(No Model.)

E. WILLIAMS.

WINDMILL.

No. 348,256. Patented Aug. 31, 1886.

Fig. 1.

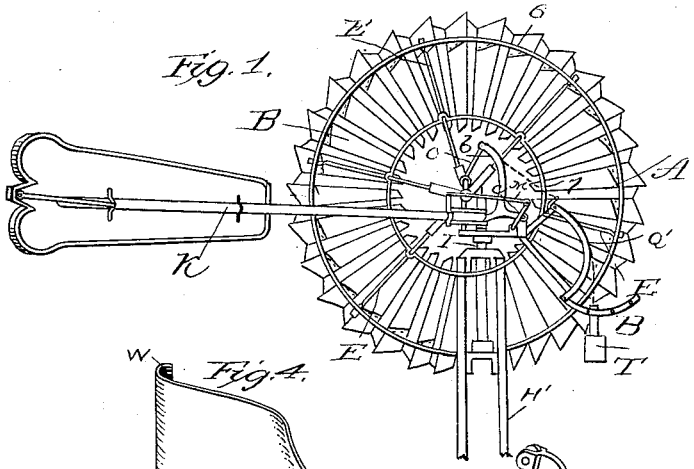

Fig. 4.

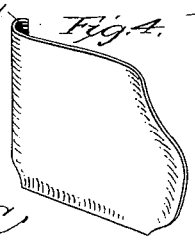

Fig. 3

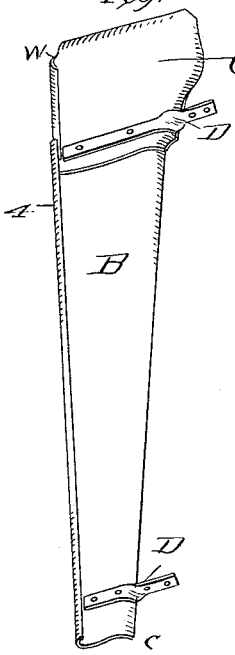

Fig. 2.

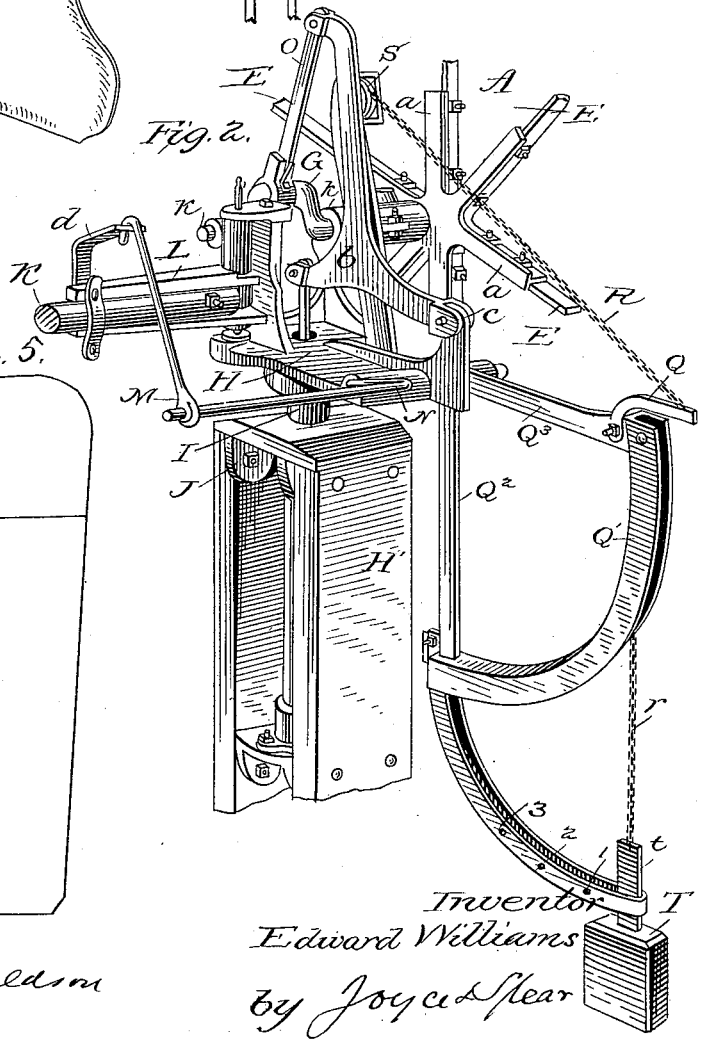

Fig. 5.

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WINDMILL.

SPECIFICATION forming part of Letters Patent No. 348,256, dated August 31, 1886.

Application filed September 29, 1885. Serial No. 178,554. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WILLIAMS, of Dubuque, in the county of Dubuque and State of Iowa, have invented a new and useful Improvement in Windmill-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to windmills of that class known as the "solid-wheel" windmill; and it consists in details of construction hereinafter fully explained, relating to the solid wheel, to the vane, and to the mechanism for turning the wheel out of the wind and for automatically controlling its movement.

In the accompanying drawings, Figure 1 is a rear view of the wheel when thrown out of the wind. Fig. 2 shows a similar view of the working mechanism, only on a scale enlarged as compared with Fig. 1. Fig. 3 shows one of the sails in perspective, and Fig. 4 a perspective view of the outer end of the sails, illustrating more fully the turning of the flanged end. Fig. 5 is a view of a modification.

The wheel A is composed of a hub, *a*, which may be made of cast metal adapted to receive wrought-iron spokes E, bolted to flanges of the short spokes on the hub. The hub is fixed on the shaft, which has a crank, G, and two bearings, *k k*, in standards on the turn-table H. The turn-table is mounted upon a pivot, I, made hollow and working in the casting J, bolted to the top of the timbers H′ of the towers. The standards *k k* are set on one side of the turn-table, not in line with the central pivot. The vane-shaft K is bolted to an arm, L. This arm is carried upon a vertical shaft, which has its lower bearing in the turn-table and its upper in the standard carried upon the turn-table, the arm-shaft being in line with the center of the table. The crank is connected by a pitman, O, to a forked lever, *b*, pivoted at *c* on the standard of the turn-table on the side opposite to the standards of the crank-shaft. The driving-rod is connected to the lower arm of the lever *b*, which is in line with the bore of the pivot.

On the arm L, which carries the vane-shaft, is a stud *d*, connected to an arm, M, fixed to the rock-shaft N, the rock-shaft having its bearing on the side of the turn-table. To the end of this shaft N is attached a quadrant having arms Q^3 and Q^2, the arm Q^2 being two or three inches longer than the arm Q^3. To the outer ends of these arms is fixed a curved channel-iron, Q′, its open side being outward and the channel forming a groove to receive the weighted chain *r*, which is made fast to the upper end of the channel-iron within the groove. A finger, Q, is attached to the arm Q^3, and to this a chain, R, is fastened, which runs over a pulley, S, on a standard fixed on the turn-table, and thence down to a position convenient to the operator in the manner in which the governor chain or rope is usually arranged.

To the lower end of the chain *r* is attached a dead-weight, T, and it will be apparent that when the power is applied to the chain R the quadrant will be lifted and with it the weight T, the rock-shaft N will be turned, and the arm M caused to push against the vane-shaft, bringing it toward or into a plane parallel with that of the wheel, thus turning the wheel out of the wind. The weight will tend to return the wheel to the wind when the power applied to the chain R ceases to act. As the shaft of the wheel is pivoted upon one side of the turn-table it will be apparent that a force of wind in excess of the given amount determined by the weight T will turn the wheel automatically out of the wind toward the plane of the vane, and by drawing upon the arm M will turn the shaft N and raise the weight. The weight in this case also tends to return the wheel when the force of the wind is sufficiently lessened. This construction of the segments and weights affords a steady motion in the opening and closing of the mill, and the increased length of the arm Q^2 causes the weight to act more powerfully as the plane of the wheel approaches the plane of the vane.

For the purpose of regulating the exposure of the wheel to the wind with reference to the vane a quarter-segment is attached to the segment Q′. This supplemental segment is made of two bars of iron with a space between inclosing a stem, *t*, of the weight T, so that as the quadrant swings the stem moves between the two parts. Holes 1, 2, and 3 are made through the sides of these bars, fitted to receive a pin to stop the inward movement of the weight as the segment rises. This holds the weight out and gives it greater action and

effect and serves to hold the wheel at any desired angle to the wind. The pin being set in any one of the holes farther from the outer ends of the supplemental segment, the weight is allowed to drop nearer to the segment Q′, and thus the resistance of the weight is lessened and the wheel is allowed to turn farther out of the wind, but is held at a certain point, as above explained.

The wheel is composed wholly of iron, which may be galvanized, and it is thereby free from liability to rust, and is less liable to get out of order than wheels made out of wood.

The sail B shown in Fig. 3 is made of galvanized sheet-iron. The front edges (shown at 4) are turned outward. This not only stiffens the sails, but affords outside an extension to the skirts and additional scope for increasing the power of the wind. The other edge of the sail is bent in an opposite direction to give it a hollow surface on that side. The end C of the sail projects beyond the outer ring and is also formed with a bent edge, as shown at *w*. This end is enlarged, as represented in Fig. 3. The sail is connected to the inner and outer rings, 6 and 7, by means of straps D, which are made of galvanized bar-iron and are riveted to the sails. The ends are twisted and bent at a proper angle, and are riveted to the rings, which are of metal, and are securely bolted to the spokes. This makes a solid, strong, and durable wheel.

The working parts heretofore described may be made of any suitable metal, and have been designed for simplicity, durability, and effectiveness in action.

To afford additional strength in the union between the skirt and sail I may bend the front edge of the sail into a spiral or rolled form, as shown in Fig. 5. Into this roll or bend the correspondingly-bent edge of the skirt is inserted. The straps D above referred to are also employed.

I claim as my invention—

1. In a windmill of the class described, a turn-table, a wind-wheel having the crank-shaft pivoted upon one side of the center pivot, a vane pivoted centrally with the pivot of the turn-table and adapted to swing laterally, a weight and mechanism, substantially as described, connected with the vane-shaft operated by the said weight, and the chain for moving the wheel out of the wind or returning it into the wind, all substantially as described.

2. In combination, the windmill, and the crank-shaft journaled out of the center of the turn-table, the centrally-pivoted vane, the rock-shaft N, having an arm, M, fixed to the shaft N and a segment fixed to the shaft N, and in combination with the rope or chain R and the weight T, substantially as described.

3. In combination with the rock-shaft N, connected to the crank-shaft of the windmill, as explained, the segment composed of the arms Q^2Q^3 and channel-iron Q′, and the weight T and chain *r*, substantially as described.

4. In combination with the shaft N, connected to the vane-shaft of the windmill, as explained, the quadrant composed of the parts $Q'Q^2Q^3$, and the supplemental segment formed with two sides having a path for the stem *t*, the weight, and holes adapted to receive a pin, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

his
EDWARD × WILLIAMS.
mark.

Witnesses:
F. W. ALTMAN,
C. S. BENTLEY,
ALEX. SIMPLOT.