2 Sheets—Sheet 1.

W. D. NICHOLS.

WIND-MILL.

No. 187,297. Patented Feb. 13, 1877.

FIG. 1

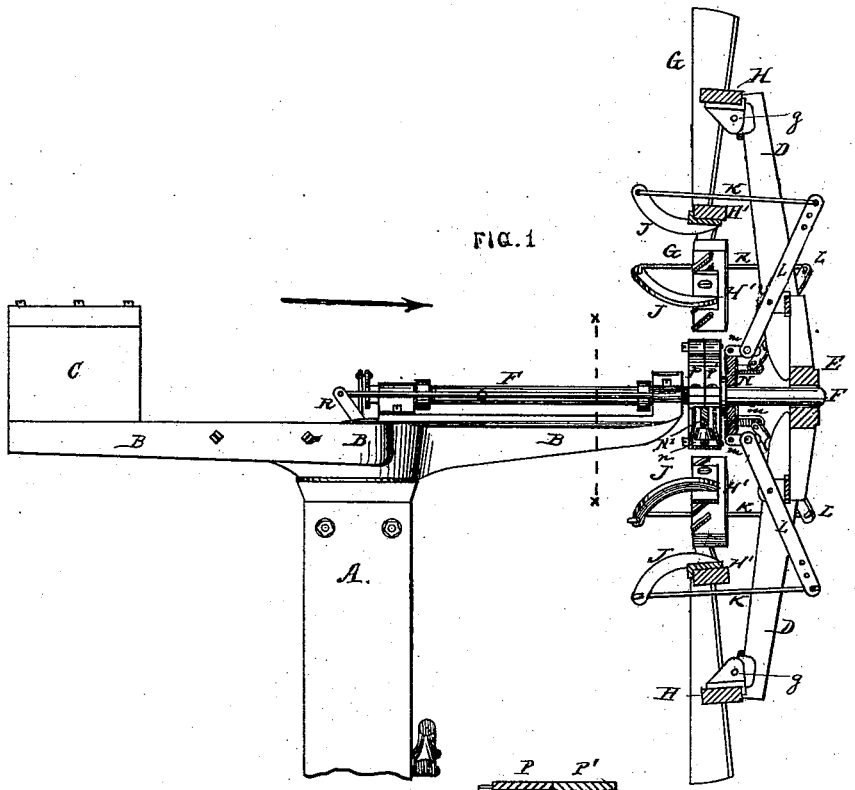


FIG. 4.

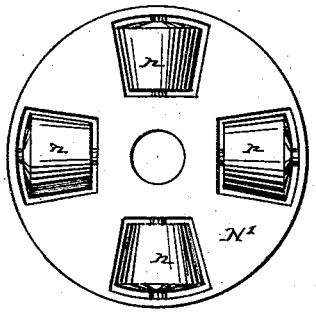
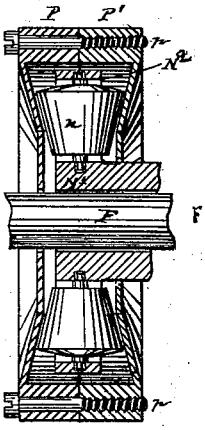


FIG. 3.



WITNESSES:

Ford R. Smith

J. B. Herford

INVENTOR

Wm D. Nichols

by Munday & Evarts

his attys.

2 Sheets—Sheet 2.

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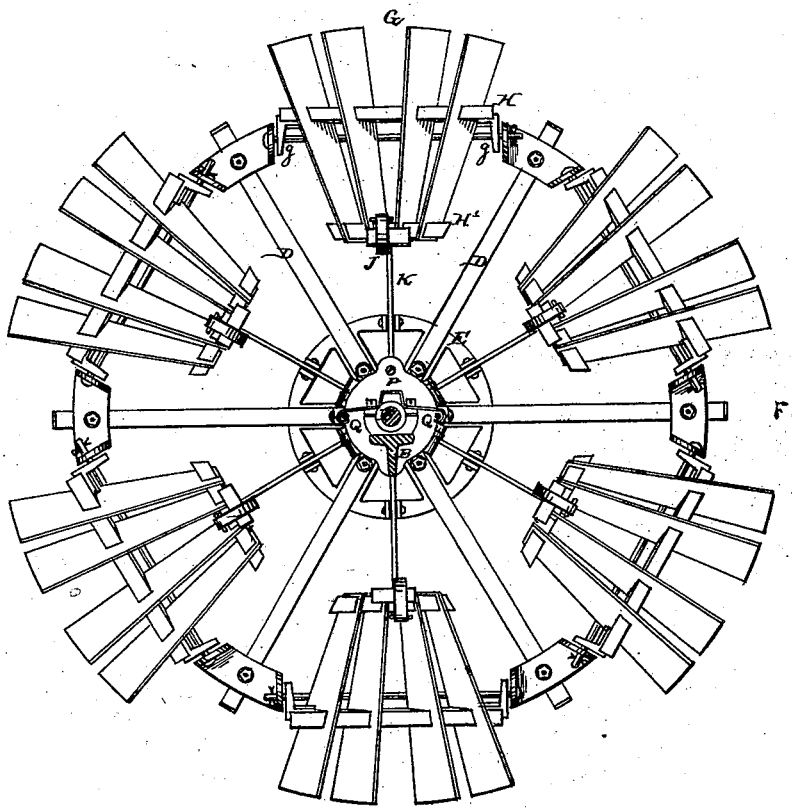

FIG. 2.

WITNESSES:
Ford R. Smith
J B Herford

INVENTOR:
Wm D. Nichols.
by Munday & Evarts.
his attys

UNITED STATES PATENT OFFICE.

WILLIAM D. NICHOLS, OF BATAVIA, ILLINOIS.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **187,297**, dated February 13, 1877; application filed January 22, 1877.

To all whom it may concern:

Be it known that I, WILLIAM D. NICHOLS, of Batavia, in the county of Kane and State of Illinois, have invented certain Improvements in Windmills, of which the following is a specification;

The nature of this invention will be understood from the following description and the accompanying drawings, which form a part of this specification, and in which Figure 1 is a side elevation, showing the wheel and moving parts partially in section. Fig. 2 is a section on the line *x x* of Fig. 1. Fig. 3 is a sectional view of the sliding collar and parts upon a larger comparative scale. Fig. 4 is a face view of the friction-disk of said collar.

Like letters of reference made use of in the several figures indicate like parts wherever used.

In the said drawings, A represents a portion of the tower upon which the rotating carriage or pivotal mechanism, and the wind-wheel, are mounted. B is the carriage, sustaining at one end the wind-wheel and its axis or shaft, and at the other end a counterpoise-weight, C, for the purpose of balancing the weight of the wind-wheel. Said weight consists usually of a box filled with stones or old iron. The mill has no tail-vane, and is kept facing the wind by the action of the current upon the wheel itself, so that the direction of the wind, when the mill is in position, will be that indicated by the arrow upon Fig. 1 of the drawing. Consequently, the face of the wheel is always turned toward the tower instead of away from it, as is the case in mills provided with a tail-vane. D D, &c., are the radial arms which form the frame-work of the wheel. They are socketed in a hub, E, which is rigidly attached to the shaft F. G G, &c., are the several rosette sails, each of which is pivoted at the tilt-bar H, between a pair of the arms D, as shown, so that they may swing out with the head-bar H′ toward the wind. Secured to the head-bar H′ of each rosette sail is a handling-lever, J, which stands out to the front or face of the wheel, projecting somewhat beyond the plane of said face. These levers J are usually of metal, and are castings of some considerable weight. It will be especially noticed that these levers J project in the direction in which the head-bars will move should the sails be blown out of the wind. In consequence of this construction the weight of the said levers J serves in a measure the same purpose as the balls of a centrifugal governor—that is to say, when the speed of the wheel is unduly increased, the weight of the levers J tends to swing the sails out of the wind, thus obviating the necessity of applying special weights to the mill for this purpose. The tendency of the centrifugal force to throw the sails out of the wind is further augmented by the manner of pivoting the sails, which, it will be seen, are swung in front of their pivots *g*. Attached to the levers J are connecting-rods K, which in turn are attached to the outer ends of the radially-arranged levers L, fulcrumed in the frame-work of the wheel, and connected at their other or inner ends by links *m* to the hub of the sliding head, which sliding head communicates with a weighted lever (not shown) or other device, for offering a graduated or regulable resistance to the governing action of the weighted rosettes, as above described.

By this series of connections, and by placing the levers J on the inside of the head-bar, instead of, as usual, upon the tilt-bar, or upon the outside of the head-bar, there is not only gained the advantage of making the weight of the casting serve as a governor-weight by its centrifugal tendency, but also a great additional advantage is gained in the fact that the sails are much more surely and certainly, as well as safely, operated from the head-bar than from the tilt-bar or other point near the pivot *g*. A better leverage and greater firmness are thus attained, and the whole mechanism greatly simplified.

The sliding head above mentioned consists of two parts, one of which revolves with the wheel and shaft, and the other, the casing, remains stationary so far as any rotation is concerned. The revolving part consists of the hub N, to which the before-mentioned links *m* are attached, and a disk, N′, forming one with the hub, and provided with conical friction-rollers *n*. The other part consists of a two-part shell, P P′, which is made to envelope the disk N′ and afford a double conical bearing—that is, a bearing at both front and rear for the friction-rollers *n*. To this shell (the

parts of which may be secured together by bolts *p*) are attached the rods Q, which communicate at the tower, by suitable bell-cranks R, with the regulable resistance above mentioned. The friction-rollers *n* project through the disk N′ at both front and rear, so that a single roller at any one point affords a bearing or surface for both the forward and return thrust of the head against the casing or shell.

The operation of the mill is as follows: The wind will be in the direction of the arrow blowing toward the mill, and will keep the mill swung around with the weight C pointing to the quarter whence the wind comes. Should the breeze increase sufficiently to speed the wheel beyond the rate required, the centrifugal tendency of the levers J, by reason of their weight and location, will cause the rosette sails to swing out on the pivots *g* until they are more or less out of the position to be acted upon by the wind. This centrifugal tendency is controlled by the levers and connections acting through the sliding head and rods Q upon a spring or weight at some suitable point below.

The disk N′ with its conical friction-rollers *n*, and the incasing-shell, afford a smooth even connection, which operates without any jar or concussion, and moves along the shaft equally well in either direction. This feature is very important, not only in the mere fact of lessening the running friction of the mill, but also in the additional fact that the governing action of the sails is thus rendered more accurate and sensitive, and consequently a much steadier motion of the wheel assured. The rollers being conical, and the bearing-surfaces of the shell beveled, the weight of the shell may be entirely borne upon the rollers, whereby the supports of the rods Q are relieved from strain.

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

1. The pivoted rosette sail having the lever J, to which the handling apparatus is connected, applied to the head-bar upon the side of the sail which, when the sail is swung out of the wind, is farthest from the center of the wind-wheel, substantially as specified, so that the weight of the said levers shall serve as a governor-weight.

2. The combination, with the wind-wheel shaft and its lever system, of the sliding disk N′, provided with friction-rollers *n n* projecting beyond both faces of the disk, and the inclosing two-part shell, substantially as specified.

3. The sliding disk provided with radially-arranged conical rollers projecting beyond both faces of the disk, in combination with the two-part shell made with beveled bearings, whereby the shell is supported upon the rollers, substantially as specified, and an accurate adjustment permitted.

WILLIAM D. NICHOLS.

Witnesses:
JOHN W. MUNDAY,
EDW. S. EVARTS.