J. T. MILLER.

Wind-Engine.

No. 208,837. Patented Oct. 8, 1878.

Fig. 1.

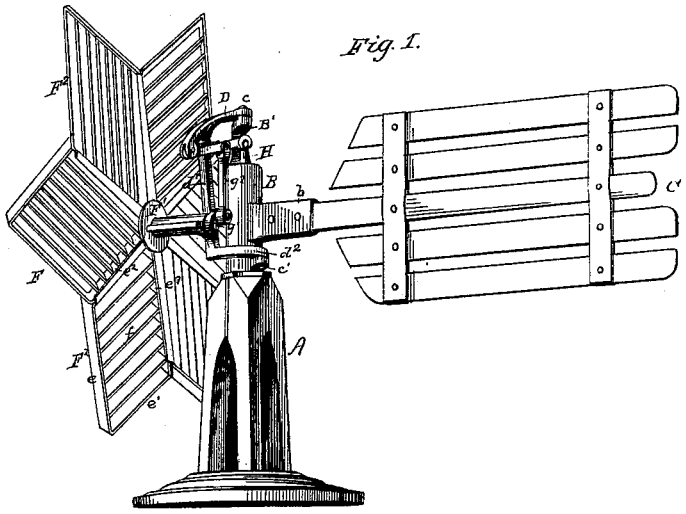


Fig. 2.

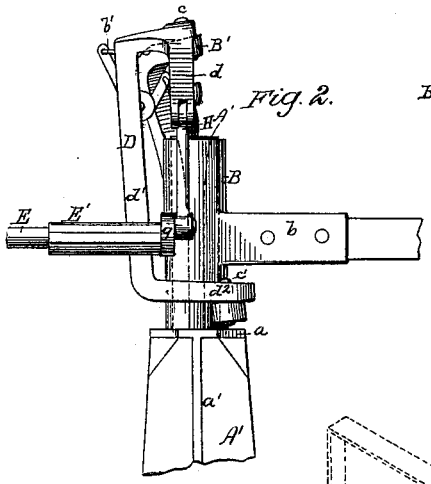


Fig. 3.

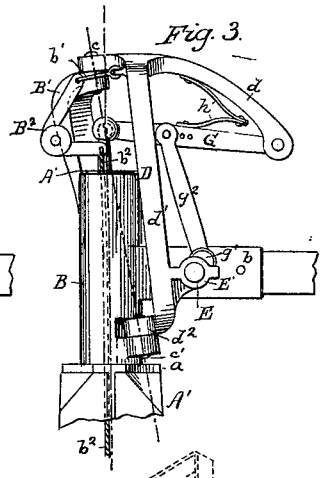


Fig. 5.

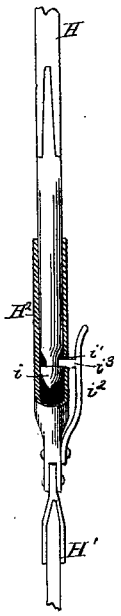
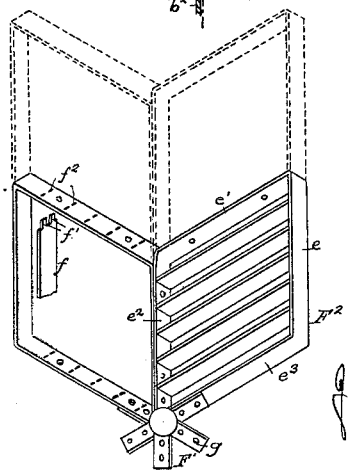


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES T. MILLER, OF URBANA, OHIO.

IMPROVEMENT IN WIND-ENGINES.

Specification forming part of Letters Patent No. **208,837**, dated October 8, 1878; application filed March 23, 1878.

To all whom it may concern:

Be it known that I, JAMES T. MILLER, of Urbana, in the county of Champaign and State of Ohio, have invented a new and useful Improvement in Windmills; and I 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 I have in view is the production of a windmill adapted to automatically regulate the speed of its wheel, and to have its wheel thrown entirely out of the wind by turning it into a position parallel or nearly so with the tail-vane, which will be simple and durable in its construction, certain in its operation, and easily and conveniently managed; and my invention therein consists, first, in the peculiar construction of the wind-wheel, to make it cheap, light, and durable, and so that it can be enlarged, if required; second, in the peculiar means whereby the wheel will be veered or swung around by the force of the wind to regulate its speed, and will return to its first position, at right angles to the tail-vane, by gravitation when the force of the wind lessens; third, in the devices for throwing the wheel out of the wind when desired; fourth, in the peculiar manner of connecting the shackle-bars of the mill and pump; and, further, in the various combinations of the operative parts, all as fully hereinafter explained.

In the drawings, Figure 1 is a perspective view of the mill from the rear of the wheel; Fig. 2, a side view of the turn-table and upper part of the standard, with the wind-wheel and tail-vane removed, the parts being in the position they assume when the wheel is facing the wind and at right angles to the tail-vane; Fig. 3, a view of the same parts when the wheel is thrown out of the wind; Fig. 4, a front view of the hub with two sections of the wheel mounted thereon, showing in dotted lines the extension of those sections; and Fig. 5, a view, partly in section, of the connection of the shackle-bars.

Like letters denote corresponding parts.

A is the supporting-frame of the mill, which may be of the ordinary or any convenient construction. Upon this frame-work is mounted the hollow standard A′, and upon this standard is sleeved the turn-table B.

The standard A′ is provided with a horizontal flange, *a*, which supports the turn-table, and below this flange are vertical flanges *a′*, placed at right angles to each other. The standards, rising from the frame-work A, set into the angles formed by these flanges, and the standard A′ and the parts of the mill connected to the turn-table are more firmly supported thereby. To the rear side of the turn-table B is cast an arm, *b*, and to this arm is rigidly secured the tail-vane C. The arm *b* is preferably situated a little on one side of the center of the turn-table. From the top of the turn-table a short standard, B^1, projects, its upper end being bent inwardly about over the center of the opening in the main standard, A′. To the upper end of this standard B^1 is pivoted, at the point *c*, the vertical frame D. This frame is composed of an arm, *d*, extending from the pivot *c* outwardly, with its outer end bent down to support the outer end of the walking-beam, to be presently described. A vertical piece, d^1, is connected to the arm *d*, and extends downwardly to near the bottom of the turn-table, where it is joined to a horizontal arm, d^2, which is curved round to the rear side of the turn-table, and is pivoted thereto at the point *c′* below the arm *b*. The pivots *c c′* are situated about in the same vertical plane; but the lower pivot, *c′*, is considerably to the rear of the upper pivot, *c*, so that when the frame D is swung backward it will swing forward again by the weight of the parts attached to the vertical piece d^1.

The positions of the pivots *c c′* are such that a line drawn through them (Fig. 3) will intercept a vertical line passing up through the standard A′ at a point about midway between the standard B^1 and the top of the standard A′, or at the half-stroke of the inner end of the walking-beam.

Upon the inside of the standard B^1 is pivoted a bell-crank, B^2, whose upper arm is connected by a rigid link, *b′*, to the frame D. The lower arm of this bell-crank has secured to it a rope, b^2, which passes down through the standard A′ and the frame-work. It will be seen that by pulling down upon this rope the

frame D can be swung around sidewise, and will be retained in that position if the rope is secured. As soon as the rope is loosened the frame is free to swing back again.

Upon the piece d^1 of the frame D, and projecting at right angles thereto, is secured or cast thereto the journal-bearing E′ for the axle E, to the outer end of which axle is fixed the hub F^1 of the wind-wheel F. This wheel is preferably constructed in six sections, F^2, as shown; but the number of the sections can be changed to five or seven, or even more, without departing from the spirit of my invention. Each section F^2 is externally in the shape of a rhombus, with one of the acute angles secured to the hub F^1.

The frame of each section is made of flat metal strips, preferably two pieces to each frame, which are bent and secured together so as to form the four sides $c\ c^1\ c^2\ c^3$, the exposed sides $c\ c^1$ inclosing the outer acute angle, and the sides $c^2\ c^3$ being next to the hub and connected to the same sides of the adjoining frames. All the sides of each frame are so bent or twisted axially as to present beveled or inclined surfaces to the wind and assist in the turning of the wheel. The blades *f*, which are supported in these frames at the same angle as the sides thereof, are constructed of thin metal plates, having at their ends projections or tenons f^1, which are inserted through holes f^2 in the sides of the frames, and are bent down against the outsides of the same, thus securely holding the blades in the frames.

The sections are arranged side by side radially around the hub F^1, and are secured thereto by means of arms *g*, which project from the hub and extend outwardly from the same the required distance to support the sections.

The wheel constructed as thus described is very light, and, all the surfaces presented to the wind being inclined, this wheel will be very effective in use. It is also quite cheap to manufacture.

If it should become desirable to increase the power of the mill, the wheel is capable of being extended or having additional sections built upon it. This is effected by extending the sides of the frames outwardly, as shown in dotted lines in Fig. 4, and mounting in these extended frames the required number of the metal blades to correspond to the sections connected to the hub.

The axle E has on its inner end a crank, g^1, from which runs a pitman, g^2, connected to the walking-beam G.

A number of holes are preferably made in the walking-beam, by which to pivot the pitman thereto, so that the point of pivot can be changed to lengthen or shorten the stroke of the shackle-bars.

The walking-beam G is pivoted at its outer end in the downwardly-hanging end of the arm *d*. The inner end of the beam is situated over the center of the hollow standard, A′, and has a socket which receives a ball on the upper end of the shackle-bar H, forming a ball-and-socket joint, so that the walking-beam will move the shackle-bar when the wind-wheel turns without regard to the position of such wheel.

Between the walking-beam and the under side of the arm *d*, and connected to both of the said parts, is placed a spring, *h*, which acts as a counter-balance. This spring resists the downward movement of the walking-beam, and is at its greatest tension when the beam is at the lower limit of its stroke. The spring would consequently assist in the upstroke of the pump when the greatest power is required, and would prevent the parts from making a too quick downstroke.

The shackle-bar H is secured to the shackle-bar H^1 of the pump, so that it can be easily removed therefrom. The lower end of the shackle-bar H has a rounded head, *i*, with a square shoulder above it, and the bar is beveled upwardly for a short distance from this circular shoulder. To the upper end of the shackle-bar of the pump is pivoted a cylindrical metal socket or sheath, H^2, provided with a slot, i^1, in one side of it, a short distance above the lower end of this sheath. A swinging spring-catch, i^2, is pivoted to the sheath H^2, and has a projection, i^3, which enters the slot i^1 when the parts are locked together.

To join the two shackle-bars the bar H is slipped in the sheath H^2, and its head *i* locked by the swinging spring-catch. The head *i* turns freely in the sheath, and, being rounded or pointed, it can be locked with the catch i^2 when the projection i^3 is in the slot without damage, since the head, when forced down, will spring the catch outwardly. The bar H being beveled above the head *i*, the pump can be worked by hand without disconnecting the shackle-bars, the sheath sliding upon the bar H, and the projection i^3 moving upon such bar upwardly from the head of its lower end.

The wheel will be turned by the wind, and through the crank, pitman, walking-beam, and shackle-bars the pump will be operated.

When it is desired to stop the mill the wheel is swung around parallel to the tail-vane, with its edge to the wind, by pulling on the rope b^2.

When the mill is in operation and the wind commences to blow hard, so that the parts of the mill and pump would be injured by keeping the wheel facing the wind at right angles to the tail-vane, the force of the wind, on account of the eccentric position of the wheel, will swing it sidewise, the frame D moving upon its pivots $c\ c'$, and the wind will act upon the wheel at an angle to its blades, and not directly against it. The greater the force of the wind the farther around will be moved the wheel, and the less effect the wind will have upon it; and as the wind moderates, the wheel, by its weight, on account of the positions of the pivots $c\ c'$, will move back toward its first position, at right angles to the tail-vane, thus completely regulating its own speed and adjusting itself to the force of the wind.

The walking-beam works the shackle-bars

when the wheel is in any position by reason of the positions of the pivots c c' being such that the inner end of the walking-beam will always retain the same position over the hollow standard A′.

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

1. A wheel for windmills constructed in rhombus-shaped sections F^2, secured together and to the hub F^1, substantially as described.

2. In a wheel for windmills, the rhombus-shaped frames, constructed of metal, and having all their sides c e^1 e^2 e^3 bent to present the same angle to the wind, and carrying blades f, substantially as described and shown.

3. In a wheel for windmills, the wind-blades f, made of sheet metal and secured in the metallic frame by means of the tenons, constructed substantially as described and shown.

4. In a windmill, the combination, with the turn-table, of the frame D, carrying the wind-wheel and swung on one side of the turn-table, the said frame being pivoted to such turn-table with its pivots in the same vertical plane as the tail-vane, and with the lower pivot in the rear of the upper pivot, substantially as described and shown.

5. In a windmill, the combination, with the turn-table, of the wind-wheel, mounted on one side of the center of such turn-table upon a swinging frame having an inclined pivotal connection with the turn-table, and the tail-vane, projecting from the turn-table at right angles to the normal position of the wind-wheel, substantially as described and shown.

6. In a windmill, the combination, with the turn-table, of the swinging frame D, hung on one side of the turn-table, carrying the wind-wheel and pivoted to such turn-table, so that a line passed through the pivots will intersect a central vertical line at the half-stroke of the joint between the walking-beam and shackle-bar, and the walking-beam G, pivoted in the said swinging frame, with its inner end over the center of the hollow standard, substantially as described and shown.

7. The combination, with the turn-table B, having curved standard B^1, of the frame D, having parts d d^1 d^2, and pivoted to the standard B^1 and to the rear of the turn-table below the arm which carries the tail-vane, and the wind-wheel F, supported upon the vertical piece d^1, substantially as described and shown.

8. In a windmill, the shackle-bars H H^1, secured together by means of the sheath H^2, pivoted to the lower bar, and having spring-catch i^2 and the pointed and rounded head i, and the shoulder at the lower end of the upper bar, constructed and arranged substantially as described and shown.

This specification signed and witnessed this 20th day of March, 1878.

JAS. T. MILLER.

Witnesses:
B. A. AUGHINBAUGH,
W. A. PURTLEBAUGH.