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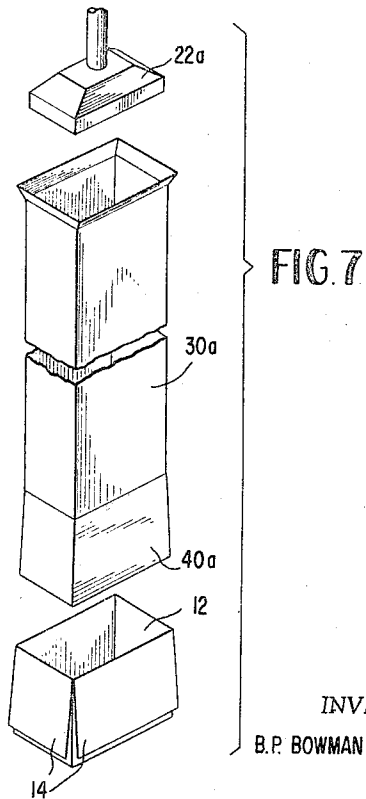
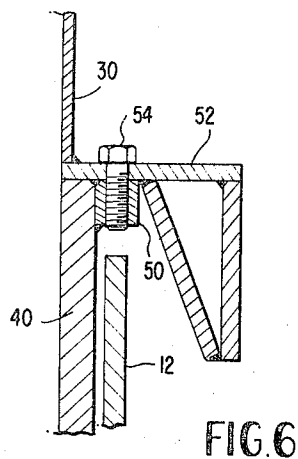
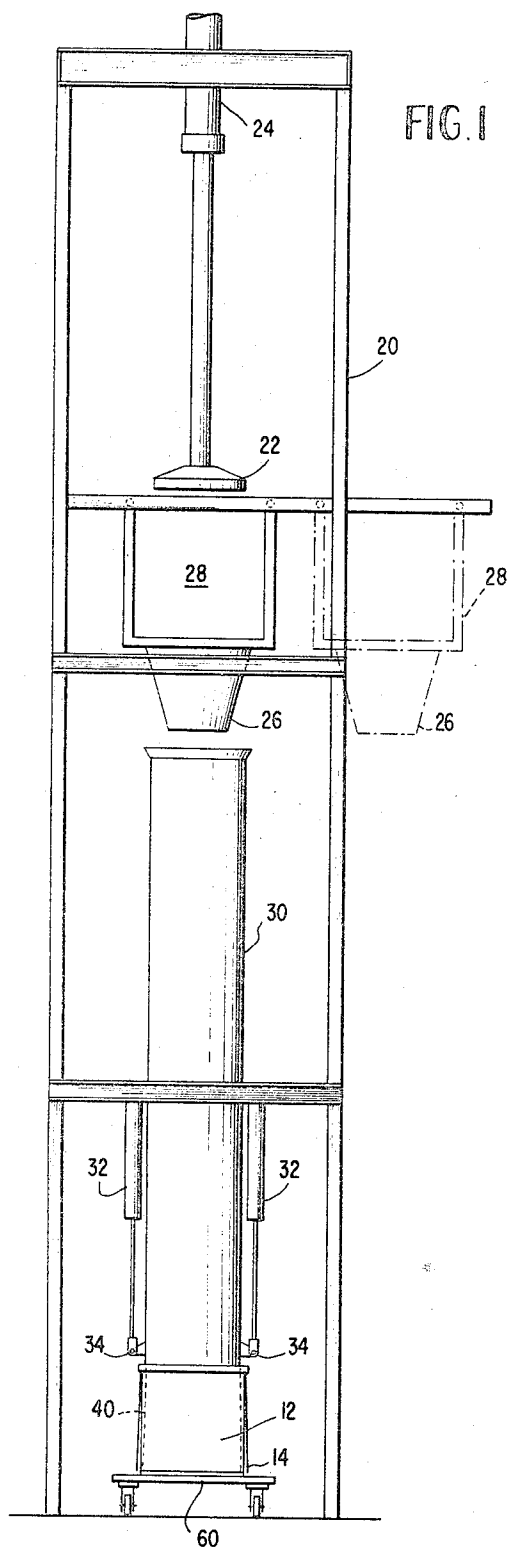
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METHOD AND APPARATUS FOR PACKING MATERIAL INTO CONTAINERS

Filed Feb. 8, 1967

2 Sheets-Sheet 1



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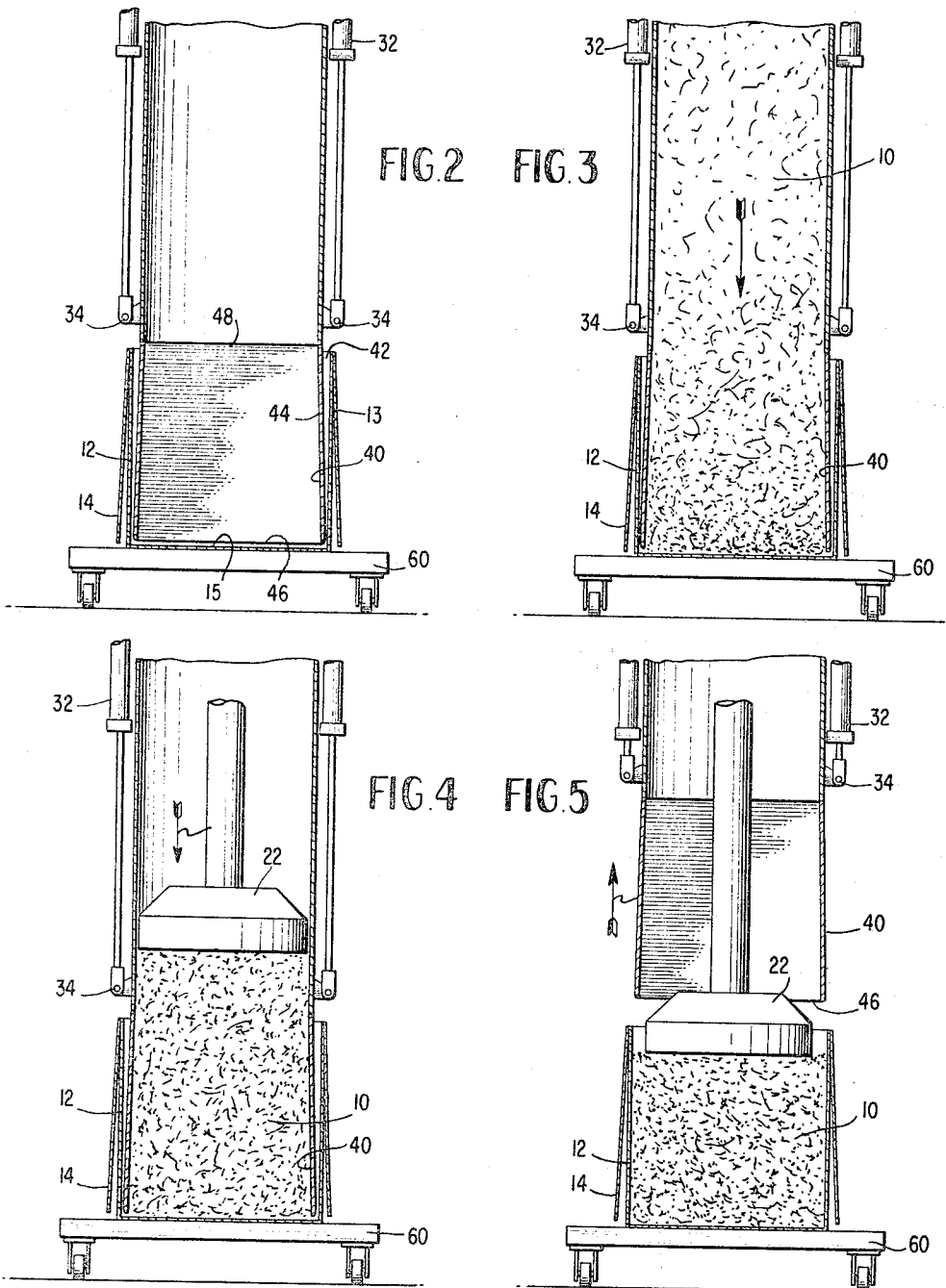
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1

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METHOD AND APPARATUS FOR PACKING MATERIAL INTO CONTAINERS

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ABSTRACT OF THE DISCLOSURE

Method and apparatus for packing loose compactible material into a container wherein a packing sleeve is first introduced into the container in close proximity to the side walls of the container, the material is then introduced into the sleeve and compacted by a plunger, and then the sleeve is removed while maintaining the plunger pressure on the material which thus fills the void left by the sleeve. Finally the plunger is removed from the container. To facilitate removal from the container after the material is packed, the side walls of the sleeve are tapered. In one embodiment, the sleeve is fixed to the lower end of a charger to be movable vertically with the charger between upper and lower positions.

This invention relates to a new method and apparatus for delivering and packing loose compactible material into containers and is of particular advantage in connection with rectangular containers of limited strength, such as made from wood or cardboard. However the present invention is not limited to such container constructions and shapes as will be apparent.

In one common method of packing loose compressible material in a container, the material is first introduced into the container in a predetermined amount and then a plunger is inserted into the container to compact the material therein. When this method is employed in conjunction with cardboard or thin wood containers, it is difficult at least on a commercially feasible basis, to sufficiently compact the material without adversely deforming the container as a result of compaction forces transmitted to the container.

One prior method which attempts to solve the above noted problem employs a support sleeve externally of the container to support the container against radial expansion and deformation during the compaction process. However, it has been found that even with this method, containers of limited strength as mentioned, are still susceptible to outward expansion and side wall deformation after the surrounding support sleeve is removed. Moreover with this prior method, the container is still subjected during compaction to the packing forces which are transmitted directly to the container side walls by the material being packed. In addition to causing deformation, this stress has been found to weaken the container at various locations in its side walls.

It is therefore an object of the present invention to provide a new method and apparatus which overcome the above noted problem in a manner which may be feasibly applicable in commercial packing operations.

A further object of the present invention is to provide such a novel method and apparatus which may be incorporated into existing or conventional packing installations.

A still further object of the present invention is to provide a new support device for sustaining compaction loads during the packing of a container such as to prevent distortion and deformation of the container. Included herein is a novel method and apparatus for moving the support device between operative and inoperative positions with respect to a container to be packed.

2

Other object and advantages will be apparent from the following more detailed description in conjunction with the accompanying drawings, in which:

FIG. 1 is an elevational view of apparatus, embodying the present invention, for filling and packing material in containers;

FIG. 2 is an enlarged fragmental, cross-sectional, view illustrating an initial stage in a packing operation wherein a support sleeve is inserted into a container to be packed with material;

FIGS. 3, 4 and 5 are views similar to FIG. 2 but respectively showing sequential steps in the packing operation;

FIG. 6 is an enlarged cross-sectional detail view showing a connection between the support sleeve and a charger in the embodiment of FIG. 1; and

FIG. 7 is a perspective view illustrating modifications of the present invention.

Referring to the drawings in detail, there is shown for illustrative purposes only, an apparatus embodying the present invention for delivering and packing loose compressible or compactible material 10 in a container 12 shown as having a generally box-like, rectangular construction with top closing flaps 14. Additionally, container 10 may be made from cardboard or thin sheet wood with dimensions, for example, 45¼" in length, 28½" in width, and 30¼" in depth.

In the shown embodiment the apparatus includes an elevated support frame 20 which supports a plunger 22 for vertical movement between an idle raised position shown in FIGURE 1 and an operative lower position for packing material as shown in FIGURE 5. Actuation of plunger 22 between its opposite positions may be achieved in any suitable manner such as by a fluid motor generally designated 24 in the drawings.

Delivery of material 10 into the container is attained by a chute 26 supported by a trolley or other suitable structure 28 for horizontal movement between an extended position overlying the container station, as shown in FIGURE 1 and a retracted position to one side of the container station, as shown in dotted lines in FIGURE 1. In the extended position, chute 26 receives the material from any suitable feeding means, such as a conveyor (not shown), for delivery downwardly ultimately into the container. The retracted position of chute 26 is employed to allow plunger 22 to be lowered into the container for compaction purposes. Plunger 22 in its uppermost position, is spaced above chute 26 to allow the chute to move into its extended position for filling the container.

After passage through chute 26, the material 10 passes through a charger 30 which further guides and delivers the material by gravity into the container. Charger 26 is illustrated as having a hollow cylindrical tubular shape but as will be understood, a rectangular charger may be employed. Additionally, charger 26 is movable between upper and lower positions shown in FIGURES 5 and 4 respectively by any suitable means such as the fluid motors 32 operatively connected at 34 to the sides of the charger. The apparatus described thus far is conventional, and a further description of similar apparatus may be found in U.S. Patents to Rice No. 2,732,113 and Boehling No. 2,619,272.

In accordance with the present invention a novel support member is uniquely employed within the container to prevent deformation of container 12 during and after the compaction process. In the shown embodiment, the support member is a sleeve 40 having a generally rectangular cross section preferably three eighths (¾) of an inch in thickness and made from sheet stainless steel. Additionally, the overall dimensions of the sleeve 40 are slightly less than the corresponding dimensions of con-

tainer 12 so as to produce a gap 42 between side walls 44 of the sleeve and side walls 13 of the container when the sleeve is inserted into the container. When used in connection with the specific container described above, it is preferable that this clearance or gap 42 be about one-quarter of an inch between the respective side walls of the sleeve and container and about three-eighths of an inch to one-quarter of an inch between the bottom edge 46 of the sleeve and the corresponding bottom wall 15 of the container.

To facilitate withdrawal of sleeve 40 from the container after the material is compacted, side walls 44 of the sleeve are slightly tapered from the upper end 48 thereof outwardly towards the lower end 46. Thus in the shown embodiment the sleeve may be dimensioned at its bottom end $44\frac{3}{4}$ inches in length, $28\frac{1}{4}$ inches in width and at its upper end, $44\frac{1}{2}$ inches in length and 28 inches in width. Additionally the depth of sleeve 40 from the top to the bottom thereof may be approximately 30 inches.

Sleeve 40 is movable between a raised, idle position shown in FIGURE 5 and a lowered, operative position shown in FIGURE 4. In the raised position of sleeve 40, the material 10 is fed into the container. Also the raised position of sleeve 40 allows the container 10 to be moved into and out of the container station. In the preferred embodiment, movement of sleeve 40 between its opposite positions is achieved by connection to the lower end of charger 30 to be movable therewith. As shown in FIGURE 6, sleeve 40 may be fixed to the charger by any suitable means such as a peripheral flange 50 fixed to the sleeve and fastened to an overlying flange 52 of charger 30 by means of bolts 54. In this manner, sleeve 40 may be installed in existing packing installations. However as shown in the modification in FIGURE 7 the sleeve may also be formed integral with the charger if desired. In FIGURE 7 the sleeve is represented by 40a while the charger is represented by 30a. Additionally in this embodiment, the plunger 22a has a rectangular pressing head generally conforming to the shape of the sleeve 40a.

It will thus be seen that by positioning sleeve 40 within the container, the compaction forces resulting from the downward force of plunger 22 on the material 10 will not be transmitted to the container sidewalls 13 during the compaction process. Moreover when sleeve 40 is removed after compaction, the gap or tolerance between the container sidewalls 13 and the sleeve will accommodate radial expansion of the material 10 occasioned by removal of the sleeve. In this manner the container will not be deformed outwardly when sleeve 40 is removed.

A typical operation will now be described. An empty container is placed at the packing station such as by means of the shown dolly 60. Charger 30 is then actuated downwardly to position sleeve 40 within the container such as shown in FIGURE 2. Trolley 28 is then moved towards the charger to position chute 26 in its extended position overlying charger 30 for delivery. Material 10 is then fed into chute 26 and charger 30 until a predetermined amount of material is reached such as may be determined conventionally by a scale (not shown). Plunger 22 is then actuated downwardly to enter sleeve 40 and compact the material to a desired degree as shown in FIGURE 4. Sleeve 40 is sufficiently strong to sustain the radially directed forces resulting from compaction so that the container at this stage receives no stress from these forces.

Having compressed the material to a predetermined degree, plunger 22 is maintained in the container on the material while charger 30 is retracted upwardly to remove sleeve 40 from the container as illustrated in FIGURE 5. This withdrawal of the sleeve is facilitated by the taper in the sidewalls 44 of the sleeve. Maintenance of plunger 22 in the container during this latter step contains the material in the container as the sleeve is withdrawn and also forces the material outwardly to fill the

void created by the tolerance or gap 42 as well as the void created by the thickness of sleeve 40. After the material has moved outwardly sufficiently, plunger 22 is withdrawn and the container is removed from the packing station whereupon the process may be repeated in the next container.

Modifications readily apparent from the foregoing description and associated drawings, although not specifically mentioned herein, will nevertheless be included within the spirit and scope of the invention as indicated in the appended claims.

I claim:

1. A method of introducing and packing loose compactible material into a container having bottom and side walls defining a space for receiving material to be packed therein, the method comprising the steps of placing the container at a fixed station and without any significant external structural support about the side walls of the container, placing a hollow support sleeve with open ends inside the container while at said fixed station and with the support sleeve in close proximity to the side walls of the container, introducing material into the sleeve to a desired level while the sleeve is in the container at said fixed station, while the sleeve is in the container at said fixed station inserting a pressing plunger into the sleeve to firmly compact the material therein with the sleeve preventing transmission of the compaction forces to the side walls of the container, removing the sleeve from the container at said fixed station while maintaining the pressing plunger in the container to contain the material as the sleeve is withdrawn and also to force the material outwardly to fill the void created by the withdrawal of the sleeve, and then removing the pressing plunger from the container at said fixed station.

2. The method defined in claim 1 wherein the support sleeve has a shape similar to the container to be packed but a slightly lesser overall lateral dimension so as to leave a predetermined clearance between the sleeve and the surrounding container side walls, and wherein sufficient pressure is applied to the material during withdrawal of the sleeve so as to force the material outwardly to also fill said clearance.

3. A method of introducing and packing loose compactible material into a container having bottom and side walls defining a space for receiving material to be packed therein, the method comprising the steps of placing the container at a fixed station and without any significant external structural support about the side walls of the container, placing a hollow support sleeve with open ends inside the container while at said fixed station and with the support sleeve in close proximity to the side walls of the container and with the lower end of the sleeve spaced slightly above the bottom wall of the container, maintaining the sleeve in said position in the container in close proximity to the side walls of the container and with the lower end of the sleeve spaced slightly above the bottom wall of the container, introducing material into the sleeve to a desired level while the sleeve is in the container at said fixed station, while the sleeve is in the container at said fixed station inserting a pressing plunger into the sleeve to firmly compact the material therein with the sleeve preventing transmission of the compaction forces to the side walls of the container, removing the sleeve from the container at said fixed station while maintaining the pressing plunger in the container to contain the material as the sleeve is withdrawn and also to force the material outwardly to fill the void created by the withdrawal of the sleeve, and then removing the pressing plunger from the container at said fixed station.

4. In apparatus for filling and packing material in a container at a fixed station, wherein the container has bottom and side walls formed of material of limited strength and the container is free of any significant external structural support about its side walls, and wherein the apparatus includes a pressing plunger vertically mov-

5

ble into the container for packing the material and subsequently movable out of the container; a support sleeve made from rigid self supporting material and including a continuous peripheral support surface enclosing a space for receiving material to be packed in the container, said sleeve having open opposite top and bottom ends for permitting material to be introduced into the sleeve while the sleeve is in the container and for permitting the sleeve to be removed from the container after the material is sufficiently packed therein, said sleeve being dimensioned to generally conform to the inner configuration of the container so as to be insertable axially into the container in close proximity to the side walls of the container for receiving material to be packed through its top end, said sleeve having tapered side wall portions tapering outwardly from the top end to the bottom end thereof for facilitating removal of the sleeve from the container after the material is packed therein.

5. The sleeve defined in claim 4 having overall lateral dimensions such that a predetermined clearance is formed between the sleeve and the surrounding container side walls when the sleeve is in the container for purposes of accommodating radial expansion of the compacted material when the sleeve is withdrawn from the container.

6. In combination with the sleeve defined in claim 4, means for moving the sleeve into and out of the container including a hollow charger having opposite upper and lower ends and an axial passage extending between the ends for receiving and directing material to the con-

6

tainer, the upper end of said sleeve being fixed to the lower end of said charger in generally coaxial alignment so that the charger and sleeve are movable together as a unit towards and away from the container, and means connected to the charger for vertically moving the charger together with the sleeve towards and away from the container.

7. The combination defined in claim 6 further including a pair of flange means projecting radially outward from the charger and the sleeve in overlying and abutting engagement, and means securing said flange means together whereby the charger and sleeve are interconnected for movement together as a unit.

8. The combination defined in claim 5 wherein, the said sleeve has a wall thickness of approximately three-eighths of an inch and wherein said predetermined clearance between the sleeve and the surrounding side walls of the container is approximately one-quarter of an inch.

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