C. F. RUDOLPH.
Windmill.

No. 227,842. Patented May 18, 1880.

Fig. 1.

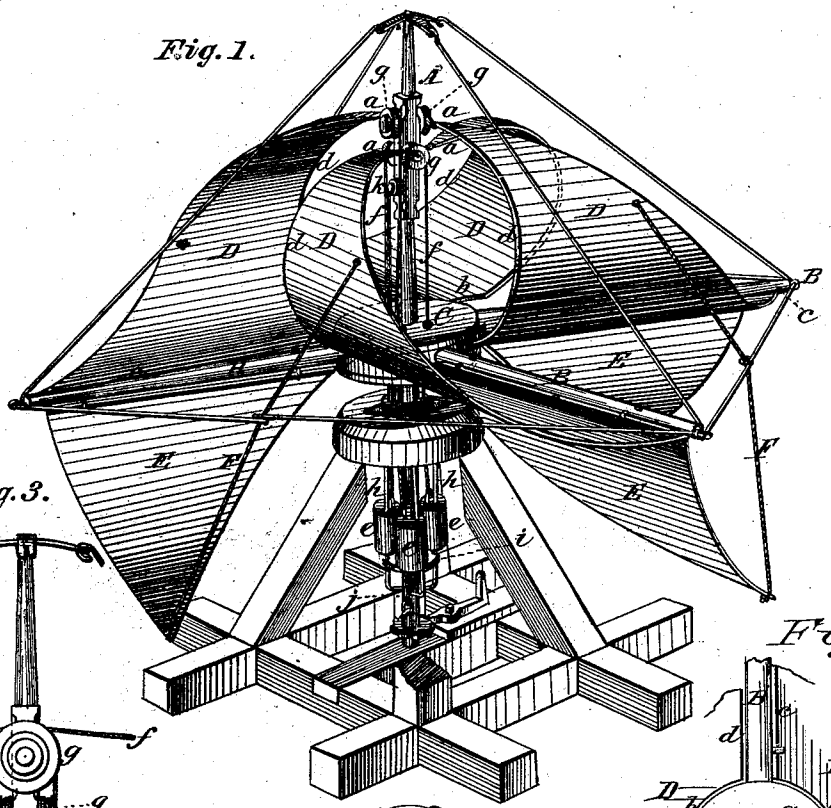


Fig. 3.

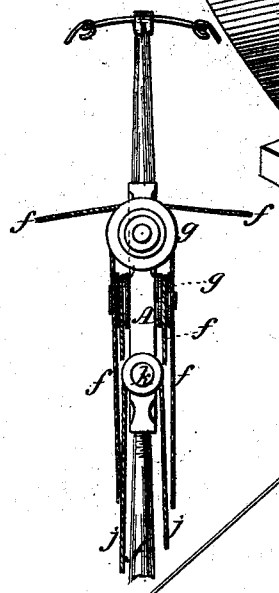


Fig. 4.

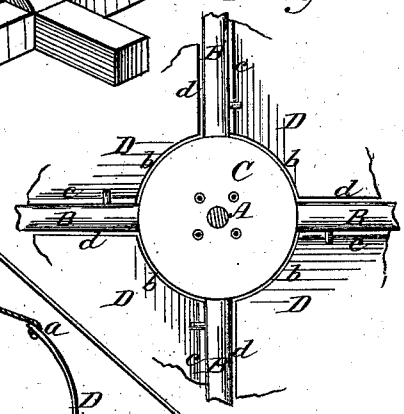
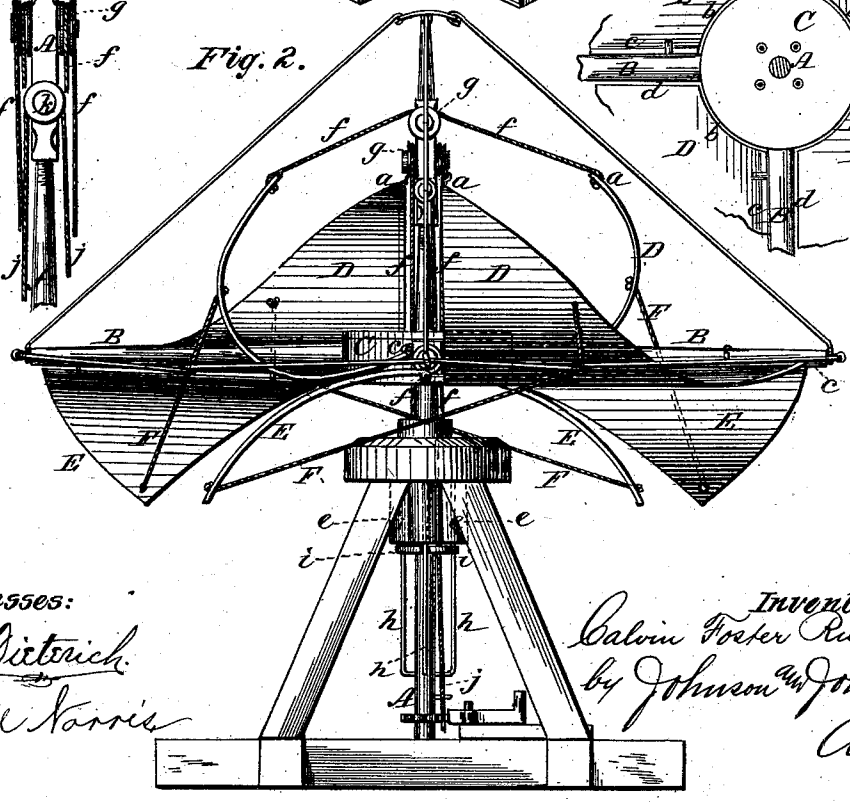


Fig. 2.



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UNITED STATES PATENT OFFICE.

CALVIN F. RUDOLPH, OF BEEVILLE, TEXAS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 227,842, dated May 18, 1880.

Application filed January 20, 1880.

To all whom it may concern:

Be it known that I, CALVIN FOSTER RUDOLPH, of Beeville, in the county of Bee and State of Texas, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

My improvements are designed with special regard to a comparatively simple and durable construction with an effective and regular action in windmills. I use two sets of hinged vanes, one of scroll form acting above, and the other of triangular form acting below, the revolving plane of horizontal arms to which they are hinged. These vanes are connected together at their free ends in such manner as to have a co-operating action under the action of the wind, and both controlled in such action by means of weights connected by cords leading from the upper free ends of the scroll-vanes over pulleys arranged upon the vertical driving-shaft and hanging below the upper bearing of the frame which supports the driving-shaft. The scroll-vanes receive the action of the wind upon their concave surfaces, which terminate in an upper point of the scroll, and in their full acting positions they are wholly above the arms with their scroll-points at or near the shaft, while the lower vanes hang down vertically, and present, by their connection with the upper vanes, their full surfaces to the wind, so that as the scroll-vanes are depressed to carry their acting-surfaces out of the wind the lower vanes are in proportion made free to swing back out of the wind to diminish its force thereon, thereby not only maintaining the regular action of the mill but obtaining increased power from the divided and connected action of the vanes. In fact, I provide each radial arm with two vanes, each separately hinged, and having a flexible connection at their free ends, so that while one is hinged independent of the other, yet the upper or scroll vane must control the lower one under all conditions of the wind.

The mill is stopped by fully depressing the scroll-vanes, which leaves the lower vanes free to be carried back, so as to offer little or no resistance to the wind, the lowering of the scrolls having the effect to take them out of the wind, as it is only in their elevated positions that they receive the full effect of the wind and hold the lower vanes against the action of the wind.

Referring to the accompanying drawings, Figure 1 represents a view, in perspective, of a windmill embracing my improvements, the vanes being in position for full operation; Fig. 2, a side elevation, showing the vanes depressed to put the mill out of use; Fig. 3, a detail of the shaft and its cord-pulleys; and Fig. 4, a detail top view, showing the relation of the scroll-vanes to the hub.

The same letters of reference refer to corresponding parts of the windmill.

The vertical shaft A is provided with upper and lower bearings in a suitable framework, and the radial arms B are secured in a hub, C, carried by said shaft, the hub and arms being firmly secured together by top and bottom plates, or in any suitable manner.

Each of the radial arms has independently hinged to it two vanes, one, D, of scroll form, extending upward with an inward concave surface and terminating at a point, *a*, by an over inward bend, so as to allow the wind to act upon its inward concave or scroll side, with its inner-edge corner, *b*, encircling that part of the hub between the arms, and with its hinged edge *c* the length of the arm, so that when in its raised or full position it presents its concave side for the action of the wind. The other, E, of these vanes is hinged to the lower side of said arm, and is of triangular form, extending downward with its full side in vertical position to receive the action of the wind. The hinged edges of these lower vanes are of equal length to the arms, but their points terminate at their outer edges, and therefore in opposite positions to the upper-point terminations of the scroll-vanes. Under this arrangement the lower hinged vane of one arm will be in a position beneath the inner edge, *d*, of the upper or scroll vane of the next arm, and these two independently-hinged vanes are connected to each other by a cord, F, leading from the outer point of the lower one to near the inner point of the upper one, whereby the two are simultaneously raised and depressed.

In the full raised position of the scroll-vanes the lower ones will present a full vertical concave surface to the wind, and the depression of the scroll-vanes by the force of the

wind will lessen such force, and will cause the lower ones to swing back correspondingly out of the wind. This action of the connected vanes is effected by means of pendent weights *e*, attached by cords *f* to the point-terminations of the scroll-vanes, and passing over pulleys *g*, secured to the shaft above the hub C, and extending down through corresponding holes in the hub and the upper bearing of the shaft, the weights being attached to the lower ends of said cords beneath said upper bearing. The weights must be sufficient to counterbalance the connected vanes and to hold them up in ordinary winds.

I propose to use the weights in sections, so that the power can be governed according to the amount of work to be done or the machinery to be driven, and hold the vanes against a strong wind, or regulate the weights for a light power by removing as many sections as may be required.

The weights revolve with the shaft, and are held in place around said shaft by means of vertical guide-rods *h*, secured to said shaft.

To put the mill out of action the weights are raised simultaneously by means of a plate, *i*, adapted to slide over the shaft, and raised against the weights by a cord, *j*, attached to said plate, the same passing over a pulley, *k*, on the shaft above the hub, and descending and passing through a hole in said lifting-plate, so as to be reached and pulled down.

That part of the shaft A which carries the pulleys is made separate and screwed onto the shaft, as shown in Fig. 3, so as to allow it to be made of a length to suit different-sized mills. For a twelve-foot mill this pulley-section will be about four feet long, and the weights will occupy about the same space for action below the hub.

The attachments for driving one or more machines are applied to the shaft below the weight devices.

Additional wings may be used so as to lap the lower wings upon the same slope and hinged to the arms, so as to give increased surface and greater power by forming extensions to said wings; but in such cases the weights must be increased accordingly.

The arms B are braced to each other and to the top of the shaft, as shown, or in any suitable manner.

I have used a mill embracing the improvements, and find it to work with great power and regularity. It always stands ready for the wind from any point. It is self-regulating, and by means of the sectional weights the power can be increased or diminished as the supplemental lower vanes are added, and which may be easily attached, when required, by means of hook-connections.

It will be understood that when the upper scroll-vanes are fully depressed out of the wind the lower vanes are free to be driven back by the wind in nearly horizontal positions, so as not to drive the mill, the lengths of the connecting-cords being such as to produce this effect.

I claim—

1. In a windmill, the vanes consisting of an upper scroll part, D, and a lower triangular part, E, hinged to the same radial arm B, the scroll part of one arm being connected to the lower triangular part of the other arm by a flexible connection, F, in combination with weights *e*, connected to the upper or scroll part, for operation substantially as herein set forth.

2. The combination, with the independently-hinged vanes D E, connected together for co-operation substantially as herein set forth, of the cords F, connected to the point-terminations *a* of the scroll-vanes, the shaft-pulleys *g*, over which said cords pass, the weights *e*, attached to said cords, the guide-rods *h* for said weights, and the lifting-plate *i*, all constructed for use in a windmill, substantially as herein set forth.

3. For windmills, the scroll-shaped vanes D, hinged to the radial arm B, terminating in a point, *a*, by an upward and inward bend of its inner end, extending the length of said arm at its hinged edge, and controlled by a cord-connected weight, *e*, substantially as herein set forth.

In testimony whereof I have hereunto set my hand.

CALVIN FOSTER RUDOLPH.

Witnesses:

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H. W. WILSON.