Nov. 10, 1942. A. B. OSGOOD ET AL 2,301,317

GRAIN BIN

Filed March 31, 1941 3 Sheets-Sheet 1

Fig. 1

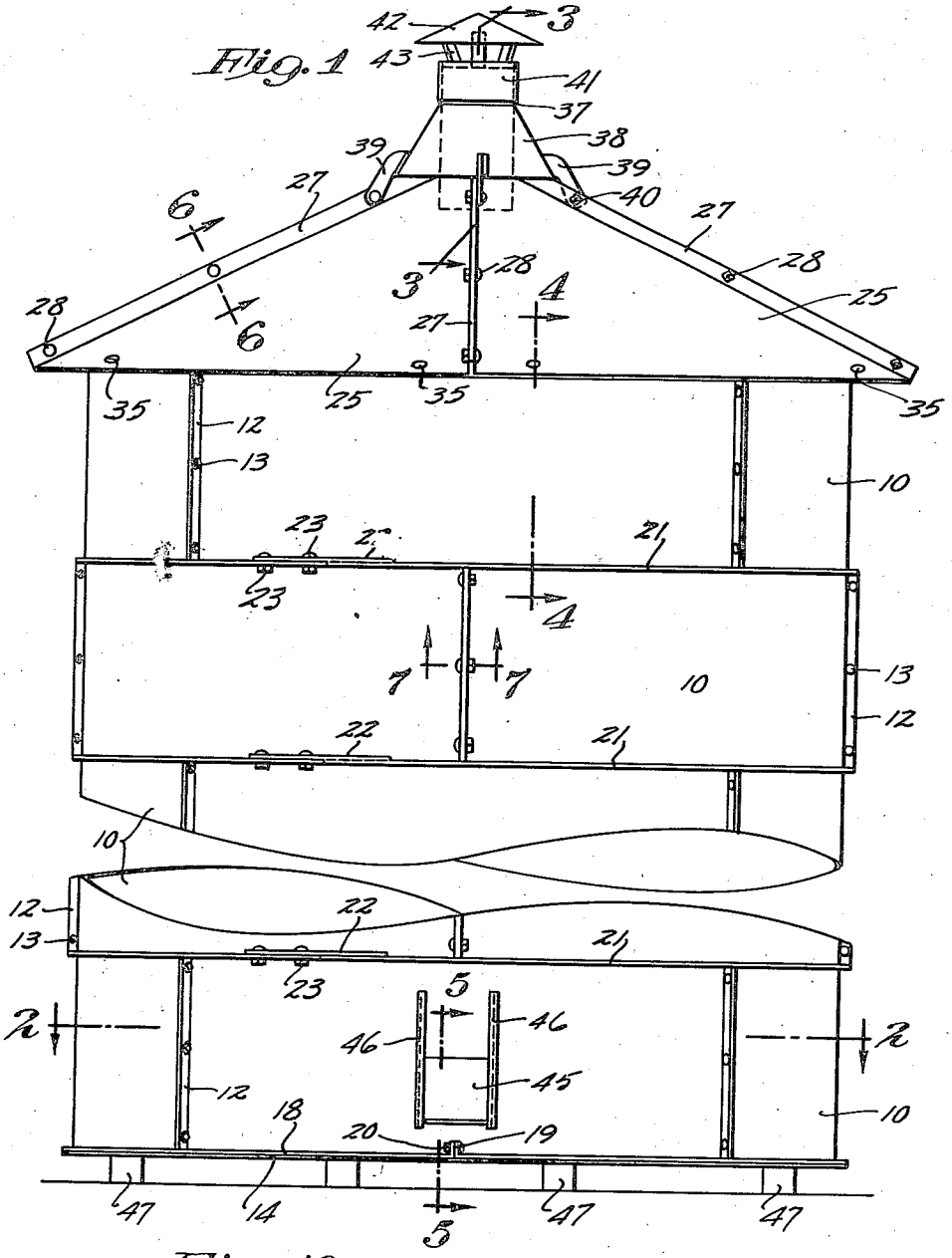
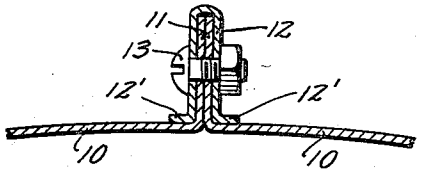


Fig. 10



Inventors
Arthur B. Osgood
David R. Larson
By their Attorneys
Merchant & Merchant

Nov. 10, 1942. A. B. OSGOOD ET AL 2,301,317

GRAIN BIN

Filed March 31, 1941 3 Sheets-Sheet 2

Fig. 2

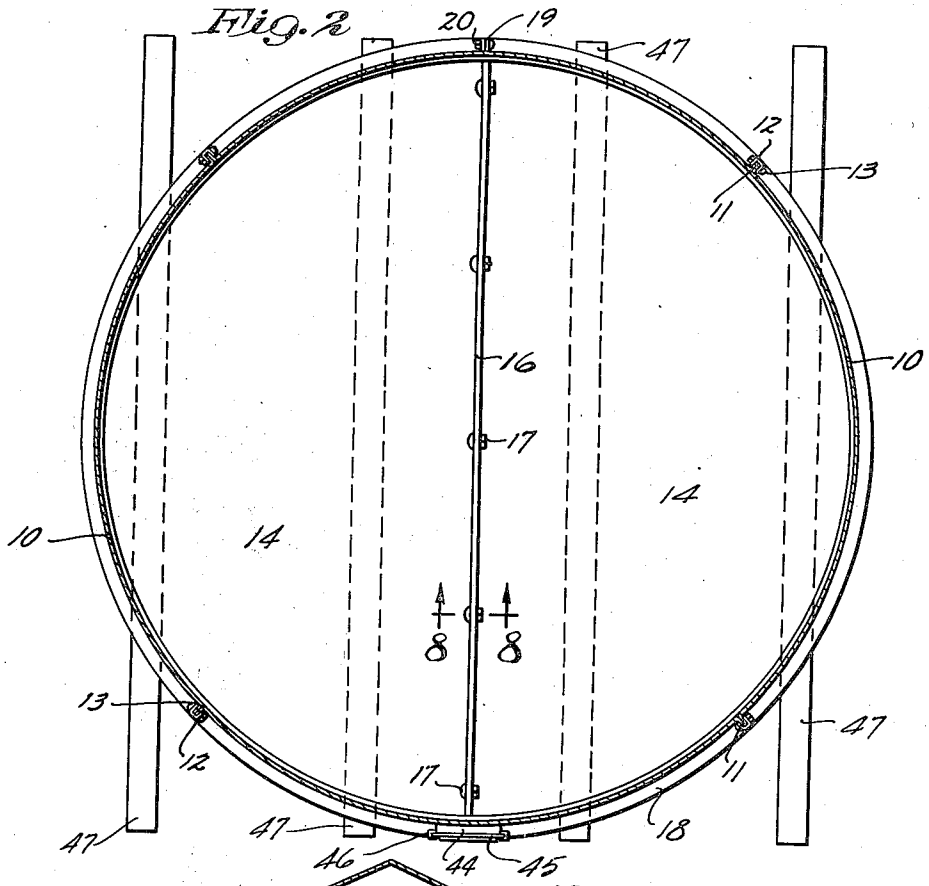
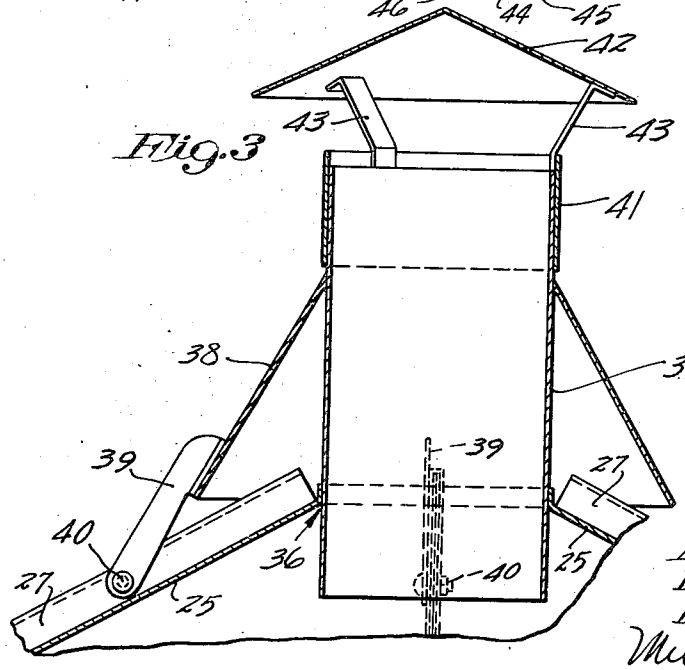


Fig. 3



Inventors
Arthur B. Osgood
David R. Larson
By their Attorneys
Merchant & Merchant

Nov. 10, 1942. A. B. OSGOOD ET AL 2,301,317

GRAIN BIN

Filed March 31, 1941 3 Sheets-Sheet 3

Fig. 4

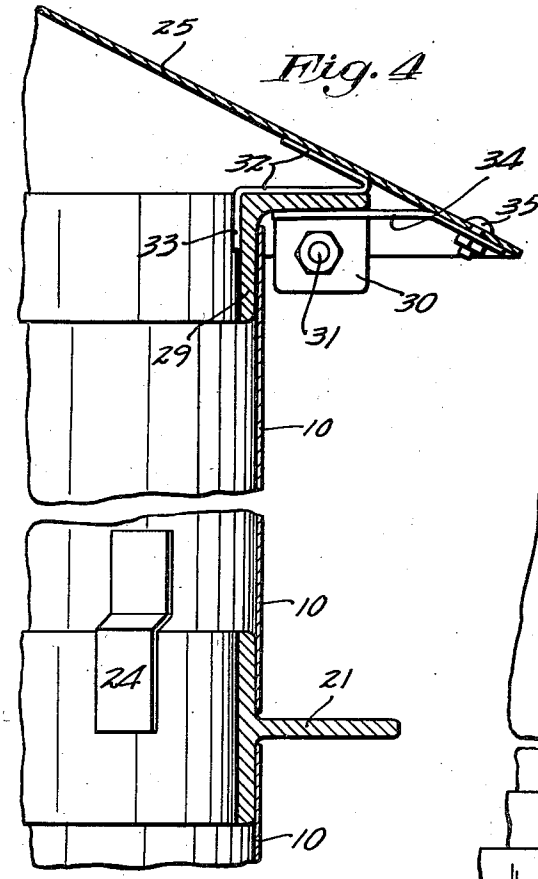


Fig. 5

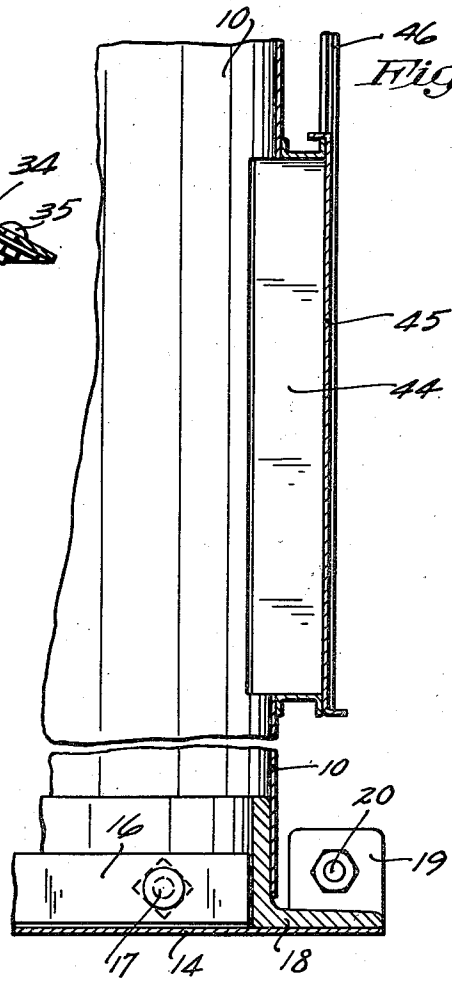


Fig. 6

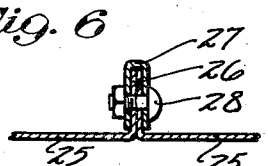


Fig. 7

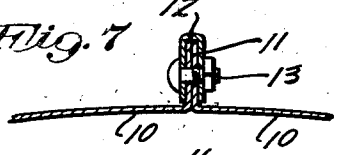


Fig. 8

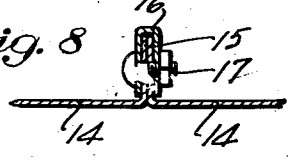
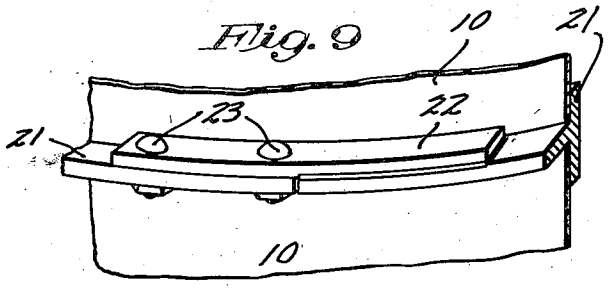


Fig. 9



Inventors
Arthur B. Osgood
David R. Larson
By their Attorneys
Merchant & Merchant

Patented Nov. 10, 1942 2,301,317

UNITED STATES PATENT OFFICE

2,301,317

GRAIN BIN

Arthur B. Osgood and David R. Larson,
Minneapolis, Minn.

Application March 31, 1941, Serial No. 386,060

6 Claims. (Cl. 189—3)

Our invention relates particularly to grain storage tanks or bins and, generally stated, consists of the novel devices, combinations of devices and arrangement of parts hereinafter described and defined in the claims.

The immediate object of the invention is to provide such a bin that is of a structure capable of being quickly erected, easily taken apart, and readily shipped in knock-down form from one place to another in ordinary box cars. The improved bin is capable of being made in various different sizes but will quite generally be made in sizes too large to be placed, assembled, in a railway box car or to be shipped, set up, or assembled on flat cars.

A bin of this kind will be found very desirable for use in connection, for example, with country elevators where at certain times the country elevator will not take care of all of the grain that it will be called upon to handle during certain seasons and where the bin may be very advantageouly used as an auxiliary or supplemental grain storage device.

In our Western country and elsewhere, it frequently happens that during the course of very few years the maximum output for a particular district will vary. This improved bin is of such character that when it is no longer required in one locality, it may be taken down, shipped and again erected in some other locality.

In meeting these requirements we have devised a bin that is made up of sections capable of being quickly assembled and securely united at the place of erection. The improved bin is therefore made up of a multiplicity of superimposed cylindrical or approximately cylindrical bands and each band is made up of a multiplicity of segments. Important features of the invention are directed to simple and efficient means or connections for uniting not only the bands but the sections of the bands. The improved bin also involves a novel roof structure including an air ventilated cupola. This cupola has novel features and involves what may be designated as a primary or main cupola and a secondary or supplemental cupola. The primary cupola is very rigidly but detachably secured to the roof structure while the secondary or supplemental cupola is capable of being freely lifted or readily removed to afford means for introducing grain into the bin through the primary cupola.

The invention further involves important details of construction and arrangement of parts as will more fully appear in the description of a commercial bin illustrated in the accompanying drawings wherein like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a front elevation showing the completely assembled bin;

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical section taken approximately on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary section taken on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary section taken approximately on the line 5—5 of Fig. 1;

Fig. 6 is a detail in section taken on the line 6—6 of Fig. 1;

Fig. 7 is a fragmentary section taken on the line 7—7 of Fig. 1;

Fig. 8 is a fragmentary section taken on the line 8—8 of Fig. 2;

Fig. 9 is a fragmentary section in perspective illustrating one of the joints formed between sections of the horizontally disposed coupling rings which latter are shown as cylindrically bent T-irons; and

Fig. 10 is an enlarged view corresponding to Fig. 7 but illustrating a preferred form of sheathing used to connect the shell-forming bands of the bin.

As above indicated, the approximately cylindrical body of the bin is made up of a multiplicity of superimposed approximately cylindrical bands or shell-forming bands, each of which is made up of a plurality of cylindrical segments 10 preferably of sheet steel. The number of these sections 10 for each cylindrical shell-forming band will vary in accordance with the diameter of the bin and will be greater in number for a large than a small bin. In the drawings we have shown four of these sections 10 in each shell-forming band. These sections 10, at their abutting ends, have outturned flanges 11, see Fig. 7, that are overlapped by metal sheaths 12 that are folded U-shaped in cross section. Nut-equipped bolts 13 are passed through these sheaths and through the flanges 11 and thus the sections of the bin-forming bands are rigidly but detachably connected with tight joints.

Preferably the bin is provided with a sheet metal bottom 14 that is made of two semi-circular sections. At their diametrical abutting edges the bottom-forming plates are provided with upturned flanges 15 that are embraced by a sheet metal sheath 16 also bent U-shaped in cross section and closely fitting said flanges.

Nut-equipped bolts 17 are passed through this sheath and said upturned flanges and thus the sections of the bottom-forming plate are rigidly but detachably connected. Welded, bolted, or otherwise rigidly secured to the outer rim portion of the sections of the bottom plate 14 is an anchoring base ring 18 that is made up of two semi-circular angle iron segments that are coextensive with the circumference of the bottom sections 14 to which they are secured. The outturned horizontal flanges of the angle irons 18, at their abutting ends, have upturned lugs or portions 19 through which nut-equipped bolts 20 are passed, see Figs. 2 and 5, so that the bottom sections are thus additionally anchored together but made readily detachable.

The lowermost of the composite shell-forming bands is telescoped over the upturned annular flange of the composite base ring 18, as best shown in Fig. 5. The several composite shell-forming bands are connected and kept in perfect alignment by heavy coupling rings 21 preferably made of T-iron sections bent into cylindrical form with the horizontal flanges of said rings projecting outwardly. The depending cylindrical flanges of these coupling rings 21 are telescoped into immediately lower composite shell-forming bands and immediately upper composite shell-forming bands are telescoped over the upturned cylindrical flanges of said coupling rings.

The coupling rings 21 to correspond with the base ring 18 is made up of two semi-cylindrical sections. At the abutting ends of the sections of joint ring 21 metallic joint straps 22 are welded or otherwise rigidly secured to the one flange and are rigidly but detachably secured to the abutting end of the other flange by nut-equipped bolts 23, as best shown in Fig. 9. Certain of the sections of some of the composite shell-forming bands are provided with rigidly secured lap straps or brackets 24, see Fig. 4, that overlap the interiors of the joint rings 21. These lap straps or brackets 24 serve to hold certain of the sections of the composite bands in place while the structure is being erected and the sections put together. In structure of any considerable size the sections of the shell-forming bands will usually be assembled one at a time.

When the desired number of multi-section shell-forming bands are applied, the roof structure will be added to the upper member. This roof structure is made up of a multiplicity of conical roof segments 25 which, at their abutting edges, are provided with outturned flanges 26 that are embraced by sheet metal sheaths 27 that are U-shaped in cross section. Nut-equipped bolts 28 are passed through the sheath 27 and flanges 26, thereby rigidly but detachably connecting the said roof segments with a very tight water shedding joint, see Fig. 6.

In Fig. 10, which corresponds closely to the cross-section shown in Fig. 7, the U-shaped sheathing strips 12, at their edges, are provided with outturned flanges 12' that are pressed against the sheets 10 and reinforce the joint between the said sections. In fact, the U-shaped sheathings shown in section in Figs. 6, 7 and 8, will, in practice, all be formed with the said outturned flanges for the purpose stated.

The roof structure is supported on an angle iron upper ring 29 the downturned flange of which is telescoped up into the uppermost multi-section band, as best shown in Fig. 4. This upper or crown ring 29, like the base ring 18, is provided at the ends of its outturned flanges with lugs 30 which, by means of nut-equipped bolts 31 or the like, are rigidly but detachably connected on the same plan as described in connection with the base ring 18.

To properly align and position the roof structure on the crown ring 29, the sections 25 of said roof structure are shown as provided with rigidly secured brackets 32 that rest upon the said crown ring and have downturned ends 33 that engage the interior of said ring, as best shown in Fig. 4. Also the roof sections are preferably provided with hold-down straps 34 rigidly but detachably secured thereto by nut-equipped bolts 35 or the like. These hold-down straps 34 will be applied after the roof structure has been set and aligned by the brackets 32 and when applied anchor the roof structure to the crown ring against lifting movements.

At the apex of the conical roof is a quite large hole 36, see Fig. 3, through which is passed the large tube 37 of the primary cupola. This tube 37 has a rigidly secured depending conical skirt 38 that rests loosely on the upstanding ribs of the roof structure and is thereby held clear of the roof segments. This skirt 38 causes the cupola structure to shed water onto the roof and away from the hole 36.

As a means for anchoring the tube 37 and the skirt and which elements have been treated as a primary cupola, detachable to the roof structure, the said skirt is shown as provided with metallic anchoring straps 39 spot welded or otherwise rigidly secured thereto. The depending ends of the anchoring straps 39 are rigidly but detachably secured to the upturned ribs of the roof structure by nut-equipped bolts 40. The cap, which constitutes sort of a secondary cupola, is made up of a sleeve 41, and a cap 42, which elements 41 and 42 are spaced apart but rigidly secured together by metallic straps or brackets 43. The sleeve 41 is of a size to be telescoped over the upper end of the tube 37.

This cap or secondary cupola is capable of being readily removed so that a grain spout or tube may be entered into the upper end of the tube 37 for the delivery of grain into the bin. When the cap or secondary cupola is applied, as shown in Fig. 3, it will shed water and prevent the same from falling into the bin through the sleeve 37.

For the removal of grain from the bin one of the sections 10 of the lowermost multi-section shell-forming bands is provided with a doorway or opening formed in a metallic frame 44 that is spot welded or otherwise rigidly secured to the said section 10, see Figs. 1 and 5. This door opening is adapted to be opened and closed by a gate 45 which, as shown, slides in a guideway 46 formed in the frame 44. In Figs. 1 and 2 the bin is shown as supported on timbers 47 but, of course, that is not a feature of the present invention.

By reference particularly to Fig. 1 it will be noted that the vertical joint flanges 11 and the sheath 12 extend the full width of the segmental shell-forming bands and that they abut against the outwardly projecting flanges of overlying and underlying coupling rings 21. This gives a very stiff and rigid shell structure even when the elements are made of comparatively light sheet metal. The manner in which the sections of the roof structure 25 are connected by the elements 26, 27 and 28, makes the roof structure very stiff and strong also when made of comparatively light sheet metal.

The feasability and utility of this knock-down

tank structure has been thoroughly demonstrated. To sum up the major important accomplishments it may be stated that the structure, while strong and capable of being produced at relatively low cost, can be readily shipped, easily and quickly erected at the place where it is to be used, may be quickly knocked down or disassembled and again shipped and reassembled at another distant place.

A commercial embodiment of the invention has been illustrated but it will be understood that various modifications in the details of construction and arrangement of parts may be made within the scope of the invention herein disclosed and claimed.

What we claim is:

1. In a tank of the kind described, a multiplicity of superimposed approximately cylindrical shell-forming bands each made up of a multiplicity of segments, a base on which the lowermost band rests, a crown ring resting on the uppermost band, a roof supported by said crown ring, and flanged coupling rings interposed between and telescoped with the adjacent edges of intermediate bands, and in which structure said crown ring is an angle iron, the vertical flange of which is telescoped into the upper shell-forming band, the horizontal flange of said crown ring projecting outwardly, said roof structure having an aligning bracket seated on said crown ring, said roof structure having a detachable retaining arm engaged under the outstanding flange of said crown ring.

2. The structure defined in claim 1 in which said roof structure has a plurality of said aligning brackets, said brackets having depending inner ends engaging the inner surface of said crown ring.

3. The combination with a cylindrical tank, of an angle iron crown ring having its depending flange telescoped within the upper end of said tank and having its horizontal flange outstanding, a roof structure provided with aligning brackets resting on and extending within said crown ring, and retaining arms rigidly attached to the projecting portion of said roof structure and engaging under the outstanding flange of said crown ring.

4. The structure defined in claim 3 in which said crown ring is made up of curved angle iron segments provided with abutting coupling lugs depending from the outstanding horizontal flange thereof, the said retaining arms being engaged under the outstanding flange of said crown ring between the coupling lugs thereof.

5. In a tank of the kind described, an upright cylindrical shell, a diametrically divided base plate for said tank having a rigidly secured angle iron base ring, the upstanding flange of which is telescoped into the lower end of said shell, an angle iron crown ring having its vertical flange telescoped into the upper end of said shell with its horizontal flange projecting outward, and a roof structure detachably anchored to the outstanding flange of said crown ring.

6. In a tank of the kind described, an upright cylindrical shell, a diametrically divided base plate for said tank having a rigidly secured angle iron base ring, the upstanding flange of which is telescoped into the lower end of said shell, an angle iron crown ring having its vertical flange telescoped into the upper end of said shell with its horizontal flange projecting outward, and a roof structure detachably anchored to the outstanding flange of said crown ring, said base plate, base ring and crown ring being made up of semi-circular members, the joints of the base plate and base ring being in a common vertical plane.

ARTHUR B. OSGOOD.
DAVID R. LARSON.