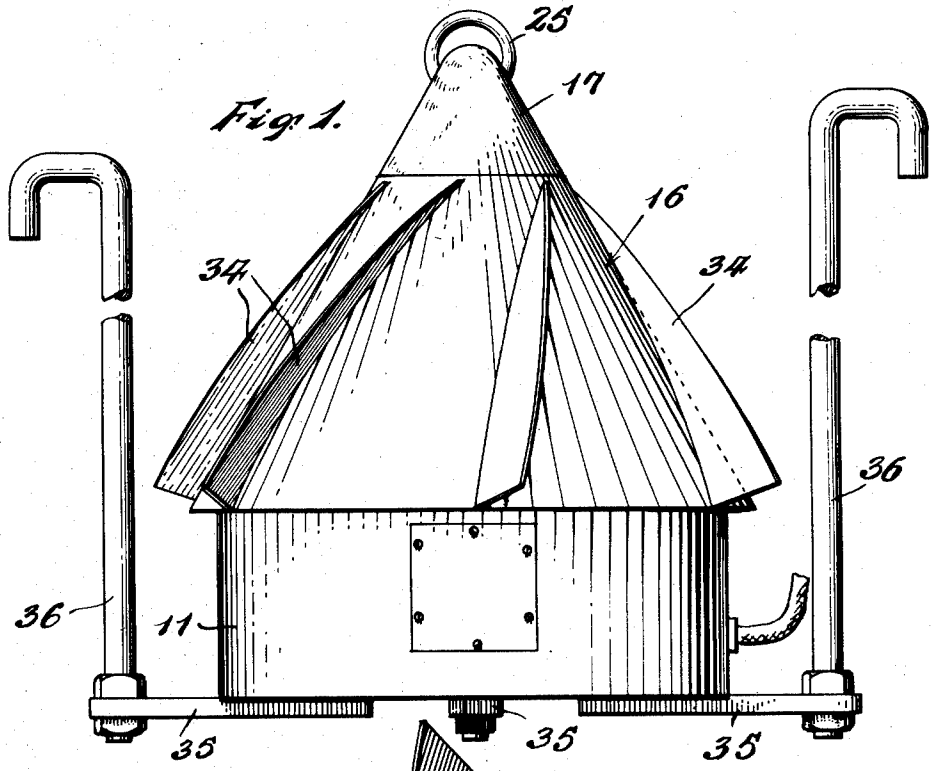
Jan. 16, 1940. C. K. A. RUDD 2,187,330

CHIP PACKER AND SPREADER FOR PULP MILLS

Filed March 30, 1938 2 Sheets-Sheet 1

Fig. 1.



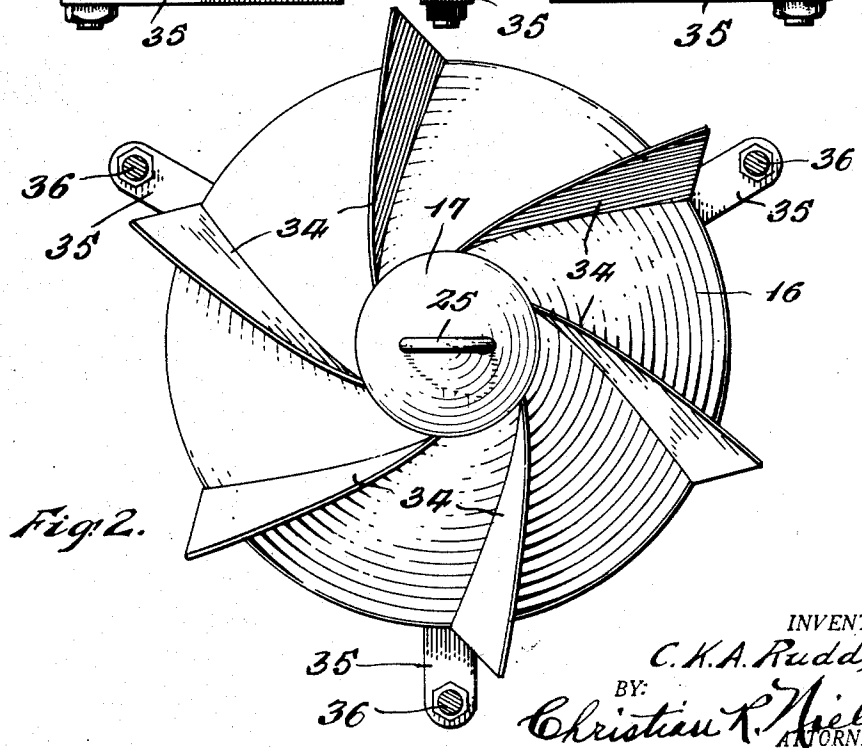


Fig. 2.

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CHIP PACKER AND SPREADER FOR PULP MILLS

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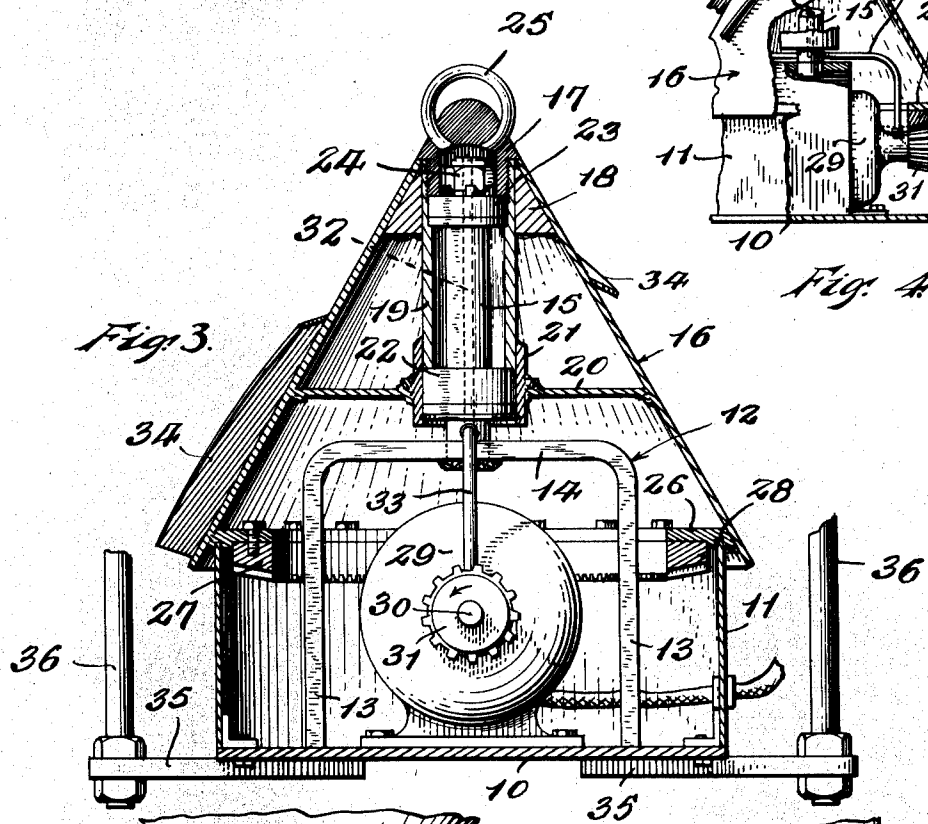


Fig. 3.

Fig. 4.

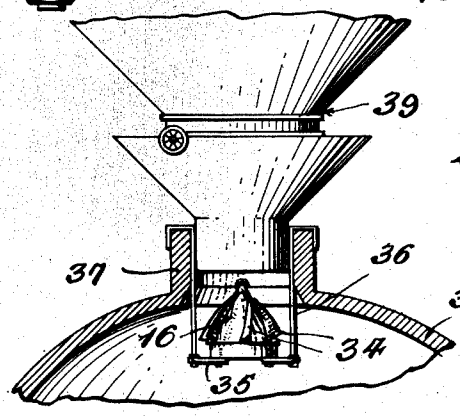


Fig. 5.

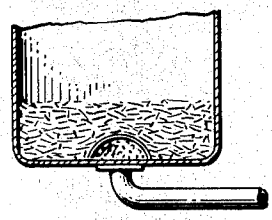


Fig. 6.

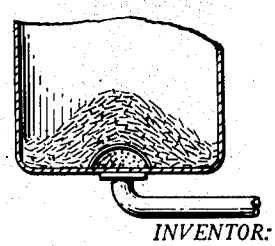


Fig. 7.

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Patented Jan. 16, 1940 2,187,330

UNITED STATES PATENT OFFICE

2,187,330

CHIP PACKER AND SPREADER FOR PULP MILLS

Claus K. A. Rudd, Everett, Wash.

Application March 30, 1938, Serial No. 198,954

2 Claims. (Cl. 214—17)

This invention relates to the general art of paper making and has reference more particularly to an improved mechanism for distributing wood chips in pulp digesters, and it consists in the constructions, arrangements and combinations herein described and claimed.

The general object of the invention is to provide a very simple apparatus whereby the chips may be so evenly distributed in the digester as to effect, in the first place, a more uniform cooking through a more uniform temperature distribution within the digester, and a more thorough cooking in the same length of time; and, in the second place, a larger charge of chips can be introduced into the digester in less time than is possible by the procedure heretofore practiced, by reason of more even distribution and piling of the chips, and will thereby considerably increase the capacity of the pulp cooking equipment.

In the present customary method of filling digesters with chips, a spout is placed over the top nozzle of the digester, and the sliding gate in the chip hopper bottom immediately above the spout is opened, the chips falling by gravity through the spout and into the digester. As is the case with all materials in small pieces, a cone shaped pile is formed in the digester, the entering chips dropping on the apex of the pile and sliding down to the position of rest somewhere along the sides of the pile. The chips have a slab-like form or shape, tending to take a position of most stable equilibrium, that is to say, they will rest on one of the flat faces having the greatest surface area, rather than on one of the edges, and slide down the cone in this position, with the result that a charge of chips is formed in the digester having a stratification corresponding to the angles of repose of the material. Not infrequently a stream of chips dropping from the bin enters the top of the digester eccentrically, and this leads to a stratification apex line somewhat eccentric to the vertical center line of the digester. However, the angularity of the stratification still exists. Now the liquid must naturally flow in channels formed by the interstices between the chips, and if the chips have an angular stratification, such as results from the usual method of filling, the channels or interstices must be somewhat continuous in the direction of the angular alinement or stratification. Since these channels lead upward and away from the walls of the digester, and in descending it follows the outside walls of the vessel because of the cooling effect resulting from radiation of heat from these walls. Hence, the center of the digester contents is always found to be considerably hotter during most of the cooking period than the outside portions, and the courses of circulation can be followed very definitely by the temperature variations. It leads to non-uniformity in the product inasmuch as part of the wood is exposed to the cooking region at a higher temperature for a much longer time than other parts. Naturally, the cooking process is not completed until all the wood has been converted into pulp, and by the time the contents of the colder zones are completely converted, the contents of the warmer central zones will be considerably overcooked, resulting in a very appreciable yield and strength loss which, of course, is undesirable. A more modern system of cooking involves the forced circulation of hot cooking liquor through the digester, passing it through a pump, and forcing it back into the digester from the bottom or top, as the case may be. This procedure is less productive of zones of unequal temperatures in the digester, but its efficiency in this respect is not complete. The angular stratification of the chips causes most of the liquor to flow through the central zone of the digester if the liquor is forced in at the bottom, or along the walls if delivered at the top, and this leads to somewhat inactive zones in the digester contents which are not pulped as rapidly as the main body of the contents. The present invention aims to eliminate all of the undesirable conditions in the digesters outlined above, and employs, as the main feature of the invention, a novel device in the nature of a revolving cone with diagonally shaped fins attached to the outer surface, and rotatably suspended in the digester slightly below the charging nozzle of the latter and disposed in the path of the falling stream of chips, for creating a substantially horizontal stratification of the chips in the digester and a closer packing of the same, by which a more uniform cooking and from 10 to 15 per cent increase in the pulp obtained from each charge is secured.

The invention, its mode of operation, the benefits and advantages inherent therein will all be readily understood and appreciated by those familiar with this branch of the paper making art from the following detailed description, taking in conjunction with the accompanying drawings, wherein,

Figure 1 is a side elevation of my chip packer,

Figure 2 is a top plan view thereof.

Figure 3 is a vertical section through the device, illustrating the drive.

Figure 4 is a fragmentary elevation with parts in section illustrating the oiling means for the motor of the device.

Figure 5 is a side elevation illustrating the packer suspended with a digester.

Figure 6 is a vertical sectional view of a digester showing the even distribution of chips as accomplished with my device.

Figure 7 is a similar view showing the chip deposition as at present carried out.

In carrying out the invention, I provide a base plate 10 upon which there is mounted by means of angle brackets or otherwise, an upstanding circumscribing wall 11.

Upon the base plate 10 within the wall 11, a yoke 12 is mounted. The yoke 12, in the present instance, comprises a pair of legs 13 their lower ends abutting and welded to the base plate 10, the connecting cross member 14 being apertured to receive an upright shaft 15. The shaft 15 is preferably welded within the aperture to afford registry.

The structure thus far described, affords the main support of the distributing cone as will now be described.

The distributing cone 16 may include walls of any suitable inclination, this depending largely upon the digester to which it is applied and in order to rotatably support the cone, I provide a cap piece 17 and a conical member 18, the latter being welded to the inner surface of the cone. The conical member 18 is secured in the apex of the cone and has mounted therein a downwardly extended bearing sleeve 19.

The cone 16 has an inwardly directed plate 20 medially of which there is provided a sleeve 21 of a diameter receiving the lower end of the sleeve 19. The sleeve 21 seats a bearing 22 revolvably supporting the cone and a similar bearing 23 supports the upper end of the shaft 15, the latter bearing being suitably retained between the upper end of the sleeve 19 and the cap 17 which is preferably screw-threaded in the sleeve.

In order that the cone 16 may be securely fixed to the shaft 15, the upper end of the shaft is exteriorly screw-threaded to receive a lock nut 24, the cap 17 being suitably recessed to receive the nut. A hoist-ring 25 is fixed to the cap 17 and will be employed in conjunction with any approved grapple for removal of the distributer.

Adjacent the lower end of the cone 16 there is secured, as by welding, a drive ring 26, upon the under side of which there is mounted an annular driving gear 27. The ring 26 is preferably provided with an annular recess 28 receiving the upper edge of the wall 11 therein.

A driving motor 29 is provided, mounted medially of the base plate 10, the motor including a drive shaft 30 carrying a gear 31 adapted to mesh with the gear 27. From the foregoing, it will be apparent that with rotation of the motor gear 31, rotation will be imparted to the driving gear 27 with consequent rotation of the cone 16.

In order that the bearing of the motor may be properly lubricated, without undue labor, the shaft 15 is provided with a longitudinal bore 32 stopping at a point slightly above the cross arm 14 of the yoke, and from this point there are formed lateral ports opening in opposite directions for reception of pipes 33, the other ends of which are connected with bores communicating with bearings of the motor.

Upon the outer surface of the cone 16 there are a series of helicoidal outwardly disposed vanes 34, the function of which will be apparent from the description of the operation.

A plurality of radially extending support bars 35 are secured to the underside of the base plate 10, the outer extremities being apertured to receive suspension rods 36, the upper ends of which are bent to engage over the upper edge 37 of the entrance opening of the digester 38 (see Figure 5).

The vanes 34 are preferably inclined in a manner to shunt the chips radially upon rotation of the cone 16.

The operation

The operation will be readily understood from the following description.

The distributer being suspended within the digester as illustrated in Figure 5, the motor 29 being energized, the cone 16 will be caused to rotate and as the chips are discharged from the hopper 39 on to the cone the vanes 34 will cause an even horizontal distribution of the chips within the digester.

While I have shown and described a preferred embodiment of the invention, this is by way of illustration only, and I consider as my own, all such modifications in structure as fairly fall within the scope of the appended claims.

I claim:

1. A chip distributer for pulp digesters comprising a base member, having means for suspension within the entrance opening of a digester, a casing on the base member, an electric motor on the base and housed by the casing, a yoke on the base having an upright shaft, a sleeve revolubly mounted on the shaft, a cone member fixed to the sleeve, said cone member having a ring gear upon its interior, a gear fixed to the drive shaft of the motor in mesh with the ring gear, the ring gear having an annular groove for reception of the upper edge of the casing, and said cone having helicoidal vanes upon its exterior surface.

2. The structure of claim 1 in which the shaft is secured against longitudinal movement, and in which the upper end of the sleeve is provided with internal threads, a cap engaged with the threads, and a hoist ring fixed in the cap.

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