March 4, 1924. 1,485,416

C. L. KELLER

BEATING DEVICE

Filed May 11, 1923 2 Sheets-Sheet 1

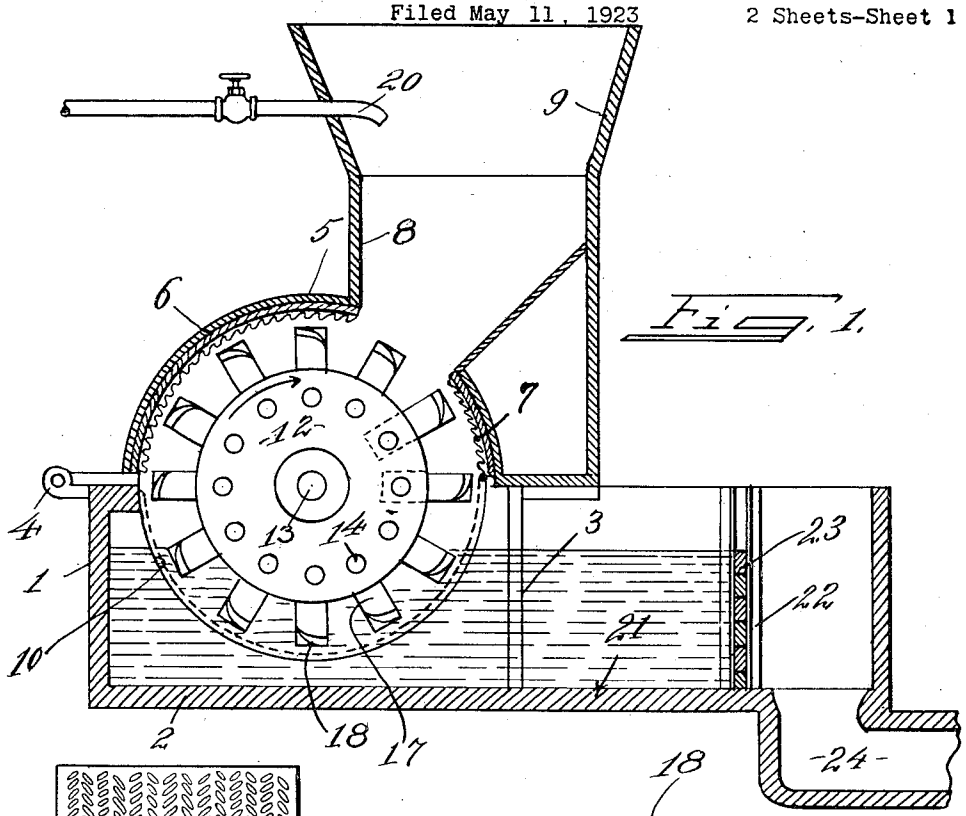


Fig. 1.

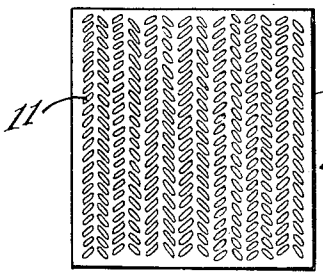


Fig. 2.

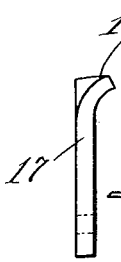


Fig. 3.

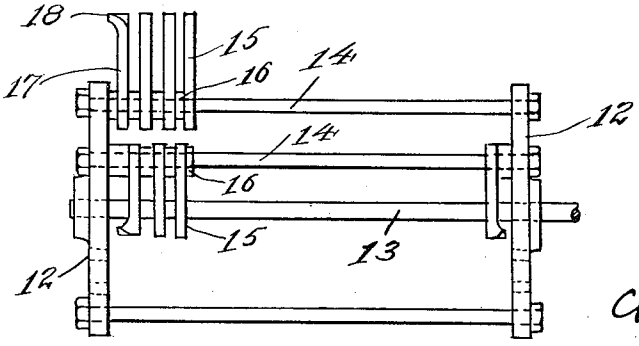


Fig. 4.

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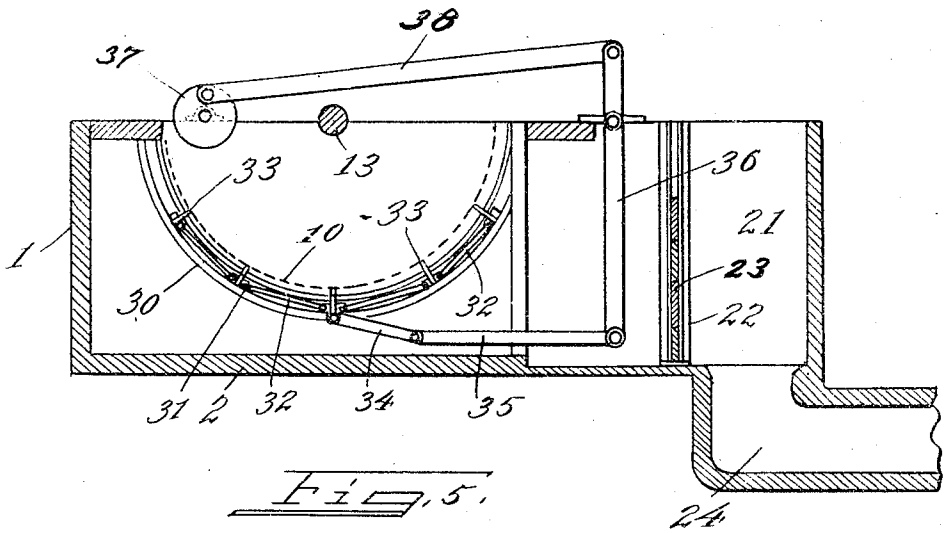


Fig. 5.

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Patented Mar. 4, 1924. 1,485,416

UNITED STATES PATENT OFFICE.

CHARLES L. KELLER, OF CINCINNATI, OHIO, ASSIGNOR TO THE RICHARDSON COMPANY, OF LOCKLAND, OHIO, A CORPORATION OF OHIO.

BEATING DEVICE.

Application filed May 11, 1923. Serial No. 638,183.

To all whom it may concern:

Be it known that I, CHARLES L. KELLER, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Beating Devices, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification.

My invention relates to devices for reducing to pulp form various kinds of fibers, so as to form a mass suitable for formation into webs of felt, and paper in the usual manner.

Lewis Grafflin, of Carthage, Indiana, has discovered a process of forming pulp from fibrous material, by the use of a machine which in general form of construction resembles the swing hammer pulverizer, used in reducing mineral matter to graded grits and powder. The exact action of the revised pulverizer used by Grafflin is obscure, but generally speaking it results in a continuous reduction of fibrous material into pulp, the final product being of the same or superior character to pulp which has resulted from beater and Jordon treatment over a period of hours, in comparison with which the time required for reduction by Grafflin is momentary, taking a few seconds.

The swing hammer is formed from a series of narrow metal bars swung pivotally on a series of cross shafts in a high speed drum. Mineral matter is fed into the drum chamber, which has roughened side walls lying fairly close to the centrifugal position of the bars, and the hammers acting as buckets and as projecting devices, as well as grinding devices, reduce the mineral matter to pulverulent shape.

The high speed of the drum gives a blow of tremendous force to the mineral matter, and the action noted is very rapid and effective on mineral matter.

When it comes to action on fibrous material, the desired action is not a breaking of the fibers to pieces, but the reducing of the built up or formed fibrous body into a pulp where the fibers are individualized. The swing hammer, when modified as by Grafflin, will accomplish the formation of a desired pulp from a wet, fibrous mass.

As stated I employ the Grafflin improved swing hammer beater, and it is my object to provide a beater or it might better be termed "pulper," which will handle rag fiber as well as wood fiber and old paper fiber, and in which the screens are kept clear and no retarding action takes place.

I have found that taking the Grafflin pulper, and using a fiber such as pieces of rag cut up and wetted, that the high speed action results in a forcing of the water away from the fibrous material through the screen, leaving a relatively dry mass which very quickly blocks the passage of material through the screen.

The increasing of the moisture content of the rag stock does not improve this action appreciably, and I have discovered that it is necessary to so control the passage of the water that its flow is proportioned to the fiber movement, whereupon the fiber is reduced and moves steadily through the machine without any clogging whatever. The essence of my device is to provide means for maintaining a suitably gauged retarding action on the passage of water through the pulper, but it also includes means for augmenting the inflow of water, and means for wiping the underside of the screen or screens so as to pull or suck through the screen such fibers as are pulped, but catch on the walls of the screen slots.

I accomplish my objects by that certain construction and arrangement of parts to be hereinafter more specifically pointed out and claimed.

In the drawing:

Figure 1 is a central longitudinal section taken through the device.

Figure 2 is a detail plan view of the screen.

Figure 3 is a side elevation of one of the outer blades of the swing hammer.

Figure 4 is a detail elevation of a portion of the drum showing the swing hammer arrangement.

Figure 5 is a detail longitudinal section showing the device for wiping the screen.

Describing first the Grafflin pulper, I have illustrated a housing having walls 1, and a base 2, said walls being absent at 3 for passage of the reduced material. Hinged at 4 to the housing and forming part of the reduction chamber is the casing 5, having a semi-cylindrical ribbed portion 6, and the

semi-cylindrical ribbed portion 7. The ribs are similar to those of a wash board only slightly larger. The casing 5 also forms a delivery chute 8, and a hopper 9 into which rag stock or other fibrous material, which has been cut up and wetted, is poured. Usually a breaker beater will be employed to effect a rough reduction of the stock, and the contents of the breaker beater, water and all pumped into the hopper.

In the housing 1 is a semi-cylindrical screen 10, in which the openings 11 are narrow slots set at convergent angles, in a series of closely adjacent rows. This slot arrangement seems to further the easiest feeding out of the pulp produced.

The swing hammer is formed of a pair of heavy plates 12, 12, on a shaft 13, and driven by said shaft. Arranged in drum fashion about the plates are a series of shafts or rods 14, on which are swung a series of fairly narrow, steel plates 15, which have holes to engage over the shafts.

I have shown a staggered arrangement of the plates 15, employing washers 16 between each plate, and on each alternate row starting with a washer, so that opposite the washer spaces on each row will be plates on the two adjacent rows. The plates are preferably rectangular, except for the two outside plates of each row.

The outside plates (Fig. 3) have their outer corners turned away from the direction of rotation of the drum-like assembly, the plates as shown at 17, having the turned-out corners 18. The action of the turned-out corners, is to propel the fibrous stock away from the side walls of the reduction chamber, thereby preventing a jamming action.

The ribbed portions at 6 will lie about 7/16ths inches away from the diametric or centrifugal position of the plates or hammers 15. The ribbed portions at 7 are preferably arranged so that the spacing from the hammers begins next to the chute at a 12/16ths inch spacing, and narrows down to a 7/16ths inch, next to the screen. The screen throughout is approximately 5/8ths inches away from the centrifugal position of the hammers.

The above described mechanism is generally that of the Grafflin pulper, and as stated, I have found that the centrifugal action applied to the aqueous content of a watery fiber stock, tends to force the water away through the screen leaving the fiber stock relatively dry and thus clogging the screen, as it requires considerable water to be feed through the screen mesh.

To avoid this action I provide in the first place for a water tap in the feed chute, as illustrated at 20. This enables me to provide excess water, at one end of the machine.

I also provide a water gate, which controls the water passage from the machine, to such an extent that the pumping out action of the swing hammer device, cannot leave the pulped fibers in a relatively dry state.

To accomplish the latter effect I mount along-side of the reduction chamber, and communicating with it through the opening at 3, a water box 21, in the sides of which are flanged plates 22, serving as retaining members for wooden slats 23, that are dropped into the ways formed in the flanged plates. The water box has an outlet conduit at 24, and the water coming in with the broken stock, or poured in through the water tap, is kept at the level found most effective, thereby submerging a portion at least of the screen. The pumping action of the swing hammer is then sufficient to feed out the pulp and water, so that the mass pours over the gate formed by the slats.

Also for some reason obscure to me, the action of the pulper is not retarded, over its action in handling more rigid, and more easily reduced fibrous masses such as chopped up paper, and wood fiber.

As it may be necessary in some cases to use a doctor, or wiper in connection with the screen, I have shown a structure in which two curved flanged plates are mounted within the housing 1, on the side walls thereof, to form two curved ways 30. In these ways are set cross bars 31, which slide in the ways, the bars being connected together center to center by means of links 32. In each bar is set a scraper blade 33, which may be of soft iron, and which blades engage with the undersurface of the screen.

The lower one of the bars may be linked as at 34, with an arm 35, which is reciprocated by means of a rocking bar 36, to which arm 35 is pivoted. The rock arm may be energized by an eccentric 37, driven slowly in comparison with the hammer drum device, and linked at 38 with the rock arm.

The action as is evident will be to move the blades through a wiping path against the bottom of the screen, covering the whole screen with a relatively small overall movement of the doctor member.

Of course variations in structure of the device within the range of the usual mechanical equivalents is desired to be covered in the claims that follow, and I wish to particularly point out that while a water gate such as I have shown is used in various mechanisms in the paper mill, the present use, having the function of keeping the screen clean, and seemingly aiding the passage of pulp through the screen, is an entirely novel one.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A device of the character described,

comprising a swing hammer pulping machine, means for feeding fiber stock and water to the said machine, and means for maintaining the screen of said machine submerged at least in part, in water.

2. A device of the character described, comprising a cylindrical chamber forming device, a drum revolving in said device, said drum equipped with swing hammers, a conduit leading into said chamber, and a screen closing the base of said chamber, said screen being semi-cylindrical, and a tank extending from said chamber and communicating therewith, and means for maintaining a desired level of water in said tank.

3. A device of the character described, comprising a swing hammer pulping machine, means for feeding wetted fibrous material thereto, and means for maintaining a desired flow of water through said machine, and for retarding said flow to be commensurate with the passage of pulped fiber from said machine.

4. A device of the character described, comprising a cylindrical chamber forming device, a drum revolving in said device, said drum equipped with swing hammers, a conduit leading into said chamber, and a screen closing the base of said chamber, said screen being semi-cylindrical, and a tank extending from said chamber and communicating therewith, and means for maintaining a desired level of water in said tank, said screen being formed of a plate with a series of rows of slots therein inclined toward each other in rows.

5. A device of the character described, comprising a cylindrical chamber forming device, a drum revolving in said device, said drum equipped with swing hammers, a conduit leading into said chamber, and a screen closing the base of said chamber, said screen being semi-cylindrical, and a tank extending from said chamber and communicating therewith, and means for maintaining a desired level of water in said tank, and a wiper device adapted to wipe over the underside of the screen, and means for operating said wiper device.

6. A device of the character described, comprising a cylindrical chamber forming device, a drum revolving in said device, said drum equipped with swing hammers, a conduit leading into said chamber, and a screen closing the base of said chamber, said screen being semi-cylindrical, and a tank extending from said chamber and communicating therewith, and means for maintaining a desired level of water in said tank, said screen being formed of a plate with a series of rows of slots therein inclined toward each other in rows, and a wiping device for the base of the screen comprising a series of blades mounted to move in the plane of the screen, and a common operator for said series of blades.

CHARLES L. KELLER.