

May 29, 1934.

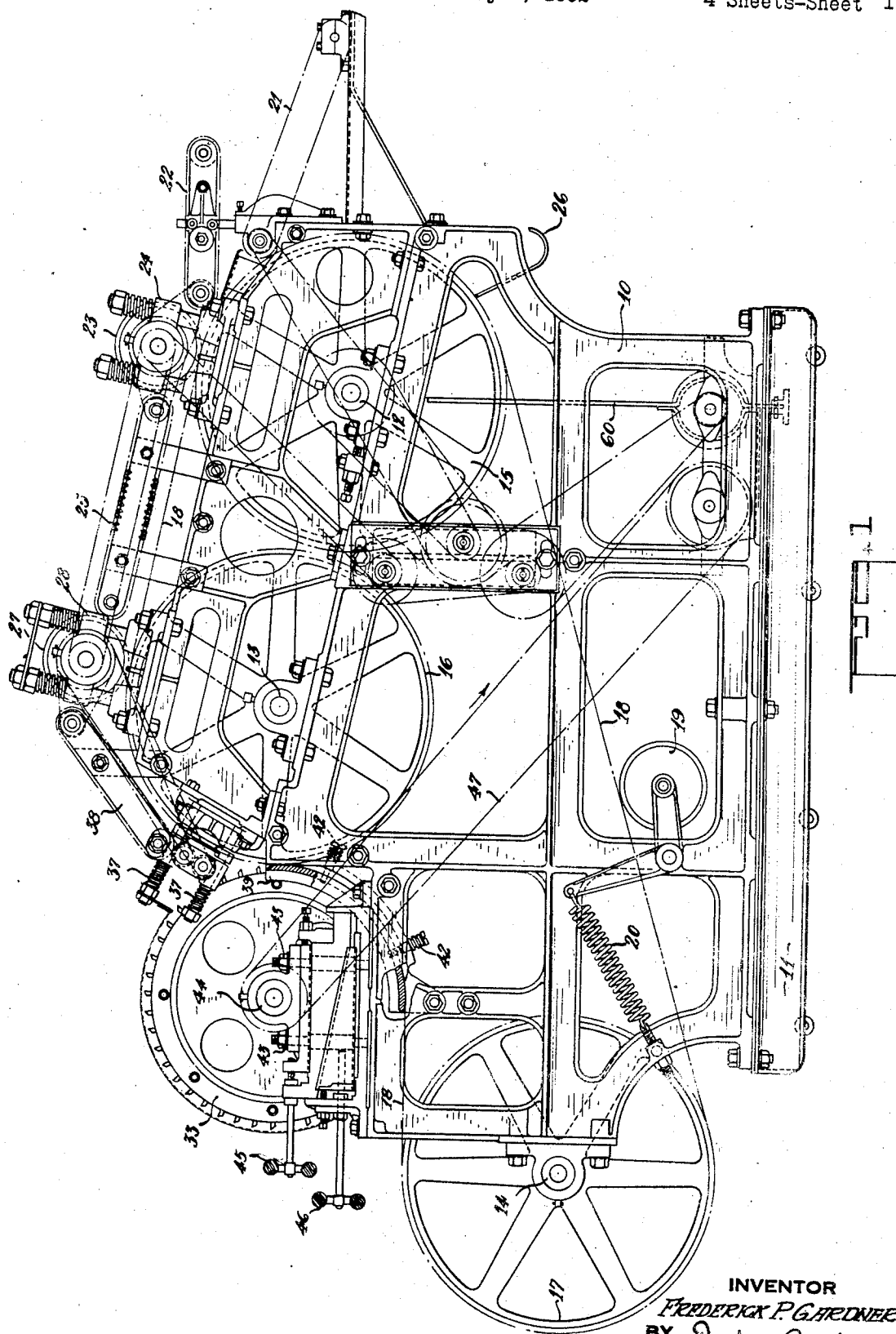
F. P. GARDNER

1,960,663

FIBER CLEANING BELT MACHINE

Filed May 6, 1932

4 Sheets-Sheet 1



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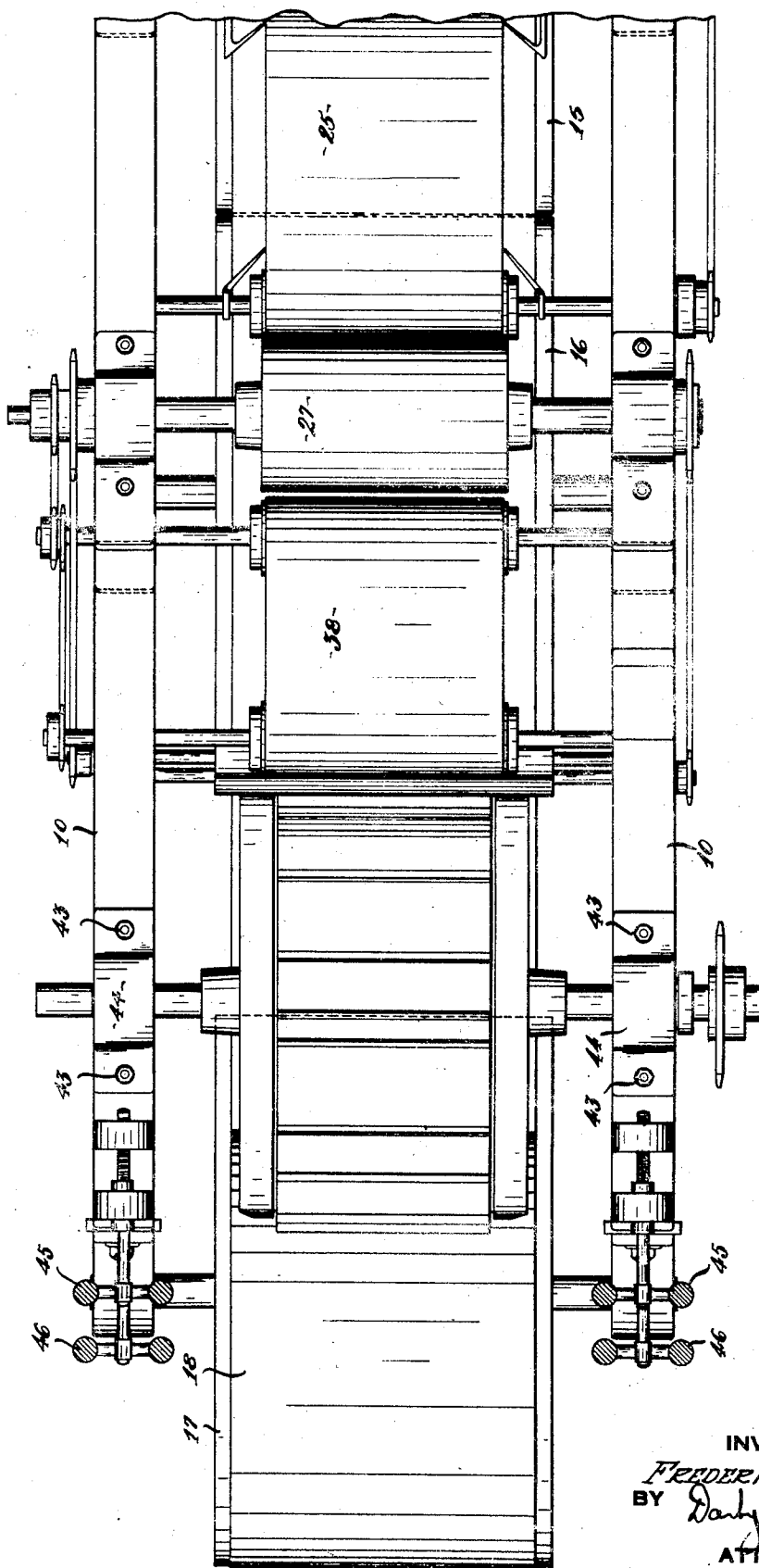
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4 Sheets-Sheet 2



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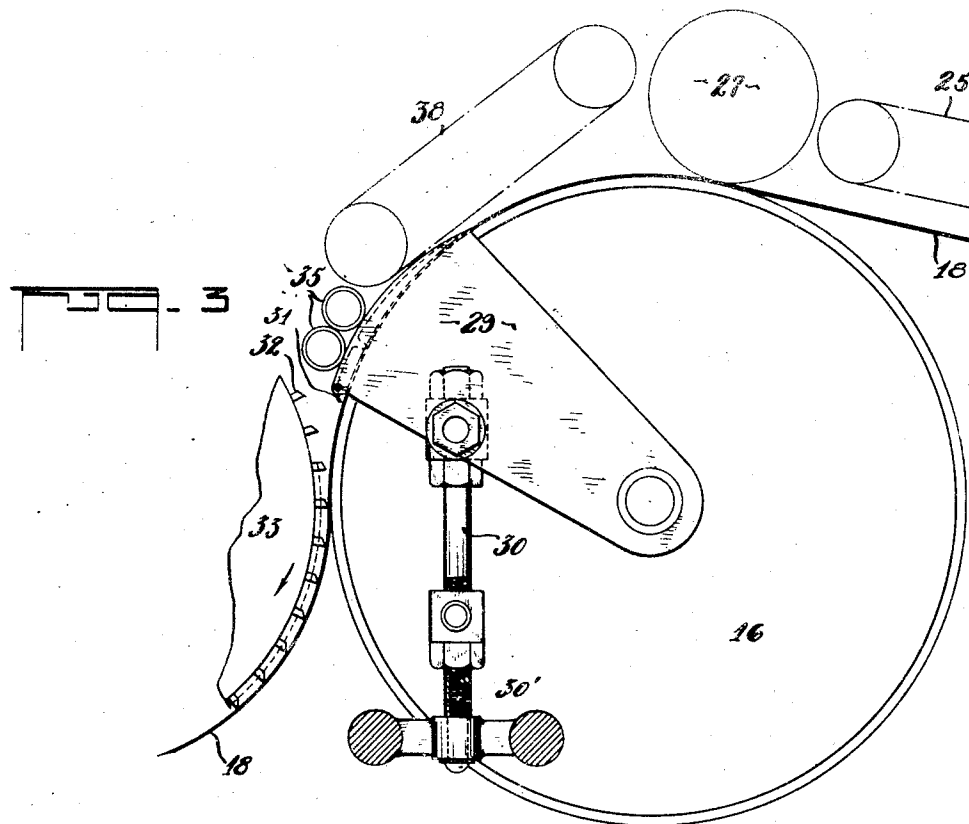
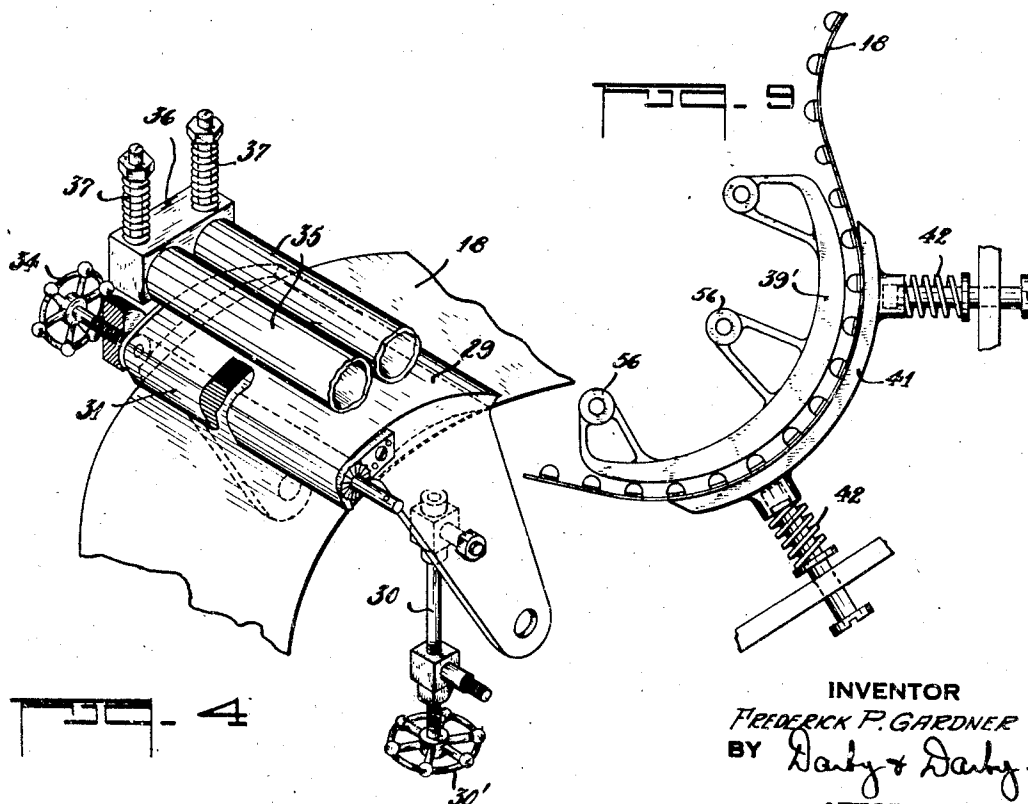
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4 Sheets-Sheet 3



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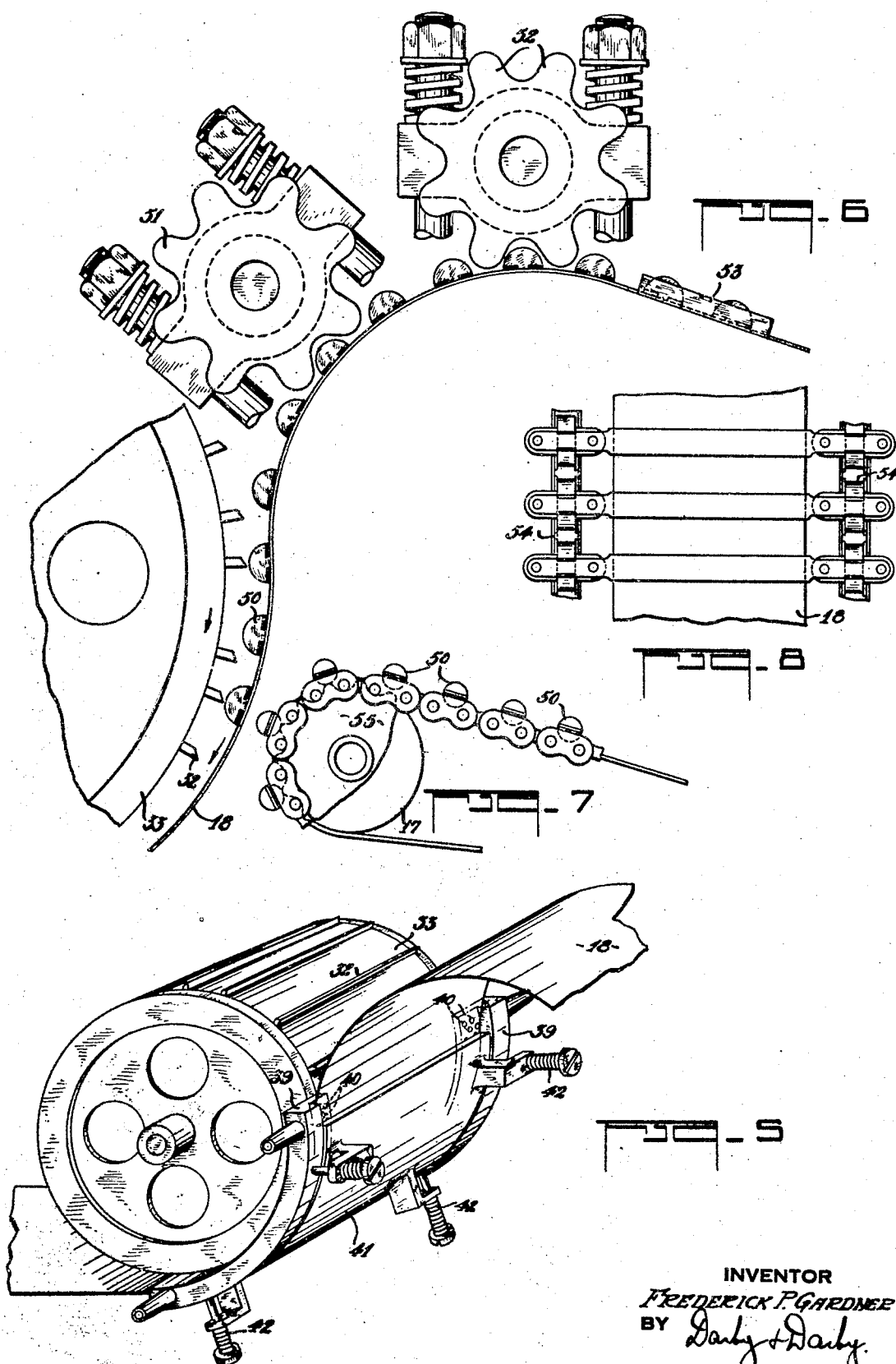
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FIBER CLEANING BELT MACHINE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

1,960,663

FIBER CLEANING BELT-MACHINE

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Application May 6, 1932, Serial No. 609,645

11 Claims. (Cl. 19—19)

This invention relates to a new and useful machine for cleaning long fiber or leaf fiber, and has for its object the provision of mechanical means for obtaining fiber and by-products contained in the leaves, stalks and stems of fiber bearing plants, such as Pita, Pita-floja, Penquin, Maya, Chivi-Chivi, Banana, Plantan, Abaca, Pineapple, Yucca, Tampico Hemp and the like.

It is a further purpose of my invention to provide a machine which is suitable for cleaning fibers of the above named varieties, and which will replace the primitive hand methods now employed in the abstraction of said fibers.

A further object includes the provision of a machine with an endless belt therein which belt acts not only as a conveyor but combines the special features of a decorticating unit made possible by compressor rolls and the agency of a flexible shoe which is adjustably fitted in the section at the back of the belt where the scraping drum revolves over the surface of the belt. The belt moreover serves to feed the fiber material into and through the machine, and also acts as a conveyor for moving the fiber material through the machine at any desired rate of travel. Moreover, in combination with the floating adjustable rolls the belt acts as a crusher unit, thereby expressing the juice from the leaf and collecting the same and also breaking the back of the leaf to distribute the fiber material more uniformly, and to loosen the pulpy material thereof.

The belt member also forms a flexible floating scraping means which coats with a scraping drum and a flexible shoe to automatically adjust itself for the handling of varying fiber masses. It further acts as a means for delivering the fiber free from the machine and freed from the pulpy matter.

In combination with the adjustable plate and scraping drum any degree of flexing can be given to the material in the operation of cleaning.

Other objects will appear hereinafter, and I attain these objects by a construction illustrated in the accompanying drawings, in which

Fig. 1 is a side elevational view of the machine embodying my invention;

Fig. 2 is a plan view thereof;

Fig. 3 is a view somewhat diagrammatic showing the adjustable breaker plate and associated parts;

Fig. 4 is a view in perspective showing the breaker plate with the breaker bar and feed rolls;

Fig. 5 is a view in perspective showing the scraping drum and the belt guiding shoe;

Fig. 6 is a somewhat diagrammatic view show-

ing the belt provided with bars and having omitted the breaker plate and associated parts;

Fig. 7 is a view showing a portion of the belt provided with movable slats;

Fig. 8 is a plan view thereof; and

Fig. 9 is a side view of a modified belt guiding shoe.

Similar reference characters refer to like parts throughout the several views wherever they occur.

It is one of the prime purposes of this invention to provide a machine which is capable of cleaning long fiber or leaf fiber of the character indicated above in an efficient manner without manual aid, said machine to be so constructed as to be portable in the field and groves where the fiber material is grown. Said feature of portability and low horse power and low upkeep being of prime importance in this respect. In my copending application, Serial No. 599,102, filed March 16, 1932, for Fiber cleaning machine, I have disclosed a type of machine suitable for similar purposes, wherein the fiber material is conveyed through the cleaning portion by a rotary drum and associated means, which drum is used in connection with this machine. In that machine I use a sector cleaning device, while in this machine I rely principally upon a continuous belt for conveying the fiber material through the machine and for cleaning the same in connection with associated parts about to be described.

The belt is a thin flexible metallic member, preferably of non-corrodible steel of suitable width and thickness. It is supported on suitable pulleys or rolls so arranged that the juices or liquids expressed by the first compression are collected at the feed end. From the first crushing rolls the belt carries the crushed fiber material to a second floating fiber-compressing roll which further compresses the fiber and spreads out the thickened masses to unify the fiber there and to loosen the pulp on the same.

The fiber is then carried by the belt onto the breaker plate beneath two feeding rolls and over the breaker bar. At this point the scraper blades on a rotating drum violently flex the fiber material so as to break the same. The angle of the breaker bar and the violence with which the scraper blades strike the fiber can be varied to a greater or less degree so as to give more or less breaker action at this point. The belt now passes onto a supporting shoe which is provided with suitable end guides and a flexibly supported backing. This backing provides for automatic adjustment of the belt with reference to the scraper blades and drum, so as to accommodate various masses

of fiber material under different conditions. The fiber is carried over this shoe and beneath the scraper blades. The scraper blades, however, will move over the fiber mass at a high rate of speed,

5 thereby stripping off the pulpy mass and collecting the same between the various scraper blades. At a suitable place where the fiber material and belt separate from the scraper blades and the drum, the pulpy material is discharged centrifugally from the drum. The cleaned fiber material is carried forward and discharged from the machine independently of the pulpy material.

The form of belt just described consists of a thin flexible sheet having no obstructions thereon. 15 In a modified form, however, and under certain circumstances, it may be desirable to increase the breaker actions of the fiber material while the same is passing through the scraping arc. In such instances I provide the belt with breaker bars across the face of the belt.

Said bars may have any desired shape, and may be so constructed as to be fastened to the belt or movable independently thereof. When breaker bars are used in connection with the belt, 25 it is desirable to modify the floating rolls so as to have a fluted surface. These flutings are so arranged that they will coincide with the breaker bars, and thus provide greater breaking and flexing action on the fiber material. These bars, therefore, extend across the face of the belt and provide greater and continuous flexing action during the cleaning and removing of the pulp therefrom. The spacing, width and form of the bars may be changed so as to suit required conditions. 35

In the modification wherein the belt is provided with independently movable bars the breaker plate may be omitted and the supporting shoe modified as to accommodate the independently movable breaker bars and supporting chain. The bars in this construction may travel at the same rate or slower or faster than the belt. If the bars are caused to move faster than the belt, the same will serve in automatically cleaning the belt from disintegrated pulpy matter. 45

Referring now to the drawings I provide a frame 10—10 mounted on suitable skid members 11—11 for supporting the machine and moving the same from place to place. On the frame 50 10 I provide bearings 12, 13 and 14 for the respective feed roll or drum 15, the mid or breaker roll or drum 16 and the end roll or drum 17. These rolls or drums carry the belt 18. Any suitable means for tensioning belt 18, such as pulley 19 held under tension by a spring 20 will serve to properly tension the belt over the drums.

The fiber containing material is fed into the machine by any suitable means such as a conveyor 21 and guide 22. The material is fed onto 60 the belt by these conveyors and between the floating liquid expressing roll 23. This roll is floatingly mounted in bearings 24. The bearing is tensioned by suitable springs in the usual manner and to such an extent that a liquid content will be substantially expressed from the fiber material. It is found that the degree of compression must be limited so as not to completely break the pulpy fiber containing material. The liquid material drains off over the belt and is 70 collected by suitable means as a trough 26. The fiber material is then carried by the belt beneath the conveyor 25 and is deposited beneath the floating compression roll 27, which is held in floating bearings 28. Pressure is now supplied 75 to the bearing of such a degree that the fiber

masses and fiber bundles and the ribs of the leaf material will be unified and pressed down so as to partially loosen the fiber material from the non-fibrous material.

The mass now is carried by the belt and deposited on the flexing or breaking plate 29. This plate is adjustably held by suitable adjusting means 30. By turning the handle 30', the plate is moved to and fro so as to increase or decrease the space between the breaker bar 31 and the scraper blades 32, which are held in a rotating scraper drum 33. The breaker bar 31 may be adjusted by a hand wheel 34, so as to increase or decrease the angle over which the fiber is flexed. By this arrangement I am enabled to increase or decrease the flexing action of the breaking mechanism so as to meet different conditions and different grades of fiber to be cleaned. 80 85 90

A pair of feed rolls 35 on the breaking plate 29 provides means whereby the rate of feeding the fiber material may be controlled. These rolls are floatingly adjusted by means of a bar 36, tensioned under springs 37. In order to guide the material onto the breaker plate, any suitable means may be provided, such as a traveling apron 38. 95 100

It will be noted that as the material passes between the breaker rolls 35 and the breaker plate 29 and breaking bar 31 that the breaker bar abruptly changes the angle at which the material is conveyed through the machine. By this means it is possible to readily adjust the degree of breaking or flexing without stopping the machine or interrupting the operations thereof. The material is then subjected to the scraping blades 32 on the rotating scraping drum 33. The rate of rotation of said drum varies with conditions and is always at a very high rate of speed up to or more than 800 revolutions per minute. 105 110 115

In order to provide a long scraping surface I cause the belt to travel on an arc of the circle described by the outer points of the scraper blades. The belt is guided through this arc by suitable means such as shoes 39 which are adjustably supported on the frame 10. The inner surface of said shoes is provided with suitable anti-friction means such as graphite studs 40 against which the belt rides. 120

In order to provide for different thicknesses of material on the belt in passing through the sector arc, I provide a resiliently supported shoe or backing 41, which shoe or backing is floatingly held by spring device 42. By this means the belt and material are floatingly supported in the path of the scraping blades. By adjusting the tension device 42 a greater or lesser degree of scraping action may be supplied to the fiber in passing through the scraping arc. It is possible to adjust the distance between the material and the scraping blades near the top or near the bottom of the belt guiding shoes. This adjustment is accomplished by loosening the bearing nuts 43 of bearing 44, and by the adjustment handle 45 and handle 46 moving the scraper drum 33 on it towards or away from the belt driving shoe. The scraper drum is driven from any suitable source of power not shown, and by this means through a suitable driving device such as chain 47, the machine is placed into operation. 125 130 135 140 145

It will be noted that the drum is mounted on semi-automatic bearing blocks which allow the drum to be moved to or from the belt in a true radius of the belt, or to give a greater or less clearance at the top and bottom of the arc between 150

the drum and the belt, or vice versa. The adjustment is made through the control rods 45 and 46, and the adjustment is made on an arc which is such as will not loosen the chain or belt 47 sufficiently to cause trouble.

After the fiber material has passed over the breaking plate and breaking bars it travels between the belt and the scraping blades on the drum, thereby submitting the fiber material to repeated and intensive scraping actions over an increased length on the fiber. By this action the loosened pulpy material is scraped from the fiber and gathered between the scraper blades by which the pulpy material is given a velocity greater than that of the moving fiber. The result is that a clean fiber is conveyed in substantially straight lines through the machine and delivered at the end thereof, while the pulpy and non-fibrous material is gathered from the fiber material and thrown off independently of the fiber material, by the rotating drum.

In connection with the shoe which guides the belt and the portion which supports the belt, it will be noted that the guide proper is fitted to the machine while the shoe which faces the back of the belt is floatingly and adjustably held to allow the belt to flex and to accommodate itself to the fibrous material as it passes over its surface.

In some instances it may be desirable to provide a greater degree of flexing for the fiber material, and to continue this flexing while the scraping blades are actively removing the non-fibrous material. In such instances I provide the belt 18 with cross bars 50, which may be fastened to the belt as shown in Fig. 6, or said cross bars may be movably held on the belt as shown in Figs. 7 and 8. Where the cross bars are used I find it advisable to dispense with the breaking plate and breaking bar and to replace the feeding rolls 35 with a fluted feeding roll 51. This roll is floatingly suspended in the usual manner, as shown. I also find it advisable, although not absolutely necessary, to replace the floating compression roll 27 by a fluted compression roll 52. The flutings of these rolls are so adjusted with respect to the bars on the belt as to fit in between the bars and thus perform the function of compressing and breaking at the same time. If desired, a liquid guide 53 may be provided as shown in Fig. 6. Ordinarily the liquid drains down the sloping surface of the belt 18 and is collected in any suitable means such as 26 heretofore noted.

Where movable bars are provided the same are preferably held and moved by side chains 54 which are moved on pulleys 55, which may be attached to the belt drums 15, 16 or 17. In order to provide for this type of movable conveyor device I have devised a shoe guide 39' over which the bars are guided, as shown in Fig. 9. The shoe guides are fastened to the frame by bolts passing through suitable eyelets 56. The spacing of the cross bars may be of any desired extent and the bars themselves may be of different design as may be desired or necessary, to meet conditions.

Where the bars are moved independently of the belt the rate of motion may be greater or less than the belt, but usually the rate of travel is somewhat greater than the belt so as to be self cleaning.

A control device operating handle 60 provides means whereby the speed of the belt and associated parts may be varied with respect to the scraping drum. It may be either increased or decreased, as is desired, and this change may be effected without interrupting the operation of the machine.

Other advantages will suggest themselves to those versed in the art, and what I claim as new and useful and desire to be secured by Letters Patent is:

1. In a fiber cleaning machine, the combination of compressor rolls and a continuous belt for conveying fiber material to said rolls of means for subjecting said fiber material to flexings, resilient means for flexibly supporting that part of the belt as it moves through an arc of a circle, and means for separating the pulp from the fiber as it is moving through said arc.

2. In a fiber cleaning machine the combination of compressor rolls and a continuous belt for conveying fiber material beneath said rolls, means for flexing the fiber material onto the moving belt, resilient means for supporting the belt on an arc of a circle while carrying the fiber material through said arc and means for separating the non-fibrous material from the fiber material while passing through the arc.

3. In a fiber cleaning machine the combination of compressor rolls and a continuous belt for conveying fiber material beneath said rolls, means for lifting the fibrous material from the belt, a bar over which said fibrous material is flexed onto the belt, resilient means for flexibly supporting the belt portion moving through an arc of a circle, and means for scraping the fibrous material on the belt supported by the resilient means.

4. In a fiber cleaning machine the combination of compressor rolls and a continuous belt for conveying fiber material beneath said rolls, means for lifting the fibrous material from the belt, a bar over which said fibrous material is flexed onto the belt, a shoe for movably supporting the belt on an arc of a circle, and scraper blades moving over said belt as it moves through said arc for collecting the pulpy matter from the fiber and discharging the same at a velocity greater than that of the fiber.

5. In a fiber cleaning machine the combination of compressor rolls and a continuous belt for conveying fiber material beneath said rolls, means for lifting the fibrous material from the belt, a bar over which said fibrous material is flexed onto the belt, a shoe for resiliently backing and supporting the belt in an arc of a circle for thereby floatingly supporting the belt portion and material moving through said arc, and a succession of scraper blades for cleaning the fiber material in the arc.

6. In a fiber cleaning machine the combination of compressor rolls and a continuous belt for conveying fiber material beneath said rolls, means for lifting the fibrous material from the belt, a bar over which said fibrous material is flexed onto the belt, a shoe for movably and resiliently supporting the belt on an arc of a circle for moving the fibrous material through said arc, and a drum carrying scraper blades for cleaning the fibrous material on the belt portion in passing through the arc.

7. In a fiber cleaning machine a continuous belt for carrying fiber material through the machine, means coacting with said belt for expressing the liquid from the fiber material, means for breaking said fiber material to loosen the non-fibrous matter from the fibrous matter, a shoe for supporting the moving belt on an arc of a circle, and means for scraping the fibrous material as it moves through said arc.

8. In a fiber cleaning machine a continuous belt for carrying fiber material through the ma-

chine, a roll cooperating with said belt for expressing the liquid products from the fiber material, a second roll for further compressing the fiber material, means for resiliently backing the

5 belt as the same carries fiber through an arc of a circle, and scraper blades for removing non-fibrous material from the fibrous material as the same passes through said arc.

10 9. In a fiber cleaning machine, an endless belt for carrying fiber material through the machine, a drum having scraper blades thereon, said drum mounted to scrape the fiber in the direction of the moving belt but at a velocity greater than that of the fiber on the belt, and means engaging

the sides of the belt for guiding and resiliently backing the same as it moves through an arc of a circle and in the path formed by the outer edges of the scraper blades.

10. A fiber cleaning machine according to claim 1 characterized in that the belt is provided with moving cross bars.

11. A fiber cleaning machine according to claim 1, characterized in that the belt is guided through said arc by means of a spring mounted shoe which gives the belt a resilient backing in the cleaning arc and floatingly supports the belt and the fiber material in the path of the scraping blades.

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