June 21, 1955 H. W. GUETTLER 2,711,130

APRON TYPE PRESS

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Fig. 1

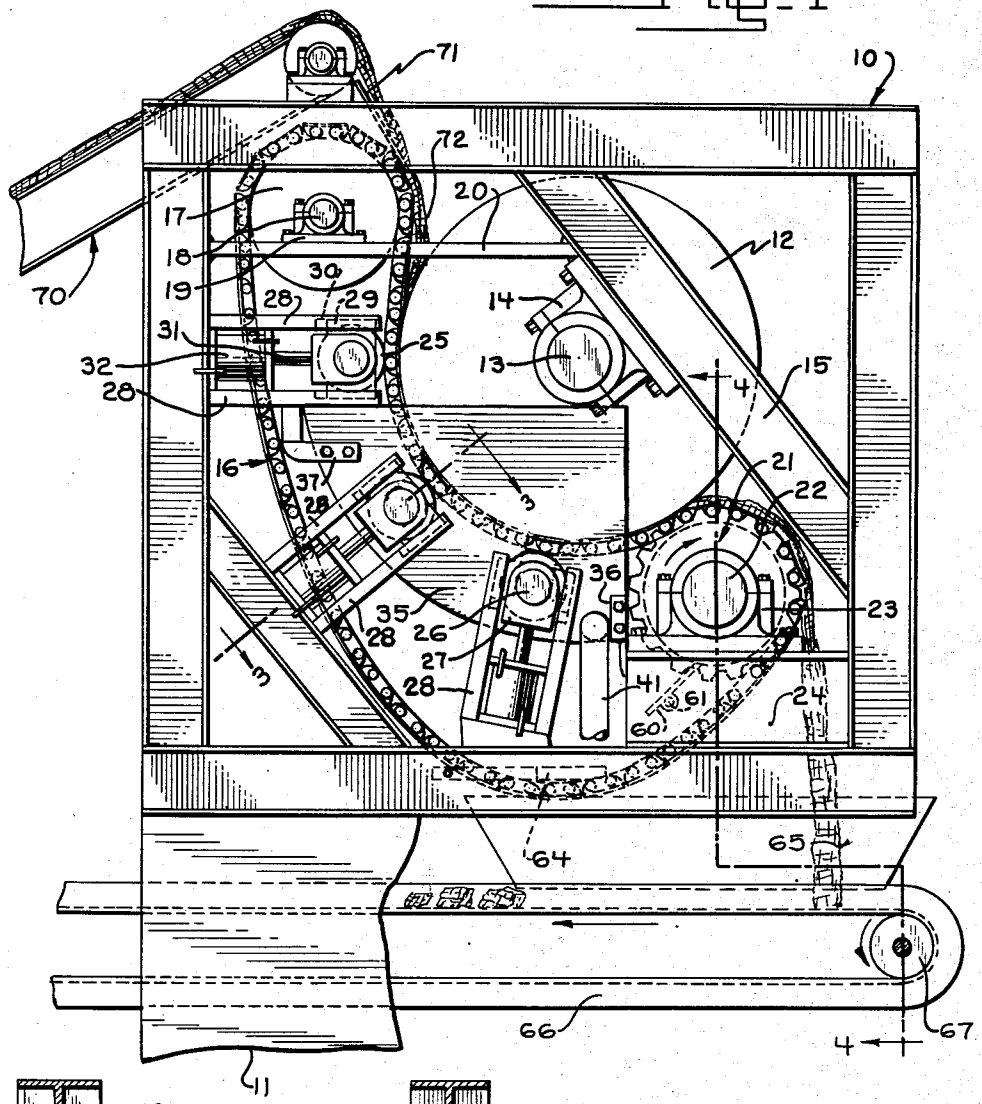
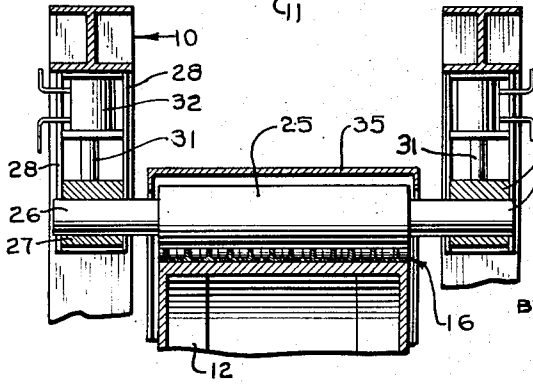


Fig. 3



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APRON TYPE PRESS

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Fig. 2

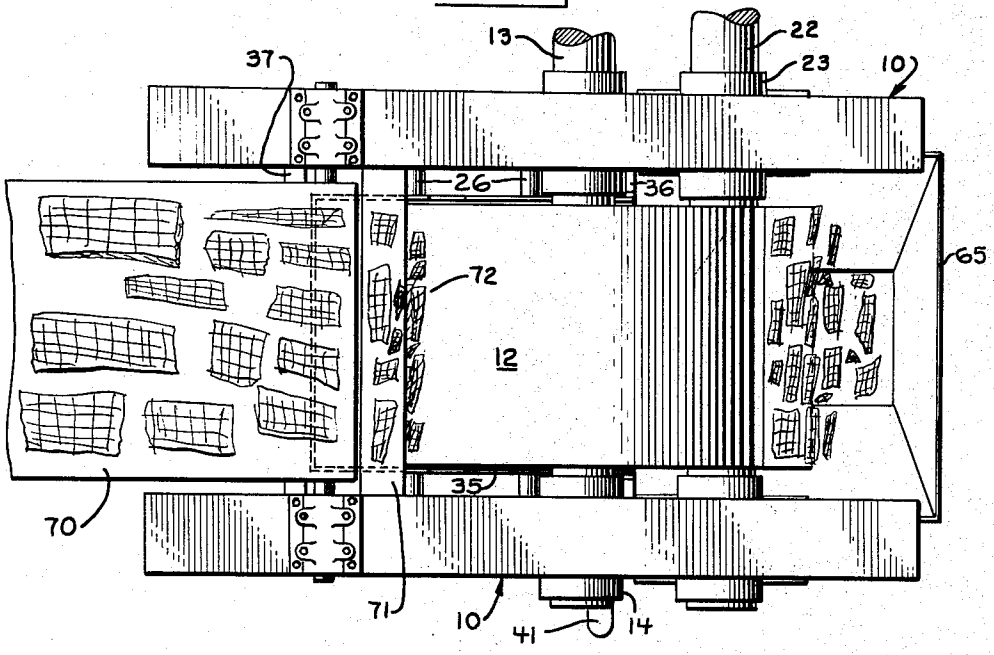


Fig. 4

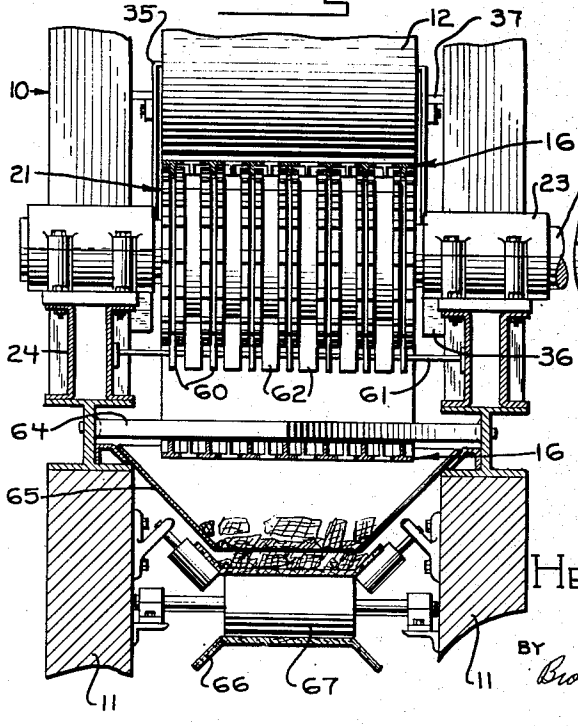
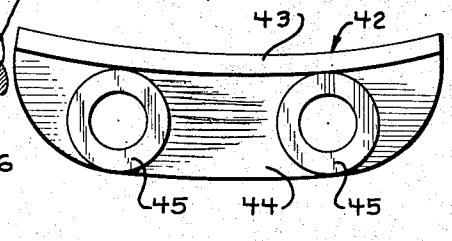


Fig. 7



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Fig. 5

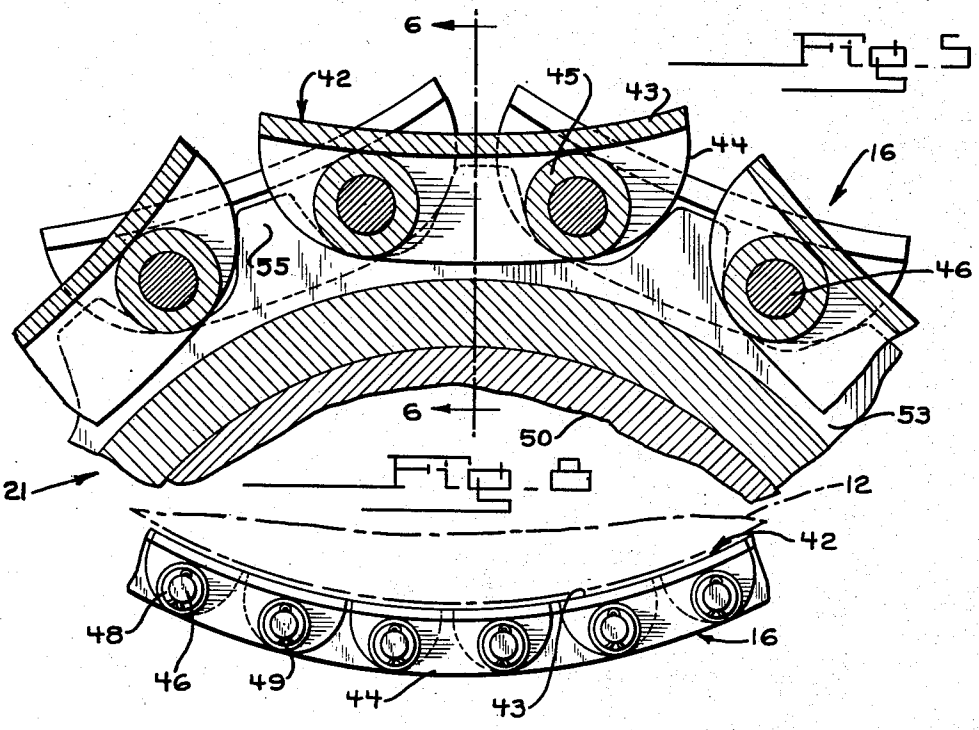


Fig. 9

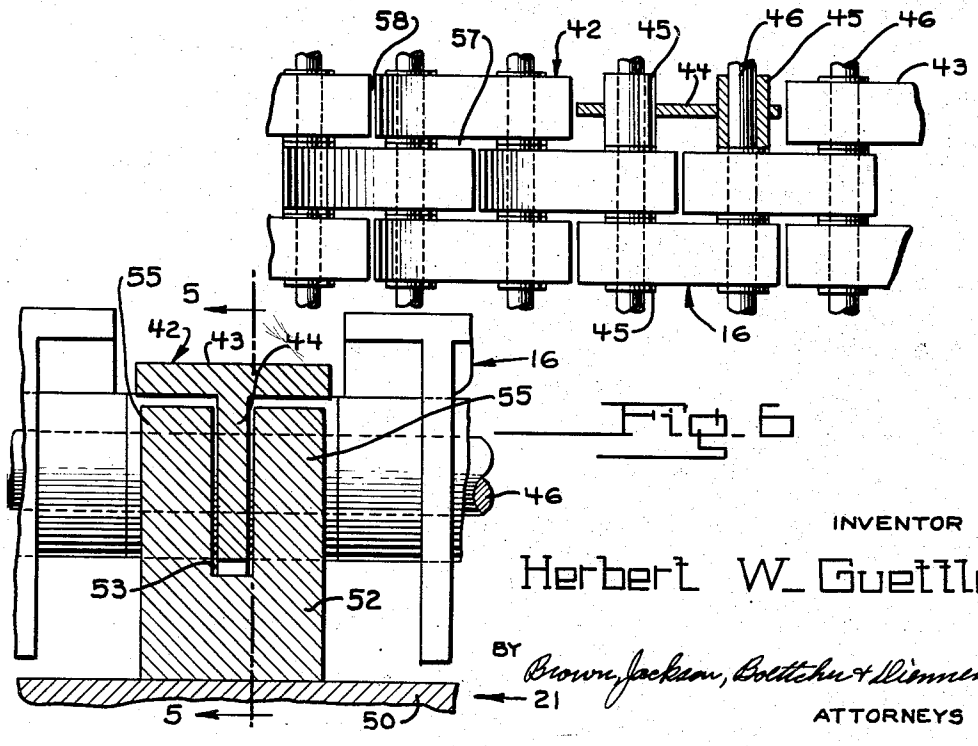


Fig. 6

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APRON TYPE PRESS

Herbert W. Guettler, San Francisco, Calif.

Application July 7, 1949, Serial No. 103,406
3 Claims. (Cl. 100—153)

This invention relates to presses, and has to do with presses of the apron type.

In various industrial processes waste materials are produced in large amount. Those materials, as produced, frequently contain considerable quantities of moisture which render them unfit for use. By reducing sufficiently the water content of such waste materials they may be rendered suitable for use for various purposes, for example, as fuel in the furnaces of the mills in which the materials are produced. For example, in paper mills large quantities of bark are removed from logs under treatment. This bark, as produced, contains water in such amount as to render it unsuitable for use as fuel. It is known to provide various types of presses for subjecting waste materials to pressure for removal in large part of the water content. Plunger presses and screw presses have been used for that purpose, but such presses have relatively small capacity and many of such presses are required for an ordinary mill, which is objectionable for obvious reasons. Roll presses have also been used but are also of limited capacity and objectionable for hte same reasons as plunger presses and screw presses. Apron presses, having an apron running between two press rolls, have also been used and have somewhat larger capacity than the other types of presses above mentioned. However, in the known apron presses the material is subjected to pressure for but a short time and such presses referred to are of limited capacity.

My invention is directed to the provision of a press of comparatively large capacity and continuous operation, capable of handling large volumes of waste materials such as above referred to. More particularly, I provide a large diameter cylinder and an apron extending about such cylinder in cooperating relation thereto for a substantial portion of the circumference thereof, and means for holding the apron to the cylinder under pressure, whereby the material under treatment is subjected to pressure for a considerable length of time between the cylinder and the apron. The apron is in the nature of a chain belt formed of links of metal, such as steel, such links being of substantially T cross section and possessing considerable mechanical strength, means being provided whereby one run of the apron is held under pressure in close proximity to the cylinder for cooperation therewith. The links of the apron are curved approximately on the same radius as that of the cylinder, so as to conform to the curvature thereof, for subjecting the material between the apron and the cylinder to high pressure throughout that portion of the cylinder about which the apron extends. I also provide means for driving the apron, such means preferably being effective for tensioning the apron about the cylinder, the latter also being driven if desired, though that is not essential. Further objects and advantages of my invention will appear from the detailed description.

In the drawings:

Figure 1 is a side view, partly broken away, of a press embodying my invention, this view also showing an elevator, partly broken away, for delivering material to the press, and a conveyor, also partly broken away, for transporting the pressed material to a suitable discharge point.

Figure 2 is a plan view of the press of Figure 1;

Figure 3 is a fragmentary sectional view taken substantially on line 3—3 of Figure 1, certain parts being shown in elevation;

Figure 4 is a partial sectional view taken substantially on line 4—4 of Figure 1;

Figure 5 is a fragmentary sectional view, on an enlarged scale, of the apron and the sprocket drive drum therefor, this view being taken lengthwise of the apron substantially on line 5—5 of Figure 6;

Figure 6 is a partial sectional view taken substantially on line 6—6 of Figure 5;

Figure 7 is a side view of one of the links of the apron on the same scale as Figure 5;

Figure 8 is a fragmentary side view, on a reduced scale relative to Figure 5, of the upper run of the apron and the press cylinder, the latter being shown fragmentarily, showing the manner in which the apron extends about the cylinder in concentric relation thereto; and

Figure 9 is a fragmentary plan view, on the same scale as Figure 8, of the apron, with certain parts broken away and shown in section.

The press of my invention comprises a suitably constructed and braced frame 10 conveniently mounted, in an appropriate manner, upon spaced apart foundation walls 11. A cylinder 12 of a large diameter is secured on a shaft 13 extending transversely of frame 10 and rotatably mounted in bearing blocks 14 secured, conveniently by bolting, to inclined braced members 15 of the frame 10. The shaft 13 may, if desired, be driven in any suitable manner at an appropriate speed, though that is not essential, as will appear more fully later.

An apron 16, to be described more fully later, extends about a lower rearward portion of cylinder 12 in close proximity thereto and along a substantial portion of the circumference thereof. The apron 16 passes about an idler roll 17 secured on a shaft 18 rotatably mounted in bearing blocks 19 suitably secured, conveniently by bolting, to brace members 20 of frame 10. From roll 17 the upper run of apron 16 passes downward about cylinder 12, as above described, and about a sprocket drum 21 secured on a shaft 22 rotatably mounted in bearing blocks 23 suitably secured, conveniently by bolting, to channel members 24 of frame 10. From the sprocket drum 21 the apron 16 passes rearward and upward to the roll 17. The shaft 22 is driven by suitable known means, and at appropriate speed, in clockwise direction as viewed in Figure 1. The sprocket drum 21 thus advances the upper run of apron 16 in a forward direction about the cylinder 12, as will be clear.

The upper run of apron 16 is held under pressure to the cylinder 12 by a suitable number—three are shown—of rollers 25 underlying the upper run of apron 16 in contact therewith. Each of the rollers 25 is provided at each end with a reduced stub shaft 26, shown more clearly in Figure 3. The stub shafts 26 of each of the rollers 25 are rotatably mounted in cross-heads 27 at the sides of the frame 10, slidably mounted in guide bars 28 welded or otherwise suitably secured at their outer ends to the frame structure. Each of the cross-heads is provided, at opposite sides thereof, with projections or ribs 29 slidable in guideways 30 in the bars 28, and is secured to the inner end of the piston rod 31 extending into a cylinder 32 appropriately mounted on the frame 10 between the guide bars 28. As will be readily understood, the piston rod 31 is secured to a piston operating in cylinder 32, the latter being provided with suitable connections for admitting fluid under pressure, preferably a liquid, to the cylinder 32 at one side of the piston and exhausting the fluid or liquid from the other side of

the piston. The rollers 25 are in contact with the under face of the upper run of the apron 16 and urge that run under pressure toward the cylinder 12, as will be understood. A sheet metal water pan 35 is suitably supported, conveniently by brackets 36 and 37 secured thereto and to elements of the frame 10, in underlying relation to cylinder 12 and the upper run of apron 16, this pan 35 extending about the cylinder 12 for a substantial portion of the circumference thereof. The pan 35 also underlies the rollers 25. The water pan 35 is provided, at its lower end, with an outlet from which extends a tube 41, leading to a suitable point of discharge, for taking off the water from pan 35.

Referring to Figures 5 to 9, inclusive, the apron 16 is of chain belt construction. It comprises a plurality of link members 42 of a T-shaped cross sectional configuration comprising a head 43 and a stem 44. Each of the link members 42 is formed of steel, or some other metal of adequate mechanical strength, and is curved lengthwise on a radius, approximately the same as the radius of the cylinder 12. The stem 44 of each link member 42 is provided, a short distance from each end, with a sleeve suitably secured therethrough providing two cylindrical bosses 45 disposed at opposite sides of stem 44. The bosses 45 receive pintle rods 46, by means of which the links 42 are pivoted together. As will be understood more clearly from Figure 9, the links are arranged in rows extending lengthwise of the apron, the links of each row being staggered relative to those of the next adjacent row. The rods 46 are restrained against endwise movement in a suitable manner, conveniently by washers 48, placed over the ends thereof, and cotter pins 49 inserted through the ends of rod 46, as shown in Figure 8. The links 42 are so disposed that the concaved surfaces of heads 42 thereof are presented to the cylinder 12, the upper run of apron 16 extending about cylinder 12 in close proximity thereto and in substantially concentric relation therewith, as in Figures 1 and 8. The rollers 25 contact the lower edges of stems 44 of links 42 for urging the upper run of apron 16 under pressure toward the cylinder 12, as will be clear from what has been said.

The sprocket drum 21 comprises a cylindrical body 50 suitably secured on shaft 22, and a plurality of sprocket rings 52 (Figures 4 and 6) are shrunk or otherwise suitably secured on body 50 and appropriately spaced lengthwise thereof. Each of the rings is provided with a circumferential groove 53 extending from its radially outer face inward to a suitable depth. The grooves 53 of the rings 52 receive the stems 44 of the links 42. Each sprocket ring 52 is further provided with appropriately spaced teeth 55 arranged in pairs, with the teeth of each pair aligned transversely of the groove 53. The teeth 55 are disposed for contact with bosses 45 of the links 42, as shown in Figure 5, for driving the apron 16. It will be noted that the groove 53 extends inward beyond the roots of the teeth 55, to accommodate the stems 44 of links 42, in the travel of apron 16 about the drum 21. It will also be noted that the bosses 45 are in contact at their ends and space the heads 43 of the links 42 a slight distance apart transversely of the apron, providing openings 57 through which water pressed from the material under treatment may readily escape. Further, the ends of the heads of the links are spaced a short distance apart, providing further openings for escape of the water. In Figure 9 the openings 57 and 58 have been exaggerated for purposes of illustration. In practice, the openings between the heads of the links 42 are adequate to permit ready escape of the water while being sufficiently small to prevent passage therethrough of the material under treatment to any objectionable extent.

In the operation of the press, a small amount of the material under treatment may pass between the links 42 in the travel of the apron 16 about the sprocket drum 21, since the links 42 are then tilted and the openings between the ends of adjacent links are increased, as will be clear from Figure 5. The material passing through the apron may tend to collect on the sprocket drum 21. To guard against that, I provide a plurality of scrapers 60 (Figures 1 and 4) mounted on a rod 61 secured between frame members 24. The scrapers 60 are disposed to extend into the grooves 53 of the sprocket rings 52, and scrapers 62, of greater width than the scrapers 60, are also secured on rod 61 and extend between the sprocket rings 52 to the body 50 of the sprocket drum, it being noted that alternate rows only of the link 42, crosswise of the apron 16, are driven by the sprocket rings 52. The scrapers 60 and 62 remove the material from the sprocket drum 21, this removed material dropping onto the upper face of the lower run of the apron 16. A deflector 64, of substantially V shape in plan, is suitably mounted at the lower portion of frame 10 in overlying relation to the lower run of apron 16 and in close proximity thereto, a short distance in rear of the scrapers 60 and 62. In the rearward and upward travel of the lower run of apron 16, the deflector functions to deflect the material on the upper face of the lower run of apron 16 outward and thus discharge it from the apron at the sides thereof.

A hopper 65 is suitably mounted in frame 10, at the lower portion thereof, in underlying relation to the forward portion of apron 16, this hopper 65 extending forward a substantial distance beyond the sprocket drum 21. A belt conveyor 66, of known type and of substantially U shape in cross section, underlies the hopper 65 for receiving the pressed material discharge therefrom. The conveyor 66 passes, at its forward end, about a roller 67, suitably mounted for rotation between the walls 11, and thence rearward to a suitable point of discharge, the upper run of conveyor 66 traveling in the direction indicated by the arrow.

It may be assumed, for purposes of description, that the press of my invention is used for treating bark removed from logs in a paper mill. The wet bark is delivered by an elevator 70, of suitable known type, to an inclined plate 71 mounted in frame 10 at the top thereof, and passes from plate 71 downward into a downwardly converging space or throat 72 between the cylinder 12 and the upper run of apron 16. The wet bark then passes between cylinder 12 and the portion of apron 16 extending substantially concentrically about, and is urged under pressure toward, cylinder 12. The bark is thus subjected to high pressure between the cylinder and the upper run of apron 16 during travel of the apron through a distance corresponding to a substantial portion of the circumference of cylinder 12, and is thereby subjected to a high pressure for a considerable length of time, sufficient to assure that the bark, as it passes with the apron 16 beyond cylinder 12, is in a sufficiently dry condition to assure that it can be burned without difficulty in the mill furnaces. As the pressed bark is discharged from the apron it passes downward through the hopper 65 and thence to the upper run of the conveyor 66, by which it is delivered to a suitable point of discharge, either directly to the furnaces or to a storage pile or bin awaiting its use as fuel, or for other purposes. The bark displaced from apron 16 by the deflector 64 drops into the hopper 65 and thence onto the conveyor 66. As above indicated, the press of my invention is suitable for treating various materials, particularly materials which are produced in large volume in industrial operations and which require to be pressed before being used as fuel or for other purposes.

The apron 16 is tensioned about cylinder 12 by the sprocket drum 21, as noted above. The bark is held against cylinder 12 by apron 16, under high pressure, and cylinder 12 is rotated by the apron 16 and the bark being pressed, during travel of apron 16. It is, therefore, not necessary, in many cases, to drive cylinder 12. In some cases, as where the material under treatment is slimy or slippery in character, it may be desirable to drive cylinder 12, which may be driven in any suitable manner.

It will be understood that changes in detail may be resorted to without departing from the field and scope of my invention, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred form only of my invention has been disclosed.

I claim:

1. In an apron type press having a cylinder mounted for free rotation and rigidly secured against radial movement, an endless apron of pivotally connected rigid drive links disposed in parallel staggered rows, said apron having one run thereof extending about the cylinder in substantially concentric cooperating relation thereto for a substantial portion of the circumference thereof; the improvement comprising means for positioning, tensioning, and retaining said run of the apron under pressure in operative relation to the cylinder, said means comprising the rigid links of the apron, a fluid actuated pressure applying means and an apron drive and tensioning means, each rigid link of said apron being substantially of T-cross section comprising an outer relatively wide pressure applying head and an inwardly extending pressure applying means engaging stem, said stem and head of each link being curved longitudinally of the apron on a radius corresponding approximately to the radius of the cylinder providing convex inner and concave outer apron surfaces respectively, the convex inner stem portions of the staggered rows when combined in side view have the appearance of providing a continuous inner curve substantially concentric with the surface of the cylinder in that portion thereof in said operative pressure relation thereto and having direct pressure engagement with said pressure applying means providing substantially equal distribution of the pressure throughout the concave outer surface in said operative pressure relation to said cylinder and urging the outer surface under pressure toward the cylinder with said concave outer surface in close proximity to the peripheral surface of the cylinder providing pressure against material therebetween, said apron drive and tensioning means comprising a rotatably mounted driven sprocket drum having circumferentially spaced axially aligned pairs of teeth axially separated by a circumferential groove extending radially beyond the root of the teeth, said apron passing about said drum with said groove receiving the longitudinally curved stems of the rigid links with the radial extent thereof providing clearance for the stems with said paired teeth engaging respective rigid links for driving and tensioning the apron in said operative pressure relation to the cylinder.

2. In a drive and pressure applying means for a press having a cylinder and an endless apron, said apron comprising pivotally connected rigid drive links disposed in parallel staggered rows having one run thereof extending about the cylinder in substantially concentric pressure operating relation thereto for a substantial portion of the circumference thereof, each rigid link of said apron being substantially of T-cross section comprising an outer relatively wide pressure apply head and an inwardly extending stem, said stem and head of each link being curved longitudinally of the apron on a radius corresponding approximately to the radius of the cylinder providing convex inner and concave outer apron surfaces respectively, the convex inner stem portions of the staggered rows when combined in side view have the appearance of providing a continuous inner curve substantially concentric with the surface of the cylinder in that portion thereof in said operative pressure relation thereto and having direct pressure engagement with a pressure applying means providing substantially equal distribution of the pressure throughout the concave outer surface in said operative pressure relation to said cylinder and urging the outer concave surface under pressure toward the cylinder with said outer surface of the cylinder providing pressure against material therebetween, apron drive and tensioning and means comprising a rotatably mounted driven sprocket drum having circumferentially spaced axially aligned pairs of teeth axially separated by a circumferential groove extending radially beyond the root of the teeth, said apron passing about said drum with said groove receiving the longitudinally curved stems of the rigid links with the radial extent thereof providing clearance for the stems with said paired teeth engaging respective rigid links for driving and tensioning the apron in said operative relation to the cylinder.

3. In a press for dehydrating bark from logs, an imperforate cylinder mounted for free rotation and rigidly secured against radial movement, an endless apron of pivotally connected rigid link construction having an upper run thereof passing about the peripheral surface of the cylinder in substantially concentric cooperating relation thereto for a substantial portion of the circumference thereof; the improvement comprising means for positioning, tensioning, and retaining said upper run of the apron under pressure in operative relation to the cylinder, said means comprising the rigid links of the apron, a fluid actuated pressure applying means and an apron drive and tensioning means, each rigid link of said apron being of substantially T-cross section comprising an outer relatively wide pressure applying head and an inwardly extending pressure applying means engaging stem, said stem and head of each link being curved longitudinally of the apron on a radius corresponding approximately to the radius of the cylinder providing convex inner and concave outer apron surfaces respectively, said links being disposed in parallel rows with the links of each row longitudinally staggered relative to the links of the next adjacent row with the longitudinal edge and transverse ends of said heads of the links being spaced apart transversely and longitudinally a distance materially less than the width of said heads providing therebetween restricted openings for discharge of water pressed from the bark, pintle rods passing through the stems of said links remote from the ends thereof and spaced inwardly from said heads pivotally connecting said links together, the convex inner stem portions of the staggered rows of links when combined in side view have the appearance of providing a continuous inner curve substantially concentric with the surface of the cylinder in that portion thereof in said operative pressure relation thereto and having direct pressure engagement with said pressure applying means providing substantially equal distribution of the pressure throughout the concave outer surface in said operative pressure relation to said cylinder and urging the outer surface under pressure toward the cylinder with said concave outer surface in close proximity to the peripheral surface of the cylinder providing pressure against the bark therebetween, said fluid actuated pressure applying means comprises a plurality of pressure rolls disposed generally concentrically with said peripheral surface of said cylinder for radial movement providing said pressure against the stems of said links, said apron drive and tensioning means comprising a rotatably mounted sprocket drum disposed with the curvature of the peripheral portions thereof curved opposite the curvature of the periphery of the cylinder, said drum comprising axially spaced sprocket rings having circumferentially spaced axially aligned pairs of teeth separated by a circumferential groove extending radially inward of said rings beyond the root of said teeth, said apron passing about said drum with the groove therein receiving the longitudinal curved stems of the rigid links and with the radial extent of the groove providing clearance for the stems, and bosses disposed on each pintle rod adjacent the ends and on opposite sides of the stem of each link to be engaged by the respective pair of teeth of said sprocket rings for driving and tensioning the apron in said operative relation to the cylinder.

(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

70,983	Fisher	Nov. 19, 1867
207,001	Barnes	Aug. 13, 1878
220,249	McCormick	Oct. 7, 1879
341,466	Fancher	May 11, 1886
474,802	Anderson	May 17, 1892
525,525	Anderson	Sept. 4, 1894
995,137	Hayward	June 13, 1911
1,094,200	Dodge	Apr. 21, 1914
1,133,539	Coldren	Mar. 30, 1915
1,141,869	Douglas	June 1, 1915
1,241,905	Behr	Oct. 2, 1917
1,454,536	Carleton	May 8, 1923
1,480,528	Morse	Jan. 8, 1924
1,653,991	Davis	Dec. 27, 1927
1,835,406	Kirsten	Dec. 8, 1931
2,027,657	Roggen	Jan. 14, 1936
2,216,996	Weston	Oct. 8, 1940
2,258,225	Shores	Oct. 7, 1941
2,365,658	Schumacher	Dec. 19, 1944
2,440,818	Bourdeaux	May 4, 1948
2,515,079	Dalrymple	July 11, 1950