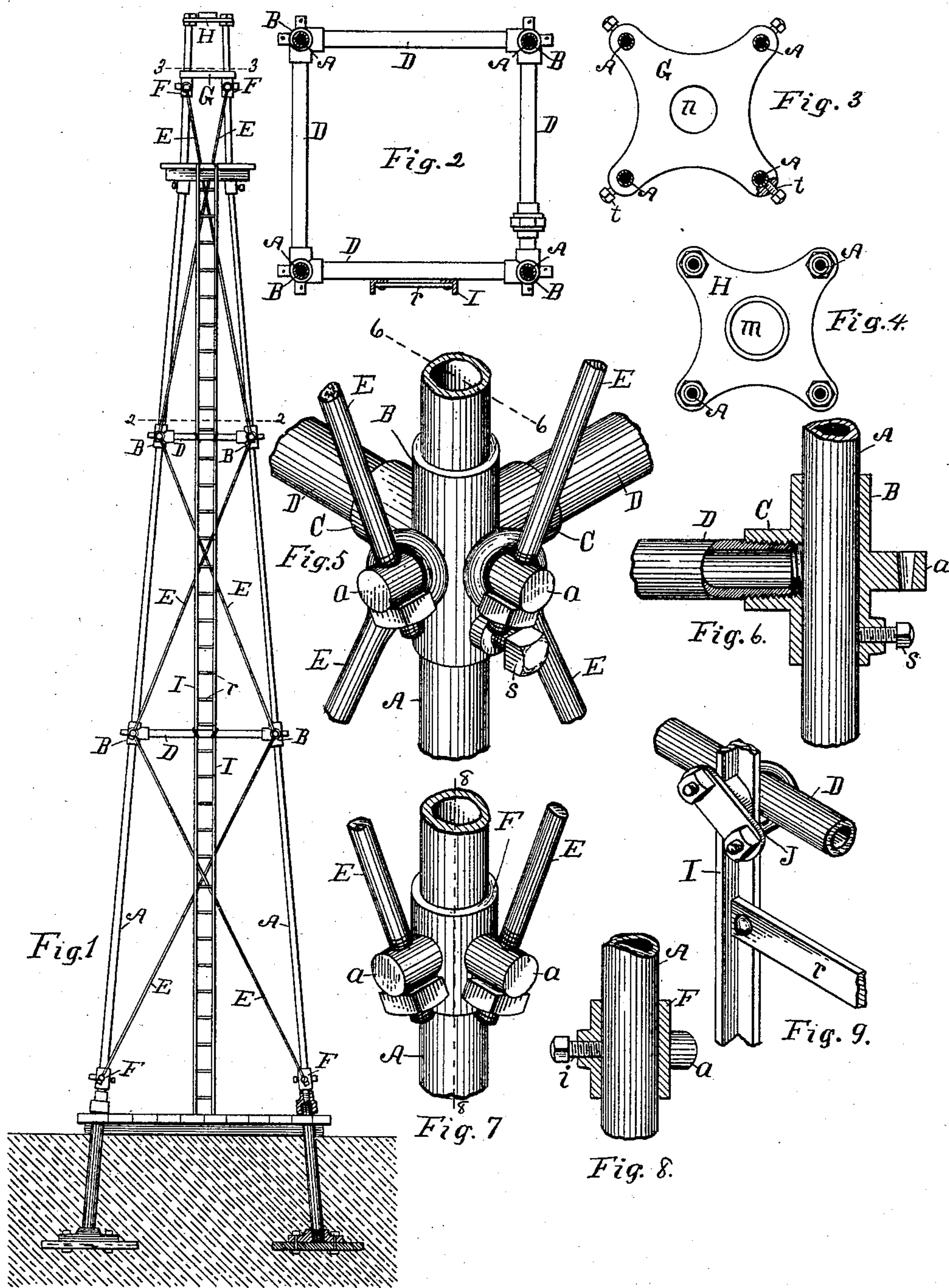


(No Model.)

K. A. SMITH & A. M. WEAD.  
TOWER FOR WINDMILLS.

No. 487,787.

Patented Dec. 13, 1892.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## TOWER FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 487,787, dated December 13, 1892.

Application filed May 25, 1892. Serial No. 434,336. (No model.)

*To all whom it may concern:*

Be it known that we, KIRK A. SMITH and ANDREW M. WEAD, citizens of the United States, residing at Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented a new and useful Improvement in Towers for Windmills, of which the following is a specification.

Our invention relates to that kind of windmill-tower usually made of steel or iron; and the improvements consist principally in the method of bracing the framework of such towers, the object being to simplify the construction of such braces and to so construct them that they can be readily tightened up at any time and always kept taut. We attain these objects in the manner herein shown, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a windmill tower and shows how this invention is applied to the same. Fig. 2 is an enlarged view, being a horizontal section on line 2 2 of Fig. 1, looking down from the top of the tower. Fig. 3 is an enlarged detail, being a plan or top view of a horizontal section of the tower, on line 3 3 of Fig. 1. Fig. 4 is an enlarged detail, being a plan view of the top plate of the tower, showing the tops of the four corner-posts of the same. Fig. 5 is an enlarged detail, being a perspective view of one of the corners of the framework of the tower and shows the manner of joining the framework together and applying the braces to the same. Fig. 6 is an enlarged detail, being a vertical section on line 6 6 of Fig. 5. Fig. 7 is an enlarged detail showing the manner of staying the braces at the bottom of the tower. Fig. 8 is an enlarged detail, being a vertical section on line 8 8 of Fig. 7. Fig. 9 is an enlarged detail, being a perspective view of one of the cross-pieces of the framework of the tower and showing the manner of securing the ladder to the same.

A whole windmill is not shown in the drawings, only enough—viz., the tower, braces, ladder, &c.—to show the manner of using our improvements.

Similar letters refer to similar parts throughout the several views.

The corner-posts of the tower A A are pref-

erably made in a round form and of tubing. Each of these posts may be constructed of several lengths of tubing joined together at their ends by means of such couplings as are usually used to connect gas-pipe or in any other desirable manner. The horizontal cross-bars D D, which form a part of the frame of the tower to join the corner-posts together, can be made of the same kind of material as corner-posts. They are joined to the corner-posts by means of the coupling-block B. Coupling-block B is made to have a hole through it vertically of a proper size to receive the corner-post A, and is adapted to slide up and down the corner-posts and be secured rigidly to them at any elevation by means of the set-screw s, which is made to screw into the coupling-block B and against the post A, as shown in Fig. 6. The coupling-block B is provided with two horizontal extensions C C, which have internal threads adapted to receive external threads on the ends of the cross-bars D, or these cross-bars D might be secured to the extensions C C in any other desirable manner. At a point on the coupling-block B nearly opposite the extensions C C are lugs or pins a. These pins project out from the main part of the coupling-block B far enough to receive an eye formed on one end of the brace-rods E and to have a hole outside of this eye, through which the other end of the brace-rod can pass.

The brace-rods E are formed with an eye in one end and a thread and nut on the opposite end. The eye of one rod is made to go over the lug or pin a of the coupling-block B, while the threaded or straight end of another brace will pass through a hole in the lug a, outside of the eye of the first rod, thereby securing the first rod in such a manner that it cannot come off the lug a. After the threaded part of a brace-rod is inserted in the hole in the lug a a nut is screwed upon the outer end of the brace-rod and against the lug a to draw the brace-rod up and hold it taut. The brace-rods are made to run diagonally across the sides of the tower and to extend upward to such a point as will give them a desirable slant across the tower to brace the tower properly. In this manner several brace-rods will be used, one above another, to brace the whole



tower. The junction of these brace-rods will of course be on about the same level as are the cross-bars D of the tower. In our drawings we have shown three lengths of these  
 5 brace-rods one above the other to reach the top of the tower, which makes three pairs of brace-rods on each side of the tower, each pair of rods crossing each other, thereby pulling in opposite directions to strengthen the tower  
 10 and keep it from weaving sidewise. Either three-sided or four-sided towers can be made in this manner.

In a four-sided tower the coupling-block B would have the extensions C C and lugs or  
 15 pins *a a* at nearly right angles to each other, while on the three-sided tower these parts would have to stand more in the form of a triangle or to correspond with the sides of the tower.

20 The block F is made similar to the coupling-block B, except that it does not have the extensions C C for the cross-bars D D. These blocks F are designed to be used at or near the bottom of the tower to secure the lower ends  
 25 of the lower braces to and at or near the top of the tower to secure the upper ends of the upper braces to.

At the upper end of the tower where there is not another brace to pass through the lugs  
 30 *a* to hold the eyes of the upper braces in place a small pin or cotter-key may be used to go through the hole in the lug *a* to secure the eye of the brace-rod from coming off the lug *a*.

The ladder is made to have angle-iron side  
 35 pieces I extending up and down one side of the tower, and these side pieces can be fastened to the cross-pieces D by the use of a clip J, having suitable nuts, &c., to bind the pieces I and D together, as shown in Fig. 9,  
 40 and the steps *r* are bolted or riveted to the side pieces J; but the ladder could be made in any other suitable manner.

We are aware that coupling-blocks for towers have been made before having eyes or  
 45 holes in them, through which the braces pass or are hooked, and we do not claim such devices.

The advantage in our method of securing the braces is that the braces can have holes or closed eyes instead of hooks, thereby making them stronger, and the lug or pin *a* can be  
 50 made; cast, or formed on the coupling-block or separate and screwed into it.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a tower for windmills, having posts  
 55 extending up and down, a coupling-block B to slide up and down the posts and carry the cross-pieces D, said coupling-block provided with a lug *a*, said lug adapted to go through  
 60 an eye in one end of a brace, and means to hold the brace from slipping off the end of the lug, in combination with a brace for bracing the tower, substantially as specified.

2. In a tower for windmills, the coupling-  
 65 blocks B, constructed substantially as shown, to have a vertical hole for the upright posts, horizontal holes for the cross-pieces, and a lug or pin *a*, adapted to go through a closed  
 70 eye or hole in the brace-rods, in combination with suitable brace-rods to brace the tower.

3. In a tower for windmills, the coupling-  
 block B, having an outwardly-projecting lug  
 75 *a*, in combination with braces having an eye in one end and a thread on the other end, said eye of one brace to go over the lug *a* and to be held in place by means of the threaded end  
 80 of another brace passing through a hole in the lug *a* outside of the eye of the first brace to act as a key, substantially as specified.

4. In a tower for windmills, braces having  
 an eye or hole in one end and a thread on  
 their other ends, in combination with the projecting lug *a*, adapted to pass through an eye  
 85 in one brace, while the threaded end of another brace passes through a hole in the outer end of the lug, substantially as and for the purposes specified.

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Witnesses:

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