No. 748,136. PATENTED DEC. 29, 1903.

G. P. YOUMANS.

TOWER.

APPLICATION FILED APR. 7, 1903.

NO MODEL.

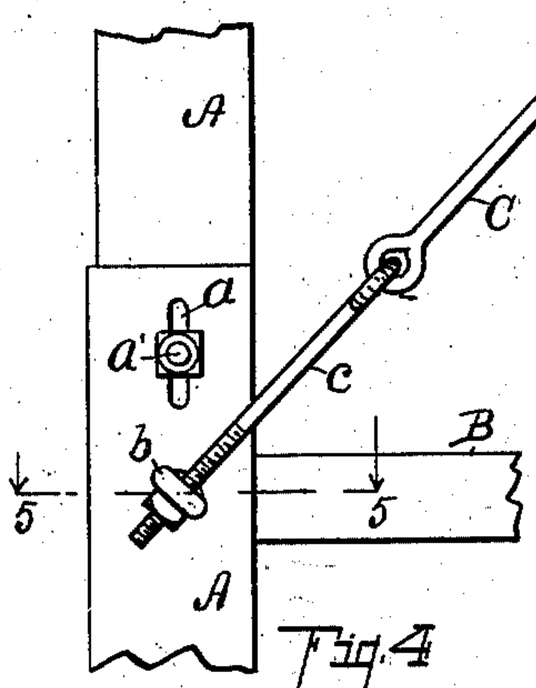


Fig. 4

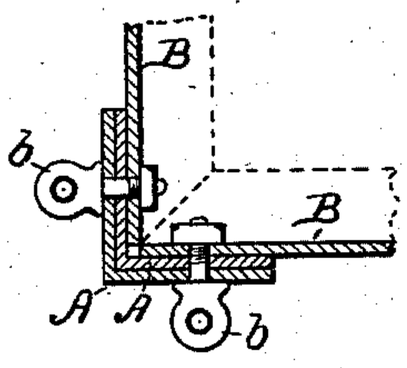
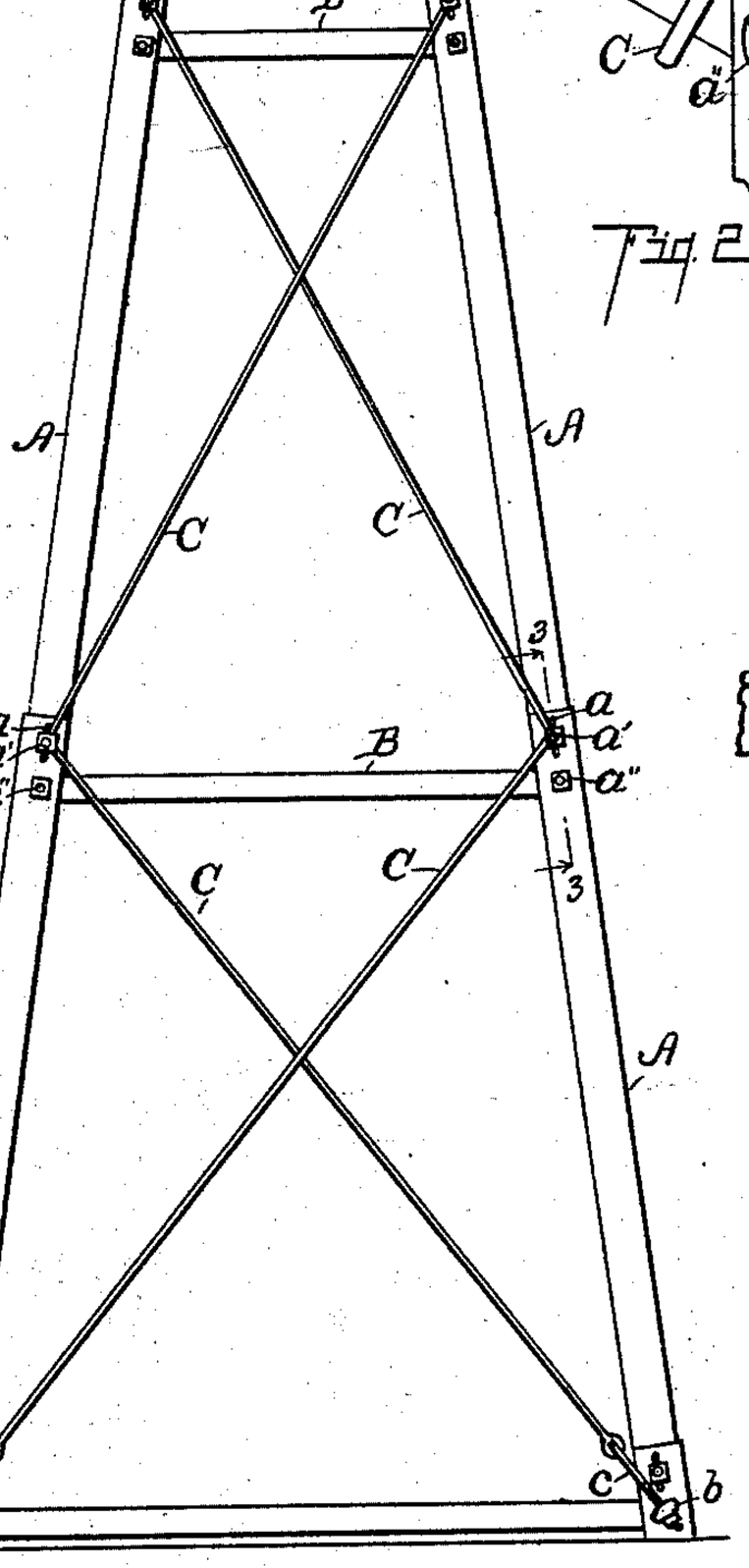


Fig. 5



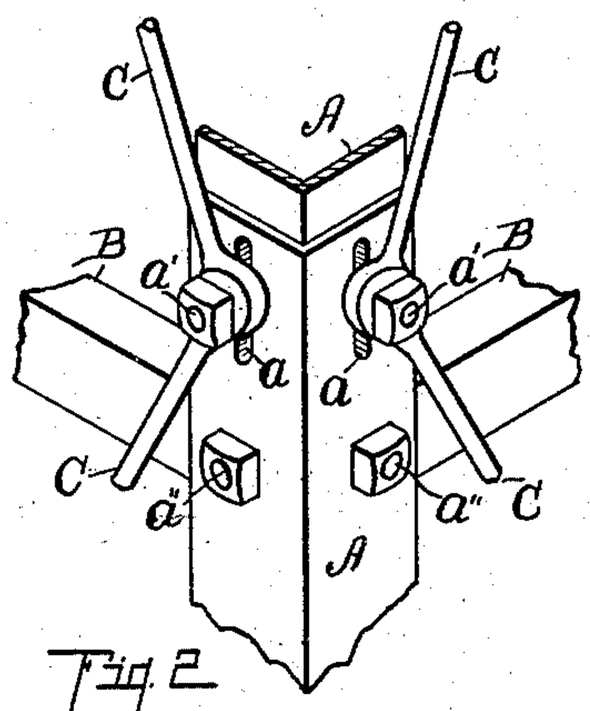


Fig. 2

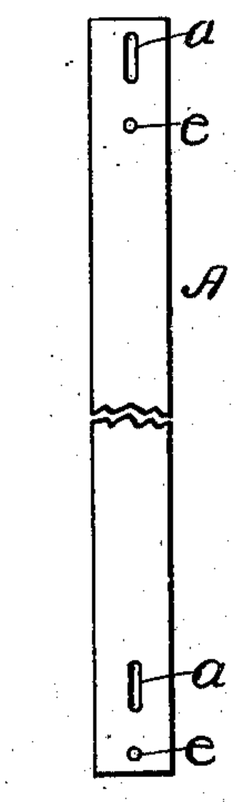


Fig. 6

Fig. 1

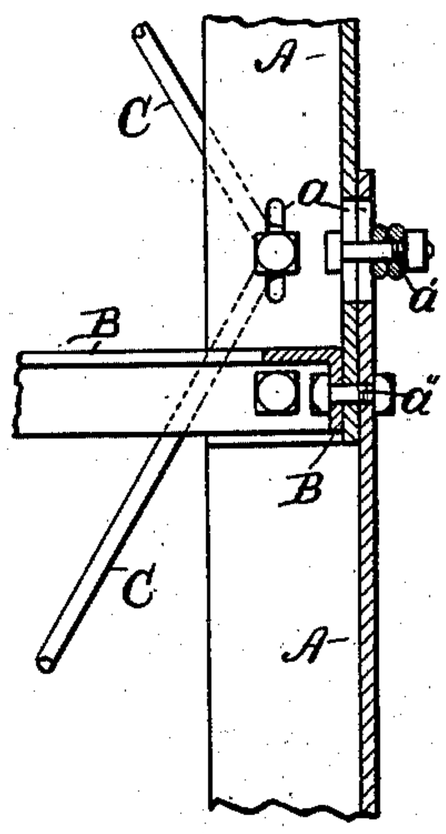


Fig. 3

Witnesses:
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By Fred L. Chappell
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No. 748,136. Patented December 29, 1903.

UNITED STATES PATENT OFFICE.

GEORGE P. YOUMANS, OF GALESBURG, MICHIGAN.

TOWER.

SPECIFICATION forming part of Letters Patent No. 748,136, dated December 29, 1903.

Application filed April 7, 1903. Serial No. 151,439. (No model.)

To all whom it may concern:

Be it known that I, GEORGE P. YOUMANS, a citizen of the United States, residing at the village of Galesburg, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Towers, of which the following is a specification.

This invention relates to improvements in towers, and especially to towers adapted for use as windmill-towers.

The object of the invention is to produce a structure that is strongly braced, in which the braces are easy to apply and can be readily adjusted for the whole tower with a minimum number of tightening bolts or screws.

A second object is to provide a tower which can be made up sectional with all of the parts properly braced at a minimum expense, although the invention is well adapted to structures that are not made sectional.

The objects of the invention relating to details of construction will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure fully embodying the features of my invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation view of a windmill-tower embodying the features of my invention. Fig. 2 is an enlarged detail view of one of the corner connections between two of the sections, showing the arrangement and connections of the braces and rods at that point. Fig. 3 is an enlarged detail sectional view on line 3 3 of Fig. 1, still further showing the details of such connections. Fig. 4 is an enlarged detail view of the bottom connection to the anchor-post and of a tightening-bolt. Fig. 5 is a detail cross-section view on line 5 5 of Fig. 4. Fig. 6 is an enlarged detail view of one of the angle-iron corner-posts.

In the drawings the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, the corner-posts of the tower are preferably made up of L angle-irons A, preferably in sections. Each of these corner-posts is provided with longitudinal slots *a a* toward each end and with bolt-holes *e*. Through the bolt-holes *e* are extended suitable bolts, as *a''*, which also connect the cross bars or braces B to the corner-posts, as clearly appears in Figs. 1, 2, 3, and 5. The slots *a* come opposite each other also, and through these slots extend small bolts *a'*, the heads being located on the inside, so that the bolts can play up and down within the slots *a* without danger of becoming detached and so that the stay-rods can be readily attached. To these bolts *a'* the diagonal brace or stay rods C C are secured zigzagging down from the top of the tower, as is illustrated in Fig. 1, the ends of these stay-rods C being formed in suitable eyes which embrace the outer ends of the bolts *a'*, and thereby afford a pivotal connection between the ends of the rods and a sliding connection with the corner-posts.

At the bottom of the tower and extending through the anchor-posts, as well as the corner-posts, are eyebolts *b*, and through these eyes extend tightening-bolts *c*, which are connected to the bottom end of the bottom rods C. It will be observed that as the bolt *c* is tightened it draws down on the bottom stay-rod C, which pulls down on the bolt *a'*, which pulls down on the bottom of the next succeeding stay-rod C, which in its turn affects the connection to the next stay-rod, and so on, until the top of the tower is reached, where the top stay-rods C are secured by a fixed bolt, which consequently has no play, so that the tightening-bolts *c* at the bottom of the tower tightens all of the brace-rods in the tower, making the tower rigid from the top. It is obvious that this would be the case if the angle-irons A were continuous from top to bottom of the tower, and it is also the case where the structure is made sectional. This puts stress on the cross-bars B, which serve as struts, making the tower a very strong trussed tower. It is obviously very inexpensive to produce. The same result could

be attained if the irons were of other form than right angles, or, for that matter, with any kind of corner-posts with cross bars or struts.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a tower, the combination of angle-iron corner-posts A A made in sections and joined together by suitable bolts; cross-braces B between the ends of the sections; slots *a* through the meeting ends of the sections of the corner-posts; bolts extending outwardly through the same so that they are free to play up and down within the slots; a series of stay-rods connected at a fixed point at the top of the tower with eyes to embrace the said bolts extending outwardly through the slots and extending zigzag downwardly from top to bottom of the tower; eyebolts between the sections at the bottom of the tower; and screw-bolts connected to the bottom of the bottom stay-rods and extending through the eyes for tightening the stay-rods, all coacting substantially as described and for the purpose specified.

2. In a tower, the combination of corner-posts made in sections lapped together and joined by suitable means; cross-braces between the posts at the ends of the sections; longitudinal slots through the posts at substantially the meeting-points and opposite the braces; bolts extending outwardly through the said slots so that they are free to play up and down through the same; a series of stay-rods connected at a fixed point in the tower and extending zigzag between the different bolts, and a screw-bolt at the end of each set of stay-rods to tighten the same and thereby brace the whole tower.

3. In a tower, the combination of corner-posts; cross-braces between the posts; longitudinal slots through the posts opposite the braces; bolts extending outwardly through the said slots so that they are free to play up and down through the same; a series of stay-rods connected at a fixed point in the tower and extending zigzag between the different bolts, and a screw-bolt in each set of stay-rods to tighten the same and thereby brace the whole tower.

4. In a tower, the combination of corner-posts; cross-braces between the posts; longitudinal slots through the posts; bolts extending outwardly through the said slots so that they are free to play up and down through the same; a series of stay-rods connected at a fixed point in the tower and extending zigzag between the different bolts, and a screw-bolt in each set of stay-rods to tighten the same, and thereby brace the whole tower.

5. In a tower, the combination of corner-posts made in sections lapped together and joined by suitable means; cross-braces between the posts at the ends of the sections; longitudinal slots through the posts at substantially the meeting-points and opposite the braces; bolts extending outwardly through the said slots so that they are free to play up and down through the same; a series of stay-rods connected at a fixed point in the tower and extending zigzag between the different bolts; a tightener for said rods to brace the whole tower.

6. In a tower, the combination of corner-posts; cross-braces between the same; a series of stay-rods connected at a fixed point on the upper part of the tower, having pivotal connection successively with each other, extending zigzag across the tower and connected by sliding connections to the corner-posts; and a tightening-bolt in each set of connected stay-rods for tightening the same, for the purpose specified.

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

GEORGE P. YOUMANS. [L. S.]

Witnesses:

A. IRENE ADAMS,

OTIS A. EARL.