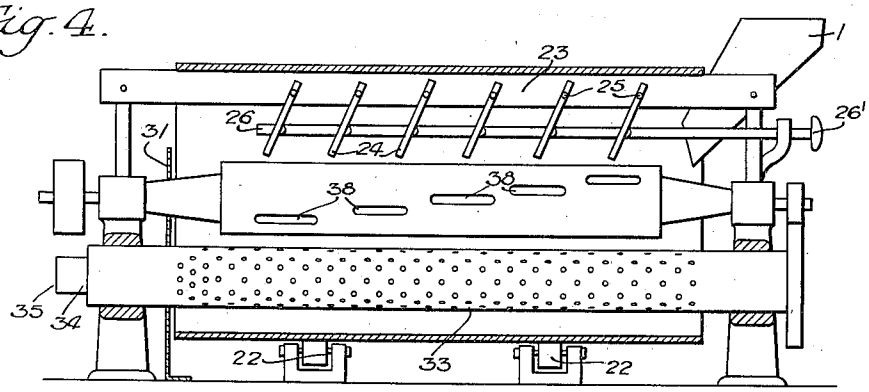


Fig. 5.

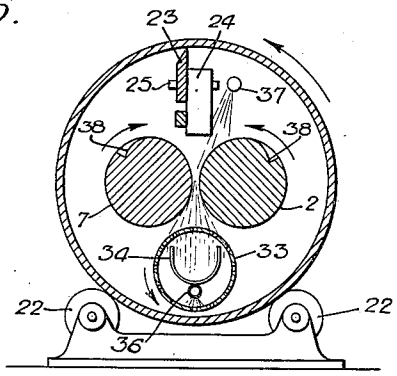
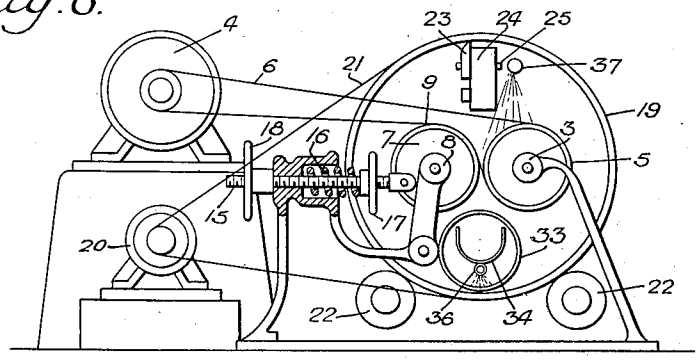


Fig. 6.



Inventor:-
Kristen Andreas Thorsen
by his Attorneys
Howson & Howson

Patented Nov. 29, 1938 2,138,715

UNITED STATES PATENT OFFICE

2,138,715

APPARATUS FOR TREATING PAPER PULP AND THE LIKE

Kristen Andreas Thorsen, Grenoble, Isere, France, assignor to Paper & Industrial Appliances Inc., New York, N. Y., a corporation of New York

Application April 24, 1936, Serial No. 76,270
In France May 6, 1935

7 Claims. (Cl. 92—20)

This invention refers to a machine for the crushing and disintegration of sundry materials, especially applicable for the separation of fibers for the washing, refining and hydration of fibrous materials destined for the manufacture of paper. The invention refers more particularly to machines comprising two cylinder presses supported one against the other and revolving at high speed, between which the material to be treated is passed several times, being subjected to a crushing and possibly to a vigorous drying. These cylinder presses are generally arranged on the inside of a hollow rotating feed cylinder receiving the material to be treated from a hopper arranged at one of its ends and discharging it after treatment through its opposite end, the purpose of this rotary cylinder being to continually lift up the material pushed by the presses in order to again pass same, while at the same time feeding it along the presses in such a manner as to discharge this material after having passed a number of times between the crushing cylinders. However, this repeated feeding of the cylinder presses through the hollow cylinder and also the regular feeding of the material into the machine presents certain difficulties; therefore, in order to permit the feeding cylinder to lift the material projected by the presses and to drop it again into same, it is generally supplied with baffle plates or blades arranged parallel to the generatrices of this cylinder. When treating pasty and sticky materials, they adhere to the wall of the feeding cylinder under the effect of the violent projection of the cylinder presses and cannot be detached by gravity after they have once been lifted above the presses. On the other hand, the feeding of the materials up to the present time was done by imparting to the feeding cylinder a more or less pronounced incline in accordance with the material treated so that the regulation of the feeding speed was very difficult to effect and quite impractical.

The machine which is the subject matter of this invention has the purpose of remedying these difficulties and permitting a regular and easily adjustable feeding and advance regardless of the nature of the material treated. It is characterized by the fact that the feed cylinder is driven at a sufficient speed so that the material leaving the press adheres under the effect of the centrifugal force to the inner surface, from which it is detached by means of a scraper which rests against the high generatrix of this cylinder, while the advancing of the material treated is effected by means of a series of channels formed by planes which are inclined with respect to the straight section of the feeding cylinder and which are arranged either in the upper region of this cylinder above the scraper or below the cylinder presses.

Other important characteristic features of the invention will be better understood from the description below and the attached drawings in which there are described and shown by way of example two manners of realization of the machine.

Fig. 1 is a longitudinal section of an apparatus embodying my invention;

Fig. 2 is an end elevation thereof;

Fig. 3 is a transverse sectional view therethrough;

Fig. 4 is a longitudinal sectional view through a slightly modified form of the apparatus;

Fig. 5 is a transverse sectional view through the apparatus of Fig. 4; and

Fig. 6 is an end elevation of the apparatus of Figure 4, parts being shown in section.

Referring to the drawings it will be noted that the machine comprises in its two manners of realization, two cylinder presses 2 and 7 arranged on the inside of the hollow feeding cylinder 19, which receives the material to be treated, which may be dry or mixed with a liquid, through the hopper 1.

The press 2 resting in the fixed bearing 3 is maintained in rotation by the motor 4 through the cog wheel 5 and the chain 6.

The press 7 resting in movable bearing 8 is maintained in rotation by the return side of the chain 6 through the intermediary of the wheel 9.

In the manner of realization shown in Figure 1, 2 and 3, the press 7 is supported more or less strongly against the press 2 by levers 10 and the counterweights 11. The springs 12 are employed to absorb the impacts caused by the passage between the presses 2 and 7 of the bunches of material and foreign bodies, etc. The threaded rod 13 and the stop 14 serve to limit the advance of the press 7 if it is desired to maintain a certain space between the two presses.

In the case of Figures 4, 5 and 6, the application of the press 7 against the press 2 is effected by means of a threaded rod 15, a spring 16, and a wheel 17 which serves to regulate the degree of support between the two presses.

The wheel 18 is provided in order to limit the advance of the press 7 if it is desired to maintain a certain space between the two presses.

The feeding cylinder 19 is maintained in rotation by the motor 20 through the intermediary

of the belt 21. This cylinder rests on 4 rollers 22.

The material coming from the hopper 1 is seized between the two presses 2 and 7 and projected by same to the bottom of the cylinder 19. The latter turns at such a speed that the effect of the centrifugal force forces the material to adhere to the smooth inner surface of the cylinder. The material lifted by the feeding cylinder is thrown against the scraper 23, arranged against the cylinder along the higher generatrix of the latter and it detaches from same the material which subsequently drops again between the two presses. The advance of the material treated in the machine is obtained by means of several channels constituted by the planes 24 inclined with respect to the straight sections of the feeding cylinder 19 and arranged in the upper part of this cylinder below the scraper 23. In order to be able to regulate the advancing speed of the material, namely the number of passages of same between the presses, the inclined planes 24 forming the guide channels are articulated to the scraper 23 around the pins 25 and they are at the same time governed by a control rod 26 to which they are articulated and which is supplied for this purpose with a control handle 26'. These inclined planes 24 employed to advance the treated material can also be arranged in the lower part of the feeding cylinder 19 under the presses 2, 7. They are, in this case, preferably articulated to the scrapers 27, serving for the cleaning of these presses. If it is desired to increase the advancing speed of the material, one can provide guide channels both in the upper and in the lower part of the cylinder 19. In order to facilitate the sliding of the material along the inclined planes 24, it is advantageous to give to the same a continuous slight vibratory movement which can be transmitted to them through the intermediary of the control rod 26 by a crank and rod, eccentric, or similar system. The satisfactory operation of the machine which has just been described requires in addition to a regular feeding of the material during the treatment, also a regular discharge of the material treated and, in particular, the continuous discharge of that part of the material which is already sufficiently reduced before arriving at the end of the cylinder 19 in order to avoid too long a stay in the crusher and a useless fatiguing of the material.

For this purpose, in the manner of realization shown in Figs. 1 to 3, the part of the cylinder 19 near the end opposite to that where the hopper 1 is located, is perforated along a certain length 28 below which there is arranged a discharge hopper 29. A rinser 30 is arranged, for instance, above the perforated part 28 in order to wash the perforations. When the presses 2 and 7 throw the material violently against the perforated wall 28, the parts sufficiently disintegrated pass through these perforations, while the rest is again lifted by the cylinder 19 and discharged into the presses. In order to force all the material treated to pass through these cylinder perforations, the end 32 of same is closed by a partition 31 which may be eliminated in case that the discharge of the material through the end 32 of the cylinder 19 suffices.

In the manner of realization shown in Figs. 4 to 6, the discharge of the sufficiently reduced material is effected by means of a perforated cylinder 33 arranged directly below the presses 2 and 7 in such a manner as to receive the stream of material leaving same. Inside the cylinder 33 there is arranged a channel 34 in the form of a gutter which receives the material which has passed through the perforations of the cylinder 33. The discharge of the reduced material toward the end 35 of the gutter 34 can be facilitated by a suitable propulsion device, for instance, by means of an Archimedes screw or by a jet of water. The perforated cylinder 33 is cleaned by means of a rinser 36 arranged in the inside of this cylinder (Figs. 5 and 6) below the gutter 34. The end of the cylinder 19 may also be closed by a partition 31.

In the event that the materials treated require a certain washing during their disintegration, the perforated wall of the cylinders 19 and 33 is replaced or preferably lined by fine screen cloth, the washing water being supplied by a rinser 37 (Figs. 2, 3, 5 and 6) and discharged at the same time as the sufficiently reduced material. This washing is favored by the violent drying to which the material is subjected upon the passing of same through the cylinder presses.

In order to prevent certain, very viscous material from accumulating at the entrance of the cylinder presses 2, 7, forming a kind of vault and clogging the machine, one of these cylinders, or both of them, is supplied with interrupted grooves constituted by sections 38, 38', 38'' . . . etc., which are comparatively short and staggered, one with respect to the other, both in the direction of the length and along the circumference, these grooves being arranged along the generatrices of these cylinders, the effect of which is to make it possible for them to energetically crush the masses accumulated at the entrance and in this way prevent the formation of such vaults.

I claim:

1. Apparatus of the class described, comprising a hollow rotating cylinder having a foraminous area for a substantial portion of its length, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, and a stationary deflecting means extending longitudinally of said cylinder adjacent said scraper so as to receive the scraped-off material and adapted to move the material longitudinally of the cylinder as it is repeatedly scraped off the cylinder wall and passed between said rolls.

2. Apparatus of the class described, comprising a hollow rotating cylinder having a foraminous area for a considerable portion of its length, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, and a stationary deflecting means comprising a plurality of deflecting vanes arranged successively longitudinally of said cylinder adjacent said scraper so as to receive the scraped-off material, said vanes being

inclined longitudinally of the cylinder so as to move the material longitudinally as it is repeatedly scraped off the cylinder wall and passed between said rolls.

3. Apparatus of the class described, comprising a hollow rotating cylinder having a foraminous area for a considerable portion of its length, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, and a stationary deflecting means comprising a plurality of deflecting vanes arranged successively longitudinally of said cylinder adjacent said scraper so as to receive the scraped-off material, said vanes being inclined longitudinally of the cylinder so as to move the material longitudinally as it is repeatedly scraped off the cylinder wall and passed between said rolls, and means for adjusting the inclination of said vanes to vary the rate of longitudinal movement of the material.

4. Apparatus of the class described, comprising a hollow rotating cylinder having a foraminous area for a considerable portion of its length, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, at least one of said rolls having a plurality of successive longitudinal grooves for relieving accumulation of material, said grooves occupying a minor portion of the roll surface means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, and a stationary deflecting means extending longitudinally of said cylinder adjacent said scraper so as to receive the scraped-off material and adapted to move the material longitudinally of the cylinder as it is repeatedly scraped off the cylinder wall and passed between said rolls.

5. Apparatus of the class described, comprising a hollow rotating cylinder, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, and deflecting means extending longitudinally of said cylinder adjacent said scraper so as to receive the scraped-off material and adapted to move the material longitudinally of the cylinder as it is repeatedly scraped off the cylinder wall and passed between said rolls, said cylinder having perforations over a portion of its discharge end for discharging material which has been disintegrated to a predetermined degree.

6. Apparatus of the class described, comprising a hollow rotating cylinder, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, deflecting means extending longitudinally of said cylinder adjacent said scraper so as to receive the scraped-off material and adapted to move the material longitudinally of the cylinder as it is repeatedly scraped off the cylinder wall and passed between said rolls, at least a portion of the wall of said cylinder being pervious, and rinsing means arranged cooperatively with the said pervious wall portion.

7. Apparatus of the class described, comprising a hollow rotating cylinder, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, deflecting means extending longitudinally of said cylinder adjacent said scraper so as to receive the scraped-off material and adapted to move the material longitudinally of the cylinder as it is repeatedly scraped off the cylinder wall and passed between said rolls, a perforated hollow cylinder within said first cylinder below said rolls for receiving material which has been disintegrated to a predetermined degree, and a discharge trough or gutter within said last-named cylinder for carrying off the discharged material.

KRISTEN ANDREAS THORSEN.