

May 8, 1962

E. D. O'BRIEN

3,033,159

CENTRIFUGAL COATING APPARATUS

Filed Oct. 27, 1960

3 Sheets-Sheet 1

FIG_1

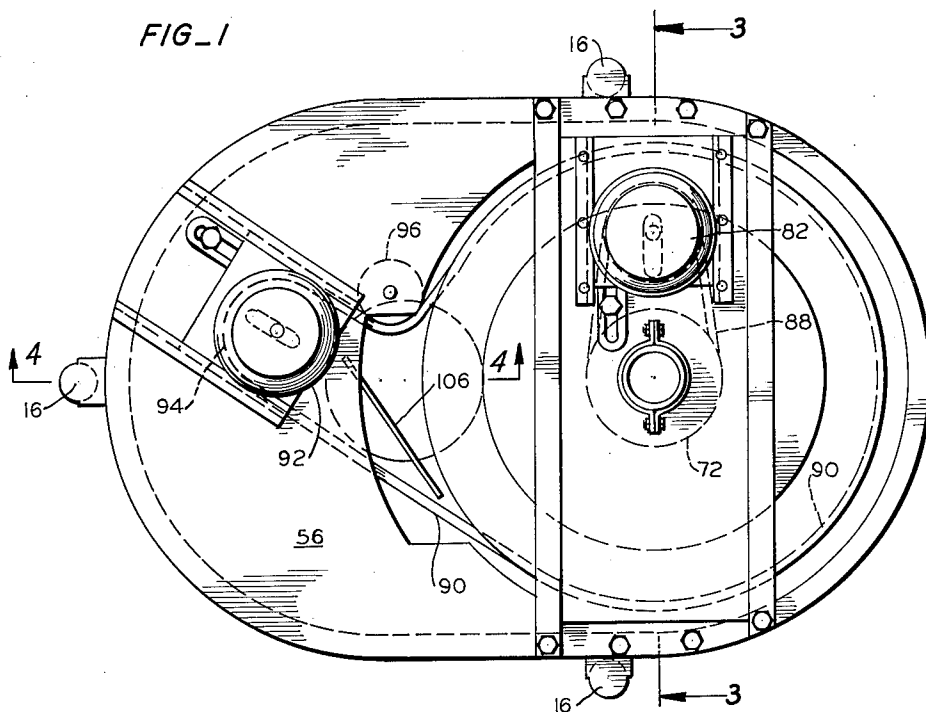
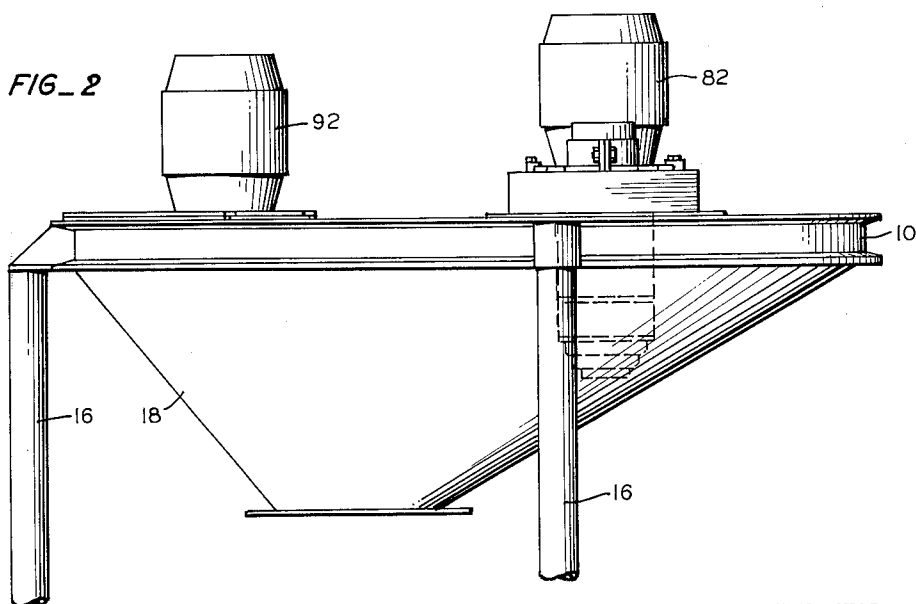


FIG_2



INVENTOR.
EDWARD D. O'BRIEN
BY
Naylor & Neal
ATTORNEYS

May 8, 1962

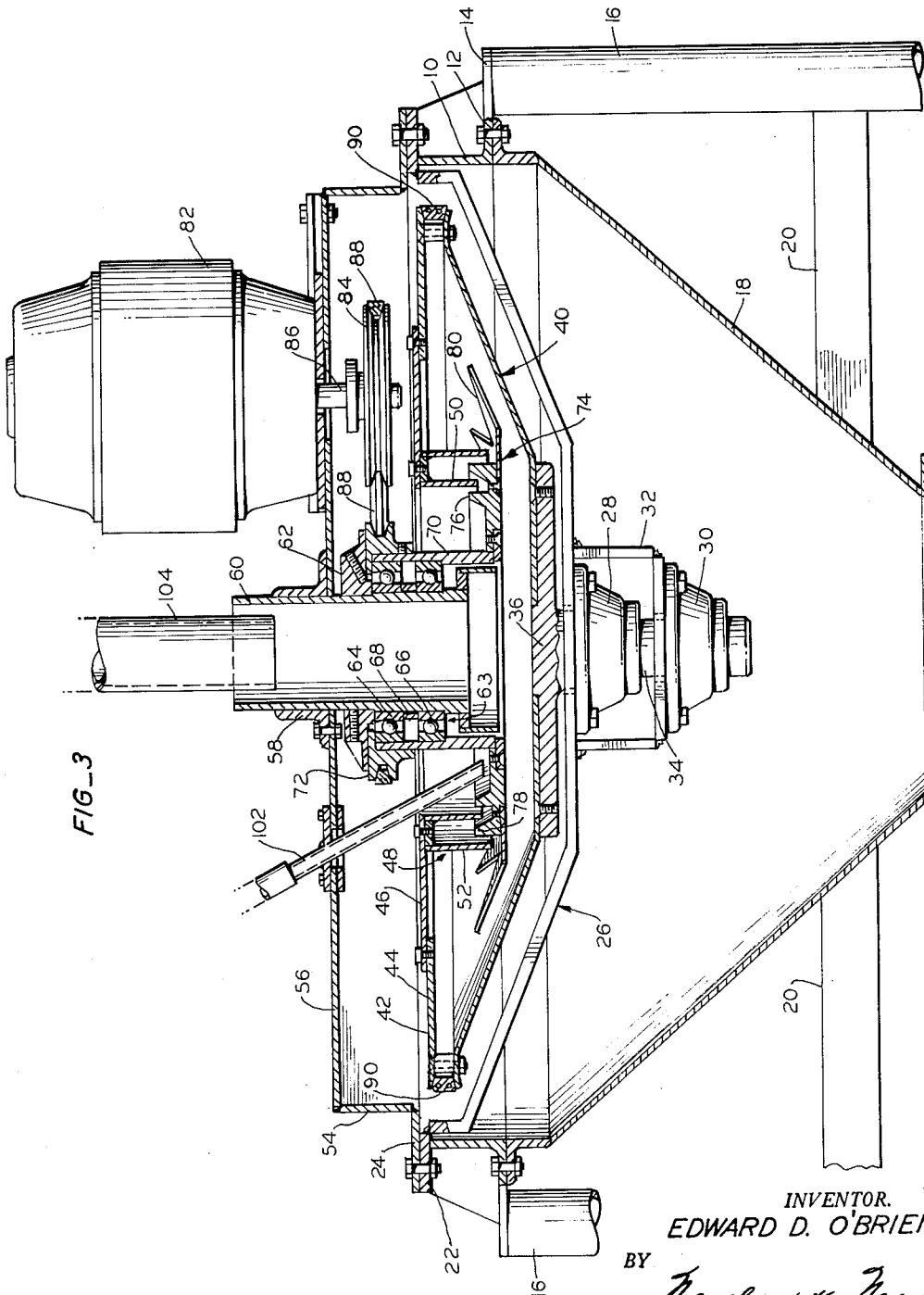
E. D. O'BRIEN

3,033,159

CENTRIFUGAL COATING APPARATUS

Filed Oct. 27, 1960

3 Sheets-Sheet 2



INVENTOR.
EDWARD D. O'BRIEN

BY

Taylor & Neal
ATTORNEYS

May 8, 1962

E. D. O'BRIEN

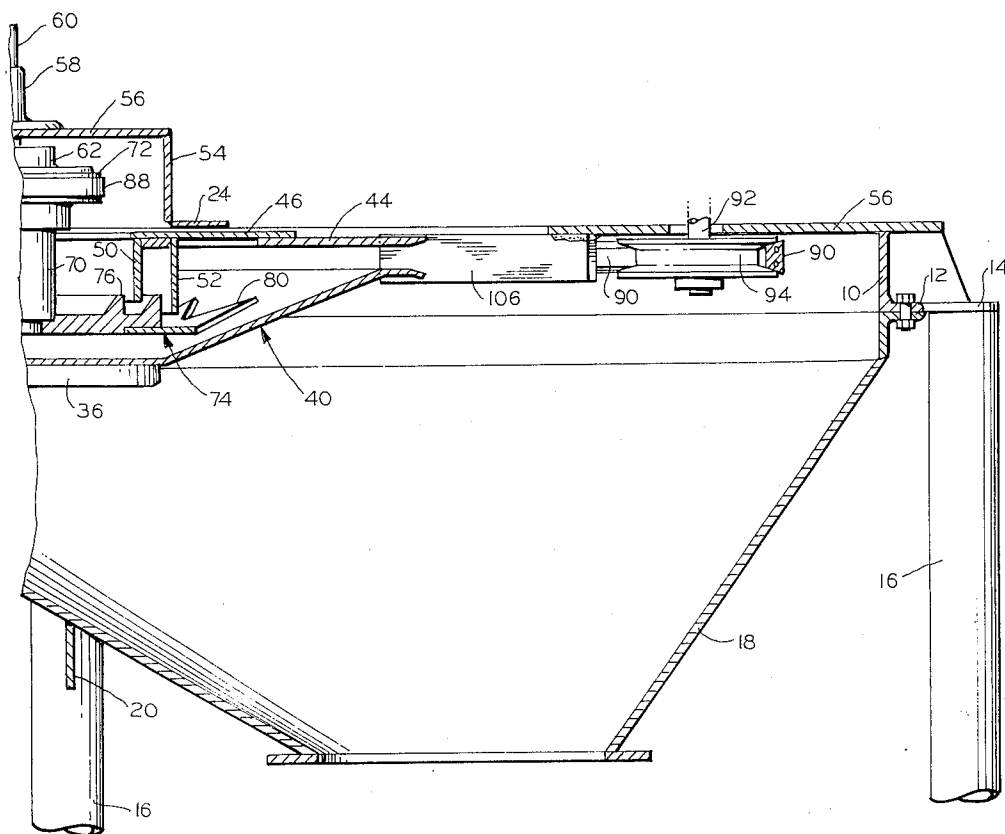
3,033,159

CENTRIFUGAL COATING APPARATUS

Filed Oct. 27, 1960

3 Sheets-Sheet 3

FIG. 4



INVENTOR.
EDWARD D. O'BRIEN
BY *Naylor & Neal*
ATTORNEYS

1

3,033,159
CENTRIFUGAL COATING APPARATUS
Edward D. O'Brien, 585 Woodside Drive,
Woodside, Calif.
Filed Oct. 27, 1960, Ser. No. 65,532
6 Claims. (Cl. 118—303)

This invention relates to coating apparatus and more particularly to improvements in centrifugal coating apparatus of the type which is specifically adapted for the controlled blending of liquids and solids, as exemplified by the equipment disclosed in my co-pending applications, Serial Number 800,730, filed March 20, 1959, for "Centrifugal Coating Apparatus."

The essential object of the present invention is to provide equipment adapted for the various purposes, i.e. coating, blending and pelletizing, set forth in my aforementioned co-pending application, but which is improved from the standpoint of efficiency of control of the degree and uniformity of mixing of the solid and liquid materials handled.

Other objects and advantages will be apparent from the following description taken in conjunction with the drawings forming part of this specification, and in which:

FIG. 1 is a top plan view of the apparatus of the invention;

FIG. 2 is a view in front elevation of the apparatus of FIG. 1;

FIG. 3 is an enlarged view in section taken along lines 3—3 of FIG. 1; and

FIG. 4 is an enlarged view in section taken along lines 4—4 of FIG. 1.

The frame for the support of the operating elements of the apparatus comprises an oval channel 10 having a lower peripheral flange 12, extension tabs 14 on said flange 12, legs 16 depending from and welded to said tabs 14, an open-ended funnel-shaped hopper 18 secured to and depending from channel 10, and brace means 20 interconnecting legs 16 and hopper 18.

A pair of abutting oval shaped rings 22 and 24 are secured together and supported by channel 10. A hanger bar 26 has its opposite ends secured to ring 22. Secured to the central portion of bar 26 is a pair of bearing blocks 28 and 30, the former being secured directly to bar 26 and the latter being secured to a U-shaped hanger strap 32 which is in turn connected to bar 26. Supported for rotation in blocks 28 and 30 is a shaft 34 which terminates at its upper end in a hub 36. Secured to and extending outwardly and upwardly from hub 36 is a dished plate 40.

Secured to plate 40 in upwardly spaced relation therefrom is a flat plate 42 comprised of interconnected outer and inner annular sections 44 and 46. Depending from inner section 46 is an inverted substantially U-shaped annular channel 48 having radially spaced apart vertical walls 50 and 52.

Attached to the inner edge of ring 24 is a vertically disposed ring 54 which in turn has secured to it a horizontally disposed cover plate 56. Hub 58, secured to plate 56 at the inner periphery of the latter, is secured in embracing relation to cylinder 60. A collar 62 is secured to cylinder 60, and supported on the periphery of said cylinder between an external shoulder formed on the latter and collar 62 is a bearing assembly 63 comprising upper and lower bearing units 64 and 66 and intervening spacer element 68. Supported for rotation on the bearing assembly is a rotatable assembly comprising tube 70, sheave 72 secured to tube 70 and extending into overlying relation with the bearing assembly for support thereby, and a multi-section plate 74 secured to the lower end of tube 70. Plate 74 is provided with a pair of annular ridges 76 and 78, and said plate terminates in a toothed

2

periphery comprised of outwardly and upwardly inclined triangularly shaped segments 80.

Means for rotating plate 74 comprise motor 82 mounted on cover plate 56, sheave 84 secured to motor shaft 86, and a V-belt 88 trained around sheave 84 and sheave 72.

Means for rotating plate 40 comprise a V-belt 90 which extends between the outer edges of plates 40 and 42, the space between said edges being complementary to the V-form of said belt, motor 92 which drives sheave 94 around which belt 90 is trained, and idler sheave 96, for belt 90, depending from cover plate 56.

It will be noted that motors 82 and 92 are mounted on plates 98 and 100 which are separate from but variably positionable on cover plate 56, thereby enabling adjustment of said motors to provide the proper tensions in belts 88 and 90.

Liquid feed tube 102 extends through cover plate 56 and is adapted to feed liquid onto plate 74 inwardly of ridge element 76. Means such as feed tube 104 extends into cylinder 60 and is adapted to feed solid material, such as granules or seeds onto the hub 36 constituting the central portion of plate 40.

With reference to FIG. 1, the belts 88 and 90 are drive in a counter-clockwise direction. When the equipment is used for the wetting or liquid coating of granules motor 92 is operated at about 1200 r.p.m., i.e., belt 90 is driven at about 2100 ft./min. When plant seed is to be coated motor 92 is operated at about 640 r.p.m., i.e., belt 90 is driven at about 1110 ft./min. (These and other uses of the equipment are described in detail in my aforementioned pending application.) Motor 82 is operated at about 3600 r.p.m., i.e., belt 88 is driven at about 4800 ft./min.

To summarize the operational and functional characteristics of the apparatus: liquid is fed from tube 102 onto plate 74; it is caused to spread outwardly of the plate in a 360° pattern by its forced repetitive up and down movement over moving ridge 76, under wall 50, over moving ridge 78, and under wall 52; the 360° outwardly moving pattern of liquid is then broken up into a fine spray by the beater action of teeth 80, as a result of which the liquid is whirled off of plate 74 and onto plate 40 over an appreciable annular area of the latter; the solid particle material is fed through tube 104 onto the hub portion 36 of plate 40 and moves outwardly onto the upwardly dished portion of said plate; upon reaching said dished portion the solid material is immediately attenuated into a thin layer which is quickly accelerated to travel at substantially the same speed as the plate, and in this condition of attenuation and speed the solid particles traverse the wetted area of the plate; belt 90 prevents the discharge of the wetted solid particles from plate 40 over the major part of the periphery of the plate but permits the discharge of the particles tangentially from the plate at that portion of the edge of the plate demarcated between the points of movement away from and return to the plate of belt 90.

The constraint of discharge of the material from the plate by belt 90 over a peripheral arc of approximately 295°, taken together with the centrifugal action of the belt on the material has the effect of lengthening the time during which the granules or seeds are in rolling contact with the liquid, thereby enabling the metered feed liquid to be substantially totally and uniformly picked up by the solid particles.

A deflector plate 106 (FIG. 1) is secured to cover plate 56 in depending relation therefrom, said plate 106 being for the purpose of preventing the material discharged from plate 40 from contacting the return reach of belt 90.

The apparatus of the invention is subject to modification within the scope of the appended claims.

What is claimed is:

1. Apparatus for the mixing together of solid and liquid materials in relatively finely divided form comprising an upwardly dished plate and means mounting the same for rotative movement about a vertical axis, a plate disposed in spaced relation above the outer peripheral portion of said dished plate and connected to the latter for rotation therewith, a drive belt extending between the edges of said plates and trained around said plates for a major part of the peripheries of said plates, said belt serving to impart rotation to said plates and to delimit the discharge of material from between said plates to a predetermined angular sector of the peripheries of said plates, means for driving said belt, and means for feeding solid and liquid materials onto said dished plate.

2. Apparatus for the mixing together of solid and liquid materials in relatively finely divided form comprising an upwardly dished first plate and means mounting the same for rotative movement about a vertical axis, a second plate disposed in spaced relation above the outer peripheral portion of said first plate and connected to the latter for rotation therewith, a drive belt extending between the edges of said first and second plates and trained around said plates for a major part of the peripheries of said plates, said belt serving to impart rotation to said plates and to delimit the discharge of material from between said plates to a predetermined angular sector of the peripheries of said plates, means for driving said belt, means for feeding solid materials onto the central portion of said first plate, and means for distributing a liquid material onto a substantial annular areal portion of said first plate outwardly of the central portion thereof.

3. In apparatus adapted for the mixing together of solid and liquid materials, the sub-combination comprising an upwardly dished plate and means mounting the same for rotative movement about a vertical axis, a plate disposed in spaced relation above the outer peripheral portion of said dished plate and connected to the latter for rotation therewith, a drive belt extending between the edges of said plates and trained around said plates for a major part of the peripheries of said plates, said belt serving to impart rotation to said plates and to delimit the discharge of material from between said plates to a predetermined angular sector of the peripheries of said plates, and means for driving said belt.

4. In apparatus adapted for the mixing together of solid and liquid materials, the sub-combination comprising an upwardly dished plate and means mounting the same for rotative movement about a vertical axis, a plate disposed in spaced relation above the outer peripheral portion of said dished plate and connected to the latter for rotation therewith, a drive belt extending between the edges of said plates and trained around said plates for a

major part of the peripheries of said plates, a drive sheave disposed in laterally spaced relation from said plates and motor means for mounting and driving said sheave, said belt being trained around said sheave to define two reaches, one reach extending away from said plates to said sheave and the other reach extending from said sheave back to said plates, and a baffle and support means therefor disposing said baffle between said reaches in intercepting relation to material discharged from between said plates, whereby said discharged material is prevented from contacting said other belt reach.

5. In apparatus adapted for the mixing together of solid and liquid materials, the combination comprising first, second and third plates, said first plate being upwardly dished and having means mounting the same for rotative movement about a vertical axis, said second plate being annular in form, having the same outer diameter as said first plate, being disposed in spaced relation above said first plate and being connected thereto for rotation therewith, said third plate being annular in form, being disposed concentrically to said first and second plates, being disposed vertically between said first and second plates, and having means mounting the same for rotation and drive means for rotating the same independently of said first and second plates, solid material feed means extending through said third plate for the deposit of solid feed material centrally on said first plate, liquid material feed means for the deposit of liquid material onto said third plate, said third plate embodying means operable to attenuate said liquid and to distribute the same under the action of rotative movement of said plate over a substantial annular areal portion of said first plate, a drive belt extending between the outer edges of said first and second plates and trained around said first and second plates for a major part of the peripheries of said plates, said belt serving to impart rotation to said first and second plates and to delimit the discharge of material from between said plates to a predetermined angular sector of the peripheries of said plates, and means for driving said belt.

6. In apparatus adapted for the mixing together of solid and liquid materials, the sub-combination comprising an upwardly dished plate and means mounting the same for rotative movement about a vertical axis, a drive belt, means including the peripheral edge of said plate training said belt around a major part of the periphery of said plate in driving relation with said plate and in impeding relation to the discharge outwardly from said plate of material fed onto said plate, and means for driving said belt.

References Cited in the file of this patent

FOREIGN PATENTS

662,045 Great Britain ----- Nov. 28, 1951