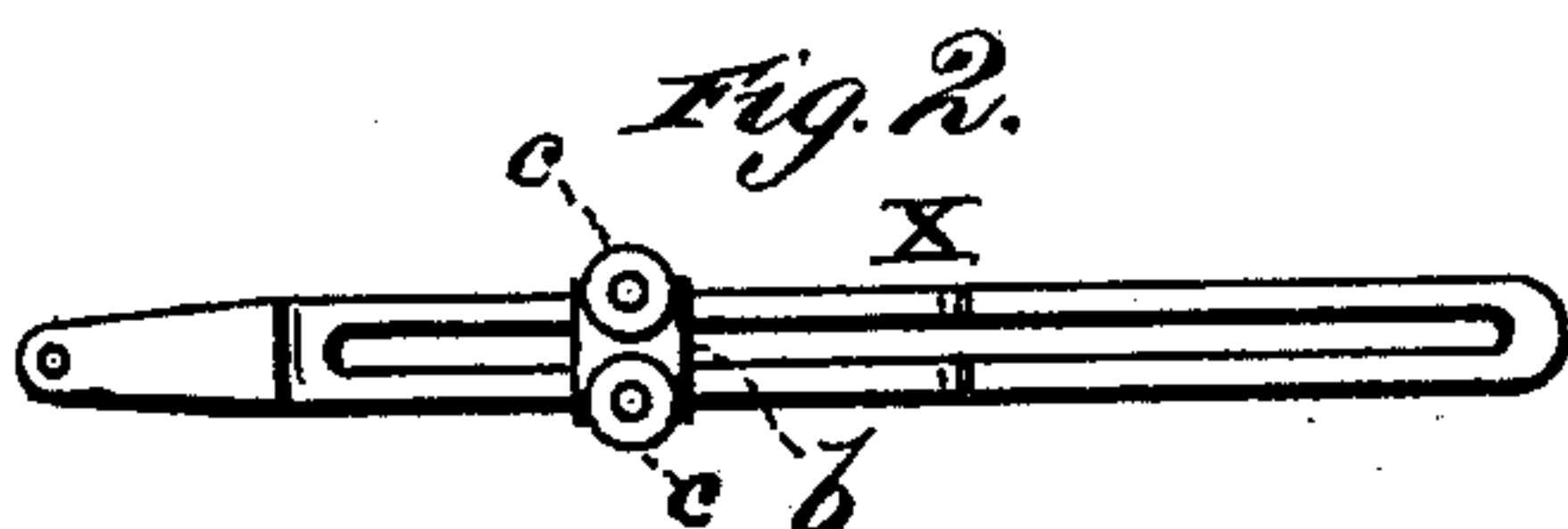
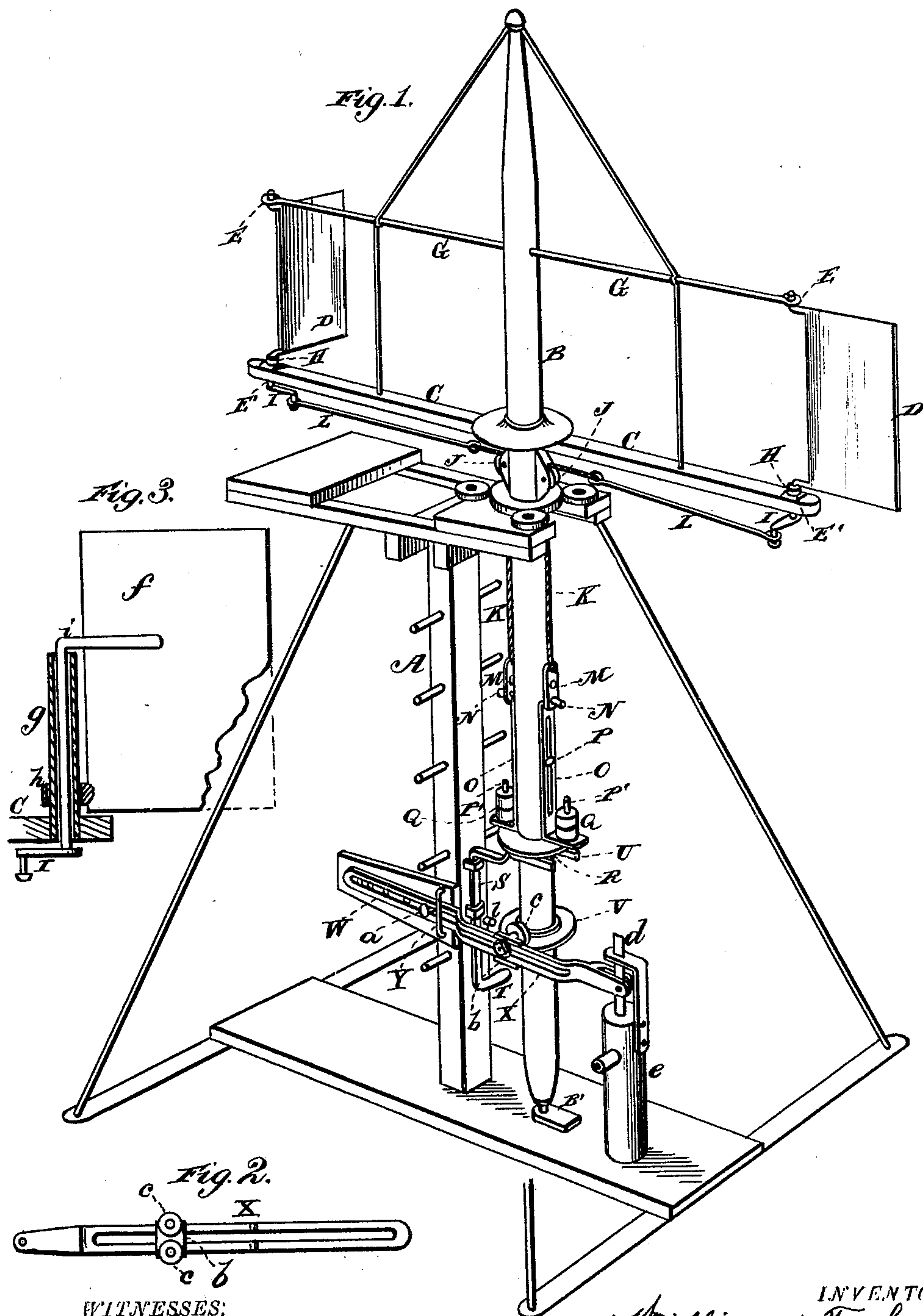


(No Model.)

W. FORBES.  
Windmill.

No. 233,226.

Patented Oct. 12, 1880.



WITNESSES:

Robert Smith  
James J. Sheehy.

INVENTOR:

William Forbes.  
By his Attorney, J. Clement Smith.



# UNITED STATES PATENT OFFICE.

WILLIAM FORBES, OF PLAINWELL, MICHIGAN.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 233,226, dated October 12, 1880.

Application filed August 4, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM FORBES, a citizen of the United States, resident at Plainwell, in the county of Allegan and State of Michigan, have invented certain new and useful Improvements in Windmills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention has relation to windmills; and it consists in the improved features of construction and combination hereinafter fully described, and particularly pointed out in the claims.

Figure 1 is a view, in perspective, of a windmill embodying the improvements of my invention. Fig. 2 is a detail view of the friction-rollers, adjustable plate, and slotted lever for operating the pump; and Fig. 3 is a view of a modification of one of the sails.

I have found by experience that it is desirable during the prevalence of heavy winds to use but a few of the sails of a windmill at a time, or only such a number as may be found necessary to perform the work required at the time, and that it is necessary to hoist more sail or take in sail as the wind dies away or increases. The mechanism hereinafter described and illustrated is constructed mainly to accomplish these objects.

Referring by letter to the drawings, A designates a derrick having a platform at the top, made stable by braces in the usual manner.

B designates a vertical shaft having its lower bearing in the step B' and its upper bearing on the platform at the top of the derrick.

C designates the arms of the wind-wheel, two arms only being shown.

D designates the sails, having upper and lower journals, E E'. The upper journal, E, has its bearing in the outer end of an arm, G, extending parallel with the arm C. The lower journal, E', is provided with a shoulder, H, and has its bearing in the outer end of the arm C. The journals E' of the sails are at the inner or rear edges thereof, extend through and below the arms C, and are each provided with a crank, I.

Vertical pulleys J are secured to the vertical shaft B, one beneath each arm C. Cords K, running over these vertical pulleys J, are connected at their upper ends with rods L, attached to the cranks I, and are provided at their lower ends with perforated plates M or rings adapted to be connected with and disconnected from hooks N at the upper ends of the slotted weight-straps O. Pins P are passed through the slots in the weight-straps O into the shaft B, and on these pins the weight-straps slide up and down when necessary. Stud P' extend upward from the weight-straps, and on these studs perforated weights Q are placed. Beneath the weight-straps O a sliding collar, R, encircles the shaft B and rests on pins driven into the shaft B beneath it.

To the derrick A is secured a sliding arm, S, having a handle, T, at its lower end and a fork, U, at its upper end, which partially encircles the shaft B immediately beneath the sliding collar R. An inclined collar, V, is fixed to the shaft B a short distance below the fork U.

A perforated arm, W, is secured to the derrick A in line with the collar V on the shaft B. To this arm W a slotted lever, X, is secured by a guide, Y, and a movable bolt, a. The lever X is bent laterally near its middle to avoid the collar V, and in that portion of its slot extending inwardly from the arm W is secured, by screw and nut, a plate, b, carrying two friction-rollers, c c, one above the other, between which, and in contact therewith, revolves the inclined collar V. One end of the slotted lever X is connected to the rod d of a pump, e.

The modification of the sail shown herein is intended to be used in small mills, and it consists of a sail, f, pivoted to a hollow mast, g, by a sleeve, h, and a journal, i, secured to the sail. The journal i is passed down through the hollow mast g, its lower end passing through the arm C, where it is provided with the crank I, and connected with the sail cords and weights in the same manner as the larger sails, hereinbefore described.

The operation is as follows: When the sail-cords are all connected to the weight-straps O the weights will hold the sails in the wind, except when a sail is struck by a sudden gust of wind, when the sail will make a complete rev-



olution, or swing around to a point where the weight counterbalances the wind. When it is not necessary to use all the sails some of the sail-cords may be detached from the weight-straps, and thereby cause the sails with which they are connected to become idle sails, which revolve with perfect freedom, maintaining a vane-like position without winding the cord or chain. The wheel may be stopped entirely and almost instantly by disconnecting all the sail-cords from the weight-straps, which may be readily done; but I have provided a better and easier way by employing the sliding arm S, having the fork U at its upper end. By raising this arm S the sliding collar R may be carried up along the shaft, and with the weight-straps and weights the handle of the arm S is rested on the catch I and holds the weights in an elevated position, so that they do not act upon the sail-cords. The sails, therefore, all become instantly idle. To start the wheel when there is sufficient wind, it is only necessary to lower the sliding arm, when the weights will draw on the sail-cords and hold the sails in position.

The friction-rollers on the plate *b* may be adjusted in the slot in the lever X, and by placing the pump nearer to or farther from the shaft B various lengths of stroke may be made with the same collar.

In case of light winds all sail should be hoisted and the set-screw *a* moved out to the end of the lever X. The large sails require the upper arm, G; but these are not necessary in small mills, where the mast-sails are used. By this style of sail the power may be increased without increasing the diameter of the wheel, as the sails may be extended vertically.

Having thus fully described my invention,

what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a windmill, the combination of the vertical sail herein described, adapted to make a complete revolution on its axis independently of the movement of the wheel, provided with the crank I below the arm C and the sail-cord and weight, substantially as and for the purposes set forth.

2. In a windmill, the combination, with the sail-cord thereof, having a perforated plate or ring at its lower end, of the weight-strap, provided with a hook at its upper end, and a stud for holding the weights in place, slotted and secured to the vertical shaft of the mill, substantially as and for the purposes set forth.

3. In a windmill, the sliding bar having a fork at its upper angle secured to the derrick-post and partially encircling the vertical shaft beneath the sliding collar on the same, in combination with the sliding collar and the slotted and weighted weight-strap secured to the end of the sail-cords, substantially as and for the purposes set forth.

4. In a windmill, the slotted and bent lever X, provided with the adjustable plate, carrying the friction-rollers *c c* and adapted to be connected at one end to the pump-rod, in combination with the inclined collar on the vertical shaft B and the perforated arm, guide, and set-screw on the derrick-post, substantially as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM FORBES.

Witnesses:

O. J. WOODARD,  
S. S. WALDO.