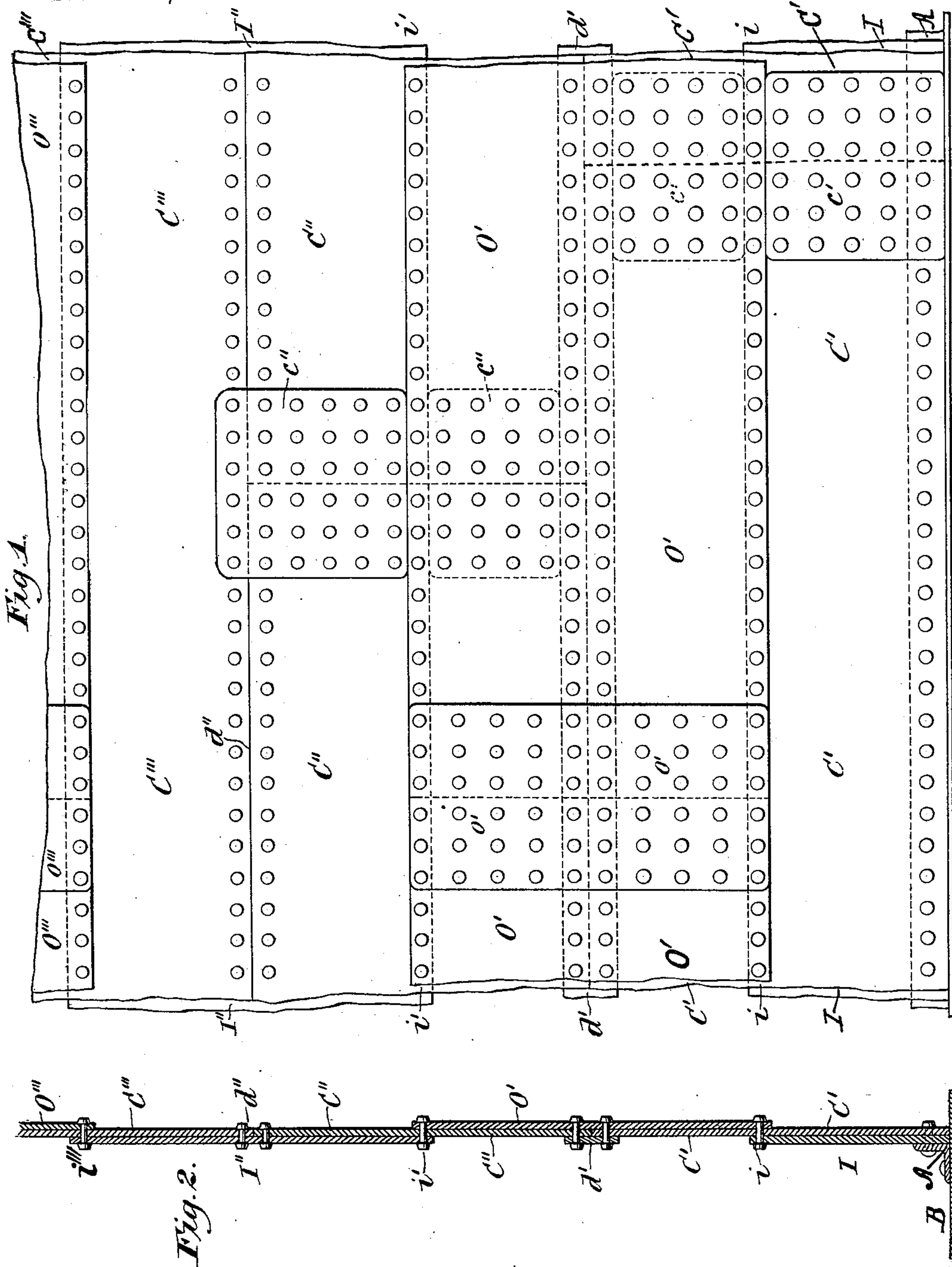


(No Model.)

J. W. OGDEN.  
TANK WALL FOR GAS RECEIVERS.

No. 547,155.

Patented Oct. 1, 1895.



Witnesses  
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# UNITED STATES PATENT OFFICE,

JOHN W. OGDEN, OF BROOKLYN, NEW YORK.

## TANK-WALL FOR GAS-RECEIVERS.

SPECIFICATION forming part of Letters Patent No. 547,155, dated October 1, 1895.

Application filed September 19, 1894. Serial No. 523,454. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. OGDEN, of Brooklyn, New York, have invented certain new and useful Improvements in Tanks for Gas-Holders, of which the following is a description, referring to the accompanying drawings, which form a part of this specification.

My invention relates particularly to the formation of the walls of such tank when made out of iron or steel plates; and its object is to give the greatest amount of strength in a manner to resist the strains peculiar to the tank and at the same time to produce a construction which may be readily and cheaply erected and which may be thoroughly reliable and durable in sustaining both the mechanical strains and the corrosion of the joints.

To these and certain other incidental ends and purposes, which will hereinafter more fully appear, my invention is embodied in the construction and its several features and parts, formed, combined, arranged, and used substantially in the manner hereinafter described, illustrated, and claimed.

Briefly, the wall consists of a series of courses placed edge to edge in the same plane and reinforced by a series of courses laid alternately inside and outside and extending centrally from each of the butt-joints somewhat more than half-way toward the next butt-joint above and below. This second series of courses are laid alternately on the inside and outside, forming joint-protecting plates and at the same time doubling the thickness of the wall. All this will be more fully apparent from the accompanying drawings, wherein—

Figure 1 is a face view, from the outside, of a portion of the wall. Fig. 2 is a section on the plane 2 2 of Fig. 1.

Throughout the drawings like letters of reference indicate like parts.

The courses of plates, which are laid in the same plane, one above the other, forming butt-joints between successive courses, are indicated by the letter C, C' indicating the lowest course, C'' the second course, and C''' the third course, and so on. The butt-joints between the successive courses are indicated at d', &c. The first joint d' has a butt-strap

upon the inner face of the wall, as clearly shown. Upon the outer face of the wall is secured the course of reinforcing-plates O' which cover the butt-joint and extend somewhat more than half way up the course of the plates C'' and an equal distance down the face of the plates C'. The meeting edges of the butt-joints are therefore confined between the butt-strap and the plates O', a single row of rivets through each serving to hold the joint. The lower portion of the plates C', extending to the base of the wall of the tank, are reinforced upon the inner side by the inside plates I, which extend from the base of the wall up the inside of the plates C' to a line somewhat above the lower edge of the plates O', as clearly shown in Fig. 2, and in dots in Fig. 1. A single row of rivets at i secure the edges of the plates I and O' to the central line of the plate C', as at i.

The foot of the wall is secured to the bottom plates B of the tank by the angle-bar A, bolted to each, as shown.

The joint between the second and third courses of the plates C'' C''', (which plates I will for clearness designate throughout as the "in-and-out" plates, because the joints of the plates come alternately on the inside and outside of the wall, exposing a portion of each plate inside and outside,) receives upon its inside the course of inside plates I'', covering the inner face of the joint d'' and extending downward to i' and upward to i''. At i' the edge of the course of the plates I'' is bolted through to the upper edge of the plates O', just as the plates O' were bolted through at i to the plates I. The exposed side of the joints d'' is in this instance on the outside of the tank, and I therefore do not usually find it necessary to protect it and reinforce it by a butt-strap, as in the case of the joint d' and others coming upon the inside of the tank. The upper edge of the plates I'' is in its turn bolted at i'' through the in-and-out plates C''' to the lower edge of the outside plates O'''; and so the wall is continued toward the top, as high as is needed, single plates being usually sufficiently strong for the uppermost courses. Successive courses of in-and-out plates have their butt-joints protected on the inside by the courses of plates II'', &c., and the butt-straps and the



whole wall is reinforced by the alternating courses of the inside and the outside plates I O' I'' O''', &c., adjoining courses being bolted through the center lines of the in-and-out plates C' C'' C''', &c. This is one of the chief features which give to my wall combined rigidity, tightness, and durability, for it is clear that to leak through any of the horizontal joints already described the water must flow between a pair of bolted plates a distance equal to one-half the vertical height of the plate in addition to the amount of overlap at the joint.

The vertical joints formed between the successive plates of each course of in-and-out plates are covered by butt-plates  $c' c'' c'''$ , &c., on one side, while the plates I O' I'', &c., cover the joints upon the other side. In the section shown in Fig. 2 none of these plates appear, as the section being taken upon the plane 2 2, and not showing the parts behind the plane, exposes none of the plates. In Fig. 1, however, the plates  $c'$ , covering the lower part of the joint between two of the plates C' upon the outside, is shown. The plates  $c'$ , corresponding with and covering the upper and inside exposed portion of the joint, is indicated in dotted lines, being bolted to the inside of the wall opposite the plate O'. The joint of the next course C'' is protected in the same way by the plates  $c''$ , the lower plate being on the inside in this instance, as shown in dotted lines, and the upper plate upon the outside, as shown in full.

The succeeding courses of plates from the bottom of the wall upward may, of course, be somewhat decreased in weight and thickness, in order to give the maximum strength to the tank with the minimum of material; but such minor details, together with many slight modifications, may be readily supplied by mere skill in the art and a consideration of well-known engineering rules. I have purposely omitted the enumeration of all such matters, because to set them forth at length would obscure rather than make clear the more essential features.

I am aware that I am not the first to use a wall of double thickness. I am well aware that a single wall of courses secured together by lap-joints has been used, and that such a wall has been doubled by the addition of a second layer of exactly similar construction, the inside plates of the outer layer being of size to fit and placed between the outer courses of the inside layer, resulting in an apparent but not a real similarity to my wall. In the first place, in such a wall no one of the joints is covered by more than the lap of the joint and the strength which is inherent in my own wall is not, therefore, present. Moreover, corrosion and leakage may far more readily take place in the old form of wall just mentioned, because the water has merely to penetrate the two superposed lap-joints, whereas in my wall, before penetrating, the water in addition to going through the butt-joint, must pass

upward or downward a distance equal to at least half the height of my plates, with the addition of the overlap. The other advantages and distinctions resting purely on well-known principles of engineering, need not be specified.

Having now described my invention with some of its attendant advantages and the manner of its construction, I claim and desire to secure by these Letters Patent, together with all such modifications, details, and additions as may be made by mere skill, and with only the limitations as therein expressed or by law implied in view of the state of the related arts, the following:

1. In combination for the purposes described, the successive courses of in-and-out plates C' C'' C''' &c. forming butt joints, the inside reinforcing plates covering alternate butt joints on the inside, the outside reinforcing plates covering the remaining joints upon the outside and extending beyond and bolted through to the edges of adjacent courses of inside plates as at  $i i' i''$  &c., the butt straps covering the inside of the last said joints, and the protective plates for the joints between the plates of each course C' C'' C''' &c., substantially as set forth.

2. In combination, the courses of in-and-out plates C' C'' C''' &c. forming butt joints, the inside plates I'' &c., covering alternate butt joints on the inside, the outside plates covering the remaining joints upon the outside and extending beyond and bolted to the edges of the adjacent inside courses of plates as at  $i i' i''$  &c. and the butt straps covering the inside of the last said joints, substantially as set forth.

3. In combination, the courses of in-and-out plates C', C'', C''', &c. forming butt joints, the inside plates I'' &c. covering alternate butt joints on the inside, the outside plates covering the remaining butt joints upon the outside and extending and bolted through the in-and-out plates to the overlapped edges of the inside plates as at  $i, i', i''$  &c., whereby the said in-and-out plates form a continuous central layer reinforced and doubled at all points by the said inside and outside plates overlapped and bolted together through the said in-and-out plates, as described.

4. In combination, the in-and-out plates C' C'' C''' &c., forming a single layer having butt joints, and courses of plates placed alternately inside and outside the said layer and bolted through the said layer and together at or near the central lines of the courses of said layer, as at  $i, i', i''$ , substantially as set forth.

In testimony whereof I have hereunto set my hand, at New York, this 18th day of September, 1894.

JOHN W. OGDEN.

Witnesses:

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