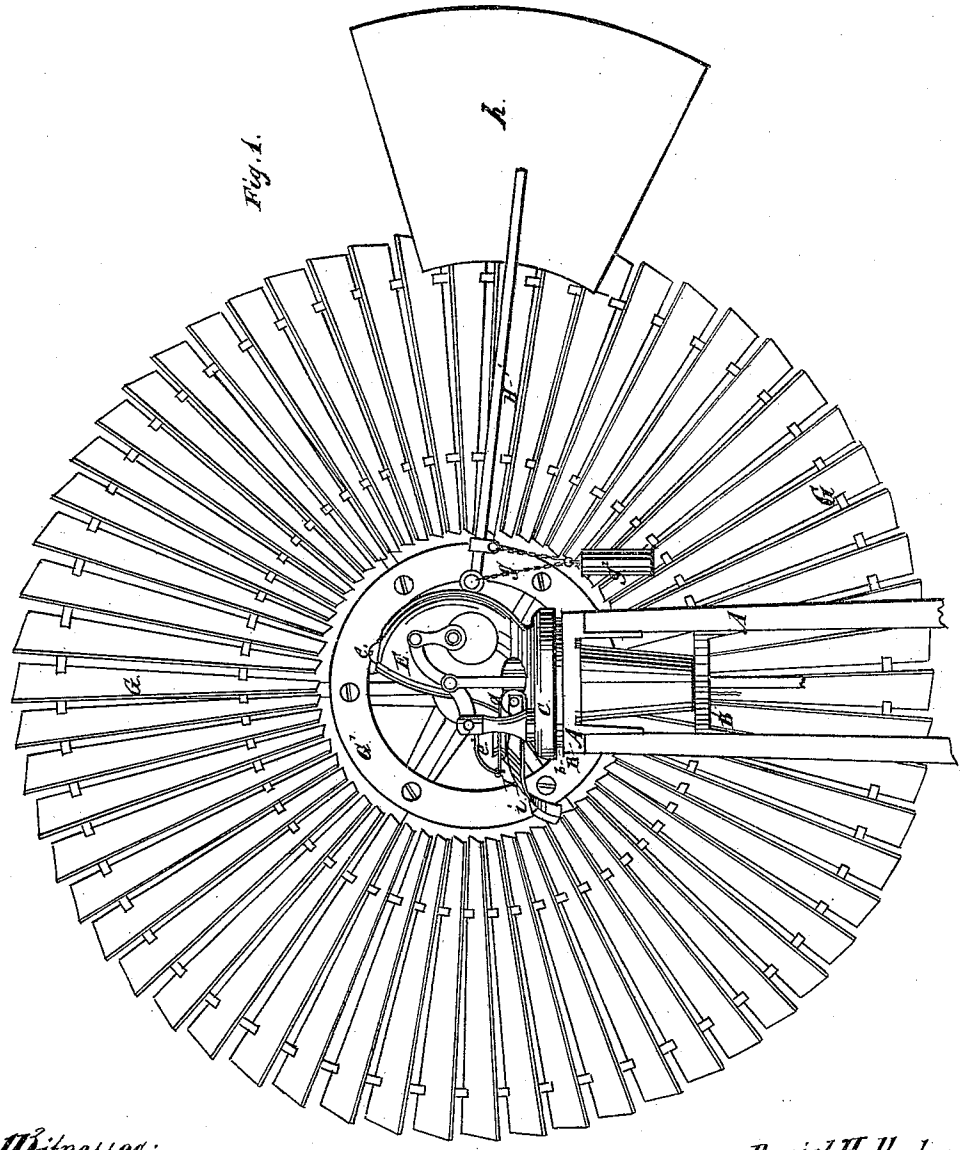
2 Sheets—Sheet 1.

D. HALLADAY.

WIND-MILL.

No. 179,108. Patented June 27, 1876.

Fig. 1.



Witnesses:
L. M. Harris
Heinrich L. Burns.

Daniel Halladay,
Inventor.
By Coburn & Thacher
Attys.

2 Sheets—Sheet 2.

D. HALLADAY.

WIND-MILL.

No. 179,108. Patented June 27, 1876.

Fig. 2.

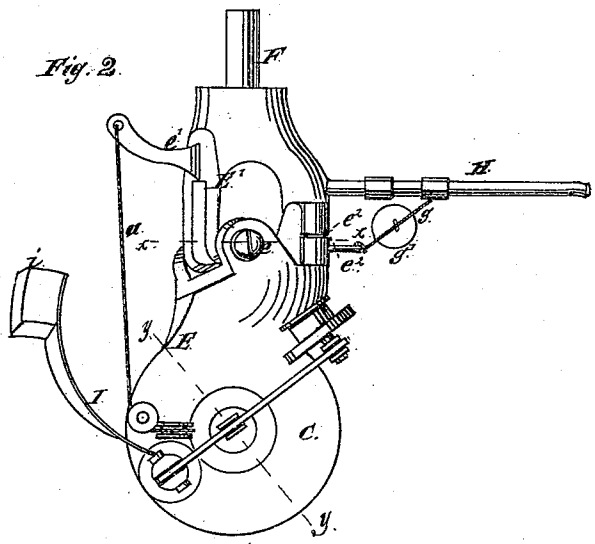
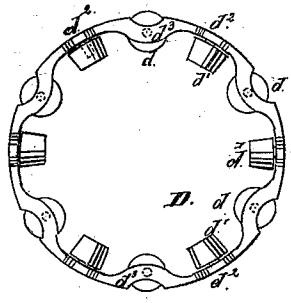


Fig. 5.



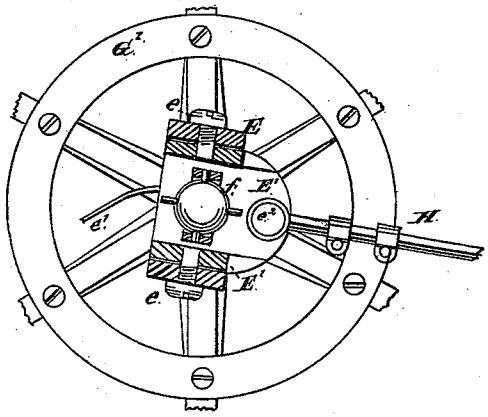


Fig. 3.

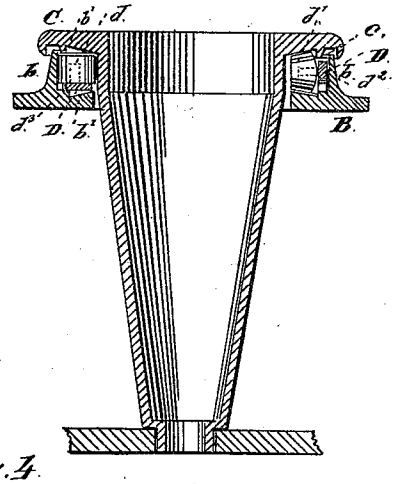


Fig. 4.

Witnesses:
Heinrich L. Brune.
L. M. Harris.

Daniel Halladay,
Inventor.
By Coburn & Thacher
Attys.

UNITED STATES PATENT OFFICE.

DANIEL HALLADAY, OF BATAVIA, ILLINOIS.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **179,108**, dated June 27, 1876; application filed March 13, 1876.

To all whom it may concern:

Be it known that I, DANIEL HALLADAY, of Batavia, in the county of Kane and State of Illinois, have invented a new and useful Improvement in Windmills, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of the mill; Fig. 2, a plan view of the turn-table and main driving-shaft, supported in hinged bearings thereon; Fig. 3, a sectional view of the driving-shaft and bearings, taken on the line *x x*, Fig. 2; Fig. 4, a sectional view of the turn-table and its bearings, taken on the line *y y*, Fig. 2; and Fig. 5, a plan view of the bearing-ring carrying anti-friction rollers, which is placed between the turn-table and its supporting-plate.

My invention relates to that class of windmills which are self-regulating. The invention consists in supporting the main driving-shaft, which carries the wind-wheel, in a skeleton-frame, made in two parts, which are hinged together, and in making the driving-shaft in two parts, united by a universal joint, to accommodate the movement of the two parts of the bearing-frame upon their pivot. It also consists in a side vane attached to the outer section of the bearing-frame, for the purpose of throwing the wheel out of the wind as the velocity of the latter increases; and it also consists in a bearing-ring, which is placed loosely between the turn-table and its supporting-plate, and carries two sets of anti-friction rollers, the axis of one set being horizontal and the other perpendicular.

In the drawings, A represents the frame which supports the wheel and operating mechanism, and B B′ the upper and lower plates, upon which the turn-table is supported, the upper plate B being placed upon the top of the tower or supporting-frame. The turn-table C consists of two parts—an upper or horizontal part, which is mounted upon the plate B, and a tubular portion projecting below the upper portion through the plate B, and journaled at its lower end in the plate B′. The upper supporting-plate B has a circular flange, *b*, projecting upward from its face, and the upper portion of the turn-table C extends over this flange, which fits in a circular groove, *c*, therein. In the space between the flange *b* and the turn-table is placed a ring, D. This ring is constructed as shown in Fig. 5, so as to furnish vertical bearings for a set of rollers, *d*, and horizontal bearings for another set, d^1. These two sets of rollers are arranged upon the ring so as to alternate with each other, the ring being constructed with alternate horizontal portions d^2 and vertical portions d^3, to furnish supports to the bearings of the rollers *d* and d^1, respectively. This ring, provided with the rollers, as described, is placed loosely between the turn-table and the plate B, the rollers *d* fitting between the flange *b* and the tubular projection of the turn-table, and the rollers d^1 fitting between the plate B and the upper portion of the turn-table, as shown in Fig. 4 of the drawings. The rollers d^1 are shaped conically, and the plate B is provided with an inclined path or groove, *b′*, in which the conical rollers travel, and permits the ring to be moved bodily. From the turn-table B a skeleton-frame, E E′, projects, the portion E being in one piece with the turn-table, and the portion E′ hinged to the latter by means of a pivotal connection. The main driving-shaft F passes through this skeleton-frame, and has a bearing in each portion. This shaft is divided, the two parts being united by universal joint *f*, in line with the pivotal connection *e*. Upon the outer end of the shaft F is mounted the wind-wheel G, which is placed with its face toward the shaft or tower—the reverse of the usual arrangement of the wheel.

A rod or arm, H, is rigidly attached to the hinged piece E′, and carries upon its outer end a side vane, *h*, which extends somewhat beyond the periphery of the wheel. The supporting-arm H is bent inward slightly toward the tower, and a cord or chain, *g*, connects it near its inner end with the portion E of the bearing-frame, upon which is hung a weight, *g′*. This cord has considerable slack to accommodate the swinging round of the wheel upon the pivots *e*.

The pivotal connection *e* between the two pieces E E′ are in a line inclined from the perpendicular, so that when the piece E′, carrying the wind-wheel, is swung outward, it has a tendency to return to its former position, and the

weight of the wheel increases this tendency, and is sufficient to bring it back to its normal position, unless there is a strong opposing force.

An arm, I, attached to the upper portion of a turn-table, carries upon its outer end a brake-shoe, *i*, which arrests the motion of the wheel when it is thrown out of the wind, and stops its revolution by coming in contact with the circular plate G′ thereon.

A rope, *a*, is attached to an arm, e^1, on the hinged piece E′, and passes over pulleys on the turn-table, down through the tubular portion of the latter to the ground. Any ordinary mechanism for transmitting motion is mounted upon the turn-table and connected with the driving-shaft.

The operation of my invention is as follows: When the wind rises so as to endanger the safety of the machinery, its action upon the vane *h* will throw the wheel around upon the pivotal joint *e*—that is, as soon as the force of the wind is sufficiently strong to overcome the weight of the wheel acting upon this inclined pivot. As the force of the wind increases the wheel will be thrown more and more around, until, finally, it is turned out of the wind altogether, and is brought against the brake *i;* but as soon as the wind dies down, the weight of the wheel brings it immediately back into operative position again on account of the inclined position of the axis *e*. The weight *g′*, hung upon the chain *g*, is to assist in bringing the wheel back into the wind, if it is thought to be necessary.

Elastic bumpers e^2 are attached to the pieces E E′, to take up the shock when the wheel is brought into the wind suddenly, and the latter may be turned out of the wind any time and fastened by means of the cord *a*.

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

1. A wind-wheel mounted upon a bearing pivoted to the turn-table upon an inclined axis, so that the weight of the wheel tends to keep it always in the wind, substantially as described.

2. The combination of a wind-wheel, mounted upon a bearing pivoted to the turn-table, and a side vane, *h*, as and for the purposes set forth.

3. The combination of the wind-wheel, mounted in the bearing hinged to the turn-table, the side vane *h*, the cord *g*, and weight *g′*, substantially as described.

4. The tubular bearing of the driving-shaft, made in two pieces, hinged together, substantially as described.

5. The combination of the tubular bearing, made in two parts, hinged together, and the driving-shaft F, also made in two parts, united by a universal joint, substantially as described.

6. The ring D, constructed as described, and carrying two sets of anti-friction rollers, one set turning on vertical and the other on horizontal spindles, substantially as set forth.

7. The combination of the plate B, constructed with a flange, *b*, the loose ring D, provided with two sets of anti-friction rollers, as described, and the turn-table C, substantially as and for the purpose set forth.

DANIEL HALLADAY.

Witnesses:
L. M. HARRIS,
HEINRICH F. BRUNS.