Oct. 29, 1940. E. COWLES 2,219,571

APPARATUS FOR DISSEMINATING SOLIDS IN LIQUIDS

Filed Aug. 23, 1938

Fig. 1.

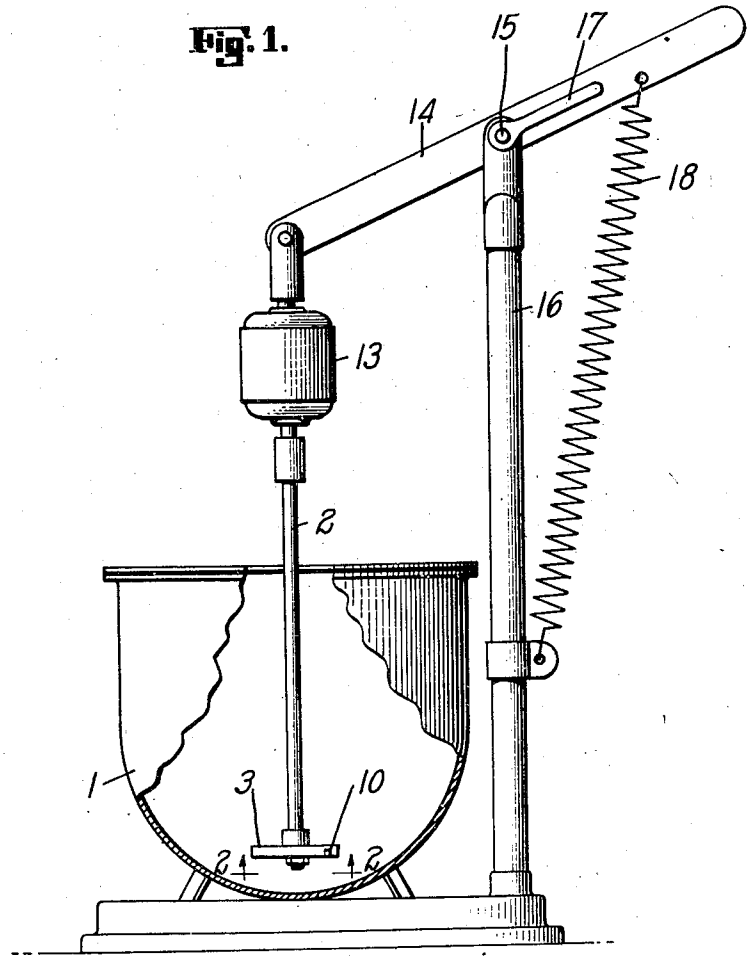


Fig. 2.

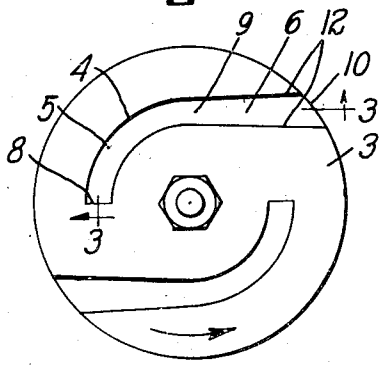
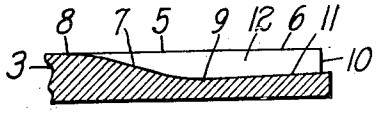


Fig. 3.



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APPARATUS FOR DISSEMINATING SOLIDS IN LIQUIDS

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7 Claims. (Cl. 259—107)

This invention relates to apparatus for disseminating solids in liquids as for example, for disintegrating, dispersing and maintaining in suspension divisible insoluble solids, and for breaking up and putting into solution solids which are soluble. Such machines are adapted for a wide variety of uses, as for example, for the treatment of paper stock, for defiberizing, for dissolving, for paint mixing, etc.

It is an object of the invention to provide an apparatus of the type described which shall be simple and inexpensive in construction and simple and efficient in operation.

It is a further object of the invention to provide an apparatus for the purposes described which will accelerate relatively small quantities of liquid to relatively high velocities which have a highly disintegrative effect.

Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawing, in which,

Figure 1 is a side elevation of an apparatus embodying my invention, partly broken away.

Figure 2 is a bottom plan view of the impeller, and

Figure 3 is a section on the line 3—3 of Figure 2.

Referring to the drawing, the apparatus comprises a tank or container 1 of any suitable size and shape.

Extending into said container is a shaft 2, carrying on its lower end an impeller member 3. In the preferred embodiment illustrated, the said impeller member comprises a circular disk having open grooves or channels 4 formed in the bottom face thereof, two of such grooves being illustrated herein. It will be understood, however, that the number of grooves used is immaterial, as one groove or a plurality of grooves may be used. Also, the said grooves may be formed in either the bottom face or the top face of the disk, or in both faces, if desired. The said grooves are formed with two distinct sections, which, for convenience may be called the intake section and the discharge section, the intake section being designated by 5 and the discharge section by 6.

The intake section of said grooves is preferably curved in an arc, the center of which is coincident with the axis of rotation of the shaft 2, and preferably the bottom of the groove throughout this section is inclined as illustrated at 7, so that the depth of the intake section increases progressively from the leading edge 8 to the end 9 of this section.

The discharge section of said grooves is preferably straight, and from the point 9 where this section joins the intake section, diverges from the axis of rotation of the impeller, so that the end of this section cuts through the rim of the impeller to form an outlet opening 10. The bottom of the groove throughout the discharge section is also preferably inclined as illustrated at 11, but in an opposite direction to the incline 7, so that the depth of the discharge portion decreases progressively. On the other hand, the side walls 12 of the discharge section diverge slightly in such manner that the cross sectional area of the discharge section of the groove remains substantially constant throughout the section.

The shaft 2 may be driven by an electric motor 13, or in any other convenient manner, and the entire motor and impeller shaft assembly may be carried on a lever 14 pivoted at 15 on a standard 16, so that the impeller may be adjusted to operate at any convenient level in the container 1. A lock member 17 may be provided to hold the lever in the desired position, and if desired, a counter-balance spring 18 may be provided to balance, in whole or in part, the weight of the assembly.

In operation, the solid and liquid materials to be treated are introduced into the container and the impeller is rotated at high speed in a counterclockwise direction as shown in Figure 2. The speed of rotation of the impeller should preferably be such as to produce peripheral velocities in excess of 2,000 feet per minute and may be as high as 15,000 feet per minute or more. The shape of the grooves is such that rotation of the impeller causes liquid to be drawn into the intake section of the grooves and discharged through the openings 10 in the form of high velocity jets. These jets, impinging on the relatively stationary liquid through which they pass, exert a highly disintegrative effect on any solids immersed or suspended therein.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. Apparatus for disseminating solid material in a liquid, which comprises, a container, and a rotatable impeller in said container, said impeller being provided with an open groove formed in the surface thereof, said groove having an intake section and a discharge section, the intake section being closer to the axis of rotation of said

impeller than the discharge section, and being curved on an arc concentric with the axis of rotation of said impeller, the bottom of the intake section of said groove being inclined from the leading edge of said section to the end thereof so that the depth of said groove increases progressively.

2. Apparatus for disseminating solid material in a liquid, which comprises, a container, and a rotatable impeller in said container, said impeller being provided with an open groove formed in the surface thereof, said groove having an intake section and a discharge section, the intake section being closer to the axis of rotation of said impeller than the discharge section, and being curved on an arc concentric with the axis of rotation of said impeller, the bottom of said discharge section being inclined from the beginning of said section to the end thereof so that the depth of said groove decreases progressively.

3. Apparatus for disseminating solid material in a liquid, which comprises, a container, and a rotatable impeller in said container, said impeller being provided with an open groove formed in the surface thereof, said groove having an intake section and a discharge section, the intake section being closer to the axis of rotation of said impeller than the discharge section, and being curved on an arc concentric with the axis of rotation of said impeller, the bottom of the intake section of said groove being inclined from the leading edge of said section to the end thereof, so that the depth of said groove increases progressively, and the bottom of said discharge section being inclined from the beginning of said section to the end thereof so that the depth of said groove decreases progressively.

4. Apparatus for disseminating solid material in a liquid, which comprises, a container, and a rotatable impeller in said container, said impeller being provided with an open groove formed in the surface thereof, said groove having an intake section and a discharge section, the intake section being closer to the axis of rotation of said impeller than the discharge section, and being curved on an arc concentric with the axis of rotation of said impeller, the bottom of said discharge section being inclined from the beginning of said section to the end thereof so that the depth of said groove decreases progressively, and the side walls of said section diverging so that the cross sectional area of said groove remains substantially constant throughout said section.

5. Apparatus for disseminating solid material in a liquid, which comprises, a container, a disk impeller in said container mounted for rotation on an axis perpendicular to the plane surfaces of said disk, and an open groove formed in one of the plane surfaces of said disk, said groove beginning at a point between the axis of rotation and the periphery of said disk, and ending at the periphery of said disk, the initial portion of said groove being curved on an arc concentric with said axis of rotation.

6. Apparatus for disseminating solid material in a liquid, which comprises, a container, a disk impeller in said container mounted for rotation on an axis perpendicular to the plane surfaces of said disk, and an open groove formed in one of the plane surfaces of said disk, said groove beginning at a point between the axis of rotation and the periphery of said disk, and ending at the periphery of said disk, the initial portion of said groove being curved on an arc concentric with said axis of rotation and being of progressively increasing depth.

7. Apparatus for disseminating solid material in a liquid, which comprises, a container, and a rotatable impeller in said container, said impeller being provided with an open groove formed in the surface thereof, said groove having an intake section and a discharge section, the intake section being curved on an arc concentric with the axis of rotation of said impeller, and the discharge section diverging from said axis.

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