ABSTRACT OF THE DISCLOSURE

Apparatus for applying liquid mist to granules, causing the granules to drop in an annular curtain, with a central spinning disc applying a mist radially outwardly and satellite spinning discs applying a mist radially inwardly, the granules falling onto perforate frustoconical means having a pressure differential thereacross for separating excess liquid from the granules.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for applying liquid mist to granules, and more particularly to apparatus for applying liquid to individual granules on a continuous basis.

Apparatus of various types has been devised heretofore for applying liquid to granules. Typical usage involves application of liquid fat to feed granules. A particularly useful device is that of the inventor herein as set forth in U.S. Pat. 3,288,052. This device is still being commercially employed to substantial advantage.

The inventor has found, however, that some parties using granule coating techniques desire apparatus assuring coating over the granule surface area in relatively uniform quantities even when substantial quantities of liquid are employed, and/or the liquid (such as liquid fat) tends to solidify and concentrate on some surface portions of the granules more than others, and/or where the operator is not a veteran operator.

Consequently, a new coating or liquid applicator was developed to this end.

SUMMARY OF THE INVENTION

An object of this invention is to provide a novel liquid applicator for granules, employing multiple direction liquid mist application for superior treatment of granules.

The novel apparatus herein enables multidirectional liquid application to granules with central mist generating and application means in combination with peripheral satellite mist generating and application means. These cooperate with granule feed means that forms an annular curtain of granules.

Mist forming discs of the apparatus operate at closely spaced but different vertical levels for effective coating without mist flow interference.

The mist covered granules drop on tapered perforate means to which a pressure differential is applied for removal of excess liquid.

These and other objects, advantages, and features of this invention will be apparent upon studying the specification in conjunction with the drawings.

BRIEF DESCRIPTIONS OF THE DRAWINGS

FIG. 1 is a sectional, elevational view of the novel apparatus; and

FIG. 2 is a sectional view taken on plane II—II of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The liquid applicator apparatus 10 includes several subassemblies, particularly, granule feed subassembly 12, central liquid mist forming and applicator subassembly 14, peripheral satellite liquid mist forming and applicator subassembly 16, and excess liquid separating subassembly 18.

The granule feeding means employs a hopper 20 for feeding granules G into the liquid mist applicator apparatus, such hopper having a discharge aligned with a spinning product distributing disc 22 therebeneath. This disc is spun on its vertical shaft 24 mounted in bearings 26, by a suitable electrical motor 28 connected by drive belt 30 and pulleys 32 and 34 to shaft 24. Peripherally surrounding spinning disc 22 is a retaining wall 36 forming part of a closed chamber surrounding the disc. The lower portion of this retaining wall tapers downwardly and radially inwardly at 36°, and then extends vertically at 36°. In the center of the compartment formed by wall 36, 36', 36'' is a generally cylindrical upstanding wall 40. Inner member 42 and outer wall portion 36'' cooperatively formed an annular discharge 44 at the lower end thereof to cause the granules spinning off discs 22 and flowing wall 36, 36' to drop in an annular curtain into the region of subassemblies 14 and 16.

Located centrally within the confines of the cylindrical zone of the annular curtain of falling granules is subassembly 14. This subassembly includes a spinning disc 48, the vertical shaft 50 of which is mounted in bearings 52, to be driven by electrical motor 54 connected by belt 56 and pulleys 58 and 60 to shaft 50. A liquid discharge supply line 62 is aligned with the center of the dish-shaped disc 48 for discharge of liquid thereon. The mist created is projected radially outwardly from the spinning disc to the cylindrical zone of the central unit 14.

Located around the outer periphery of this cylindrical zone of the falling curtain of granules is a plurality of satellite liquid mist generating units, here four in number, forming subassembly 16. These four satellite units 70 are basically alike except for possible minor structural differences to cause the disc to be located at slightly different vertical levels as described more fully hereinafter. Each includes an electrical motor 72 with an upper output shaft. To the upper end of each shaft is mounted a dish-type spinning disc 74 into which a liquid supply conduit 76 discharges liquid to be misted. These mist generators project a mist radially inwardly toward the curtain of falling granules. The mist is also projected outwardly but such is restrained and collected as will be clear. The discs 74 of these peripheral generators are purposely at a different vertical level than, but closely spaced from the vertical level of disc 48 of the central unit 14. Further, the discs 74 of the individual peripheral units are preferably at a slightly different vertical elevation from each other also as mentioned above. This difference in elevation prevents the streams of mist generated from each disc from directly interfering with the adjacent streams from the other disc. This is particularly important with respect to the satellite generators relative to the central generator, to achieve optimum applicator conditions.

The housing portion that encloses the peripheral mist generators extend around all of them and includes an annular trough 82 to collect excess liquid projected from these satellite discs but not directed toward the curtain of falling granules. This excess liquid passes down drain line 84 to a recovery drain 86 which also receives excess liquid from special separating means to be described. More specifically, extending downwardly beneath central subassembly 14 is excess liquid separating subassembly 18 having generally frustoconical configuration. It preferably is formed of two sections, upper section 90 and lower section 92.

Upper section 90 has a positive frustoconical configuration, having a granule engaging outer surface between its smaller diameter upper end and its larger diam-
3. The apparatus in claim 2 wherein said satellite spinning discs are arranged peripherally around said cylindrical zone at different vertical levels.
4. The apparatus in claim 1 wherein said discs are at different vertical levels.
5. Apparatus for applying a liquid mist to granules comprising: granule feed means configured, arranged, and oriented to form an annular curtain of falling granules in a cylindrical zone; central liquid misting means beneath said granule feed means and inside said cylindrical zone arranged to project a liquid mist radially outwardly to said cylindrical zone; and peripheral liquid misting means around said cylindrical zone, arranged to project a liquid mist radially inwardly to said cylindrical zone, wherein said central liquid misting means comprises a spinning disc, and said peripheral liquid misting means comprise a plurality of satellite spinning discs.
2. The apparatus in claim 1 wherein said satellite spinning discs are vertically spaced closely to but not at the same vertical level as said central spinning disc.
3. The apparatus in claim 2 wherein said satellite spinning discs are arranged peripherally around said cylindrical zone at different vertical levels.
4. The apparatus in claim 1 wherein said discs are at different vertical levels.
5. Apparatus for applying a liquid mist to granules comprising: granule feed means configured, arranged, and oriented to form an annular curtain of falling granules in a cylindrical zone; central liquid misting means beneath said granule feed means and inside said cylindrical zone arranged to project a liquid mist radially outwardly to said cylindrical zone; and peripheral liquid misting means around said cylindrical zone, arranged to project a liquid mist radially inwardly to said cylindrical zone; and slanted, perforate, excess liquid separating means beneath said central zone.
6. The apparatus in claim 5 including means to form a pressure differential across said perforate separating means to cause excess liquid to flow through said perforate separating means.
7. The apparatus in claim 5 wherein said separating means has frustrational configuration.
8. The apparatus in claim 5 wherein said separating means includes an upper positive frustrational section having its larger diameter at the bottom to cause granules to drop down along the outer surface thereof, and a lower negative frustrational section having its larger diameter at the top to cause granules to drop down along the inner surface thereof.
9. Apparatus for applying a liquid mist to granules comprising: granule feed means including an annular lower outlet for forming an annular curtain of falling granules in a cylindrical zone; a liquid mist creating, central spinning disc located below the level of said annular outlet and within the confines of said cylindrical zone to project a liquid mist radially outwardly to said cylindrical zone; a plurality of liquid mist creating spinning discs located in satellite fashion around said cylindrical zone to project a liquid mist radially inwardly to said cylindrical zone; the vertical level of each of said plurality of spinning discs being different than the vertical level of said central spinning disc; perforate, frustrational, excess-liquid separating means beneath said cylindrical zone, and means to form a pressure differential across said separating means to withdraw excess liquid dropping thereon.

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U.S. Cl. X.R.

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