Dec. 8, 1931. R. T. LANG 1,835,789

SCREW PRESS

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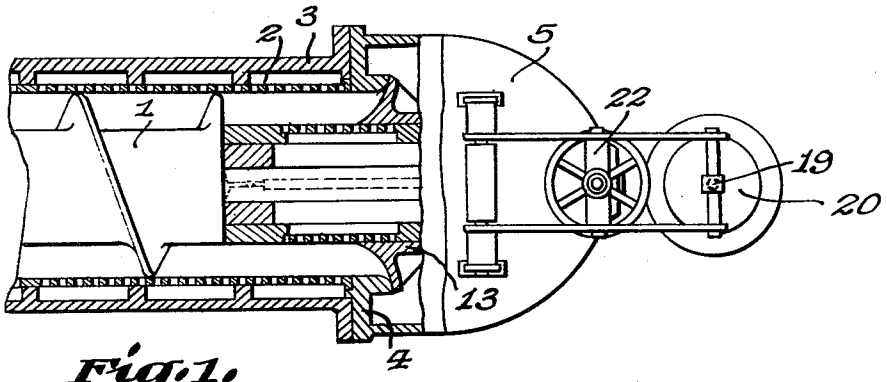

Fig. 1.

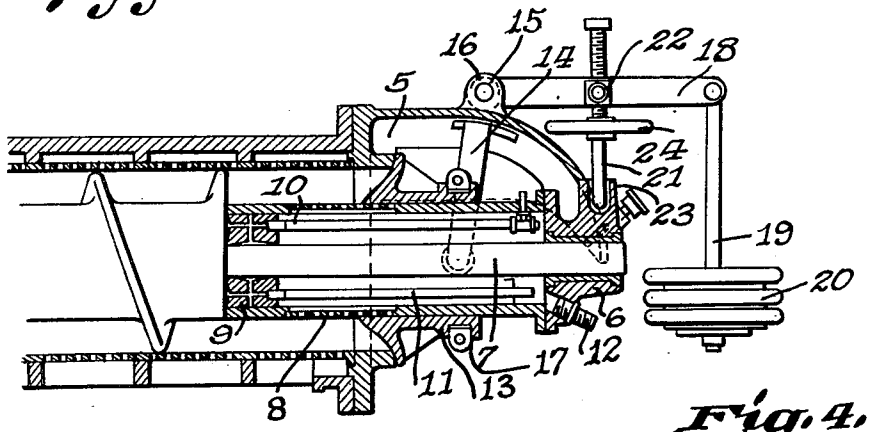

Fig. 2.

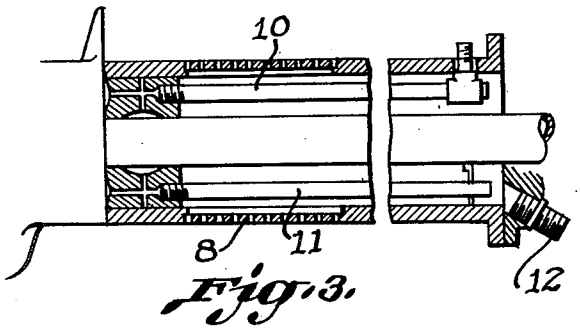

Fig. 3.

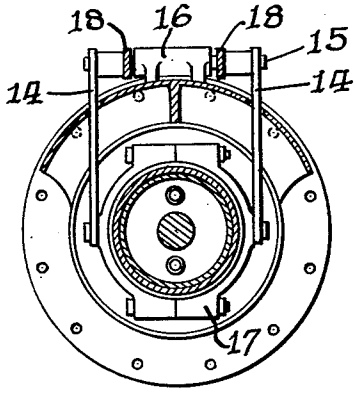

Fig. 4.

Inventor
Richard T. Lang
By C. P. Goepel
Attorney.

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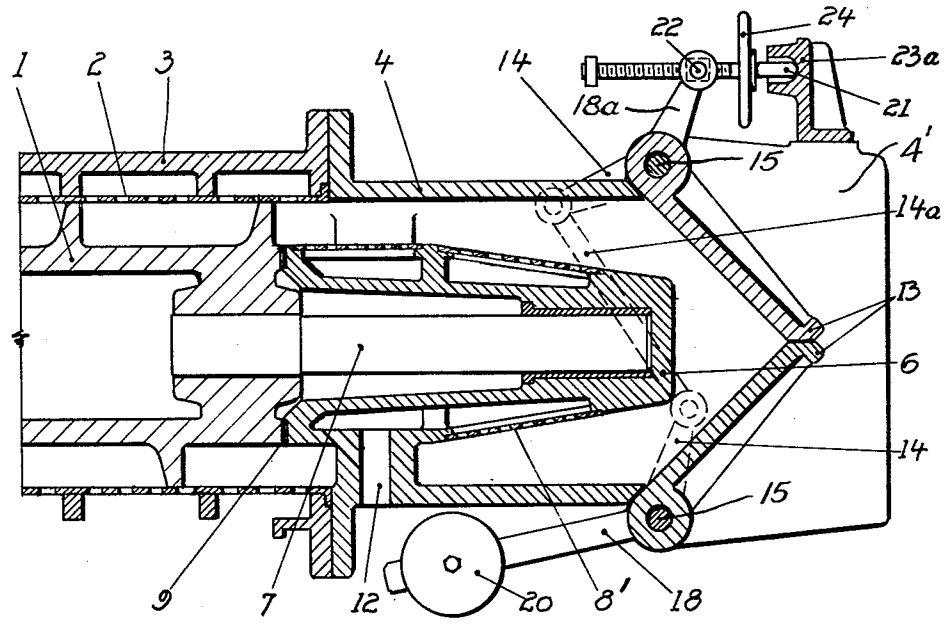

FIG. 5.

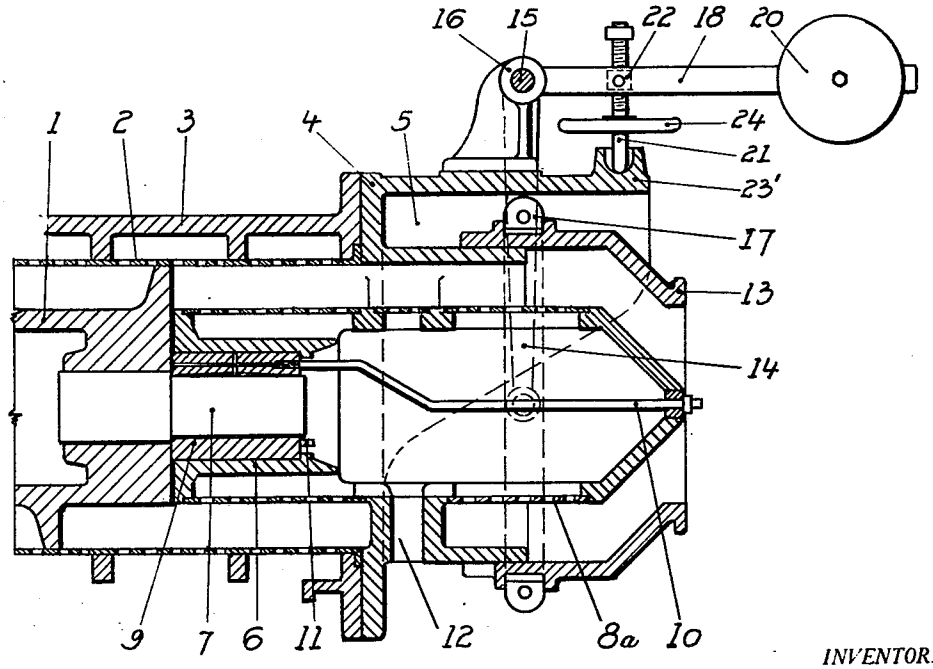

FIG. 6.

INVENTOR.
Richard T. Lang.
BY
C. P. Goepel
ATTORNEY.

Patented Dec. 8, 1931 1,835,789

UNITED STATES PATENT OFFICE

RICHARD T. LANG, OF WEEHAWKEN, NEW JERSEY, ASSIGNOR TO AMERICAN VOITH CONTACT COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

SCREW PRESS

Application filed January 30, 1928. Serial No. 250,421.

This invention relates to screw presses, and more particularly to screw presses of the type designed to remove liquid from diluted substances, whereby dewatering and washing of the substances is accomplished. The improved press is especially adapted for the treatment of pulp in paper mills. It has been found in actual practice that the pulp delivered by the present types of screw presses is considerably dried in the neighborhood of the outer circumference of the screw threads than near the bottom thereof, the difference in consistency between the outer and inner portions of the mass when it leaves the machine, often being far in excess of fifteen per cent (15%). This condition is highly objectionable, as uniform dryness of the pulp throughout the entire mass is essential for its further treatment, viz., bleaching, nitrating, etc. Moreover the degree of dryness of the pulp, controls the capacity of the screw press to a considerable extent and experiments have shown that a screw press delivering the pulp with a consistency of fifty per cent (50%) at the outside and thirty-five per cent (35%) at the inside, i. e. with an average dryness of forty-two and a half per cent (42½%) has seven and a half per cent (7½%) less capacity than a screw press which delivers pulp with a uniform dryness of fifty per cent (50%) throughout.

The mechanisms heretofore known, which aim to obtain greater uniformity throughout the pressed mass, for example, hollow screws with perforations in the body of the screw; rotating perforated shells in continuation of the screw body proper, etc., are inefficient due to the fact that the high friction between the perforated surfaces and the pulp causes the pulp to rotate with the screw thereby preventing proper pressing of the mass.

An object of the present invention is to provide an improved screw press which will discharge a pulp mass having a substantially uniform degree of dryness throughout, and which will have a greater delivery capacity than the presses heretofore known.

A further object of my invention is to provide a press having the described characteristics, which is of simple and economical construction, high efficiency, and great durability.

Generally stated one of the important features of my invention is to provide a spout section at the discharge end of the screw, having concentric inner and outer stationary walls, the inner wall of which is substantially in alignment with the body of the screw and is formed with perforations to permit the free escape of liquid from the pressed mass. The outer wall may be imperforate or perforated as desired. When perforated additional liquid may be expelled from the outer layers of the pulp mass through the perforations. It will be obvious from the foregoing that the inner layers of the pulp during a considerable distance of their travel through the press will be free to drain and that the pressed pulp in the compartment is held against rotation. The pulp treated by this new type of press is characterized by its substantially stated uniform dryness and maximum density throughout. At the discharge end of the spout section a throttling or plugging device may be arranged which is adapted to automatically yield when unusual pressures are encountered to permit the escape of pulp, and which can be adjustably regulated to yield at any desired predetermined pressure. By regulating the throttling device to yield at different pressures masses of pulp of different degrees of density may be obtained as desired. The throttle may be further provided with an adjustable setting device which permits the distance between the outlet spout and the face of the throttle to be controlled as desired. The degree of opening to which the throttle is set together with the amount

of pressure yieldingly exerted upon the throttle controls the density of the pulp delivered by the machine.

In the accompanying drawings,

Figure 1 represents a top plan view of the discharge end of a screw press embodying my invention,

Fig. 2, a vertical longitudinal central section of the construction illustrated in Fig. 1,

Fig. 3, a sectional view on an enlarged scale showing the draining compartment and certain associated parts,

Fig. 4, a vertical transverse section through the outlet end of the press taken through the cap and jacket and looking toward the plug,

Fig. 5 is a vertical longitudinal section showing a modified form of construction, and

Fig. 6 is a similar view showing an additional modified form of construction.

In the practice of my invention referring descriptively to the specific embodiment thereof which is herein exemplified in Figs. 1 to 4 of the drawings, the press comprises a worm screw 1 rotatably mounted in the perforated shell 2 of the casing 3 of the press, to which the outlet spout 4 is attached. Integral with the spout is a cap 5 with the outer bearing 6 for the extended shaft 7 of the screw. To a flange on the bearing a perforated jacket or pipe 8 is attached. This pipe has a lignum vitæ or babbitted bushing 9 fastened to its free end, by means of which the pipe is carried on the extended shaft 7 of the screw. The bushing 9 is provided with holes and grooves through which water under pressure is supplied as a lubricant for the shaft 7 and the front face of the screw 1. The water for the lubrication is supplied through the pipe 10 which is connected to the fresh water conduit of the mill. A pipe 11 leads the used water out of the bushing near the outlet 12 of the perforated pipe. Through this outlet the water which is pressed out from the pulp is also discharged. The pressure of the water supplied should be high enough to prevent pulp from entering between the adjoining faces of screw 1 and bushing 9. Instead of lubricating the bushing, an anti-friction bearing can be used as well. The adjustable plug 13 is guided on the perforated pipe 8 and can be moved towards or away from the discharge end of the outlet spout 4 by means of slip collar 17, levers 14 swinging around pin 15 which is carried by the boss 16 on the cap 5. The levers 14 engage slip collar 17 which in turn meshes with the ring-shaped groove of the plug 13. The pressure is applied to the plug or closure 13 by means of levers 18, weight spindle 19 and weights 20. The setting device is represented by spindle 21, which passes through the threaded fulcrum 22 and reposes in a cavity 23 in the cap 5. By turning handwheel 24, the spindle rises and lowers, thereby changing the distance between plug 13 and discharge end of outlet spout 4. The bar or fulcrum 22 has its ends rotatably mounted in the levers 18.

In Fig. 5 the bearing 6 carrying the extended shaft 7 of screw 1, is located within the outlet spout 4 and connected to the latter by means of two or more arms of an oval section, so as not to obstruct the free passage of the pulp between the arms. The bearing 6 extends towards the screw carrying a perforated jacket 8′, a ring 9 of anti-friction metal fastened to the inner face of the bearing and being used as seal between the rotating screw 1 and the bearing. If desired, the bearing body can be shaped in such a manner that perforated plates can also be inserted around the conical part of the body in order to increase the total inner perforated surface through which the liquor pressed out from the pulp passes. The liquor is discharged through the vertical connecting arm 12 which is hollow, this arm joining the bearing to the spout 4.

Instead of using a plugging device with circular cross-section as shown in Figs. 1, 2 and 3, the plugging device in Fig. 5 consists of: 2 flaps or valves forming a closure 13, laterally limited by the 2 vertical side walls of the outlet spout. To the pins 15 of the flaps, levers 14 and 18 are connected, the pressure on the flaps being produced by weights 20 located on the levers 18.

Fig. 6 shows a third modification of my invention with the bearing 6 of the extended shaft 7 of the screw 1 close to the body of this screw. The bearing 6 is again connected to the outlet spout 4 by means of two or more arms of oval section. The bearing extends away from the screw and carries a perforated jacket 8*a*. A bushing 9 of lignum vitæ or babbitted metal supports shaft 7; 10 and 11 represent water connections to and out of the bushing 9 for the same purpose as in Figs. 1, 2 and 3. 12 is the outlet of the jacket 8*a* for discharging the liquor expelled from the pulp. This outlet is in the form of a perforated arm which connects the bearing to the spout 4 and other arms which need not necessarily be perforated may connect the spout 4 and bearing 6 together at other points. The head of the bearing is cone shaped; 13 is the circular plug or closure having a cylindrical portion mounted to slide on the cap 4 and a conical open end. In the innermost position of the plug, the conical end of this closure comes into contact with the end of the bearing and completely shuts the outlet spout in this position. This shape of the plug allows an extremely fine regulation of the pressure and the passage area of the pressed out pulp. The movement of the plug and its setting device corresponds exactly with those of Figs. 1 to 5, and needs no further explanation.

In Figure 5 the spout 4 has an extension

4′ which carries the part 23*a* bearing the socket for the spindle 21. The two levers 14 are connected by a link 14*a* and the weighted lever 18 may be integral with the lower lever 14. Attached to the upper end 15 is an arm 18*a* to which is pivotally secured a threaded bearing block for the screw 21. In Figure 6 the part of the spout 4 which has the socket for the spindle 21 is shown at 23′.

While I have shown one of the preferred embodiments of my invention it is to be understood that various changes in form, arrangement and procedure may be resorted to without departing from the spirit and scope thereof as defined in the appended claims.

I claim:

1. A screw press comprising a casing having a rotary screw therein to expel liquid from the contents of the press, said screw having a reduced axial portion projecting from its body, a spout projecting from the discharge end of the press and extending around said axial portion, a bearing for the adjacent end of said axial portion carried by the spout, a perforated jacket surrounding said axial portion between the bearing and body of the screw, said jacket enclosing a space to receive liquid expelled from the contents of the press by the screw, and a bearing associated with the jacket engaging the body of the screw.

2. A press comprising a casing, a rotary screw therein, a spout for the discharge end of said casing, a bearing supported by the spout, the screw having an extension which is received in said bearing, a perforated jacket surrounding the extension between the screw and the bearing, and enclosing a space between it and the extension, the bearing having an outlet leading from the space between the jacket and the extension, and a closure mounted to slide on said jacket to control the delivery of the contents of the press.

3. A screw press comprising a casing, a rotary screw in the casing, a spout for the discharge end of the casing, a bearing within said spout, an extension on the shaft received by the bearing, a perforated jacket on the bearing enclosing a space to receive liquid expelled from the contents of the press, the bearing having an outlet leading from said space, said bearing also having a conical end, and a closure having a conical end to co-operate with the conical end of the bearing to control delivery of the contents from said press.

4. In a screw press of the kind described, a casing having a outlet end, a stationary cylindrical jacket located in the outlet end and defining with the casing a delivery outlet for material, a member on the casing supporting the jacket and provided with a bearing, a rotary screw within the casing having a reduced axial portion received in said bearing, said jacket surrounding the axial portion and extending from the bearing to the screw, a bushing interposed between the jacket and screw, and means for controlling the discharge of material through the delivery outlet.

5. In a screw press of the kind described, consisting of a casing having a rotary screw therein and provided with a fixed support at its outer end, a perforated cylindrical jacket fixed to the support and extending into the casing in coaxial relation to the screw, and defining with the casing an annular delivery outlet for the press contents, a bushing associated with the jacket and engaging the screw, and means for controlling the discharge of the press contents through said delivery outlet, comprising an annular plug slidable on the jacket toward and away from the delivery outlet, and weighted levers operatively mounted on the support and connected with the plug for normally urging the plug towards the delivery outlet.

6. In a screw press of the kind described, consisting of a casing having a rotary screw therein and provided with a fixed support at its outer end, a perforated cylindrical jacket carried by the support in coaxial relation to the screw and provided with a bushing engaging the screw, said jacket defining with the outlet end of the casing an annular delivery outlet for the press contents, means for controlling the discharge of the press contents through the delivery outlet, comprising an annular plug slidable on the jacket toward and away from the delivery outlet, a slip collar on the plug, a weighted lever fulcrumed on the support and connected with the slip collar whereby normally to urge the plug toward the delivery outlet, and a setting device for adjusting the position of the lever.

7. In a screw press of the kind described, a casing with an outlet end, a rotary screw in the casing having a reduced axial portion extending well beyond the outlet end, means supporting the outer end of the axial portion including a spout and a bearing in the spout for the axial portion, a perforated stationary jacket forming a liquid receiving space between it and the axial portion, said jacket extending from the bearing to the screw, and means controlling the delivery of the press contents through the outlet end, comprising an annular plug slidable on the jacket toward and away from the outlet end, and weighted levers associated with the cap normally urging the plug toward the outlet end.

8. In a screw press of the kind described, a casing having an outlet end, a spout on the casing for the outlet end and provided with a bearing, an axial extension on the screw received in the bearing, a stationary perforated jacket carried by the bearing and enclosing

a space to receive liquid, and means controlling the delivery of the press contents through the outlet end around the jacket, comprising an annular plug slidable on the jacket toward and away from the outlet end, and weighted levers arranged on the spout and connected with the plug for normally urging the plug towards the outlet end.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

RICHARD T. LANG.