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FIBER BEATER FOR THE LIBERATION OF CELLULOSE FIBERS

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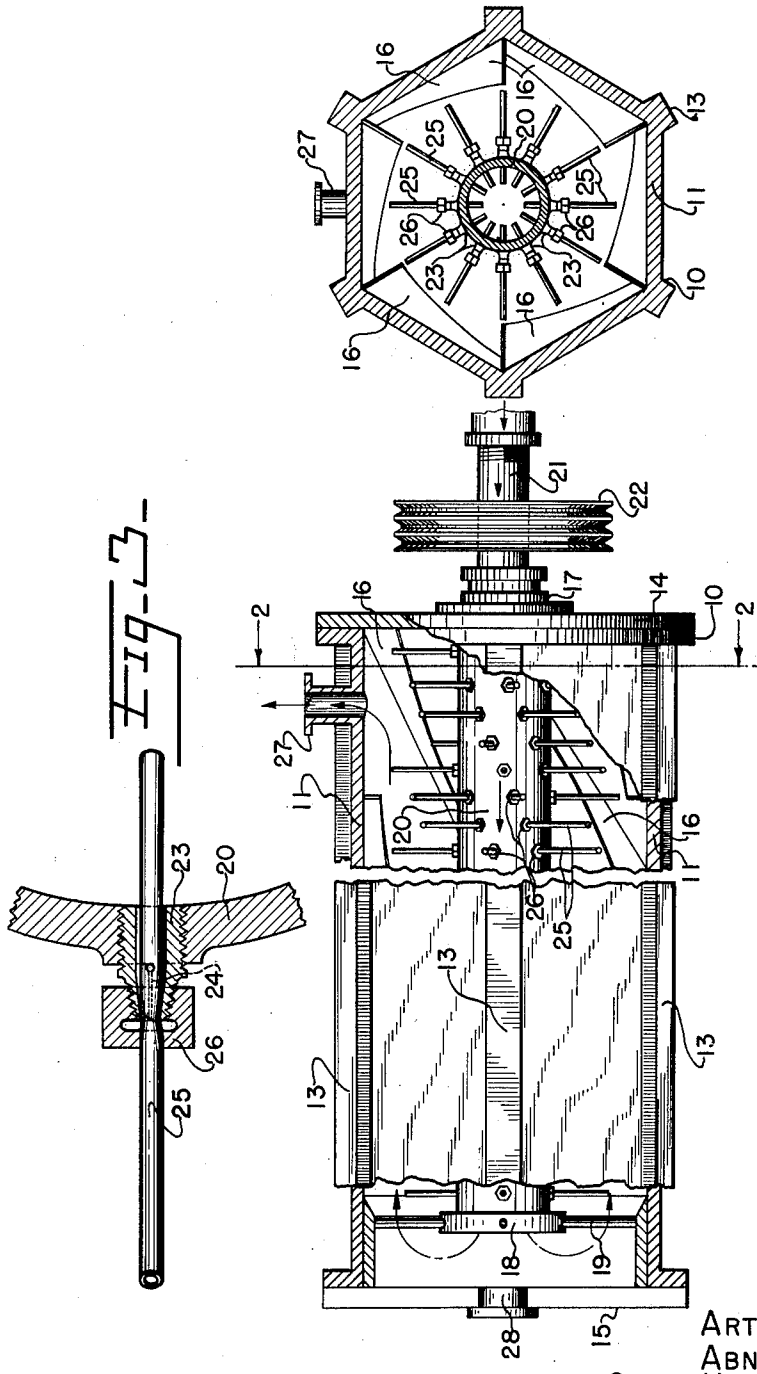


Fig. 2

Fig. 3

Fig. 1

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FIBER BEATER FOR THE LIBERATION OF CELLULOSE FIBERS

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3 Claims. (Cl. 92—22)

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The present invention relates to a beater used in cellulose fiber liberation and particularly to a beater exerting a flexible whipping action and turbulent throwing effect of softened fiber bundles suspended in liquid against irregular baffles and walls designed to baffle rapidly moving fiber bundles to separate the fiber thereof into individual long fibers without abrasion, tearing, cutting or otherwise degrading long fragile fiber into inferior shorter lengths. The device is an improved beater for various fibers but is particularly suitable for releasing digestively softened cotton stalk fiber treated in a process such as described in co-pending application, Serial Number 33,696, filed June 18, 1948.

It is a primary object hereof to provide a beater wherein the fiber is liberated by flexible whipping and baffling of the turbulent movement of the fiber bundles.

Other objects will be inherent in the description of the invention. Reference is made to the drawings for detailed description wherein:

Figure 1 is a fragmentary elevational view of a fiber beater constructed in accordance with the present invention;

Figure 2 is a transverse sectional view of the beater on the line 2—2 of Figure 1; and

Figure 3 is a detail fragmentary sectional view of the beater tank showing the manner of mounting a whip therein.

While the beater with certain modification may be operated in vertical or other position, it is here mounted for horizontal operation. The beater comprises a closed tank or container body 10, of rugged construction for withstanding pressure, preferably having irregular sides 11. As shown, the sides are straight and together form a hexagonal container. Any number of straight sides may be used to form a polygon or the walls may be eccentrically round such as heart-shaped, the purpose being to present a wall for stopping and baffling turbulent and rapidly moving fiber bundles in liquid suspension as propelled by the flexible whips, as further described hereinafter, as distinguished from sliding abrasion against symmetrically curved walls. The sides 11 may be flanged and welded at their intersection to form strongly reinforcing ribs 13. The ends of the tank are closed by plates 14 and 15 of shape suitably corresponding to that of the tank 10.

To enhance the baffling effect of the irregular walls, a series of spiral vanes 16 are mounted against the walls 11 and extend inwardly of the tank, resisting the flow of fiber suspension through the tank.

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A bearing and stuffing gland 17 of conventional construction is mounted in the end plate 14. Arranged in proximity to the end plate 15 is a bearing 18, supported from the tank walls by straps 19. A cylindrical beater duct 20 is concentrically mounted in the tank 10 and has its opposite ends journaled in the bearings 17 and 18. The beater duct 20 is of heavy gauge tube and is fastened to a pipe 21 for communication with a supply of liquid, carrying in suspension, the fiber to be treated in the tank. The pipe 21 has rigidly mounted, in driving relation thereon, a pulley wheel 22 for rotation of the pipe 21 and beater duct 20. The pulley wheel 22 is conventionally grooved to receive a driving belt from any suitable source of power.

The beater duct 20 is radially bored and threaded at short intervals to receive whip sockets 23 which comprise bushings. The bushings are split at 24 and are adapted to be squeezed against and grip flexible whips 25 by nuts 26 fastened on tapered threads of the split ends of bushings 23. The whips 25 pass radially to the interior of the beater duct 20 to provide whipping action inside and outside of the beater duct 20 as it is rotated. The flexible whips are preferably rubber. The passageway through each whip may be constricted by contracting the split bushing grip through movement of the nut 26. This prevents passage of the liquid from the interior of the beater duct 20 to the exterior thereof by way of the tubular rubber whips.

The whips may be disposed about the beater duct in any desired arrangement, either aligned axially or spirally, the latter arrangement tending to accelerate or impede the flow of liquid axially inside and outside of the beater duct, depending on its direction of rotation.

An outlet duct 27 is provided in one of the sides 11 of the tank for withdrawal of the separated fiber suspension and, as shown, is preferably near the same end as the inlet 21. An alignment hole and cover cap 28 is mounted in the end plate 15 to aid in alignment of the bearing 18.

In operation, the digestively softened fiber bundles are passed into duct 21, rapidly rotated by a motor driven belt on pulley 22, and thence passes into the inside of the beater duct 20 rapidly rotating therewith. The axially moving fiber bundle suspension is flexibly whipped by the rubber whips 25 extending into the interior of the beater duct 20 and the softened bundles begin to separate under the beating without being broken, cut or abraded in the first stage. After passing axially the length of the beater duct 20, the fiber

suspension passes out of the inner end of the beater duct, is stopped by end plate 15 and reversed in direction, now passing between the outside of the beater duct and the walls of the tank, and ultimately leaves through outlet 27. The whips on the outside of beater duct 20 have a longer gyrating radius and consequently greater flexibility and whipping action. Moreover, during the flexing and straightening of the tubes, fiber and liquid is alternately drawn into the tubes and expelled. The whips flexibly beat and throw the pulp against the spiral vane baffles and straight sides, giving a stopping, reversing and turbulent churning of the fiber in the liquid without abrasion, tearing or cutting of the fiber.

It will be evident that various modifications of this invention will occur to those skilled in the art and it is intended that the foregoing description be regarded as illustrative and not limiting except as defined in the claims.

What we claim is:

1. A fiber beater comprising a tank, a hollow cylindrical shaft rotatably mounted therein, a plurality of flexible whips radially mounted on said shaft extending into the hollow interior of said shaft, as well as outwardly toward the walls of said tank, one end of said shaft extending outwardly of the tank and forming an inlet for fiber suspended in liquid and the other end of said shaft being open and terminating inside of the tank close to one end, with an outlet near the opposite end of the tank.

2. A fiber beater comprising a closed tank having irregular walls shaped to baffle movement of fiber suspension turbulently whipped thereagainst, a hollow cylindrical shaft rotatably mounted in said tank, having one end open and terminating inside of the tank close to one end, and the other end thereof extending outside of the tank, forming an inlet for fiber suspended in liquid, a plurality of flexible rubber whips radially mounted on said shaft, extending into the hollow interior of said shaft, as well as outwardly towards the walls of the tank, with an outlet in the tank located near the inlet outside of said shaft.

3. A fiber beater comprising an elongated horizontally mounted closed pressure resistant tank having a plurality of straight sides joined to polygonal shape, spiral vanes longitudinally mounted against said walls, said walls and vanes cooperatively adapted to baffle movement of fiber suspension turbulently whipped thereagainst, a hollow cylindrical shaft rotatably mounted in said tank, having one end open and terminating inside of the tank close to one end and the other end thereof extending outside of the tank, forming an inlet for fiber suspended in liquid, a plurality of flexible rubber radially mounted on said shaft extending into the hollow interior of said shaft, as well as outwardly towards the walls of the tank, with an outlet in the tank located near the inlet outside of said shaft.

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