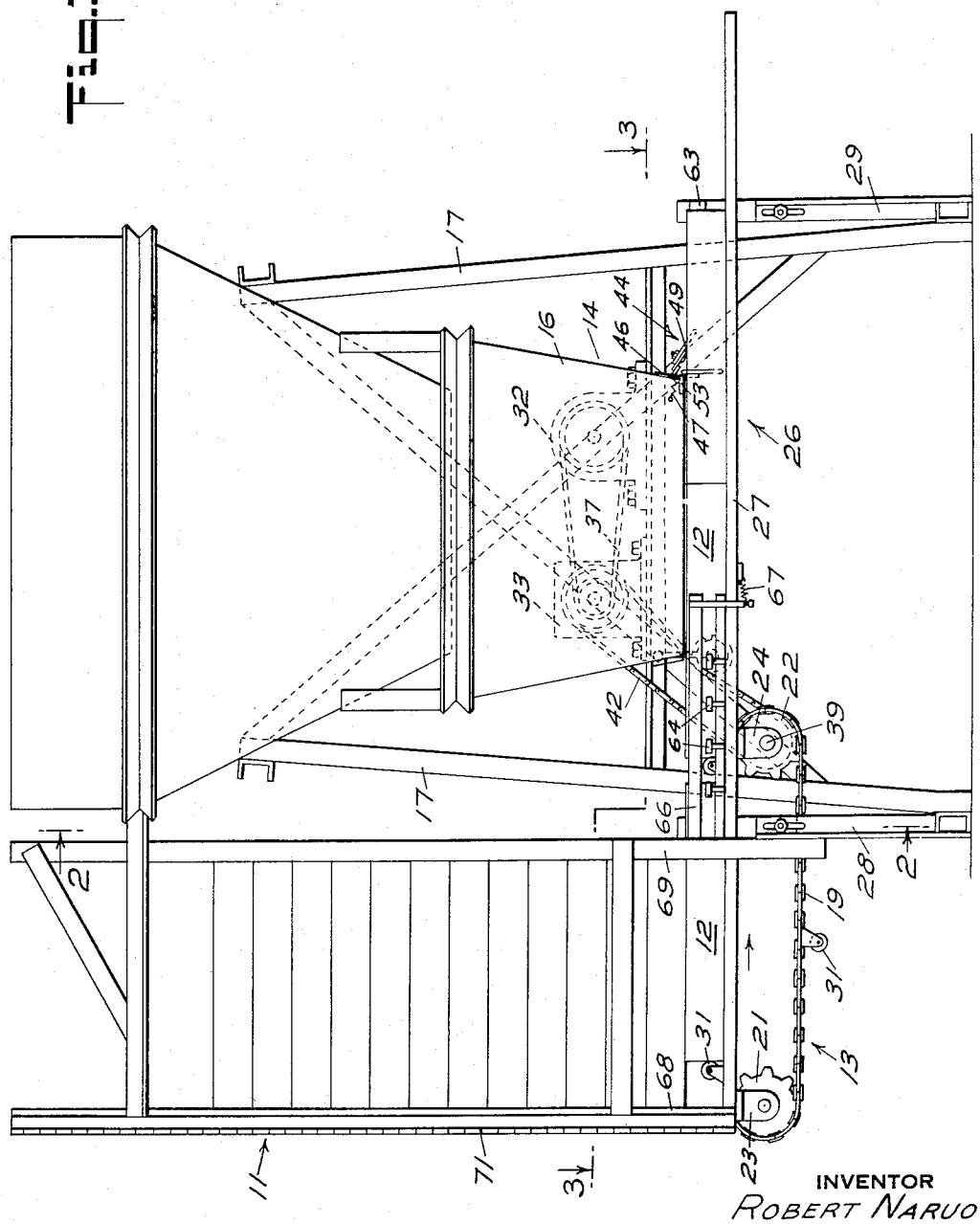
June 5, 1956 R. NARUO 2,749,006

METHOD AND APPARATUS FOR FILLING RECEPTACLES WITH PULVERULENT MATERIAL OR THE LIKE

Filed March 16, 1954 3 Sheets-Sheet 1

Fig. 1.



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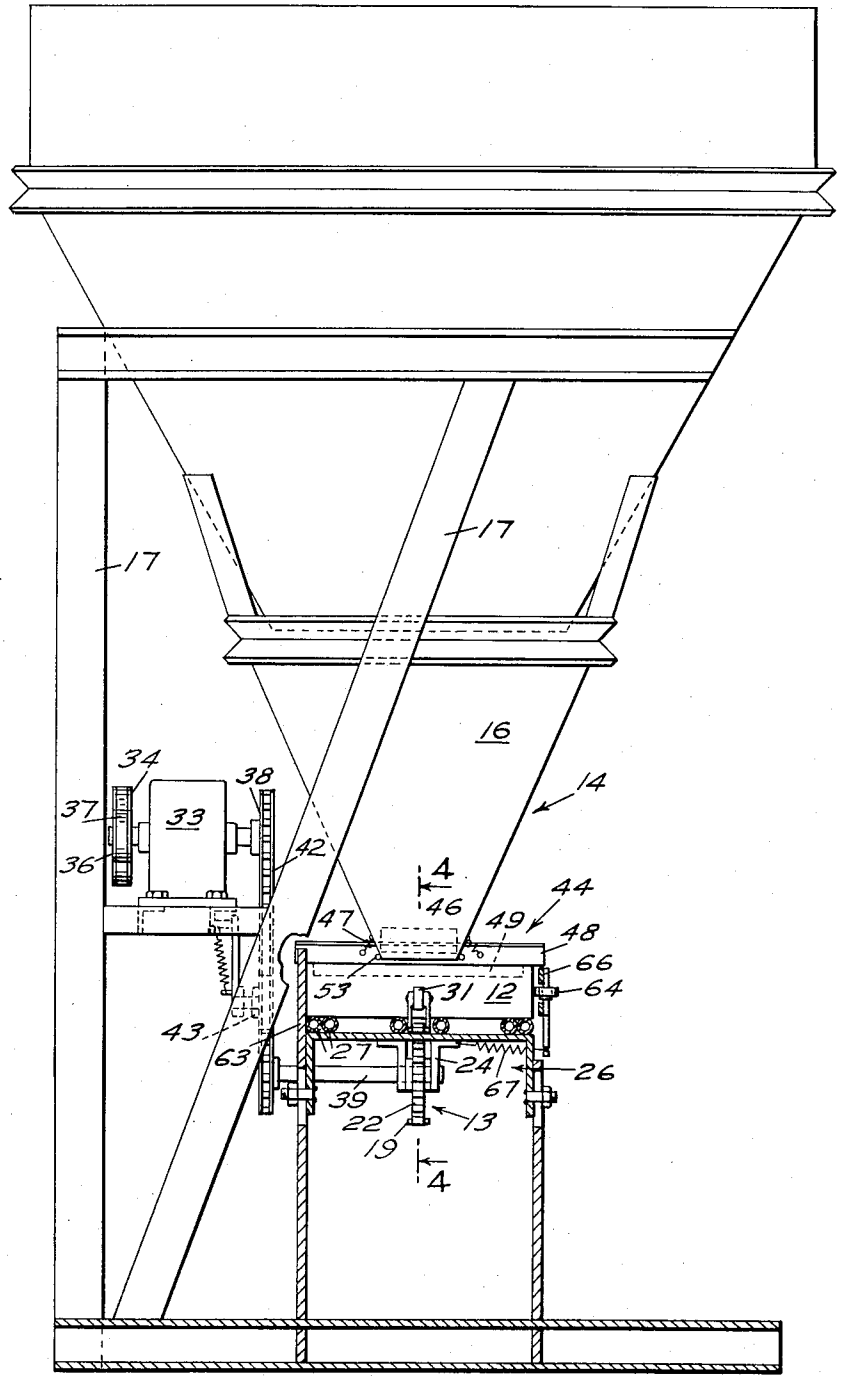


Fig. 2.

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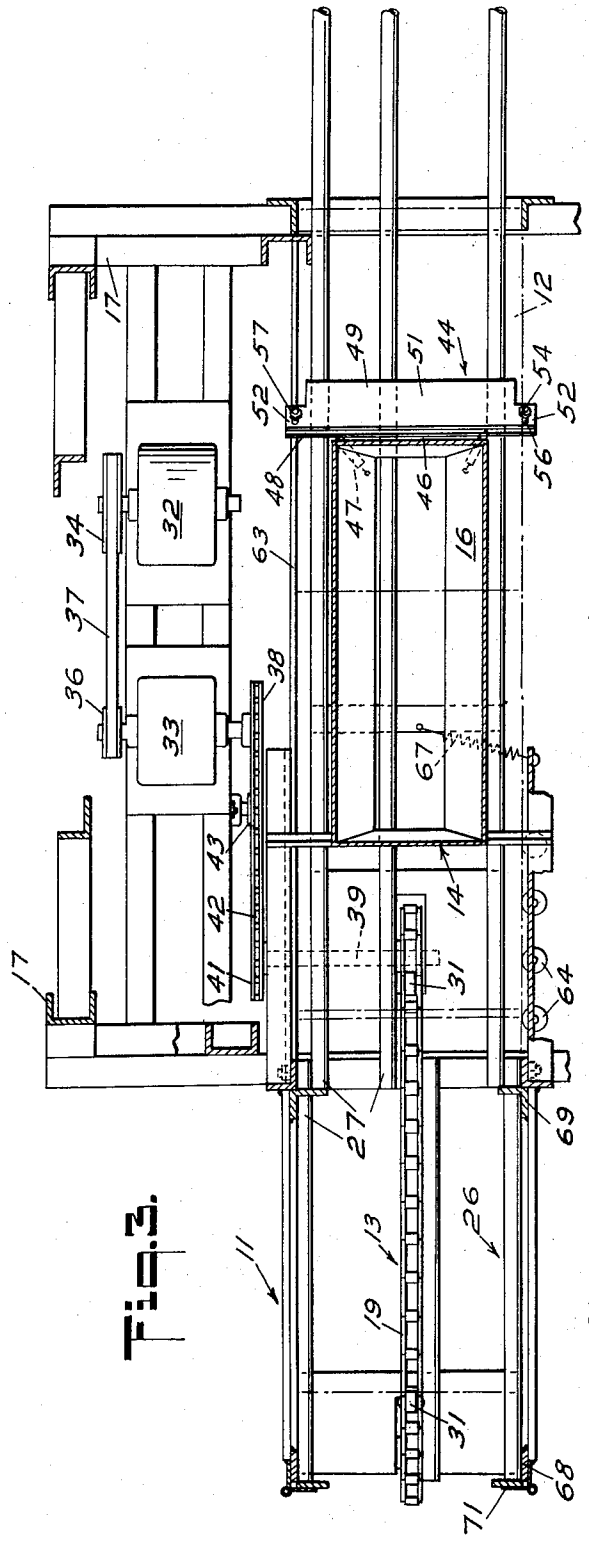


Fig. 3.

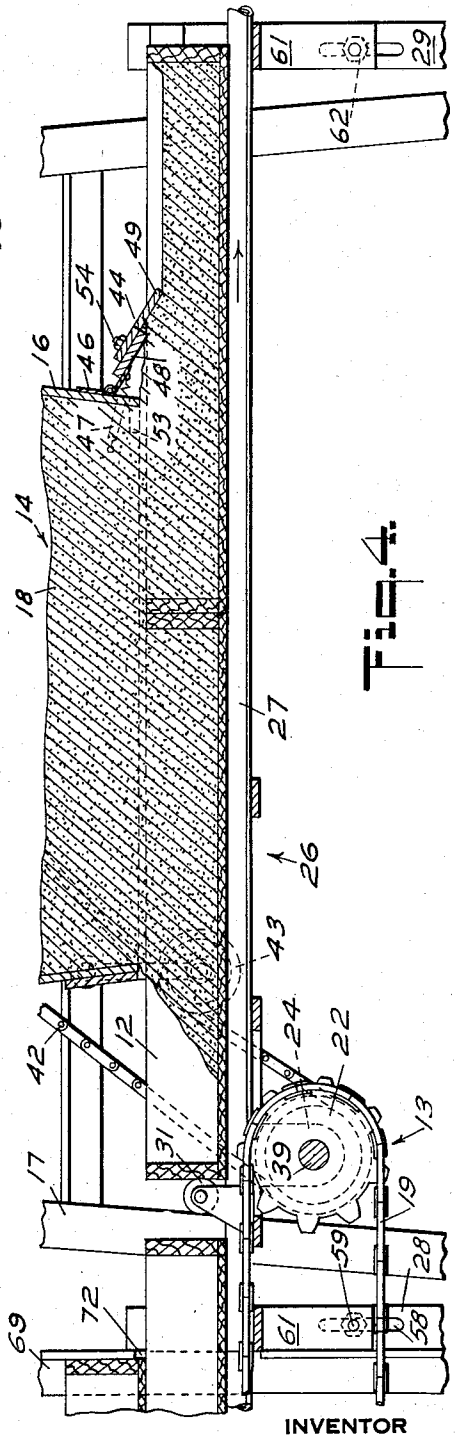


Fig. 4.

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2,749,006

METHOD AND APPARATUS FOR FILLING RECEPTACLES WITH PULVERULENT MATERIAL OR THE LIKE

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Application March 16, 1954, Serial No. 416,575

8 Claims. (Cl. 226—95)

This invention relates to the filling of receptacles, such as boxes or flats with pulverulent material, and is more particularly directed towards a method and apparatus for conveying the lowermost flat from a vertical stack thereof to a receiving station where each succeeding flat is filled with a preselected uniform amount of soil.

Heretofore, the filling of boxes or flats for the growing of seedlings has been a laborious hand process wherein the soil was first shoveled into the flats, then smoothed and leveled to the desired height in the flat. As will be apparent this has been a slow and costly process, particularly where large quantities of soil-filled flats are required at one time.

It is therefore an object of the present invention to provide a method and apparatus for automatically filling flats with soil.

Another object of my invention is to provide a method and apparatus of the character described in which the flats may be uniformly filled.

A further object of this invention is to provide apparatus of the type described in which the top surface of the soil deposited in the flats will be scraped smooth and level.

A still further object of this invention is to provide apparatus of the type referred to which is adjustable to allow a greater or smaller amount of soil to fill the flats as desired.

Another object of this invention is to provide apparatus of the type described arranged to receive a plurality of flats in vertically disposed stacked relation and in which the lowermost flat of the stack is moved along a substantially horizontal plane to a filling means.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings:

Figure 1 is a side elevational view of a flat filling apparatus embodying the present invention.

Figure 2 is a front elevational view of the apparatus, the plane of the view being substantially indicated by the line 2—2 of Figure 1.

Figure 3 is an enlarged horizontal sectional view taken substantially in the plane indicated by line 3—3 of Figure 1.

Figure 4 is an enlarged vertical section taken substantially in the plane indicated by line 4—4 of Figure 2.

In broad terms, the apparatus of the present invention includes a stack supply means 11, which holds receptacles such as boxes or flats 12, from which the lowermost receptacle is moved by means of a conveyor 13 along a horizontal plane to underlie a filling means 14 where

the flat 12 receives soil or other pulverulent material, the top surface thereof is scraped level, and the flat moves on to be removed from the apparatus in any desired manner such as by a conveyor or by hand.

Referring first to the filling means 14, it will be seen that such means comprises a vertically disposed hopper 16 supported by necessary framework 17, positioned directly over the path along which the flats 12 are moved by the conveyor 13. The hopper 16 has a lower discharge opening and when a flat 12 has been moved from the stack supply means 11 to the filling means 14, pulverulent filling material such as soil 18 is introduced into the top of the hopper by any desired means where it gravitally falls through the hopper discharge opening and into the underlying flat. It will be apparent that the lower discharge opening of the hopper should be of substantially the same dimension or smaller than the open top of the receptacles, and as here shown the length of the lower discharge opening is substantially the same as the inside length of the flats 12, while the width of the lower discharge opening is considerably less than the width of the flats.

Means are provided to move the flats 12 from the stack supply means 11 to the filling means 14 by the conveyor 13, the latter including a conveyor chain 19 carried on two horizontally spaced sprockets 21 and 22. Bearings 23 and 24, carrying the sprockets 21 and 22, are mounted on the lower portion at the feed end of a platform 26 which extends the full length of the apparatus. The flats 12 are slidably supported on this platform from the time they are placed in the stack supply means 11 until they are removed at the discharge end. The platform consists of horizontally disposed rods 27 supported at the feed and discharge ends by legs 28 and 29. The bearing 23, in which is journaled the sprocket 21 is mounted under the forwardmost portion of the feed end of the platform 26 over which is positioned the stack supply means 11. The sprocket 22 is journaled in the bearing 24 which is mounted below the platform 26 substantially between the stack supply means 11 and the filling means 14. The conveyor chain 19 engaged and driven by the sprockets 21 and 22 will thus be seen to lie medially of the platform rods 27, and is provided at regularly spaced intervals with projections in the form of rollers 31 which are arranged to engage the rear end of a flat to move the latter.

As seen in Figure 1, when a roller 31 advances over the sprocket 21 and engages the rear end of the lowermost flat 12 in the stack supply means 11, the flat is moved along the platform 26 to a position subjacent the filling means 14 before the roller 31, moving around the sprocket 22, is disengaged from and stops exerting forward pressure on the rear end of the flat. By this time another roller 31 has engaged the sequential flat 12 from the stack and is likewise moving such flat along the platform. It will be seen that when the roller 31 is disengaged from the first flat there is a short interval of time wherein the flat remains stationary under the filling means 14, until the forward end of the next flat abuts the rear end of the first flat and the roller 31 engaging the rear end of the second flat thereupon moves the two flats forward together, thus causing the second flat to be positioned under the hopper for receiving the soil, and moving the first flat towards the discharge end of the platform.

Power is supplied to the conveyor 13, through a motor 32, coupled to a gear box 33 by means of sheaves 34 and 36 and a belt 37. A shaft from the gear box carries a sprocket wheel 38, and an extension of a shaft 39 on which is mounted the sprocket 22 carries another sprocket wheel 41. A chain 42 passing around the two

sprocket wheels 38 and 41 thereby transfers power to the conveyor 13 for driving the latter. A spring-urged idler sprocket 43 may be provided to maintain necessary tension on the chain 42.

After the soil 18 has been deposited in the flat 12 from the filling means 14, the top surface thereof is scraped smooth to the desired height by means of a gate 44 hinged at 46 to the lower portion of the front end of the hopper 16. The gate is normally held in a vertical position extending transversely across the path of travel of the flats 12 by means of two springs 47, one end of each being secured to the gate 44 and the other ends thereof attached to opposite sides of the hopper 16. As best seen in Figures 3 and 4, the gate 44 includes a plate 48 welded or otherwise secured to the hinge 46 and on which is mounted an adjustable scraper 49. The main portion 51 of the scraper 49 has a width somewhat less than the inside width of the flats, and there are provided on either side of the scraper at the top portion thereof, extensions or ears 52 extending slightly beyond the outside width of the flats. As the flat is moved toward the discharge end from the filling means 14, the leading end of said flat engages the downwardly depending gate portion 51, forcing it to rotate upwardly about the hinge 46 until the leading end of the flat has passed under and beyond the lower edge of the scraper 49. Thereupon the springs 47 urge the gate downwardly until the ears 52 bear upon the sides of the flat thereby limiting further downward movement of the gate, and the scraper 49 extends downwardly within the flat to level the soil to the desired height and to retain excess dirt within the filling means 14.

In order to limit the backward movement of the spring-urged gate 44 beyond its normal vertical position, dogs 53 are welded at the lower portion on opposite sides of the hopper 16. When the gate returns to its vertical position the dogs 53 bear against the plate 48 holding the gate in that position against the tension of the springs 47.

The flats may be filled with any desired amount of soil by adjusting the position of the scraper 49 of the gate 44. Plate 48 is provided at either end with threaded studs 54 which extend through slots 56 in the ears 52 of the scraper 49 to receive bolts 57. By loosening the bolts 57 the scraper 49 may be moved up or down along the slots 56 in order to retain more or less soil in the flat as desired, and the bolts thereupon tightened.

Further control of the amount of soil deposited in each flat is obtained by vertical adjustment of the platform 26 so as to position the latter closer or further from the discharge opening of the hopper. To provide such adjustment, slots 58 are provided in the legs 28 and 29 to adjustably receive threaded studs 59 mounted on downwardly depending extensions 61 of the platform 26. Bolts 62 threaded onto the studs 59 may be loosened to lower or raise the platform and thereupon tightened to hold the platform in the desired position in relation to the lower discharge opening of the hopper. As the flats are supported on the platform, vertical adjustment of the latter will provide a corresponding vertical adjustment of the flat position. It will also be understood that as conveyor 13 is carried on the platform, the conveyor will likewise be raised and lowered with the adjustment of the platform.

Means are provided to keep the flats in longitudinal alignment along the platform after leaving the stack supply means 11, and as here indicated such means include a stationary guide bar 63 mounted at one side of the platform 26 on vertical extensions of platform legs 28 and 29. Rollers 64, carried on a bar 66, one end of which is secured to the frame work 17 while the other end is resiliently urged toward the center of the platform 26 by a spring 67, bear against the side of the flat opposite the stationary guide bar 63 thereby retaining the flats in alignment on the platform. Due to the spring pressure exerted upon the rollers any reasonable variation in the width of the flats will not have a detrimental effect on the proper guiding of same.

Any means may be used to supply flats to the conveyor 13, however, as here illustrated I have provided a stack supply means 11, placed over the front feed portion of the platform 26, whereby flats may be stacked vertically, one on top of the other and maintained therein by vertical retaining members 68 and 69 located at the rear and front corners of the flats. Horizontal framework connects the retaining members and supports them from the hopper 16 and the legs 28 of the platform. Retaining members 68 are provided with hinged portions 71 in order to allow adequate passageway to place the flats in the stack supply means 11. The retaining members 69 are provided with cut-out portions 72 just above the platform, as best seen in Figure 4, to permit the lowermost flat to be moved from the stack supply means 11 along the platform 26 when engaged by the conveyor rollers 31.

Starting now with a complete cycle of operation, the stack supply means 11 is first filled with empty flats. The hinged portions 71 of vertical retaining members 68 are opened outwardly in order that the flats may be placed one on top of the other within the stack supply means, that is, within the rectangular area defined by the four vertical retaining members 68 and 69. When the required number of flats has been placed in the stack supply means the hinged portions 71 are swung inwardly parallel with the rear ends of the flats.

The conveyor 13 is actuated through the motor 32, whereupon a roller 31 of the conveyor chain 19 engages the rear end of the lowermost flat 12 in the stack supply means 11, moving said flat along the platform 26 to a point where it underlies the lower discharge opening of the hopper 16. Soil or similar pulverulent material 18 is then introduced into the top of the hopper in any desired manner, such as by a conveyor, where it gravitally falls through the hopper into the subjacent flat. The roller 31 of the conveyor chain 19 has moved the flat 12 from the stack supply means 11 to the filling means 14; however, at that point the roller 31 moves down around sprocket 22 so the flat is no longer moved by that roller, and for a short interval of time it remains stationary under the hopper while the filling process takes place. In the meantime, however, another roller 31 has engaged the second flat which is now the lowermost one in the stack supply means 11, moving it along the platform, and before the roller 31 has disengaged from that flat its front end engages the rear end of the first flat moving it, too, along the platform where its front end forces the gate 44 to rotate upwardly about its hinge 46 until the front end of the flat has passed beyond the lower edge of the gate, whereupon the scraper 49 snaps down into the area of the flat, scraping the surface of the dirt level and retaining excess dirt within the hopper 16.

It will be apparent that the first and second flats advance together until the second flat has reached the position under the filling means 14 where the roller 31 disengages from the rear end of the second flat. Thereupon both flats remain stationary for a short time until the front end of the next succeeding flat moved by a roller 31 abuts the rear end of the second flat, moving all three flats forward toward the discharge end of the platform 26 where each succeeding soil-filled flat may be removed from the apparatus in any desired manner.

What is claimed is:

1. Apparatus for filling open top receptacles with pulverulent material comprising: a substantially vertically disposed hopper having a lower discharge opening therein, horizontally disposed conveyor means mounted subjacent said hopper and aligned with said opening arranged to support receptacles thereon for movement past said opening, a scraper blade positioned adjacent said opening and over said conveyor means and having its outermost edge lying below the plane of said opening, means for pivotally

supporting said blade about an axis traversing said conveyor means for rocking movement thereabout, and means resiliently urging said edge portion downwardly and toward said conveyor.

2. Apparatus of the character described comprising: a vertically disposed hopper in which a quantity of material may be placed, said hopper having a lower discharge opening through which said material may gravitally fall, horizontally disposed conveyor means positioned subjacent said opening and arranged to support receptacles with the open top thereof positioned upwardly, said means including adjusting means to selectively vary the spacing between said opening and said conveyor means whereby receptacles may be selectively raised and lowered relative to said opening, and scraper means adapted to level the top surface of material placed in said receptacle.

3. Apparatus for filling open top receptacles with pulverulent material comprising: a hopper having a lower discharge opening in which a quantity of material may be placed to gravitally descend through said opening, substantially horizontally disposed conveyor means including a driven member positioned subjacent said opening and arranged to support receptacles with the open tops thereof positioned upwardly, means for moving said driven member towards said opening, scraper means positioned adjacent said opening and transversely above said conveyor means and having its outermost edge lying below the plane of said opening, means resiliently urging said edge portion downwardly and toward said conveyor, vertically disposed means horizontally spaced from said hopper overlying said conveyor means and arranged to support a stack of receptacles, and means on said driven member for engaging the lowermost receptacle in said stack and moving the latter towards said opening.

4. Apparatus of the character described comprising: a vertically disposed hopper having a lower discharge opening, horizontal conveyor means disposed subjacent said opening and arranged to support open top receptacles thereon, said means including a conveyor having upwardly extending projections thereon for engaging a receptacle and moving the latter toward said opening, and means independent of the movement of said conveyor means for adjustably controlling the amount of soil placed in such receptacle, said last named means including a blade extending transversely of said conveyor means having first portions adapted to engage opposed edge portions of a receptacle and a second portion therebetween adapted to enter such receptacle.

5. A method of filling open top receptacles with a pulverulent material which comprises the placing of a quantity of such material in a hopper having a lower discharge opening, moving a receptacle along a substantially horizontal path to a position subjacent said opening, halting such movement while material flows into said receptacle from said opening, moving another receptacle against the first mentioned receptacle causing the latter to be moved from the opening and positioning the second receptacle thereunder, and leveling the material in said first receptacle during said latter movement thereof.

6. Apparatus for filling open top receptacles with pulverulent material comprising: a substantially vertically disposed hopper having a lower discharge opening therein, horizontally disposed conveyor means mounted subjacent said hopper and aligned with said opening arranged to support receptacles thereon for movement past said opening, material leveling means including a scraper member positioned over said conveyor means adjacent the trailing edge of said opening, and means for selectively positioning the lowermost edge of said scraper member at selected positions below the general plane of said opening.

7. Apparatus as set forth in claim 6 including means for pivotally mounting said scraper member, means for limiting rotation thereof in a direction towards said opening, and resilient means normally urging said member towards said opening.

8. Apparatus for filling open top receptacles with pulverulent material comprising: a substantially vertically disposed hopper having a lower discharge opening therein, horizontally disposed conveyor means mounted subjacent said hopper and aligned with said opening arranged to support receptacles thereon for movement past said opening, scraper means positioned over said conveyor means adjacent the end portion of said discharge opening, said means including a first element traversing said conveyor means and mounted for oscillation about an axis traversing said conveyor means, and a second plate-like element adjustably secured to said first element and having notched portions adjacent the edges thereof whereby said second element may be positioned within a receptacle with said portions lying on the edges thereof.

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