Dec. 29, 1953 A. T. HURTER 2,664,204

ROTARY DRAINAGE SCREEN

Filed June 8, 1950

4 Sheets-Sheet 1

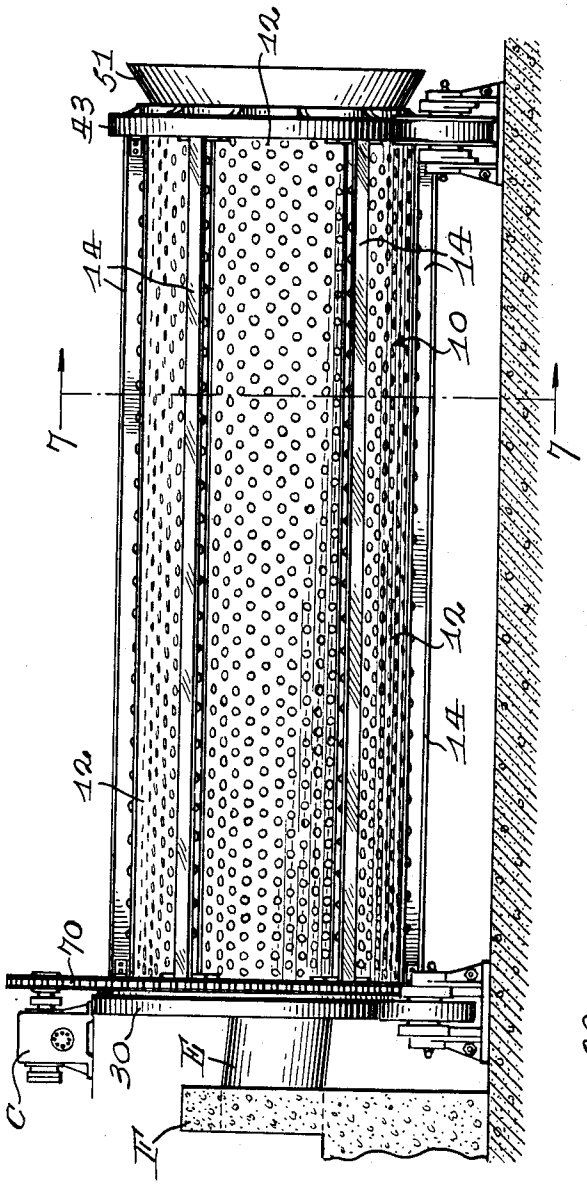


Fig. 1

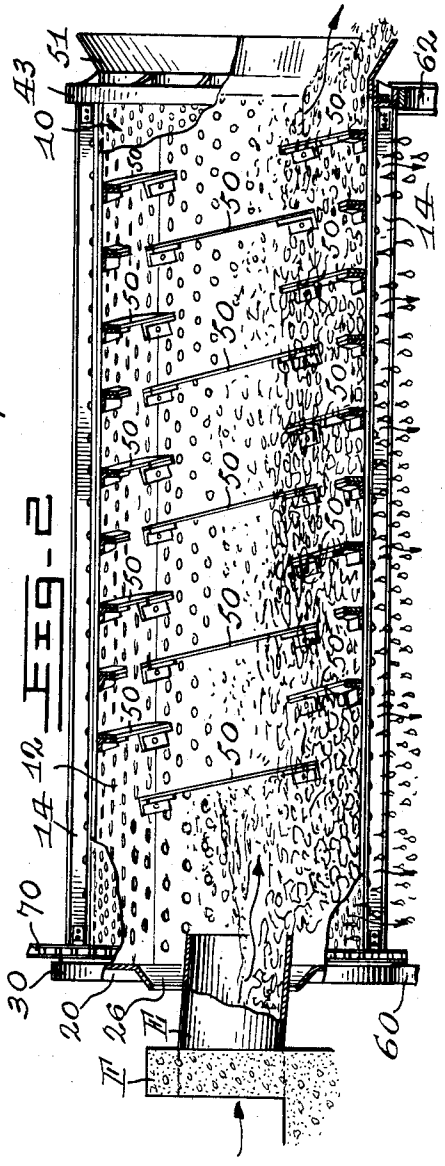


Fig. 2

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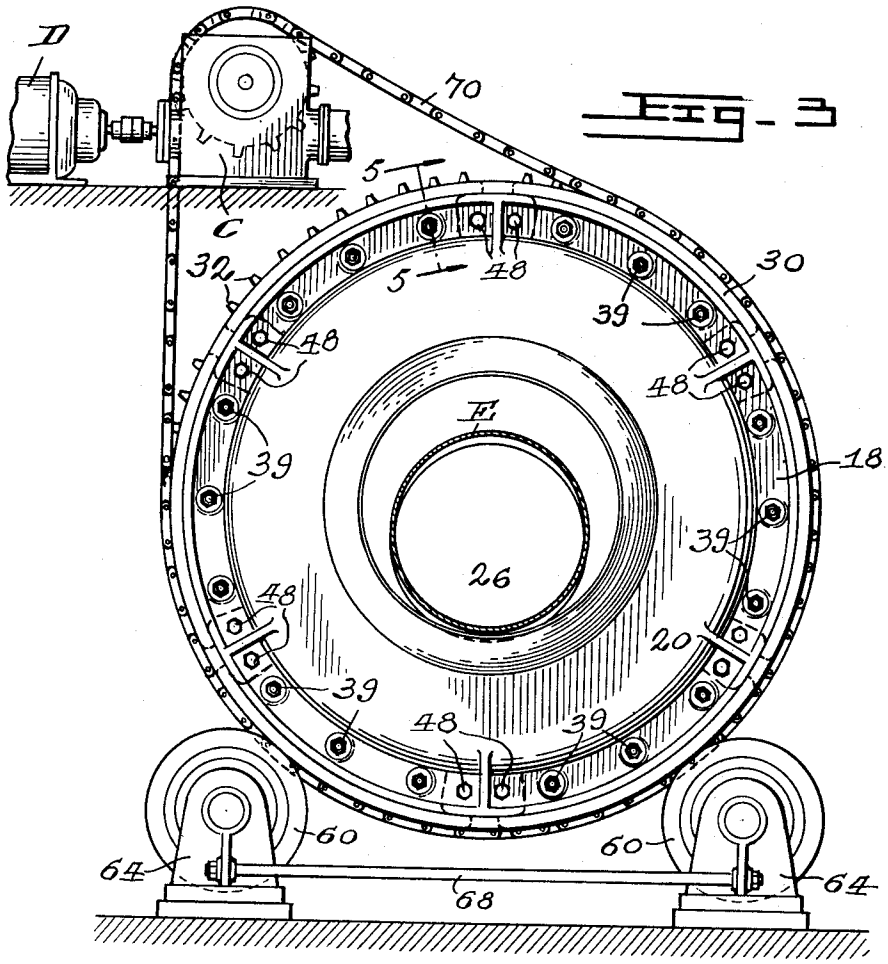


Fig. 3

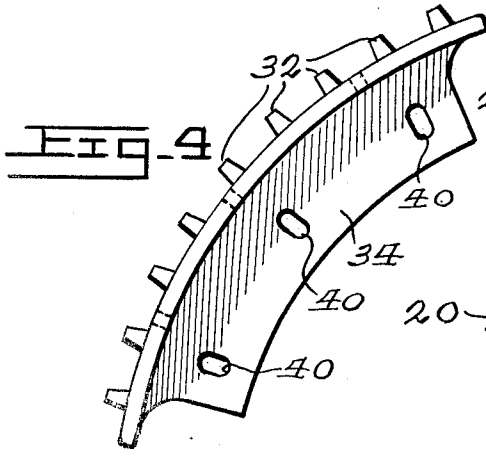


Fig. 4

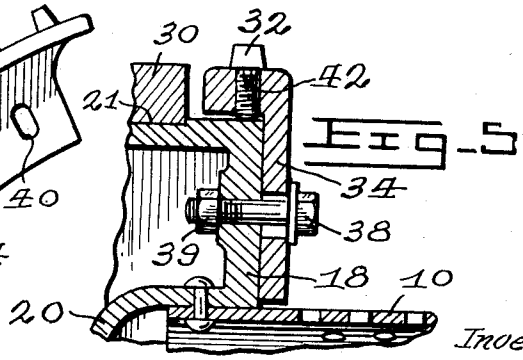


Fig. 5

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ROTARY DRAINAGE SCREEN

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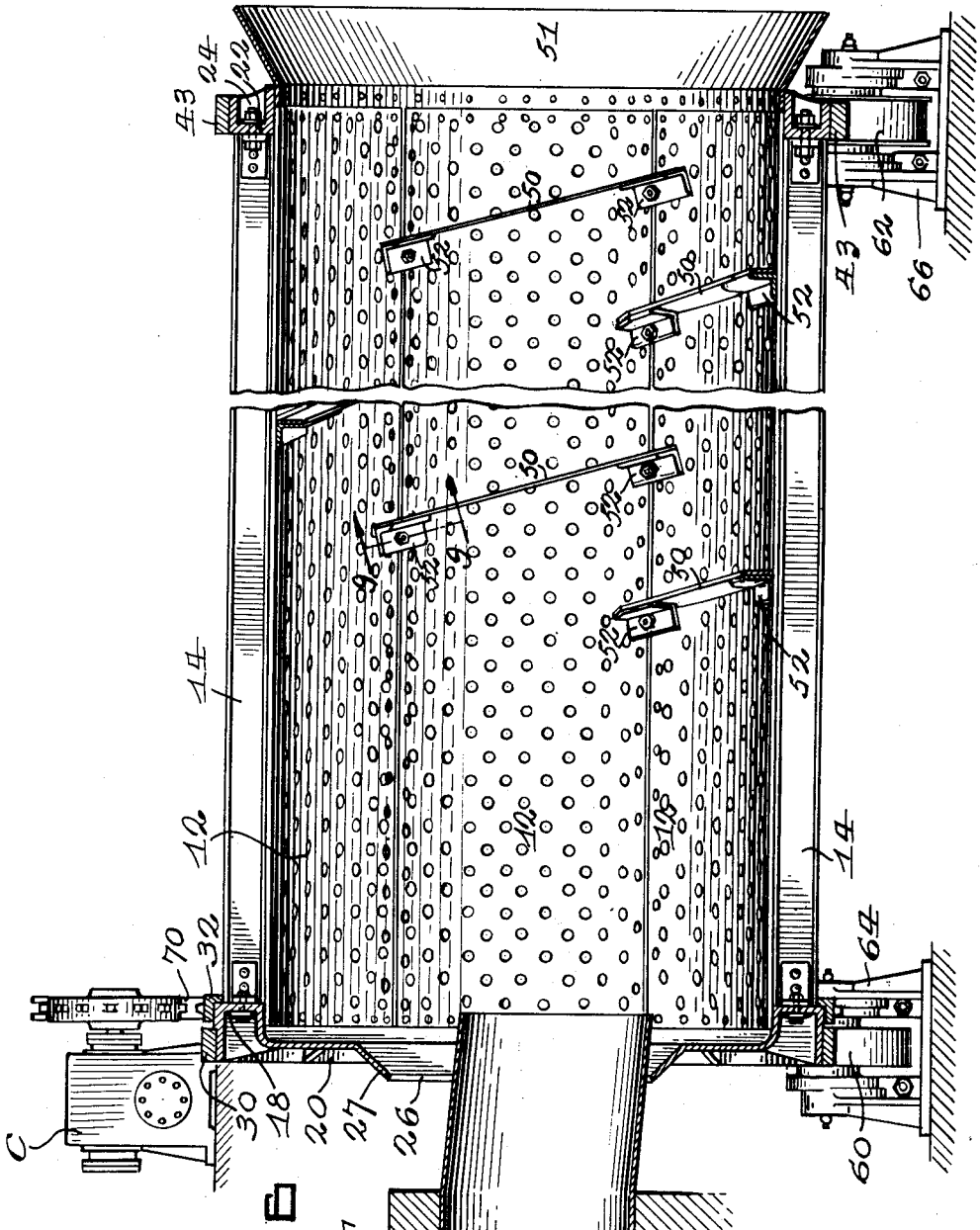


Fig. 6

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Fig. 7

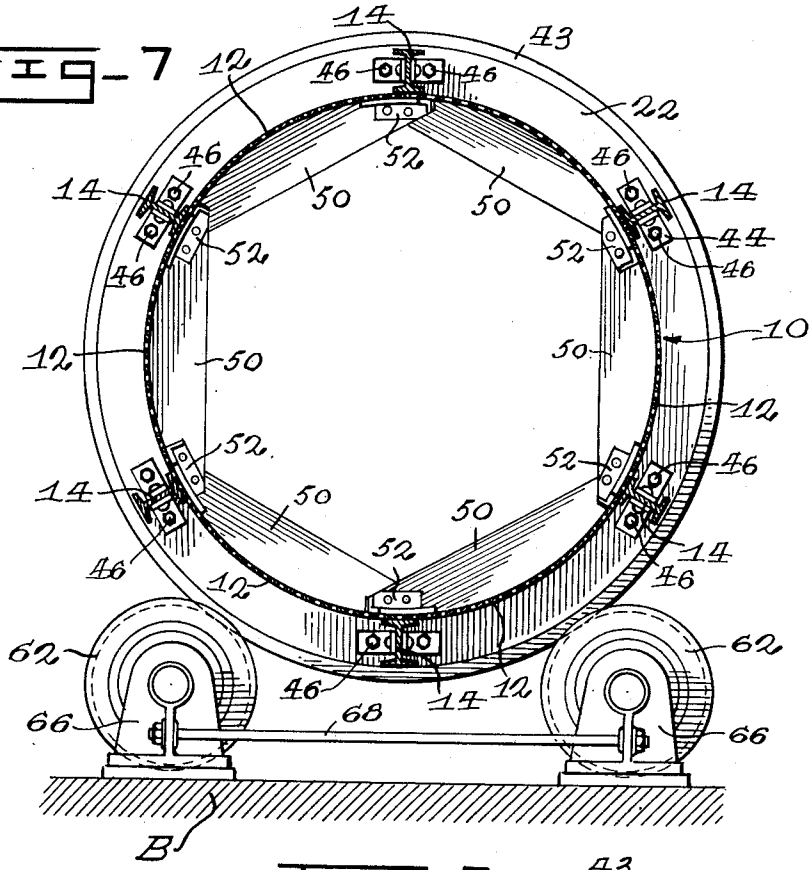


Fig. 8

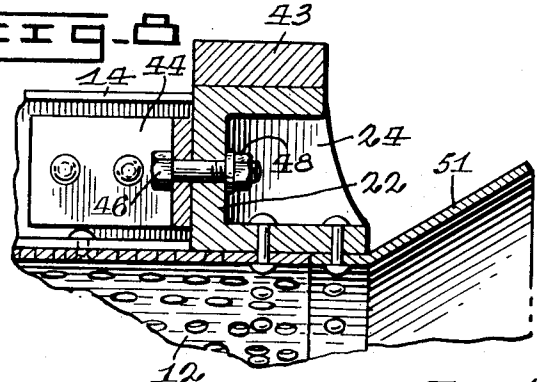
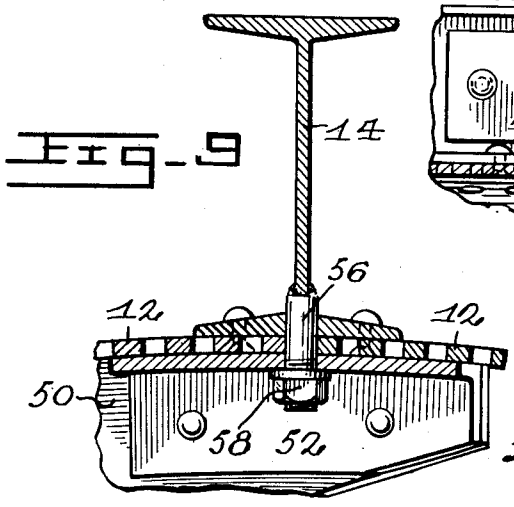


Fig. 9



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UNITED STATES PATENT OFFICE

2,664,204

ROTARY DRAINAGE SCREEN

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Application June 8, 1950, Serial No. 166,825

1 Claim. (Cl. 210—199)

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The present invention relates to water extraction apparatus and more particularly to apparatus of this nature utilized for the removing of excess water from wood waste, such as bark or the like.

In the usual process of debarking pulp wood logs the logs are placed in large tumbler drums that are provided with internal projections adapted to loosen the bark as the logs are whirled about. This operation is generally carried out with water supplied to the drum so as to keep the logs wet and aid in the loosening of the bark. As will be understood, the bark becomes soaked or impregnated with water and at the same time picks up quite a lot of excess moisture externally due to its rough outer surface. The peeled bark is usually sluiced with water from the barking drum and dumped into a convenient river or stream, or alternatively piled and allowed to dry after which it is burnt. At the present time the disposal of this wood waste presents a considerable problem to the pulp producing industry as in many places there are anti-pollution laws which now forbid the dumping of wood waste into rivers or streams.

Where such laws exist, the only other practical means of disposing of the bark is to burn it. As there are great quantities of this material dumped each day from the average mill the process of extracting the excess water from the bark must be accelerated. If it is just dumped in piles and left to dry out naturally, it will be understood that this takes considerable time and consequently a great deal of storage space is required.

Therefore, the bark is usually first subjected to a preliminary operation which allows the excess or surface moisture to drain from the bark and it is then placed in bark presses where sufficient of the water is removed to allow for efficient disposal by combustion. Without this preliminary step of dewatering, the bark press would soon clog up and further the amount of water remaining in the bark would be in excess of the 50 to 60% moisture content which is the maximum possible to maintain proper disposal by means of combustion.

Various apparatus has been designed for this excess water removal, for example, inclined scraper conveyors are sometimes utilized, but in order to handle the required volume of wood waste these are generally large and cumbersome, involving complicated systems of conveyors, chains, and gears which necessarily requires considerable initial outlay for their installation and also subsequent high maintenance costs.

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The present invention recognizes these difficulties and aims to provide a satisfactory solution by providing an additional perforated drum or screen into which the bark can be discharged from the tumbler drum and rotated so as to drain away most of this excess water.

The present apparatus is designed so as to require a minimum of maintenance for its efficient operation and further requires considerably less space for its installation as compared with prior art apparatus used for this purpose.

The apparatus is not intended to force the water from the interior of the bark but merely to agitate the bark while allowing the surplus water to be drained off from the exterior of the bark.

Accordingly, the invention is a bark draining or revolving screen that comprises essentially of a perforated drum that is mounted so as to be rotatable about a horizontal axis and which includes internal deflecting members that are adapted to agitate and carry the bark at a retarded speed along the length of the drum.

More specifically, a preferred construction of a bark revolving screen constructed in accordance with the invention comprises of a perforated cylindrical drum that is provided at each end with annular riding rings that are supported for rotation on spaced apart trunnion wheels. The front end of the drum is closed off by a casting which includes a centrally located inlet opening and the rear end of the drum is constructed so as to provide an unrestricted discharge outlet equal to the internal diameter of the drum. A plurality of deflecting members are mounted within the drum in regular spaced apart sequence to form a spiral formation about a major portion of the longitudinal axis of the drum with the outer ends of the deflecting members overlapped circumferentially. With this arrangement, the rotation of the drum causes the deflecting members to agitate and guide the wet bark along the length of the drum while the surplus water drains off through the perforations in the walls of the drum.

In the preferred construction the rear set of trunnion wheels are grooved so as to retain the rear riding ring and drum from lateral movement. The drum is provided with an annular driving sprocket that surrounds the front end of the drum and which is preferably constructed in several interlocking segments that are secured to the peripheral margin of the casting forming the inlet end of the drum. The main cylindrical body of the drum is reinforced longitudinally by radially spaced apart beam members that extend between

and are secured to the front casting and a second annular casting that surrounds the discharge end of the drum and serves as a supporting base for the rear riding ring.

Having thus generally described the nature of the invention particular reference will be made to the accompanying drawings, and in which:

Figure 1 is a side elevation of a preferred construction of a bark revolving screen according to the invention.

Figure 2 is a diagrammatic view, partially in section, of the construction of Figure 1 to illustrate the action of the revolving cylinder in operation.

Figure 3 is an end view of the inlet end of the construction shown in Figure 1 with the supporting foundation for the inlet spout removed for clarity.

Figure 4 is an enlarged detail view of one of the sprocket sections.

Figure 5 is an enlarged sectional view of Figure 3 along the line 5—5.

Figure 6 is an enlarged horizontal cross section of the construction shown in Figure 1 to illustrate in more detail the assembly and relative positions of the various portions of the apparatus.

Figure 7 is a sectional view of Figure 1 along the line 7—7.

Figure 8 is an enlarged detail view of a portion of the discharge end of the cylinder, to illustrate more clearly the attachment of the end casting and longitudinal support members.

Figure 9 is a sectional view of Figure 6 along the line 9—9 to illustrate in more detail the attachment of the deflectors to the interior of the perforated cylinder.

With particular reference to Figures 1, 2, and 3 of the drawings which illustrate in detail and in section a preferred construction of a bark revolving or draining screen as it appears in side elevation, 10 designates the main cylindrical screen or drum of the apparatus. The main drum body 10 is made up of a series of perforated curved plates 12 that are interconnected radially by attachment of their longitudinal marginal edges to the lower flanges of a plurality of radially spaced apart I-beams 14, preferably by riveting. The I-beams 14 are arranged so as to extend substantially the length of the drum body 10 on the outer peripheral surface and are connected between a casting 20 surrounding the inlet end of the drum and a further annular casting 24 surrounding the discharge end of the drum. The casting 20 includes an outstanding annular flange 18 and the casting 24 an outstanding flange 22 and the ends of the I-beams 14 are secured to these respective flanges.

The casting 20 surrounding the inlet end of the drum 10 is formed so as to have a centrally disposed inlet opening 26 surrounded by an outwardly sloping annular flange 27 that extends from the main body of the casting. The outer peripheral edge of the casting 20 is formed so as to extend inwardly and overlap the ends of the perforated plates 12 and terminate in the outwardly extending annular flange 18 to which the beams 14 are secured and which also serves as a base for the attaching of a front riding ring 30 and a driving sprocket 32.

The driving sprocket 32 is made up of a plurality of separate sprocket segments 34, see Figure 4, which are secured to the casting flange 18 by means of bolts 38 and nuts 39. As shown in detail in Figure 5, the openings 40 in the sprocket segments 34 through which the bolts 38 pass are elongated, and the segments 34 can be adjusted radially by means of a plurality of set screws 42 which are threadably engaged in the upper flange of each segment 34 and are adapted to bear against the upper surface of the casting flange 18. In the preferred construction illustrated there are three set screws 42 to each segment 34 and these are spaced apart circumferentially so as to allow each segment to be capable of individual adjustment. The upper peripheral surface of the flange 18 of the casting 20 is recessed as indicated at 21 and the front riding ring 30 fits over this recess adjacent to and in front of the driving sprocket 32.

The flange 22 of the annular casting 24 which surrounds the discharge end of the drum 10 includes a flat outer peripheral surface on which the rear riding ring 43 is mounted. The annular casting 24 is positioned on the discharge end of the drum 10 so as to overlap the outer ends of the perforated plates 12 with a portion of the casting 24 protruding beyond the outer marginal edge of the plates 12 so as to provide a means of attaching an annular flanged collar 51 that surrounds the discharge end of the drum 10 with the inner surface flush with the interior of the drum.

The I-beams 14 are secured to the outstanding flanges 18, 22 of the castings 20, 24 by means of angle brackets 44 which are riveted to each side of each end of the beams 14 between the upper end and lower flanges with the other leg of the angle being secured to the castings 20, 24 by suitable bolts 46 and nuts 48.

A plurality of deflecting plates 50 are mounted within the interior of the drum 10 in regular spaced apart staggered sequence so that they follow a spiral conformation about the longitudinal axis of the drum. Each of the plates 50 have the lower side shaped to conform to the internal curvature of the drum 10 with the upper side extending straight across so as to effectively block off a segment of the drum's inner peripheral surface. The plates 50 are each mounted within the drum at an oblique angle relative to the drum ends so that each plate deflects the bark from the inlet end of the drum towards the discharge outlet and they are arranged relative to the circumference of the drum so that the ends of the plates overlap circumferentially.

As is shown in detail in Figures 6 and 9, the plates 50 are each of sufficient length to obliquely span one of the perforated plates 12 and they are secured to the drum by means of angle plates 52. The angle plates 52 are riveted to the plates 50 and secured along the juncture of each of the perforated plates 12 to the I-beams 14 by means of studs 56 that are inserted through suitable holes drilled between the plates into the lower flange of the I-beams 14 where they are secured by welding. The lower ends of the studs 56 projecting within the drum 10 are threaded and the plates 52 include suitable openings through which the studs 56 pass allowing the angle plates 52 to be fastened in position by means of suitable nuts and washers 58.

The riding rings 30, 43 are supported for rotation between spaced apart trunnion wheels 60, 62 journalled in bearing supports 64, 66 fastened to a suitable foundation B. The rear trunnion wheels 62 are flanged so as to retain the rear riding ring 43 and the drum assembly against lateral displacement. Both sets of trunnion wheel bearing supports are reinforced against spreading by transverse rods 68 that extend across beneath the drum 10 adjacent the front and rear.

With particular reference to Figure 3, the driv-

ing sprocket 32 is driven by means of a sprocket chain 70 from a suitable transmission box C powered through motor D. It will be understood that this driving means is illustrative only and that other suitable driving means could be employed to rotate a revolving screen constructed in accordance with the invention.

In use, the apparatus is preferably erected on a suitable foundation adjacent to the usual barking mills and an inlet spout E mounted on a rigid base F is adapted to deliver bark and water into the inlet opening 26 of the drum 10, see Figure 2. The drum 10 is rotated at a speed sufficient to thoroughly agitate the bark as it is moved through the drum 10 by the deflector plates 50 but not sufficiently fast to expel any of the water by centrifugal force. The main purpose of the present deflecting plate arrangement is to cause the bark to move along the perforated surface of the drum at a retarded speed to allow the surface water to drain therefrom and is not intended to squeeze or force water from the bark as would be done in a bark press.

The removal of the surface water from the bark has been found to greatly expedite the drying out of the usual piles of wood waste so that their disposal, generally by combustion, can be accomplished with a considerable saving of time.

I claim:

An apparatus for the draining of excess water from water soaked bark comprising a cylindrical drum having an elongated main body, means supporting said drum exteriorly for rotation about an horizontal axis, said drum body consisting of a plurality of elongated perforated plates of arcuate cross section interconnected along the longitudinal marginal edges by attachment to a plurality of longitudinally extending reinforcing beams disposed in equal radially spaced apart relationship about the exterior of said drum body, said drum having an unrestricted discharge outlet equal to the internal diameter of said drum disposed at one end and a centrally disposed unrestricted inlet opening of considerably lesser diameter at the other end, a plurality of deflector members mounted within said drum in regular spaced apart relationship and in a helical formation extending about a major portion of the longitudinal axis of said drum with the ends of the deflector members overlapping circumferentially, each of said deflecting members having a lower marginal edge shaped to conform with the internal curvature of said drum with the upper marginal edge being straight so that each member is adapted to effectively block off a semicircular segment of said drum's inner peripheral surface and means to rotate said drum comprising a sprocket gear surrounding the inlet end of said drum, a sprocket chain, motor means to drive said sprocket chain, said sprocket gear consisting of a plurality of separate arcuate toothed segments each carrying a plurality of teeth and being mounted in equally spaced apart relationship about said drum end and means whereby each of said sprocket gear segments are adjustable radially.

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