J. BENSON.
Wind-Mill.

No. 209,853. Patented Nov. 12, 1878.

Fig. 1.

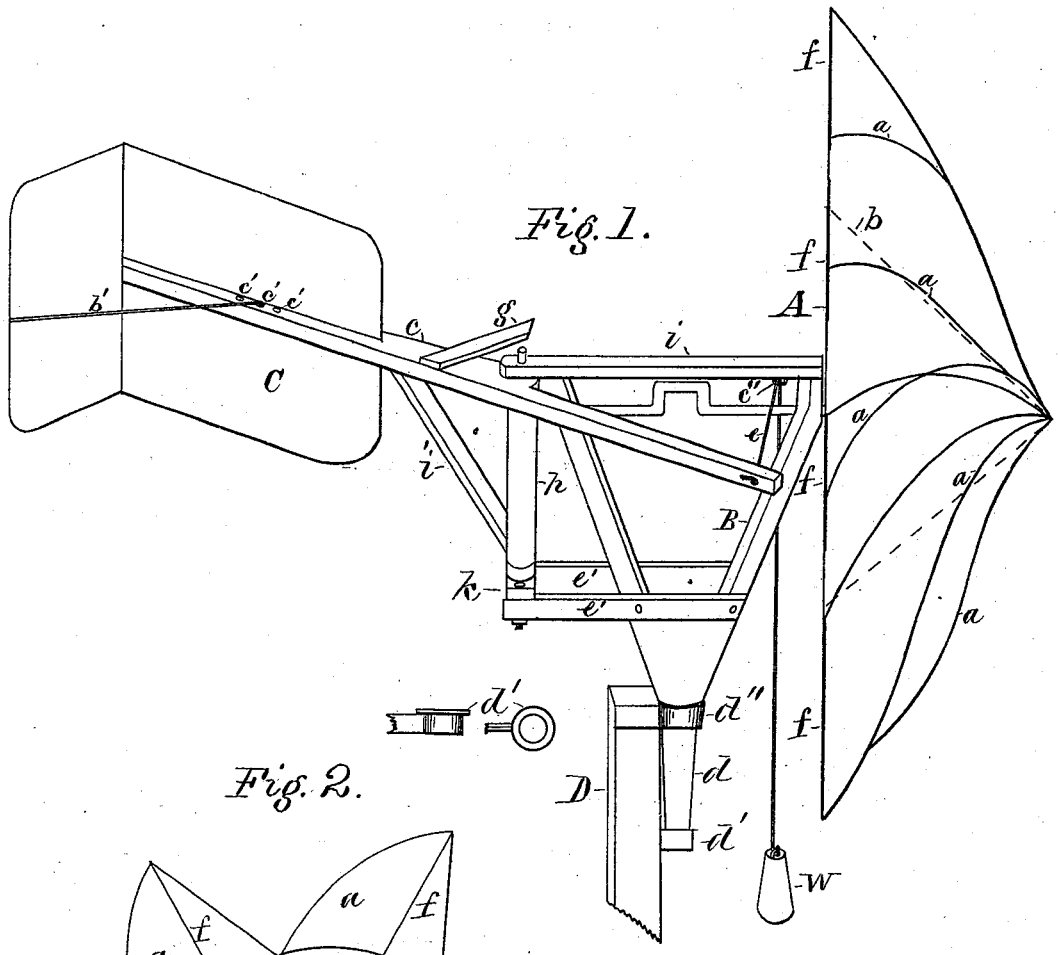


Fig. 2.

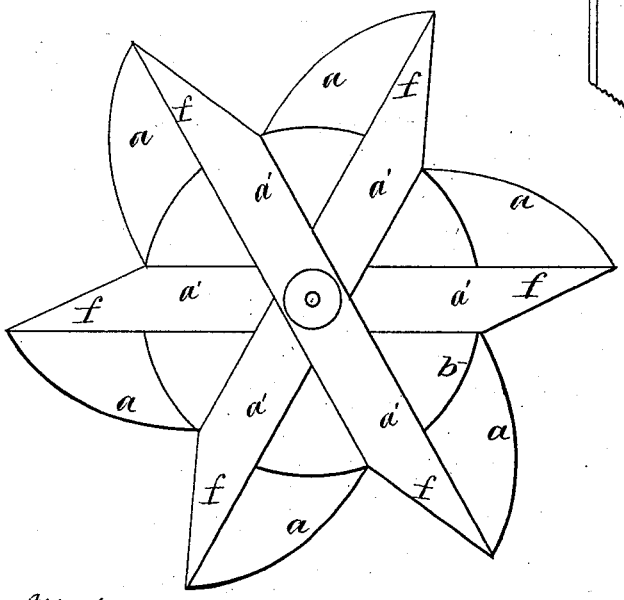
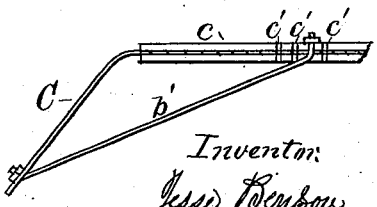


Fig. 3.



Attest.
Wm. Mc. Converse
Ora Converse

Inventor:
Jesse Benson
By Bleleonverse
Atty.

UNITED STATES PATENT OFFICE.

JESSE BENSON, OF CHAMPAIGN, COUNTY, OHIO.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **209,853**, dated November 12, 1878; application filed July 27, 1878.

To all whom it may concern:

Be it known that I, JESSE BENSON, of the county of Champaign, in the State of Ohio, have invented certain new and useful Improvements in Windmills, which improvements are fully, exactly, clearly, and concisely set forth in the following specification, so that those skilled in the art can construct and use the same, reference being had to the accompanying drawings, which are a part of the same.

My invention relates to that class of windmills which are constructed on the principle of a turbine wheel, differing, however, in its construction from most of those bearing that name principally in its simplicity, compactness, strength, and cheapness, and being radically different from any in the construction of the governor part. Heretofore wind-wheels which are constructed of iron alone are generally made with a hub having a number of radial arms extending from it, which bear the vanes pivoted upon them. Wheels made of iron and wood combined are generally of similar construction. Both kinds, on account of their necessarily loosely-confined parts, connections, pivoted bearings, &c., are objectionable, because of their liability to become frozen together by ice and sleet, so as to become inoperative. Wind-turbines which are constructed with the least number of flexible attachments, connections, &c., are for the above reason to be preferred. To carry out this principle I have all parts of my wheel fixed, depending on the governor alone to throw the wheel out of the wind. Besides making my wheel simple in construction, with fixed wind guides or vanes, I have bent the tail-vane at an angle, so as to make use of it as a powerful governor, which will bring the wheel under instant control, without any auxiliary attachments, the wind operating within the angle with greater force to push it in the opposite direction.

Figure 1 is a view of my improved wind-turbine. Fig. 2 is a back view of the wheel. Fig. 3 is a longitudinal sectional view of the tail-vane and its adjustable brace from the top.

A is the wheel, which has a large conical body, *b*, (shown in dotted lines, Fig. 1, and seen from the rear, Fig. 2,) its apex forming the front and center, with spiral-shaped flanges or guides *a*, extending from the point of the cone *b* to its base, curving backward, and increasing in width till they reach the base-line, where they are bent out flat, forming the extended points *f* in the same plane with the base-line of the cone. These are in the shape of an acute-angled triangle, with its long point outward on a line with and forming the extension of each of the six flat cross-braces which support the rear part of the wheel. The entire wheel, cone, flanges, and braces are constructed of sheet metal. The latter may be reenforced with wood on the inside to strengthen the wheel. The openings between the braces may be left or closed also with sheet metal.

The wheel is mounted upon a simple crank-shaft, *c'*, having its bearings in the two limbs of the fork B near the top. This fork is pivoted in bands or thimbles *d'* and *d''*, on one side of the top of the derrick post or mast D, a shoulder being formed on the fork, to allow the mill to turn freely thereon. Two bars, *e'*, extend out from the base of the fork to the rear, to support a step-bar, *k;* and a bar, *i*, across the top of the fork B, parallel with these, also extends to the rear. Between the step-bar *k* and the bar *i* is a pivoted (perpendicular) post or pintle, *h*, which supports the governor-vane C, the bar *c*, which forms the central rib of the vane, being pivoted at the top of the turn-post *h*, and extending forward beyond it to the front of the fork. It is cut away one-half its width forward of the post, to allow it to lap close against the side of the fork. A brace, *i'*, connects the vane-bar with the lower end of the turn-post *k*. On the top of the bar *c* is secured a short bar, *g*, which extends out on the opposite side from the lap end *l* of the same, which operates as a stop against bar *i* when the governor-vane swings around to a little more than a right angle with the axis of the wheel. This extended movement of the governor-vane around through a little more than a quarter of a circle is found necessary in order to bring the mill to a full stop. The vane C is formed of a broad piece of sheet metal, ribbed two-thirds of its length next the fork by the bar *c*, its outer third turned or bent around (outward) at an angle to the line of its length or the bar *c*. A brace, *b'*, is se-

cured across the angle to keep it in position. This brace is made adjustable at the end which passes through the rib by a series of holes, c' c' c', so that the angle of the governor-vane can be increased or reduced, according to the requirements caused by the strength of the prevailing winds in the locality where the mill is erected.

The brace may be hooked into the bar c, as shown in Fig. 1, or it may pass through the bar and interposed metal of the vane, as seen in the sectional view, Fig. 3. It is not necessary to bend the vane at a sharp angle, as it is more liable to break. It is better to bend it with a curve, as shown in this figure. That part of the bar c of the governor-vane forward of the pintle is used to attach a cord or wire, e, to, for the purpose of throwing the mill into gear or into the wind by means of the weight W, or the hands, if necessary. The weight W acts as a counterpoise to the movement of the governor-fan C. The wire or cord e is attached to the front end of the bar c, and passes through an eye, c'', or its equivalent, on the under side of the top bar, i, of the fork, and has the weight W attached to its free end, which may pass down through a central hole in the pivotal stem d of the fork, or it may hang outside, as seen in Fig. 1. The fork turns freely in the thimbles d' and d'', the upper one, (d'') of which is provided with a flange, for giving the shoulder a firmer and larger bearing, as it is this thimble which supports most of the weight of the mill.

The operation of my mill can be readily understood by the drawings. It will be seen that the increased size of the wind-guides or flanges a at the periphery of the wheel give it great power, and as it is constructed with a very large cone, which forms its body part, the resistance is lessened by this and the peculiar spiral shape of the guides. The points f not only support and strengthen the broad ends of the flanges at the point of debouchure, but facilitate its ease of rotation. The hollow formed by their union with the broad end of a allows the full force of the wind-current to bear against them until the rotation of the wheel carries them consecutively beyond the line of its action, while the flat surface in line with its base steadies the wheel as it revolves.

I disclaim a cone body and curved blades in a wind-wheel, as these are generic inventions before used. My invention is an improvement upon the patent to E. Manley, March 6, 1877, differing therefrom not only in having regular spiral blades, increasing in their width from apex of cone to base, but by also having the flat foot-pieces f, projecting outwardly in the plane of its base, cutting the line of its main shaft at right angles.

I claim as my improvement—

1. The wheel A, constructed with a large conical body, having the spiral flanges or wind-guides a rigidly affixed thereto, and gradually increasing in their width from the apex of the cone b to its base-line, where they are bent out flat at right angles with the axial line of the wheel, so as to form the extended angular points f, as and for the purpose set forth.

2. A wind-wheel in which its rudder or guide-vane extends rearward in line with the main shaft, is pivoted vertically to the fork-frame, its stem extended forward across the top of said fork on one side, so as to allow a horizontal movement through the arc of a circle in the opposite direction only, and having its rear end bent at an angle outward from the direction of such movement, to adapt it to operate more readily in folding up toward the wheel, for the purpose shown and specified.

3. In combination with a bent governor-vane, C, as described, the adjustable brace b', as and for the purpose set forth.

JESSE BENSON.

Attest:
F. M. VANNESS,
F. H. PATZER.