2 Sheets—Sheet 1.

W. W. MARSH.

WIND-MILL.

No. 181,004. Patented Aug. 15, 1876

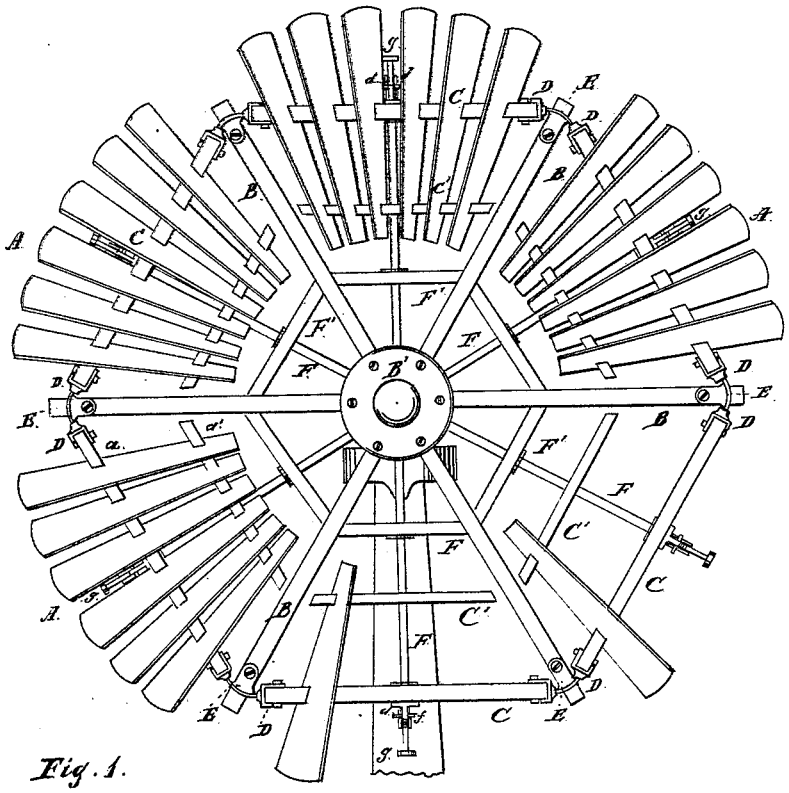

Fig. 1.

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2 Sheets—Sheet 2.

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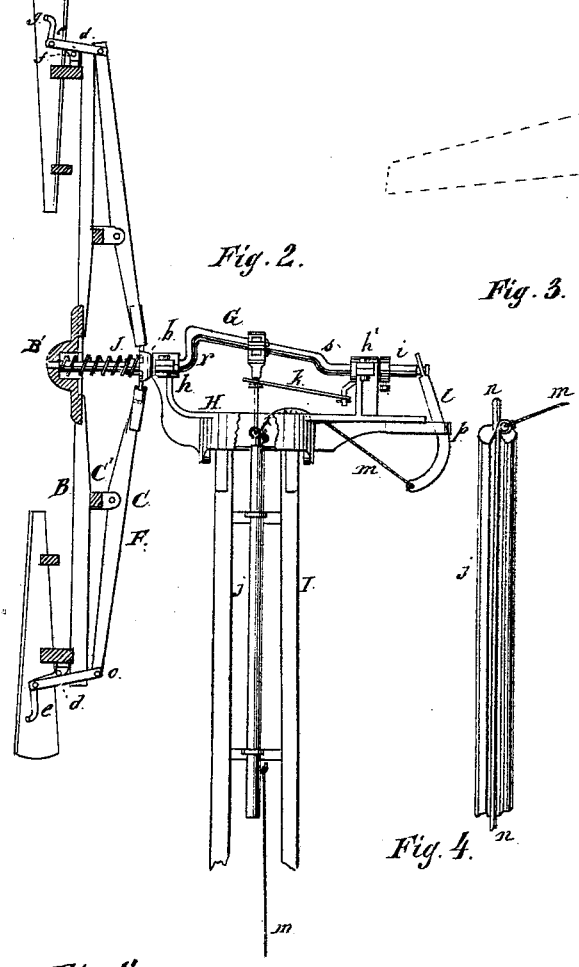

Fig. 2.

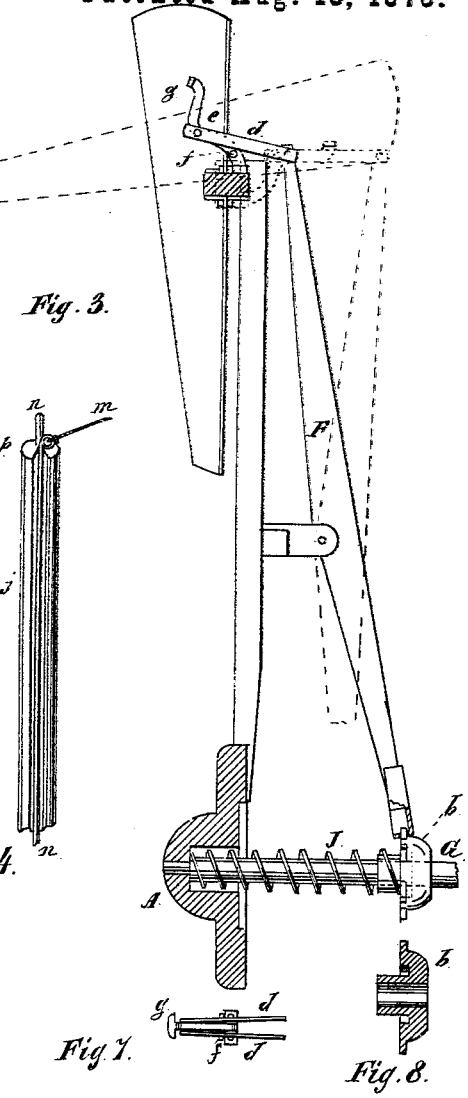

Fig. 3.

Fig. 4.

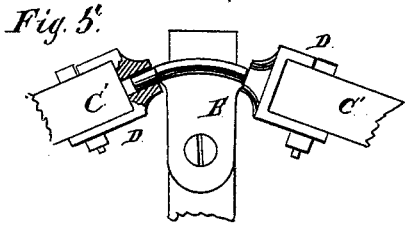

Fig. 5.

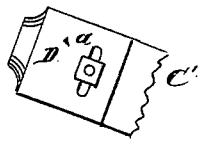

Fig. 6.

Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM W. MARSH, OF SYCAMORE, ILLINOIS.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **181,004**, dated August 15, 1876; application filed May 22, 1876.

To all whom it may concern:

Be it known that I, WILLIAM W. MARSH, of Sycamore, De Kalb county, State of Illinois, have invented new and useful Improvements in Windmills, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a front view; Fig. 2, a side view, some of the parts being shown in section; Figs. 3, 4, 5, 6, 7, and 8, enlarged details.

This invention consists in pivoting the several segments of the wind-wheel upon the outer ends of the main supporting-bars, as more fully hereinafter described, in such a manner that they assist in regulating the motion of the mill; in special devices for opening and closing the segments; in devices attached to the main bar of each segment for the purpose of limiting the movement of the segments in both directions; in concaving the center of the outer dial, and also the loose hub upon the shaft, thereby permitting the use of a long spring without overhanging the wheel too far from its support; in a modification of the form of the graduating-crank; in the use of a set collar on the rear end of the crank, for the purpose of adjusting and fixing its position, in order to regulate the length of the stroke; and in the peculiar arrangement and construction of the devices for throwing the wind-wheel out of the wind.

In the drawings, A represents the several segments of the wind-wheel; B, the main bars, permanently secured at their inner ends to the center of the dial or hub B′; C C′, cross-bars of each segment, upon which the fan-strips are secured; D, irons, secured upon each end of the main cross-bars C; E, irons, permanently secured near the outer ends of the bars B. These irons E have a cross-piece, curved in form, the ends of which are round and enter suitable bearings in the irons D, as shown in Fig. 5, and by means of which each segment is pivoted at each end of the bar C. F represents a second series of long bars, the inner ends of which are pivoted to the loose hub *b*, placed upon the shaft G. These bars F are pivoted also to the cross-bars F′, and at their outer ends are again pivoted between two metal bars, *d*. These two bars *d* are also, at their opposite ends, pivoted to the bent iron *e*, which, at one end, is permanently secured to the bar C at its center. This bent iron *e* is provided with two stops, one, *f*, to prevent the inner ends of the segments from being carried beyond the perpendicular by the force of the wind, and the other, *g*, on the outer end of *e*, so arranged that, when the segments are in the position shown by the dotted lines in Fig. 3, this stop will come in contact with the bars *d d* and limit the movement of the segments in that direction.

G is the shaft. It has two bends, *r s*, as represented in Fig. 2. The bend *r* is found in a former patent issued to myself and one O. E. Miles, but the bend *s* is new. This shaft G is supported in suitable bearings *h h′*, supported upon a suitable platform or ring, H, which revolves upon the top of the tower or standard I, in the usual manner. *i* is a collar, which can be adjusted upon the shaft or crank G, and secured at any desired position by a set-screw. *j* is a piston-rod. The upper end is provided with a bearing through which the shaft G can slide. It is properly-jointed to permit its free movement, notwithstanding the bent shaft. *k* is a loose brace, so arranged as to prevent the longitudinal movement of the upper end of the piston-rod. *l* is a lever pivoted at *p*. The upper end is connected in any suitable manner to the shaft G, and to the lower end is secured a chain, *m*, which passes over a sheave on the top of H, thence down by the side of, or in a groove in the piston-rod *j*, to a point near the ground.

A rod, *n*, may be used a portion of the way, instead of the chain *m*, as shown in Fig. 3, if desired.

The dial or hub B′ is deeply recessed, as shown in Fig. 2, and the loose hub *b* is also recessed, as shown in Fig. 8. J is a coil-spring around the shaft G, between the hubs B′ and *b*, its ends entering the recess therein.

The operation is as follows: When there is a light wind, the parts will be in the position represented in Figs. 1 and 2, and the wind-wheel will catch the full force of the wind. The position of the upper end of the piston-rod *j* upon the graduating shaft or crank G is such that the piston will have but a short stroke, pumping but a small quantity of water. If the wind increases in force, the tend-

ency will be to push the wind-wheel back. At the same time, by means of the pivoted bars F, and other devices connected therewith, and with the segments, the lower ends of the several segments will be thrown somewhat forward, and the increased motion of the wheel will also have a tendency to throw out the lower ends of these pivoted segments, thus aiding to regulate the movement.

If the wind becomes very strong, the segments will assume the position shown by the dotted lines in Fig. 3, in which position the stops *g* will come in contact with the arms *d*, limiting the movement of the segments in that direction.

When the segments are in the position shown in Figs. 1 and 2, the stops *e* will be in contact with the under side of the bars *d*, preventing the lower ends of the segments from being carried too far back.

As the shaft or crank G is forced back, the length of the stroke is increased. The operation of the mill in this respect is the same as that described in the patent to myself and Miles. The second bend, *s*, in the graduating crank or shaft G, is, however, quite an improvement, producing an improved result, which is this: The bearing of the piston will not run down so far that no pumping will be done, and even though the joints be somewhat worn, there will be at all times a short stroke, sufficient to elevate some water; and, furthermore, a longer stroke can be obtained at the other end of the shaft with less bevel or graduation to overcome, and without placing the boxes or bearings too far apart, as is necessary when the crank or shaft is regularly graduated, as shown in the said former patent, so that, by this construction, greater capacity is secured, and greater certainty of operation with the short stroke.

By means of the collar *i* the position of the shaft G, and, consequently, the position of the wind-wheel, can be adjusted, thus determining the shortest stroke which the piston *j* can have, and varying its range.

It is desirable to bring the wind-wheel as near as possible to the supporting-frame, and it is necessary, in mills of this class, to have a coil spring, J, of sufficient power to return the segments.

By recessing the dial B′ and the loose hub *b*, I am able to use a long spring with less overhang to the wheel.

It is customary to carry the cord or chain, by means of which the wheel can be thrown out of the wind, directly down from the tail of the vane, where it is frequently in the way and liable to be caught. By carrying this cord down the inside of the supporting-frame this difficulty is avoided.

The under side of the iron D is provided with a slot, *a*. The iron is secured to the bar C by means of a bolt, which, as shown, does not extend through that portion of the iron which is on the outside of the bar, but does pass through the bar and the slot *a*, being held by means of a nut. By means of this slot *a* the position of the iron D can be changed, and, consequently, the position of the segment, so that it can be evenly balanced, or the weight thereof upon the outside be increased or diminished, thereby affecting the operation of the segment, it being evident that if the weight be increased upon the outside, more power will be required to throw the lower ends of the segment out. These irons D might be so constructed that the bolt would pass through both sides thereof, in which case both sides should be provided with a slot.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The segments A of a wind-wheel, pivoted upon supporting-bars B, said bars B being secured to the hub B′, substantially as specified.

2. The slotted iron D, in combination with the iron E, supporting-bars B, and segments A of the wind-wheel, for the purpose of pivoting the segments and adjusting their position, substantially as and for the purposes specified.

3. The iron *e*, provided with stops *f g*, in combination with the segments A, substantially as and for the purposes described.

4. In a wind-mill, the set collar *i*, in combination with a graduated crank, substantially as and for the purpose set forth.

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Witnesses:

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ARTHUR M. STARK.