May 27, 1930. F. FARREL, JR 1,759,896

MILL SHREDDER

Filed July 1, 1927

Fig. 1.

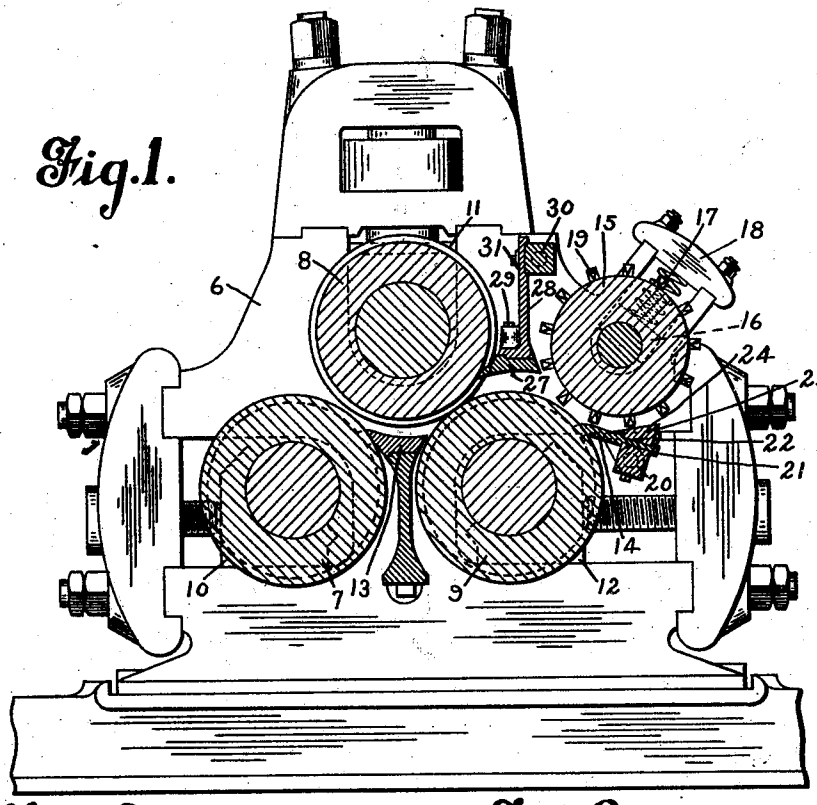


Fig. 3.

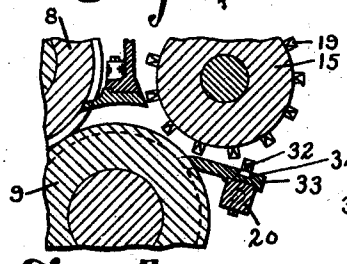


Fig. 2.

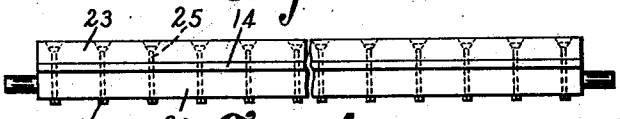


Fig. 4.

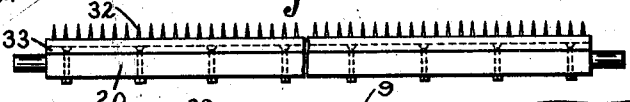


Fig. 5.

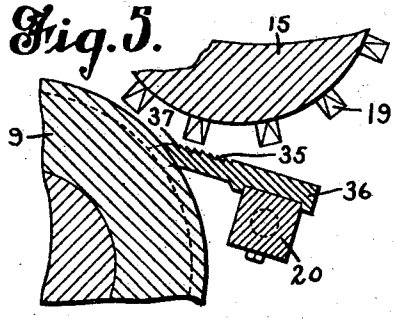
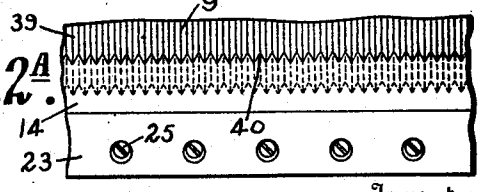


Fig. 2A.



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UNITED STATES PATENT OFFICE

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MILL SHREDDER

Application filed July 1, 1927. Serial No. 202,385.

This invention relates to a cane mill and in particular to a mill adapted to crush and disintegrate the cane preceding subsequent juice expressing operations. In the operation of tandems made up of a series of sets of juice expressing rolls, with or without a preliminary crusher, it is highly important that the cane be thoroughly disintegrated early in the operation of the tandem in order that the subsequent juice expressing operations may be efficiently carried out. It has been proposed to use in connection with one of the first sets of rolls of the tandem, for example, the first three roller mill, a shredder roll driven at a relatively high speed and having a number of knives carried on the outer surface thereof which engage the cane and disintegrate it. These shredding rolls usually cooperate with one of the rolls of the mill, with a scraper bar, or both, or some other means, carried on the mill. As the primary object of my invention, I contemplate a mill of the above type in which the shredding is carried out in a more efficient manner than in those previously known.

It is customary in mills employing shredding rolls, to revolve the roll so that the teeth travel in the same direction as the cane. There is a tendency in these mills for the teeth of the roll to pick up the cane or otherwise drag it through the mill without acting on the cane to disintegrate it. It is an object of the present invention to prevent cane from passing through the mill in this manner.

In a more specific aspect, it is an object of the present invention to provide means which will control or retard to a certain extent the passage of cane between the shredder roll and its cooperating means in order that the knives or the shredder roll may more efficiently disintegrate the cane.

The means cooperating with the shredder roll, in the present application, is a scraper bar arranged in contact with one of the rolls of the mill, and as another object of my invention I contemplate means associated directly with the scraper bar for retarding the movement of the cane thereon and holding it subject to the action of the shredder roll so that it is thoroughly shredded by the rapidly revolving shredder knives.

A further object of my invention is to deliver the cane to the shredder roll and its cooperating means in a compact mass so that the revolving knives of the shredder may more efficiently disintegrate the cane.

To these and other ends the invention resides in certain novel features and combinations of parts to be hereinafter described and claimed.

In the drawings,

Fig. 1 is a side elevation, partly in section, of a mill having my invention embodied therein;

Fig. 2 is a side elevation of the scraper bar shown in Fig. 1;

Fig. 2A is a partial plan view of the scraper bar shown in Fig. 2, and the roll with which it cooperates;

Fig. 3 is a view of a modified form of scraper bar with teeth thereon;

Fig. 4 is a side elevation of the scraper bar shown in Fig. 3; and

Fig. 5 is a view of still another modification of the scraper bar.

Referring to the drawings, in which I have shown some preferred embodiments of my invention, the reference numeral 6 designates generally the housing of a three-roll cane mill having, as is usual in such mills, a cane roll 7, a top roll 8, and a bagasse roll 9, which are mounted in adjustable bearings 10, 11 and 12, respectively. Between the cane roll 7 and the bagasse roll 9 is mounted a turn plate 13 of usual form and supported in the usual manner. A scraper bar 14 is shown cooperating with bagasse roll 9 and above the scraper bar is a shredder roll 15, mounted in suitable adjustable bearings 16, and yieldingly urged towards the bagasse roll 9 and the cooperating scraper bar 14 by means of the springs 17 supported between the bearings 16 and caps 18. On the outer surface of the shredder roll is a series of teeth 19. The scraper bar 14 is secured on a square rod 20 by means of a groove 21 formed in the lower face of the scraper bar for the reception of the rod 20, the latter having its outer ends mounted in bearings 22, secured on the mill 6. On the

upper surface of the bar 14 and on the opposite side from roll 9 is a retarding block 23, herein shown as generally triangular in cross-section, with its upper surface closely adjacent but spaced from the teeth of the shredder roll 15, and a portion of its lower surface received in the slot 24 of the scraper bar 14. Suitable means are provided for securing the block 23, scraper bar 14, and rod 20 together, herein a series of bolts 25 being shown, which pass through the block 23, scraper bar 14, and rod 20, the bolts 25 having their heads received in countersunk openings in block 23 and secured against displacement by nuts 26.

Between the juice expressing roll 8 and the shredder roll 15 is a turn plate 27 having one of its lower edges in contact with the roll 8 and the opposite edge spaced from the roll 15 to give clearance to the teeth 19. The turn plate 27 is supported on an inverted L-shaped bracket 28, being secured thereto by bolts 29, the bracket in turn being attached to a shaft 30 by suitable means, as, for example, bolts 31. The shaft 30 is mounted on the mill 6 in any suitable manner, not being shown herein in detail.

In Fig. 3, I have shown a modified form of a scraper bar for the bagasse roll in which the block 23 of Figs. 1, 2 and 2^A is replaced by a series of teeth 32 arranged in horizontal alignment on the upper surface of the scraper bar 33 and having their sides converging towards the top, front and rear edges in order to form cutting edges. Teeth 32 are supported in bar 33 in any suitable manner, and as shown herein are mounted in a dovetailed slot 34 formed in the upper face of the scraper bar.

In Fig. 5, I have shown another modification in which a series of teeth 35 are formed in the upper surface of the scraper bar 36, each of the teeth having one of its faces 37 disposed toward the bagasse roll and at right angles to the upper surface of the bar 36, and each having its rear face sloping downwardly and away from the bagasse roll.

As is customary in mills of this type the cane roll 7, top roll 8, and bagasse roll 9 are provided with circumferential V-shaped grooves 39. The scraper bar 14 is provided with a series of V-shaped teeth 40 adapted to enter the grooves 39 and to remove any cane adhering to the roll 9. The turn plate 27 is provided with similar V-shaped teeth engaging the grooves of the top roll.

In operation, it will be understood that, with reference to Fig. 1, the cane roll 7 and bagasse roll 9 are rotated in a clockwise direction, while the top roll 8 and shredding roll 15 are driven in a counter-clockwise direction. The cane passes between the cane roll 7 and top roll 8 over the top of the turn plate 13 and between the top roll 8 and bagasse roll 9, where it is crushed and disintegrated. The disintegrated cane is carried in a compact mass between the turn plate 27 and roll 9, over to and between the shredder roll 15, the roll 9, and scraper bar 14. The rapidly revolving knives of the shredder roll 15 engage the cane passing between this roll and the scraper bar 14, and thoroughly disintegrate the same. Block 23, which is arranged at an angle to the upper surface of the scraper bar 14, retards the passage of cane thereover, permitting the teeth of the shredder roll to have a prolonged action on the cane, and prevents the teeth from merely dragging the cane over the upper surface of the scraper bar.

In the form shown in Fig. 3, the teeth 32 not only act in the same manner as the block 23 in opposing the movement of the cane over the upper surface of the scraper bar, but in themselves have cutting edges so that they may assist in disintegrating the cane.

In the form shown in Fig. 5, the teeth arranged at an angle to the upper surface of the scraper bar engage the cane passing thereover and oppose the movement of the cane so that the teeth of the shredder roll may efficiently act thereon.

While I have shown my improvement arranged on a three-roll mill, it is to be readily understood that the same is not limited thereto, but may be used in other mills, for instance, one having two cooperating rolls.

The cane acted on and discharged by rolls 8 and 9 is ordinarily in rather small pieces, for the most part, and if acted on while in a loose condition, by the knives of the roll 15, would offer insufficient resistance to the knives and tend to be picked up bodily thereby and carried through the mill without undergoing an effective shredding action. By keeping the cane compressed by means of the turn plate 27, the cane presented to the knives 19 of roll 15 is in a compact mass and so supported for the action of the knives thereon that it is thoroughly disintegrated by the rapidly revolving knives and reduced to a fluffy mass of well separated fibers from which the remaining juice may be readily extracted by further juice expressing operations.

It is to be understood that the invention is not limited to all the details shown herein but is capable of variation and modification within the spirit of the invention and the scope of the appended claims.

What I claim is:

1. In a cane mill, shredding means, means cooperating therewith adapted to support cane passing through said mill while acted on by said shredding means, and means for resisting movement of the cane over said cooperating means due to the action of said shredding means thereon, said last named means being provided with a cane supporting surface arranged at an angle to the adjacent cane supporting surface of the cooperating means.

2. In a cane mill, shredding means, means cooperating therewith adapted to support cane passing through said mill while acted on by said shredding means, and means including a surface over which cane passes, the surface extending at an angle to the path of movement of said cane and adapted to oppose movement of the cane over the cooperating means.

3. In a cane mill, shredding means, a plate cooperating therewith adapted to support cane passing through said mill while acted on by said shredding means, and means for resisting movement of the cane over said plate, said last named means being provided with a cane supporting surface arranged at an angle to the general plane of the plate.

4. In a cane mill, shredding means, a plate cooperating therewith adapted to support cane passing through said mill while acted on by said shredding means, and means including a wedge shaped block carried on said plate and provided with a cane engaging surface arranged at an angle to the direction of movement of the cane, said last named means being adapted to resist movement of the cane over said plate due to the action of said shredding means thereon.

5. In a cane mill, a rotary shredder roll having a series of knives carried on the outer surface thereof, means cooperating with said shredder roll and adapted to support cane passing through said mill while acted on by the knives of said shredder roll, and means for resisting movement of the cane over said cooperating means to permit a prolonged action of the knives of said shredder roll thereon, said last named means being provided with a surface arranged at an angle to the cane supporting portion of said first named means and substantially tangent to the rotary shredder.

6. In a cane mill, a rotary shredder roll having a series of knives carried on the outer surface thereof, said roll being rotated at a relatively high speed and adapted to act on cane passing through said mill and to disintegrate the same, and means spaced radially from said shredder roll and extending in the path of the cane adapted to resist movement thereof due to the engagement of said knives therewith.

In witness whereof, I have hereunto set my hand this 29th day of June, 1927.

FRANKLIN FARREL, JR.