

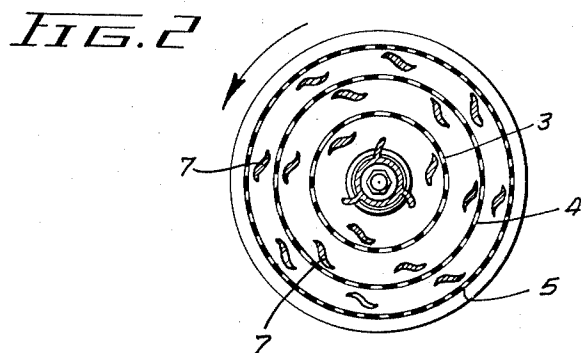
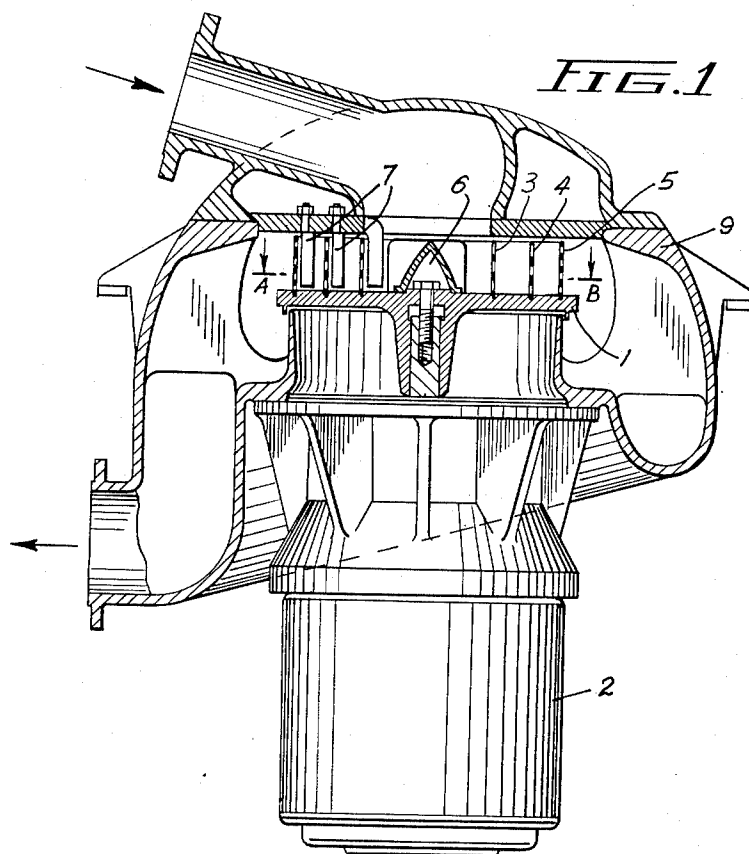
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COMMINUTING APPARATUS

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COMMUNUTING APPARATUS

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Fig. 1 is a partly sectional and partly diagrammatic elevational view of one possible apparatus for carrying out the present invention; and

Fig. 2 is a sectional plan view taken along line A—B of Fig. 1 in the direction of the arrows.

Referring now to the drawings, there is shown in Figure 1 a circular disc 1, in the nature of a table, which is fixedly connected to the vertical shaft of the motor 2 to be turned when the latter operates. To the top surface of the table 1 there are fixed, in the particular example, illustrated, three concentric perforated drums 3, 4, and 5, each of which has a central vertical axis coincident with the turning axis of table 1. A bladed structure 6 is fixed to the center of table 1 on the top surface thereof within the innermost perforated drum 3.

Mounted on the apparatus over the drums is a stationary supporting plate 8 which has fixedly connected thereto a plurality of elongated vane members 7 which extend in a direction parallel to the turning axis of table 1 and which are distributed about the inner surfaces of the drums 3, 4, and 5 in the manner clearly illustrated in Figure 2. Each of these vane members 7 includes one elongated edge portion located adjacent to an inner drum surface and an opposite edge portion located distant from this inner drum surface, these edge portions of each vane member 7 having a pointed cross-section and respectively extending in opposite directions from the intermediate part of vane member 7, as is clearly apparent from Figure 2.

As is clearly illustrated in Figure 1, the vane members 7 include upwardly extending threaded parts which respectively pass through apertures in the plate 8 and which are fixed to the latter by nuts which engage these threaded parts and are located on the top side of plate 8. As is evident from Figure 1, a supply duct structure is removably mounted on an outlet duct structure 9, so that when this supply duct structure is removed, the above-mentioned nuts are accessible and may be loosened to adjust the angular position of the vanes 7 so that the gaps between the same and the perforated drums may be set to most suitably comminute a given material.

Material to be comminuted is fed to the apparatus through this supply duct structure in the direction of the arrow shown at the top left of Figure 1. The material falls to the space within the innermost perforated drum 3, and the rotation of table 1 in the direction of the arrow shown in Figure 2 causes the blades of structure 6 to throw the material outwardly toward the perforated drum 3 so that the material is in part comminuted by this centrifugal force and the centrifugal force of the rotating drums 3, 4 and 5, the material passing successively through the drums 3, 4, and 5 and being received in the hollow annular casing of the discharge structure 9 which is provided with a bottom outlet shown at the left of Figure 1 and delivering material in the direction of the arrow shown adjacent to the outlet of structure 9.

The vanes 7 cause the material to be comminuted with a force in addition to the above-mentioned centrifugal force, so that the disclosed apparatus is particularly for the comminution of materials which have thus far been very difficult to successfully break up because of the fact that they gel very quickly on their outer surfaces. It is evident from Fig. 2 that as the table 1 turns with the drums 3, 4, and 5 in the direction of the arrow shown in Figure 2, the material located next to the inner surfaces of the drums will be forced through the gaps between these inner drum surfaces and the vane members 7 and will be thereby squeezed through the perforations of the drums so that an exceedingly strong comminuting action augmenting that produced by the centrifugal force is provided.

It will be understood that each of the elements described above, or two or more together, may also find a

The present invention relates to a comminuting device. More particularly, the present invention relates to a device for decreasing the size of particles in a solution, and in particular particles which readily form a gel when located in a given solution. Thus, the present invention is particularly adapted for the solution of cellulose-xanthogenate in a caustic soda for the manufacture of viscose. A process of the latter type creates many difficulties because when the particles of cellulose-xanthogenate are introduced into the solution they immediately start to gel on their outer surfaces and become rubbery so that they set up a great resistance to being broken up into fine particles. There have been many attempts to overcome these difficulties, such as introducing the particles into the solution in fairly small sizes and such as carrying out the process in centrifuges and the like, but thus far there has not yet been a practical solution to this problem.

One of the objects of the present invention is to provide a practical solution to this problem by subjecting the particles to be comminuted to a force in addition to a centrifugal force.

A further object of the present invention is to provide a means for adjusting the comminuting force of an apparatus of the above type.

An additional object of the present invention is to provide a comminuting apparatus suitable for industrial uses and being made of few, sturdily constructed, simple parts.

With the above objects in view, the present invention mainly consists of a comminuting apparatus which includes at least one perforated drum and at least one elongated vane member located within the drum and being substantially parallel to the axis thereof, this vane member having one elongated edge portion located adjacent to the inner surface of the drum and an opposite elongated edge portion located distant from the inner drum surface so that material within the drum will be squeezed between said one edge portion of said vane member and the inner surface of said drum when the vane and drum are turned about the drum axis with respect to each other in a direction which moves the material first into contact with the opposite edge of the vane and towards the above-mentioned one edge of the vane, the apparatus including a means for turning said vane and drum with respect to each other as described above. The vane is preferably adjustably mounted so that the gap between said one edge thereof and the inner surface of the drum may be set at a size suitable for a particular material which is comminuted by the apparatus.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

useful application in other types of comminuting apparatus differing from the types described above.

While I have illustrated and described the invention as embodied in comminuting apparatus adapted to comminute material by a force in addition to a centrifugal force, I do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of my invention.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. Apparatus for comminuting particles in suspension in a liquid, comprising, in combination, a plate; turning means connected to one side of said plate for rotating the latter in one direction about a predetermined axis normal to said plate; a perforated cylinder having a smooth inner surface and having its axis coincident with said predetermined axis, said cylinder being open at one end and fixed at its opposite end to the side of said plate opposite from said one side thereof so that said cylinder turns about said predetermined axis in said one direction together with said plate; a plurality of elongated vanes extending into said cylinder through said one end thereof almost up to said plate, being parallel to and distributed about said predetermined axis, and being located adjacent said smooth inner surface of said perforated cylinder, said vanes each being of a substantially S-shaped cross section and each having opposite, elongated leading and trailing edge portions of substantially pointed cross section which respectively lead and trail with respect to said one direction of rotation of said plate and cylinder so that during rotation of the latter in said one direction each element of said cylinder located opposite a leading edge portion of each vane moves toward the trailing edge portion of each vane, said trailing edge portions of said vanes being located closely adjacent to said inner smooth surface of said cylinder and said leading edge portions of said vanes being located distant from said inner surface of said cylinder so that during rotation of the latter in said one direction particles in suspension in a liquid in said cylinder will be moved toward the trailing edge portions of said vanes between the latter and said cylinder to be forced through the perforations of said cylinder; stationary support means fixed to said vanes for maintaining the latter stationary during rotation of said cylinder and plate; and conduit means communicating with the interior of said cylinder for leading a liquid having particles in suspension therein to the interior of said cylinder and communicating with the exterior of said cylinder for leading the liquid with the comminuted particles in suspension therein away from said cylinder.

2. Apparatus as defined in claim 1 and wherein a means for centrifugally moving a liquid with particles in suspension therein outwardly away from said predetermined axis is fixed to said plate for rotation therewith and is located within said cylinder.

3. Apparatus as defined in claim 1 and wherein an adjusting means is operatively connected to said vanes for adjusting the gap between the trailing edge portions thereof and said inner surface of said cylinder.

4. Apparatus for comminuting particles in suspension

in a liquid, comprising, in combination, a plate; turning means connected to one side of said plate for rotating the latter in one direction about a predetermined axis normal to said plate; a plurality of concentric perforated cylinders having smooth inner surfaces and having their axes coincident with each other and with said predetermined axis, said cylinders being open at one end and fixed at their opposite ends to the side of said plate opposite from said one side thereof so that said cylinders turn about said predetermined axis in said one direction together with said plate, the sizes of the perforations of said cylinders varying inversely with the diameters thereof so that the innermost of said cylinders has perforations larger than the perforations of the remaining cylinders while the outermost of said cylinders has perforations smaller than those of the remaining cylinders; a plurality of elongated vanes extending into each cylinder through said one end thereof almost up to said plate, being parallel to and distributed about said predetermined axis, and being located adjacent the smooth inner surfaces of said cylinders, said vanes each being of a substantially S-shaped cross section and each having opposite, elongated leading and trailing edge portions of substantially pointed cross section which respectively lead and trail with respect to said one direction of rotation of said plate and cylinders so that during rotation of the latter in said one direction each element of said cylinders located opposite a leading edge portion of each vane moves toward the trailing edge portion of each vane, said trailing edge portions of said vanes being located closely adjacent to said inner smooth surfaces of said cylinders and said leading edges of said vanes being located distant from said inner surfaces of said cylinders so that during rotation of the latter in said one direction particles in suspension in a liquid in said cylinders will be moved toward the trailing edges of said vanes between the latter and said cylinders to be forced through the perforations of said cylinders so as to be comminuted in stages upon passing successively through the perforations of the cylinders of increasing diameter; stationary support means fixed to said vanes for maintaining the latter stationary during rotation of said cylinders and plate; and conduit means communicating with the interior of the innermost of said cylinders for leading a liquid having particles in suspension therein to the interior of said innermost cylinder and communicating with the exterior of the outermost of said cylinders for leading the liquid with the comminuted particles in suspension therein away from said outermost cylinder.

5. Apparatus as defined in claim 4 and wherein a means for centrifugally moving a liquid with particles in suspension therein outwardly away from said predetermined axis is fixed to said plate for rotation therewith and is located within the innermost of said cylinders.

6. Apparatus as defined in claim 4 and wherein an adjusting means is operatively connected to said vanes for adjusting the gap between the trailing edge portions thereof and said inner surfaces of said cylinders.

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