A. B. FUNK & S. MILLER.

WIND MILL.

No. 186,822. Patented Jan. 30, 1877.

Fig. 1.

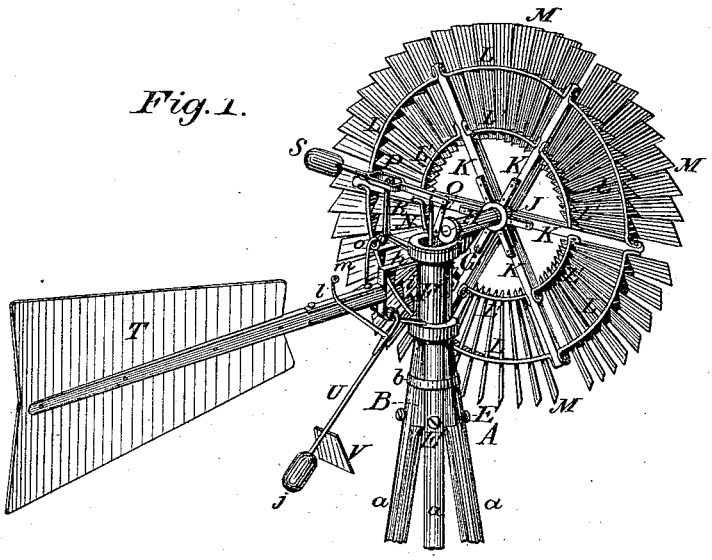


Fig. 2.

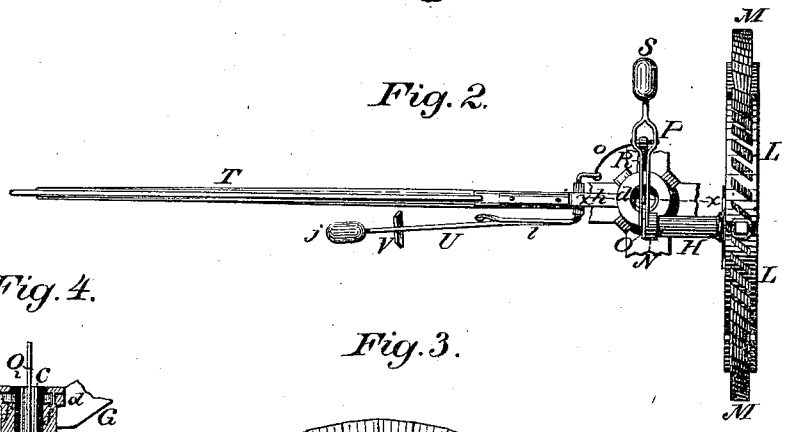


Fig. 4.

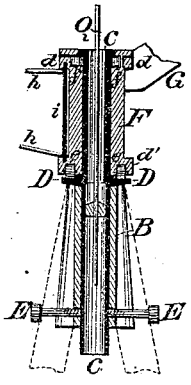


Fig. 3.

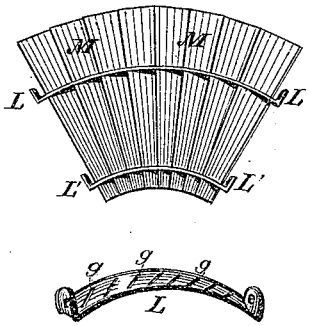
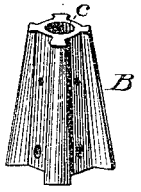


Fig. 5.



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UNITED STATES PATENT OFFICE.

AARON B. FUNK AND SYLVANUS MILLER, OF URBANA, OHIO.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **186,822**, dated January 30, 1877; application filed November 25, 1876.

To all whom it may concern:

Be it known that we, AARON B. FUNK, of Urbana, in the county of Champaign and State of Ohio, and SYLVANUS MILLER, of Urbana, in the county of Champaign and State of Ohio, have invented a new and useful Improvement in Windmills; and we do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object we have in view is an improvement in that class of windmills having a rigid wind-wheel, whose angle of presentation to the wind is automatically adjusted under varying pressures, and the purpose of the improvement is to produce a windmill simple in construction, durable in wear, and effective in use.

The novel features of this windmill consist, first, in the peculiar construction of the wind-wheel; second, in the means for adjusting the vertical position of the pivot-tube; and further, in the various novel combinations of the principal operative parts, all as more fully hereinafter explained.

To enable those skilled in the art to make and use our contrivance, we proceed to describe the same, having reference to the drawings, in which—

Figure 1 is a rear perspective view; Fig. 2, a top view; Fig. 3, a view of a separate portion of one of the wind-wheel rings or holders; Fig. 4, a vertical section on the line *x x* of Fig. 2; and Fig. 5, a separate view of the hub.

Similar letters denote corresponding parts in each figure.

A represents the derrick-frame of usual construction, with the separate supports *a a a a* brought nearly together at the top, and held in place by any proper band, *b*. The tops of these supports, however, fit into proper recesses in the hub B, which is a casting with a central cylindrical opening, *c*, and is made as specifically shown in Fig. 5. Through this opening the pivot-tube C passes, having secured to it rigidly a plate, D, which rests upon the top of the hub. This tube is preferably made of wrought-iron or other suitable metal, and the plate D being a little beveled on its lower side, the tube has a little freedom of movement in each direction. In this movement it is restrained, and its vertical position adjusted without regard to the exact vertical position of the derrick-frame by the set-screws E, which pass through the tops of the separate supports *a a a a*, and through the hub or through the hub alone, or through the supports below the hub. The tube before mentioned extends up through the main stock F, and, at the top, may have a flanged collar resting upon the top of the stock. This stock is made preferably of proper cast metal, and has flanges *d d'* at the top and bottom. In the bottom are placed friction-rollers *e*, which traverse around upon the upper surface of the plate D, and in the upper flange are other friction-rollers *f*, which press against the sides of the upper end of the tube. It will thus be perceived that the stock and the various parts attached to it, hereafter to be described, rest upon the plate D, having rotation thereon by means of the friction-rollers *e*, and revolve around the tube C, frictional contact therewith being avoided by the friction-rollers *f*. Upon one side of the top of the stock F is a wing, G, supporting a tubular bearing, H, in which the main shaft I of the wind-wheel rotates.

Upon the outer end of this shaft is secured a spider, J, to which the arms K of the wind-wheel are secured, the face side of which arms are beveled to conform to the angular position of the blades in the wind-wheel. To these arms are secured annular metallic holders L L', one near the periphery of the wind-wheel and the other nearer to its center, which holders are preferably made of thin iron plate, with edges flanged outwardly or inwardly to give greater strength. These annular holders may be complete rings, with suitable openings for the arms to pass through; but, preferably, for convenience in repairs, they may be made in sections extending from one arm to the other, and secured at the ends to the arms in any convenient way. These annular holders have diagonal openings *g* through them to permit the passage and retention of the blades M at the suitable angle of presentation to the wind. These blades M, made of suitable wood, and tapering from the outer

ends inwardly, should first be thoroughly saturated in hot or boiling oil, and when in place will not be effected by the changes in temperature, and will never work loose.

At the inner end of the main shaft is secured the crank or crank-wheel N, which is placed nearly centrally upon one side of the top of the stock. To this is pivoted a connecting-rod, O, which in turn is pivoted to one end of a walking-beam, P. To this walking-beam is pivoted the pitman Q, which passes down through the tube C and reciprocates vertically therein. The walking-beam is in turn pivoted to a standard, R, which is secured to the side of the stock opposite to the side where the crank N operates. Upon the outer end of the walking-beam is a weight, S, capable of adjustment outwardly or inwardly. The tail-vane T, of ordinary construction, is pivoted, by its yoke *h*, to a vertical rod, *i*, between the upper and lower flanges of the stock, and has pivoted, preferably, upon the lower arm of the yoke a bell-crank lever, U, upon the free end of which is an adjustable weight, *j*. To the other end of this lever is pivoted a link, *o*, the other end of which is pivoted to the standard R. From the lever U there also extends upward an arm, *l*, to which is secured a proper cord or chain, *m*, which passes down through the tube and comes within reach of the operator.

To the lever U, preferably near its lower end, is secured a small fan, *v*, which may be attached adjustably thereto. This fan tends to raise such lever and throw the wheel out of the wind.

The operation of our windmill is as follows: The tail-vane holds the wind-wheel up to the wind, which causes it to revolve, and by its revolution its shaft is turned, and through its connecting-rod motion is communicated to one end of the walking-beam, by the walking-beam to the pitman, which is advantageously situated in this machine for the purpose of pumping, as the upper bucket may be directly attached to it.

By this arrangement of the walking-beam and the adjustable weight, it will be observed that the weight serves as a counter-balance, to assist in drawing the pitman up, which, in pumping, will require by far the greater force, while in the downward stroke of the pitman the wheel has little more to do than to raise the weight. Thus the power of the wheel is quite uniformly exerted at all points of its revolution, and it is relieved from the strain usually incident to drawing the pitman up.

When the wind is excessive, the wheel is gradually thrown out of the wind, as by reason of the position of its shaft upon one side of the head of the stock, under the pressure upon the wind-wheel, it is forced backwardly, and the stock is then turned partially around, while the tail-vane maintains its normal position in line with the direction of the wind-currents.

In this partial revolution of the stock, by means of the force of the wind upon the fan V, and by means of the connection of the standard R, the weighted end of the bell-crank lever is raised, and the weight upon this lever counter-balances the movement of the wind-wheel out of the wind, and restores this wheel to its normal face presentation to the wind as its force abates. If the force of the wind is excessive, the wind-wheel is turned around, so as to be in line with the tail-vane, and presents only its edge to the wind. By means of the cord or chain *m* the operator upon the ground may at will throw the wind-wheel wholly or partially out of the wind.

If the derrick-frame does not stand absolutely vertical in position, as often happens, by means of the set-screws E the true vertical position of the tube may be maintained.

The advantage of having the wind-wheel turn positively out of the wind without concurrent movement of the tail-vane is that the wind-wheel is rendered thereby more sensitive to changes in the force of the wind-currents. The other advantages of construction will be obvious to those skilled in the art and require no particular mention.

Having thus fully described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. In a windmill, the combination, with the spider-hub J and arms K, of the annular metallic holders L L′, and the blades M, substantially as described and shown.

2. In a windmill, the combination with the supports *a* of the derrick-frame and the hub B, of the tube C and set-screws E, for adjusting the vertical position of such tube, substantially as described and shown.

3. In a windmill, and in combination, the main driving-shaft, secured to one side of the stock, the weighted bell-crank lever U, and the fan V, substantially as described.

4. In a windmill, and in combination, the wind-wheel and its shaft, mounted upon one side of the stock, the tail-vane, pivoted to the said stock, and the weighted lever, whereby the wind-wheel is thrown out of the wind by its eccentric position, and is restored by the weight of the said lever, substantially as and for the purposes set forth.

This specification signed and witnessed this 13th day of October, 1876.

AARON B. FUNK.
SYLVANUS MILLER.

Witnesses to signature of AARON B. FUNK:
L. W. SEELY,
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Witnesses to signature of SYLVANUS MILLER:
THOS. S. BINKARD,
J. A. FITZPATRICK.