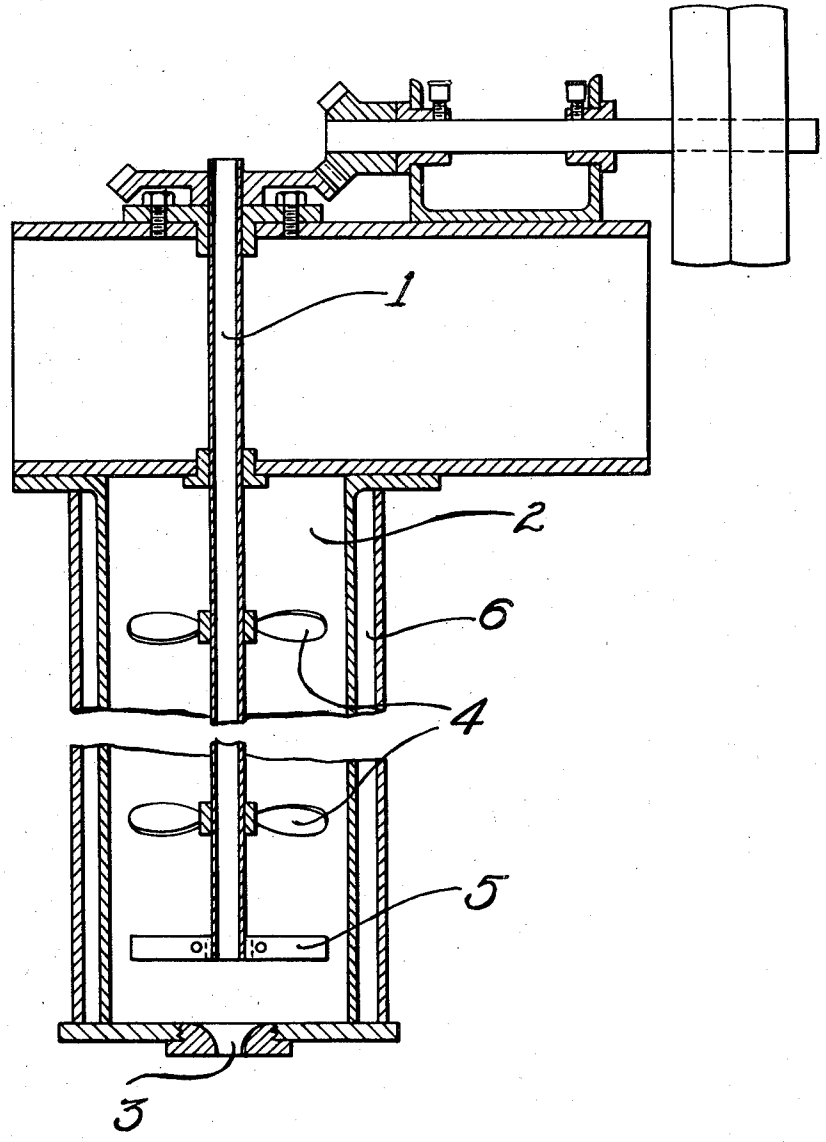
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APPARATUS FOR GRANULATING MOLTEN MATERIALS

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APPARATUS FOR GRANULATING MOLTEN MATERIALS

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1 Claim. (Cl. 83—91)

This invention relates to an improved method of and apparatus for producing a spray of fluid material for the production of materials in granular form.

The production of materials in granular form is often effected by spraying the material either molten or in the form of a concentrated solution from a height and allowing the droplets to solidify during their downward passage before they come into contact with the bottom of the spraying tower.

It is customary to employ as the spraying means a vessel with one or more nozzles, the fluid if desired being forced out under pressure, or to disintegrate a relatively larger stream of fluid by means of a blast of air. These devices suffer from the drawback that the nozzles are apt to become choked by any large pieces of solid in the material being sprayed, and also they tend to produce a proportion of very fine granules (dust) together with the granular produce of the desired size.

According to the present invention, the initial liquid material is vorticized, i. e. caused to assume a whirling motion, and is allowed to fall through an orifice in the form of a conical curtain which soon breaks up into droplets which solidify during their passage through the surrounding gaseous medium. A means for carrying the invention into effect may consist of a vessel having a relatively large orifice at the bottom and a rotary member arranged within the vessel and adapted to impart a whirling motion to the liquid. It has been found that for a given size of nozzle (orifice) a certain minimum speed of rotation of the rotary member is required in order to secure an efficient spray, and also that there is an optimum range of pressure for the liquid in the neighbourhood of the nozzle. Thus, when spraying a magma of molten ammonium nitrate and chalk, containing 4 per cent. of water, at a temperature of 100° C. through a nozzle 1" in diameter with a head of liquid about 2 feet, it was found that if the rotary member only made 350 revolutions per minute the magma ran straight out of the nozzle; at 412 R. P. M. partial formation of spray occurred, while at 470 R. P. M. good spraying was obtained.

The rotating member may consist of a hollow tube bearing a number of external vanes on the upper portion and an external paddle at the lower extremity. The rotation of the paddle imparts to the fluid in the container a whirling motion which tends to prevent the out-flow of fluid from the jet. The vanes, however, are set in such a manner that they produce a downward pressure and thus the escape of the fluid material in the jet can be controlled by varying the speed of rotation of the hollow member.

We have found that the magnitude of the downward thrust imparted to the fluid by the rotating vanes varies with the hydrostatic pressure, and in fact, with a large head of liquid it may be advantageous to arrange the vanes so as to give an upward thrust either by reversing the direction of rotations or by reversing their pitch. With an appropriate head of liquid the vanes may be omitted altogether.

By this means we can employ a circular orifice of substantially greater area than would be possible without the control afforded by the rotating member, and in this way the risk of the jet becoming blocked by foreign bodies is considerably reduced. If, however, choking does occur the orifice may be cleared by means of a rod passing down through the hollow member. Owing to the small angle spray, a reduction in the diameter of the spraying tower becomes possible.

Gaseous medium for spraying may be introduced through the hollow tube.

The vanes may be independently mounted on a hollow member concentric with the member carrying the paddle. In this way the thrust of the vanes may be varied independently of the speed of rotation of the paddle.

One form of apparatus is shown in the appended drawing wherein **1** is the hollow shaft, **2** the vessel with an orifice **3**, **4** the vanes and **5** the paddle. **6** is a steam jacket surrounding the vessel. In such an apparatus material to be granulated may be introduced into vessel **2**, through an opening not shown, thereafter agitated by means of vanes **4** and paddle **5**, and forced by hydrostatic pressure and vanes **4** through orifice **3**, whereby a spray in the form of a conical curtain may be obtained.

Various changes may be made in the apparatus and method described without departing from the invention or sacrificing any of the advantages thereof.

We claim:

Apparatus for granulating material by spraying comprising a vessel, a centrally located, conically shaped orifice in the bottom thereof and leading directly to free space, and a rotating propeller-type agitator mounted on a vertical, hollow, rotating shaft forming a conduit adapted to convey gas to the interior of the vessel.

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