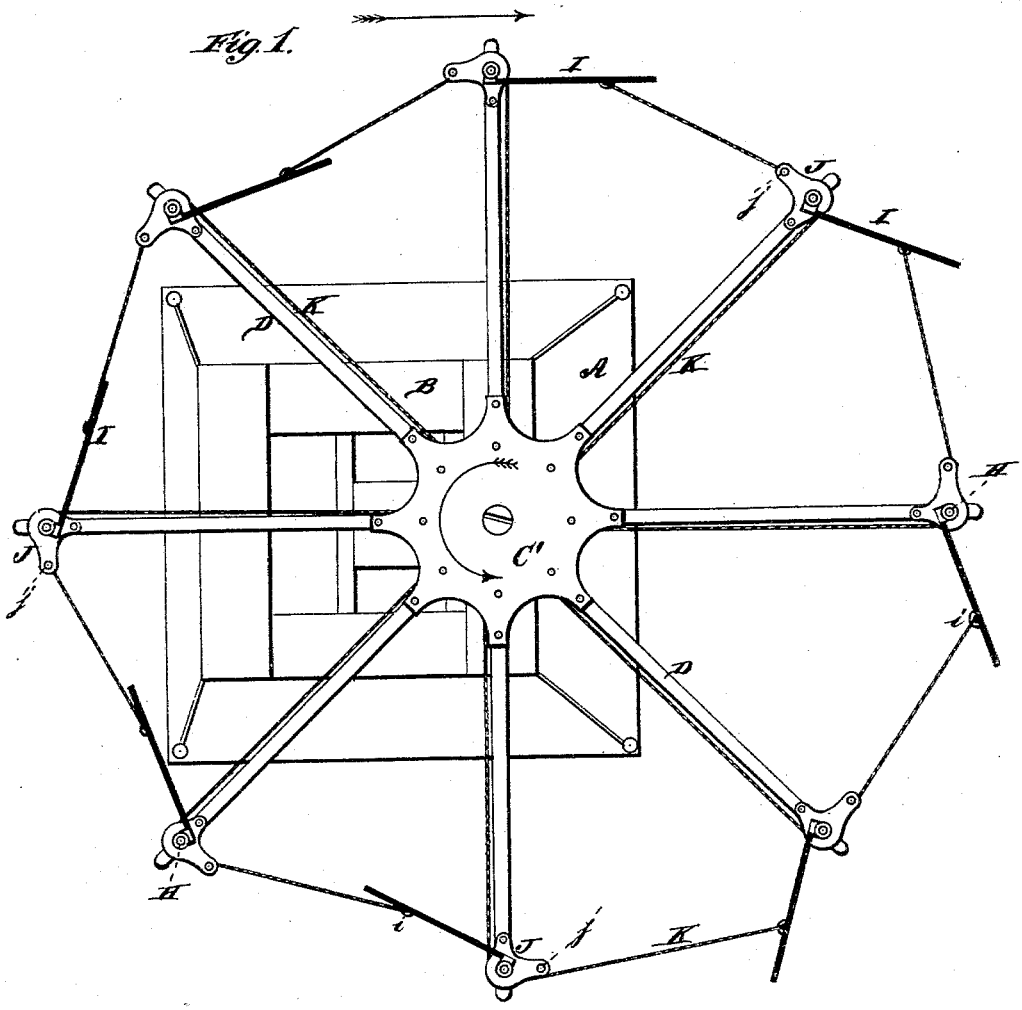
2 Sheets—Sheet 1.

W. FORBES.
Wind-Mills.

No. 210,772. **Patented Dec. 10, 1878.**

Fig. 1.



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2 Sheets—Sheet 2.

W. FORBES.
Wind-Mills.

No. 210,772. **Patented Dec. 10, 1878.**

Fig. 2.

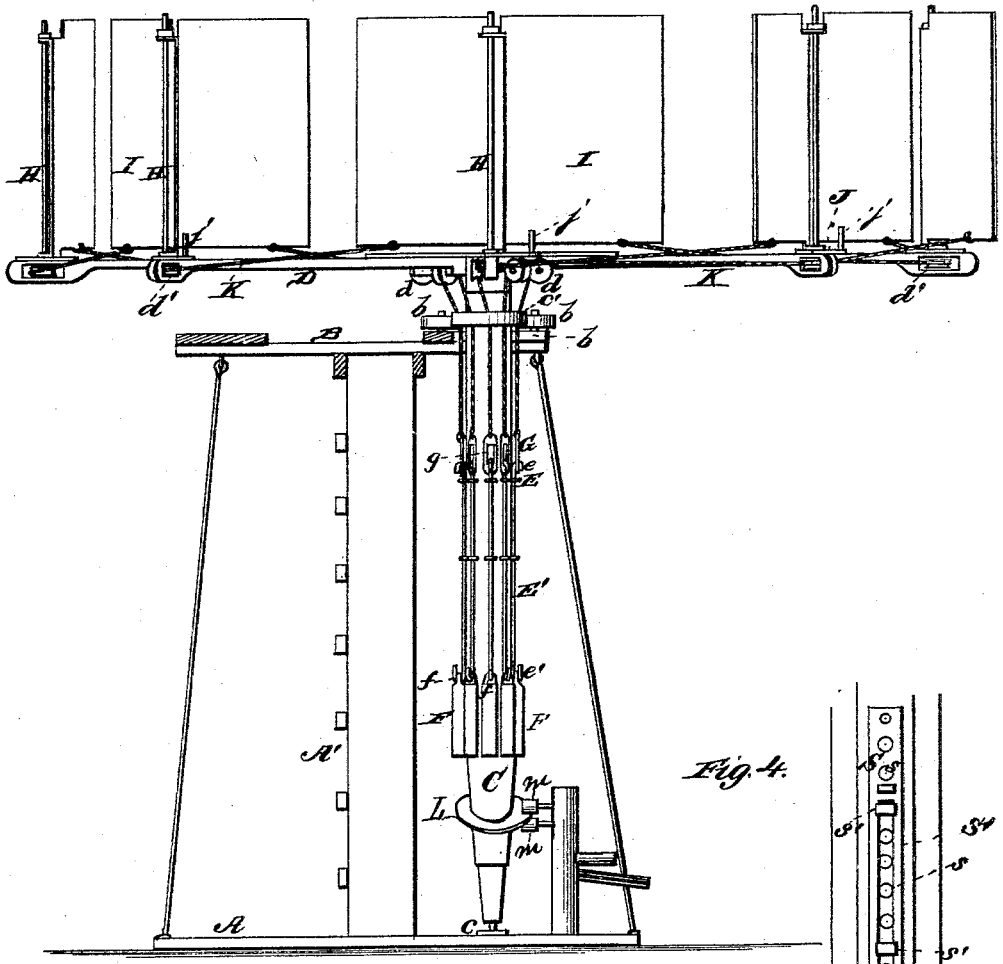


Fig. 4.

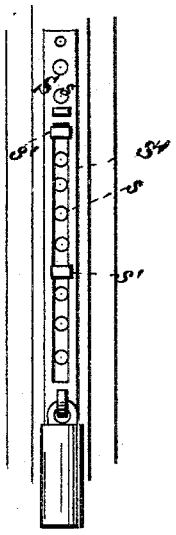
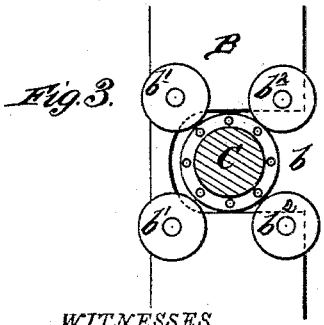


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM FORBES, OF PLAINWELL, MICHIGAN.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **210,772**, dated December 10, 1878; application filed October 19, 1878.

To all whom it may concern:

Be it known that I, WILLIAM FORBES, of Plainwell, in the county of Allegan and State of Michigan, have invented a new and valuable Improvement in Windmills; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a top plan of my windmill. Fig. 2 is a vertical central sectional view of the same, and Figs. 3 and 4 are detail views thereof.

My invention has relation to a motive power obtained from wind—a wind-engine—adapted to be applied to any suitable purpose, such as pumping, or the like; and the novelty consists in the construction and arrangement of parts, as will be more fully hereinafter set forth.

Upon a proper derrick I place a frame having a recess provided with four friction-rollers, the outer two of which may be removable. The recess and rolls furnish a bearing to receive the revolving vertical shaft, which has a friction-collar adapted to bear against the rolls. The shaft revolves below on a hardened pivot and metal plate, and it is provided around its surface with eyebolts, or their equivalents, which receive hooked rods, having at their lower ends cases adapted to be filled with sand, gravel, and the like, and serve as weights.

Upon the upper extremity of the revolving shaft is a rigid metal disk, and to it are secured radial arms, of equal number with the weight attachments; and to their outer ends are vertical rigid masts carrying pivoted sails, said masts serving as a shaft for a pulley journaled in the radial arm below the masts. Hung on the arms, near the upper end of the revolving shaft, are other pulleys.

A rope or chain leads from the center of the lower edge of each sail over the pulley in the outer end of the succeeding arm, thence inward over the pulley at the head of the shaft, thence through holes in the shaft-collar, and down the plane of the shaft, where they are provided at their ends with slotted plates to receive the hook on the upper ends of the weight-rods when the weights are to be attached.

Suitable stops are provided to prevent the sails from making a full revolution.

I have shown an inclined collar on the shaft; but my invention may be applied to any suitable machinery by any proper device.

The weights may be adjusted to accommodate or control the wind, and may be detached at will to stop the machine.

It will be observed that each sail will turn inward and outward, governed by the weights, and that they all have a bearing force, more or less, from the wind, except the one sail which is advancing directly against the wind, mast-edge first. (See Fig. 1.)

Referring to the drawings, upon a suitable base, A, I erect a platform or derrick, A′, properly braced, and upon the upper end secure a frame, B, having a recess, *b*, and four friction-rolls, b^1 b^1 b^2 b^2, two of which, b^2, are removable.

C represents a revolving vertical shaft, pivoted upon a hardened point, *c*, below, and provided at its upper extremity with a rigid disk, C′, having radial arms D secured thereto. Upon the sides of the shaft C are eyebolts or sockets E, which receive rods E′, hooked at the upper and lower ends, respectively, at *e* and *e′*. The lower hook, *e′*, engages an eye or bail, *f*, upon a case, F, adapted to receive sand, gravel, or the like, to produce a weight. The upper hook, *e*, engages a plate, G, having a slot, *g*, through which a rope is passed and tied, said rope running over pulleys *d* *d′*, and connecting with a sail, I, at *i*.

Upon the side of each radial arm D, near the shaft, is a pulley, *d*, and journaled in the outer end of each arm is a pulley, *d′*, the shaft of such pulley being the lower end of a rigid vertical mast, H, upon which is pivoted or hung a sail, I, of sheet metal, wood, or other material.

A plate, J, pierced by the mast H, has a stop, *j*, rigid therewith. At a point, *i*, near the center of the lower edge of each sail, (there being a series, one on each radial arm,) is secured a rope, chain, or their equivalent, K, which passes around the pulley *d′*, thence inward toward the axis and over the pulley *d*, thence downward through a collar, *c′*, on the shaft C, which

collar operates upon the friction-wheels b^1 b^1 b^2 b^2, and from thence downward, and upon them is attached the plate G g.

The shaft may be applied to an inclined collar, L, or to any gearing or device suitable to transmit force or motion. I deem this collar important, as it gives a uniform reciprocating rectilinear motion. The inclined collar L rotates between two friction-rollers, m m, on studs or arms attached to a pump-rod or pitman-rod, so that motion is communicated to the rod when the shaft C revolves.

Fig. 4 shows a modification, in which a perforated plate, S, is secured to the shaft, the holes s receiving I-shaped pins s', which hold a weight-strap, S'. The pins may be moved to control the play of the sails.

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

1. In a windmill, the combination of the weights F, rods E' e e', and slotted plates G g with the ropes K and sails I, substantially as and for the purposes set forth.

2. In a windmill having radial arms D, provided with pulleys d d' and stops J j, the combination of the weights F, rods E', having hooks e e', with the slotted plates G g, adapted to be disconnected therefrom, and the ropes K and sails I, so that any one of the sails may be detached from its weight, as set forth.

3. The frame B, having recess b and friction-rollers b^1 b^1 b^2 b^2, in combination with shaft C, disk C', arms D, sails I, and weights G, as specified.

4. The masts H, serving the double function of supporting the sail and acting as a shaft for the pulley d, in combination with the sails I i and weights F, as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM FORBES.

Witnesses:
DANIEL EARLE,
JOHN CRISPE.