

No. 675,248.

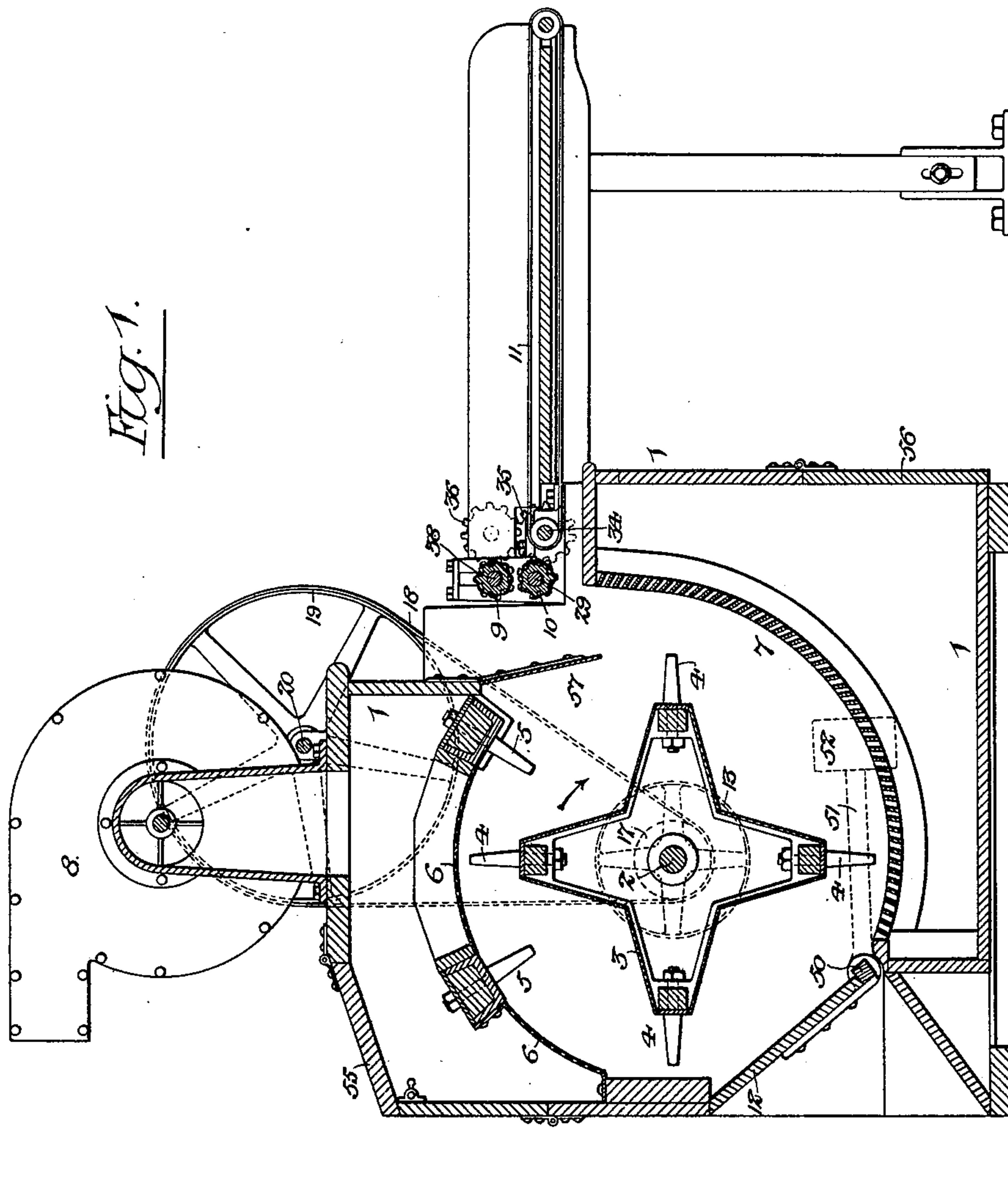
C. SCHOFIELD.  
WILLOW.

Patented May 28, 1901.

(Application filed July 21, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:-  
*Frank L. Graham.*  
*Louis H. Whitehead.*

Inventor:-  
*Charles Schofield.*  
by His Attorneys:-  
*Howson & Howson*

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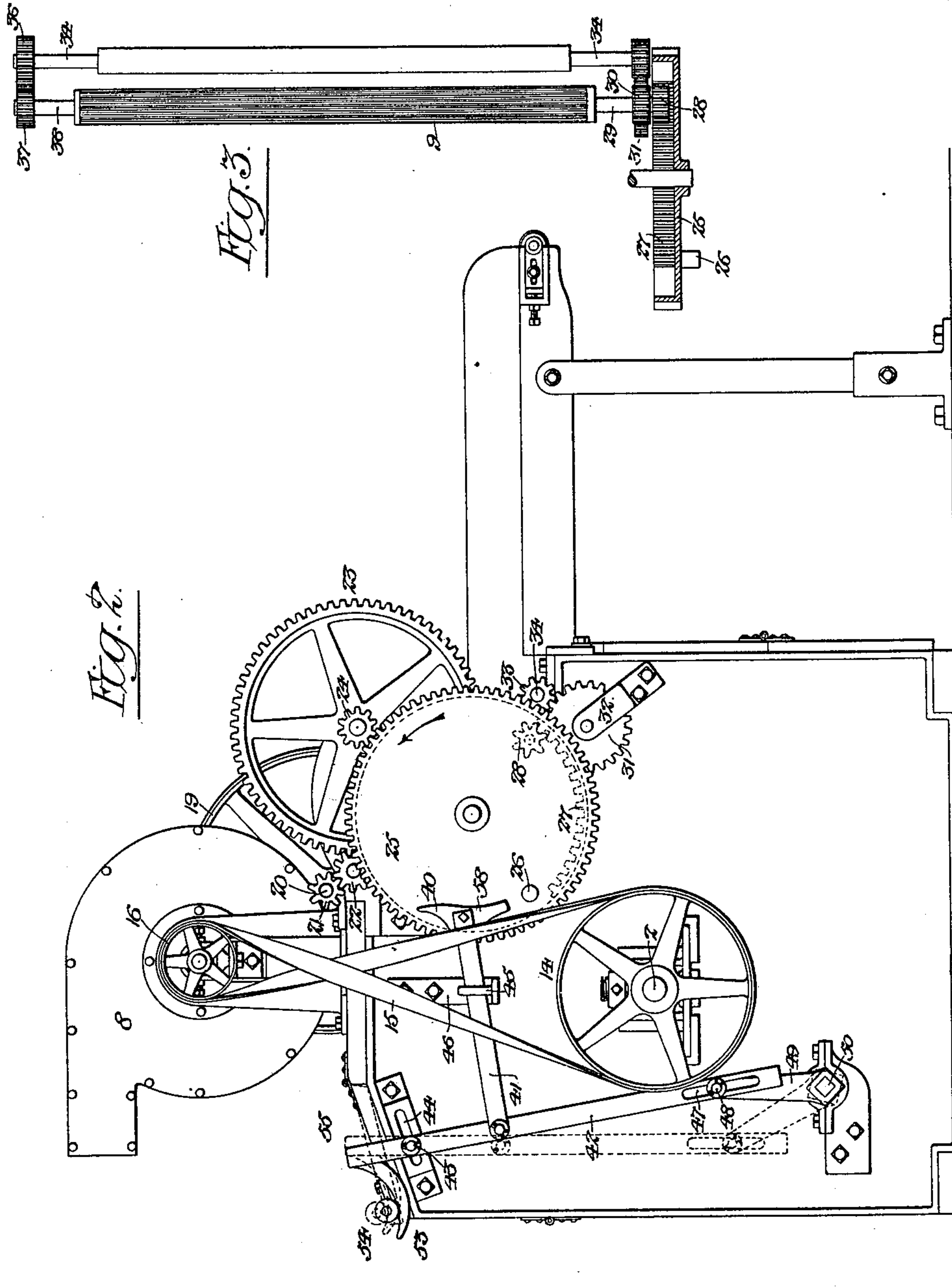
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# UNITED STATES PATENT OFFICE.

CHARLES SCHOFIELD, OF PHILADELPHIA, PENNSYLVANIA.

## WILLOW.

SPECIFICATION forming part of Letters Patent No. 675,248, dated May 28, 1901.

Application filed July 21, 1900. Serial No. 24,455. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES SCHOFIELD, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain  
5 Improvements in Willows, of which the following is a specification.

My invention consists of certain improvements in the machine technically known as a "willow" and intended for beating, opening,  
10 and cleaning masses of fiber submitted to its action, the object of my invention being to render such a machine automatic in its operation, thereby lessening the cost of attendance and preventing the loss of time due to  
15 the usual periodical stoppages for the purpose of removing the cleaned fibers and recharging the machine. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

20 Figure 1 is a longitudinal sectional view of a willow constructed in accordance with my invention. Fig. 2 is a side elevation of the machine; and Fig. 3 is a plan view, partly in section, of certain elements of the machine.

25 The machine known as a "willow" consists of a casing 1, having appropriate bearings for a transverse shaft 2, upon which is mounted a drum 3, consisting usually of a series of hollow arms with projecting teeth 4 at their  
30 outer ends, the drum being rotated and the teeth 4 of the same coöperating with certain fixed teeth 5 and perforated or slotted segmental screens or gratings 6 and 7 to open or loosen up, beat, and remove the dust or  
35 dirt from masses of fiber subjected to the action of the machine. With the machine are also usually combined an exhaust-fan 8, a pair of feed-rolls 9 and 10, a conveyer-belt 11 for carrying the masses of fiber to said  
40 feed-rolls, and a pivoted discharge door or flap 12 at the bottom of the machine, through which the cleaned and separated mass of fibers can be removed. Usually, however,  
45 the operation of the machine must be arrested after the cleaning of each mass of fibers until said cleaned mass has been removed from the machine and a fresh charge of fibers has been introduced into the same; and it is the object of my invention to render unnecessary these temporary stoppages  
50 of the machine for loading and unloading the same.

The shaft 2 has the usual pulley 13 for receiving the driving-belt and a pulley 14 for receiving the crossed belt 15, whereby the  
55 pulley 16 of the fan-shaft is rotated, and said shaft 2 also has another pulley or drum 17, (shown by dotted lines in Fig. 1,) which receives a belt 18, the latter passing around and driving a pulley 19 on a transverse shaft  
60 20, mounted in suitable bearings on the top of the casing 1 of the machine. This shaft 20 has a spur-pinion 21, which meshes with a pinion 22 on a short stud at one side of the casing, said pinion 22 meshing with a spur-  
65 wheel 23, also mounted on a stud at the side of the casing and having secured to it a spur-pinion 24, which meshes with a spur-toothed disk 25, mounted so as to turn freely on a suitable stud or shaft carried by the casing.  
70 This disk 25 has on its outer face a projecting pin 26 and on its inner face a segmental rack 27, the latter meshing with a pinion 28 on a shaft 29, which carries the lower feed-roll 10, said shaft having also another pinion  
75 30, which meshes with a spur-wheel 31, the shaft or spindle of the latter being carried by a bracket 32 on the side of the machine and said wheel meshing with a pinion 33 on a shaft 34, which carries the forward drum  
80 of the feed belt or apron 11. This shaft 34 has at its opposite end a spur-wheel 35, meshing with a similar spur-wheel 36, which is in gear with a pinion 37 on the shaft 38 of the upper feed-roll 9. (See Figs. 1 and 3.) When,  
85 therefore, the segmental rack 27 is in mesh with the pinion 28, forward motion will be imparted to the endless apron 11 and to the feed-rolls 9 and 10 and material will be fed into the working chamber of the machine,  
90 this feeding operation ceasing as soon as the segmental rack 27 passes out of operative relation with the pinion 28.

The projecting pin 26 on the disk 25 is adapted to act upon a shoe 40, carried by the  
95 inner end of an arm 41, which is hung to a lever 42, the latter being pivoted to the stud 43, which is adjustable in a slotted plate 44 on the side of the machine, the arm 41 being guided in its movements by a loop 45 on a side  
100 plate 46. The lower end of the lever 42 is slotted, as at 47, for engagement with a stud 48, projecting from an arm 49 on one end of the shaft 50, which carries the delivery door



or flap 12 of the machine, the other end of said shaft having an arm 51 with counter-weight 52, as shown by dotted lines in Fig. 1. The upper end of the lever 42 is bent and curved, as shown at 53, for action upon an antifriction-roller 54, carried by a projecting stud or pin on a valve 55, pivoted to the top of the casing.

When the machine is about to begin its operation, the parts are in the positions shown in Figs. 1 and 2, the door 12 being held in the closed position by the action of the counter-weighted arm 51, the valve 55 being likewise closed and the feed of the fiber into the working chamber of the machine just beginning. As the fibers are fed into the machine they are carried around by the teeth 4, and the action of said teeth and of the fixed teeth 5 causes the beating of the mass of fibers and the tearing apart or loosening of the same, so as to free the dust, dirt, or other foreign impurities from the fiber, which impurities are either drawn up through the screen 6 by the action of the fan or drop through the slots of the grating 7 into the chamber beneath the same, from which they can be withdrawn at intervals through a suitable hinged door 56 without arresting the operation of the machine.

The fibers under treatment are prevented from interfering with the incoming fibers delivered by the rolls 9 and 10 by reason of a shield or guard-plate 57, located in front of said rolls, as shown in Fig. 1.

The disk 25 rotates in the direction of the arrow, Fig. 2, and as soon as the rack 27 has passed out of operative relation with the pinion 28 the feed of fibers into the working chamber of the machine ceases, the machine having now received its full load, which is subjected to the action of the machine until the pin 26 of the disk 25 comes into contact with the shoe 40 on the arm 41 and pushes outward upon the same, so as to swing the lever 42 to the position shown by dotted lines in Fig. 2. This has the double effect of raising the valve 55 and swinging forward the arm 49, so as to lower the discharge door or flap 12 of the machine sufficiently to permit of the discharge of the cleaned fiber from the working chamber of the machine, the opening of the valve 55 providing for an inflow of air to supply the fan 8, and thus preventing any such forcible inflow of air through the discharge-opening of the machine as would tend to interfere with the free delivery of the cleaned fiber through said opening. One rotation of the disk 25 therefore represents a complete cycle of operations of the machine—that is to say, the feeding of material into the machine, its proper treatment therein, and its discharge therefrom after being treated. The time during which the charge is fed to the machine can be determined by the length of the segmental rack 27 and the discharge period by the length of the shoe 40, the machine being automatic and continuous in its

operation and the only attendance required being the supply of fiber to the endless belt or apron 11 and the carrying away of the cleaned fiber discharged from the machine.

The length of time required for each cycle of operation can be varied by varying the speed of the governing wheel or disk 25 in respect to that of the primary shaft 2 of the machine, a ready means of accomplishing this being to use a larger or smaller pulley 19, as the time of treatment is to be longer or shorter.

The pin 26 and rack 27 are so disposed upon the disk 25 in relation to each other and to the shoe 40 and pinion 28 that the feeding operation due to the engagement of the said pinion with the segmental rack never takes place while the discharge-door 12 is open, the feed of fresh material beginning immediately after the pin 26 passes beyond the shoe 40, and the door 12 is closed by the action of the counterweighted lever 51.

The shoe 40 is preferably formed with a concaved lower portion 58, (shown in Fig. 2,) so that when the shoe has been pushed outward by the action of the pin 26 thereon this concaved portion will be concentric with the axis of the disk 25. Hence the shoe will be retained in the projected position and the door 12 will be held fully open until the pin 26 passes beyond the limits of the shoe, although, if desired, the configuration of the shoe may be such as to permit of the gradual closing of the door.

Although I have shown and prefer to use a single governing device for operating both the feed and discharge mechanism of the machine, my invention in its broader form is not limited to the use of such single device, as there may be independent governing devices, one for the feeding mechanism and the other for the discharge mechanism, so timed as to operate alternately and with any desired lapse of time between successive operations.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of a willow having a discharge-door or outlet-closer, a suction-fan, a valve for admitting air into the casing of the machine to supply said fan, and means for simultaneously opening the said discharge-door and valve, substantially as specified.

2. The combination of the discharge-door or outlet-closer of a willow, with an operating device therefor comprising a rotating disk with projecting pin or stud, and mechanism connected to the discharge-door and having a shoe for being acted upon by said pin, part of said shoe being concaved so as to present a surface concentric with the axis of rotation of the disk, substantially as specified.

3. The combination in a willow, of the discharge-door or outlet-closer having a pivoted shaft with arm thereon, an air-inlet valve, a lever acting upon said arm and also upon the valve and means for vibrating said lever at intervals, substantially as specified.

4. The combination in a willow, of a pair



of feed-rolls, an endless feed belt or apron, a  
rotating segmental rack and gearing whereby  
said segmental rack is caused to simulta-  
neously operate both feed-rolls and feed-  
5 apron, said gearing comprising spur-wheels  
at both ends of the apron-roller, a spur-wheel  
at one end of the lower feed-roller meshing  
with said segmental rack, and pinions where-  
by one end of the apron-roller is driven from  
10 one end of the lower feed-roller and the other

end of the apron-roller is caused to drive the  
other end of the upper feed-roller, substan-  
tially as specified.

In testimony whereof I have signed my  
name to this specification in the presence of 15  
two subscribing witnesses.

CHARLES SCHOFIELD.

Witnesses:

F. E. BECHTOLD,  
JOS. H. KLEIN.