June 27, 1961 O. L. DUBIE 2,990,036

MATERIAL HANDLING BIN

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Fig. 1.

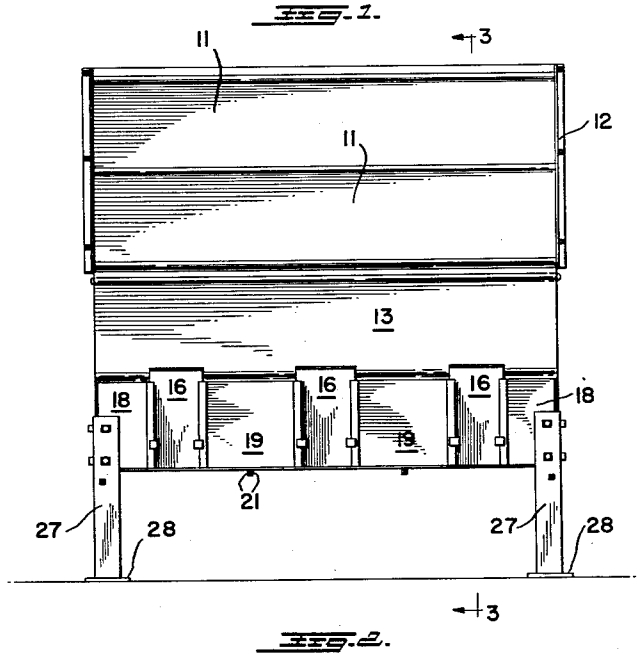
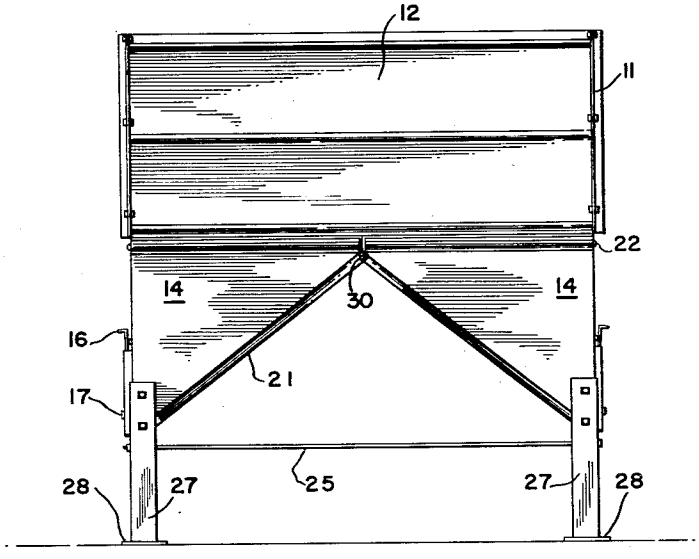



Fig. 2.




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Fig. 3.

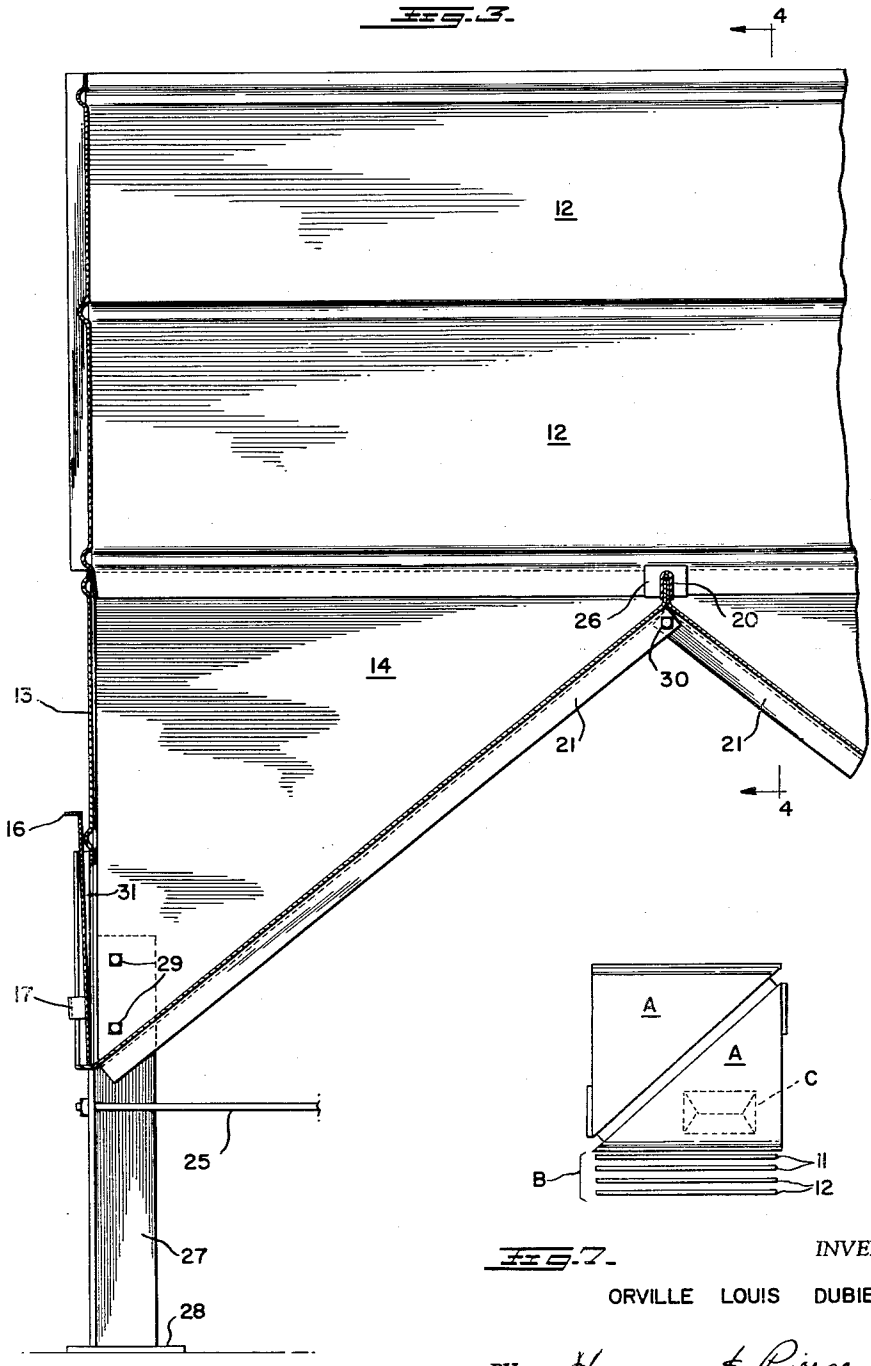






Fig. 7.

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MATERIAL HANDLING BIN

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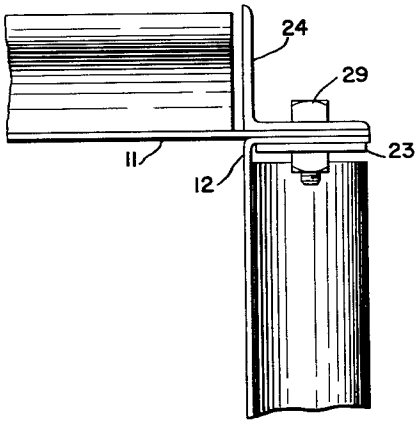



Fig. 5.

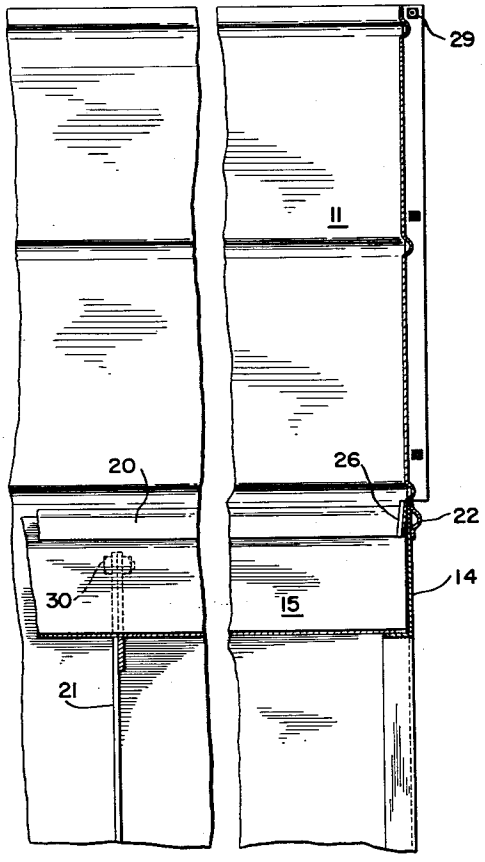
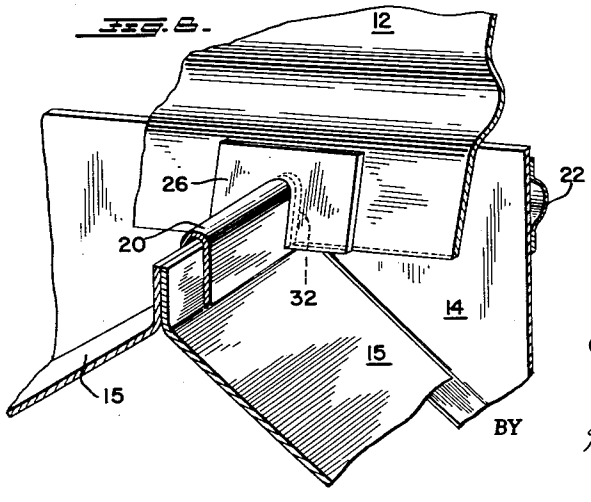



Fig. 4.

Fig. 6.




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United States Patent Office

2,990,036

Patented June 27, 1961



2,990,036

# MATERIAL HANDLING BIN

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Filed Mar. 5, 1957, Ser. No. 643,963

5 Claims. (Cl. 189—3)

An essential item of equipment for farmers, road maintenance engineers, and others is a material handling bin for the storage and dispensing of bulk materials. It is desirable that such a bin be spacious enough to handle up to several tons of dry materials, yet at the same time it should take up a minimum of storage and shipping space before final assembly for its ultimate use.

A further desirable feature is the ability to completely discharge the stored material through one or more dispensing openings. Material handling bins presently available do not provide the above desideratum.

It is, accordingly, an object of the present invention to provide an improved material handling bin shaped to readily discharge the stored contents thereof.

A further object of the present invention is to produce a fabricated bin which may be shipped and stored in a partially assembled state that is economical of space, and then be readily assembled by the user.

A more specific object of the instant invention is to provide a bin which may be prefabricated in part into "knock-down" units for shipment, yet may be conveniently set up for use with a minimum of complicated parts and fastening means.

In particular, it is an object of the present invention to provide a material storage, handling, and dispensing bin of sheet material pre-assembled into units by the manufacturer for final assembly by the user.

The above and further objects and details of the invention will be readily apparent upon consideration of the detailed description of a preferred embodiment thereof which follows, in which:

FIG. 1 is a general side elevation view of the assembled bin;

FIG. 2 is an end elevation view of the bin of FIG. 1, drawn to a similar scale;

FIG. 3 is a partial vertical section of the bin taken along line 3—3 of FIG. 1, and drawn to an enlarged scale to show certain details thereof;

FIG. 4, taken along line 4—4 of FIG. 3, shows, in section, additional details of the bin construction;

FIG. 5 is a plan view to a further enlarged scale, showing a detail of a method of assembling the vertical side and end walls of the bin;

FIG. 6 is a partial isometric view of the interior of a portion of the bin according to the present invention; and

FIG. 7 is a schematic end elevation of a partially assembled bin representing one method of packaging for shipment.

Referring now to the drawings, it will be apparent that the assembled bin may be basically cubic in shape with a pair of slanted bottom or floor members **15** which project upwardly into the cubic space to form two triangular hopper sections that direct the stored material to a plurality of discharge openings **31**. Such openings are fitted with access doors **16**.

The upper section of the bin comprises a substantially square open assembly consisting of four walls of sheet material. Front and back walls **11** are identical to one another. The two interconnecting side walls **12** are



similarly identical to each other, and differ slightly from walls **11** in the provision of angular flanges at the edges thereof so that the four wall sections may be attached to one another by the fastening means **29**, as clearly shown in detail of FIG. 5, to form a unitary upper section.

The two identical lower hopper sections each comprise an open topped assembly consisting of the aforementioned upwardly slanting floor member **15** to which an upstanding generally triangular side wall member **14** is securely attached at either end by any suitable means, such as welding, bolting, riveting, or the like to form a material tight joint. A vertical skirt member **13** of sheet material extends between the two side wall members **14** to form part of the outwardly facing wall of each hopper. Skirt **13** is attached to the walls **14** in a manner similar to that of floor member **15**. Spaced vertical panel members **18** and **19** are similarly secured at their upper edges to the lower edge of skirt **13**, and at their lower edges to the floor member **15** so as to define a plurality of discharge openings **31**. Panels **18** are further secured in a material tight joint to the side walls **14** where they abut the same at either end of the outer hopper wall.

Access doors **16** are provided to close the openings **31**. In the preferred embodiment, each door may have a pair of lugs **17** suitably affixed thereto or formed therefrom. The lugs **17** act to guide door **16** between the opposed vertical edges of the panels **18**, **19**, which define each discharge opening **31**. As indicated in FIGS. 1 to 3, the panel edges may be suitably bent to serve as runners to retain the doors **16**.

It should be noted at this point that the floor member **15** of each hopper section is reinforced by a plurality of reinforcing members **21**. Two such members are shown attached to the underside of floor **15** by welding or other suitable means along a line parallel to the plane of wall members **14**. Reinforcing members **21** should be selected from that class of structural shapes which are provided with one or more upstanding flange or web sections in order to properly brace the hopper section bottom, and to further perform an important and novel assembly function according to the present invention. Members **21** are indicated in the drawings as being of the well known "angle-iron" type, having a cross-section designated as L. It is not necessary to be limited to this particular shape in order to practice the invention, for other shapes, such as the "tee," T; "box," "□"; "eye," I; for example, may be used, as will become apparent in the explanation which follows.

Referring now to FIGS. 3, 4, and 6, the important steps in assembling the material handling bin are as follows:

The two hopper sections are placed in abutting back-to-back relation, and as detailed in FIG. 4, the reinforcing members **21** of each hopper are attached to the respective bottoms **15** so that in assembly the upstanding flange or web elements on the underside of one hopper project and lie adjacent those of the other hopper at the bin centerline. Fastening means **30**, shown as bolts, but which may alternately be rods, pins, clamps, or the like, are used to secure the adjacent flanges of the reinforcing members **21**, together, and thereby secure the backs of the hoppers to one another.

As shown in FIGS. 3 and 6, a U-shaped ridge strip or cap **20** serves to additionally secure the abutting back

edges of the two hopper sections together along a line at the interior of the bin in a material tight joint.

In order to elevate the bin for convenient access to the doors **16**, the supporting legs **27**, which may be formed of angle-iron as shown in the drawings, are fastened to the outer corners of the hopper sections by fastening means **29**. Suitable load bearing plates, or feet **28**, may be attached to the base of each leg if desired. Two tie rods **25** are provided which extend between legs **27** at each end of the bin to maintain the hopper sections in proper spaced relation.

The upper section of the bin, made up of walls **11** and **12**, is shown as merely resting in position above the lower hopper sections. The weight of the upper section will normally prove sufficient to keep it in place, since the lower edges thereof are bent inward slightly to provide an interlocking material tight joint around the top perimeter of the hopper sections. Obviously, fastening means such as **29** may be used between the adjacent edges of elements **11** and **13**, and **12** and **14**, if found necessary or desirable.

As shown in FIGS. 3 and 4, and the detail of FIG. 6, it is an important feature of the preferred construction that the ridge cap strip **20** is not fastened over the abutting edges of the floor members **15**, but merely rests over their edge joint. However, a side lock piece **26**, having the general configuration of an inverted **U** is securely fastened to the inner lower face of each upper wall member **12** at the proper position to overlie cap strip **20** and hold it in place by the combined weight of the assembled upper section. If the sheet material of side wall **12** is too thick to provide enough tolerance for wall **12** to fit inside wall members **14**, a cut-out **32** may be made in the lower face of wall **12** in alignment with the opening in lock piece **26** so that both elements **26** and **12** will overlie strip **20**.

The usual methods of design and fabrication of sheet material structures may be employed in carrying out the invention. For example, stiffening ribs may be formed in walls **11**, **12** and **13** as shown in the drawings, and a reinforcing section or strip **22** may be attached to stiffen the upper edge of the wall pieces **14**. Further, as shown in detail in FIG. 5, a reinforcing flange **23** and angle member **24** are preferably provided to stiffen the joint where walls **11** and **12** meet.

FIG. 7 is a schematic representation of one possible method of storing or shipping the material handling bin as a plurality of "knock-down" units for economy of space. Each unit A of the figure represents a preassembled hopper section comprising elements **13**, **14**, **15**, **18**, **19** and **21**; unit B represents the four wall elements **11**, **12**; and the package C which may be placed inside one of the units A contains the remaining elements required to make up the assembled bin. Due to their shape, the two units A may be fitted together to form a substantially rectangular block with the wall members of unit B nested closely adjacent thereto, to provide the utmost economy of space. Units A may be secured to one another, and unit B may be further fastened to these units by banding, strapping, or the use of wires or ropeties to facilitate handling for storage or shipment.

Various modifications of the embodiment shown in the drawings may be made without affecting the scope of the present invention, as will occur to those skilled in the art. For example, vertical interior partitions may be provided as required, suitably **V**-notched at the bottom, to subdivide the bin into separate areas, or top cover members may be attached as required. Accordingly, the foregoing description is to be taken by way of illustration only, and not as limiting the practice of the present invention, which should be interpreted according to the scope of the appended claims.

I claim:

1. A knockdown material handling bin comprising in combination; a plurality of independent prefabricated units including a plurality of hopper sections and a common upper storage section, each of said hopper sections including a front wall having material discharge means located therein, an upwardly inclined bottom wall attached to the lower edge of said front wall, and two triangular side panels, means carried by the undersides of said bottom walls to clamp said hopper sections together along the mutually adjacent upper edges of said bottom walls, cap means to overlie a seam formed by the upper edges of said bottom walls to further secure said hoppers together and to form a material tight joint between said hoppers, and positioning means carried by said storage section to engage said cap and position said storage section on top of said hopper sections.

2. A knockdown material handling bin comprising in combination; a plurality of independent prefabricated units including a plurality of hopper sections and a common upper storage section, each of said hopper sections including a material discharge means, and an upwardly inclined bottom wall, means carried by said bottom wall to clamp said hopper sections together along the mutually adjacent upper edges of said bottom walls, cap means to overlie a seam formed by the upper edges of said bottom walls, and positioning means carried by said storage section to engage said cap to locate said storage section on top of said hopper sections.

3. In a knockdown material handling bin having independent prefabricated units including two hopper sections and a common storage section with means carried by the unit for mounting said storage section on top of and in mutual communication with said hopper sections, apparatus for securing the prefabricated hopper sections together along mutually adjacent walls comprising in combination; vertically extending edge portions on the mutually adjacent walls of said hoppers, an inverted **U**-shaped cap mounted over the adjacent vertical edge portions of said mutually adjacent walls and extending the length thereof, downwardly opening slot means in the walls of said storage section for straddling said cap, whereby the weight of said storage section is utilized to hold said cap in place, and means including a plurality of ribs mounted on the adjacent bottom walls of said hoppers and having overlapping end portions for releasably securing said hoppers together, said **U**-shaped cap and said last mentioned means comprising the sole attaching structure between said prefabricated hoppers.

4. A knockdown material handling bin comprising in combination; a plurality of independent prefabricated units including two hopper sections and a common upper storage section, each of said hopper sections including a substantially vertical front wall having material discharge means on the lower portion thereof, an upwardly inclined bottom wall attached to the lower edge of said front wall, side panels extending between said bottom wall and said front wall, a vertically extending end portion on the upper edge of the bottom wall, means carried by the underside of the hopper bottoms to releasably fasten said hopper sections together with the upper edges of said bottom walls in juxtaposition, and an inverted **U**-shaped securing cap mounted over the upper edges of said bottom walls and extending the length thereof, said attaching means carried by the undersides of said hopper bottom and said **U**-shaped cap providing the sole securing structure between said hopper sections, and means for positioning said common storage section on top of and in mutual communication with said hopper sections including downwardly opening slots in the walls of said storage section positioned to straddle said **U**-shaped cap.

5. The device according to claim 3, wherein said prefabricated hopper sections are identical in structure and triangular in cross-section and said common storage section includes four equidimensional walls, whereby said prefabricated hoppers and said equidimensional walls

may be assembled in compact relation to form a rectangular shipping package.

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