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APPARATUS FOR DISTRIBUTING POWDERED MATERIAL

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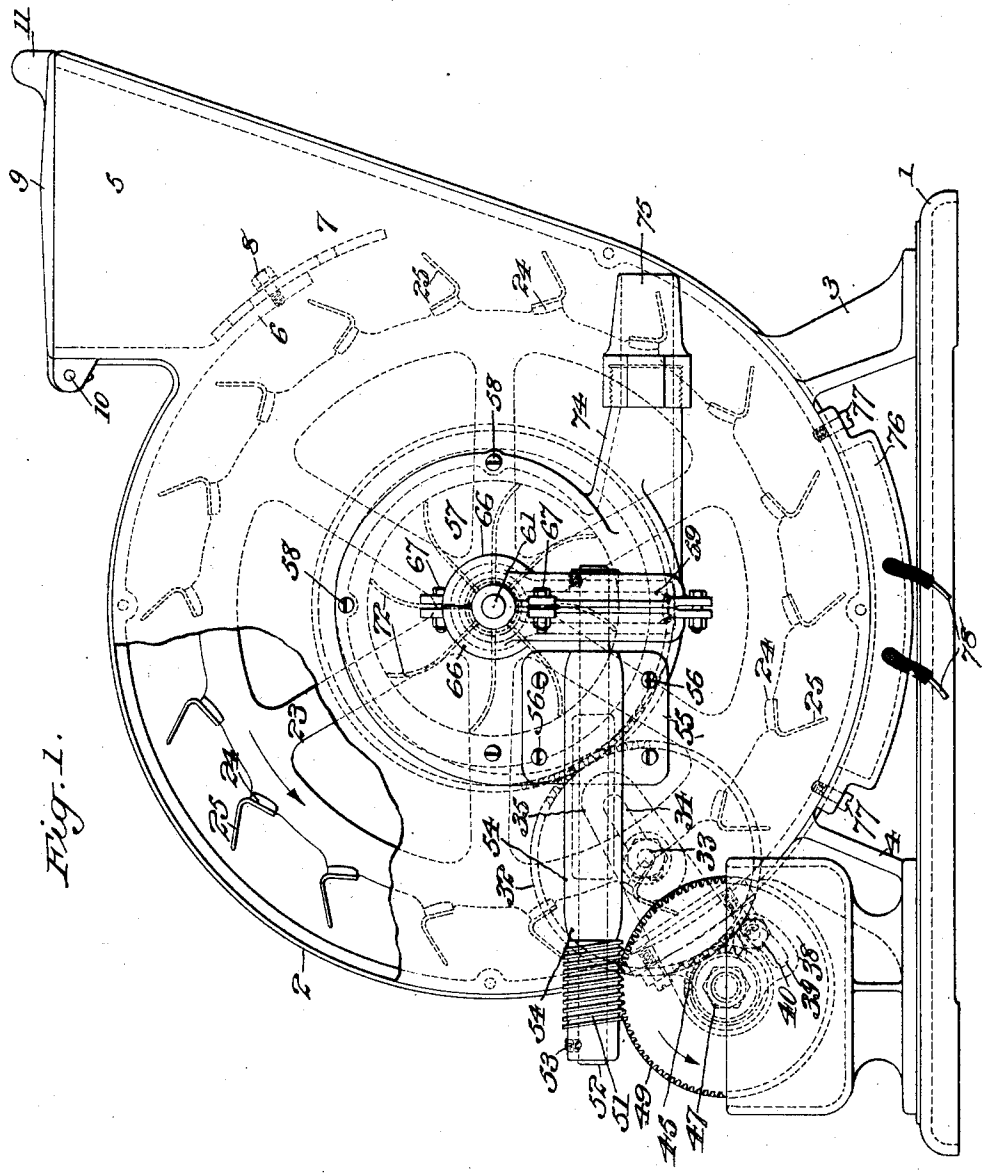


Fig. 1.

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Fig. 2.

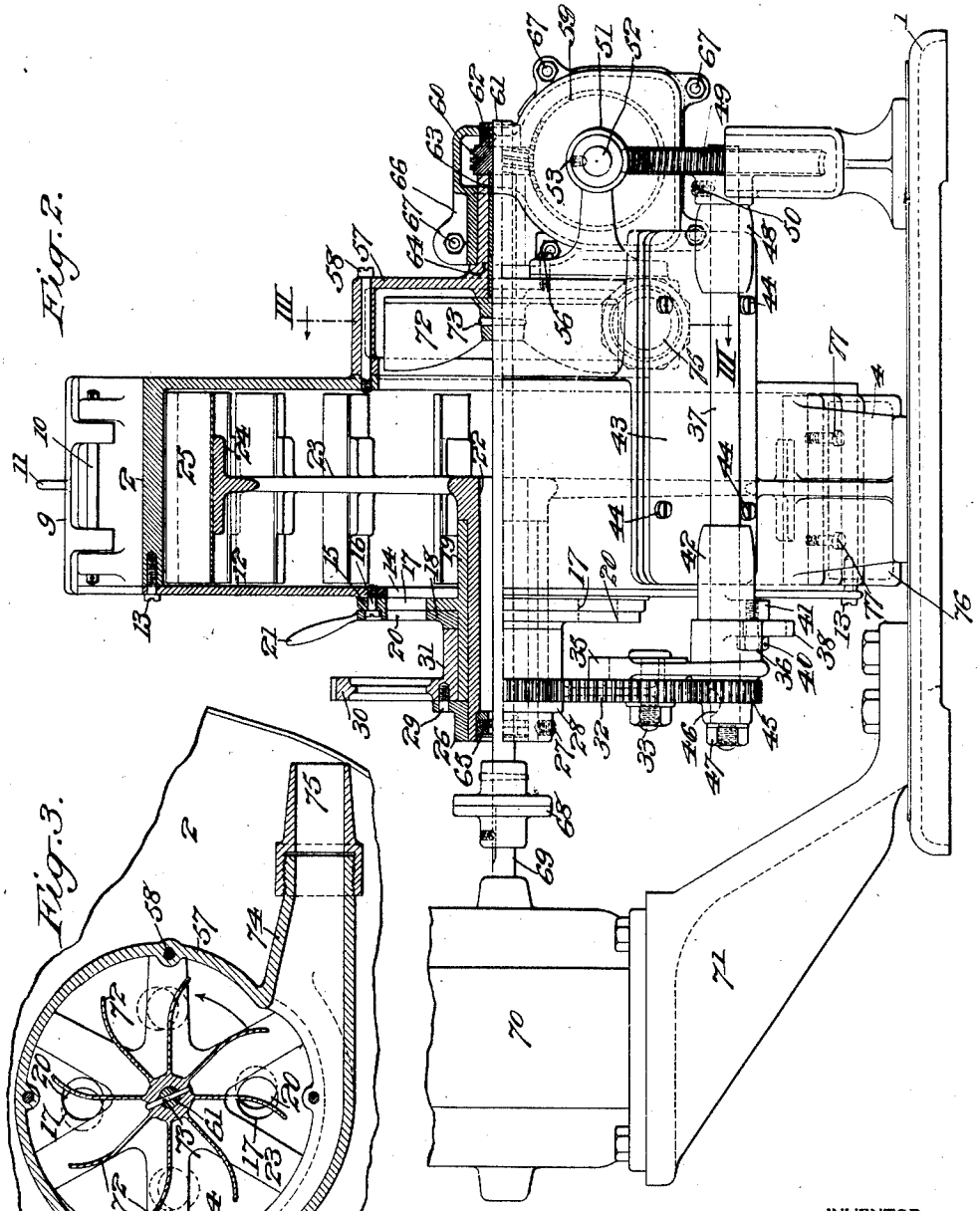


Fig. 3.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DISTRIBUTING POWDERED MATERIAL.

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This invention relates to an apparatus for distributing powdered material, such, for instance, as soapstone, talc or the like, which is commonly employed in tubing or extruding machines for coating the extruded product in order to prevent adhesion of its parts.

An object of the invention consists in providing improved means whereby the powder may be carried along with a comparatively slow moving current of air or the like generated by apparatus tending to produce a partial vacuum.

Another object consists in providing improved means for creating the partial vacuum and hence, generating the current of air or the like.

Another object consists in providing improved means for passing the powdered material into the said current of air or the like and for continuously returning to the said current such of the powdered material as has been passed thereinto and not been carried along thereby.

Another object consists in providing improved means whereby the means for generating the current of air or the like and the means for passing the powdered material thereinto are actuated from a common source.

Another object consists in providing improved means for regulating the force of the current of air or the like.

Another object consists in providing improved means for feeding the material from the distributing apparatus to the tubing or extruding machine.

Another object consists in providing improvements in the form, construction and arrangement of the several parts, whereby the above named and other objects may be effectively attained.

A practical embodiment of the invention is shown in the accompanying drawings, in which

Fig. 1 represents a side elevation of the improved apparatus.

Fig. 2 represents a view partly in end elevation and partly in vertical section of the same.

Fig. 3 represents a detail section taken in the plane of the line III—III of Fig. 2, looking in the direction of the arrows.

In supplying non-adhesive powdered material to tubing machines, it has been customary to partially fill a suitable receptacle with the said material and then inject a current of compressed air into the said receptacle, which current would stir up a cloud of the powdered material and force it out through a pipe or other suitable outlet leading from the receptacle. This procedure requires an air current of very considerable force, and this force frequently causes injury to the product of the tubing machine, particularly when the said product consists of a tube of relatively small diameter which is being produced in considerable length. This injury generally arises from the fact that the surface friction of the air within the tube generates a back pressure after a considerable length of tubing has been extruded, which back pressure causes the air to expand, and thereby distort, a portion of the tubing. Disadvantages have also existed in the fact that the powder sometimes is forced into the tube in small lumps instead of in a very finely subdivided condition and also in the fact that the supply of powder carried along by the current of air has been irregular. My present invention overcomes these prior difficulties by providing improved means attaining the objects previously named.

Referring to the drawings, a base plate 1 is provided for the apparatus, and upon this base plate there is set a drum-like casing 2 which has a pair of legs 3, 4 extending from its lower part and resting upon the base plate 1.

One side of the casing 2 is developed outwardly and upwardly into a filling chute or hopper 5, and it will be observed that one side of the said chute 5 is substantially tangential to the circumference of the casing 2, as clearly shown in Fig. 1.

The opening from the casing into the chute 5 is partially restricted by the circumferential wall of the casing 2, as indicated at 6, and a gate 7 is mounted on the said portion 6 of the wall of the casing by a cap screw 8 that projects through a slot fashioned in the gate. By this arrangement, the gate is adjustable so as to provide means for still further restricting and, in fact, practically closing, communication between the chute 5 and the interior of the casing 2.

The top of the chute 5 has a hinged lid 9 that is pivoted at 10 and has a grip 11 for manual operation.

One side of the casing 2 is open, and a cover plate 12, which is suitably shaped to conform to the circumference of the casing

2, is removably secured thereto by screws 13.

This cover plate 12 has a central aperture 14 that is closed by a disc 15 fixed in position by screws 16.

The disc 15 has an annularly disposed series of holes 17, and a shutter 18, which consists of a thin circular plate, is mounted on a journal 19, which forms part of the disc 15, and is provided with a series of holes 20 that are fitted to register with the holes 17. The shutter 18 is rotatable upon the journal 19 and has a handle 21 for this purpose.

From this construction, it will be seen that, by rotating the shutter 18, the openings 17 and 20 may be made to wholly coincide, to partly coincide, or not to coincide at all, so that this constitutes means for opening, to a greater or less extent, communication between the surrounding atmosphere and the interior of the casing 2.

The journal 19 formed on the disc 15 projects both within and without the casing 2, and in said journal, a hollow shaft 22 finds its bearing. One end of said shaft extends beyond the journal 19 and into the casing 2 so as to be centrally disposed therein. This inner end of the shaft 22 carries a skeleton wheel 23.

The wheel 23 has its rim formed so as to constitute a plurality of seats 24 inclined at an angle to the adjacent radii of the wheel, which seats serve as supports for scoops 25 that consist of plates bent to a cross sectional form of acute angular shape.

The outer end of the shaft 22 has a collar 26 fixed thereto by a set screw 27, and this collar is developed into a flange 28 that has a stud 29 set therein and projecting into a large gear 30 which has a sleeve bearing 31 on the exterior of the journal 19. The said sleeve bearing serves to hold the shutter 18 firmly in position against the disc 15, as is shown in Fig. 2.

The large gear meshes with an intermediate gear 32 that is mounted by means of a bolt 33 in a slot 34 formed in an arm 35 that projects laterally from a hub 36 which is mounted on a countershaft 37.

The said hub 36 has a flange 38 which is provided with an arcuate slot 39; and a cap screw 40 is passed through the slot 39 and threaded into a flange 41 formed on a bearing 42 which is fast to a plate 43 that is fixed to the casing 2 by screws 44.

This arrangement permits the arm 35 to be adjusted in a curved path about the shaft 37 so as to move the intermediate gear 32 toward and away from the large gear 30.

A pinion 45 is fast on the shaft 37 by a key 46 and held in position by a nut 47. This pinion is intended to mesh with the intermediate gear 32, so that the rotation of the shaft 37 will drive the large gear 30 and hence rotate the wheel 23.

The pinion 45 may be removed, if desired, and another sized pinion substituted for it, in order to vary the speed of rotation of the wheel 23 with respect to a given speed of rotation of the shaft 37. In case the size of the pinion 45 is changed, the adjustability of the intermediate gear 32 in the slot 34, and the adjustability of the arm 35 in the slot 39 enables the intermediate gear to be so positioned as properly to mesh with the substituted pinion. This provides a ready means of varying the speed of rotation of the wheel 23 without the necessity of altering the speed of rotation of the countershaft 37, which, as will hereinafter be described, is driven from the source of power.

The said shaft 37 has its end which is away from the pinion 45 mounted in a bearing 48 that is fast to the plate 43, and the extremity of the said shaft has a worm gear 49 fixed thereon by a set screw 50.

The said worm gear meshes with a worm 51 which is fixed on a shaft 52 by a set screw 53, the said shaft 52 being mounted in an elongated bearing 54 that is fast to a plate 55 secured by screws 56 to the side of a housing 57 that is fastened by screws 58 to the side of the casing 2 opposite the cover plate 12.

The end of the shaft 52 opposite the worm 51 carries another worm gear 59 that meshes with a worm 60 which is fixed to a shaft 61 by a set screw 62.

The shaft 61 has one end mounted in a bushing 63 that is carried in a journal 64 formed integral with and projecting from the housing 57. The other end of the shaft 61 passes through a yielding washer 65, that may be composed of felt or other suitable material. This washer is held in position by a pair of rings that are forced into the shouldered outer end of the hollow shaft 22, as clearly shown in Fig. 2 and, as said washer has a close engagement with the surface of the shaft 61, it serves to prevent the egress of the powdered material or, substantially, the ingress of air at this point. A housing 66 composed of two halves, fastened together by bolts 67, serves to cover the worm gear 59, worm 60 and adjacent parts, the said housing 66 being supported by one end of the shaft 52 and the contiguous end of shaft 61.

The shaft 61 projects axially through the casing 2 and terminates in a coupling 68, which coupling is keyed to a power shaft 69 projecting from a motor 70 that is carried on a bracket 71 mounted on one side of the base 1. It will be clear that the operation of the motor serves, through the chain of shafting and gearing above described, to drive the wheel 23.

The housing 57, above mentioned, encompasses a fan or blower 72 that is fast to the shaft 61 by a cotter 73, so that the fan

or blower rotates with and at the same speed as the shaft 61. The arrangement of gearing is such that the said shaft, and hence the fan, rotates substantially faster than the scoop carrying wheel 23.

The housing 57 is provided with a tangentially projecting outlet 74 (clearly shown in Fig. 3) which has a nozzle 75 threaded thereon, and it will be seen that the rotation of the fan or blower 72 will tend to draw the air from the interior of the casing 2 and exhaust it through the outlet 74 and nozzle 75, so that the said fan acts as a centrifugal suction pump tending to create a partial vacuum within the casing 2. This operation, of course, sucks air through the openings 17 and 20 in the disc 15 and shutter 18 and, by adjusting the shutter in a rotary direction with respect to the disc, the effective size of said openings can be varied so as to govern the amount of air permitted to enter the casing 2.

A suitable electric heating unit 76 is secured to the lower side of the casing 2 by screws 77 and may be connected by wires 78 with any suitable source (not shown) of electricity. This heating unit serves to keep the powdered material within the casing 2 in a dry condition and insure that it shall remain finely subdivided and not form lumps.

In operation, the lid 9 is lifted and the cover 7 adjusted to provide a suitable opening between the chute 5 and the casing 2, so as to permit the powdered material to pass into the casing with greater or less rapidity. A suitable amount of the powdered material, such as talc, is now admitted into the chute 5 and the lid 9 closed. The said material will move downwardly toward, and part of it will actually reach, the bottom of the casing 2, as indicated in Fig. 1. The electricity is turned on so as to heat the element 76. The shutter 18 is turned by its handle 21 so as to permit a certain amount of coincidence between the openings 17 and 20. The motor 70 is started, thus causing the fan or blower 72 and the scoop wheel 23 to rotate.

The arrangement is such that the scoop wheel rotates in an anti-clockwise direction, as indicated by the arrows in Fig. 1, so that the scoops 25 move upwardly toward and against the material passing down through the chute 5 into the casing 2. As the apparatus operates, the scoops will be filled with the incoming material and will carry it upwardly totward the top of the casing 2. As each scoop approaches the top, it will begin to spill more and more of its load of powdered material and, after it has passed beyond the highest point of its travel, each scoop will entirely empty itself. This will generate a continuous descending cloud or curtain of powdered material which will, in its downward course, come to the axis of the wheel 23 and casing 2. The air let in through the openings 17 and 20 will be drawn through the casing 2 in an axial direction toward the fan 72 and ejected through the outlet 74 and nozzle 75, and this current of air will carry along with it part of the descending cloud of powder within the casing 2 and cause the same to be passed out through the outlet 74 and nozzle 75. By regulating the shutter 18, as well as the speed of rotation of the fan 72, the power of the suction created in the casing 2 can be adjusted to suit the circumstances, so that a greater or less amount of the powdered material will be passed out of the casing in any given period of time. These means of regulation enable the operator to insure an adequate and even supply of the powdered material from the distributing apparatus to the tubing machine while, at the same time, preventing any excess of pressure which would injure the tubing.

The arrangement of the chute 5, with one side tangential to the circumference of the casing 2, in combination with the anti-clockwise rotation of the wheel 23, provides a very effective means for supplying the powdered material to the scoop carrying wheel, and prevents undue collection and clogging of the material within the casing 2.

It may be mentioned that the nozzle 75 on the outlet 74 is intended to be connected by suitable hosing or piping with a tubing machine, in the usual manner; and it is preferred to mount the apparatus so that the nozzle 75 will be at a higher level than the point of connection to the tubing machine, so that gravity may assist in the feed of the powdered material.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention; and hence, I do not intend to be limited to the details herein shown and described, except as they may be included in the claims.

What I claim is:

1. An apparatus of the character described comprising, a receptacle for the material, a fan tending to create a vacuum within the receptacle, a scoop carrying wheel for agitating material in the receptacle, and a pair of shafts, one within the other, for rotating the fan and wheel.

2. An apparatus of the character described comprising, a receptacle for the material, a fan mounted on one side of the receptacle for tending to create a vacuum therein, a source of power located at the other side of the receptacle, a shaft running from the source of power through the receptacle to the fan for rotating the latter, a scoop carrying wheel within the receptacle for agitating the material, a second shaft surrounding said first shaft and connected to said wheel, and a

train of mechanism exterior to the receptacle connecting said shafts, whereby the rotation of the first shaft will rotate the second shaft.

3. An apparatus of the character described comprising, a receptacle for the material, a wheel in the receptacle for agitating the material, a hollow shaft upon which said wheel is mounted projecting through a side of the receptacle, an actuating shaft traversing said hollow shaft and spaced from the inner wall thereof, and means located between said two shafts for preventing the egress of powdered material from the receptacle or the ingress of air thereinto.

4. An apparatus of the character described comprising, a receptacle for the material, a wheel in the receptacle for agitating the material, a hollow shaft upon which said wheel is mounted projecting through a side of the receptacle, an actuating shaft traversing said hollow shaft and spaced from the inner wall thereof, and a yielding washer located between said two shafts for preventing the egress of powdered material from the receptacle or the ingress of air thereinto.

5. An apparatus of the character described comprising, a receptacle for the material, a wheel in the receptacle for agitating the material, a hollow shaft upon which said wheel is mounted projecting through a side of the receptacle, an actuating shaft traversing said hollow shaft and spaced from the inner wall thereof, and a yielding washer carried by said hollow shaft and located between said two shafts for preventing the egress of powdered material from the receptacle or the ingress of air thereinto.

6. An apparatus of the character described comprising, a receptacle for the material having a central outlet, a housing secured to said receptacle in register with said outlet, a fan located in said housing tending to create a vacuum within the receptacle through the outlet, a scoop carrying wheel in the receptacle for agitating the material, and a motor for rotating the fan and wheel, said motor and fan being disposed on opposite sides of the receptacle and substantially coaxially mounted with the wheel.

In testimony, that I claim the foregoing as my invention, I have signed my name this 17th day of November, 1924.

VERNON ROYLE.