Feb. 12, 1946. H. G. ALLEN 2,394,737

FILLING MACHINE

Filed March 22, 1941 3 Sheets-Sheet 1

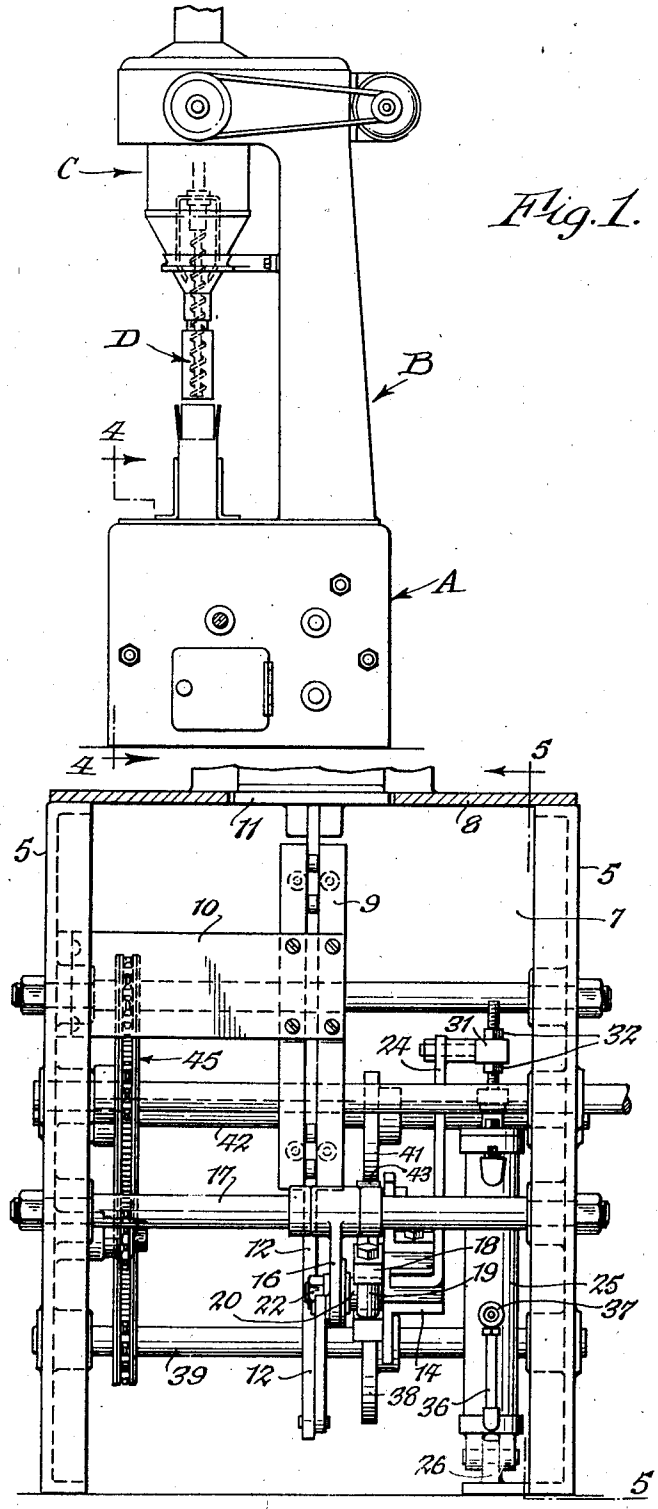


Fig. 1.

Fig. 2.

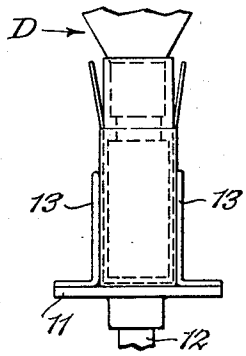


Fig. 3.

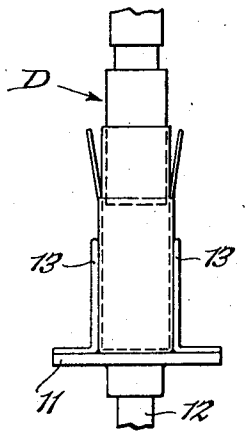


Fig. 4.

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FILLING MACHINE

Filed March 22, 1941 3 Sheets-Sheet 2

Fig. 5.

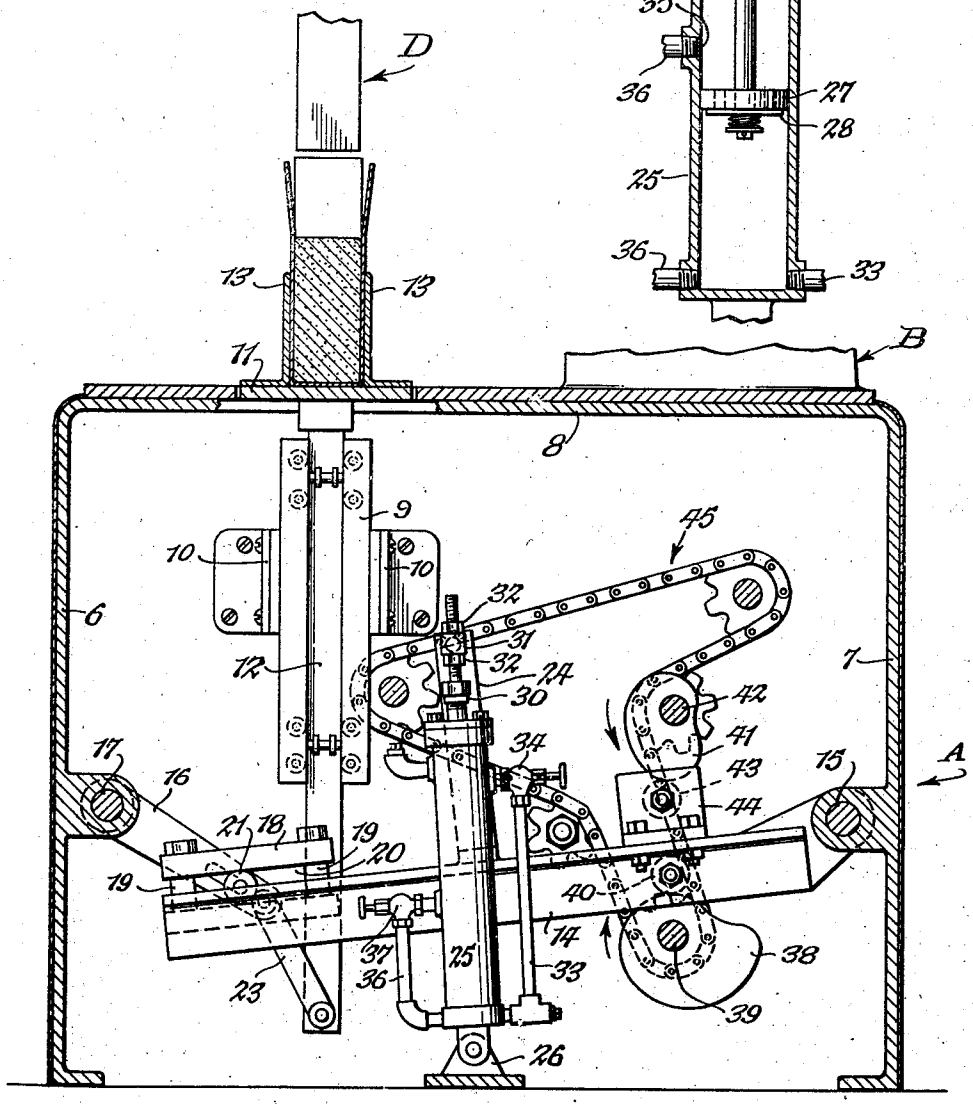


Fig. 6.

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Feb. 12, 1946. H. G. ALLEN 2,394,737

FILLING MACHINE

Filed March 22, 1941 3 Sheets-Sheet 3

Fig. 7.

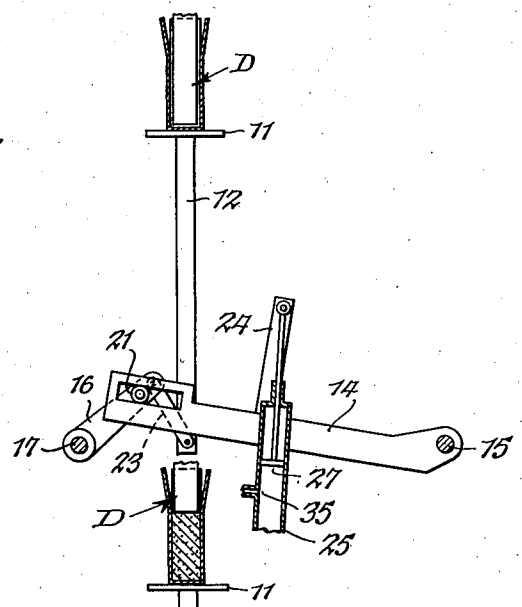


Fig. 8.

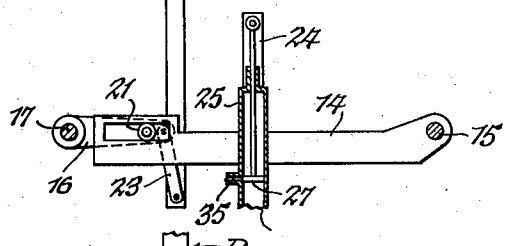
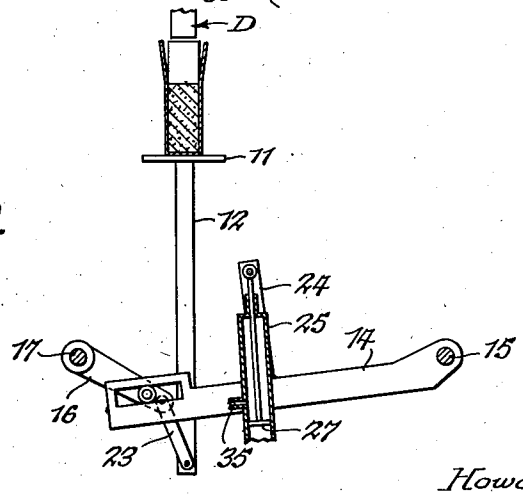


Fig. 9.



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2,394,737

FILLING MACHINE

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Application March 22, 1941, Serial No. 384,616

4 Claims. (Cl. 226—24)

This invention relates to new and useful improvements in container filling machines of the type adapted to handle powdery non-free-flowing materials and particularly seeks to provide novel means for effecting the desired resistance to the downward movement of a container being pressure packed.

Filling machines of the general type to which this invention relates may comprise one or more filling units. When more than a single unit is employed to fill a container, it is common practice to fill the container in two operations, the first of which injects the bulk load into the container, and the second of which completes the filling by the addition of the dribble feed while the container is supported by a weighing device. This invention is particularly adaptable for use in connection with the bulk loading operation. In some instances, the bulk load material must be compacted to a certain distance below the container top in order to provide ample space to receive the dribble charge. In instances of this nature, the container is carried by a vertically movable member adapted to freely move the container upward, but offering resistance to the return downward movement. Thus, the container is pressure packed by filling from the bottom up, and the degree of packing is determined by combined effect of the resisting force of the container supporting member during its downward movement and the applied force produced by the feeding auger of the filling machine.

Heretofore, several forms of devices have been employed which imposed a more or less uniform resistance to containers during the downward movement of the same while the bulk loading operations were being performed. These prior devices have included balance beams which supported a container on one end and a resistance imposing weight on the other end, and counterbalanced supports having suspended weights adjusted to provide the desired resistance. The vast majority of these earlier devices were generally bulky in structure and difficult to manipulate or regulate accurately.

It is therefore an object of this invention to provide a novel device for imposing a desired substantially uniform resistance during downward movement of a container while bulk loading is taking place.

Another object of this invention is to provide a device of the character stated which is effective, after the bulk loading has been completed, to reduce the resistance against downward movement of the container to a degree which then permits more rapid movement of the container to its lowest limit of downward movement.

Another object of this invention is to provide a device of the character stated which permits free upward movement of a container preparatory to bulk loading thereof.

Another object of this invention is to provide a device of the character stated which is simple in design, rugged in construction, and economical to manufacture.

With these and other objects in view, the nature of which will become more apparent, the invention will be more fully understood by reference to the drawings, the accompanying detailed description, and the appended claims.

In the drawings:

Fig. 1 is a side elevation of one form of filling machine in connection with which this invention may be employed;

Fig. 2 is an enlarged fragmentary side elevation illustrating the position of a container and its associated supporting member at the start of bulk loading;

Fig. 3 is a view similar to Fig. 2 and shows the position of the parts at the end of bulk loading but before the container supporting member has reached its downward limit of travel;

Fig. 4 is a longitudinal vertical section taken on line 4—4 of Fig. 1;

Fig. 5 is a transverse vertical section taken on line 5—5 of Fig. 4;

Fig. 6 is a detail vertical section taken through the hydraulic cylinder;

Fig. 7 is a somewhat conventionalized view illustrating the positions of the several parts comprising the linkage connections at the beginning of bulk loading;

Fig. 8 is a view similar to Fig. 7 but showing the positions of the parts upon completion of bulk loading; and

Fig. 9 is a view similar to Figs. 7 and 8 but showing the final positions of the parts at the completion of the downward movement of the container supporting table.

Referring to the drawings in detail, the invention as illustrated is embodied in a filling machine including a base A which houses the container support controlling mechanism, a standard B and material feeding devices C mounted on the standard and including the usual vertically disposed feed auger D.

The base A is a generally rectangular housing including side walls 5, 5, a front wall 6, rear wall 7 and a top 8. One side wall 5 supports the vertically disposed slide way 9 through the medium

of brackets 10. The slide way 9 is adapted to support a vertically movable container-supporting table element 11 having a depending slide bar or plunger 12 engaged with the slide way 9. The table element 11 is provided with spaced container-confining plates 13, 13 between which a container is adapted to be placed for filling, and which are adapted to prevent the walls of the container from bulging outwardly as a result of the filling operation. Normally, the table element 11 is disposed in substantially coplanar relation with the top 8 of the base, and when in that position is adapted to receive an empty container from a supply of containers. After a container has been properly positioned upon the table element 11 the table element is raised under the filling devices C, and the auger D and its cooperating nozzle elements are thereby positioned within the container in the manner indicated in Fig. 2 of the drawings. The filling mechanism is then placed into operation, and as the material is injected into the container the force resulting from the filling will tend to move the table element 11 and the container associated therewith downwardly to thereby effect the filling of the container from the bottom up. In other words, the container will be pressure packed. Means must be provided to provide a uniform resistance to the downward movement of the table element 11 during the filling operation in order that the pressure packing of the container may be properly effected.

The slide bar 12 and its associated table element 11 are adapted to be reciprocated vertically through mechanisms (see Figs. 5–9) which include an oscillatable bar 14 having one end carried by a shaft 15 journalled between the side walls 5 and located adjacent the end wall 7. A pitman 16 has one end secured to a shaft 17 journalled between the side walls 5 and located adjacent the end wall 6. The free end of the bar 14 is provided with a cage structure comprising a strap 18 maintained in spaced parallel relation with respect to the top plane of the bar by spacing elements 19, 19 to define thereby a guideway 20. A roller follower 21 is engaged in the guideway 20 and is adjustably secured adjacent the free end of the pitman 16 through the medium of a clamping nut 22. A link 23 has one end pivotally connected to the free end of the pitman 16 and its other end pivotally connected to the lower end of the plunger 12 to complete the operative connections between the plunger and the bar 14. Thus, it will be readily apparent that oscillation of the bar 14 will produce a corresponding vertical reciprocatory movement to the plunger 12 and its associated table element.

The bar 14 is provided near its mid-point with an upstanding post 24 which is pivotally connected at its upper end to devices which effectively and substantially uniformly resist the return downward oscillation of the bar and consequently by the desired uniform resistance to downward travel of the table element 11 during bulk loading. These devices include an upstanding capped cylinder 25 pivotally connected at its lower end to a lug 26 carried by the base A. The cylinder 25 is filled with a fluid such as oil and is provided with a short apertured piston 27 having a spring biased disc valve 28 on its lower side normally closing the piston apertures and which permits free passage of the piston upwardly through the fluid, but which retards downward passage of the piston as the piston must then displace the fluid. A piston rod 29 has its lower end secured to the piston 27 and its upper end projecting beyond the upper cap closing the associated end of the cylinder 25. Suitable packing glands 30 are carried by the cylinder cap and prevent leakage of fluid around the piston rod. The free end of the piston rod 29 is provided with a block 31 which is pivotally connected to the upper end of the post 24. The block 31 may be adjusted axially with respect to the piston rod through the medium of adjusting nuts 32.

Open communication between the upper and lower ends of the cylinder 25 is provided through the medium of a pipe 33 and valve 34 which connects the upper and lower ends of the cylinder. Thus, displacement of fluid from the lower end of the cylinder to the upper end thereof during downward movement of the piston 27 is permitted. It is obvious that, since the valve disc 28 is located on lower face of the piston, downward movement of the piston will be resisted by pressure of the fluid in the bottom of the cylinder and the degree of this resistance may be regulated by proper adjustment of the valve 34. Since there is no necessity to prolong the resistance to downward travel of the table element 11 beyond the time during which bulk loading of the supported container is taking place, means are provided whereby, upon completion of the bulk loading, the table element will partake of a considerably more rapid downward movement to its lower limit of movement. In this connection, the cylinder 25 is provided with a port 35 located in such a position that it will be opened into communication with the upper portion of the cylinder by downward passage of the piston. The port 35 is connected to the bottom of the cylinder 25 through the medium of a pipe 36 and valve 37. Thus, as the piston is moved downwardly to provide the requisite resistance to movement of the table element 11, it will pass below the port 35 and, as soon as the port is thus brought into open communication with the upper portion of the cylinder, it will be readily apparent that the fluid, which is displaced by passage of the piston, will enter the upper portion of the cylinder through the pipe 36 and valve 37 as well as through the pipe 33 and the valve 34. Thus, the fluid within the bottom portion of the cylinder is permitted to become displaced much more rapidly than it was displaced through the pipe 33 and its associated valve 34, and it is obvious that this greater flow of fluid from the lower portion of the cylinder to the upper portion of the cylinder will result in a more rapid downward movement of the piston and will consequently effect the desired quick drop of the table element 11 during the latter portion of its downward travel.

The bar 14 and its associated linkage connections are adapted to be raised to the uppermost position preparatory to filling of a container through the medium of cam and follower connections which include a high lift cam 38 rigidly secured to a shaft 39 journalled between the side walls 5 and which engages a roller cam follower 40 rotatably carried by the bar 14. Thus, rotation of the shaft 39 will effect the upward oscillation of the bar 14 and, consequently, will effect the raising of the table element 11 to its uppermost position. Continued rotation of the shaft 39 will effect movement of the cam 38 relative to the cam follower 40 beyond the high lift point and will thus permit downward movement of the table element and its associated linkage connec-

tions under the filling pressure of the feed auger D of the filling head. Since it is necessary that the cycles of operation of a filling machine of this nature be completed at uniform intervals of time in order that the over-all productive speed may be satisfactorily maintained, it is desirable to provide means to assure the return of the table element 11 to its lowermost position prior to the time at which the next succeeding cycle of operations begins. In this connection, a cam 41 is rigidly secured to a shaft 42 journalled between the side walls 5 and is adapted to operatively engage a cam follower 43 rotatably mounted on a bracket 44 secured to the upper face of the bar 14. The cam 41 is so designed that it will not tend to engage the follower 43 until the bar 14 has almost reached its lower limit of oscillation. Thus, engagement of the cam 41 with the follower 43, in the event that the bar 14 has not quite returned to its lowermost position, serves merely as a device which assures the return of all parts to the initial position at the end of each cycle of operations. It should be noted that the cam follower connections 41 and 43 serve no function relative to the resistance effect of the mechanisms herein described during bulk loading and are so timed that they cannot be effective to positively impart any downward movement of the bar 14 until the quick drop portion of movement thereof has commenced. The cam shafts 39 and 42 may be driven through the medium of sprocket chain and gear connections generally indicated at 45 and which may be operatively connected to the main driving elements of the filling machine.

The time at which the quick drop portion of travel of the mechanism begins may be varied by varying the position of the piston 27 within the cylinder through the medium of the adjusting nuts 32 of the piston rod 29. Variations in the over-all distance of vertical travel of the table element 11 and its associated plunger 12 may be effected by adjusting the roller 21 within the slot of its associated pitman 16.

Thus, it will be seen that the invention herein disclosed provides a novel device for imposing a substantially uniform resistance to the downward movement of a container while pressure packed bulk loading is taking place; which is effective after the bulk loading has been completed to reduce the resistance against downward movement of the container to a degree which permits a relatively quick drop movement of the container to its lowest limit of travel; which permits free upward movement of the container preparatory to bulk loading thereof; and which is simple in design, rugged in construction and economical to manufacture.

It is of course to be understood that certain details of arrangement and proportions of parts may be variously modified without exceeding the scope of the appended claims.

I claim:

1. In a container filling machine, a base, a filling nozzle carried by said base, a vertically movable container supporting table carried by said base and disposed in vertical alignment with said filling nozzle, means including an oscillatable bar and link connections for raising said table to place a container carried thereon in nozzle encompassing position preparatory to bulk loading of said container, means associated with said nozzle for forcibly injecting material into said container, the force thereby produced being effective to initiate downward movement of said table and the container carried thereby, a fluid containing cylinder having one end connected to said base, a piston slidably mounted within said cylinder, a piston rod having its free end pivotally connected to said oscillatable bar, said piston being provided with a valve effective to permit free passage of the piston upwardly through the fluid in said cylinder and to resist downward movement of said piston through the fluid, and adjustable means communicating with each end zone of said cylinder for permitting displacement of said fluid during downward movement of said piston and being effective to control through said piston and the linkages associated therewith the imposition of a substantially uniform resistance to downward movement of said table whereby the bulk load material injected into said container will be packed substantially uniformly upwardly from the bottom throughout its entire depth.

2. In a container filling machine, a base; a filling nozzle supported above said base; a vertically movable container supporting table carried by said base and disposed in vertical alignment with said filling nozzle; means for raising said table to place a container carried thereon in nozzle encompassing position preparatory to filling said container; means associated with said nozzle for forcibly injecting material into said container, the force thereby exerted being effective to produce downward movement of said table and the container carried thereby; fluid controlled means comprising a fluid containing cylinder, a piston slidably mounted within said cylinder, said piston being provided with a valve effective to permit free passage of the piston in one direction through the fluid in said cylinder and to resist movement of said piston through the fluid in the opposite direction, and means communicating with each end zone of said cylinder for permitting displacement of said fluid at a limited rate during movement of said piston in said last-named direction; said fluid controlled means being operatively connected with said table to be effective during downward movement of said table produced by the injection of filling material into the container carried thereby to impose substantially uniform resistance to such downward movement and to permit relatively free upward movement of said table.

3. In a container filling machine, a base; a filling nozzle supported above said base; a vertically movable container supporting table carried by said base and disposed in vertical alignment with said filling nozzle; means for raising said table to place a container carried thereon in nozzle encompassing position preparatory to filling said container; means associated with said nozzle for forcibly injecting material into said container, the force thereby exerted being effective to produce downward movement of said table and the container carried thereby; fluid controlled means comprising a fluid containing cylinder, a piston slidably mounted within said cylinder, said piston being provided with a valve effective to permit free passage of the piston in one direction through the fluid in said cylinder and to resist movement of said piston through the fluid in the opposite direction, means communicating with each end zone of said cylinder for permitting displacement of said fluid at a limited rate during movement of said piston in said last-named direction, and means operative subsequently to predetermined movement of said piston in said last-named direction for permitting displacement of said fluid at a substantially

greater rate; said fluid controlled means being operatively connected with said table to permit relatively free upward movement of said table and to be effective during downward movement of said table produced by the injection of filling material into the container carried thereby to impose substantially uniform resistance to such downward movement and to permit relatively free downward movement of said table after injection of filling material into said container is complete.

4. In a container filling machine, a base; a filling nozzle supported above said base; a vertically movable container supporting table carried by said base and disposed in vertical alignment with said filling nozzle; means for raising said table to place a container carried thereon in nozzle encompassing position preparatory to filling said container; means associated with said nozzle for forcibly injecting material into said container, the force thereby exerted being effective to produce downward movement of said table and the container carried thereby; fluid controlled means comprising a fluid containing cylinder, a piston slidably mounted within said cylinder, said piston being provided with a valve effective to permit free passage of the piston in one direction through the fluid in said cylinder and to resist movement of said piston through the fluid in the opposite direction, ports opening into opposite end zones of said cylinder, means connecting said ports including an adjustably restricted passageway through which said fluid may flow to permit displacement thereof at a limited rate during movement of said piston in said last-named direction, an additional port located between the ends of said cylinder, means connecting said additional port with an end zone of said cylinder including a passageway through which said fluid may be displaced at a substantially greater rate after said piston has passed said additional port in its movement in said last-named direction; said fluid controlled means being operatively connected with said table to permit relatively free upward movement of said table and to be effective during downward movement of said table produced by the injection of filling material into said container to impose substantially uniform resistance to such downward movement whereby the material being injected into said container will be substantially uniformly packed throughout its entire depth and being effective after packing of said material is complete to permit a relatively quick drop of said table to its lowermost position.

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