

April 1, 1952

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2,591,633

BEATING APPARATUS

Filed Dec. 9, 1947

Fig. 3.

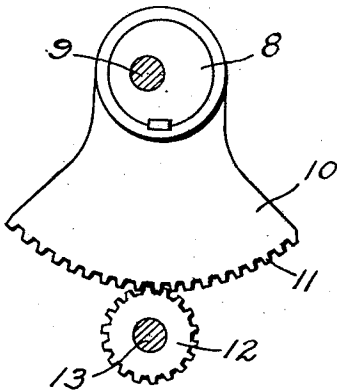


Fig. 4.

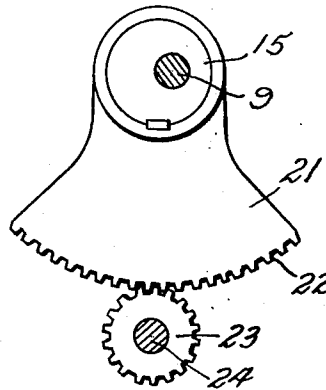


Fig. 1.

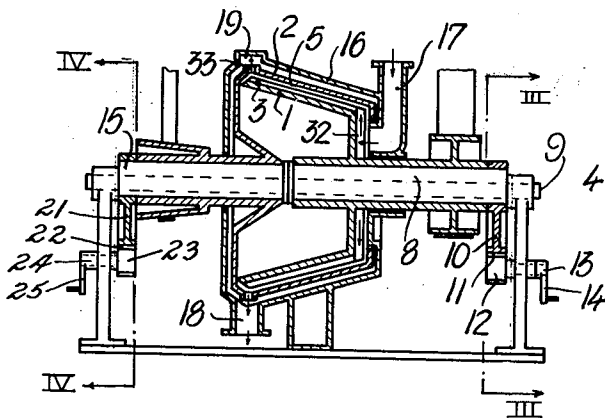
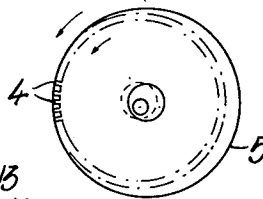


Fig. 2.



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UNITED STATES PATENT OFFICE

2,591,633

BEATING APPARATUS

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Application December 9, 1947, Serial No. 790,583
In Norway December 17, 1946

1 Claim. (Cl. 92—27)

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The invention relates to an apparatus of the kind comprising a roll, in the shape of a cylinder or a cone, and being supported rotatably round its axis, and a case enclosing the roll. Apparatus of this kind is commonly used for mechanical treatment of fibrous material suspended in water and is in the following description called a "beater." It should, however, be understood that this designation represents no limitation on the invention, as the apparatus according to the invention may also be named—for example—"refiner," "breaker," "disintegrator" or "grinding apparatus."

In an apparatus of the above mentioned type the mechanical treatment or beating of the material takes place as the material passes between the surface of the roll and the adjacent surface of the case. The beater is commonly provided with bars on its operating surface. The case is often also provided with bars on its inner wall or the part of the same which cooperates with the roll.

The roll in such apparatus is generally placed eccentrically in relation to the case and is preferably supported in such a manner that its axis can be displaced in parallel with itself for adjustment of distances between the cooperating surfaces of the roll and case.

Apparatuses are known in which the case is fixed and the roll rotates. Apparatuses are further known in which the case also is rotatably supported. The present invention relates to the last mentioned kind and the invention consists substantially therein that the apparatus is supplied with a means for adjustment of the rotating speed of the two grinding parts independent of each other.

The case and the roll rotate preferably in the same direction but with different speeds so that the same or different perimeter velocity may be obtained.

The apparatus may be provided with two motors of which the one drives the roll and the other the case. The same motor may, however, also be used to drive both the roll and the case. In this instance, there is inserted an exchange gear between the motor and roll or case. The motor may be directly connected partly to the roll or the case and partly to an intermediate shaft provided with an adjustable V-belt transmission or the like for the case or the roll.

If the roll rotates with a greater perimeter speed than the case, it will—when the apparatus is used—pull the case around so that it may be necessary to brake the case. This can be obtained by means of separate motor, as for example can be constructed so that it operates with a constant number of revolutions thereby maintaining the speed of the case constant. The braking may, however, also be carried out by means

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of an exchange gear such as the kind indicated above. Hereby the advantage is obtained that the power consumed is partly regained.

The case should rotate with sufficient velocity so that the centrifugal force keeps the material outwardly against the perimeter. As a result of this compelled movement of the material the apparatus can operate with any consistency of material. This is a substantial advantage as compared with apparatuses commonly used which only with difficulty can operate with consistency of more than 8%.

The apparatus according to the invention can operate continually or discontinually. By continual operation the apparatus may be preferably carried out in such a manner that the case is enclosed by a fixed housing provided with an inlet opening for continuous supply of the material to the space between the roll and the case at the one end of the apparatus and with an outlet for continuous discharge of the material at the other end.

As the case and the material rotate in the same direction as the roll, this rotation may be brought up to very high velocity, with a corresponding increase of the capacity of the apparatus, without the necessity of accelerating the material more than usual each time it passes the beating place. On the other hand this acceleration may be reduced by the election of a smaller difference in the velocity than commonly used between bedplate and roll. In most apparatuses the roll rotates with a perimeter velocity of about 10 meters per second against a fixed case or bedplate.

In the apparatus according to the invention, the material to be treated is shortly after the introducing of the same into the case imparted the same rotation velocity as the case. The power consumed in connection with this acceleration which takes place only once is immaterial as compared with the acceleration work which the roll must carry out each time the material passes the beating place.

It should be noted that—as already indicated previously—beaters are known in which both the roll and the case are rotatably supported and rotate when the apparatus is operated. In such apparatuses always only the roll or the case is driven with adjustable speed whereas the rotation speed of the other rotating member cannot be adjusted. It is the possibility of regulating the rotation speed of both the roll and the case independently of each other according to the invention which makes it possible to obtain the great advantages as stated in the previous description.

In order that the invention should be more easily understood it will be described in the following in greater detail, in connection with the

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drawing which diagrammatically illustrates an embodiment of the invention.

In the drawing:

Figure 1 is a diagrammatic longitudinal section through the apparatus of the invention;

Figure 2 is a diagrammatic view at right angles to Figure 1 showing the position of the roll in relation to the case;

Figure 3 is a sectional view taken on the line III—III of Figure 1, parts thereof being omitted for clarity; and

Figure 4 is a sectional view taken on the line IV—IV of Figure 1, parts thereof being omitted for clarity.

According to the invention the apparatus consists of a roll 1, being rotatably supported and being on its outer surface provided with bars 3 and being enclosed by a case 2, which is also rotatably supported. Each bar 3 on the roll has a surface 4, cooperating with the inner surface 5 of the case. The last mentioned surface may be provided with similar, low, broad bars or with grooves or it may be smooth. The inner surface in the case may be cylindrical, conical or of another suitable shape.

The rotation axis of the roll is parallel with the rotation axis of the case in such a manner that the roll is eccentrically supported in relation to the case.

As illustrated in Figure 1, the roll 1 is supported on a sleeve 8, which is provided with an eccentric longitudinal bore by means of which it is turnably supported on a fixed shaft 9. The turning of the sleeve 8 is obtained by means of a mechanism consisting of an arm 10 at one end of the sleeve which arm extends in radial direction and being at its free end provided with a tooth segment 11 and further comprising a toothed wheel 12 on shaft 13 meshing with the toothed segment and which wheel can be turned by means of a crank 14.

The case is supported on an eccentric sleeve 15 turnably supported on the shaft 9. The turning of this sleeve may be caused by means of a toothed segment 21 having the toothed portion 22 which cooperates with toothed wheel 23 mounted on shaft 24 which is rotatable by means of a crank 25.

The driving of the roll and the case may for instance be caused by means of belt transmissions. The speed difference between the roll and the case can be adjusted either by adjusting the speed of the roll and maintaining the speed of the case constant or vice versa. The belt transmission may be so dimensioned that the speed on the case as desired may be adjusted so that the difference in the perimeter speeds between the case and the roll becomes nil, or the case can rotate with a perimeter velocity smaller or greater than the roll.

Outside the case is placed a stationary housing 16 provided with an inlet opening 17 and outlet opening 18. In the case is provided an annular channel 19 by means of which the material is conveyed to the outlet 18.

The operating of the apparatus as shown on the drawing is as follows:

The material is supplied through the inlet opening 17 and is first caught by a small number of scoops 32, conveying the material radially outwards. As a result of the large rotation velocity the material takes the form of a ring on the inside of the inner wall of the case.

The sleeve 8 is turned by means of the crank 14 until the distance or the pressure desired between

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the bars 3 and the case 5 is obtained. The bars penetrate the layer of material with great speed and as the case rotates a substantially thicker layer of the material between the roll and the case is obtained than by common beaters in which the bars in the bedplate which correspond to the case in the present invention, are stationary.

In the apparatus according to the invention a different beating effect is obtained when operating with a certain distance between the two beating surfaces than when operating with a certain pressure between the same. Further a different beating effect is obtained when operating with different relative velocities between the said beating surfaces. As both beating surfaces rotate it is possible to treat material of substantially higher consistency than usual. When supplying new charges of material the material will be pressed together and moved in axial direction of the roll from the inlet and to the outlet of the apparatus where the case at the perimeter is provided with openings 33, through which the material is discharged. The material is received by the channel 19 and is discharged from the apparatus through the outlet 18.

The invention described is designed for continuous operation and with horizontal arrangement of the shafts. However, the shafts may be arranged vertically or inclined with the inlet at the top and the outlet at the bottom.

In the previous description only one rotating roll is mentioned, but the invention is not limited to this. As easily understood, the apparatus according to the invention may also be provided with two or more in the same case operating, in parallelly supported rolls.

The invention is further not limited to treatment of fibrous materials in that the apparatus according to the invention may also be used for beating or treating other materials.

I claim:

Beating apparatus comprising a shaft, means for supporting said shaft in fixed, horizontal position, a sleeve having an eccentric bore and turnably mounted on said shaft, means for adjusting the axis of said sleeve by turning the same on said shaft, a roll rotatably mounted on said sleeve, a second sleeve having an eccentric bore mounted on said shaft, means for adjusting the axis of said second sleeve independently of the axis of the first mentioned sleeve by turning said second sleeve on said shaft, a case enclosing the roll and being rotatably mounted on said second sleeve, and driving means by which the speed of rotation of the roll and the case can be adjusted independently of each other.

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