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(54) **Device to disintegrate paper, cardboard and the like.**

(57) Device to disintegrate paper, cardboard and similar materials, which device consists of a tub (1) into which the material to be disintegrated is fed and from which it is removed in the disintegrated state, and of at least one rotating rotor (3) with several blades (2, 5), situated on one of the walls of the tub (1). Current pulpers work effectively only with a mild consistency. When the consistency increases the disintegrating power decreases essentially. With the invention the problem has been solved by that at least one of the blades is a pumping blade (2) and at least one a disintegrating blade (5).

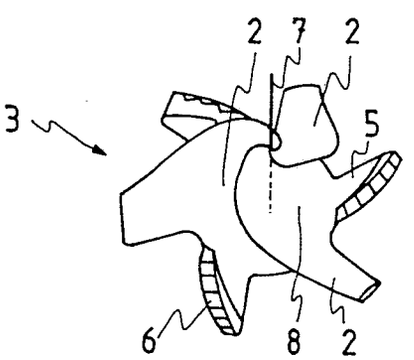

Fig. 2

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Description

DEVICE TO DISINTEGRATE PAPER, CARDBOARD AND THE LIKE

This invention is related to a device to disintegrate paper, cardboard and similar materials, which device consists of a tub into which the material to be disintegrated is fed and from which it is removed in the disintegrated state, and of at least one rotating rotor with several blades, situated on one of the walls of the tub.

With the paper and cardboard machines getting bigger, pulpers used for disintegrating the web have been developed by that the installed motor power has been increased so that the paper or any similar material could be disintegrated quickly enough into a form in which it can be pumped. Pulpers are also used for disintegrating bale pulp, broke rolls and similar solid materials. In that case the disintegrating organ of the pulper, the rotor, is situated at the bottom of the tub.

All current so-called horizontal and vertical pulpers require relatively much power to cope with the bigger amounts to be disintegrated due to increased production. Moreover, those pulpers work effectively only with a low consistency. With higher consistencies the disintegrating power of these current models diminishes drastically. For higher consistencies there have been developed so-called high-consistency pulpers, but they have the disadvantage of not being able to be used continuously.

Regarding prior art, reference is still made to Finnish patent No. 72356, which presents a horizontal pulper with two rotors installed on one wall of the tub in such a way that straight lines running through the axial lines of the rotors intersect at least in one projection. Also that pulper suffers from the disadvantages explained above.

The object of this invention is to achieve a new rotor that can be used both in horizontal and in vertical pulpers, and of which rotors there can be one or more in the same tub. A device according to the invention is characterized by that at least one of the blades is a pumping blade and at least one a disintegrating blade.

An advantageous embodiment of a device according to the invention is characterized by that there are equally many pumping blades and disintegrating blades, and that they have been arranged in the rotor's direction of rotation alternately.

Another advantageous embodiment of a device according to the invention is characterized by that the three pumping blades of a six-bladed rotor extend from the periphery of the rotor to the centre of the rotor, forming a solid pumping blade unit, and that the disintegrating blades formed between these pumping blades have disintegrating teeth for mechanical tearing that extend from the periphery of the rotor only to the edge of the rotor's body.

Still another advantageous embodiment of a device according to the invention is characterized by that the disintegrating teeth have been installed in such a manner that they are replaceable.

Essential in a rotor according to the invention is that it combines mechanical disintegration with a powerful acceleration of stock, which increases hydraulic disintegration, i.e. strengthens the cutting forces in the liquid. In a device according to the invention the pumping blades cause the hydraulic forces of disintegration and the replaceable disintegrating teeth of the disintegrating blades carry out the mechanical disintegration work.

In tests carried out it has been possible to cut the power consumption to almost a half with a device according to the invention in comparison to devices of prior art. In addition, the disintegration time and the disintegration consistency can be selected to suit the production in question. The installed power of pulpers of prior art with current paper machines is from 1,000 kW to 1,500 kW, which means that yearly savings from Fmk 850,000 to Fmk 1,300,000 in operating costs are obtained if the price of electric energy is 20 p/kWh. Moreover, with a device according to the invention the reliability of operation is improved considerably, since variations of production do not cause motor stoppages due to overloading.

In the following the invention is explained in detail by means of examples of advantageous embodiments, with reference to the attached drawings among which

Fig. 1 shows from a above a know device to disintegrate paper, cardboard and the like,

Fig. 2 shows in a perspective a rotor according to the invention,

Fig. 3 shows the replaceable teeth of a disintegrating blade of a rotor according to the invention,

Fig. 4 shows the same as Fig. 3, but seen from the direction of the teeth.

Figure 1 shows a known pulper (Finnish patent No. 72356), i.e. a device to disintegrate paper, cardboard and the like. The device can be placed for instance under a big paper machine, in which case the feeding into the tub 1 of the material to be disintegrated happens through the open top of the tub. The disintegration of the paper or cardboard in the tub 1 is carried out with rotating rotors 3. In Figure 1 the number of rotors is two, and they are situated on the same wall of the tub. The driving motors 4 of the rotors are situated outside the tub, coaxially with the rotors. The rotors in this known device are conventional ones, i.e. they have numerous tearing blades of essentially the same kind.

Figure 2 shows a six-bladed rotor 3 according to the invention, such as can be used both in horizontal and in vertical pulpers; and there can be one or more of them in the same tub. The three pumping blades 2 of the six-bladed rotor 3 extend from the periphery of the rotor 3 to the centre of the rotor, forming a solid pumping blade unit 8. Between these pumping blades have been formed disintegrating blades 5 that have been equipped with disintegrating teeth 6 for tearing that extend from the periphery of the rotor only to the edge of the body of the rotor 3.

Figure 3 shows the teeth 6, which can be in one

piece that is fastened replaceably on the disintegrating blade 5 by inserting bolts or similar elements through the holes 7. The tooth piece is curved in the way shown in Figure 4.

It is obvious to a person skilled in the art that the embodiments of the invention are not restricted to the examples given above, but can be varied within the scope of the following patent claims.

Claims

1. Device to disintegrate paper, cardboard and similar materials, which device consists of a tub (1) into which the material to be disintegrated is fed and from which it is removed in the disintegrated state, and of at least one rotating rotor (3) with several blades (2, 5), situated on one of the walls of the tub (1), **characterized** by that at least one of the blades is a pumping blade (2) and at least one a disintegrating blade (5).

2. Device according to Claim 1, **characterized** by that there are equally many pumping blades (2) and disintegrating blades (5), and that they have been arranged in the rotor's direction of rotation alternately.

3. Device according to Claim 1 or 2, **characterized** by that the three pumping blades (2) of a six-bladed rotor (3) extend from the periphery of the rotor to the centre of the rotor, forming a solid pumping blade unit (8), and that the disintegrating blades (5) formed between these pumping blades (2) have disintegrating teeth (6) for mechanical tearing that extend from the periphery of the rotor only to the edge of the rotor's body.

4. Device according to any of the Claims 1-3, **characterized** by that the disintegrating teeth (6) have been installed in such a manner that they are replaceable.

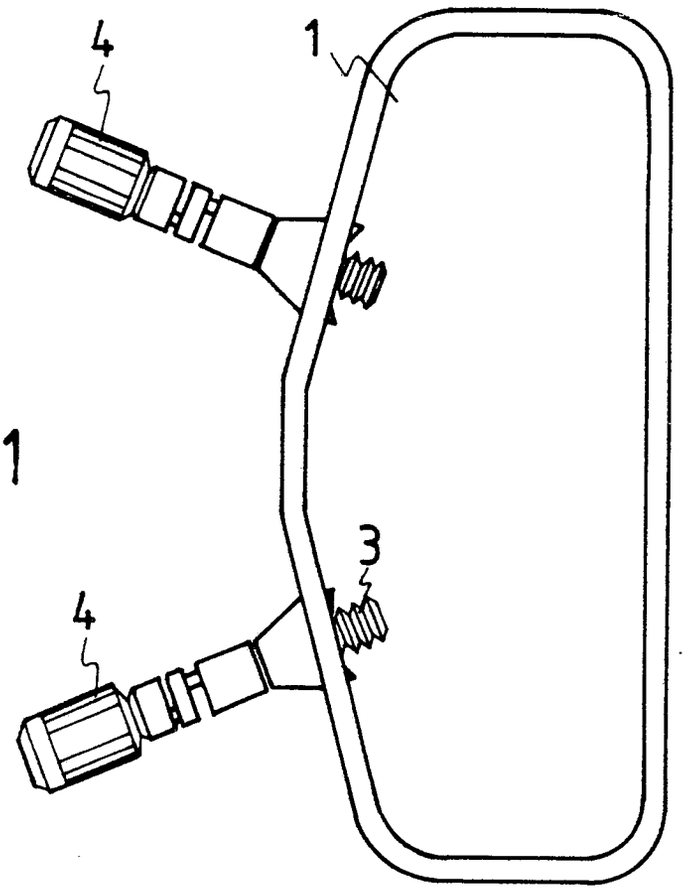

Fig.1

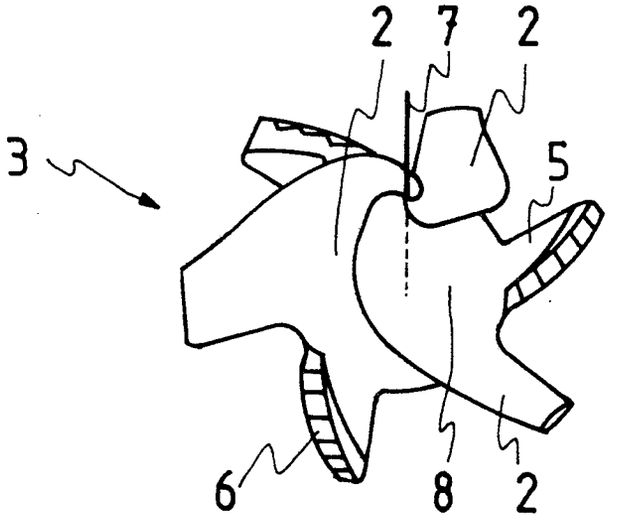

Fig.2

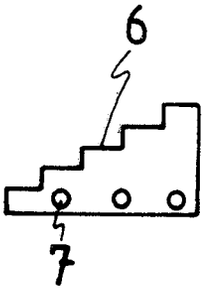

Fig.3

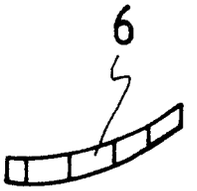

Fig.4