

(No Model.)

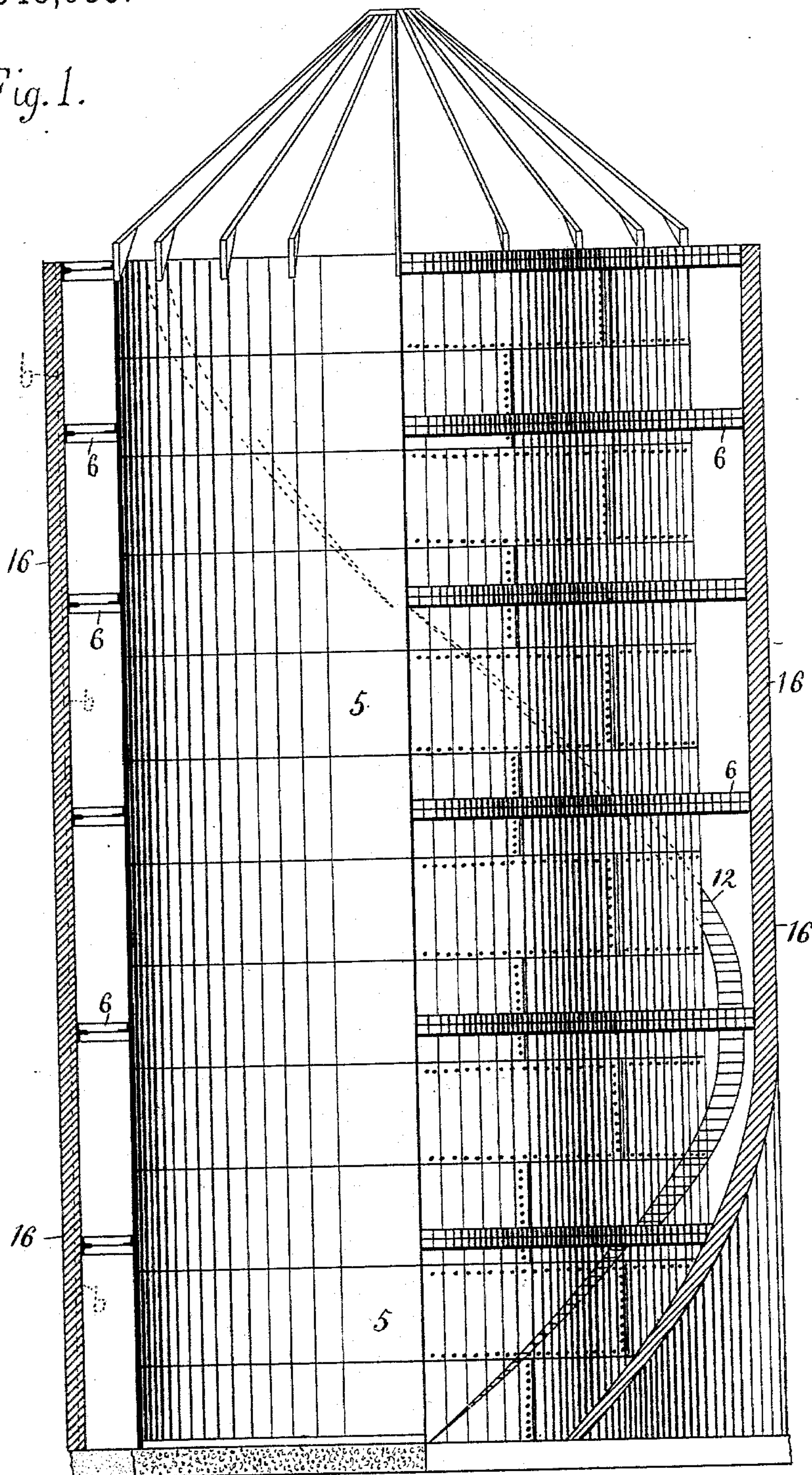
2 Sheets—Sheet 1.

E. FLAD.  
SHEET METAL TOWER.

No. 548,635.

Patented Oct. 29, 1895.

Fig. 1.



Witnesses  
*E. E. Fernell.*  
*W. A. Alexander.*

By his Attorneys

Inventor  
*Edward Flad,*  
*Fowler & Fowler*

(No Model.)

2 Sheets—Sheet 2.

E. FLAD.  
SHEET METAL TOWER.

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Fig. 3.

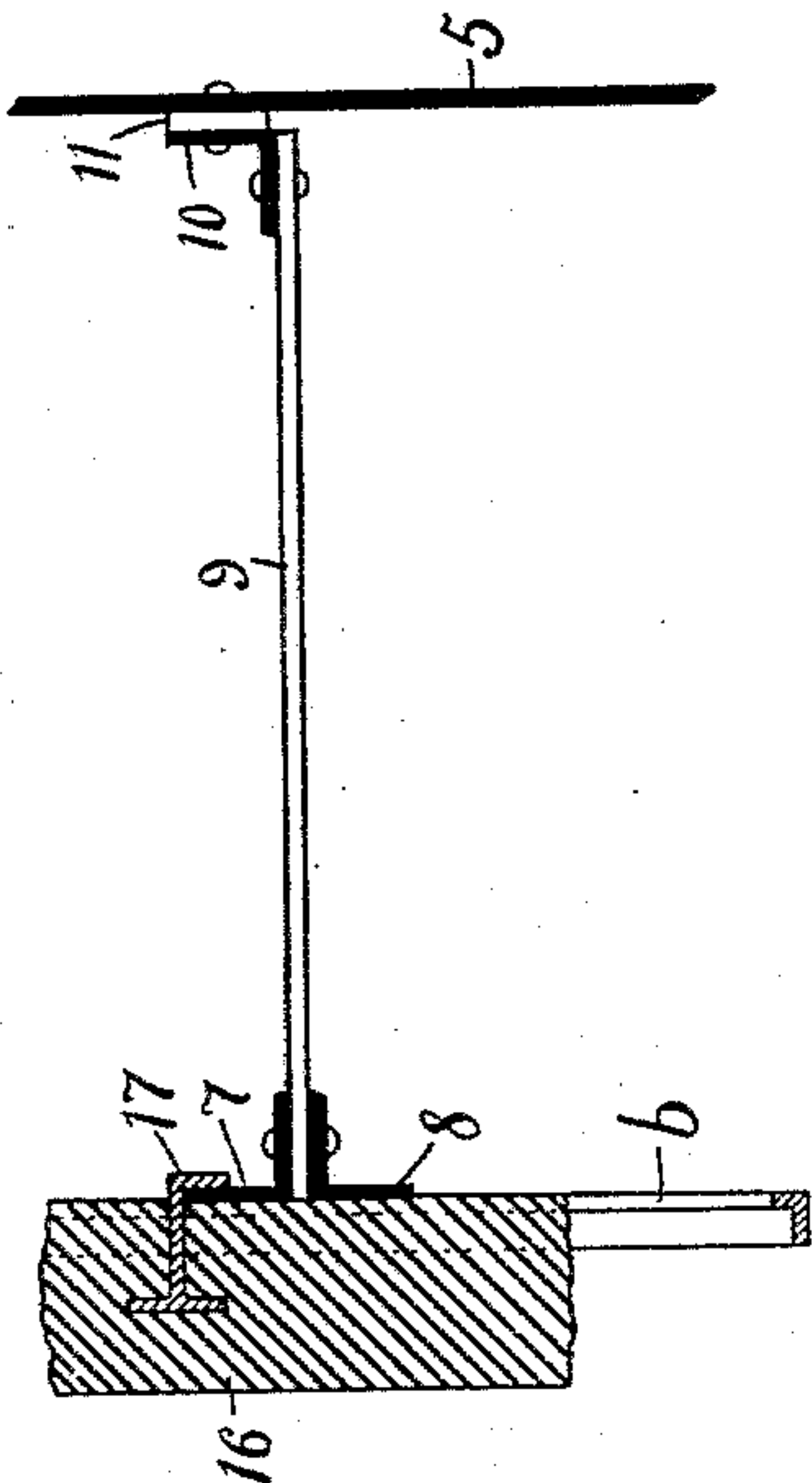
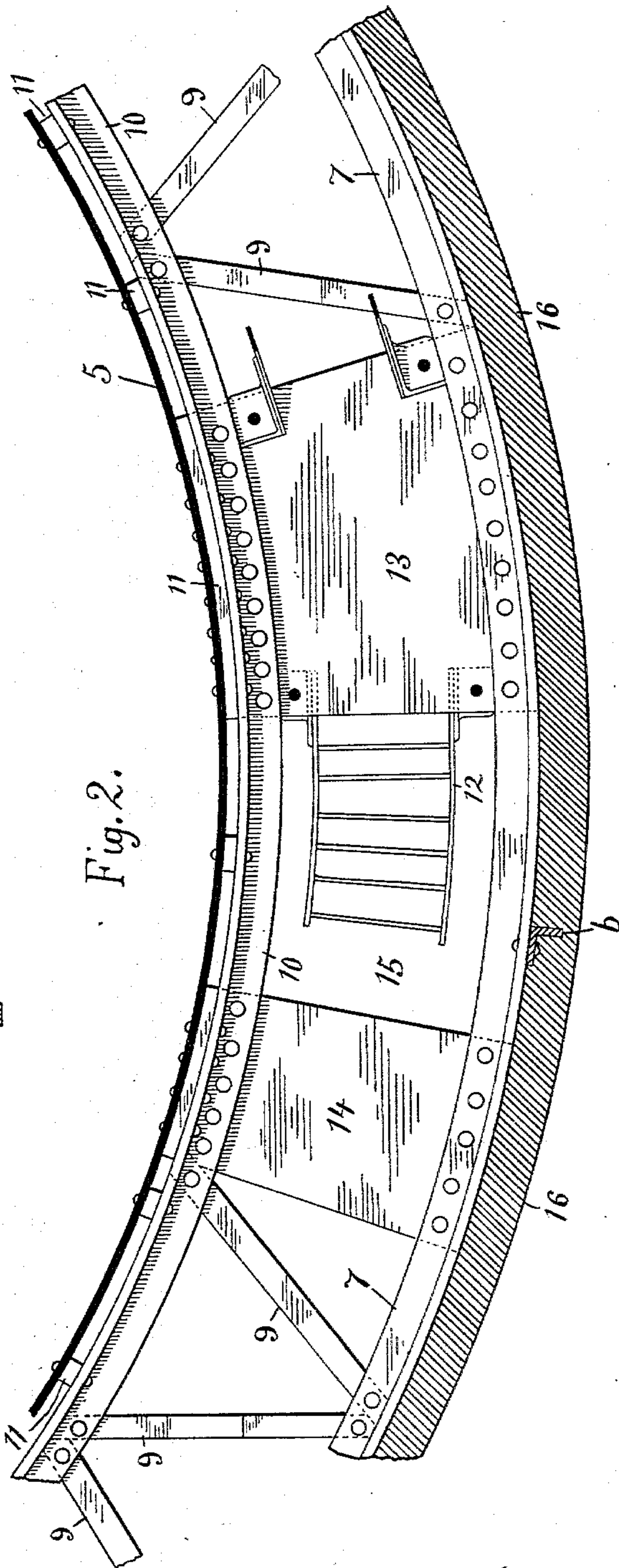


Fig. 2.



Witnesses  
E. E. Tennell.  
W. A. Alexander

Inventor  
Edward Flad  
By his Attorneys  
Fowler & Fowler



# UNITED STATES PATENT OFFICE.

EDWARD FLAD, OF ST. LOUIS, MISSOURI.

## SHEET-METAL TOWER.

SPECIFICATION forming part of Letters Patent No. 548,635, dated October 29, 1895.

Application filed May 3, 1895. Serial No. 547,958. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD FLAD, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Sheet-Metal Towers, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates more particularly to improvements in water-towers.

Water-towers, being of great height and of considerable diameter, present a large surface to the wind, and are therefore subjected to enormous wind-pressures. Such towers are often collapsed by this pressure, particularly so when the water in the tower is low.

This invention has for its object to prevent the collapsing of water-towers due to wind-pressure, and at the same time to strengthen the tower laterally.

The invention has also other objects in view, which will be hereinafter set forth.

The invention will be best understood by referring to the accompanying drawings, in which—

Figure 1 is a view, half in elevation and half in section, of a water-tower made in accordance with the invention. Figs. 2 and 3 are enlarged views of details.

The same marks of reference indicate the same parts in the different views of the drawings.

5 is a cylindrical water-tower composed of sheet-iron plates of suitable thickness riveted together in the ordinary way, as illustrated in the drawings. It is this cylindrical shell which is liable to collapse when the wind-pressure is great and the water is comparatively low in the tower. It is necessary that the inside of such towers, when located in cold climates, be of smooth bore and free from internal bracing, for the reason that in cold weather a cake of ice forms at the top of the water in the tower, and such cake of ice should be permitted to rise and fall with the level of the water in the tower. Where projections or obstructions are placed within the tower or upon the inside of the peripheral walls thereof, they are liable to hold the cake of ice which forms at the top

of the water suspended while the water in the tower may have descended to a low level. Should the cake of ice so suspended give way or break, which it often does, the whole body of ice will fall, striking the water in the lower part of the tower a hammer-blow, and thereby disrupting the plates of the tower. To properly brace such towers laterally, I provide them with circular girders around the exterior thereof, at regular or irregular intervals. This leaves the interior free from projections and obstructions of any kind. The circular girders also serve to strengthen the tower laterally in both directions, enabling it to better withstand wind-pressures without and at the same time capable of better resisting the water-pressure within. From this it results that thinner plates can be used to construct such towers, if desired. These circular girders so exteriorly placed upon the tower also afford a means to gain access to the top of the tower by ladders or stairs reaching from girder to girder. The said girders form platforms for the ladders and around the tower at various places, whereby the plates of the tower may be examined and the tower thoroughly inspected throughout, as occasion may require. The exterior peripheral edges of said girders also afford a means against which the inclosing wall or casing of the tower may rest and serve to hold such casing in place, thus allowing the use of a lighter and cheaper form of casing than would otherwise be required. The girders thus serve several useful purposes.

In the drawings, 6 are the circular girders arranged at suitable distances apart around the tower 5. An enlarged view of a portion of one of these circular girders in plan, as well as a portion of the tower and inclosing casing in horizontal section, are shown in Fig. 2, and in vertical section in Fig. 3. The circular girder consists of two outer angle-bars 7 and 8, between which are bolted or riveted the outer ends of lattice-bars 9, the inner ends of which lattice-bars are riveted or bolted to an inner circular angle-bar 10, arranged adjacent to the plates of the tower. The circular girders may have solid web-plates in place of lattice-bars, or may be built up of any well-known shapes of metal.

When the plates of the tower are riveted together and overlap each other, the circular



girders should not be made to fit the tower snugly. The angle-bars 10 are riveted at suitable points to the plates of the tower, fillers 11 being placed between the circular angle-bars 10 and the plates of the tower, where the two are riveted together, the fillers being interposed between the circular girders and the tower to take up the space between the two. Vertical angle-bars *b* are provided at intervals on the outside of the circular girders, being suitably united thereto. The object of these angle-bars is to form a support for the edges of the outer circular girders.

To gain access to the top of the tower I employ ladders or stairs 12, the first of which extends from the foundation or ground up to the first circular girder, and the next one from the first girder to the next one above, and so on. Between the ladders at the girders extends a plate 13, the outer edge of which is riveted between the outer angle-bars 7 and 8 and the inner edge of which is riveted to the inner angle-bar 10. This plate serves as a platform between the ladders.

To leave a clear open space between the parts of the girders, so that persons may go up and down the ladders, lattice-bars 9 are not used in the girders above the ladders, but a web-plate 14 is used, the outer edge of which is riveted between the angle-bars 7 and 8, and the inner edge of which is riveted to the angle-bar 10. A substantially-square space 15 is thereby left between the plates 13 and 14 for any one to pass up and down the ladders.

16 is the casing for the tower, and this is preferably placed upon the same foundation which supports the tower. The inside of the casing comes against the outer circular edges of the girders. The casing may be of wood or brick, hollow tile, or other suitable material, as desired. The circular girders may be provided at intervals with anchor-bars 17, the heads of which are secured to the casing and the ends of which hook over the edges of the circular girders to tie the casing to the girders. The ladders or stairs are arranged

between the casing and the tower and are housed by the casing.

The circular girders may also be applied exteriorly to gas-tanks or gasometers, which, while not very high, are of large diameter and are therefore subjected to great wind-pressures.

Having fully set forth my invention, what I desire to claim and secure by Letters Patent of the United States is—

1. A water tower composed of sheet metal plates and provided exteriorly at intervals with circular girders bracing it laterally, and having a casing surrounding and resting against said girders, substantially as and for the purpose set forth.

2. A tower composed of sheet metal plates and provided exteriorly at intervals with circular girders bracing it laterally, with ladders or stairs helically disposed around said tower and extending between said girders, substantially as and for the purpose set forth.

3. A water tower composed of sheet metal plates and provided exteriorly at intervals with circular girders bracing it laterally, and having a casing surrounding and resting against said girders, with ladders or stairs helically disposed around said tower and extending from girder to girder between said tower and casing, substantially as and for the purpose set forth.

4. A tower composed of sheet metal plates and provided at intervals with circular girders bracing it laterally, said circular girders consisting of outer and inner circular angle bars, the latter being riveted to the plates of the tower, and web bracing extending between said outer and inner angle bars.

In testimony whereof I have hereunto set my hand and affixed my seal in the presence of the two subscribing witnesses.

EDW. FLAD. [L. S.]

Witnesses:

A. C. FOWLER,  
JOHN F. GREEN.