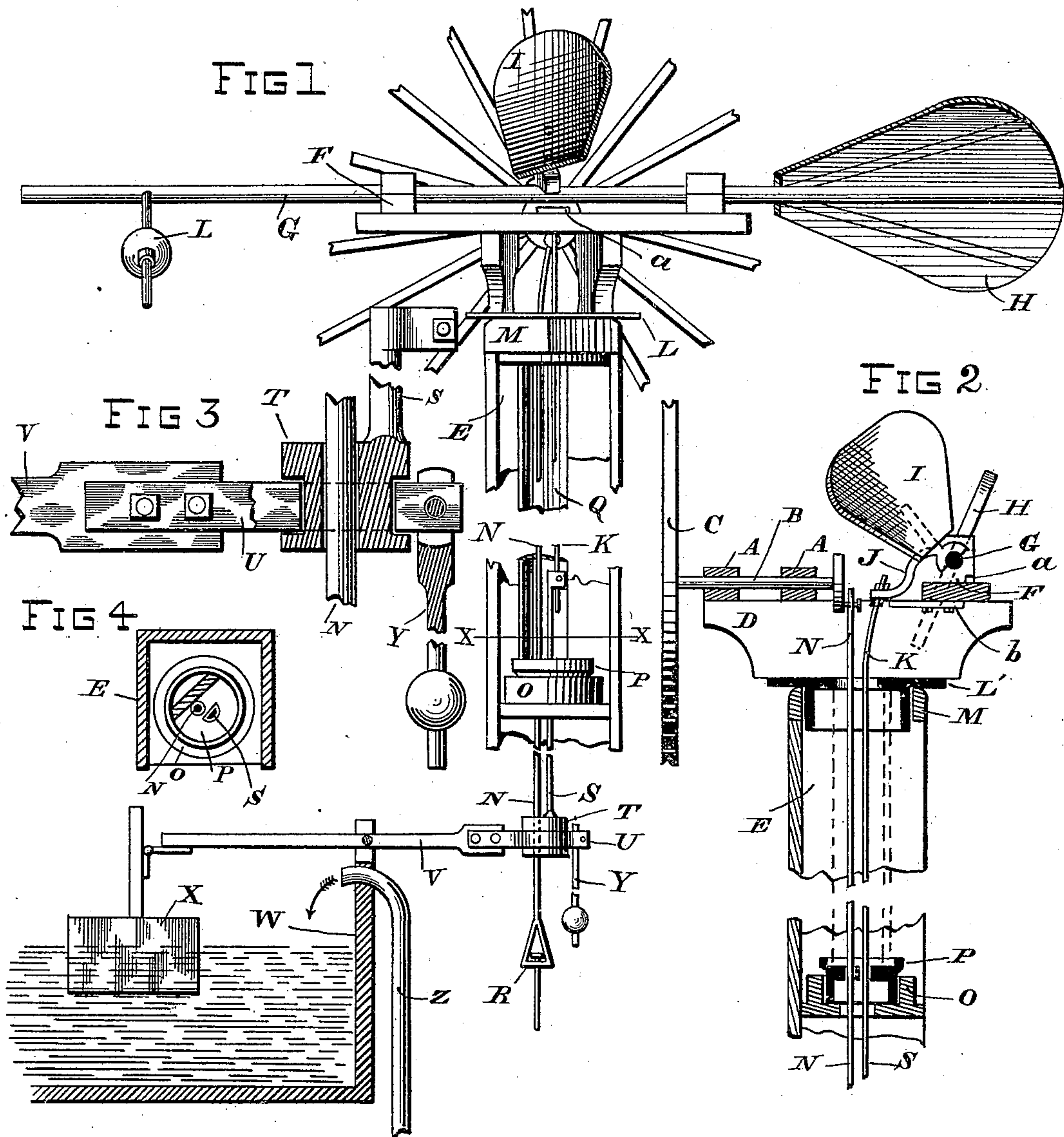


(No Model.)

F. W. KROGH.
Windmill.

No. 238,789.

Patented March 15, 1881.



WITNESSES
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FERDINAND W. KROGH, OF SAN FRANCISCO, CALIFORNIA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 238,789, dated March 15, 1881.

Application filed November 8, 1880. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND W. KROGH, a citizen of the United States, and residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

My invention relates to certain improvements in self-regulating windmills, the self-regulating mechanism of which may be operated either by the power of the wind or by the quantity of water in the tank; and it consists in providing a buoy or float set in the tank upon a lever-rod, which is suitably connected to the auxiliary or governing vane.

In the accompanying drawings, Figure 1 is a front elevation, partly broken away, and showing the position of the vanes when the fan-wheel is partly turned out of the wind. Fig. 2 is a side view, partly broken away. Fig. 3 is a sectional view, showing the swivel through which the pump-rod plays and the balance-rod. Fig. 4 shows a cross-section through the penstock, on line X X of Fig. 1.

Similar letters refer to similar parts throughout the several views.

The bearings A, which carry the shaft B of the wheel C, are firmly secured upon suitable carrying-blocks D, firmly secured to the top of the turn-table or cap at the upper end of the penstock E. These carrying-blocks also support the bearings F for the shaft G of the vane H.

Midway between the two bearings F F, I place, upon the vane-shaft G, the auxiliary or governing vane I, and from the iron to which this vane is bolted there is a curved and downwardly-projecting arm, J, the outer end of which is pierced for the reception of the rod K, the office of which will be more fully explained hereinafter.

Secured to one of the carrying blocks or beams which support the bearings of the vane-shaft G, I place stops *a* and *b*, which prevent the said shaft from making but little more than a quarter of a revolution within its bearings.

The longest diameter of the auxiliary vane I is set at an angle of about forty-five degrees to the shortest diameter of the vane H, while

the shortest diameter of the auxiliary vane I is set at an angle of about forty-five degrees to the longest diameter of the vane H; or, in other words, the face of the auxiliary vane I is set quartering to the wind, and also to the face of the main vane H, so that an increase in the force of the wind upon the fan-wheel will also act upon the auxiliary vane I, and, by raising it up and causing it to make a quarter-revolution, has the effect of turning the flat side of the main vane to the direction of the wind, thus causing the fan-wheel to be turned out of the wind.

The outer end of the vane-shaft G is provided with a weighted arm, L, which is set at right angles to the vane-shaft, and also to the flat side of the vane H.

The turn-table L' has a downwardly-projecting flange, which sets inside of an iron casting, M, secured upon the top of the penstock, and upon which the turn-table has its bearing, and it is provided with an aperture, through which the rods K and N move up and down.

Near the lower end of the penstock I place a casting, O, which supports and forms a bearing for the casting P. The turn-table L' and casting P are firmly connected by the timber Q, and both turn with the fan-wheel C as it is thrown in or out of the wind. The casting O is provided with an aperture, through which plays the pump-rod N and rod S. The casting P has two apertures in it, through which the rods N and S play. That for the pump-rod N (which is provided near its lower end with a swivel, R) is circular in plan, while that through which the rod S plays is semicircular in plan, or of any other suitable form, so as to bind upon the sides of the rod or bar and cause it to turn with the turning of the casting P, as is seen in Fig. 4. The lower end of the rod K enters a loose clasp upon the top of the rod S, and the lower end of the said rod is provided with a swivel-block, T, which is pierced for the passage of the pump-rod, and recessed to form a bearing for the clamp U. This clamp U is bolted to a lever-arm, V, pivoted upon one side of the tank W, and has hinged to its inner end the float X, while to the outer end of the clamp U is hinged the weighted rod Y, which serves to balance the float X.

The inner end of the shaft B of the fan-wheel is provided with the usual connections for the pump-rod.

5 Z represents the pipe through which water is forced from the pump into the tank.

The operation of my improved self-regulating windmill will be as follows, to wit: Let it be supposed that the windmill is running at a moderate rate of speed. An increase in the
10 force of the wind will cause the auxiliary vane I to be raised and blown backward, and at the same time, owing to the large surface which it slantingly presents to the wind, will turn the main vane from its edgewise position to
15 the wind, changing the face to the wind, and the fan-wheel C will be turned out of the wind, or so that the face of the rim of the wheel will be presented to the wind, and no action will be had; but as the force of the wind lessens, the
20 weighted arm L will cause the auxiliary vane I to resume its original position, thereby turning the fan-wheel to the force of the wind. As the water in the tank W rises the float X, which is balanced by the weighted arm Y, also
25 rises, thereby drawing down the rod S, which, in turn, draws down the rod K, and causes the

partial rotation of the vane-shaft G and lowering of the auxiliary vane I, and this action throws the mill out of the wind, as hereinbefore explained, thereby causing a suspension
30 of the supply of water to the tank; but as the supply of water in the tank is drawn off, the weighted arm L will cause the vane-shaft to be partially rotated backward, and thus cause the fan-wheel to be again thrown into the
35 wind.

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

In a self-regulating windmill, the combination of the balanced float X, lever-arm V, swivel
40 T, rods S and K, curved arm J, and auxiliary vane I, all constructed and arranged to operate substantially as herein described and set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 29th day of September, 1880.

FERDINAND W. KROGH. [L. S.]

Witnesses:

C. W. M. SMITH,

WILLIAM C. HARNEY.