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2,503,233

DISCHARGE MECHANISM FOR DEHYDRATORS

Filed March 9, 1945

2 Sheets-Sheet 1

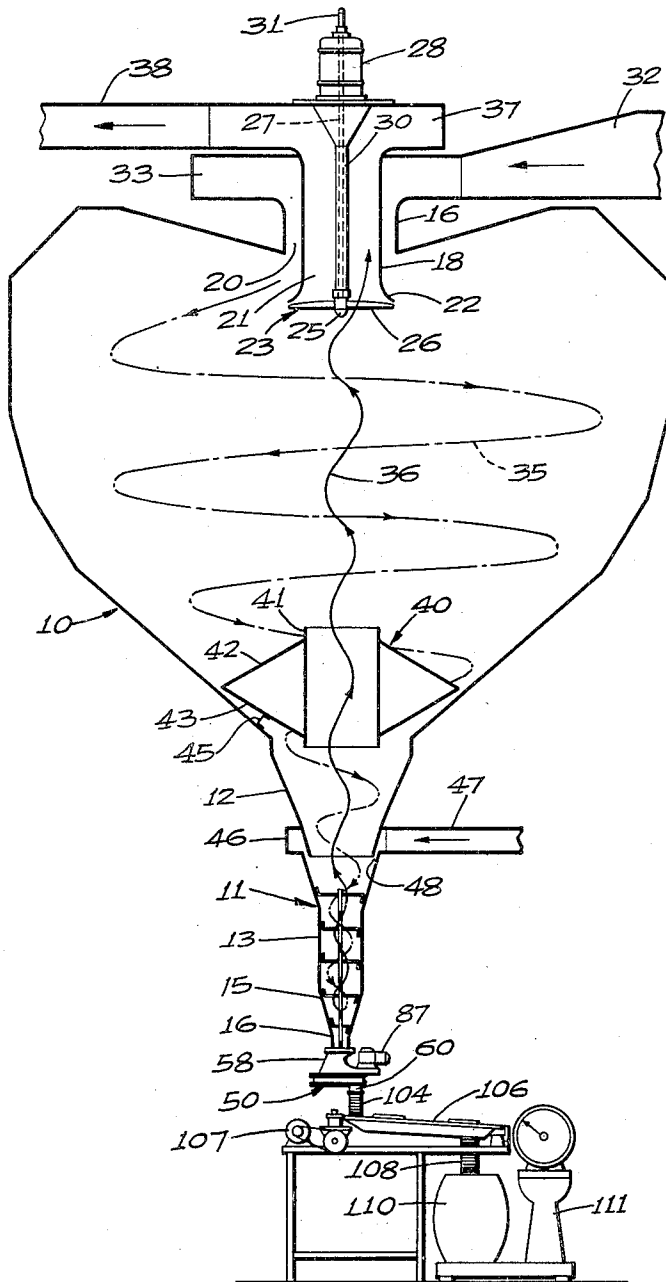


Fig. 1

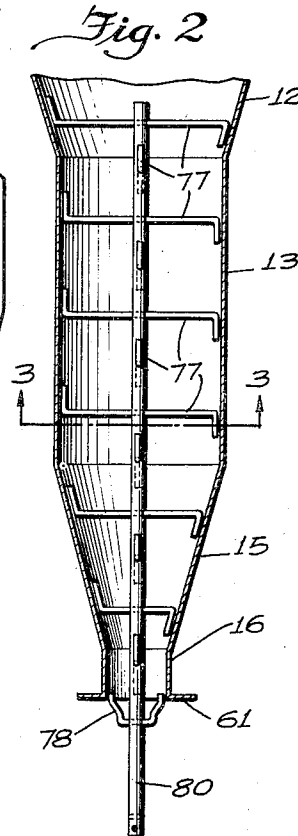
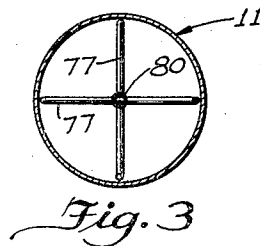


Fig. 3

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2 Sheets-Sheet 2

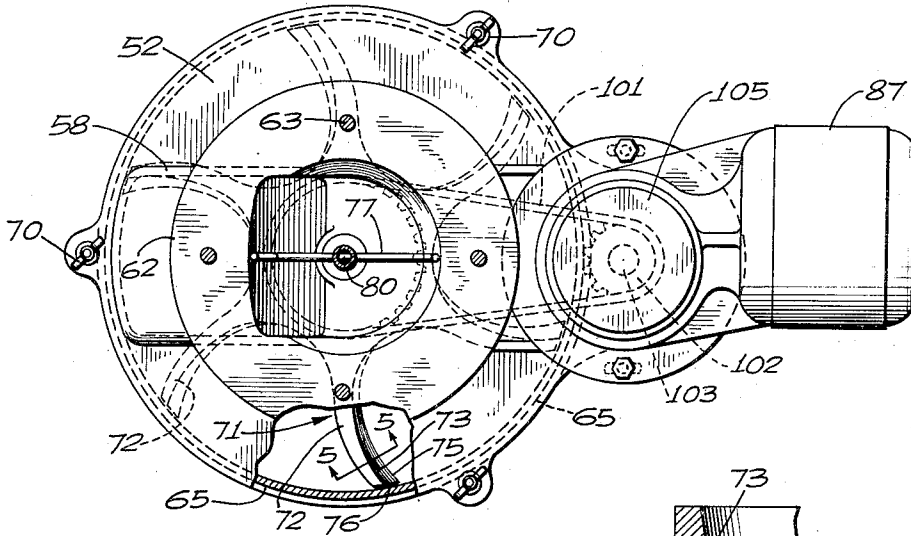


Fig. 4

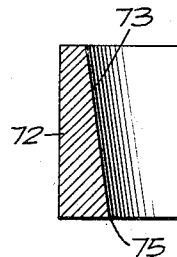


Fig. 5

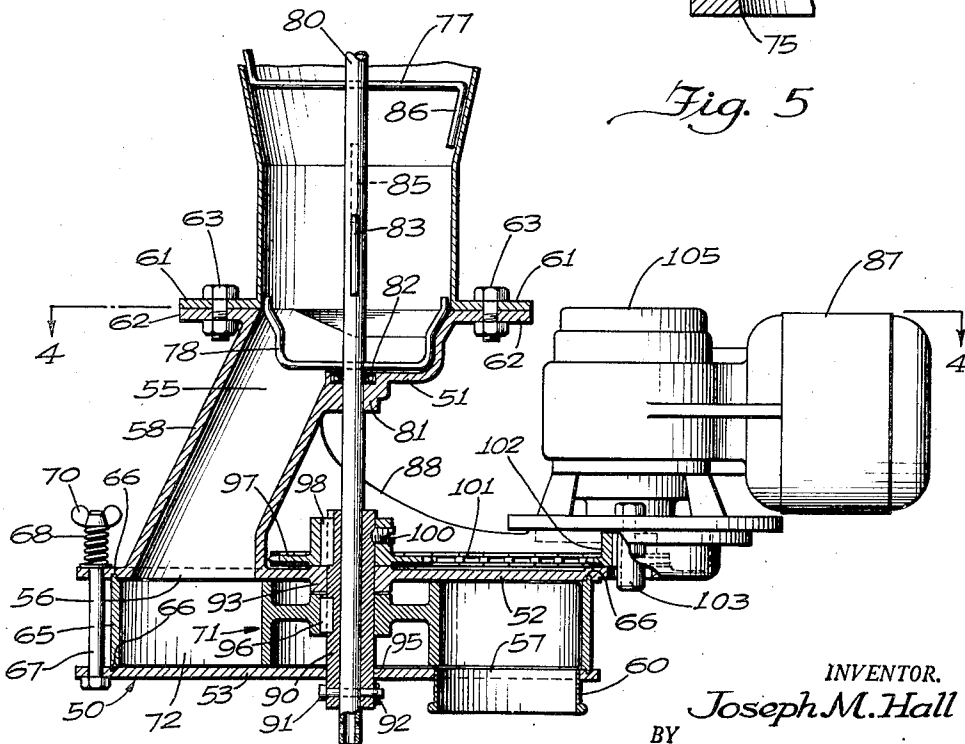


Fig. 6

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DISCHARGE MECHANISM FOR
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Application March 9, 1945, Serial No. 581,823

13 Claims. (Cl. 222—236)

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In the operation of a dehydrating chamber of the character here under consideration, a drying medium such as air is introduced into the chamber through a suitable inlet and is withdrawn through a suitable outlet in such manner as to set up a desired drying circulation in the chamber. Any provision for discharging the dehydrated product from the chamber must not permit such communication between the interior and the exterior of the chamber as will interfere with the required circulation of the drying medium. A discharge arrangement that provides free communication to the atmosphere cannot be used in most installations since the pressure of the drying medium in the chamber is either substantially above or substantially below atmospheric pressure.

A dehydrator construction must furthermore meet certain sanitary requirements. All interior surfaces of the dehydrating apparatus that makes contact with the material under process must be freely accessible for frequent cleaning and the parts of the system must break down into separate units with smooth material-contacting surfaces sufficiently exposed for thorough and rapid cleaning. In addition, it is highly desirable that the material under process be confined to the dehydrating apparatus and the receptacles for the finished product since leakage or escape of the material not only is costly but also causes unsanitary conditions in the environment of the apparatus.

One object of my invention is to provide an efficient discharge mechanism constructed to meet the above requirements, that is to say, to avoid interfering with circulation of the drying medium in the dehydrating chamber and to provide sanitary operation and permit rapid cleaning. In this regard a specific object of my invention is to provide a leakage-proof discharge valve arrangement of simple structure that may be quickly dismantled and reassembled. Additional specific objects of the invention relate to the construction of such a valve member per se as will be understood hereinafter.

It is usually desirable to provide a stirrer to prevent the dehydrated material from caking or banking up in the bottom of the dehydrating chamber in such manner as to block flow to the discharge valve. A further object of my invention is to provide such a stirrer in combination with a discharge valve and to provide a common driving means for both the stirrer and the valve with emphasis on simplicity of structure, efficient

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power transmission, sanitation, and the necessity for periodic dismantling of the apparatus.

My general object is obtained in large part by using a rotary discharge valve with offset inlet and outlet ports, employing an upright shaft directly connecting said valve and the previously mentioned stirrer, and transmitting power to said shaft between the valve and the stirrer.

Further objects of the invention relate to the construction of the stirrer per se, it being my purpose to achieve a simple structure that effectively agitates the dehydrated material and permits a certain flexibility with respect to conformation with the configuration of the dehydrating chamber walls.

The above and other objects and advantages of my invention will be apparent in the following detailed description taken with the accompanying drawings.

In the drawings, which are to be regarded as merely illustrative,

Fig. 1 is a somewhat diagrammatic view of a dehydrating chamber equipped with my discharge mechanism, the view being largely in section and partly in side elevation;

Fig. 2 is an enlarged fragmentary section of the lower discharge portion of the dehydrating chamber;

Fig. 3 is a cross-sectional view taken as indicated by the line 3—3 of Fig. 2;

Fig. 4 is a horizontal section on a large scale, taken as indicated by the line 4—4 of Fig. 6 with parts broken away to reveal certain structure;

Fig. 5 is a fragmentary section, on a greatly enlarged scale, of the rotary valve member taken as indicated by the line 5—5 of Fig. 4; and

Fig. 6 is a view on an enlarged scale, partly in vertical section and partly in side elevation, of the discharge mechanism.

Fig. 1 shows a dehydrator chamber generally designated 10 which may be the sole dehydrating chamber employed or may be merely one unit in a multiple stage system. The dehydrator chamber 10 may be of any shape but preferably, as indicated in the drawings, is of circular tapering configuration with a lower restricted discharge portion generally designated 11. By way of example, the lower discharge portion 11 is shown of circular tapering configuration comprising an upper conical wall 12, an intermediate cylindrical wall 13, a lower conical wall 15, and a lower cylindrical wall 16.

As thus described, the dehydrating chamber 10 has a bottom opening formed by the lowermost cylindrical wall 16. This bottom opening is to

be spanned by a suitable bottom wall removable for cleaning purposes and in the preferred practices of my invention, the bottom wall is a functional part of my discharge mechanism and is removable bodily with an assembly of discharge mechanism parts.

Since the present invention relates primarily to the discharge mechanism, any arrangement may be employed for circulating a drying medium through the dehydrating chamber. In the arrangement shown, the upper end of the dehydrating chamber is provided with an outer cylindrical wall 17 of relatively short length and an inner cylinder wall 18 of greater length extending both above and below the inner cylinder wall.

The space between the outer cylindrical wall 17 and the inner cylinder wall 18 constitutes an annular inlet passage 20 for the drying medium and the interior of the inner cylinder 18 forms an outlet passage 21 for the drying medium. The lower end portion of the inner cylinder 18 is preferably flared, as indicated at 22, and is spanned by a rotary sprayer generally designated 23 having a central hollow hub or sprayer head 25 and a plurality of hollow arms 26.

The sprayer 23 is preferably of the construction shown and described in my copending application Serial No. 588,467, entitled "Dehydrator," filed April 16, 1945. Since the specific construction of the sprayer 23 is disclosed in the copending application and does not constitute a part of the present invention, it is not necessary to go into detail here. It may be noted, however, that the arms 26 are not only hollow to serve as sprayer nozzles, but also are shaped to serve as fan blades to exert an upward propelling force on the drying medium. The sprayer 23 is mounted on the lower end of a shaft 27 that extends downward from a motor 28, the shaft being cased in a stationary tube 30. The shaft 27 is of hollow construction so that the liquid material to be dehydrated may be conducted from a suitable supply pipe 31 through the shaft to the sprayer 23.

A suitable drying medium, for example air or superheated steam, is brought to the annular inlet passage 20 by means of an inlet duct 32 and an inlet snail 33 in a well known manner, the snail giving the incoming fluid stream rotary motion as it enters the chamber. The rotating drying medium moves downwardly through the annular inlet passage in a spiral which expands in diameter to the side walls of the dehydrator chamber partly because of the flared deflector 22 provided by the inner cylinder 18. The drying medium continues to rotate in the same direction but with increasing velocity as it moves down the progressively restricting walls of the chamber 10. This downwardly moving spiral which may be termed the outer spiral is ultimately reversed in axial direction in the lower discharge portion 11 of the chamber, and then ascends with the same direction of rotation in what may be termed an inner spiral. In Fig. 1 the outer spiral is indicated by a dot-dash line 35 and the inner spiral is indicated by a solid line. 36.

The inner spiral 36 enters the outlet passage 21 and in doing so is acted upon by the fan-shaped arms 26 of the sprayer 23. From the outlet passage 21, the drying medium enters an outlet snail 37 from which it is discharged into an outlet duct 38.

Certain additional expedients may be added to facilitate the desired circulation of the drying medium. One such expedient comprises a special

deflector generally designated 40 having a central cylinder 41 to which is attached two conical walls 42 and 43. The special deflector 40 is positioned in the region in which the dehydrating chamber 10 narrows to form the discharge portion 11, the special deflector being supported in such position by a plurality of suitable brackets 45.

The outer spiral of the drying medium passes downward through the annular space between the special deflector 40 and the surrounding wall of the chamber 10 while the inner spiral passes upward through the central cylinder 41.

Another expedient to facilitate the desired circulation may comprise a small auxiliary inlet snail 46 mounted on the conical wall 12 of the chamber discharge portion 11. The auxiliary snail 46 receives a relatively cool fluid medium, for example, air from an inlet duct 47 and discharges the air downward into the chamber portion 11 through an annular inlet port 48. The dehydrated product, for example, powdered milk or powdered egg is heated substantially by the relatively hot drying medium and is usually quite hot when precipitated into the lower chamber portion 11. The introduction of the relatively cool air from the auxiliary snail 46 has a cooling effect to prevent such prolonged heating of the powdered product as might result in deterioration in quality.

Turning to the details of the present invention, Fig. 6 shows what may be termed a first transverse wall 51 to serve as the bottom of the dehydrating chamber 10, a second transverse wall 52 spaced a substantial distance therebelow to serve as the top wall of a valve casing generally designated 50, and a third transverse wall 53 to serve as the bottom wall of the valve casing. To permit the desiccated material to pass through this assembly, the first transverse wall 51 has an opening 55 constituting the discharge port of the dehydrating chamber 10, the top wall 52 of the valve casing has an inlet opening or port 56, and the bottom wall 53 of the valve casing has a discharge opening or port 57, the latter port being provided with a short spout 60. The discharge port 57 of the valve casing is substantially offset from the inlet port 56 and in the construction shown is at a location diametrical from the location of the inlet port. A passage means or discharge chute 58 interconnects the discharge opening 55 at the bottom of the dehydrating chamber 10 and the inlet port 56 of the valve casing 50.

It is contemplated that the valve casing 50 will be removable with respect to the dehydrating chamber 10 and preferably the discharge chute 58 is likewise removable. In the construction shown, the top valve casing wall 52, the discharge chute 58, and the bottom wall 51 of the dehydrating chamber are united in one piece that is removably secured to the lower end of the dehydrating chamber. To permit removably mounting this unitary assembly on the lower end of the dehydrating chamber 10, the lower end of the chamber may be formed with a radial flange 61 and the bottom wall 51 of the chamber may likewise be formed with a radial flange 62, the two flanges being normally held together by suitable bolts 63.

It is to be especially noted that dismantling the described construction to separate the unitary assembly of chamber bottom wall 51, discharge chute 58, and top valve casing wall 52 accomplishes several purposes for facilitating cleaning of the apparatus. In the first place, the removal

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of the unitary assembly from the chamber 10 leaves the chamber completely open at the bottom to permit a thorough flushing operation; in the second place, the removal exposes the inner surface of the chamber bottom wall 51 for cleaning; in the third place, the whole interior of the discharge chute 58 is rendered easily accessible for cleaning and inspection; in the fourth place the inner surface of the valve casing 50 is completely exposed; and in the fifth place, the interior of the valve casing 50 is open for cleaning and inspection.

It is contemplated that the valve casing 50 will break down further into separate units for cleaning and inspection but will normally form a sufficiently tight construction to prevent release of the desiccated material other than release through the valve port 57. In my preferred construction shown in the drawings, the valve casing 50 is completed by a cylindrical wall 65 in the form of a simple ring that is normally clamped between the upper and lower casing walls 52 and 53, which upper and lower casing walls have annular grooves 66 to seat the ring. Normally, the three walls 52, 53 and 65 are held tightly together in assembled relation by suitable means such as a series of bolts 67 equipped with helical springs 68 and wing nuts 70. These bolts pass through suitable holes in the upper and lower valve casing walls 52 and 53 outside the circular wall 65 and the wing nuts 70 are tightened down sufficiently to create spring pressure effective for clamping the assembly together.

The valve casing 50 houses a suitable rotary valve member 71 that serves to continually push powdered material from the region inside the valve casing 50 below the discharge chute 58 to the region above the valve discharge port. In my preferred construction, the rotary valve member 71 is formed with a plurality of arms 72 for acting upon the desiccated material. In my preferred construction, best shown in Figs. 4 and 5, each of the arms has a face 73 so inclined as to have a slight lifting effect on the desiccated material. The inclination of the face 73 also serves to make the lower leading edge 75 of the arm sharper than a rectangular edge to provide an improved scraping action against material that tends to pack by gravitation on the lower valve casing wall 53. In my preferred construction moreover, each of the valve arms 72 is curved or swept back to urge the desiccated material inward from the cylindrical valve wall 65 and to provide a relatively sharp upright leading edge 76 which tends to scrape material from the cylindrical wall. It has been found that if the vertical dimension of the valve member 71 is substantially .003 inch less than the vertical spacing of the two walls 52 and 53, the desiccated material will not be blown past the upper and lower edges of the arm 72 because the powdered material banks across the clearance spaces to form effective seals.

In a dehydrating chamber of the character described, desiccated material such as powdered milk or powdered egg tends to bank up in the discharge portion 11 of the chamber instead of flowing freely therethrough, especially since the discharge portion of the chamber is of restricted diameter. It is desirable then to provide the previously mentioned stirrer means to continually break up the powdered mass.

In the construction shown, the stirrer means comprises a plurality of spaced stirrer bars 77 of what may be termed Z-shaped configuration and a lowermost stirrer bar 78, U-shaped in gen-

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eral configuration. These various stirrer bars are mounted on an upright shaft 80 that slidably extends through a bearing 81 formed in the transverse bottom wall 51. A suitable packing means 82 may also be mounted in the transverse wall 51 to prevent the powdered material from leaking through the clearance space between the shaft and the bearing 81.

The lowermost U-shaped stirrer bar 78 conforms to the dished configuration of the transverse bottom wall 51 and serves to continually shift material towards the discharge opening 55 of the dehydrating chamber as well as to break up the mass of material immediately above the discharge opening. Each of the Z-shaped stirrer bars 77 extends radially and diametrically in opposite directions from the shaft 80 and has one of its ends bent upward and the other of its ends bent downwardly, the bent portions conforming to the local configuration of the surrounding wall.

One important advantage of such a stirrer arrangement is that it is flexible in the sense that the stirrer bars may be independently bent as required to avoid scraping contact with the axial wall. If any one stirrer bar tends to scrape the surrounding wall, it is a simple matter to bend the stirrer bar in either a vertical plane or a horizontal plane to obviate such contact. If the stirrer bars were interconnected or if individual stirrer bars were of braced construction or of considerable dimension axially of the shaft 80, such flexibility would not be afforded.

While the stirrer arrangement comprises a plurality of stirrer bars, nevertheless the stirrer operation is effective substantially continuously throughout the vertical dimension of the lower chamber portion 11. This continuity of the stirring action through substantially the length of the lower chamber section 11 may be understood by referring to Fig. 6. In Fig. 6, the lowermost stirrer bar 78 creates a zone of stirring operation of the same vertical height as the U-shaped stirrer. Immediately adjacent this lowermost zone is a second zone of stirring operation represented by the vertical dimension of the downwardly bent portion 83 of the next stirrer bar. Contiguous with this second stirring zone is the third stirring zone corresponding to the upturned portion 85 of the same stirrer bar. The next substantially contiguous stirring zone is represented by the downwardly bent portion 86 of the next stirrer bar, and so on.

In the provision of a suitable driving means for actuating the described valve and the described stirrer, it is an object of my invention to meet certain desirable considerations. Among these considerations are the following: the desirability of applying a driving force to the valve and stirrer, preferably in a balanced manner, with the point of application between the valve and stirrer; the desirability of constructing a driving connection with the shaft 80 that may be readily withdrawn from the shaft in the dismantling procedure, preferably with minimum manipulation; the desirability of operating the rotary valve by means of the upright shaft in a manner that permits the valve casing to be withdrawn from the shaft and yet requires no clearances through which the powdered material might leak from the valve casing; the desirability of providing a power means for driving the shaft 80 that requires little space and does not exert a lateral thrust tending to throw the lower chamber portion 11 out of its proper vertical alignment; and the desirability of minimizing

any manipulation for operatively disconnecting the power means when the apparatus is dismantled for cleaning. All of these considerations are satisfactorily met by the construction now to be described.

One important expedient is to employ a small individual motor 87 for actuating the shaft 80 and to mount the motor on a suitable bracket 88 that is unitary with the previously described unitary assembly of transverse bottom wall 51, discharge chute 58 and transverse valve casing wall 52. Thus the motor 87 is movable bodily with the unitary assembly when the unitary assembly is detached from the lower chamber portion 11 and in normal operation the motor cannot exert a lateral thrust on the lower chamber portion since it is, in effect, carried by the lower portion.

Another important expedient is to actuate the shaft 80 through the medium of a shaft sleeve 90 that extends completely through the valve casing 50 and is releasably engaged with the shaft. In the particular arrangement shown in Fig. 6, the releasable engagement is effected by a suitable cross pin 91 that extends through suitable holes in the shaft and shaft sleeve, the cross pin being retained by a cotter pin 92.

The shaft sleeve 90 extends with a suitable close running fit through a bearing 93 in the top casing wall 52 and in the same manner through a suitable close fitting aperture 95 in the lower valve casing wall 53. The valve member 71 is connected with the shaft sleeve 90 by a suitable key 96 and above the valve casing 50 a rotary driving means in the form of a sprocket gear 97 is engaged with the shaft sleeve both by a key 98 and a suitable set screw 100. A sprocket chain 101 extends from the sprocket gear 97 to a second sprocket gear 102 on a short drive shaft 103. The drive shaft 103 is part of a speed reduction mechanism 105 operated by the motor 87.

The dehydrated material may be discharged from the spout 60 into any suitable container for the finished product. In the arrangement shown in Fig. 1, however, the spout 60 has an extension in the form of a flexible conduit 104 for discharging the product on to a vibrating screen 106 operated by a suitable motor 107. The screened material passes through a flexible conduit 108 into a shipping container 110. The shipping container 110 is shown on suitable scales 111.

The manner in which the described discharge mechanism operates will be readily understood from the above description. The powdered product produced by dehydration in the chamber 10 gravitates into the discharge portion 11 of the chamber where it is acted upon by the plurality of stirrer bars to prevent such bridging of the powdered mass as might prevent movement to the bottom of the chamber. In addition, the lowermost U-shaped stirrer bar 78 continuously shifts material at the bottom of the dehydrating chamber towards the entrance to the discharge chute 58. The material dropping down through the discharge chute 58 enters the rotary valve and is continually transferred from the region in the valve casing below the discharge chute to the region above the spout 60.

As may be understood by referring to Fig. 4, the arms 72 of the valve member 71 are effective successively to block communication between the inlet and outlet ports of the valve casing 50, the powdered material itself serving as a seal across all clearance spaces. As a result, there is no possibility of such gaseous flow between the atmosphere and the interior of the lower dehydrat-

ing chamber 11 through the valve casing 50 as would interfere with the dehydrating operation or undesirably reduce the pressure differential between the dehydrating chamber and the atmosphere. All of the assembled parts, including the parts of the valve casing 50, are leakage-proof so that no material escapes from the apparatus except through the spout 60.

The frequent dismantling of the discharge mechanism for cleaning may be carried out in a rapid and convenient manner to make all of the material-contacting interior surfaces readily accessible for cleaning. It is merely necessary to remove the series of bolts 63 around the bottom of the chamber portion 11 and to remove the cross pin 91 from the lower end of the shaft 80 to permit bodily removal as a unit of the assembly comprising the chamber bottom wall 51, the discharge chute 58, the rotary valve, the motor and the driving connection between the motor and the valve. It is to be noted that upon such removal of the assembly the interior of the dehydrating chamber 10 becomes readily accessible for cleaning and flushing. All the surfaces within the dehydrating chamber including the surfaces of the stirrer means are smooth and free from such crevices as would tend to trap the dehydrated material.

The assembly that is bodily removed in the manner described may itself be quickly broken down into members and sub-assemblies that are designed for thorough and convenient cleaning. It is merely necessary to remove the bolts 67 and the associated springs 68 to permit removal of the bottom wall 53 and the cylindrical wall 65 of the valve casing 50 thereby to expose all of the interior valve surfaces. When the valve casing 50 is dismantled in this manner, a sub-assembly remains intact including the following elements: the discharge chute 58; the top valve casing wall 52; the sprocket gear 97; the speed reduction mechanism 105; and the motor 107. It is to be emphasized that the motor drive presents no problem whatsoever in the dismantling procedure and does not make necessary any additional dismantling operation. It is a feature of the invention that the simple procedure of removing the bottom wall of the dehydrating chamber results in operatively disconnecting the power means from the upright shaft 80 and leaves the shaft exposed in the lower end of the dehydrating chamber for cleaning.

The description herein, in specific detail, of a preferred practice of my invention suggests the possibility of various changes and substitutions under my concept and I reserve the right to all such departures from the description that properly fall within the scope of my appended claims. I claim:

1. In a dehydrating system, a dehydrating chamber, a bottom wall for said chamber, a valve casing including a top casing wall spaced below said bottom wall, said valve casing having a discharge port, an upright shaft extending through said chamber bottom wall and said valve casing, passage means interconnecting said two walls for communication between said chamber and said casing, said passage means lying to one side of said shaft, said valve casing being removable relative to said dehydrating chamber, stirrer means in said chamber actuated by said shaft, a sleeve journaled in said valve casing, said sleeve surrounding said shaft and being slidable longitudinally of the shaft, a rotary valve in said casing operatively connected with said sleeve, a rotary drive means on said sleeve outside said

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valve casing to drive said sleeve and shaft thereby to drive said stirrer and valve, power means operatively connected with said rotary drive means for actuation thereof, and means releasably securing said sleeve on said shaft whereby release of said securing means will permit bodily movement of said sleeve together with said valve casing and said rotary drive means away from said chamber.

2. In a dehydrating system, a dehydrating chamber, a bottom wall for said chamber, a valve casing including a top casing wall spaced below said bottom wall, said valve casing having a discharge port, an upright shaft extending through said chamber bottom wall and said valve casing, a passage means interconnecting said two walls for communication between said chamber and said valve casing, said passage means lying to one side of said shaft, said valve casing and said passage means being removable relative to said dehydrating chamber, stirrer means in said chamber actuated by said shaft, a sleeve rotatably mounted in said top casing wall, said sleeve surrounding said shaft and being slidable relative to the shaft, said sleeve being releasably connected with the shaft, a rotary valve mounted on said sleeve inside said casing, and a rotary drive means mounted on said sleeve outside said casing, said valve casing sleeve and rotary drive means being movable with said sleeve when the sleeve is shifted downward along said shaft.

3. In a dehydrating system, a dehydrating chamber, a bottom wall for said chamber, a first releasable means normally anchoring said bottom wall in place, stirrer means in said chamber, a rotary valve for discharging the dehydrated material from said chamber, said rotary valve including a valve casing connected to said bottom wall, a sleeve for actuating said valve, a power driven shaft operatively connected with said stirrer, said shaft extending through said sleeve, and a second releasable means connecting said sleeve to said shaft whereby release of both said releasable means permits opening of said chamber by bodily movement of the assembly comprising said bottom wall, said valve casing, and said sleeve.

4. In a dehydrating system, a dehydrating chamber open at the bottom, a first transverse wall removably connected to said chamber across the bottom opening thereof, a second transverse wall spaced below said first transverse wall, passage means interconnecting said two walls to provide communication with said chamber through said second wall, a third transverse wall spaced below said second transverse wall, said third wall having a discharge port out of register with said passage means, an upright cylindrical wall between said second and third transverse walls, means to hold said cylindrical wall and said second and third transverse walls in assembled positions to form a closed cylindrical valve casing, said holding means being releasable for separation movement of the walls to expose for cleaning operation the inner surfaces of the valve casing and of the lower end of said passage means, a rotary valve in said valve casing to move dehydrated material therein from the region below said passage to the region above said discharge port, a shaft for actuating said rotary valve means, said shaft extending upward through said first and second transverse walls to one side of said passage means, stirrer means in said chamber actuated by said shaft, and power means

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operatively connected to the shaft intermediate said first and second transverse walls.

5. In a dehydrating apparatus, a dehydrating chamber, a bottom wall for said chamber separated from the rest of the chamber structure, a valve casing having a discharge port, a top wall for said casing separate from the rest of the casing structure, an upright shaft extending through both said chamber bottom wall and said top casing wall, a passage means interconnecting said two walls for communication between said chamber and said valve casing, said passage means lying to one side of said shaft, means securing said bottom chamber wall to the rest of the chamber structure and securing said top casing wall to the rest of the casing structure, said securing means being releasable whereby the bottom chamber wall may be lowered away from the rest of the chamber structure and the rest of the casing structure may be lowered away from said top casing wall thereby to expose for cleaning operations the inner surfaces of said two walls and said passage means as well as the interiors of said chamber and valve casing, stirrer means in said chamber actuated by said shaft, and drive means operatively connected to said shaft.

6. In a dehydrating apparatus, a dehydrating chamber, a bottom wall for said chamber separated from the rest of the chamber structure, a valve casing having a discharge port, a top wall for said casing separate from the rest of the casing structure, an upright shaft extending through both said chamber bottom wall and said top casing wall, a passage means interconnecting said two walls for communication between said chamber and said valve casing, said passage means lying to one side of said shaft, means securing said bottom chamber wall to the rest of the chamber structure and securing said top casing wall to the rest of the casing structure, said securing means being releasable whereby the bottom chamber wall may be lowered away from the rest of the chamber structure and the rest of the casing structure may be lowered away from said top casing wall thereby to expose for cleaning operations the inner surfaces of said two walls and said passage means as well as the interiors of said chamber and valve casing, stirrer means in said chamber actuated by said shaft, and power means carried by said valve casing, said power means being operatively connected with said shaft between said bottom chamber wall and said top casing wall.

7. In a dehydrating apparatus, a dehydrating chamber, a passage means extending downward from the bottom of said chamber, a valve casing mounted on the lower end of said passage means, said passage means and said valve casing constituting a conveying assembly to move dehydrated material out of said chamber, a shaft to one side of said passage means extending upward into said chamber and downward into said casing, stirrer means in said chamber driven by said shaft, a rotary valve member in said casing driven by the shaft, a motor mounted on said conveying assembly, said motor being operatively connected with said shaft, and means securing said conveying assembly to said chamber, said securing means being releasable to permit the conveying assembly together with the motor to be lowered into spaced relation to the chamber to expose the interior of the chamber and the interior of said passage means for cleaning.

8. In a dehydrating apparatus, a dehydrating chamber, a passage means extending downward

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from the bottom of said chamber, a valve casing mounted on the lower end of said passage means, said passage means and said valve casing constituting a conveying assembly to move dehydrated material out of said chamber, a shaft to one side of said passage means extending upward into said chamber and downward into said casing, said shaft having an intermediate portion exposed outside said passage, stirrer means in said chamber driven by said shaft, a rotary valve member in said casing driven by the shaft, a motor mounted on said conveying assembly, said motor being operatively connected with said intermediate portion of the shaft, and means securing said conveying assembly to said chamber, said securing means being releasable to permit the assembly together with the motor to be lowered into spaced relation to the chamber to expose the interior of the chamber and the interior of said passage means for cleaning.

9. In a dehydrating apparatus, a dehydrating chamber, a passage means extending downward from the bottom of said chamber, a valve casing at the lower end of said passage means, said valve casing having an upper wall united with said passage means for movement therewith, a shaft to one side of said passage means extending upward into said chamber and downward into said casing, said shaft having an intermediate portion exposed outside said passage, stirrer means in said chamber driven by said shaft, a rotary valve member in said casing driven by the shaft, a motor operatively connected with said intermediate portion of the shaft, said motor being united with said passage means for movement therewith, and means securing said passage means to said chamber, said securing means being releasable to permit the passage means together with the motor to be lowered into spaced relation to the chamber to expose the interior of the chamber and the interior of said passage means for cleaning.

10. In a dehydrating apparatus of the type wherein a substantial pressure differential is maintained between the interior pressure and atmospheric pressure, a dehydrating chamber having a port therein for discharge of desiccated

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material, an inclosed valve chamber having inlet and outlet ports therein, a passage between said discharge port of said dehydrating chamber and said inlet port, a rotary valve in said valve chamber adapted for continuous transfer of said desiccated material from said inlet port to said outlet port without substantial loss of said pressure differential, and means for operating said rotary valve.

11. Apparatus as described in claim 10, having stirring means in said dehydrating chamber, said stirring means being operatively connected to said rotary valve.

12. In a dehydrating apparatus of the type wherein a substantial pressure differential is maintained between the interior pressure and atmospheric pressure, a dehydrating chamber having a port therein for discharge of the desiccated material, an inclosed valve chamber having inlet and outlet ports therein, a passage between said dehydrating chamber and said inlet port, a rotary valve in said valve chamber, said rotary valve being smaller than said valve chamber to provide clearance between said valve and said chamber, said clearance being on the order of .003 of an inch whereby said valve will transfer said desiccated material from said inlet port to said outlet port without substantial loss of said pressure differential, and drive means for operating said rotary valve.

13. Apparatus as described in claim 12, having stirring means in said dehydrating chamber, said stirring means being operatively connected to said rotary valve.

JOSEPH M. HALL.

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