

(No Model.)

E. A. DANA.
WINDMILL.

No. 446,512.

Patented Feb. 17, 1891.

Fig: 1.

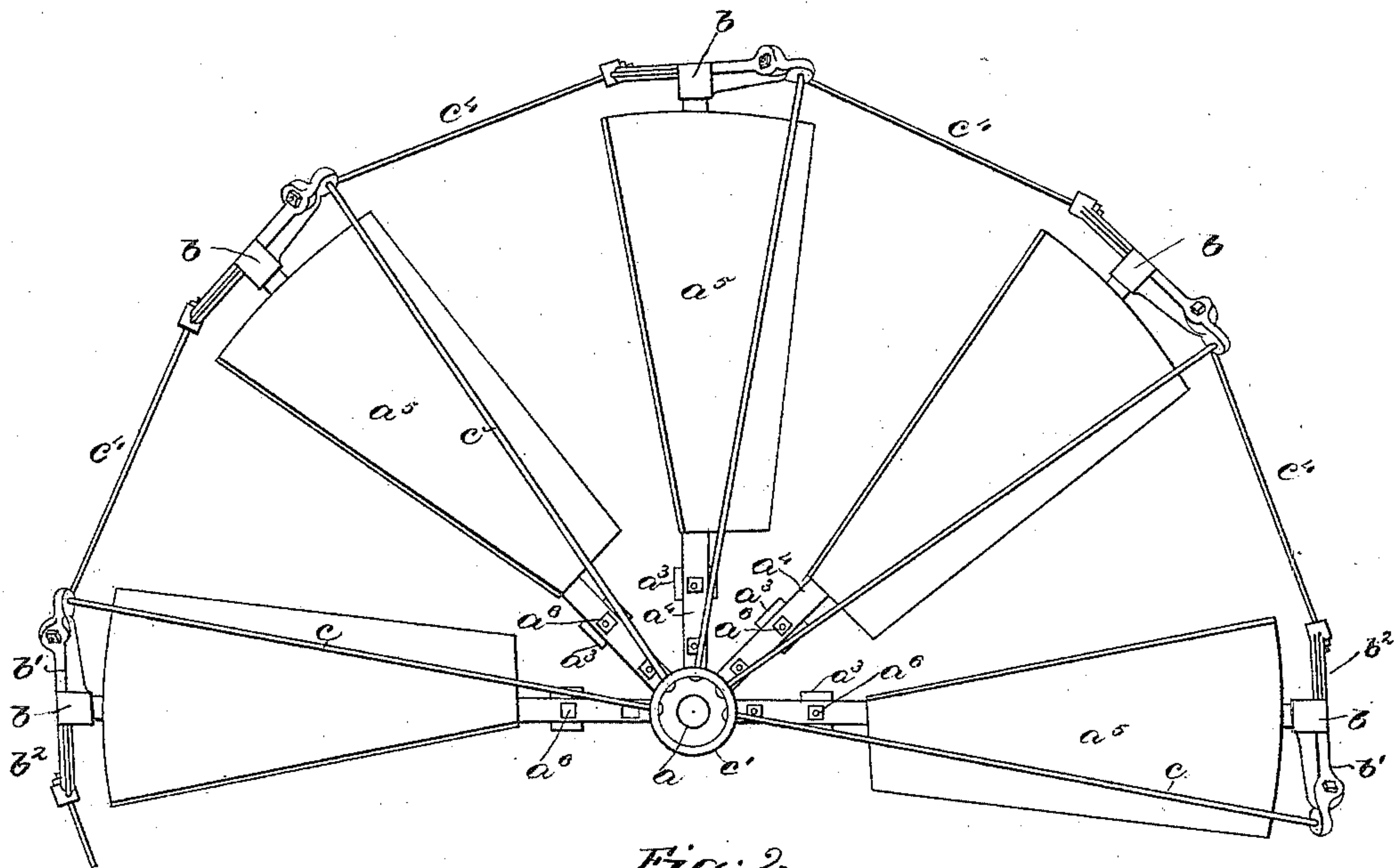


Fig: 2.

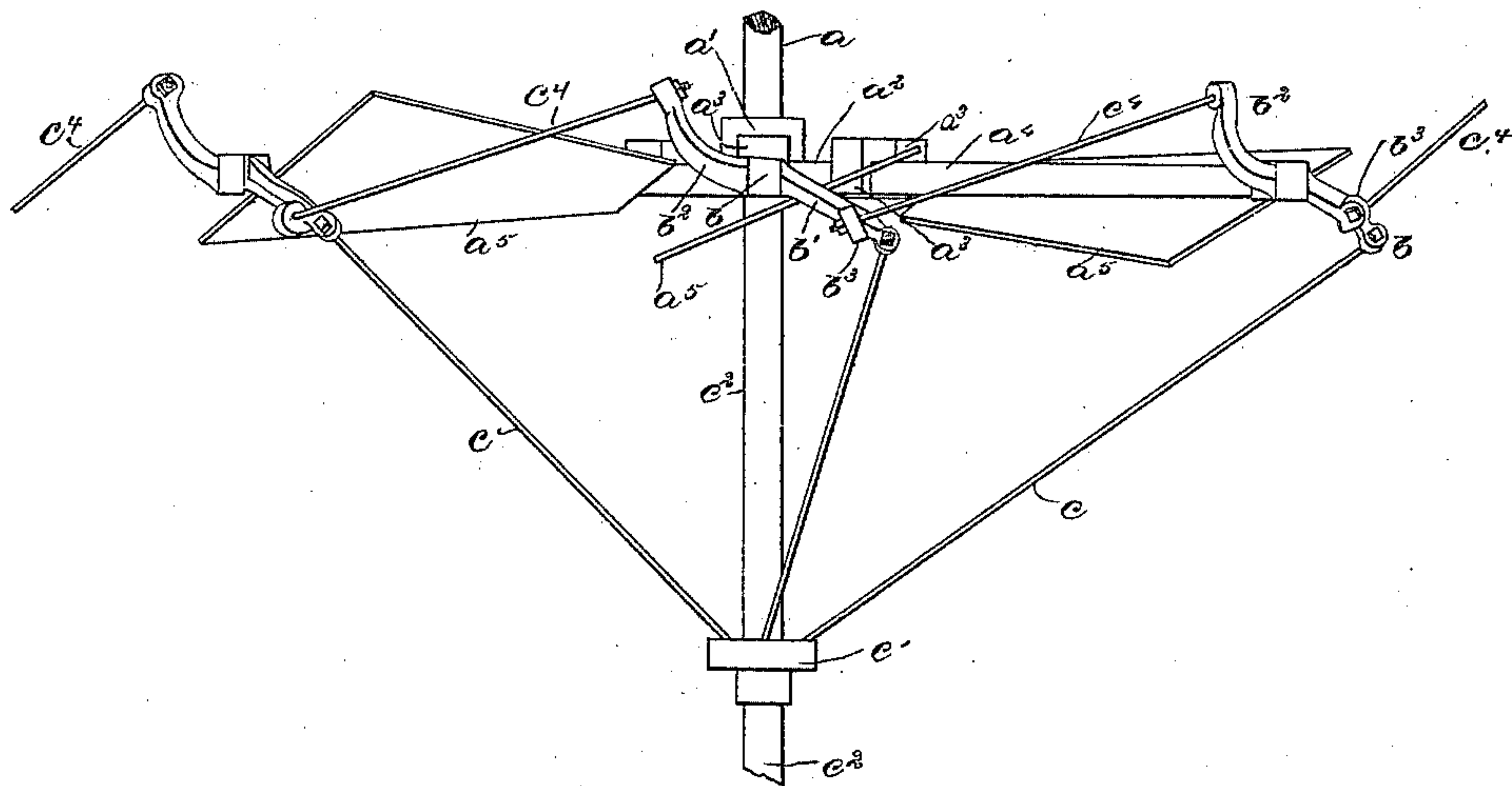
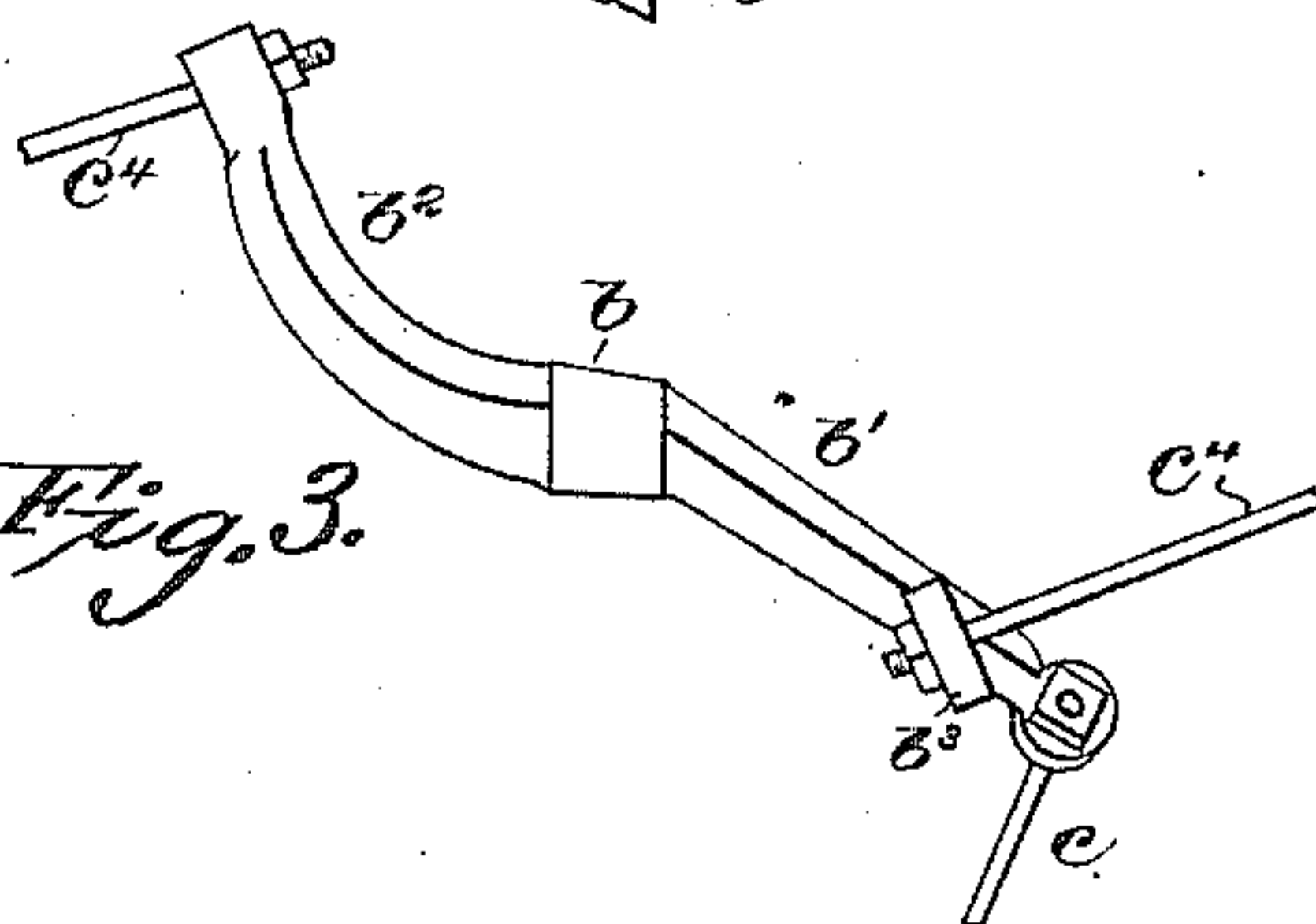


Fig: 3.



Witnesses.

Thomas Holiday
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Inventor.

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UNITED STATES PATENT OFFICE.

EDWARD A. DANA, OF FAIRHAVEN, MASSACHUSETTS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 446,512, dated February 17, 1891.

Application filed May 1, 1886. Serial No. 200,818. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. DANA, of Fairhaven, county of Bristol, and State of Massachusetts, have invented an Improvement in Windmills, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to that class of vertical windmills in which the wind-wheel consists of a series of broad fans or sails so hinged to radial arms in the hub on the shaft as to swing back and forth between a position in which they will stand in front of the arms with their faces nearly parallel with the plane of revolution, and a position on one side of the arms with their faces at right angles with the plane of revolution.

My invention has for its object to provide for wind-wheels of the class referred to, of large size, a method of front trussing or bracing, whereby they may be made sufficiently strong and rigid to withstand excessive wind-pressure; and it consists in a general way in securing to the end of each arm outside of its fan or sail a stay-holder in the form of a cross-bar with its arms extended on opposite sides of the sail or fan arm, the said stay-holder being shaped and fitted, as will be described, to hold the stay-rods, which are so arranged as to counteract twisting or straining effect upon the said arms, as will be hereinafter fully explained in the detailed description of my invention.

Figure 1 in elevation represents a sufficient portion of a wind-wheel of the class referred to to enable my invention to be understood; Fig. 2, a plan or top view of Fig. 1, and Fig. 3 one of the stay-holders enlarged.

The main shaft a has mounted upon it a hub a' , provided with arms a^2 , extended radially from the said hub, each of said arms, as herein shown, having side pieces a^3 , which form guides for an arm a^4 , to which a fan or sail is hinged at or near its longitudinal center in such a manner as to be freely turned back and forth between, first, a position in front of the arm a^4 nearly parallel with the plane of revolution, and, second, a position on one side of the arm a^4 at right angles with the plane of revolution. The first position is

the one shown in the drawings, with the sails at their best working angle, whereas in the second position the sails would stand edgewise to the wind or at full reef.

In order that wind-wheels of this description of large areas may be so constructed as to withstand without injury heavy wind-pressures, I mount upon the end of each sail-arm a^4 a stay-holder b in the form of a cross-bar, with its arms b' and b^2 extended on opposite sides of the sail, the said stay-holder being suitably fitted with holes for the reception of stay-rods c c^4 , as will be described. The arm b' of each stay-holder is so shaped and so placed in front and to one side of the arm a^4 as to carry the stay-rod c , which is attached to the end of arm b' , clear of its nearest fan or sail in any of its possible positions, each stay-rod c having its other end secured to the hub or stay-holder c' on the end of the rod c^2 , which projects in front of and in line with the main shaft a . The forward or front stay-rods c being attached to the arms b' of the stay-holder, to one side of the arm a^4 , the leverage thus produced under heavy wind-pressure upon said arm a^4 will exert upon it a twisting and straining effect, which it is found necessary to counteract. This I accomplish by attaching to the end of the other arm b^2 of each stay-holder the stay-rod c^4 , whose other end I fasten in the boss b^3 on the arm b' of the stay-holder, which is mounted on the next adjoining sail-arm a^4 , and as the arm b' last referred to is secured by a stay-rod c to the central hub or truss-holder c' , it will be seen that an effectual resistance to the leverage referred to is afforded by the connected stay-rods extending from the arm b^2 to the central hub c' . The stay-rods c^4 , with their connected stay-holders, also constitute a complete and rigid rim for the wind-wheel.

The fans or sails will in practice be regulated to swing in unison on the arms a^4 by any usual means—as, for instance, in the United States patent, No. 188,236, granted to me March 13, 1877.

I claim—

In a vertical wind-wheel, a shaft, a hub mounted thereon and having a series of substantially vertical arms a^2 , and a series of fan blades or sails pivotally secured thereto, com-

bined with stay-holders b , having arms b' b^2 ,
extended on opposite sides of the sail and
mounted upon the ends of the sail-arms a^4 ,
and with stay-rods c , secured at one end to a
5 hub on the shaft and connected at the other
end to the arm b' of the stay-holders b in
front and at one side of the arms a^4 , and with
rim-rods connecting the arms b' and b^2 , re-
spectively, of adjacent stay-holders b , where-

by twisting effect produced by the stay-rods c is counteracted, substantially as described.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

EDWARD A. DANA.

Witnesses:

G. W. GREGORY,
F. CUTTER.