2 Sheets—Sheet 1.

W. A. WHEELER.

Windmill.

No. 217,033. Patented July 1, 1879.

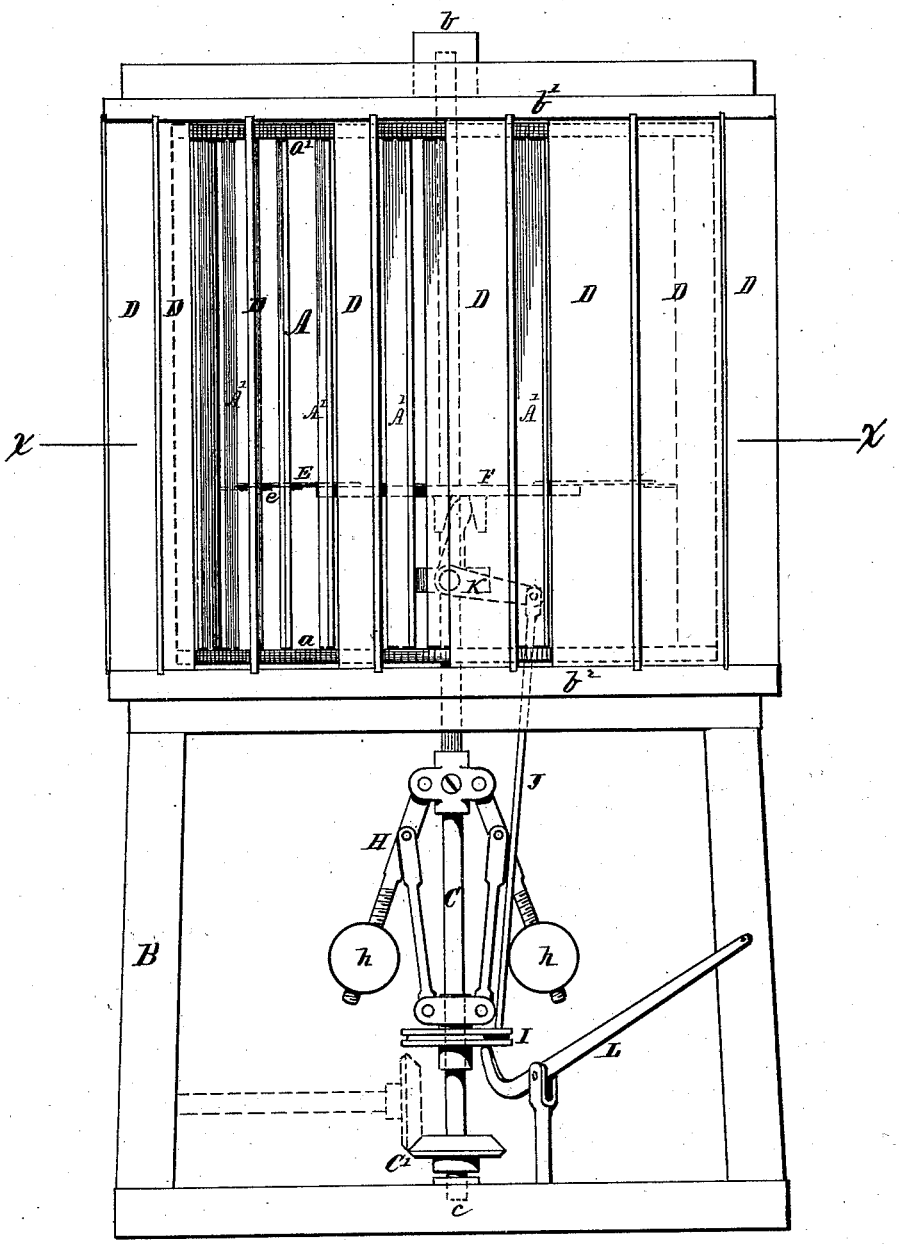

Fig. 1

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Windmill.

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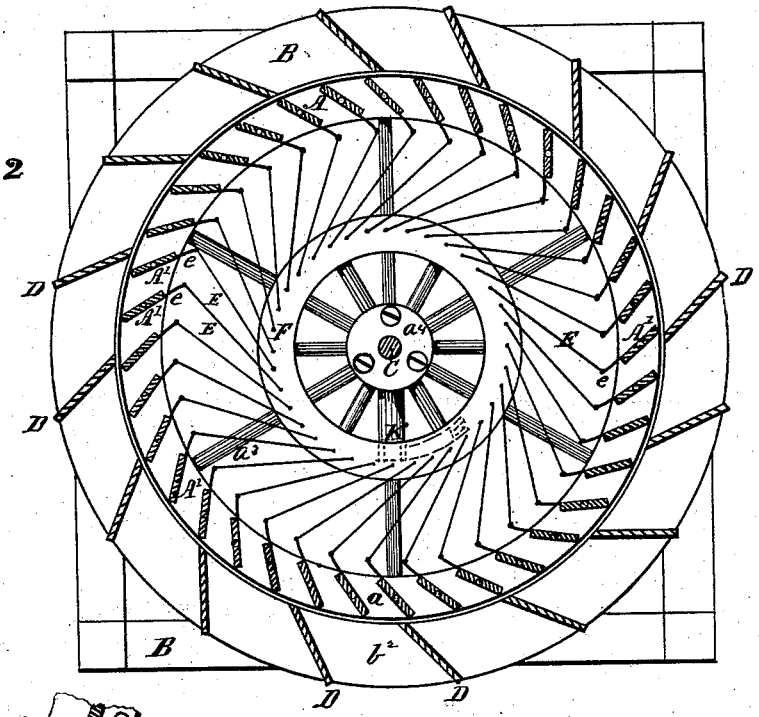
Fig. 2



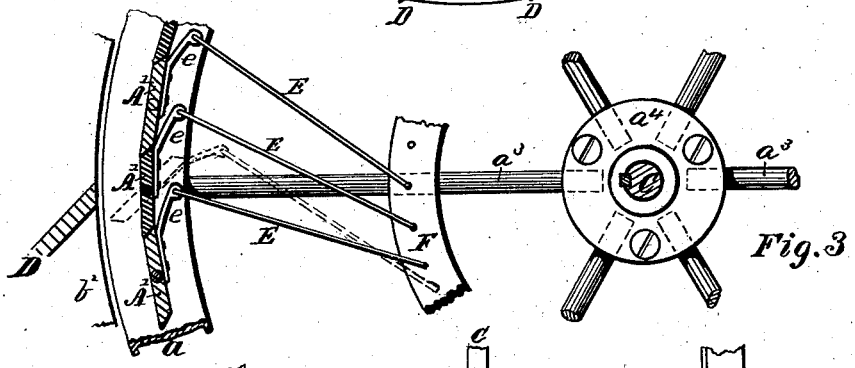
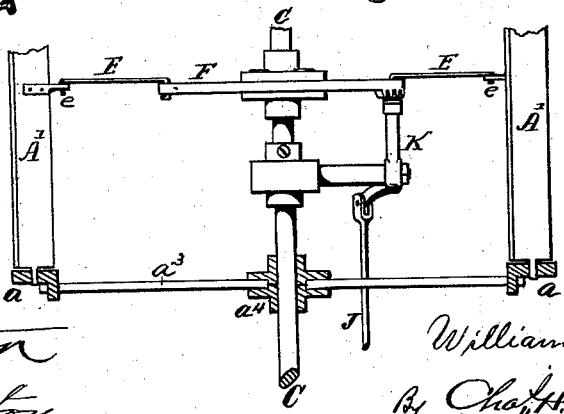


Fig. 3

Fig. 4



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UNITED STATES PATENT OFFICE.

WILLIAM A. WHEELER, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **217,033**, dated July 1, 1879; application filed February 1, 1879.

To all whom it may concern:

Be it known that I, WILLIAM A. WHEELER, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Windmills; and I declare the following to be a description of my said invention sufficiently full, clear, and exact to enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 represents a side view of a windmill illustrating the nature of my invention. Fig. 2 is a horizontal section or plan of the same at line *x x*, Fig. 1. Fig. 3 is a detail view, showing construction of sails, connections, &c., on a somewhat larger scale. Fig. 4 is a vertical sectional view of the lower part of the wheel.

This invention relates to that class of windmills known as "horizontal mills," in which the wheel revolves in a horizontal position about a vertical axis; and consists in certain improvements in the construction, form, and proportions of the wheel, the manner of combining it with its supporting-tower, and the organization of the various parts with a view of rendering the mill in a high degree effective, convenient, and durable, and especially adapted to the practical requirements of service.

The peculiar features of my invention are set forth and explained in the following description, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, A denotes the wind-wheel, and B the tower or supporting-frame, which may be a specially-constructed tower, or the cupola of a barn, shop, or other building properly arranged for the reception of the wheel A, which latter is mounted on an upright central shaft, C, supported by bearing *b* at its top end, and extending down to the lower part of the tower or building, where it is provided with a suitable step-bearing, *c*, (adjustable or otherwise,) and also with gears C′ or other suitable mechanism for transmitting motion to the machinery or pumps to be operated.

The upper part of the tower or cupola B is constructed with a series of vertical blinds or inclined wind-deflectors, D, rigidly secured or held at their top and bottom ends to the stationary circular plate b^1 and sill b^2, each standing at an inclination of about forty-five degrees (more or less) from its own radial plane, thus forming a spiral shield or lantern, within the vortex of which the wheel A is located, as illustrated. (See Fig. 2.)

The wheel A is made with upper and lower rims, *a* a^1, supported by spokes or arms a^3, radiating from hubs or plates a^4, keyed to the central shaft C.

Between the rims *a* a^1 are the sails A′, which consist of a series of narrow vertical slats or pieces of thin material set along the periphery of the wheel at intervals of about their own width, with their ends pivoted or swiveled to the respective rims *a* a^1, so as to be capable of a rolling movement for varying the inclination of the sail-slats and opening and closing the spaces between them.

Small ear-pieces or arms *e* are attached to the inner edges or sides of the sail-slats A′, from which rods E connect with the mechanism for moving the sail-slats.

The proportional width for the sail-slats A′ is about one-twelfth to one-twenty-fourth, or less, of the diameter of the wheel, varying somewhat with the size of the windmill, but in no instance greater than one-twelfth of the diameter, the slats A′ being proportionally narrower in the large wheels than in the small-sized wheels.

The number of sail-slats employed in a wheel should be such as will fill the space at the circumference of the wheel when the sail-slats are closed, no stationary pieces being employed, but the sails being arranged so that their edges will close down directly upon each other in the manner substantially as indicated in Fig. 3.

The edges of the slats may be arranged to lap past each other, or they can be beveled or formed so as to close flush or match together, as indicated in Fig. 3.

When the spaces are fully opened the sail-slats stand about forty-five degrees angular from their radial plane, their inclination being subject to variation by the action of regulating mechanism, as hereinafter explained.

The number of sail-slats A′ is greatly in excess of the number of blind or deflector boards D, so that two or more sails are at the same

time presented at each of the open spaces between adjacent deflectors. They are also arranged in dissimilar numbers, so that there shall be no relative correspondence or uniformity as to the series of sails A′ and series of deflectors D.

The proportional height of the wheel may be varied to suit the requirements of size and position. A height equal to the diameter is a good proportion for a medium-sized wheel of, say, eight feet diameter. This proportion would be somewhat reduced on larger-sized wheels.

The construction of a horizontal wind-wheel with narrow slat-sails of the proportions specified, supported by upper and lower rims, and the arranging of such sails to operate in the peculiar manner set forth are features of my invention.

The wheel A is arranged within the lantern or cupola so that the outer edges of the sail-slats A′ will pass in close proximity to the inner edges of the deflector-boards D. The wind passes through the wheel and exerts its force at both front and back, striking the sails as it enters the wheel, and also as it passes out of the wheel, thus imparting a powerful rotative movement to the wheel without a severe side strain on the bearings, this, too, without regard as to the direction from which the wind blows.

Within the wheel A and loose on the shaft C is arranged a rim or disk, F, to which the rods E from the sails A′ are connected, as shown. Said disk F can be partially rotated independent of the shaft C by means of a governor mechanism, thus varying the inclination of the sails A′, so as to regulate the speed at which the wheel revolves.

The governor H is, in the present instance, arranged directly on the shaft C, below the wheel A. It is provided with a plate or collar, I, which moves up and down the shaft by the action of the balls *h*, and from which a rod, J, extends, to connect with the arm of a bell-crank lever, K, that operates the disk or rim F, said lever K being fulcrumed on a suitable hub keyed to the shaft C, while its upper arm is connected with the rim F by means of intermeshing lugs, gear-teeth, or in other suitable manner.

When the governor-balls *h* and plate I become elevated, by rapid revolution of the wheel A or otherwise, the sail-slats A′ are rolled or moved so as to close the air-spaces, extreme elevation completely closing the sails, as indicated in Fig. 3, while depression of the governor-balls *h* causes the sails A′ to open to the position indicated in Fig. 2, or as per dotted lines, Fig. 3.

A lever or equivalent mechanism, L, may be employed for raising the collar I and closing the wheel when it is desired to stop the action of the mill, and such mechanism can be provided with a cord or similar attachment extending to the lower part of the tower or building, for convenience of operating it.

If desired, the governor may be arranged within or above the wheel instead of below the wheel, as shown.

The regulating mechanism and the manner of combining it with the sails are features of my invention.

It will be observed that my improved windmill can be arranged in the cupola of a barn or other building, and that only a small opening to the interior is required for the entrance of the shaft C. Also, that in case of storms, and when not in use, the wheel can be completely closed and thus protected from the action of the weather, so that the mill will, without injury, safely withstand gales.

I am aware that horizontal wind-wheels have heretofore been constructed wherein the sails were hinged or swiveled and arranged to be adjusted by means of automatic governing mechanism; hence I do not herein make claim, broadly, to such features. Neither do I claim, broadly, the feature of closing the periphery of a wind-wheel against the action of storms; but

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. The wind-wheel constructed as hereinbefore described, with upper and lower rims, a^1 *a*, supported by the central shaft C, and provided with slat-sails A′, of narrow proportions, as specified, the width of said sails being not greater than about one-twelfth the diameter of the wheel, and said sails being swiveled and arranged in close series in such manner and relation to each other that the edges of adjacent sails will close directly against each other, as set forth.

2. In a windmill, the swiveled sail-slats A′, of narrow proportions, as specified, arranged in close uninterrupted series about the periphery of the wheel, as shown, and the surrounding blind or deflector boards D, arranged in a series numerically dissimilar and less than said sail-slats, substantially as set forth, whereby two or more sail-slats are at the same time exposed at each opening between adjacent deflector-boards.

3. In combination, substantially as described, the wheel A, having pivoted sail-slats A′, provided with arms *e*, the disk or rim F, mounted on the central wheel-shaft C, and the connecting-rods E, as and for the purpose set forth.

4. In combination, substantially as described, the swiveled sail-slats A′, central disk or rim F, connections E *e*, crank-lever K, rod J, collar I, and elevating device L, as and for the purposes set forth.

Witness my hand this 25th day of January, A. D. 1879.

WILLIAM A. WHEELER.

Witnesses:
CHAS. H. BURLEIGH,
S. R. BARTON.