W. T. BURROWS.

Wind-Mill.

No. 163,734. Patented May 25, 1875.

Fig. 1.

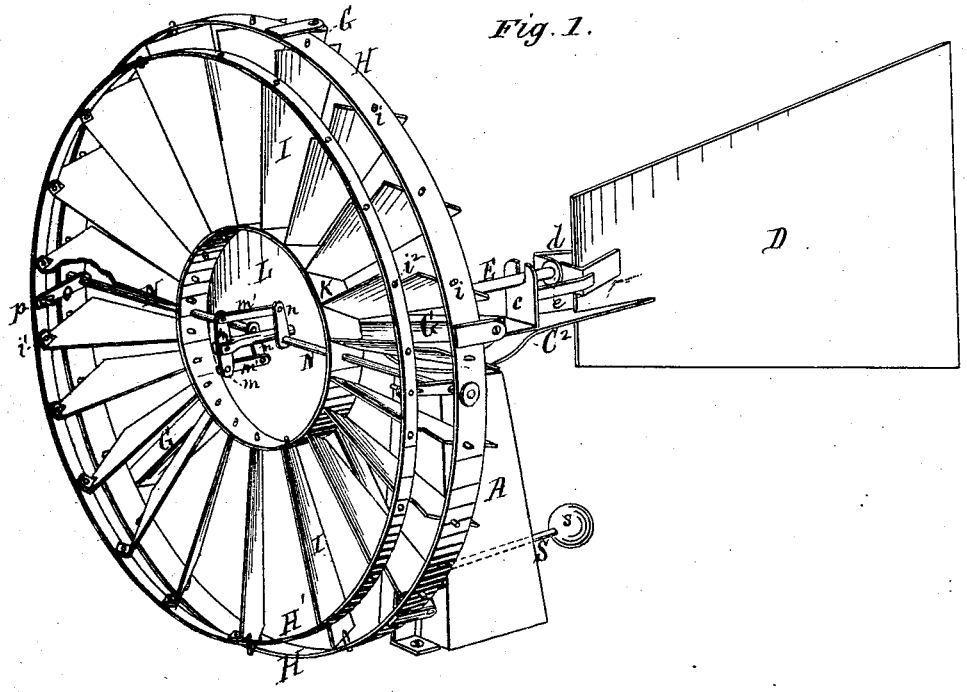
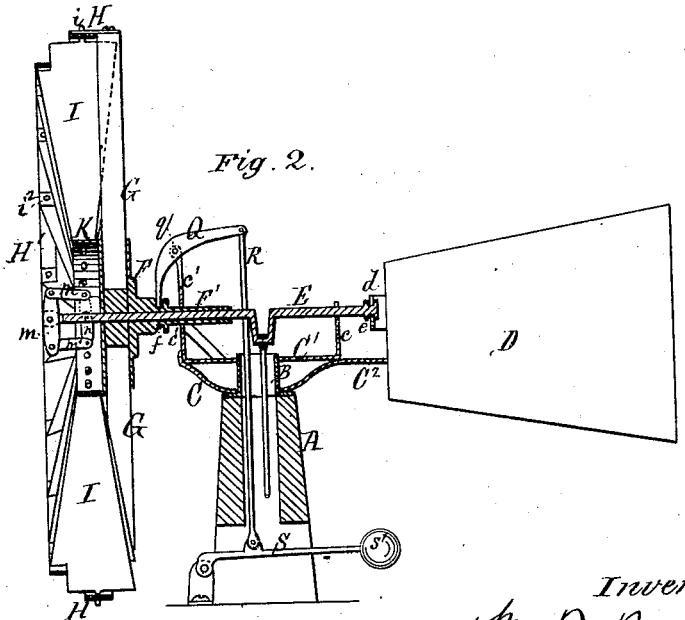


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM T. BURROWS, OF NASHUA, IOWA, ASSIGNOR OF ONE-HALF HIS RIGHT TO N. B. RIDGWAY AND M. ROSENBAUM, OF SAME PLACE.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **163,734**, dated May 25, 1875; application filed November 6, 1874.

To all whom it may concern:

Be it known that I, WILLIAM T. BURROWS, of Nashua, county of Chickasaw, State of Iowa, have invented certain new and useful Improvements in Windmills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, making part of this specification, in which—

Figure 1 represents a perspective view of a windmill embracing my improvements. Fig. 2 is a vertical section through the same, taken in line with the center of the wind-wheel shaft.

Similar letters of reference denote corresponding parts in both figures.

The invention relates to a novel construction of the wind-wheel, and to the governing devices connected therewith, for controlling and regulating the velocity of the wheel under the varying force of the wind actuating the same; and the invention consists in combining the wind-wheel, which is provided with pivoted blades or slats, with a sliding hub or sleeve mounted and moving endwise on the main shaft, and with crank-rods operated by said movement of the wheel, as hereinafter set forth, whereby the position or angle of the slats is determined or regulated by the position of the wheel on its shaft, and this, in turn, by the force or backward thrust of the wind thereon, for regulating the velocity of the wheel, as hereinafter explained. It further consists in the combination with the wheel, adapted to move endwise bodily on its shaft, as above described, of the levers and connecting devices hereinafter described, whereby the attendant on the ground can move the wheel endwise on its shaft, and thus throw the wheel into or out of action, or regulate its velocity, as will be described.

In the accompanying drawing, A represents the tower, which may be of any usual construction, and of any desired height to meet the requirements of its location. Upon the top of this is mounted a vertical sleeve or cylinder, B, which forms the vertical pivot on which the wind-wheel frame or support is free to turn to accommodate the position of the wheel to the direction of the wind, and through which the pitman or crank rod and the lever-rod or link descend to the ground, as shown. The wind-wheel frame is composed, by preference, of the inverted arch or yoke C, the ends of which are connected by the horizontal chord or brace-plate C^1, and both are perforated centrally to receive the vertical tubular shaft B, or a sleeve connecting and bracing the plates C C^1, and surrounding and turning upon the sleeve-shaft B. One end of the yoke-piece C is extended at C^2, and has the vane D rigidly connected with it, and upon the frame C C^1 uprights *c c′* are mounted, in which bearings are formed for the wheel-shaft E, which extends beyond said bearings, and at its rear end is provided with a grooved collar, *e*, and a notched yoke-bracket, *d*, connected with the vane D, embraces the collar *e*, entering the groove therein, and preventing end movement of the shaft in its bearings in uprights *c c′*. Upon the shaft E, near its forward end, is mounted a hub, F, to the rear face or end of which is rigidly secured a sleeve, F′, which, together with the hub F, is free to slide endwise on the shaft E. Radial arms G are secured to the outer or forward face of the hub F, and to the outer ends of these arms a rim, H, is rigidly attached, said rim projecting forward from the arm G, and forming the support for the outer ends of the slats or fan-blades I, which are pivoted thereto about midway of their width, as shown at *i*. The inner ends of these fan-blades are pivoted in a similar manner to an inner rim, K, formed upon the periphery of a disk, L, attached to the outer faces of the radial arms G, concentrically with the shaft E. The outer front corners of the slats, which are made tapering in width from their outer to their inner ends, as shown, have lips or flanges i^1 formed upon or attached to them, and a ring, H′, is fastened to these lips, each by a pivotal joint at i^2, as shown, the ring H′, by preference, being of less diameter than the ring H, so as to fold within or inside of said ring. The outer end of the shaft E, which extends outward through and beyond the disk L, has a cross bar or head, *m*, connected with it, and to the outer ends of this bar *m* the outer ends of links *m′* are connected, the inner ends of said links being con-

nected with crank-arms *n*, formed upon or rigidly connected with the inner ends of rock-shafts N, which have their bearings in the rings H and K, as shown. The shafts N, near their outer bearings, have crank-arms *o* rigidly connected with them, said cranks being set at an angle on the shaft of forty-five degrees, more or less, to the arms *n*. The outer ends of the arms *o* are slotted to receive and permit the longitudinal play therein of pins or pivots at *p*, connecting them with the ring H′.

The inner or rear end of the hub F of the wind-wheel has a peripherical groove formed in it at *f*, and in this groove is placed the lower forked end of bell-crank lever Q, which is pivoted at its elbow *q* in the upper end of the bearing-standard *c′*, which extends above the shaft E, as shown in Fig. 2, to form a support for said lever. The upper horizontal arm F′ of this lever extends inward over the vertical tubular pivot B, and a rod, R, connected with said end, extends downward through the tubular pivot B, and is connected at its lower end at a point within convenient reach of the attendant on the ground, with a weighted lever, S, the weight *s′* upon which may be adjusted nearer to or farther from the fulcrum, for diminishing or increasing its power, as required.

The operation is as follows: The wheel, being set with the slats at the most efficient angle of presentation to the wind, is held in position for giving the desired speed of rotation by means of the lever Q, weighted as explained. When the force of the wind increases beyond what is required for giving the desired velocity, its increased power tends to force the wheel, with its hub and sleeve, backward on the shaft E, carrying the shafts N with them. The outer ends of the inner crank-arms *n* being held against this movement inward by their connection, through links *m′*, with the fixed cross-head *m*, and a partial rotation of the shafts N is consequently produced, and this in turn thrusts the arms *o* forward or outward, carrying the ring H′ with it, and producing a partial rotation of said ring relatively to the ring H, in such manner as to turn the fan-blades I into position more or less approaching lines parallel with the direction of the wind, according to the force of the wind and the consequent backward thrust of the wheel. As the force of the wind abates, the weighted lever S, acting through the link R and bell-crank lever Q, forces the wheel outward again, reversing the action of the cranks above described, and causes the blades I to resume their oblique position relatively to the direction of the wind. Whenever the attendant desires to throw the wheel out of action, all that is necessary to be done is to simply raise the lever S, which, operating through the connections described, draws the wind-wheel rearward, bringing the fans into lines parallel with the current of wind; and the lever may be held in this position, by a rack or any suitable device for the purpose, until it is desired to set the wheel again in motion, when, by releasing the lever, the weight thereon will act through the connecting devices described to turn the pivoted blades into their former oblique position.

Modifications may be made in the construction and arrangement of some of the parts; thus, under some circumstances, it may be found desirable to impart the end movement to the shaft E, instead of to the wheel, in which case the bracket *d* would be removed, and the sleeve F held against end movement in its bearings by any suitable arrangement for that purpose.

The supporting pivotal frame C C′, also, instead of being made of separate plates, as described, may be cast in one piece with its bearing-standards. The blades, instead of terminating at the rings H and H′, may project beyond them, for increasing the size of the wheel, or diminishing the size and weight of the rings, and the adjustable weight *s′*, instead of being placed on the lever S, may be placed upon an extension of the elbow-lever Q, beyond the rod R; but the arrangement first described is preferred, as the weight is thereby made more accessible for purposes of adjustment.

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

1. The wind-wheel having the fixed and movable rings and pivoted slats, all connected with the sliding hub or sleeve, and adapted to slide endwise bodily on its main central shaft, as described, in combination with the arm or cross-head *m* on the end of said shaft, and the crank-rods N connected therewith, and operating as described.

2. The wind-wheel provided with the fixed and movable rings, pivoted slats, and crank-rods, as described, and adapted to move endwise bodily on its shaft, in combination with the forked lever Q, rod R, and weighted lever S, for moving the wheel and pivoted slats, as described.

WM. T. BURROWS.

Witnesses:
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