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REINFORCED CONTAINER FOR BULK MATERIALS

Filed June 5, 1962

2 Sheets-Sheet 1

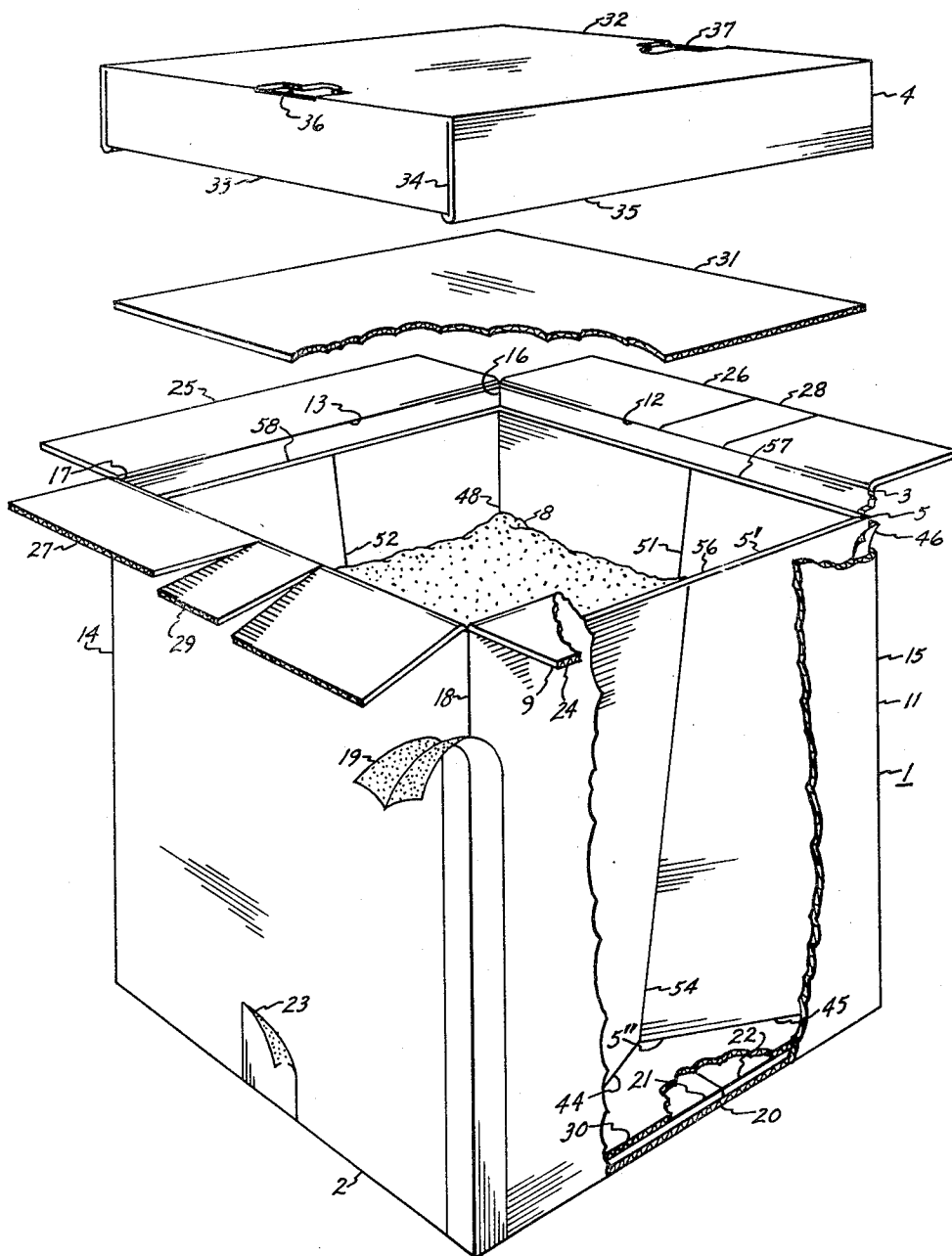


Fig. 1.

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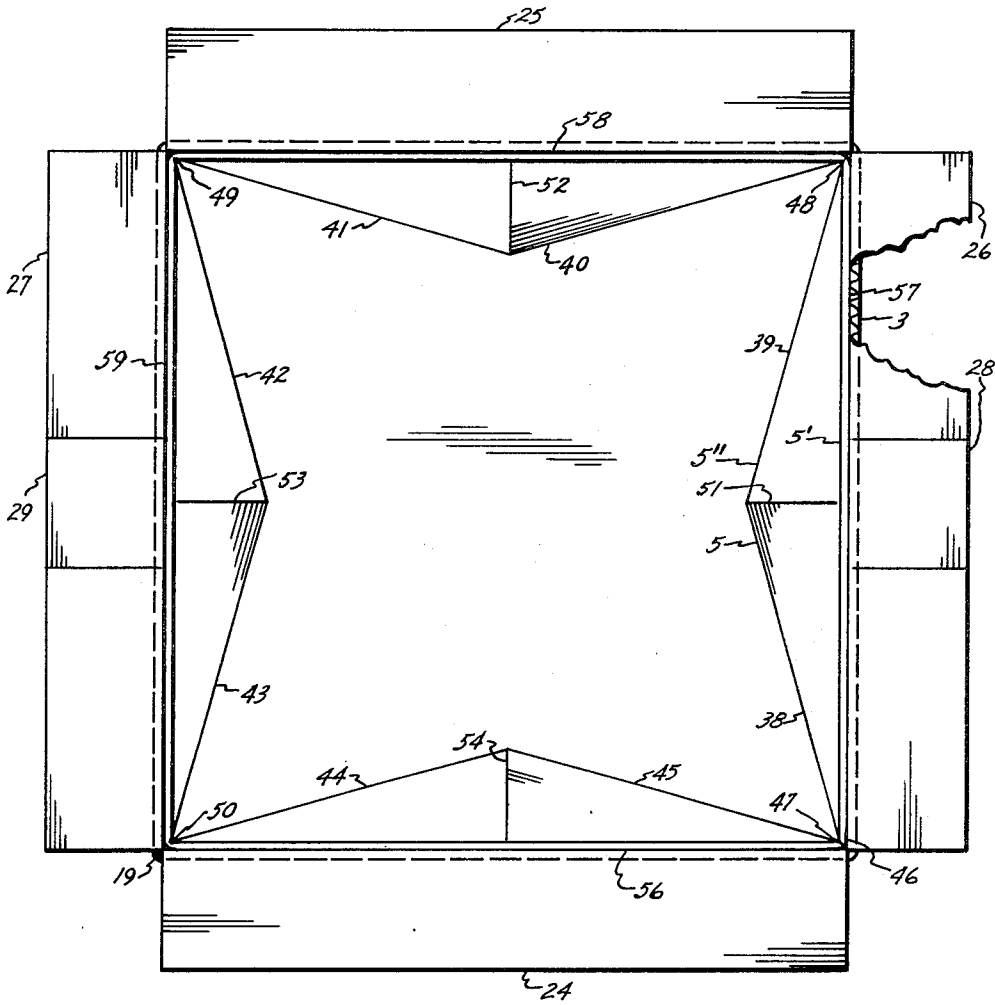


Fig. 2.

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REINFORCED CONTAINER FOR BULK MATERIALS

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This invention relates to improvements in containers, and more particularly concerns a container typically formed of corrugated fibreboard or the like and specifically adapted to be used for storing and transporting bulk materials.

A general object of this invention is to provide a distortion resistant container for storing and shipping bulk materials.

Further general objects of this invention are to reduce the costs of producing high strength containers for bulk materials and to provide an inexpensive container for this purpose which may be shipped flat and readily erected and assembled for use.

A further object of this invention is to provide a bulge-resistant container for bulk materials which has high stacking strength.

A particular object of this invention is to provide a bulge-resistant container having optimum capacity characteristics.

A further particular object is the provision of a container having a sleeve therein preventing bulging of the side walls of the container and minimizing the unusable space therewithin.

The novel features which are believed to be characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is an exploded perspective view of a container in the form of a half slotted carton, partially broken away, the carton being shown as partially filled with bulk material in accordance with this invention; and

FIGURE 2 is a top plan view of the unclosed carton shown in FIGURE 1.

Referring now more particularly to FIGURES 1 and 2, there is provided a box 1 in the form of a half slotted carton having side walls 11, 12, 13 and 14, the box 1 being formed of a folded, slotted and prescored blank of single wall corrugated fibreboard which is folded to provide wall angles 15, 16, 17 and 18 with walls 11 and 14 being joined along wall angle 18 by tape 19. The bottom portion 2 of the box 1 is closed by flaps, including flaps 20, 21, 22, having tape 23 holding the flaps in a closed position. The upper part 3 of the box 1 is provided with flanges 24 and 25 which are attached to respective walls 11 and 13 and with flanges 26 and 27 which are attached to respective walls 12 and 14. Severed from flanges 26 and 27 are respective locking tabs 28 and 29 which are respectively connected to walls 12 and 14. A pad 30 is preferably disposed at the inside bottom of the box 1, with a second pad 31 arranged as a top liner.

The top end closure or cover 4 for the box 1, as shown in FIGURE 1, comprises a panel 32 having depending side flanges arranged to telescope over the upper end portion 3 of the carton 1. Cover flange 33 has an end ear 34 tucked into and held by a double folded flange 35, and a similar corner construction is employed at each corner of the cover. Top panel 32 has openings 36 and 37 positioned to receive locking tabs 28 and 29 when the end closure 4 is closely placed on the box 1.

The box 1 is intended to be closed, after filling with bulk materials 8, by placing pad 31 restingly on sleeve 5, by folding flanges 24, 25, 26 and 27 inwardly over the pad, with tabs 28 and 29 in upstanding generally vertical position, and, finally, by bringing cover 4 downwardly, with tabs 28 and 29 extending through the respective cover slots, to telescope the cover skirt or flanges 33 and 35 outwardly of and along the side walls of box 1. The locking tabs are finally folded over to hold the cover in place. Pads 30 and 31 minimize entrapment of finely divided bulk material between the flaps or flanges of the end closure.

Positioned within box 1 is a sleeve 5 formed of a blank of single wall corrugated fibreboard which is folded to form reinforcing members 56, 57, 58 and 59 for respective walls 11, 12, 13 and 14. The reinforcing members 56, 57, 58 and 59 are substantially contiguous with respective walls 11, 12, 13 and 14 of box 1 at its upper end portion 3. Sleeve 5 has its upper end portion 5' in substantially the same configuration as the upper end portion 3 of box 1, and the space within the sleeve 5 decreases and sleeve 5 tapers from its upper end portion 5' to its lower end portion 5'', lower end portion 5'' of sleeve 5 being generally star shaped. Sleeve 5 at its lower end portion includes a plurality of angularly connected panels 38, 39, 40, 41, 42, 43, 44 and 45 with panels 38 and 45 being joined by tape 46 to form angle 47. Between panels 39 and 40 there is provided an outwardly extending fold or angle 48 and angle 48 together with angle 47 are contiguous with or nestingly engage respective wall angles 16 and 15 of the box 1. Likewise, the angles 49 and 50 between respective panels 41 and 42 and panels 41 and 42 and panels 43 and 44 are nestingly engaged within respective wall angles 17 and 18 of the box 1. These outwardly extending angles 47, 48, 49 and 50 are herein shown, when measured inwardly of sleeve 5, as decreasing from a substantially 90° angle at the upper end portion 5' of sleeve 5 to an acute angle at the lower end portion 5'', and these angles are substantially equal to each other. Interspaced between the outwardly extending acute angles 47, 48, 49 and 50 of the sleeve, there is provided inwardly extending folds 51, 52, 53 and 54 which are measured outwardly of the sleeve 5, are shown as decreasing from substantially 180° angles at the upper end portion 5' of sleeve 5 to obtuse angles at the lower end portion 5''. All the obtuse angles 51, 52, 53 and 54 are substantially equal to each other, as shown, which depends on whether the sides of box 1 are substantially the same or not. As so arranged, it will be seen that panels 38 and 39, joined along fold 51 constitute the reinforcing member 57 for wall 12. Panels 40 and 41 joined along fold 52 constitute reinforcing member 58 for wall 13. Each of reinforcing members 56 and 59 are constructed of a similarly joined pair of panels for respective box walls 11 and 14.

In the four sided square box 1, as shown in FIGURE 1, each of the folds 51, 52, 53 and 54, between the outwardly extending panels of each wall reinforcing member, is substantially flat and 180° at the upper sleeve end portion 5', and each of the folds or obtuse angles 51, 52, 53 and 54 is preferably between 160° and 170° at the lower sleeve end portion 5'' in order that the space within the sleeve may contain optimum quantity of bulk material 8, while providing optimum reinforcement of the box walls, but it is contemplated that an obtuse angle as small as substantially 140° or as large as 170° or 175° may be approximate in some instances. With the obtuse angles of the lower sleeve end portion 5'' being between 140° and 170°, each of the acute angles at the lower sleeve end portion 5'', between the outwardly extending panels of respective adjacent wall reinforcing members which are nested within respective wall angles, will have the respec-

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tive limits of 50° and 80°, and each panel adjacent the bottom portion 2 of box 1 of each wall reinforcing member will make an angle of between substantially 5° and 20° with the box wall towards the edge of which the panel extends into engagement with the respective wall angle.

The term bulk materials when used in this application is intended to include granular, comminuted or particulate solids, as, for example, sand, grains or powders, as well as liquids which would be placed, for example, into a deformable liquid tight bag barrier, such as a polyethylene bag. When bulk materials, whether in the nature of particulate solids, represented generally in FIGURE 1 by solids 8, or liquids within a deformable bag barrier, are placed within the sleeve 5, the pressure of the materials 8 against the panels 38, 39, 40, 41, 42, 43, 44 and 45 forces the respectively outwardly extending folds or acute angles 47, 48, 49 and 50 into the respective wall angle folds, 15, 16, 17 and 18, resulting in a lateral tensioning of walls 11, 12, 13 and 14, thereby preventing distortion, such as, bulging of the box walls. The pressure of the bulk materials increases from a minimum at the upper part 3 of box 1 to a maximum at the bottom portion 2 thereof. The tapered sleeve 5 compensates for the increasing pressure adjacent the lower sleeve portion 5' by having the obtuse angles 51, 52, 53 and 54 to decrease from substantially 180° to a predetermined angle, for example 165°. The pressure of the bulk materials below the upper part 3 of box 1 and sleeve upper portion 5' is transmitted only to the wall angles 15, 16, 17 and 18 and substantially no pressure is exerted against the box wall panels between the wall angles which could cause bulging thereof, in that the reinforcing members 56, 57, 58 and 59 of the sleeve 5 between the wall angles adjacent the bottom portion 2 of box 1 lie entirely spacedly inwardly of the wall panels. Any pressure of the bulk materials at the sleeve upper portion 5' and box upper part 3 is insufficient to distort or bulge the sleeve 5 and walls of box 1.

While box 1 is shown as a half slotted carton, it is to be understood that box 1 could take the form of a regular slotted carton or any other well known form of box or container.

The provision of a sleeve 5 which assumes the shape of the box or container adjacent its upper end for maximum capacity within the sleeve and tapers into a star-shape at the lower end of the container affords optimum capacity characteristics for the box while providing effective and optimum reinforcements of the box walls to prevent distortion.

The corrugations in the walls of the box shown in FIGURES 1 and 2 are vertical to allow the box to have a high stacking strength. The sleeve of this invention is formed of horizontally corrugated fibreboard thereby to afford strength in the direction toward the wall angles necessary to transmit the forces imposed by the bulk materials on the sleeve panels which, transmitted as compression forces on the sleeve panels, place the box walls under tension. Furthermore, it has been found that the lateral tensioning of the box walls imposed thereon by the sleeve panels tends to increase the stacking strength of the filled container. While single wall fibreboard is specifically shown and described herein, it will be apparent that other types of board suitable for containers may be substituted if desired.

While only a certain preferred embodiment of this invention has been shown and described by way of illustration, many modifications will occur to those skilled in the art and it is, therefore, desired that it be understood that it is intended in the appended claims to cover all such modifications as fall within the true spirit and scope of this invention.

What is claimed as new and what it is desired to secure by Letters Patent of the United States is:

1. A container for storing and shipping bulk materials comprising a multi-sided box having a bottom closure

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and a plurality of elongated sides, each of said sides being connected to the next along and forming respective wall angles, an elongated bulk-material-containing sleeve positioned within said box and having an upper end portion and a lower end portion, said bottom closure being closely engaged against said lower end portion of said sleeve, said sleeve at its said upper end portion substantially conforming to the shape of said box at its upper end, said sleeve having a plurality of outwardly extending portions equal to the number of said side wall angles, each said side wall angle nestingly receiving a respective one of said outwardly extending portions thereinto inwardly of said box, said sleeve having a respective fold line spaced approximately intermediate of said outwardly extending portions and extending substantially from said upper end portion to said lower end portion of said sleeve, said sleeve at its said lower end portion bridging inwardly between said outwardly extending portions and being out of contact with said sides between said respective wall angles, said sleeve at its said upper end portion being in contact with said sides between said respective wall angles.

2. A container for storing and shipping bulk materials comprising in combination a box having a rectangular base and four vertical walls attached to said base with each said wall connected to the next along and forming a respective wall angle, a hollow sleeve positioned within said box and having an upper end portion and a lower end portion, said sleeve having four outwardly extending portions, each said wall angle nestingly receiving a respective one of said outwardly extending portions thereinto inwardly of said box, said sleeve having a respective fold line spaced approximately intermediate of said outwardly extending portions and extending substantially from said upper end portion to said lower end portion of said sleeve, said sleeve at its said upper end portion substantially conforming in shape to and nestingly fitted within said box, said base being closely engaged against said lower end portion of said sleeve, said sleeve at said lower end portion bridging inwardly between said outwardly extending portions and being out of contact with said walls between said respective wall angles, said bulk materials filling said sleeve to cause said walls to be under tension.

3. A container for storing and shipping bulk materials comprising in combination a box having a square base and four vertical walls attached to said base with each wall connected to the next along and forming a respective wall angle, a square pad positioned inwardly of said box and resting on said base and a hollow sleeve for receiving bulk materials thereinto, said sleeve being inserted within said box and having an upper end portion and a lower end portion, said sleeve at its said upper end portion substantially conforming in shape to said box and being contiguous with said four vertical walls, said pad closely engaged against said lower end portion of said sleeve, said sleeve at its said lower end portion having four outwardly extending folds which as measured inwardly of said sleeve are acute angles and four inwardly extending folds which as measured outwardly of said sleeve are obtuse angles, said outwardly extending folds and inwardly extending folds being equidistantly interspaced around said sleeve and extending substantially from said upper end portion to said lower end portion of said sleeve, said outwardly extending folds being nested respectively within said wall angles whereby bulk materials disposed in said hollow sleeve force said outwardly extending folds into said wall angles to thereby impose tensioning forces on said box walls.

4. A container for storing and shipping bulk materials comprising in combination a box having a square base and four vertical walls attached to said base with each wall connected to the next along and forming respective wall angles, a square pad positioned inwardly of said box and resting on said base, an elongated sleeve having a

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square upper end portion and a four-pointed-star-shaped lower end portion for receiving bulk materials therein, said sleeve being inserted within said box, said pad closingly engaged against said lower end portion of said sleeve, said sleeve at said upper end portion having four outwardly extending folds which as measured inwardly of said sleeve are substantially right angles, said outwardly extending folds of said sleeve at its said upper end portion progressively decreasing to acute angles at said lower end portion of said sleeve, each of said outwardly extending folds being nested in a respective said wall angle, said sleeve at its said lower end portion having four inwardly extending folds which as measured outwardly of said sleeve are obtuse angles, said outwardly extending folds and inwardly extending folds being equally interspaced around said sleeve, bulk-materials filling said sleeve to cause said walls to be under tension, said wells being under an increasing tension toward said base.

5. A container for storing and shipping bulk materials comprising in combination a multi-sided box having a base and a plurality of side walls attached to and extending upwardly from said base with each said wall connected to the next along and forming a respective wall angle, a multi-sided hollow sleeve defining a space for containing bulk materials within said box, said sleeve having an upper end portion and a lower end portion, said sleeve having a plurality of outwardly extending folds between said upper end portion and lower end portion thereof, each of said outwardly extending folds being nested within a respective said wall angle, said sleeve at its said upper end portion conforming to the shape of said box with the outer faces of said sleeve being contiguous with respective said side walls, said sleeve at its said lower end portion bridging inwardly between said outwardly extending folds and defining inwardly extending folds out of contact with said respective said side walls between said respective wall angles, said inwardly extending folds extending from said lower end portion substantially to said upper end portion, the angle of said inwardly extending folds as measured outwardly of said sleeve adjacent said lower end portion are obtuse

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angles, said obtuse angles progressively increase from said lower end portion to said upper end portion of said sleeve whereby bulk materials disposed in said space exert pressure on the inner faces of said sleeve and thereby forces said outwardly extending folds into said respective wall angles and increasingly tensions each of said box to a maximum adjacent said base.

6. A container for storing and shipping bulk materials comprising a box having a base and elongated vertically extending walls attached to said base with each wall connected to the next along and forming respective wall angles, an elongated hollow sleeve positioned within said box for receiving bulk materials therein and having an upper end portion and a lower end portion, said upper end portion of said sleeve having a horizontal cross-section shape substantially identical to the shape of the horizontal cross-section of said box at its upper end part, said sleeve having elongated folds respectively nested within a respective wall angle, said upper end portion of said sleeve being fitted within said box, said sleeve being tapered intermediate said elongated folds from said upper end portion to said lower end portion thereby decreasing the hollow of said sleeve, said lower end portion having a pointed star-shaped horizontal cross-section, said lower end portion of said sleeve bridging inwardly between said elongated folds and being out of contact with said walls between said respective wall angles, the bulk materials filling said hollow of said sleeve and exerting a minimum of pressure at said upper end portion of said sleeve and increasingly more pressure on said sleeve toward its said lower end portion thereby forcing said elongated folds into said respective wall angles and tensioning the respective box wall.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,145,900

August 25, 1964

Maurice G. Franklin

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 67, for "approximate" read -- appropriate --;
column 5, line 18, for "wells" read -- walls --.

Signed and sealed this 26th day of January 1965.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents