April 13, 1954 S. V. WICKSELL 2,674,927

DISINTEGRATOR FOR FIBROUS MATERIALS

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Fig. 1.

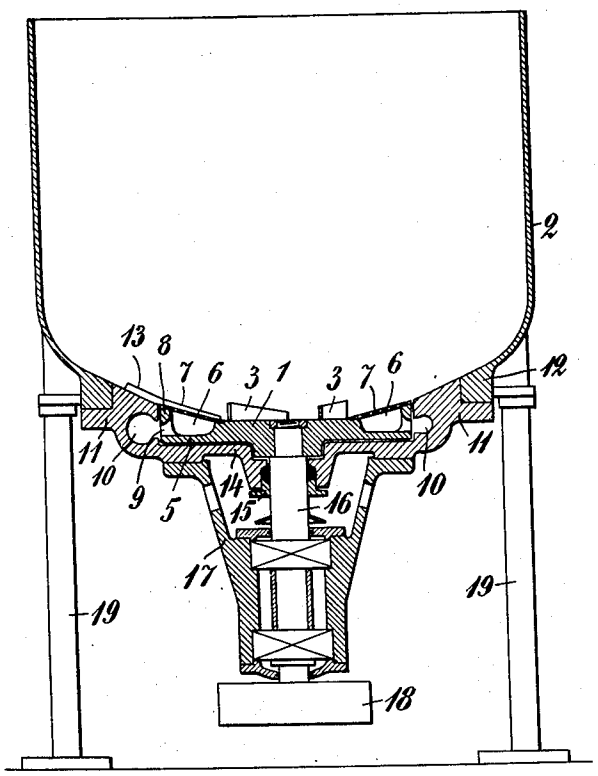


Fig. 2.

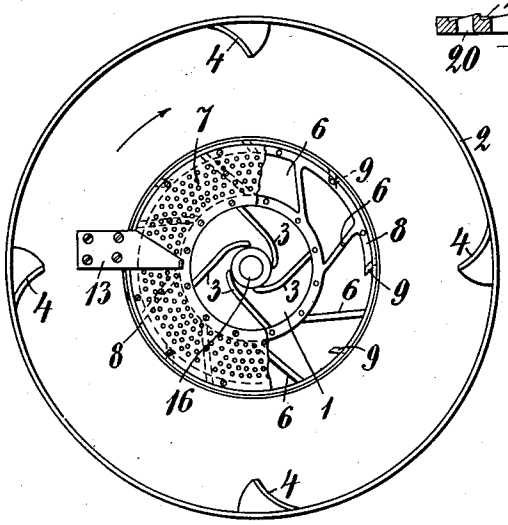
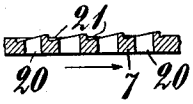


Fig. 3.



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DISINTEGRATOR FOR FIBROUS MATERIALS

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7 Claims. (Cl. 92—23)

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The present invention refers to an apparatus for disintegrating and fibrating of fibrous materials such as pulp bundles, paper waste and the like in water. Apparatus of this description, so-called pulp disintegrators, principally consist of a rotor serving for the circulation and the working of the pulp, a pump in the form of a rotating pump wheel, and a strainer plate arranged above the outlet from the pulp container, through which strainer plate the disintegrated pulp is sucked out and strained.

The present invention has for its object to increase the disintegrating capacity and the working capacity of such pulp disintegrators, and is principally distinguished by the feature that the rotor, the pump wheel, and the strainer plate are built together to form a rotating unit. Here, the vanes serving for the circulation and the working of the pulp are preferably arranged on the hub portion of the rotor, while the pump wheel has a concentrically arranged axial inlet around the hub portion, said inlet being covered by an annular strainer plate. This constructively simple arrangement of said parts relatively to each other brings the advantage that the strainer plate rotates, merging closely to the vanes, so as to attain, in consequence thereof, a powerfully disintegrating effect on the material.

The invention will be described more closely with reference to the accompanying drawings, which illustrate a form of embodiment of a pulp disintegrator constructed in accordance with the invention. Fig. 1 represents a vertical section and Fig. 2 a plan view of the pulp disintegrator. Fig. 3 shows a section through a portion of the strainer plate, representing a special embodiment of the same.

The rotor 1 is arranged at the bottom of a receptacle 2, which is intended to be filled with the material to be disintegrated and with water in a proportion of, for instance, 3.5 to 5% of pulp. Arranged in the hub portion of the rotor are a number of vanes 3 adapted to bring the pulp into rotation within the container while working at the same time upon the pulp and facilitating the disintegration thereof. The bottom of the container is inclined and consequently brings about a vertical circulation of the pulp, guide plates 4 arranged on the cylindrical wall of the container then effecting a deflection of the stream of pulp inwardly toward the centre of the container, where the pulp is thus caused to flow downwardly. Extending from the rotor hub is a plane disk 5 forming an attachment for a number of pump wheel vanes 6, which are disposed in an

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edgewise fashion in an annular space, which is covered at the top by an annular strainer plate 7, and which is limited outwardly by an annular wall 8 carried by a number of short vanes 9 arranged around the circumference of the disk 5. The parts 5—9 form the pump wheel proper having through the strainer plate 7 an axial inlet connected directly to the pulp container, and a radial outlet through the intervening spaces between the vanes 9. This outlet opens in front of a spiral-shaped channel 10 in a pump housing 11 surrounding the rotor, said pump housing being secured in a flange 12 on the pulp container, the portion of the pump housing situated between the pump wheel and said flange then forming an annular part of the bottom of the container. The strainer plate 7 is secured with its inner edge in the hub portion of the rotor, and is attached with its outer edge to the wall 8, which at the same time tightens the pump wheel against the pump housing. The plate, which may be plane or conical, is also supported by the vanes 6, to which it is preferably also secured. Screwed onto the part of the pump housing 11 located on a level with the bottom of the container is a scraper 13 extending over the strainer plate and preventing the fibrous pulp from sticking to the plate.

The bottom portion 14 of the pump housing is tightened against the rotor shaft 16 by a stuffing box 15, and is formed as an attachment for a bearing housing 17 arranged underneath the pump housing, said bearing housing 17 having the shaft 16 mounted therein. The rotor shaft 16 carries at its lower end a belt pulley 18, through which the rotor is connected to a driving motor, not shown in the drawing. The pulp container is mounted on a number of posts 19, the rotor with its associated bearing housing being suspended in the pump housing 11 attached to the bottom of the container.

The number of revolutions of the rotor is chosen differently with respect to the nature of the material to be treated. For example, the number of revolutions may vary from 300 up to 800 revolutions per minute. When the vanes 3 throw the mixture of water and pulp over the strainer plate 7, the liberated fibres will be separated to pass through the holes of the strainer plate and to be caught by the vanes 6, 9, the mixture of fibres and water being thus hurled out into the channel 10 in the pump housing, whence it is emptied into a collecting receptacle, or is returned to the pulp container 2 to be subjected to repeated treatment. Through the arrange-

ment of the strainer plate 7 immediately outside the vanes 3, and through the rotary movement of the strainer plate, the latter will powerfully act upon the pulp of fibres in order thus to actuate the disintegration of the fibres in a favourable way. This effect may be further increased by making the strainer plate in the manner shown in Fig. 3. The strainer plate is provided on the upper side thereof with recesses or depressions arranged around the holes 20, the bottom portions of said recesses or depressions forming oblique surface 28 inclined to the walls of the holes. If desired, the strainer plate may instead be channeled in a radial direction. The holes themselves may be either cylindrical or conical, and in the latter case they widen to the lower side.

On account of the rotary movement of the strainer plate, the latter keeps purer than is the case in known constructions, where the strainer is stationary and a rotating scraper must be used to keep the plate clean. In an arrangement according to the present invention, no scraper is normally required, a scraper being made use of only in cases more or less severe.

The disintegrating and working capacity of the apparatus may be increased further by making the pulp container of a polygonal configuration, for instance with 12 sides, instead of making it round, the material being then also worked upon by the walls of the container during the rotary movement of the pulp.

I claim:

1. A pulp beater comprising a pulp container, a rotary impeller mounted in said container at the bottom thereof, said bottom having a circular outlet opening coaxially surrounding the impeller, a ring-shaped strainer plate covering said outlet opening and mounted to rotate together with the impeller, and a centrifugal pump wheel mounted coaxially with the impeller below said strainer plate and having an axial inlet registering with said outlet opening.

2. A pulp beater as claimed in claim 1, wherein

the impeller has a hub portion carrying beating and circulating vanes at the top thereof and vanes of the pump wheel at its peripheral portion beneath the strainer plate.

3. A pulp beater as claimed in claim 1, wherein the strainer plate is supported by the vanes of the pump wheel.

4. A pulp beater comprising a pulp container, a rotary impeller centrally mounted in said container at the bottom thereof and provided with a central hub portion carrying beating and circulating vanes, a centrifugal pump wheel forming a peripheral portion of the impeller, said peripheral portion having a circular discharge opening, a ring-shaped strainer plate covering said discharge opening and mounted on the peripheral portion of the impeller outside said beating and circulating vanes, and pump wheel vanes provided in said discharge opening below the strainer plate.

5. A pulp beater as claimed in claim 4, wherein the impeller is rotatably mounted in a pump housing secured to the bottom of the pulp container and containing an outlet channel communicating with the discharge opening of the impeller.

6. A pulp beater as claimed in claim 4, wherein the impeller and the strainer plate form a central rotary part of the bottom of the pulp container.

7. A pulp beater as claimed in claim 4, wherein the strainer plate is provided on the upper side thereof with recesses or depressions arranged around the holes in the plate.

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