

**No. 669,392.**

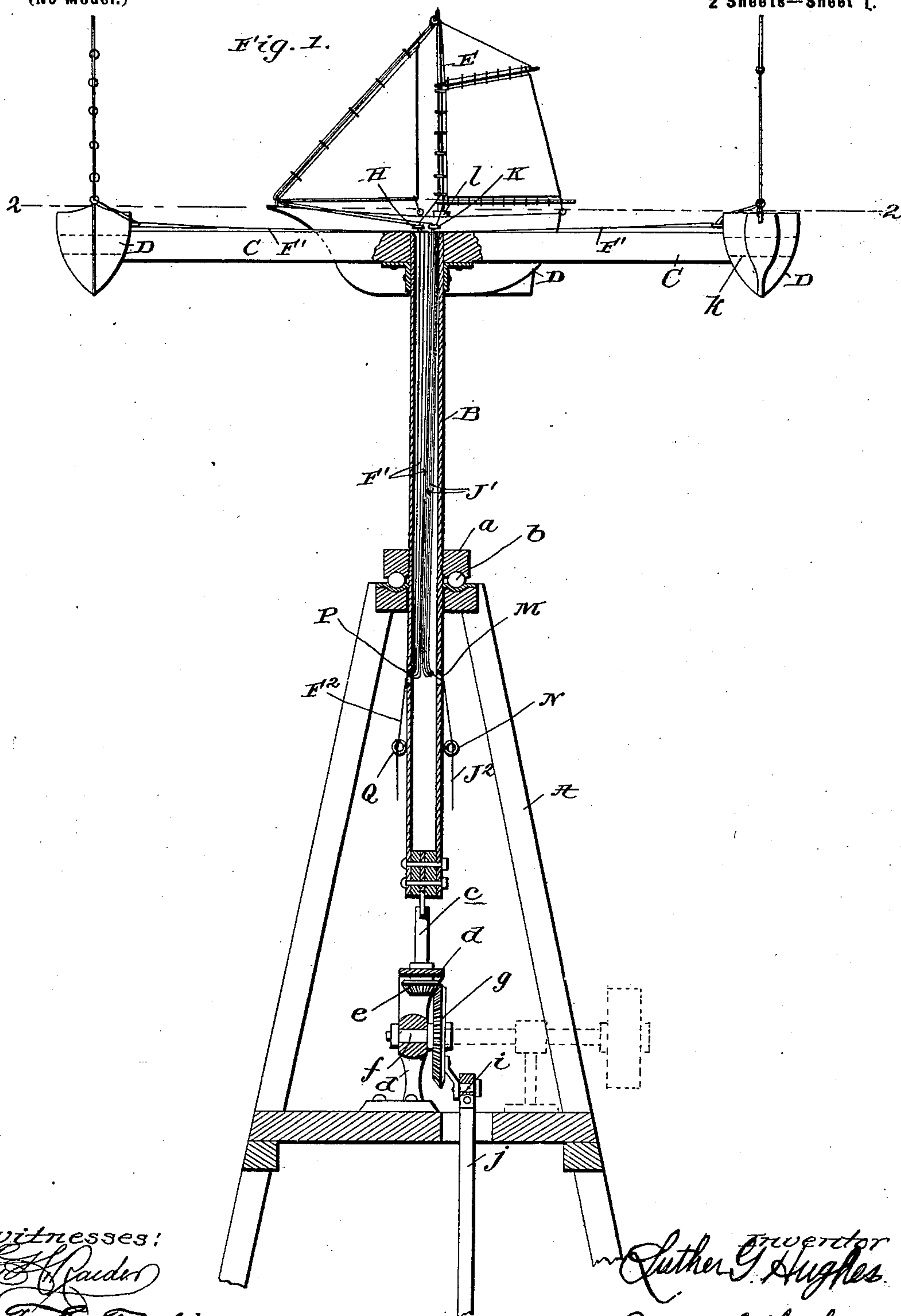
**Patented Mar. 5, 1901.**

**L. G. HUGHES.**  
**WINDMILL.**

(Application filed Dec. 13, 1900.)

(No Model.)

**2 Sheets—Sheet 1.**



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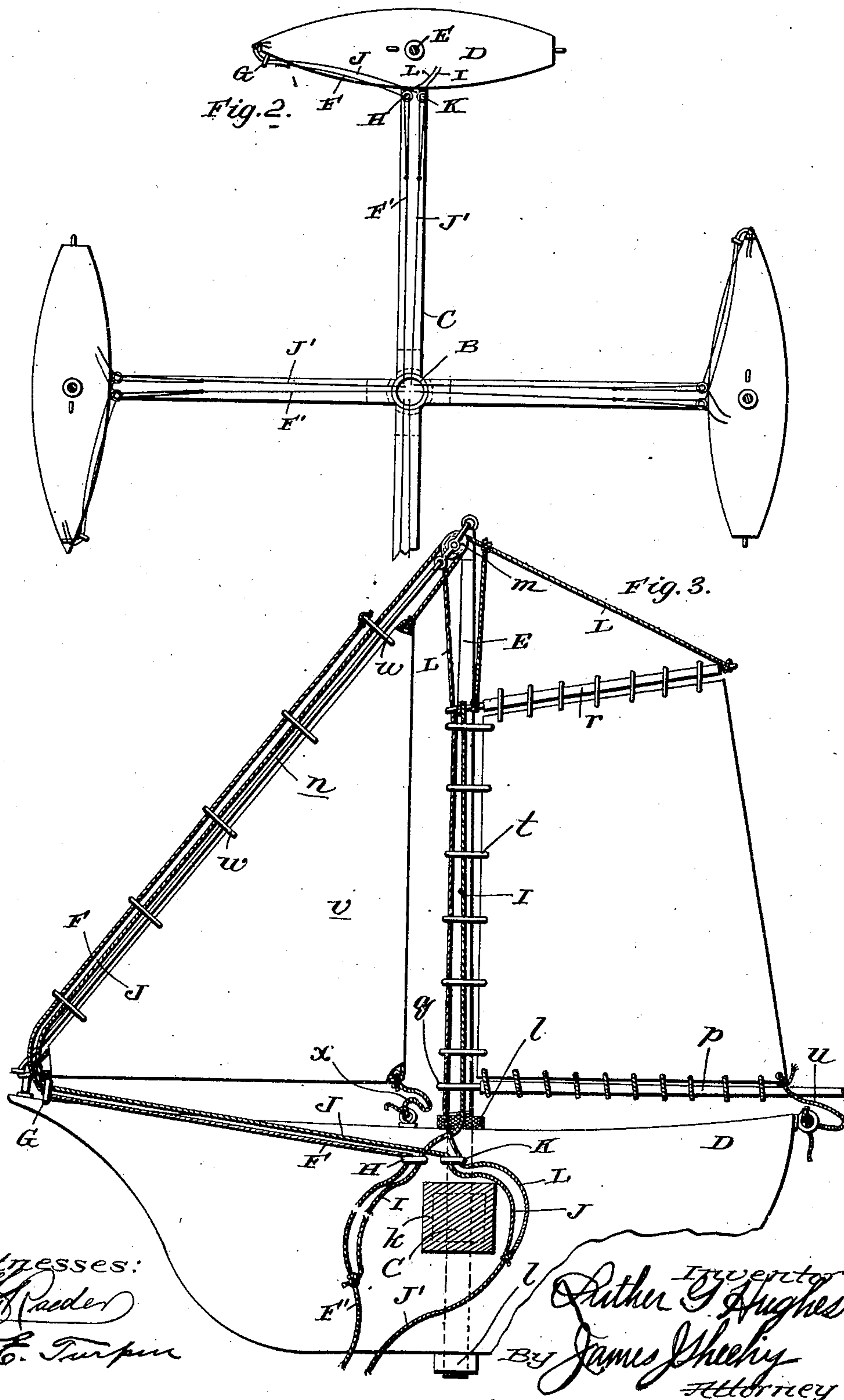
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# UNITED STATES PATENT OFFICE.

LUTHER G. HUGHES, OF FOUNTAIN INN, SOUTH CAROLINA.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 669,392, dated March 5, 1901.

Application filed December 13, 1900. Serial No. 39,719. (No model.)

*To all whom it may concern:*

Be it known that I, LUTHER G. HUGHES, a citizen of the United States, residing at Fountain Inn, in the county of Greenville and State of South Carolina, have invented new and useful Improvements in Windmills, of which the following is a specification.

My invention relates to improvements in windmills; and it consists in a certain peculiar construction, the novelty, utility, and advantages of which will be fully understood from the following description and claims when taken in conjunction with the accompanying drawings, in which—

Figure 1 is a vertical sectional view of my improved windmill with some of the parts in elevation. Fig. 2 is a horizontal section taken in the plane indicated by the broken line 2 2 of Fig. 1. Fig. 3 is an enlarged broken detail section illustrating one of the sail-supports and the sails in a set position thereon.

In the said drawings similar letters of reference designate corresponding parts in all of the views, referring to which, A is a windmill-tower which may be of any construction suitable to the purposes of my invention, and B is an upright central shaft which is journaled in the tower and is adapted to be turned by the wind through the medium of devices hereinafter pointed out. The said shaft B may be of wood or metal and journaled in the frame *a* in any suitable manner. I prefer, however, to utilize a metallic tube for the shaft, the said tube being provided at an intermediate point of its length with an exterior flange *a*, between which and the top of the tower or frame A are interposed antifriction-balls *b*, this with a view of reducing the friction and rendering easy the rotation of the shaft.

Motion may be transmitted from the shaft B to a pump-rod or other device to be actuated through the medium of any suitable interposed gearing. I prefer, however, to employ for the purpose the simple and inexpensive gearing shown in Fig. 1 and which comprises a shaft *c*, journaled in a metallic frame *d* on the tower A and having its upper end connected to the shaft B and its lower end equipped with a beveled pinion, a horizontal shaft *f*, also journaled in the frame *d* and disposed at right angles to the shaft *c*, and a beveled gear *g*, fixed on shaft *f*, in mesh with

the beveled pinion *e* and having an arm *h*, designed to be connected by a wrist-pin *i* to the pump-rod, (indicated by *j*.) This gearing serves when the mill is in operation to regularly reciprocate the pump-rod and is simple, compact, and durable. When it is desired to drive a rotary device from the shaft B of the mill, the shaft *f* is extended, as shown by dotted lines in Fig. 1, and equipped with a pulley to receive a belt.

The shaft B is provided, preferably at its upper end, with four (more or less) lateral arms C, which are fixed to the shaft so as to turn therewith and are provided in turn with sail-supports D, preferably in the form of boats, disposed at right angles to the arms, as shown. In the preferred embodiment of the invention the outer ends of the arms C are let into mortises *k* in the sail-supports or boats D, and the masts E on the latter are carried through the supports or boats and the arms and are provided above and below the supports or boats with nuts *l*. This, as will be readily appreciated, effects a strong and durable connection of the sail-supports or boats to the arms C and also securely fixes the masts in position.

Each of the sail-supports or boats D is similarly equipped, and therefore a detail description of the one shown in Fig. 3 will suffice to impart an understanding of all. In addition to a mast E the said sail-support or boat D is provided with a pulley *m*, connected to the upper end of the mast; a line or rod *n*, interposed between and connected with the upper end of the mast and the forward end of the support or boat; a boom *p*, having a ring *q* at its inner end receiving the mast; a spar *r*, also having a ring at its inner end receiving the mast; a mainsail interposed between and connected to the boom and spar and having a plurality of rings *t* loosely receiving the mast; a slack sheet *u*, interposed between the outer portion of the sail or boom and the rear portion of the support or boat and connected to the same; a jib-sail *v*, having a plurality of rings *w* loosely receiving the line or rod *n*; a slack sheet *x*, interposed between and connected to the lower rear portion of the jib and the support or boat; a rope F, connected to the upper ring *w* of the jib and passed through the other rings thereof and also



through guides G H on the support or boat; a rope I, connected to the upper ring or other portion of the mainsail s and passed through the guide H and suitably joined below said guide with the rope F; a rope J, connected to the upper portion of the jib and passed over one of the pulleys of the block m and thence through the guide G on the support and also through another guide K on said support, and a rope L, which is connected to the upper portion of the mainsail and is passed over one of the pulleys of the block m and is then carried down and through the guide K and is joined in any suitable manner below said guide to the rope J. The rope J', into which the ropes J and L merge, may be properly denominated the "sail-raising" rope, since when it is pulled both the mainsail and the jib will be raised to the set position. (Shown in Fig. 3.) The rope F', into which the ropes F I merge, may be properly denominated the "sail-lowering" rope, since when it is pulled the mainsail and the jib are hauled down and secured in a snug manner close to the support or boat D, so as to present but a minimum amount of surface to the wind. The facility with which the sails may be raised and lowered constitutes an important feature of my invention, for it will be seen that an attendant in the event of a storm is enabled to expeditiously lower and make snug the sails, and thereby prevent damage to the mill.

The sail-raising ropes J' of the several supports or boats D are carried to and down the tubular shaft B and at about the point shown in Fig. 1 are merged into a common sail-raising rope J<sup>2</sup>, which latter is passed through an aperture M in the shaft B and through an eye N, to which it may be tied when desired. In like manner the sail-lowering cords F' of the several boats or sail-supports are carried to and down the tubular shaft B and are merged, as shown, into a sail-lowering rope F<sup>2</sup>, common to the sails of the several boats. This rope F<sup>2</sup> is preferably carried through an aperture P in the shaft B and through an eye Q, to which latter it may be tied when desired. When other than a tubular shaft is employed, it is obvious that the ropes may be carried down at the outside of the same; also that said ropes may be fastened by any means suitable to the purpose.

It will be readily appreciated from the foregoing that by drawing on the rope J<sup>2</sup> an attendant is enabled to quickly raise or set all of the sails of the several boats D, and by tying or fastening the said rope is enabled to secure the sails of all the boats in their set positions; also, by drawing on the rope F<sup>2</sup> an attendant is enabled to lower simultaneously the sails of all the boats, and by tying or fastening the rope F<sup>2</sup> is enabled to secure the sails snugly in their lowered positions. The facility with which the sails may be lowered is materially advantageous, since it precludes damage to the sails and other parts of the mill, provided the party in charge acts

promptly when apprised of the approach of a wind-storm.

In the practical operation of my improved mill it will be seen that a wind blowing from any direction will act against the sails of the boats, and thereby move the boats in a circular path and with them the arms C and the shaft B. It will also be observed that the sails are adapted to accommodate themselves to the direction in which the wind is blowing, and consequently the boats are likely to be moved and the shaft B rotated by very light winds.

My improvements are very simple and inexpensive and may be made so light as not to entail the employment of heavy and expensive towers, common to ordinary windmills, and while they are ornamental in appearance they are capable of developing considerable power.

I have entered into a detail description of the construction and relative arrangement of the parts embraced in this, the preferred embodiment of my invention, in order to impart a full, clear, and exact understanding of the same. I do not desire, however, to be understood as confining myself to such specific construction and arrangement of parts, as such changes or modifications may be made in practice as fairly fall within the scope of my invention.

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

1. In a device adapted to be operated by the wind, the combination of a plurality of sail-supports mounted to move in a circular direction and provided with masts, and blocks at the upper ends of said masts, each of which comprises pulleys, vertically-movable sails mounted on the supports and connected thereto, cords connected to and adapted to lower the jib-sails of the supports, cords connected to and adapted to lower the mainsails of the supports, cords connected to the jib-sails and passed over pulleys of the blocks and adapted to raise said jib-sails, cords connected to the mainsails of the supports and passed over pulleys of the blocks, guides for the cords, and connections whereby the sail-lowering cords of all of the sails and the sail-raising cords of all of the sails may be operated from a common point.

2. In a device adapted to be operated by the wind, the combination of a sail-support provided with a mast, vertically-movable jib and main sails arranged on the support, sail-lowering ropes or cords connected to the jib and main sails, and connected together, pulleys connected to the mast, and ropes or cords for raising the main and jib sails, connected to the upper portions of said sails and passed over the pulleys and connected together.

3. In a windmill, the combination of a suitable support, an upright, a rotary shaft journaled in said support and having lateral arms provided with sail-supports, masts rising from



said supports, pulleys connected to said masts, vertically-movable jib and main sails mounted on each support, sail-lowering cords or ropes connected to the mainsails and jib-  
5 sails, sail-raising cords or ropes connected to the mainsails and jib-sails and passed over the pulleys, a cord connected to the sail-lowering cords of the several supports, and a cord connected to the sail-raising cords of the sev-  
10 eral supports.

4. In a windmill, the combination of a suitable support, a tubular, upright shaft journaled therein and having lateral arms provided with sail-supports, masts rising from  
15 said supports and provided with pulleys, ver-

tically-movable main and jib sails on the supports, sail-lowering cords connected to the jib and main sails of the several supports and passed through guides to and through the hollow shaft, and sail-raising cords connected to  
20 the main and jib sails of the several supports, and passed over the pulleys and through suitable guides to and through the tubular shaft.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.  
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LUTHER G. HUGHES.

Witnesses:

B. S. COX,

W. B. JONES.