Sept. 7, 1965 N. R. WILSON 3,204,856

TOP EDGE-OPENING RECTANGULAR BAG AND PROCESS OF USING SAME

Filed Dec. 23, 1963 3 Sheets-Sheet 1

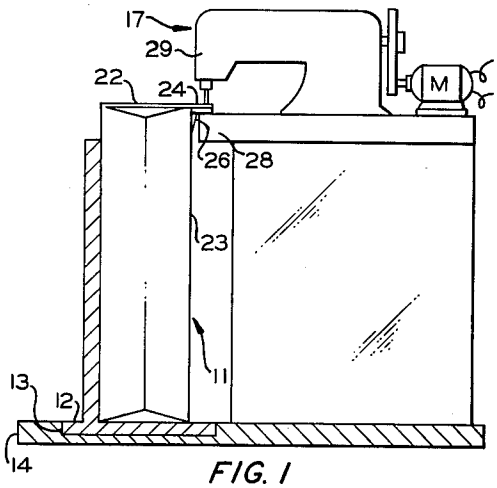

FIG. 1

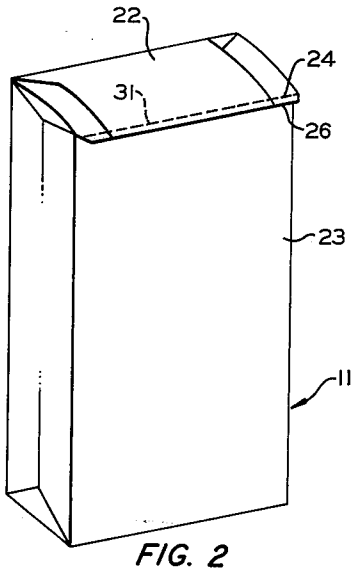

FIG. 2

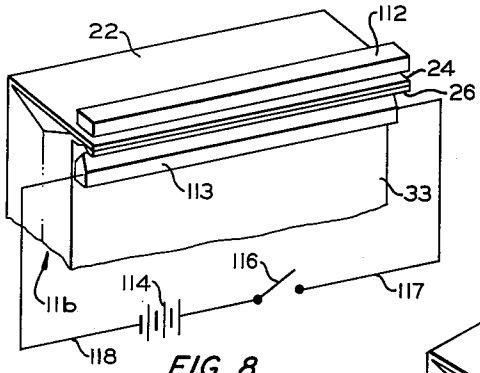

FIG. 8

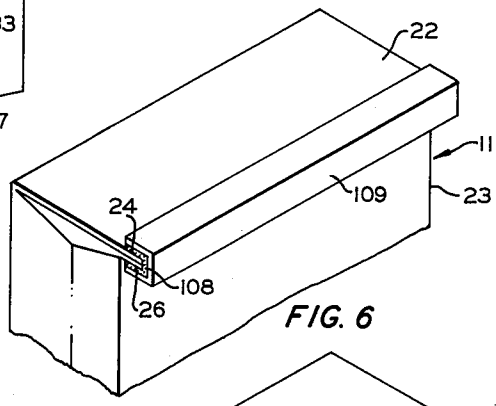

FIG. 6

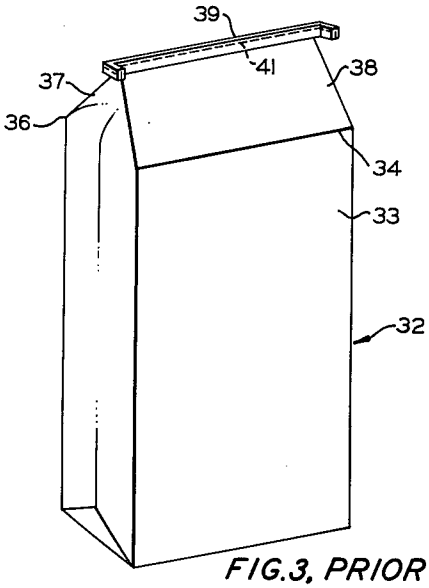

FIG. 3, PRIOR ART

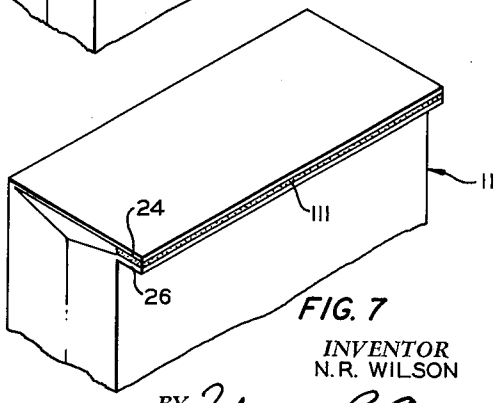

FIG. 7

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Sept. 7, 1965 N. R. WILSON 3,204,856

TOP EDGE-OPENING RECTANGULAR BAG AND PROCESS OF USING SAME

Filed Dec. 23, 1963 3 Sheets-Sheet 2

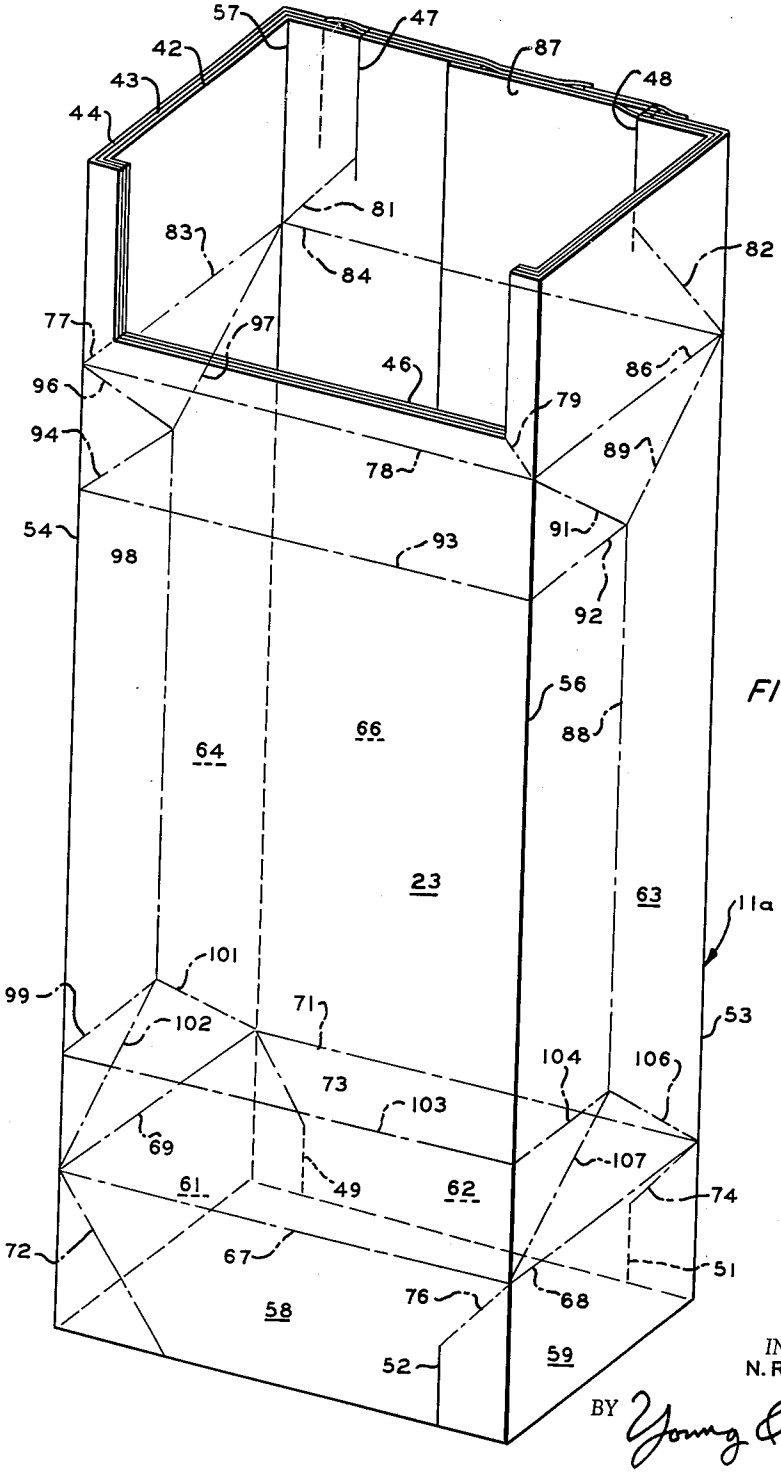

FIG. 4

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TOP EDGE-OPENING RECTANGULAR BAG AND PROCESS OF USING SAME

Filed Dec. 23, 1963 3 Sheets-Sheet 3

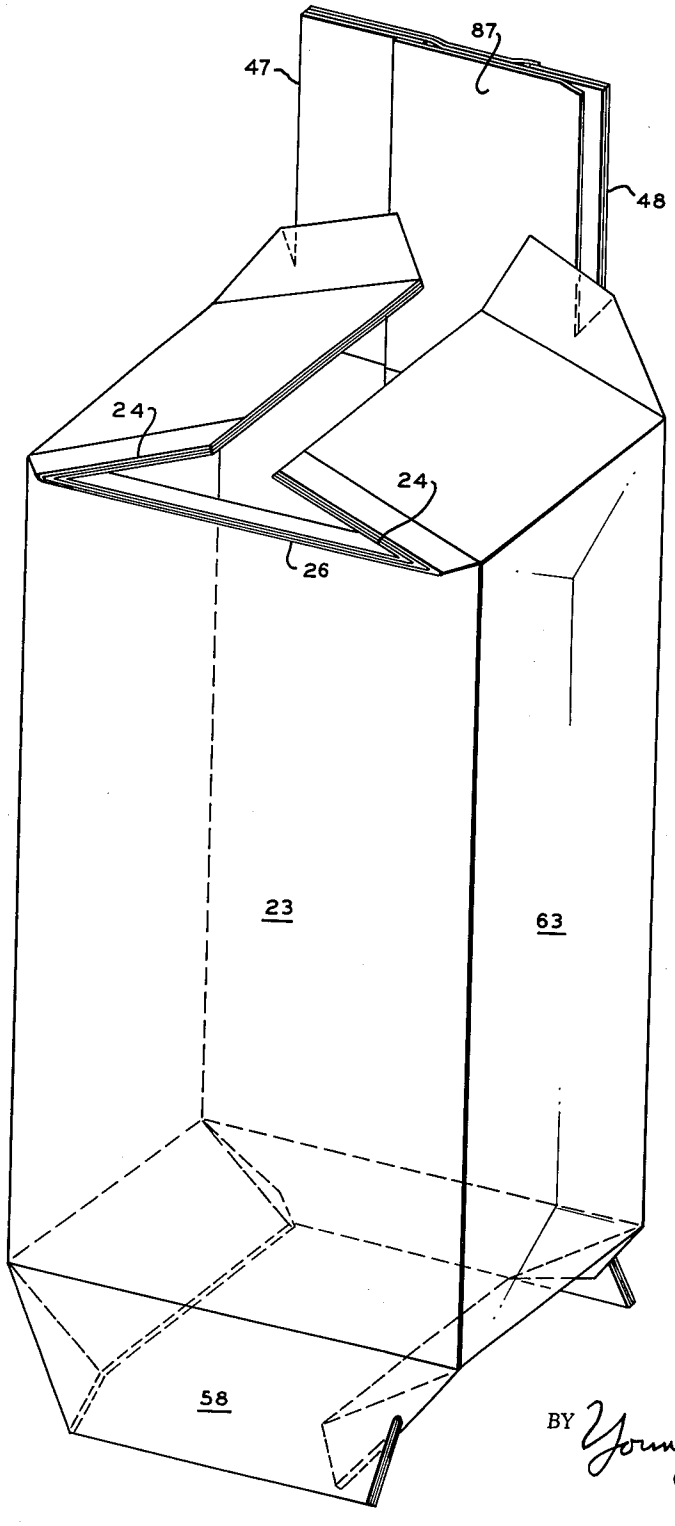

FIG. 5

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3,204,856

TOP EDGE-OPENING RECTANGULAR BAG AND PROCESS OF USING SAME

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Filed Dec. 23, 1963, Ser. No. 332,794
8 Claims. (Cl. 229—53)

This invention relates to a bag in the form of a hollow parallelepipedon having an edge opening extending along the vertex of one of its dihedral angles. In another aspect it relates to means to close said edge opening. In another aspect it relates to the process of using said bags to store particulate solid materials without waste space caused by the prismatical construction of the top of open-end bags used in the prior art.

In the prior art, as shown in FIGURE 3, open-end bags when closed have a prismatical top which is necessary to the filling and sealing of the bag, which top does not fit closely against the other bags when the bags are piled in a compact mass. This results in difficulties in handling on pallets with fork lift trucks, in stacking, and in storage in piles, as well as a waste of storage space because the prisms do not fit together as parallelepipedons do when piled in a compact mass. While attempts have been made to produce parallelepipedon bags with narrow valve openings, as in Miller 2,338,254 of January 4, 1944, such bags do not fill readily from conventional hopper-loading machines but require special loading spouts and blowing equipment which cannot provide as uniform weight filling of the bags as customary with automatic weighing and hopper-loading equipment available for loading open-end bags which operate perfectly with the novel top edge-opening bag of the present invention, filled from an elliptical spout as wide as the open top edge.

One object of the present invention is to provide an edge-opening, parallelepipedon bag capable of accurate weight loading with an ordinary hopper-loading device used with open-end bags without having a prismatical top when the bag is sealed.

Another object is to provide a novel and useful bag for particulate material.

Another object is to provide a method of filling, sealing, and storing the bags of this invention without waste space.

Numerous objects and advantages will be apparent to those skilled in the art on reading the accompanying specification, claims, and drawings.

FIGURE 1 is an elevational view with parts in section of the filled, edge-opening, hollow, parallelepipedon bag of the present invention being sealed by sewing the walls of the opening together on a conventional sewing machine.

FIGURE 2 is a perspective view of the filled and sewed bag of the present invention as it comes from the sewing operation of FIGURE 1.

FIGURE 3 is a perspective view of a filled and sewed open-end bag of the prior art showing how it has a prismatical top, which is inconvenient in handling and wastes space in storage.

FIGURE 4 is a perspective view showing one embodiment of a bag of the present invention before being folded and the ends closed to form an edge-opening bag. The ordinary dotted lines show edges of the bag not visible in the position shown, while the dot and dash construction lines show where the bag may be folded in order to store the same compactly in a flattened condition before expanding the same into the position shown in FIGURE 4, and also where the bag may be folded in order to close the ends as shown in FIGURE 5.

FIGURE 5 is a perspective view of the bag of FIGURE 4 with the ends in the process of being folded shut.

FIGURE 6 is a perspective view showing a second species in which the top edge opening of the bag of the invention is closed by an overlapping, U-shaped, adhesive strip instead of being sewn together as in FIGURE 1.

FIGURE 7 is a perspective view of a third species of the invention in which the top edge opening is merely sealed together with adhesive.

FIGURE 8 is a perspective view of the fourth species, which is suitable when the bag is made of heat-weldable plastic material, such as polyethylene, and the top edge opening is welded closed by application of heat and pressure from the heating and pressure bars diagrammatically shown.

In FIGURE 1, a hollow, parallelepipedon bag having an edge opening of the present invention generally designated as **11** has been placed on a conveyor belt or plate **12** which is movable in a direction into and out of the figure in a groove **13** in a base plate **14**. At the stage or position of conveyor **12** shown in FIGURE 2, the filled bag **11** is positioned under a conventional sewing machine generally designated as **17**. By tilting the conveyor **12** so the top edges **24** and **26** of bag **11** are at the top of the bag, the bag can be completely filled by gravity. By having the widest edge of the bag open substantially throughout its entire extent and inserting an elongated or generally elliptical funnel or spout (not shown) of substantially the entire length of the slot, the bag can be completely filled by gravity dumping much quicker and more accurately than if the material had to be blown in through a narrow tube in a narrow valve opening as in Miller, cited above.

Bag **11** has an edge opening between the top **22** and side wall **23**, which may be provided with integral overlapping tabs **24** and **26**, respectively, coextensive with said opening. However, the invention may be practiced without tabs **24** and **26** by merely securing the abutting edges of walls **22** and **23** together coextensive with said upper edge opening. However, it is easier to operate with tabs **24** and **26** present.

As shown in FIGURE 1, tabs **24** and **26** pass between the base **28** and sewing machine head **29** of a conventional sewing machine **17** which sews tabs **24** and **26**, or the abutting edges of **22** and **23** (not shown), together closing the top edge opening. As at least a dozen sewing machine companies have suitable conventional sewing machines like **17** on the market, it is not believed necessary to show any details of construction.

In FIGURE 2 is shown the finished product, comprising the hollow, rectangular, parallelepipedon, edge-opening bag **11** filled with an accurately weighed load of particulate solid material, such as carbon black, with the tabs **24** and **26** of top **22** and side wall **23** sewed together with stitches of thread **31** closing and sealing the top edge opening between walls **22** and **23**. As it is obvious that parallelepipedons can be stacked or piled on pallets handled in the conventional manner with fork lift trucks and can be piled in stocks and piles in storage without any waste space, it is not believed necessary to illustrate this point further by showing any such piles composed of bags **11**. It is preferred that the edge-opening be coextensive with the edge.

However, it should be noted that when a conventional open-end bag of the prior art, generally designated as **32** in FIGURE 3 (the ordinary open-end bag furnished by grocery stores to customers for carrying groceries home), is sealed, it is necessary to fold the front wall 33 at **34** and the back wall at **36**, so that the top portions **37** and **38** of these walls form a prismatical top above **34** and **36** which is conventionally closed by an overlapping

U-shaped tape **39** sewn together with stitches **41** with the edges of walls **37** and **38** inside the walls of U-shaped strip **39**. This prismatical top is not filled with particulate solids and makes the bag hard to handle to place in compact arrangement on pallets (not shown) or to pile the same without waste space (not shown) caused by the prismatical top.

FIGURE 4 shows in perspective view a rectangular cross-section, multi-layer tube cut to form a top edge-opening bag generally designated as **11A** embodying the present invention. This bag **11A** has been so designated to distinguish from the bag generally designated as **11** in FIGURES 1, 2, 6 and 7 which may or may not be made of laminated paper like bag **11A**, or may or may not be made of heat-weldable plastic like bag **11B** of FIGURE 8, as explained further below.

The laminated bag **11A** of FIGURE 4 has proved to be particularly suitable for packaging pelleted and/or flocculent carbon black and consists of a plurality of overlapping sheets of paper **42, 43** and **44** formed in the shape of a rectangular tube and secured together by adhesive at least along the overlapping seams. This rectangular tubing is cut in proper lengths and then has a rectangular piece cut out to form opening **46** and slots **47, 48, 49, 51** and **52** cut for folding purposes.

While this unit can be stored flat by merely folding it flat along edges **53** and **54** and flattening out the dihedral angles at edges **56** and **57** and forming the bag at a later time just before filling, it is generally preferable to have the top and bottom of the bag secured together by folding the lower portions **58, 59, 61** and **62** of sides **23, 63, 64** and **66**, respectively, inward below construction dot and dash fold lines **67, 68, 69** and **71**, respectively, allowed by longitudinal cuts **49, 51** and **52** with folds along dot and dash construction lines **72, 73, 74** and **76** as shown in FIGURE 5, and securing the overlapping sides together with adhesive to form a flat bottom for the bag. In a similar manner cut-out rectangle **46** and slots **47** and **48** provide means for folding the top of the bag together along fold lines **77, 78, 79, 81, 82, 83, 84** and **86**, respectively, as shown in FIGURE 5, or the overlapping portions being secured together by adhesive except for flaps **24** and **26**, which are not attached until after the bag is filled and sealed, as will be explained below. In this operation the vertical rear flap **87** is brought down last to seal over the top of the bag.

When the folding movements commenced in FIGURE 5 are completed, the bag is then in the form of a hollow parallelepipedon having an open top-edge opening coextensive with the vertex of the corresponding dihedral angle, as shown by bag **11** in FIGURES 1, 2, 6 and 7. If the completed bag is not to be used before filling immediately or at that point, it may be folded flat in any suitable manner for storage or shipment, such as by pressing in the sides and folding along lines **88, 89, 91, 92, 93, 94, 96, 97, 98, 99, 101, 102, 103, 104, 106** and **107** as indicated.

While it is preferred to set the tabs **24** and **26** of the bag shut down with sewing machine **17** as shown in FIGURE 1, it is obvious that the invention may be practiced in other ways to form other species. For example, in FIGURE 6, tabs **24** and **26** may be secured together by a layer of adhesive **108**, coated U-cross section tape **109** secured across the opening. If tabs **24** and **26** are made in abbreviated form or eliminated, tape **109** may extend into contact with walls **22** and **23** sealing across the top edge opening, although it is preferred to have tabs **24** and **26** of appreciable extent.

In FIGURE 7, tabs **24** and **26** are secured together by an adhesive **111** placed therebetween after the bag is filled.

It should be understood that the bag **11** of FIGURES 1, 2, 6 and 7 may be a single thickness of paper, or be made of a plurality of paper laminations as bag **11A** of FIGURES 3 and 4, or bag **11** may be made of a single or plurality of laminated sheets of a suitable plastic material, such as polyethylene, polystyrene, vinylidene chloride, or any other plastic compound suitable for making bags, and it is within the knowledge of those skilled in the art to select a suitable adhesive **108** or **111** which is compatible and effective with the particular material of which the bag is made, such as starch, casein glue, rubber cement, vinyl adhesive, or the like.

FIGURE 8 shows a modification in which flaps **24** and **26** of bag **11B**, or the edges of top **22** and sides **33** of bag **11B**, are secured together by welding the same between pressure bar **112** and heater bar **113** heated by any suitable means, such as battery **114**, switch **116** and circuit wires **117** and **118**, and obviously to be so welded the material of bag **11B** should be susceptible of heat welding, such materials being known to those skilled in the art and comprising polyethylene, polystyrene, vinylidene chloride, and other plastic compounds.

While specific examples have been given for illustrative purposes, it is believed the invention is not limited thereto.

Having described my invention, I claim:

1. A bag having a wall in the form of a completely closed, hollow, rectangular parallelepipedon with the exception of one opening extending directly through said wall only along the entire extent of the vertex of one of the dihedral angles of said parallelepipedon, the two edges of said one bag wall forming said dihedral angle each having an extension across said opening in contact with the other extension, and means comprising said extensions adapted to close said opening.

2. A bag having a wall in the form of a generally closed, hollow parallelepipedon with one opening extending directly through said wall only along susbtantially the entire extent of the vertex of one of the dihedral angles of said parallelepipedon, the two edges of said bag wall forming said dihedral angle each having an extension across said opening in contact with the other extension, and means comprising said extensions adapted to close said opening.

3. The bag of claim **2** in which the means adapted to close said opening comprises a strip of material secured to the opposite walls of said extensions across the opening by sewing a linear element through said material and said extensions.

4. The bag of claim **2** in which the means adapted to close said opening comprises means for securing said extensions together.

5. The bag of claim **2** in which the means adapted to close said opening comprises a linear element sewn through the opposite walls of said extensions.

6. The bag of claim **2** in which the means adapted to close said opening comprises a strip of adhesive material secured to the opposite walls of said extensions across the opening.

7. The bag of claim **2** in which the means adapted to close said opening comprises an autogenous weld between the adjacent walls of said extensions.

8. The bag of claim **2** in which the means adapted to close said opening comprises an adhesive material on at least one of the adjacent walls of said extensions.

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FRANKLIN T. GARRETT, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,204,856 September 7, 1965

Newton R. Wilson

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 4, line 28, strike out "one".

Signed and sealed this 19th day of April 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents