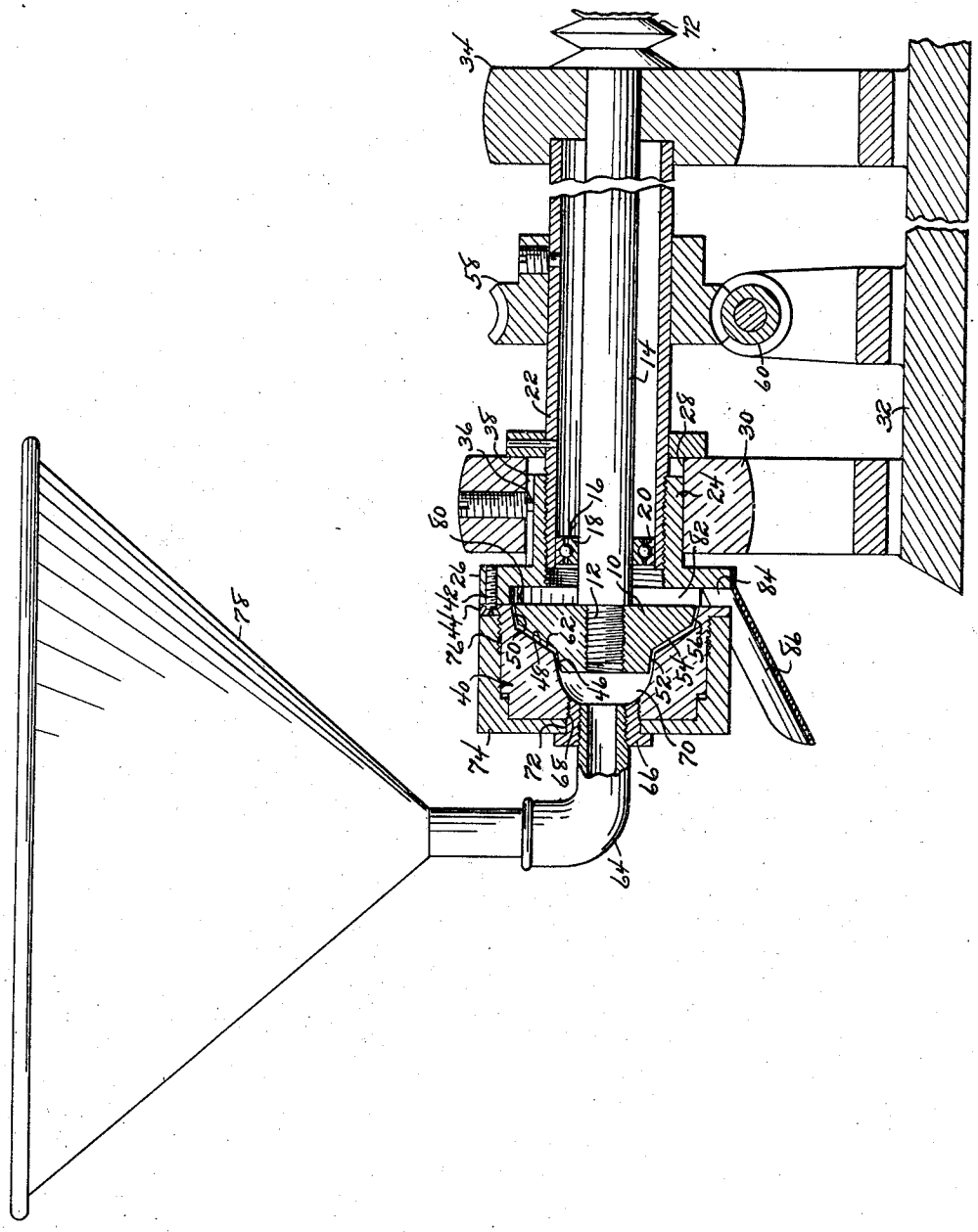
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DISPERSION MILLS

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DISPERSION MILL

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2 Claims. (Cl. 83—13)

My invention relates to grinding apparatus, and has among its objects and advantages the provision of an improved dispersion mill.

The drawing illustrates a longitudinal sectional view of a mill in accordance with my invention.

In the embodiment of the invention selected for illustration, I make use of a rotor 10 threadedly connected at 12 with a drive shaft 14. This shaft is supported in roller bearings, one of which is illustrated at 16. The inner race 18 is mounted on the shaft 16 and the outer race 20 is mounted inside a tube 22.

To one end of the tube 22 is threadedly connected a tubular neck 24 fixed to a head plate 26. This neck is slidably guided in a bore 28 in a bearing 30 mounted on a base 32. Thus the tube 22 is supported in the bore 28 through the medium of the neck 24, and the opposite end of the tube may be supported in a bearing 34 mounted on the base. While the neck 24 is movable axially inside the bore 28, the neck 24 is keyed against rotation by means of a pin 36 riding in a groove 38 in the neck. The neck may be adjusted longitudinally of the axis of the bore through rotation of the tube 22.

A stator 40 is attached to the head plate 26 by bolts 42 extending through a flange 44 on the stator and threaded into the head plate. This stator is provided with grinding faces 46, 48 and 50, which faces are of frusto-conical contour with different tapers. The face 46 has a small angle taper with respect to the axis of the shaft 14. The face 50 has a slightly greater taper while the face 48 has a considerably greater taper. All the faces are straight longitudinally but are curved concentrically of the axis of the shaft 14. The faces 46, 48 and 50 are also of progressively larger diameters, respectively.

The rotor 10 is also provided with grinding faces 52, 54 and 56. These faces respectively coact with the faces 46, 48 and 50, and are of correspondingly shaped contours. The spacing between the stator and the rotor may be varied through rotation of the tube 22 for shifting the neck 24 axially of the opening 28. To this end, a worm gear 58 is fixed to the tube 22 and meshes with a worm 60, which may be manually rotated to attain the desired operating space between the rotor and the stator. The rotor and stator faces are so related as to provide a space or chamber 62 between the faces 48 and 54.

An elbow 64 is threaded into a bushing 66 threaded into a bore 68 in the stator 40. This bushing and the stator are so shaped as to provide a chamber 70 at the forward end of the rotor 10. This bushing is extended through an opening 72 in a stator cover 74 having threaded connection with the stator at 76. To the opposite end of the elbow 64 is attached a material containing hopper 78, this end of the elbow being arranged vertically so that the material will gravitate into the chamber 70 for processing purposes.

The drive shaft 14 is held against axial movement to maintain the rotor 10 in predetermined spaced relation with the stator 40 by any preferred known means, as for example the combination pulley and thrust enlargement 72 bearing against the outer face of the shaft bearing 34 and which may bear against a second shaped bearing as shown in my Patent #2,297,637 dated September 29, 1942.

In operation, centrifugal forces generated by the rotor cause the solution of materials to be thoroughly mixed in the chamber 70, in addition to reducing the large lumps or particles to a uniform size, thereby permitting the material to enter between the multiple angle faces of the stator and the rotor.

The multiple angle faces between the rotor and the stator are adjusted to any desired clearance, the center angle is proportionally open four times the size of the first and third angles. This additional opening is instrumental in making the edges of the angles to have a glass cutter edge, thereby causing a cutting and shearing action on the particles and globules. In addition the opening or space 62 provides a dispersing chamber of four times the size of the spaces between the first and third angles, thereby creating a draft action to draw the material through the spaces for the sharp edges to perform their work. Without such a space, the materials would not be drafted through the mill in accordance with my invention, since the edges cause a change of direction and position and a different phase of action. In the third place, the space or chamber functions as a homogenizing chamber, without air, that changes the product by means of the physical action imparted thereto to a homogeneous mass of solution, thus changing the many types and sizes of particles and globules to a uniform color, size and shape.

The third or final space retards the flow from the dispersion or homogenizing chamber to give the material sufficient time for final action to insure uniformity.

The tremendous speed of the rotor 10 creates such a disturbance in the chamber 70 and so violently agitates the substance therein that when passing through the extremely narrow multiple

angles 46, 48 and 50 of the stator and the angles 52, 54 and 56 on the rotor and contacting the knife edge on the stator defined by the intersection of the angles 46 and 48 and the knife edge on the rotor defined by the intersection of the angles 54 and 56, the result is a complete breakdown of all atoms in the original substance.

This machine performs efficiently in the manufacture of leather finishes, paper coatings, textile finishes and sizings, printing and lithograph inks, paints, varnishes and lacquers, rubber dispersions, dairy and food products, emulsions (lacquers and wax), pharmaceuticals and cosmetics, etc.

The rear face 39 of the rotor 10 is spaced from the head plate 26 to provide an outlet chamber 32. An opening 36 is provided in the head plate for delivering the processed materials to a chute 38. The shaft 14 may be driven by an electric motor, not shown, mounted on the base 32.

Without further elaboration, the foregoing will so fully explain my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. In a mill of the character described, a rotor, said rotor being formed with circumferential faces at each end and on its intermediate portion, said faces having a decreasing taper toward the front end of the rotor, said end faces proximating cylindrical surfaces and the intermediate face having a comparatively abrupt taper proximating a plane transverse to the axis of the rotor, a stator adapted to assume complementary relation with the rotor having its interior shaped to provide faces corresponding to said faces of the rotor and adapted to assume co-acting relation with the latter, the co-acting faces being formed so that in any selected clearance adjustment of the rotor the co-acting intermediate faces will be spaced apart a distance substantially greater than the distance between the co-acting faces at each end, whereby matter passing axially between the co-acting faces is subjected to dispersion in the relatively enlarged chamber provided between the intermediate faces.

2. In a mill of the character described, a rotor, said rotor being formed to provide circumferential faces at each end and a face intermediate said end faces, said faces having a decreasing taper toward the front end of the rotor, said end faces making a very small taper angle with relation to the rotor axis and the intermediate face making a great angle with relation to said rotor axis, a stator disposed to assume complementary relation with the front of the stator and having its interior shaped to provide faces corresponding to said faces of the rotor so as to assume coacting relation with the latter, the co-acting end faces being disposed to form sharp angles at their juncture with the intermediate faces, the co-acting faces being formed so that in any selected clearance adjustment of the rotor the co-acting intermediate faces will be spaced apart a distance several times the distance between the co-acting faces at each end, whereby matter passing axially between the co-acting faces is subjected to cutting action at the angular junctions and to dispersion in the relatively enlarged chamber provided between the intermediate faces.

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