

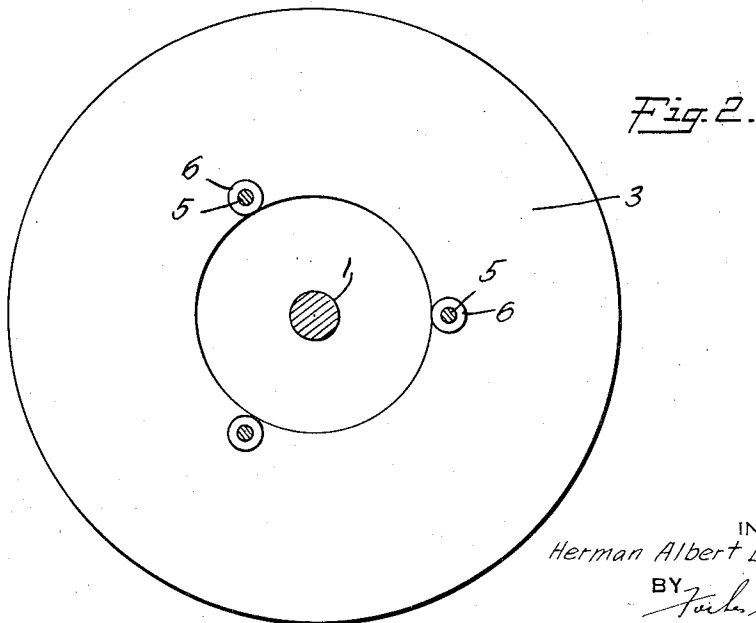
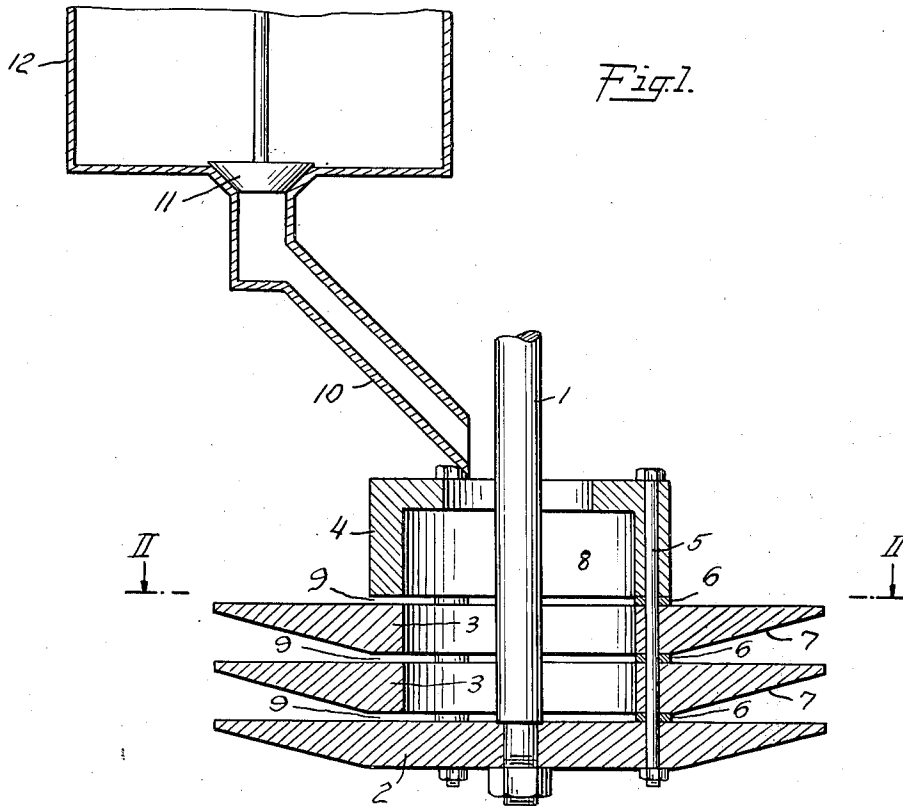
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LIQUID DISPERSING DEVICE

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LIQUID DISPERSING DEVICE

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5 Claims. (Cl. 299—63)

This invention relates to an apparatus for the dispersion of liquid materials. More particularly, this invention relates to an apparatus for dispersing molten materials into a cooling gas in the form of substantially uniform droplets.

It is desirable to produce many materials in the form of separate granules which are obtainable by dispersing a melt of the same into a cooling gas. For example, it has heretofore been proposed to thus treat fused caustic alkalis and fertilizer salts such as urea, ammonium nitrate, etc. It is desirable that the liquid material be dispersed in substantially uniform particles so that the product obtained will consist of granules of uniform size. The difficulties in producing a highly satisfactory product are enhanced when large quantities of the fused material are to be rapidly handled on a commercial scale.

It is an object of this invention to provide a dispersing device capable of rapidly handling large quantities of fluid material and dispersing it in substantially uniform droplets. Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention comprises a chamber having vertically disposed side walls arranged for rotation in a horizontal plane about a vertical axis which passes through the center of the chamber, the side walls being pierced by a plurality of elongated narrow slots. The invention also comprises a multiple disc fluid dispersing device arranged for rotating about the center axis of the discs. The invention further comprises a fluid dispersing device comprising a plurality of discs forming a centrally located chamber and restricted feed channels leading from the central chamber to the surfaces of the discs. The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is a cross section of an example of the dispersing device of this invention;

Fig. 2 is a cross section of the device shown in Fig. 1 taken along line II—II.

Referring to the drawing, a shaft 1 carries on its lower extremity a circular disc 2. A plurality of annular discs 3 having thickened portions at the center of the annuli and a retainer ring 4 are

carried in superimposed relationship with disc 2 by bolts 5 which pass through the ring and discs. The bottom of each of discs 3 and of retainer ring 4, is spaced from the top surface of the disc below by means of annular spacers 6 through which bolts 5 pass. By tightening down on the nuts of bolts 5, ring 4 and plates 3 and 2 are rigidly held as a unitary structure which may be rotated about shaft 1. In the device shown in the drawing, the bottom surfaces 7 of discs 3 diverge from the top surface of the disc below, from the center of the disc towards the outside. The central thickened portions of discs 2 and 3 and ring 5 form a central basket-like container enclosing a chamber 8. The outer portions of discs 2 and 3 constitute a series of horizontal fins about the outside of chamber 8. Slots 9 formed by the inner portions of discs 2 and 3 and the bottom of retainer ring 4, lead from chamber 8 to the surfaces of the outer portions of the several plates. A delivery spout 10 controlled by a valve 11 serves to deliver fluid from a vessel 12 to the central chamber 8 of the dispersion device. Shaft 1 of the dispersion device is connected to a motor not shown in the drawing, whereby the device may be rapidly rotated about the shaft as an axis.

In employing the device shown in Figs. 1 and 2 for the dispersion of fused sodium nitrate, for example shaft 1 and the discs and retainer ring, carried thereon are rapidly rotated. Fused sodium nitrate is then continuously passed into chamber 8 from vessel 12 to maintain a level of the fused material in chamber 8 above the uppermost of slots 9. Under the influence of the centrifugal force upon the fused material in chamber 8 generated by the rotation of the chamber, the fused sodium nitrate is ejected through slots 9 to the surfaces of discs 2 and 3, is passed over the surfaces of the discs and from the outermost edges thereof the molten nitrate is thrown in the form of divided droplets. The rate of rotation of shaft 1, the diameter of discs 2 and 3, the distance of slots 9 from the center of rotation of the device, and the width of the slots are correlated to feed the fluid material from chamber 8 to the outer portions of surfaces 2 and 3 at a desired rate and to disperse it from these surfaces in droplets of the desired size. For example, the following data is for a device which has been found to satisfactorily disperse fused sodium nitrate into a cooling gas for the production of a pebbled product. This data is given as illustrative of a particular device constructed in accordance with this invention and is not intended to limit the scope of the invention

since numerous modifications of this particular device may be made.

Diameter of discs-----inches--- 6
 5 Distance of discharge edge of slots from cen-
 ter of rotation-----inches--- 1½
 Width of slots-----inches--- .03
 Speed of rotation of discs
 -----revolutions/minute--- 800

10 By positioning slots 9 at a relatively short distance from the center of rotation as compared with the outer edges of the discs, the desired rate of feed of the fluid material to the surfaces of the discs is accomplished employing relatively
 15 wide slots since the centrifugal force acting upon the liquid to force it through the slots increases as the liquid moves away from the center of rotation. Thus with the slots near to the center of rotation, the force acting upon the liquid to
 20 eject it through a slot is relatively small and a comparatively wide slot may be employed without excessive quantities of liquid passing through the slot. This is of particular advantage in that narrow slots have a tendency to be stopped up
 25 by solid material which may be carried in the fluid passed therethrough. A further advantage is that variations in the rate of rotation of the device have a lesser influence in changing the rate of feed of materials through the slots
 30 than when they are at a greater distance from the center of rotation. It will thus be seen that in dispersing fluid material from the device of this invention, the material is first acted upon by centrifugal force to eject it through a means
 35 for controlling the amount of ejected liquid. The centrifugal force acting upon the ejected liquid is then increased as it moves along the surface of discs 2 and 3 and under the influence of a relatively high force is thrown from the discs into
 40 the atmosphere surrounding the device.

It is, of course, evident that the dispersion device of this invention is not limited in use to the dispersion of fused solids but may be employed in
 45 general for the dispersion of liquids. Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in
 50 the accompanying drawing shall be interpreted as illustrative and not in a limiting sense. For example, while in the device shown in the drawing, and particularly described above, the surface of adjacent discs diverge away from each
 55 other from the center towards the outside of the plates, it is not necessary that the dispersing device of this application embody this particular feature. A dispersing device may likewise be constructed in accordance with my invention wherein the slots governing the flow of
 60 liquid from the central chamber discharge directly to the atmosphere surrounding the device instead of, as described above, to the surface of discs over which the liquid passes and from the
 65 edges of which it is thrown outwardly. Furthermore, while in the apparatus particularly described the superimposed discs and ring are each fixed to the next lower disc and the lowest disc

is fixed directly to shaft 1, the device of this invention may be constructed with the several discs and ring each separately fixed directly to the central shaft.

I claim:

1. A liquid dispersing device comprising a circular disc and a plurality of vertically disposed annular discs fixed to a shaft said annular discs having horizontal upper surfaces and bottom surfaces diverging from the top surface of the disc below from the center towards the outside and being spaced from each other and from the circular disc to provide elongated narrow slots forming feed channels leading from a central chamber to the surfaces of said discs.

2. A liquid dispersing device comprising a circular discs and a plurality of vertically disposed annular discs having thickened central portions of the annuli, said discs constituting the walls and bottom closure of a central chamber and spaced from each other to provide elongated narrow slots leading from the chamber to the outer surfaces of the discs whereby liquid supplied to the chamber is retained above the uppermost of said slots and is fed in regulated amount to the surfaces of the discs, and means for rotating said discs in a horizontal plane.

3. A liquid dispersing device for the spraying of hot melts solidifying at atmospheric temperatures comprising a cylindrical container with vertically disposed side walls arranged for rotation in a horizontal plane about an axis traversing the container and a plurality of circumferentially elongated narrow slots of a structurally fixed width piercing said side walls, the width of said slots and their distance from the axis about which said side walls rotate being correlated to feed liquid from a body of the same maintained within the container through the slots at a desired rate.

4. A liquid dispersing device comprising a container with vertically disposed side walls arranged for rotation in a horizontal plane, a plurality of horizontal fins on the outside of said container, and circumferentially elongated narrow slots of a structurally fixed width piercing said side walls and leading from within said container to said fins, the outer portions of the surface width of said fins for a radial distance not substantially less than the radial length of said slots being spaced from the surfaces of adjacent fins a distance materially greater than the distance between the walls of said slots.

5. In a liquid dispersing device for the spraying of hot melts solidifying at atmospheric temperatures, a plurality of annular discs vertically positioned with respect to each other, said discs being arranged for rotation about their central axis and spaced from each other to form elongated narrow slots of a structurally fixed width between the central portions of the discs, the width of said slots and their distance from the axis about which said discs rotate being correlated to feed liquid from a body of the same maintained within the central chamber formed by the annuli of said discs through the slots at a desired rate.

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