(Model.)

2 Sheets—Sheet 1.

S. & C. A. MILLER.

WINDMILL.

No. 248,491. Patented Oct. 18, 1881.

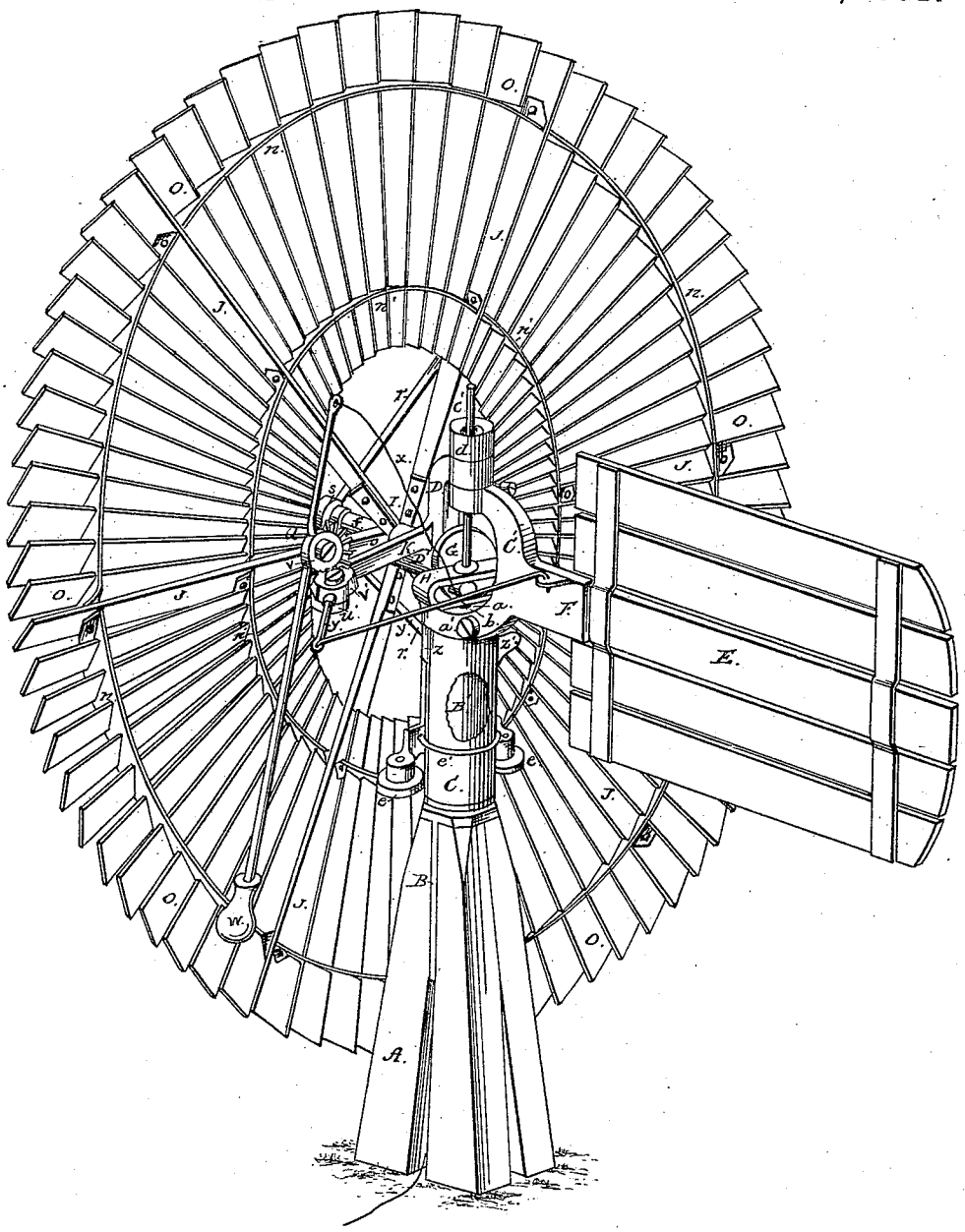


Fig. 1.

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N. PETERS. Photo-Lithographer, Washington, D. C.

(Model.)

2 Sheets—Sheet 2

S. & C. A. MILLER.

WINDMILL.

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Fig. 2.

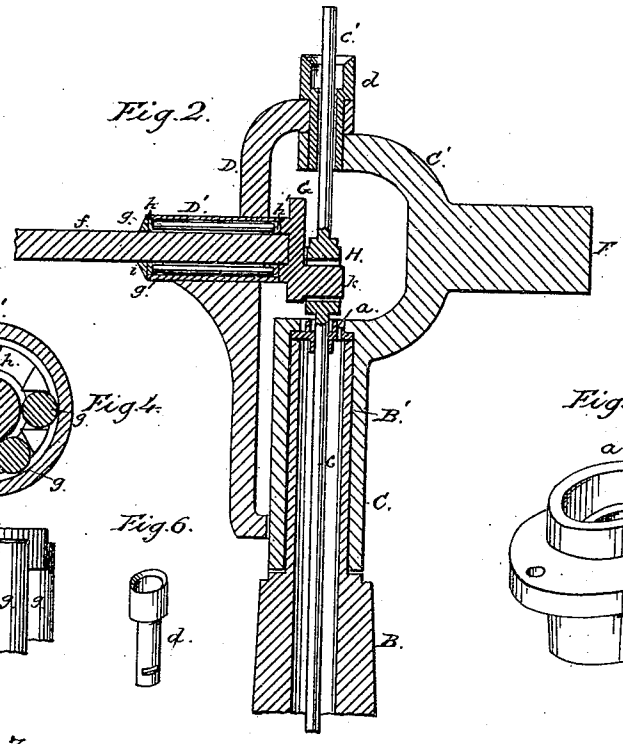


Fig. 4.

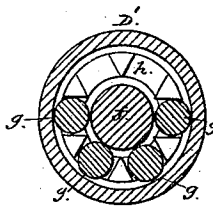


Fig. 3.

Fig. 5.

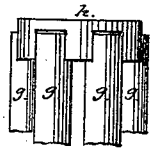


Fig. 6.

Fig. 7.

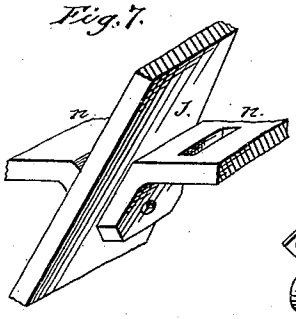


Fig. 9.

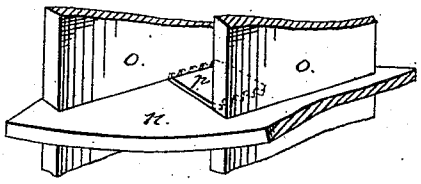


Fig. 11.

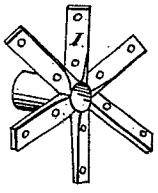


Fig. 8.

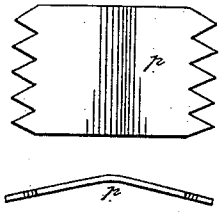
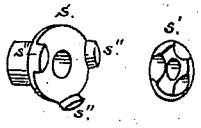


Fig. 10.



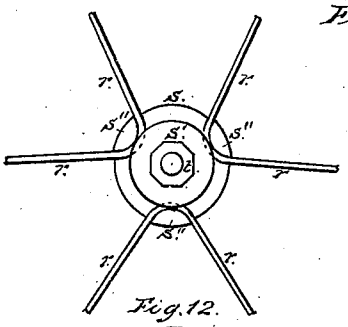


Fig. 12.



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UNITED STATES PATENT OFFICE.

SYLVANUS MILLER AND CHARLES A. MILLER, OF URBANA, OHIO.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 248,491, dated October 18, 1881.

Application filed November 26, 1880. (Model.)

To all whom it may concern:

Be it known that we, SYLVANUS MILLER, and CHARLES A. 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.

Our invention relates to an improvement in windmills, and particularly to that class which are provided with a rigid wind-wheel, whose angle of presentation to the wind is automatically adjusted under varying pressures.

Our object is to produce a windmill that shall be simple in construction, durable in wear, and effective in use; and to that end it consists in the novel construction, arrangement, and combinations of the various operative parts thereof, all as more fully hereinafter described and claimed.

To enable persons skilled in the art to make and use our invention, we will now proceed to fully describe the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of the entire windmill; Fig. 2, a vertical section through the frames and turn-table; Fig. 3, a perspective view of the iron disk; Fig. 4, a detail view of the journal-box in section, showing the main shaft *f* and the anti-friction rollers; Fig. 5, a view of one of the recessed rings and some of the rollers inserted, as used in the journal-box; Fig. 6, a view of the pin that unites the frame D with the frame of the turn-table; Fig. 7, a view showing the manner in which the arched metal blade-holders are secured to the arms of the wheel; Fig. 8, a view of the toothed lock used to secure the blades of the wheel in their arched metal holders; Fig. 9, a view of the lock placed between two blades; Fig. 10, a view of the brace-rods and their collars; Fig. 11, a perspective view of the spider-hub I, and Fig. 12 a perspective view of the nut *t*.

Similar letters denote corresponding parts in each figure.

A is a derrick-frame of the usual construction, having four posts, whose upper ends are secured to the downward projections of a cast-iron gudgeon, B. This gudgeon B is provided with a vertical cylindrical spindle, B′, which in turn is provided with a hole running longitudinally through its entire length, including the lower part embraced by the said derrick-posts.

C is a cylindrical turn-table, bored out to fit the spindle of gudgeon B, (said spindle being clearly shown in Fig. 2,) around which it revolves easily. This turn-table C is bored to within a short distance of the top, when a smaller auger is used to bore it entirely through, thereby forming a seat for receiving and supporting an iron disk, *a*. This disk *a* is constructed in the shape shown in Fig. 3, and is inserted in the upper chamber of turn-table C, and held in position by a set-screw, *a′*. (Shown in Fig. 1.) When the turn-table is slipped down over the spindle B′ the said disk rests upon the upper end of the spindle, thereby admitting of a careless and easy revolution of the turn-table around the spindle. This disk is provided on the upper surface, near its outer edge, with a curved rectangular opening, *b*, which is intended as a passage-way for the rope or wire that operates the governor, and is provided with an upward-extending flange to prevent the oil that lubricates the bearing of the disk from overflowing into the spindle, there being two holes drilled through the disk near the outer edge for its passage directly over the bearing of the disk. Through the center of the disk is drilled a hole to receive a vertical driving-rod, *c*, which passes downwardly through it and the spindle, to be attached to a pump or other device that the mill may be intended to operate. This center hole is also provided with a raised chamber for the reception of the oil that lubricates the driving-rod *c*. The upper end of this rod *c* above the disk is secured to a hollow link-shaped cam, H.

C′ is a frame cast to the turn-table C, its upper end terminating directly over the vertical center of said turn-table, and to which the tail-vane E is rigidly attached at F.

D is a frame, to which the journal-box D′ is cast. The upper end of this frame terminates directly over and rests upon the upper end of the frame C′, and both are provided with a hole corresponding to that of the disk and spindle, for the reception of a pin, *d*, which

unites the two said frames together. This pin *d* has a notch filed across its outer surface to receive the point of a set-screw passing through the upper end of frame C′, to make it stationary with said frame and allow frame D to turn thereon in a hinge-like manner. This pin has also a hole drilled through its entire length, to receive a vertical rod, *c′*, and is provided with a raised chamber at its upper end, similar to that of the iron disk *a*, to serve as a cup for the oil which lubricates the rod *c′*, that passes down through said hole, and is attached at its lower end to the upper part of the hollow link-shaped cam H, heretofore mentioned. This rod *c′* is really a continuation of the vertical driving-rod *c*, and were it not for the hollow link-shaped cam H they would be one entire rod.

The lower end of the frame D is forked horizontally, and is provided with a small roller, *e*, pivoted on the end of each arm of said fork. These rollers revolve horizontally around the base of the turn-table C, and are used in connection with the yoke *e′*, that encircles the turn-table, and whose ends are secured to the frame D by nuts, to preserve the vertical position of said frame should the wind strike the rear face of the wheel, as it frequently does after a calm.

The journal-box D′, attached to frame D, and of which it is a part, furnishes the bearing for the main shaft *f*. This journal-box is provided with anti-friction rollers *g*, as shown in Fig. 2, their equidistant relation to each other being preserved by the use of recessed rings *h h′*, which embrace loosely in their recesses the ends of six or more such rollers, as shown in Fig. 5. The main shaft *f*, passing through these recessed rings, with said rollers around and between it and the inner wall of the journal-box, has a tendency to push the rings *h h′* out; but such an occurrence is obviated by the rear face of the hub of crank-wheel G and a collar, *i*, fixed to shaft *f*, which covers the outer end of the journal-box next to the wind-wheel, which (crank-wheel and collar) keep the rings from slipping back from the ends of the rollers. The said collar and crank-wheel, moving together and in the same direction, tend to keep both rings *h h′* moving together and in the same direction. Consequently there is no liability of the rollers lagging at either end, which would have the effect to draw them out of line, and thereby produce great friction, and probably the bursting of the journal-box.

The crank-wheel G is keyed to the inner end of shaft *f*, and is provided near its outer edge with a crank-pin, *k*, which passes into the hollow link-shaped cam H, around in which it works when driven by the shaft *f*, upon which the wind-wheel is mounted.

The spider-hub I, attached to the shaft *f* near the outer end of the journal-box, and to which the wind-wheel is attached in sections, is firmly secured to said shaft by a set-screw. The arms of said spider-hub are cast on an angle corresponding with the angle given the blades of the wheel, which are about thirty degrees to the plane of the hub, which gives the arms J of the wheel, when bolted to them, the same angular face that the blades *o* have, thus bringing into requisition the inclined faces of said arms, which add very much to the power of the wheel; and, further, the angular faces of the arms J present the best form to which to bolt the arched metal blade-holders *n n′*, for bolting the arched metal blade-holders on the front side facing the wind renders the wheel stiffer in all its parts and less liable to become loose. These arched metal blade-holders *n n′* are of suitable thickness, and are diagonally slotted for the reception of the blades *o*. At their ends they are bent up on the same angle that the slots have, thereby forming lugs, through each of which is drilled a hole. The outer faces of these lugs, being on a divergent line, fit exactly between arms J of the wheel when bolted to the arms of spider-hub I. Two of the said arched metal blade-holders, when filled with their quota of blades *o*—one holder near the outer and the other near the inner end—constitute one section of the wheel. Six or more such sections, as may be preferred, are placed one between each pair of arms J, and where the lugs of said holders embrace the angular sides or faces of said arms, bolts are passed through both the lugs and arms at the same time, thereby fastening them perfectly secure.

The blades *o* are made of suitable wood, and are tapered from their outer to their inner ends, and are held in their places in the arched metal holders *n n′* by locks *p*, which are made of strap-iron, provided with teeth at each end, and bent as shown in Fig. 8. One of these locks, placed between a pair of blades on the inner face of the outer holder, *n*, where it is intended to be placed, and flattened down, causes the toothed ends to enter into the blades and completely lock every pair of blades so treated in the whole wheel.

In using some kinds of wood for making the blades *o* the lock *p* may be dispensed with by making the blades a little thicker than the slots in the holders are wide, and by passing them between two iron rollers they are reduced by compression to the proper thickness to enter the slots in the blade-holders. When so treated and placed in the slots it is found that in a few hours the compressed blades expand to their former thickness, thereby making themselves more secure than lock *p* would. This method is preferred to the use of the lock when the wood will permit of it.

In order that the wind-wheel may be perfectly strong, straight, and kept from springing by the sudden gusts of wind that are liable to strike its face and bend or damage it, we have provided brace-rods *r*, bent in the shape of an acute angle, each end of which is fastened to one of the arms J and their bent portion passed around projecting lugs *s″* of a collar, *s*, near the end of the main shaft *f*.

These rods are held firmly on said lugs by a similar collar, *s'*, provided with notches on its inner side, which fit closely over the bent portion of these rods, and is pressed closely against the rods by a nut, *t*, screwed on the end of the shaft *f*, whereby the wheel is prevented from bending or breaking, regardless of the force of the wind.

Extending outwardly from the frame D, above the journal-box, is an arm, K, having cast on its end a bracket composed of a vertical and a horizontal arm, *u w'*. On the side of this vertical arm is pivoted a semi cog-wheel, *v*, to which is cast the weighted lever or governor *w*. On the horizontal arm is pivoted a similar cog-wheel, *v'*, with which the cog-wheel *v* engages. Projecting from this cog-wheel *v'* is an arm, *y*, which connects with an arm, *y'*, which, in turn, is connected to an outwardly-extending plate of the extension F, to which the tail-vane E is attached. The office of this weighted lever or governor *w* is to hold, through arm K, the wind-wheel to the wind; but when the wind blows with such force as to overcome the resistance offered by the governor *w*, the wheel, which has a tendency to turn out of the wind contrary to the pull of said governor, because of the horizontal inclination given it in that direction, immediately swings around, taking a position nearly parallel with tail-vane E. The moment the wind subsides the weighted lever or governor returns the wheel to the wind again. The rope or wire *x*, attached to the upper end of said lever and passing down through the opening *b* in the disk *a* and spindle of gudgeon B to the ground, enables any one there to pull the wheel out of the wind at his pleasure.

Upon the side of the cylindrical turn-table C, extending outwardly, are two lugs, *z z'*, at right angles to each other, between which plays the frame D. One of these lugs, *z*, serves to stop the wheel, when in the wind, on a horizontal inclination in the direction it is pulled out of the wind, and the other, *z'*, is to stop the wheel when pulled out of the wind, holding it on a divergent line to the tail-vane, so that when the wind blows hard it cannot blow behind the wheel, as that would have the effect to make the wheel flop back and forth, rendering it liable to damage; but so arranged it is held more steadily when out of the wind than if stopped exactly parallel with the tail-vane.

We are fully aware that windmills have heretofore been provided with separate straight rods for attaching the head-brace to the wheel, the outer ends of such rods being fastened into the head by means of nuts, making it tedious and at the same time difficult to straighten the wheel, while by doubling ours, as shown, we do not need to cut screws on their ends or have any trouble in attaching them, they being formed on a machine made expressly for the purpose. Thereby they are all the same length, and when put on and fastened, as shown, with one nut only, the wheel is drawn perfectly straight, the holes through the arms being uniform in their distance from the center of the wheel.

The arms may be very much sprung; but as soon as the braces are bolted to them they must necessarily be held straight. Consequently we always have a straight wheel.

Windmills have also heretofore been provided with a frame similar to our frame D, except that they use two bearings, one above and one below, instead of only one, as we use, the lower end being provided with the rollers and the yoke to preserve its vertical position.

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

1. The wind-wheel constructed and mounted as described, in combination with the brace-rods *r*, collars *s s'*, and nut *t*, substantially as described, and for the purpose set forth.

2. The wind-wheel and shaft *f*, in combination with the journal-box D', anti-friction rollers *g*, recessed rings *h h'*, and frame D, united to frame C' of turn-table C, which is mounted on the spindle of gudgeon B, substantially as described.

3. In combination with the frame D and frame C' of the turn-table C, constructed, mounted, and united together as described, the wind-wheel, shaft *f*, crank-wheel G, crank-pin *k*, and hollow link-shaped cam H, provided with the rods *c c'*, substantially as described and shown.

4. The wind-wheel, shaft *f*, and frame D, with its arm and bracket, in combination with the weighted lever *w*, semi cog-wheels *v v'*, arms *y y'*, turn-table C, lugs *z z'*, pin *d*, and tail-vane E, substantially as described, and for the purpose set forth.

5. In a windmill, the combination of the derrick-frame, gudgeon B, spindle B', turn-table C, disk *a*, and tail-vane E with the frame D, pin *d*, shaft *f*, crank-wheel G, crank-pin *k*, hollow link-shaped cam H, and rods *c c'*, substantially as described.

This specification signed and witnessed this 9th day of November, 1880.

SYLVANUS MILLER.
CHARLES A. MILLER.

Witnesses:
JNO. M. RUSSELL,
GEORGE GEIGER.