April 15, 1930. C. S. JOHNSON 1,754,516

BIN

Filed April 27, 1928

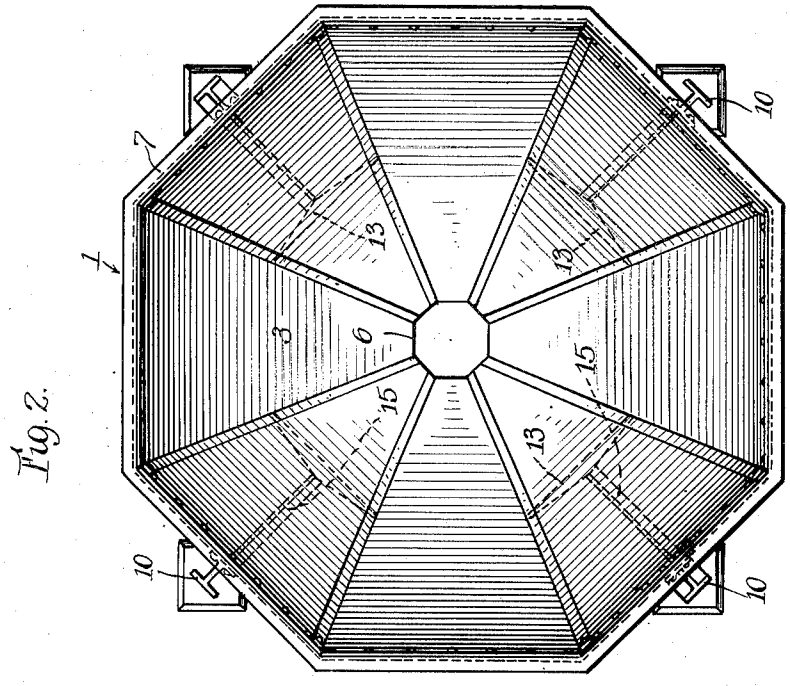

Fig. 2.

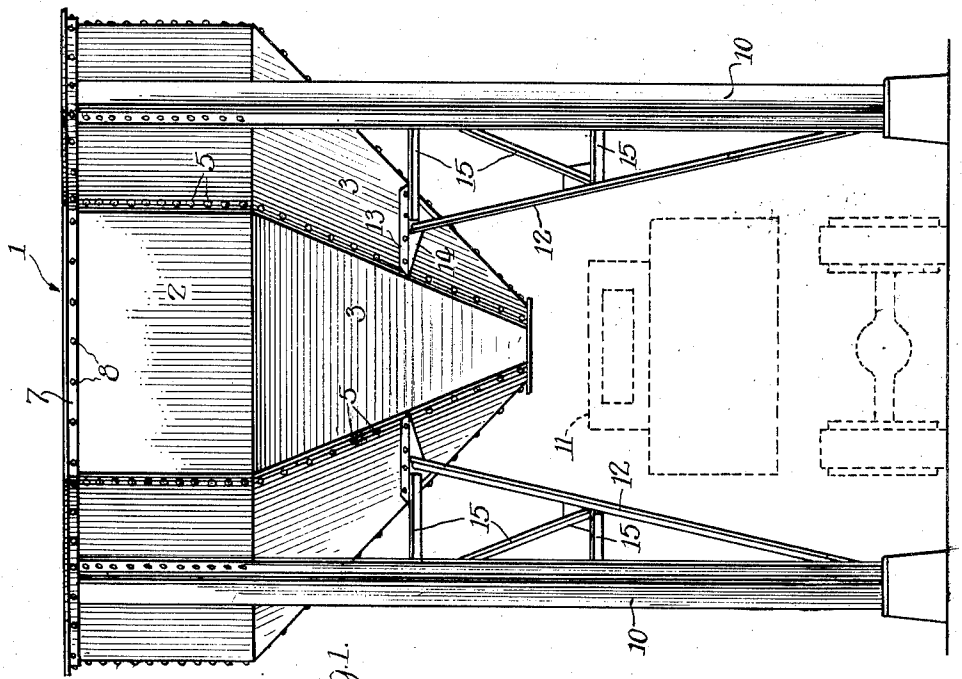

Fig. 1.

Inventor:
Charles S. Johnson,
By Chisholm Parker & Carlson
Attys.

Patented Apr. 15, 1930

1,754,516

UNITED STATES PATENT OFFICE

CHARLES S. JOHNSON, OF CHAMPAIGN, ILLINOIS

BIN

Application filed April 27, 1928. Serial No. 273,210.

The invention relates generally to bins which are adapted to contain granular materials such as sand and gravel aggregates. More particularly it relates to bottom discharge bins of this character which are supported above a drive-way or work space for the purpose of loading vehicles or the like which may be positioned thereon.

Bins for this purpose as constructed heretofore have been square, rectangular or round in form.

It is generally known that round bins are more economical than square or rectangular bins in metal required for the container because of the greater relation of volume to the surrounding surface of the container that may be employed. The round bins more closely approach a sphere in form and it is well known a sphere has a greater volume per unit of surface than any other solid form.

Round bins are preferably built with conical bottoms and support the load with the bottom metal in tension and avoid bending strains in flat plates which occur in square or rectangular bin bottoms. It is well known in the art that supporting a load by metal in tension is the most economical manner of employing the metal.

Round bins support the load between the standards or columns by the circular girder which the vertical round walls naturally form. These circular girders function as continuous girders or beams. The continuous girder or beam is well known to the art as the most economical type of girder or beam as to the amount of metal employed.

However, round bins require manufacturing processes not required by square or rectangular bins and some of these processes are expensive and would preferably be avoided. The round bins require hot flanging operations on the shell plates in order to form the riveted connection between the vertical wall and bottom plates. The round bins with the conical bottoms require hot flanging operations, or multiple bending operations, or conical rolling of the plates in order to form the cone surfaces and these operations would all preferably be avoided due to the expense involved.

The primary object of this invention is to provide a bin which approaches the metal economies of the round bin construction and combines these with the manufacturing economies of flat plate construction where hot flanging, multiple bending or conical rolling are avoided.

A further object is to provide an overhead bin construction that may be economically sway braced.

A further object is to provide a bin having wide angles in the bottom corners, thereby yielding low resistance to the discharge flow of materials.

A further object is to provide a bin of flat plate construction supported by standards or columns attached to the vertical walls intermediately in the length of the vertical wall sections so that these particular wall sections may function as double arm cantilevers, thereby working to save metal required to resist beam strains.

A further object is to provide a bin so supported by columns or standards that any flat vertical wall sections which function as end-supported beams may be shorter in length than the distance between the columns or standards, thereby working to save metal required to resist beam strains.

A further object is to provide a flat plate bin so formed and supported by a related number of standards attached to the vertical walls, that all the wall sections may function in combination as a continuous girder or beam, thereby working to save metal required to resist the supporting strains.

Other objects and advantages will become apparent from the following description and from the drawings in which:

Figure 1 is a front elevational view of a bin embodying the preferred form of the invention, showing somewhat diagrammatically a truck in loading position thereunder.

Fig. 2 is a plan view of the bin shown in Fig. 1.

For purposes of disclosure I have illustrated in the drawings and will hereinafter describe in detail the preferred embodiment of the invention with the understanding that I do not intend to limit the invention to the

particular construction and arrangement shown, it being contemplated that various changes may be made by those skilled in the art without departing from the spirit and scope of the appended claims.

In the embodiment chosen for purposes of disclosure, the invention is shown as applied to a bin 1 which is formed from sheet metal. The bin 1 is preferably formed from a plurality of similar side-wall sections 2 having integral trapezoidal bottom portions 3 which are adapted to be bent inwardly to form the converging bottom portion of the bin. In the present case eight of such side-wall sections 2 are secured together by rivets 5 so that the bin 1 thus formed is octagonal in shape with a bottom discharge opening 6 defined by the lower ends of the converging walls 3. For the purpose of stiffening the upper edges of the side walls 2, a relatively small angle iron bar 7 may be secured thereabout by rivets 8.

To support the bin 1 in an elevated position, as above a driveway or work space, a plurality of column members or standards 10 are provided which are preferably positioned about the bin so as to form a passageway and allow a truck 11 to be driven thereunder for loading. It is contemplated that a sufficient number of columns will be employed to produce a stable structure and in the present instance four columns 10 are shown, one being secured to each alternate side wall 2 centrally thereof. Preferably the columns 10 are in the form of H-columns and extend along the outer surfaces of the side walls 2 to the top edge thereof so that the walls may be securely riveted to the flanges of the columns.

When secured in this manner, each of the two ends of the side walls 2 which are secured directly to the columns are forced to constitute cantilever beams and the loads thereon will normally be substantially equal.

It will be apparent that since the portions of the sides 2 which are attached to the columns act as cantilevers, the load placed thereon will result in diagonal tension in the plate and that the compressive stresses developed therein will be in the lower part of the vertical portion of the side wall, which part is reinforced against lateral bending by the angular bottom walls 3 attached thereto. It will also be seen that the intermediate side walls 2, for any given capacity of bin, will be less than half the length of the side walls of an equivalent square shaped bin such as has been used heretofore and that consequently the stresses therein will be less than one-fourth as great.

It will also be evident that the corners formed in the vertical walls by the junction of adjoining wall sections will function as stiffeners or struts for holding the vertical walls properly in place to resist the bending strains developed by the load transmitted from the bottom plates. Also that these stiff corners efficiently serve to transmit the load from the intermediate end-supported beam sections to the adjoining cantilever sections of the vertical walls.

It will also be noted that the combination of alternate flat sections of vertical walls supported by columns central in their length, with intermediate flat sections of vertical walls unsupported directly by columns, results in the wall functioning as a continuous beam or girder and the inherent economies of the continuous beam are thereby introduced into the construction along with the use of flat plate construction.

It will also be apparent that the flat surfaces in the bin bottom are shorter in width than is obtainable with square or rectangular bins and that therefore less thickness of plates or less stiffening provisions are required for the same loadings per unit of bottom surface.

To ensure greater rigidity of the bin structure, bracing means is preferably provided which extends from each of the columns 10 and perpendicularly to the bottom wall portions 3. In its preferred form, each of these braces comprises a main member 12 suitably secured at one end near the bottom of the column 10 and which is secured at its other end to the bottom wall portion 3 of the wall section 2 to which the column is attached. This attachment is preferably made by means of a plate 13 extending laterally across the section 3 and riveted thereto and which has a gusset plate 14 integrally formed therewith and riveted to the strut 12. Preferably a plurality of truss members 15 are positioned between the main strut 12 and the column 10 so that together with the column 10, the members 12 and 15 form a substantially rigid truss extending perpendicularly to and supporting the bottom plate 3.

When the bracing structure is positioned in the manner described, only one brace will be needed for each column and due to the fact that the braces are positioned at an angle relatively to the driveway, a greater clearance will be provided between the braces for the passage of vehicles to be loaded. Furthermore, the positioning of the supporting columns intermediate the ends of the side walls so as to make the ends of the side walls act as cantilevers serves more efficiently to utilize the material of the sloping bottom walls, since the metal therein acts to prevent lateral flexure of the bottom edge of the vertical side walls.

From the foregoing description it will be apparent that the invention provides a bin structure which requires a minimum amount of material to produce a substantially rigid bin of a given capacity, thus reducing the cost thereof and facilitating the handling and shipping of the bin.

It will also be observed that due to the similarity and size of the sections and the reduced number of braces from which the bin structure is formed, the fabrication and erection of the bin is much more simple and economical than that of bins which have been heretofore known. The actual economies in cost of material used and labor required have been found to vary from 15 to 33 per cent depending upon the size of bins compared.

I claim as my invention:

1. A loading bin adapted to straddle a drive-way so that vehicles may be moved thereunder to be loaded therefrom, said bin comprising a plurality of duplicate side sections arranged to form an octagonal bin, said sections having sloping bottom portions which converge inwardly to form a bottom discharge opening, a plurality of columns, one attached centrally to each alternate side section, and brace members attached one to each of said columns and extending inwardly toward the center of the bin and arranged to brace said converging bottom portions centrally thereof.

2. A loading bin adapted to straddle a drive-way so that vehicles may be moved thereunder to be loaded therefrom, said bin comprising a plurality of duplicate side sections arranged to form an octagonal bin, said sections having sloping bottom portions which converge inwardly to form a bottom discharge opening, and a plurality of columns, one attached centrally to each alternate side section.

3. A bin structure of the character described comprising, in combination, a plurality of supporting columns, a plurality of side walls each secured intermediate its ends to one of said columns so as to project laterally therefrom in both directions in the form of cantilever beams, a plurality of other side walls positioned alternately with the first mentioned side walls and attached thereto so as to be supported thereby and to form a continuous enclosing side wall for the bin, and a bottom wall for said bin attached to all of said side walls.

4. A structure of the class described comprising a bin having side walls with vertical top portions and converging bottom portions which serve to brace said vertical portion against lateral flexure and also to define a bottom discharge opening, and a plurality of columns arranged to provide a stable support for said bin in an elevated position, each of said columns being attached to one of said side walls intermediate the ends of said wall so that compressive stresses developed in the vertical portions of said wall due to a load placed in said bin will be located in the lower part of said vertical top portion which part is laterally braced by one of said converging bottom portions.

5. A bin structure of the character described comprising a plurality of vertical side walls and converging bottom walls defining a bottom discharge opening, and a plurality of columns, each engaging one of said vertical side walls in supporting relation centrally thereof.

6. A bin structure of the character described comprising a plurality of duplicate side sections formed from flat sheets of metal, each angularly disposed relatively to the adjoining section, and a plurality of supports attached to said side walls intermediate the ends of the walls and arranged to form a stable structure.

7. In a structure of the class described, a bin adapted to contain granular materials, having side walls, and bottom walls defining a central discharge opening, columns attached to said bin to support the bin above a driveway, and bracing members extending inwardly toward the center of the bin from said columns to the bottom walls perpendicularly to said walls.

8. A bin structure of the character described, comprising a plurality of side walls having sloping bottom portions defining a bottom discharge opening, a plurality of columns, each attached to one of said side walls centrally thereof, and a plurality of bottom braces, one extending inwardly toward the center of the bin from each of said columns perpendicularly to one of said bottom walls.

In testimony whereof, I have hereunto affixed my signature.

CHARLES S. JOHNSON.