

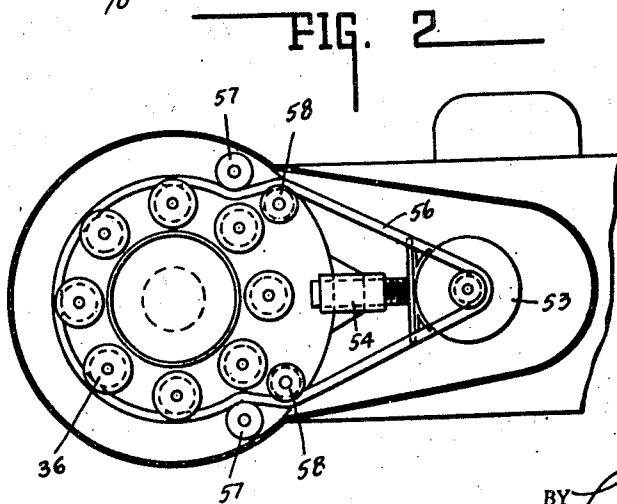
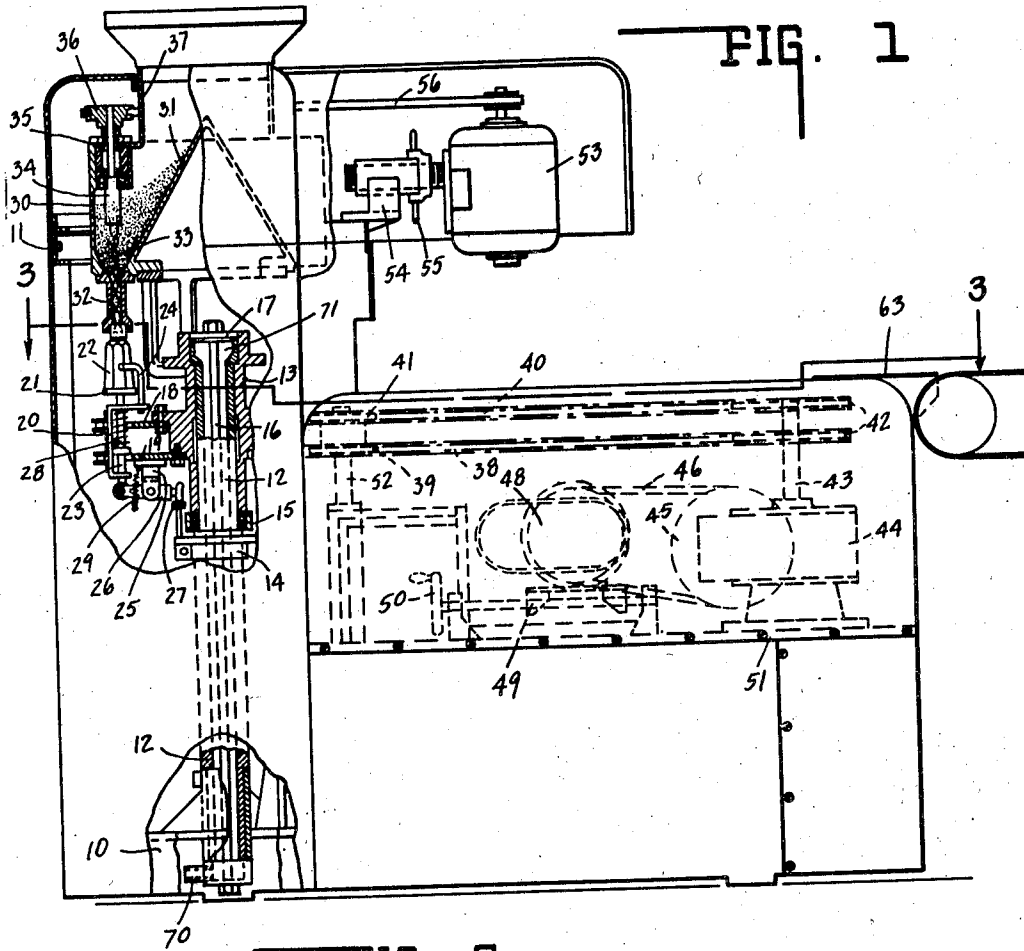
June 15, 1948.

C. F. CARTER
APPARATUS FOR FILLING CONTAINERS EMPLOYING
VACUUM AND MECHANICAL FEEDERS

2,443,182

Filed Jan. 12, 1944

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG. 3

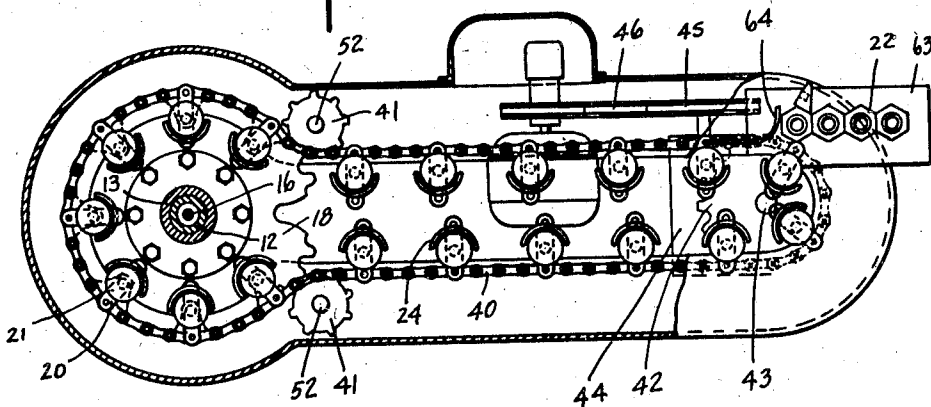


FIG. 4

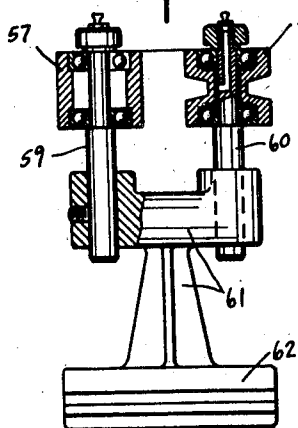


FIG. 6

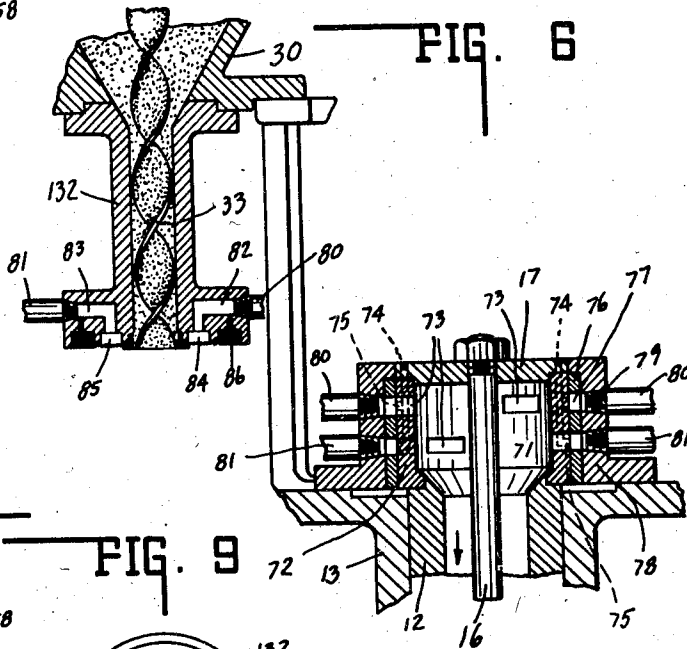


FIG. 5

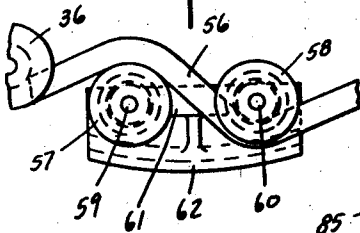
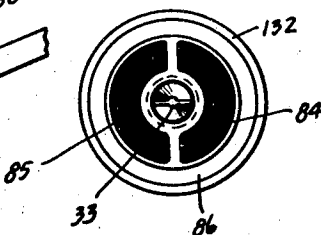


FIG. 9



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3 Sheets-Sheet 3

FIG. 7

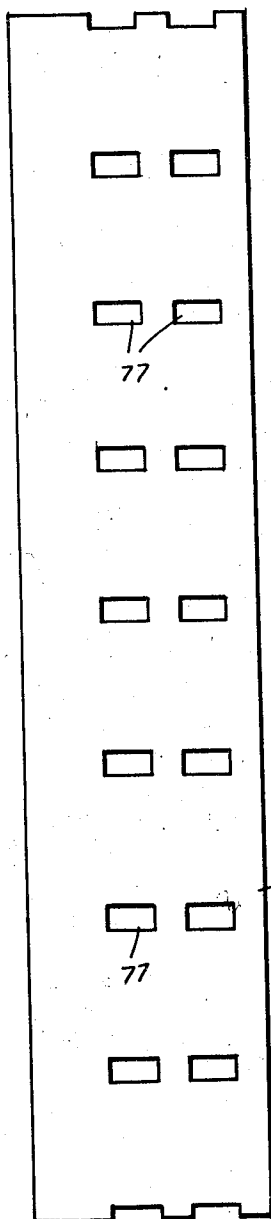
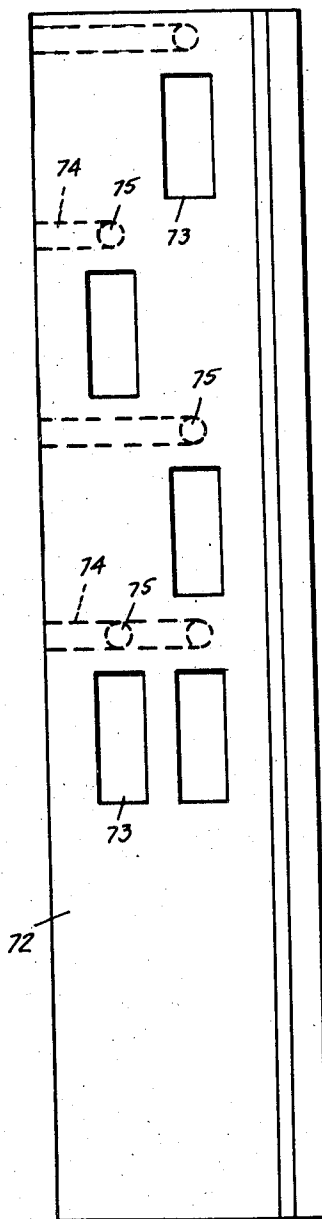


FIG. 8



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UNITED STATES PATENT OFFICE

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APPARATUS FOR FILLING CONTAINERS EMPLOYING VACUUM AND MECHANICAL FEEDERS

Clarence F. Carter, Danville, Ill.

Application January 12, 1944, Serial No. 517,920

23 Claims. (Cl. 226—116)

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This invention relates to improvements in apparatus for filling cans, cartons, jars and similar containers or receptacles with powdered or granulated materials, and particularly to a multiple-head automatic packaging or filling machine.

It is the purpose of this invention to provide apparatus for automatically and rapidly filling and packing a container with a comminuted material of either fine or coarse density to a prescribed and constant volume, weight and density. This is accomplished through a controlled and positive feeding of the material from the hopper to the container, such as by a predetermined number of revolutions of an auger; and wherein the character of the material and container warrants, facilitating the positive feed and packing by application of a vacuum to the container.

Whereas the conventional type of auger filler is slow and dusty in its operation, and whereas the vacuum type of filler as disclosed in Letters Patent No. 2,170,469, granted August 22, 1939, will not successfully handle some of the granulated materials, this invention comprises improvements thereover embodying the more desirable principles of the auger and vacuum fillers. The resulting multiple automatic filler herein disclosed operates rapidly in its continuous filling operations without dust, and is adjustable to provide for accurate packaging.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a side elevation of the machine with parts broken away and shown in central vertical section as applied to the packaging of granulated materials without application of vacuum. Fig. 2 is a top plan view of the machine shown in Fig. 1 with the hood removed. Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1. Fig. 4 is an elevation, with parts in section, of the adjustable filler control. Fig. 5 is a plan view of the control shown in Fig. 4. Fig. 6 is a sectional view of a filler head showing a modified form thereof and associated vacuum control. Fig. 7 is a developed view of the vacuum control valve sleeve. Fig. 8 is a developed view of the parted vacuum head. Fig. 9 is a plan view of the underside of the filler head shown in Fig. 6.

In the drawings there is illustrated a multiple head filling machine having a base 10 with supporting frame 11 in which there is provided a vertically extending hollow supporting shaft 12 adapted to support at its upper end for rotation thereabout, a hopper supporting casting 13. For this purpose the shaft 12 has secured thereabout

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a fixed collar 14 to support the ball bearing race 15 upon which the hopper casting 13 revolves. A tie rod 16 extends centrally through the hollow shaft to secure over the top thereof a centering and closure washer 17.

Secured to suitable flanges about the casting 13 there are spaced sprocket wheels 18 and 19. Said sprocket wheels carry and are driven by driving and conveyor chains as will be hereinafter described. At spaced intervals along said driving and conveyor chains, there are mounted thereon a series of brackets 20, each supporting a lifter plate 21 for receiving and positioning a container indicated at 22. For this purpose a plunger 23 is slidably mounted in the inwardly turned upper and lower flanges of each bracket 20, carrying said plate at its upper end. Each lifter plate 21 is provided with a finger 24 extending upwardly therefrom for receiving, centering and maintaining the container 22 in aligned position thereon, the stem of said finger being slidably guided in the upper flange of the bracket 20. Adjacent each bracket 20 and depending downwardly from the lower chain and its sprocket wheel 19 there is a yoke 25 having a lifter arm 26 fulcrumed thereto intermediate its ends. One end of the lifter arm is engageable with a cam track 27. The other end thereof is in roller contact with the lower end of the plunger 23. Said plunger is provided with a compression spring 28 having its upper end engaging the upper flange of the bracket 20 and its lower end seated upon a collar fixed to the plunger. A lifting spring 29 is connected to the pivoted arm 26 at one end and to the base of the yoke 25 at its other end. This arrangement is such that the spring 29 normally tends to elevate the lifter plate 21 against the tension of the spring 28 when the lifter arm is released by the cam track 27. In this position the container is held against the filler head under tension of the spring 29 until the arm 26 rides onto the cam track 27, thereby permitting the plunger 23, lifter plate and container to be lowered by the spring 28.

Any number of container lifting plates with their associated brackets and mechanism just described may be carried about the sprocket wheels 18, 19, simultaneously, there being shown for purposes of illustration herein seven such units.

The hopper casting 13 also supports its hopper 30 which is provided with a central cone 31 extending upwardly therein. Extending downwardly from spaced openings in the bottom of the hopper there is a series of filling heads 32, each being axially aligned with one of the lifter

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plates 21 and its plunger 23. Extending downwardly from the hopper through each of the heads 32 there is provided a filling auger 33 terminating at its lower end with the mouth of the filler head and having at its upper end a shaft 34.

In alignment with each of the augers and carried in the upper part of the hopper 30, there is provided an auger shaft bearing and housing 35. The auger shaft extends upwardly through its bearing housing and has secured at its upper end a driving wheel or pulley 36. Thus, as shown in Fig. 2, there are provided eight pulleys 36, each adapted to rotate one of the augers in feeding alignment with one of the lifter plates 21. The hopper 30 is provided with an upwardly-extending filler neck 37 centrally thereof and within the annular series of pulleys 36. The lower end of the filler head is flared to receive the mouth of the container 22 and center it in alignment with the auger. Such flared portion of the filler head is provided with the usual resilient sealing gasket to seal the mouth of the container during the filling operation under pressure of the spring 29.

For controlling the amount of material fed into the containers according to prescribed volume, weight and density, it is essential that the hopper be rotated at a predetermined speed, and that the containers 22 be automatically fed to and removed from their respective lifter plates. For this purpose there is provided a pair of dual driving and conveyor chains, one chain 38 extending about an idler sprocket 39 and the driven sprocket wheel 19. The other chain 40 passes about the idler sprockets 41 and the sprocket wheel 18, as shown in Figs. 1 and 3. Said chains, in addition to driving the sprocket wheels 18, 19 serve to convey the containers to the filling heads as above described.

The driving and conveyor chains are driven by a pair of sprocket wheels 42 mounted on a shaft 43 extending upwardly from a speed reduction transmission, as indicated at 44, the speed reduction transmission being driven by a pulley 45 which in turn is driven by a belt 46 from a pulley mounted on motor 48 mounted for adjustment on a base 49 by a hand wheel 50. The base and driving pulley are of the "Reeves" variable speed type for controlling the duration of the filling cycle of the containers. Said drive mechanism is supported upon an extension frame 51 in which the shaft 43 of the driving sprockets and the spindle 52 of the idler sprockets 39, 41, have their supporting bearings.

The pulleys 36 on the auger shafts act to rotate the augers and thereby feed the material through the respective filler heads 32. They are driven by the motor 53 carried upon a supporting bracket 54 and adjustable relative thereto by a hand wheel 55. Said motor is adapted to drive a belt 56 as illustrated in Figs. 1, 2 and 5. By means of said belt and motor, the auger pulleys 36 are rotated only during their feeding operation, said belt 56 being so arranged as to engage and drive said pulleys during a predetermined partial cycle of the hopper. Inasmuch as it is desirable to impart feeding rotation to the augers for only a predetermined time and throughout a portion of their travel, the relative position of their driving engagement by the belt 56 is controlled through an adjustable filler control comprising a pair of idler pulleys 57, 58. Said idler pulleys, as shown in Figs. 2, 4 and 5, are supported upon independent spaced vertical shafts

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59, 60 carried by an adjusting bracket 61 having a clamping base 62. The base 62 of each pair of idlers is clamped for adjustment about the frame 11 and so arranged that the belt 56 passes between the idlers, on the outer side of idler 59 and on the inner side of idler 57. Idler 57, therefore, acts to throw the belt into frictional engagement with the auger driving pulleys 36 when they reach a predetermined filling position and idler 59 directs the belt out of engagement therewith when the filling operation is completed. By reason of this adjustment the augers are caused to feed the material throughout a predetermined path of travel of the hoppers during their driving association with belt 56 between the respective pulleys 57.

In operation of the machine, the empty containers 22 are conveyed to a loading platform 63 from which they are guided by an apron 64 onto the respective lifter plates 21 of the conveyor chains 38, 40. Said chains convey each container on a lifter plate 21 into alignment with a filling head, at which position the driving belt 56 is out of driving engagement with the corresponding auger pulley 36, and the lifter plate 21 is in its lowermost position through the action of the spring 28. The container having been thus positioned by said lifter plate and centered thereon by the centering finger 24, further travel thereof brings the lifting arm 26 to position for release from the cam track 27, whereupon the lifting spring 29 raises the lifter plate with the mouth of the container pressed and sealed under spring tension in filling position against the filler head 32. As the hopper casting continues to rotate, the pulley 36 moves into driving engagement with the belt 56, according to the adjustment of the idler pulley 57. Thereupon the auger is rotated to feed a predetermined amount of material into the container per revolution. The number of revolutions is governed by the speed of the motor 53, and the duration of the filling operation is controlled by the rotation of the hopper casting governed by the Reeves speed control or the like and the position of the respective idlers 57, 58. Upon auger pulley 36 disengaging the driving belt 56, the feeding is discontinued. At this station the cam 27 is engaged to lift the arm 26, permitting spring 28 to lower the lifter plate 21. This frees the mouth of the container from the filler head, whereupon the container is carried therefrom by the link conveyor chains to a position for removal.

The machine as above particularly described, is most adaptable for filling small mouthed containers with a granulated material, such as salt, sugar and the like, which is comparatively free of dust and requires no vacuum pack, since the air in the container is free to escape upwardly through the material as it is fed therein.

Wherein a powdered material is to be packed, it may be desirable to assist the positive feed or augers, and the packing operation through the application of vacuum or partial vacuum to the container and thereby increase the speed of packing, increase the density of the pack, and eliminate dust.

To apply the vacuum, a suitable vacuum pump is connected to a nipple 70 leading to the interior of the hollow shaft 12 and vacuum head 71 in the hopper casting 13, as illustrated in Fig. 6. The vacuum head is embraced by an apertured stationary ring 72 securely clamped to the upper end of the hollow shaft 12 by the washer 17,

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Said ring is viewed from the interior in developed form in Fig. 8, being provided with a staggered series of elongated apertures 73 and spaced intermediate downwardly-extending air vents 74 registering with suitable ports 75 in the washer 17. Surrounding and conforming to said stationary ring there is a rotating ring 76, a development of which is shown in Fig. 7. Said ring is provided with a double series of spaced apertures 77 adapted to register periodically with the apertures 73 and air ports 75 in the stationary ring during their relative rotation. The rotating ring is locked to the rotating head 78 having apertured sockets 79.

Connected with each of the sockets 79 there is a flexible air hose, the upper of which is indicated at 80 and the lower of which is indicated at 81. Each pair of hose 80, 81 is connected to opposite sides of the modified filler head 132, being in communication with the air ducts 82 and 83, respectively. Said air ducts lead to the semi-circular screened openings 84 and 85, respectively. Surrounding said semi-circular screened openings there is provided an annular gasket 86 against which the upper edge of a large mouthed container engages.

In operation, as the hopper casting 13 is rotated, the rotating ring 76 rotates relative to the stationary ring 72. This brings the aperture 77 of the rotating ring in periodic registry with the elongated apertures 73 and the ports 75 of ducts 74. Each pair of apertures 77 is connected through the flexible hose with one of the filler heads 132 which comprise a modification of and is otherwise similar in its operation to the heads 32. The upper series of apertures 77 being connected with their respective hose 80, lead to the screened opening 84. The lower series of apertures 77 communicate with their respective hose 81, leading to the screened opening 85.

With a partial vacuum being maintained in the vacuum head 71, air will be drawn from the container through first one and then the other of screened openings 84, 85. This has the effect of evacuating the air in the container to permit and facilitate introduction and packing of the material therein by the auger feed, and at the same time remove and carry away any dust developed in the filling of the container. To prevent clogging of the screens in said openings by the material when the air is evacuated from the container, a pulsating effect is developed by causing air to pass first through one side and then the other side of the screen, as hereinafter described.

It may be noted from the development of the stationary ring in Fig. 8 that it is blanked off and there are no apertures in that portion thereof extending from the unloading to the loading stations of the hopper. Immediately upon the filling operation commencing, the apertures 77 of the rotating ring will engage both an upper and lower aperture 73 in the stationary ring. This has the effect of initially withdrawing air from the container through both screened openings simultaneously for about 30 degrees of the hopper rotation as the auger starts to fill the container.

Upon apertures 73, 77 initially passing out of registry, apertures 77 of the rotating ring register with the air ports 75, allowing the air hose to fill up with air at atmospheric pressure. Thereupon apertures 77 move out of registry with the ports 75, the lower aperture 77 then registering with the lower aperture 73. This evacuates the

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air trapped in the lower hose 81, and draws air from the container upwardly through the screened opening 85 in the head while at the same time drawing the trapped air from the hose 80 in the reverse direction through the opposite screened opening 84 to thereby unclog the latter. Continued rotation of the hopper moves the lower aperture 77 out of registry with the lower aperture 73 and brings it into registry with the next following air vent 74, filling hose 81 with air at atmospheric pressure. Thereupon the upper aperture 77 registers with the upper aperture 73 to withdraw air from the container upwardly through the screened opening 84 and draw the entrapped air from the hose 81 downwardly through the screen 85 to unclog it. This cycle of pulsations, first drawing air upwardly from the container through the screen on one side of the head and drawing entrapped air from the hose down through the opposite screen to unclog it, is repeated, first on one side of the head and then the other during each filling operation.

By means of the foregoing auger feeding mechanism and intermittent pulsating vacuum control, the advantages of the positive and controlled auger feed, as well as those of the vacuum pack, are taken advantage of. This is particularly applicable to powder or finely comminuted material, where a dense packaging thereof in a wide mouth container is desired, the filling operation being considerably speeded up thereby. This results in a packaging operation which is accurate as to quantity, weight and density, as well as being dustless.

As claimed herein, the driving belt and wheels or pulleys for the augers and hopper may be in the form of link belts or chains and sprocket wheels; or the belts may be of a character for driving flat faced pulleys or sheaves. Also the comminuted material may be of varying degrees of fineness, i. e., either fine and powdery or coarse and granulated. With the former, it is more desirable to utilize a vacuum, which may not be necessary when feeding a more coarse or granular material.

The invention claimed is:

1. A machine for continuously and automatically feeding containers with a comminuted material including a support, a rotatable hopper thereon having a plurality of filling heads spaced thereabout, means for rotating said hopper, a material feeding auger extending into each of said heads for feeding material therethrough from said hopper to the container, a driving member on each auger, a motor driven belt, and means adjustable about said support engageable with said belt to direct it into driving engagement with said members during a predetermined travel thereof about said support.

2. A machine for continuously and automatically filling containers with a comminuted material, including a support, a hopper mounted on said support having a plurality of filling heads spaced thereon, means for moving said hopper and filling heads relative to said support and at a predetermined speed, a material feeding auger rotatably mounted in each of said heads having a driven member thereon, a driving member for rotating said augers at a predetermined speed, and means adjustable on said support for effecting a driving connection between said driving member and a predetermined number of said members for causing simultaneous rotation of their respective feeding augers at said predeter-

mined speed throughout a predetermined path of movement of said hopper.

3. A machine for continuously and automatically filling containers with a comminuted material including a support, a hopper rotatably mounted on said support for containing said material, a plurality of spaced filling heads extending downwardly from said hopper and communicating therewith, a motor driven belt operably connected with said hopper for rotating the same at a predetermined speed, a material feeding auger extending into each of said heads having a driving wheel thereon, a motor driven belt engageable with said driving wheels for rotating said augers at a predetermined speed of rotation, and a pair of idler wheels adjustably mounted on said support engageable with said belt to direct it into effective driving engagement with said wheels at predetermined stations in the path of rotation thereof.

4. A machine for continuously and automatically filling containers with a comminuted material including a support, a rotatable hopper thereon having a plurality of filling heads spaced thereabout, means for rotating said hopper, a material feeding auger extending into each of said heads, means for rotating said augers independently of said hopper and during a predetermined length of travel thereof, a container support associated with each of said filling heads movable therewith, and cam-controlled yielding means operably connected with each of said container supports for yieldingly raising and lowering a supported container into and out of sealing and filling engagement with its respective head at predetermined stations in the travel thereof.

5. A machine for continuously and automatically filling containers with a comminuted material including a support, a rotatable hopper thereon having a plurality of filling heads spaced thereabout, means for rotating said hopper, a material feeding auger extending into each of said heads, means for rotating said augers independently of said hopper and during a predetermined length of travel therewith, a container support associated with each of said filling heads movable therewith, a cam engaging lifter arm movably mounted in association with said hopper engageable with said container supports respectively, a lifting spring connected with each of said arms normally tending to elevate said arm and support for lifting the supported container into sealing and filling engagement with its filling head, and a spring connected with said container support tending to lower it and its supported container from engagement with its head upon cam-actuated lowering of the support-engaging portion of said arm.

6. A machine for continuously and automatically filling containers with a comminuted material, including a support, a rotatable hopper thereon having a plurality of spaced filling heads extending downwardly therefrom, a driven wheel connected with said hopper, speed controlled means for driving said wheel, a flanged bracket carried by said wheel in alignment with and below each of said heads, a reciprocating container support slidably mounted on said bracket, a lifter arm pivotally mounted on said wheel and in association with said bracket, having one end in operative engagement with said platform, a cam track on said support engageable by the other end of said lifter arm, a lifting spring connected with said arm and support tending to

elevate said arm to cause said container platform to be elevated into container sealing and filling engagement with its head under spring tension, and a lowering spring engageable between said platform and bracket tending to lower said platform and container free of said head upon actuation of said arm by said cam track.

7. A machine for continuously and automatically filling containers with a comminuted material including a support having a vacuum head, a rotatable hopper thereon having a plurality of filling heads spaced thereabout, means for rotating said hopper about said support at a predetermined rate of speed, a material filling auger extending into each of said heads, means operable to independently effect rotation of said augers during a predetermined period of rotation of said hopper to forcibly feed said material into a container, means movable with said hopper to place said containers into sealing and feeding engagement with said heads respectively during feeding rotation of said augers, a source of vacuum communicating with said vacuum head, a valve rotatable with said hopper, and air ducts connecting said valve with said filling heads respectively, said valve being ported to alternately and intermittently exhaust air from within the container and admit air at atmospheric pressure thereto during the feeding of the material therein by the said filling auger.

8. A machine for continuously and automatically filling containers with a comminuted material including a support having a hollow shaft and provided with a valve head therein, a source of vacuum for said head connected with said hollow shaft, a hopper rotatably mounted about said shaft having a plurality of filling heads spaced thereabout, means for rotating said hopper at a predetermined rate of speed, a rotatable material feeding auger extending into each of said filling heads for positively feeding material from said hopper, means for rotating said augers in said heads, air ducts connecting said vacuum head with each of said filling heads, a rotatable valve for controlling the vacuum connection between said head and said ducts, said valve being rotatable with said hopper, and means for moving a container into and out of sealing and filling engagement with each of said heads during a partial revolution of said hopper, said valve being so ported and the driving means for said augers being so timed in relation thereto as to intermittently exhaust air from and admit air to said container during the positive feeding of material by said auger.

9. A machine for continuously and automatically feeding containers with a comminuted material including a support, a material containing hopper rotatably mounted on said support, a variable speed drive for rotating said support, a vacuum chamber within said support, a series of filling heads spaced about said hopper, means for positively feeding material therefrom, air ducts leading from said vacuum chamber and from the atmosphere to each of said heads, a rotary valve rotatable with said hopper for controlling said ducts, a reciprocable container platform associated with each head for moving a container into sealing and filling engagement therewith during a partial rotation of said hopper, said valve being so ported as to cause air to be successively exhausted from and admitted to said container while in its said sealing engagement, and means for simultaneously actuating said feeding means to positively feed the material from said

hopper to said container during the said withdrawal of air from and application thereto.

10. A machine for continuously and automatically filling containers with a comminuted material, including a support, a hopper movably mounted thereon having a plurality of spaced filling heads, means for moving said hopper through a predetermined path at predetermined speed, a material feeding member associated with each filling head for positively feeding a predetermined quantity of material therethrough during the said movement of the hopper, a vacuum head, air ducts connecting said vacuum head and the atmosphere with each of said filling heads, and a valve on said vacuum head controlling said ducts operable with the rotation of said hopper to successively exhaust air from and admit air at atmospheric pressure to the container during the positive feeding of material thereto.

11. A machine for continuously and automatically feeding containers with a comminuted material, including a support, a rotatable hopper thereon having a plurality of filling heads spaced thereabout, means for rotating said hopper, a material feeding auger extending into each of said heads for feeding material therethrough from said hopper to the container at a predetermined rate of feed, an exposed driving member on each auger, and means adjustable relative to said support operable to make driving connection with each of said members throughout a predetermined travel thereof about said support.

12. A machine for continuously and automatically feeding containers with a comminuted material including a support, a rotatable hopper thereon having a plurality of filling heads spaced thereabout, means for rotating said hopper, a material feeding auger extending into each of said heads for feeding material therethrough from said hopper to the container, a driving member on each auger, and a motor having driving engagement with each of said members during a predetermined travel thereof about said support.

13. A machine for continuously and automatically feeding containers with a comminuted material including a support, a material containing hopper rotatably mounted on said support, driving mechanism for rotating said support, a vacuum chamber within said support, a series of filling heads spaced about said hopper, having sealing engagement with the respective containers, means for positively feeding material therefrom, air ducts leading from said vacuum chamber and from the atmosphere to each of said heads, a valve rotatable with said hopper for controlling said ducts, said valve being so ported as to cause air to be successively exhausted from and admitted to the respective containers while in their sealing engagement, and means for simultaneously actuating said feeding means to positively feed the material from said hopper to said container during the said withdrawal of air from an application thereto.

14. A machine for continuously and automatically feeding containers with a comminuted material, including a support, a rotatable hopper thereon having a plurality of filling heads spaced thereabout, means for rotating said hopper, a material feeding auger extending into each of said heads for feeding material therethrough from said hopper to the container at a predetermined rate of feed, a driving member on said auger and means operable to make driving connection with each of said augers throughout a

predetermined travel thereof about said support.

15. A filling machine including a support, a hopper movably mounted thereon having a plurality of spaced filling heads, means for moving said hopper through a predetermined path at a predetermined speed, a material feeding member associated with each filling head for positively feeding material therethrough during a predetermined part of the movement of the hopper, a driving member on each material feeding member, means operable to make driving connection with each feeding member throughout a predetermined portion of the travel thereof about said support, ducts for connecting the interior of said container with a source of reduced pressure and a source of increased pressure, valve means controlling said ducts, said valve means operable to connect the inside of the container alternately with said source of reduced pressure and said source of increased pressure, and means for actuating said valve means at predetermined points in the hopper travel to effect said alternate connections, thereby alternately decreasing and increasing the pressure within the container.

16. A filling machine comprising a support, a hopper movably mounted thereon having a plurality of spaced filling heads engageable in sealing relationship with a container, means for moving said hopper through a predetermined path at a predetermined speed, a conduit connecting the inside of the container with a source of reduced pressure and a source of increased pressure, valve means in said conduit, valve operating means actuated by the hopper moving means for alternately connecting the container with said sources of reduced pressure and increased pressure at predetermined points in the hopper travel.

17. A machine for continuously and automatically feeding containers with comminuted material including a support, a rotatable hopper having a plurality of filling heads spaced thereabout, means for rotating said hopper, and means for alternately exhausting and introducing gas to said container at predetermined points during a predetermined travel of said hopper, said last named means being operatively associated with said means for rotating said hopper.

18. A filling machine comprising a support, a hopper movably mounted thereon having a plurality of filling heads, means for moving said hopper through a predetermined path at a predetermined speed, material feeding members associated with said filling heads for positively feeding material therethrough from said hopper during a predetermined part of the movement of said hopper means for actuating said feeding members including a driven belt and a pair of idler wheels adjustable to direct said belt in actuating engagement with said feeding members during a predetermined movement of said hopper, means for changing the speed of movement of said hopper independent of the means for actuating said feeding members, thereby permitting alteration of the amount of material fed by altering the speed of the hopper.

19. A machine for continuously and automatically feeding containers with a comminuted material, including a support, a hopper movably mounted thereon having a plurality of spaced filling heads, means for moving said hopper through a predetermined path at a predetermined speed, a material feeding member operatively associated with each filling head for positively feeding material therethrough, variable driving

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means for engaging said material feeding member during a predetermined part of the said movement of the hopper, and means independent of the means for actuating said material feeding member to vary the speed of the hopper, thereby altering the quantity of material fed.

20. A machine for continuously and automatically filling containers with a comminuted material including a support, a hopper movably mounted thereon, a filling head on said hopper, means for moving said hopper through a predetermined path at a predetermined speed, means for varying the speed of said hopper, a material feeding member extending into said filling head for feeding material therethrough from the hopper to the container, variable driving means for engaging said material feeding member during a predetermined part of the movement of said hopper, said driving means being independent of the means for varying the speed of said hopper.

21. A filling machine for automatically and continuously feeding a container with comminuted material, comprising a support, a hopper movably mounted thereon, a filling head on said hopper, means for moving said hopper through a predetermined path at a predetermined speed, means for varying the speed of said hopper, an auger extending into said filling head for feeding material therethrough from the hopper to the container, a driving member on the auger, and variable driving means engaging the auger during a predetermined limited travel of said hopper about said support.

22. A machine for continuously and automatically feeding a container with comminuted material comprising a support, a hopper movably mounted thereon, means for moving said hopper through a predetermined path at a predetermined speed, a plurality of spaced feeding heads on the hopper, said heads engageable in feeding relationship with a container, said heads being provided with a passage connecting the interior of the container and the hopper, a duct in said head connecting the interior of the container with a

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conduit communicating with a source of reduced pressure and a source of increased pressure, valve means in said conduit, said valve means operable to connect the inside of the container alternately with said source of reduced pressure and said source of increased pressure, and means controllable by the hopper movement for actuating said valve means at predetermined points in the hopper travel to effect said alternating connections, thereby alternately decreasing and increasing the pressure within the container.

23. A machine for continuously and automatically feeding containers with a comminuted material, comprising a support, a hopper movably mounted thereon having a plurality of spaced feeding heads, means for moving said hopper through a predetermined path at a predetermined speed, a vacuum head, ducts connecting said vacuum head and the atmosphere with each of said feeding heads, valve means controlling said ducts, means operable with the movement of said hopper to control said valve means to successively exhaust air from and admit air to the container during a predetermined travel of said hopper.

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