

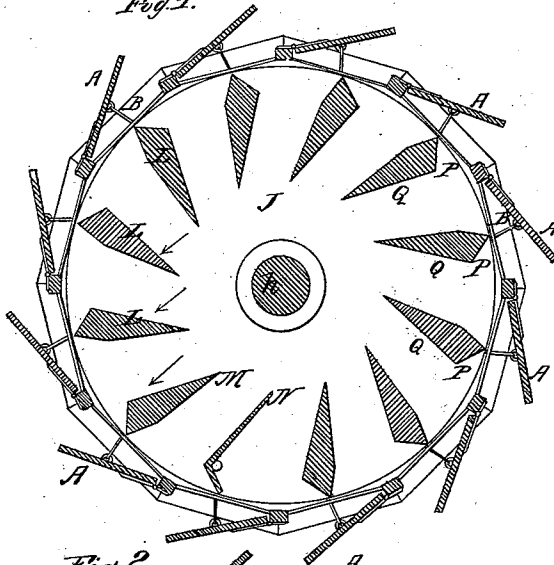
*J. R. Clough,*

*Wind Wheel.*

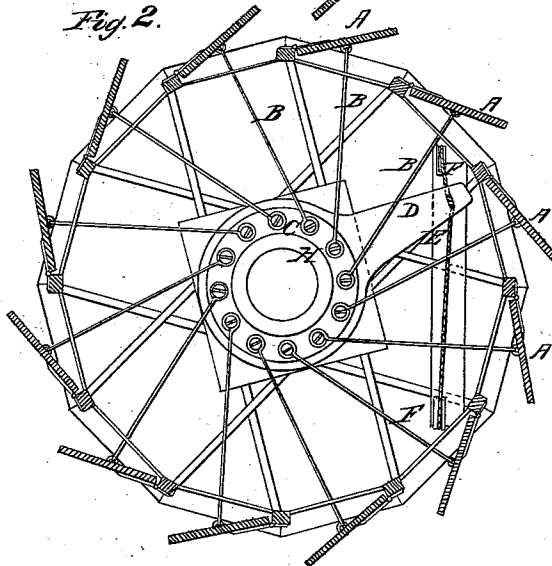
*N<sup>o</sup> 84,614.*

*Patented Dec. 1, 1868.*

*Fig. 1.*



*Fig. 2.*



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# United States Patent Office.

SAMUEL H. HALSTEAD, OF GODFREY, ILLINOIS, ADMINISTRATOR  
OF THE ESTATE OF JESSE R. CLOUGH, DECEASED.

*Letters Patent No. 84,614, dated December 1, 1868.*

## IMPROVED WINDMILL.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that JESSE R. CLOUGH, of Godfrey, in the county of Madison, and State of Illinois, invented a new and useful Improvement in Windmills; and that the following is a full, clear, and exact description thereof, enabling those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 is a horizontal section, taken through the vanes.

Figure 2 is a like section, the vanes and shaft being left out of view, so as to show the devices for regulating the doors or wind-boards.

Similar letters indicate corresponding parts.

This invention relates to windmills, or wind-wheels, as they are also sometimes called, of the class which has a vertical shaft, with vanes revolving in a horizontal plane, and enclosed in an outer case, which is so constructed as to serve the twofold purpose of a mill-building and a regulator, to govern the access of wind to the wheel or vanes.

For this example of the invention, the outer case represents a twelve-sided structure, whose upper part is provided with as many hinged doors or wind-boards, to control the openings in the sides.

These doors or wind-boards are hinged on the right or left-hand side, to correspond with the shape or position of the vanes.

The lower part of the structure or outer case has closed sides, and is partly occupied by the regulating-apparatus.

The letter A designates the hinged doors or wind-boards, which are severally connected to rigid rods B, whose inner ends are connected at points equidistant from each other, to a horizontal wheel, C, that revolves around the shaft of the wind-wheel, being fitted closely around a collar H, within which the shaft turns.

From one side of the rim of the wheel C projects a radial arm, D, which reaches nearly to the outer case, and to the said arm, near or at its end, is attached an endless cord or band, E, which runs over guiding-pulleys, F F, placed to the right and left of the arm, at points just beyond the ends of the arc through which the said arm C is intended to move, whence said cord E goes down to a drum or windlass below, but not here shown, to which it is permanently secured.

The drum or windlass has the usual radial arms, by which it is turned.

By turning said windlass in either direction, the central wheel C is revolved towards the right or left, as desired, and the hinged doors or wind-boards A are thrown out or drawn in, and adjusted to any desired point, to admit a greater or less supply of wind to the vanes, or, by closing them, to cut off the access of the wind, and, at the same time, protect the vanes and

the interior of the mill from rain and from the atmosphere.

The wind-wheel is composed of two disks, J, only one of which is here shown, fixed on a vertical shaft, K, said disks being of such a diameter that they will freely turn within the outer case of the mill, and being placed apart a distance about equal to the height of the hinged doors or wind-boards A.

Between these disks are placed vertical vanes, L, equidistant from each other, and corresponding in number to the doors A.

The said vanes are of a general triangular shape, and their sides are placed at the angles, respectively, of about ninety degrees, forty-five degrees, and one hundred and ten degrees, with respect to a tangent drawn at the circumference of the wheel, at the outer edges of the vanes. But these proportions are not absolutely essential, since a deviation of a few degrees will not alter the principle of construction, or materially interfere with the effectiveness of the invention.

The said vanes can be modified in form, without departing from the principle of the invention, as, for example, they can be made of the different forms and angles shown in the vanes marked M N, fig. 1.

Each vane is equal to about one-fourth the whole diameter of the disks J, and they are set so as to bring their outer edges about in line with the peripheries of the disks, and, consequently, the centre of the wheel is left open, and free from any obstruction other than the shaft.

The vanes are placed with their backs, which are the bases of their triangular forms, on a radial line, drawn from the centre of the wheel. This arrangement brings the narrow faces P (which are supposed to be drawn to the angles of forty-five degrees) in a suitable position to receive the direct action of the wind, which enters through the openings, which are controlled by the wind-boards A.

The wind, after acting upon the faces P, passes over the faces Q, (which are supposed to be arranged at an angle of one hundred and ten degrees,) and crosses the interior of the wheel, passing the shaft K, and strikes the faces Q on the opposite side of the wheel, on its way out.

The wind, consequently, acts twice on each vane, once, in its impact, against the outer faces P, and again while passing out of the wheel, when it comes against the inner faces Q, on the opposite side of the wheel to the place of entrance, whereby the force of the wind is used to great advantage and with great economy, and the pressure on opposite sides of the shaft is approximately equalized.

The shape of the outer case or frame can be varied, at pleasure, from a square to a circular form.

This mill can be adapted to almost any degree of power, by enlarging the wind-surface of the vanes and

increasing the diameter of the wheel, or three distinct wheels can be placed in a triangular case, and geared together, and where speed is required direct from the power, this is perhaps the best adaptation of this form of wheel, as three small wheels, having a sum of surface-measurement equal to that of one large one, would give the speed which may be required, in a direct manner, without the expense of the usual intermediate gearing of varying diameters, the speed attained being due to the diameter of the wheel, and the power to the surface-measurement of the vanes.

Having thus described this invention.

What is claimed as new, and desired to be secured by Letters Patent, is—

The triangular vanes L, arranged substantially as described, so that their narrow faces P are exposed to the direct action of the wind on entering the wheel, and the adjoining faces Q are exposed to its action when leaving the wheel.

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