

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. 180,990, dated August 15, 1876; application filed May 24, 1876.

To all whom it may concern:

Be it known that we, MATTHEW T. CHAPMAN and MARK C. CHAPMAN, of Galva, in the county of Henry and State of Illinois, have invented certain new and useful Improvements in Windmills; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of windmills in which the wind-wheel is held to the wind by a flexible tail-vane or rudder, which permits the wheel to be deflected from the direction of the wind by increase in its velocity, and permits its return toward its normal position in relation to the direction of the wind as its velocity decreases; and the invention consists, first, in the use of one or more weights placed in such relation to the wind-wheel that their tendency to recede from its axis of motion by an increase in its velocity or centrifugal force may regulate the deflexure of the wind-wheel; second, in the use of a spring to return the centrifugal weights toward their normal position with diminishing velocity of the wheel; third, in the use of a pulley on the wind-wheel shaft, connected by a cord with the tail-vane, and brought into frictional contact with the wind-wheel hub by the centrifugal weights, for the purpose of deflecting the wheel when there is increased velocity of wind; and, fourth, in the use of a weight with the last-named devices for returning the wind-wheel toward its normal position as the wind decreases in velocity.

In the accompanying drawings, Figure 1 is a top view of a windmill embodying our invention, the wind-wheel and its hub in section. Fig. 2 is an enlarged side elevation of the working parts, the wind-wheel removed, and its hub and the axle-boss shown in section. Fig. 3 is a diminished front elevation of the wind-wheel.

Referring to the parts by letters, A represents the hollow conical-shaped vertical axis, on which the mill rotates, and is mounted in suitable bearings in a frame, B, carried on the

tower. (Not shown in the drawings.) C is the wind-wheel, of that class having rigid or fixed sails, and is rigidly attached to its shaft D, which is provided with suitable bearings in standards *a a*, which project upward from the axis A. E E' are sliding disks on the shaft D, one on each side of the wheel C, and are connected by rods *e e*, which pass through the boss *d*. F is a loose pulley on the boss *d*, and between the hub *c* of the wheel C and the disk E', so that when the disk E' is drawn toward the wheel C the pulley F will be brought into frictional contact with the wheel-hub. G G are bell-crank levers, pivoted at their angles to standards *c'*, which project from the frame-work of the wheel C, so that one of their arms, *g*, rests against the face of the disk E, and from their other arms, *g'*, rods *h* extend radially outward and through eyes *h'*, projecting from the wheel-frame, and carry on their outer ends the centrifugal weights H. I is a spiral spring encircling the extended end of the shaft D, and placed between a collar, *i*, and the disk E, so as to press the disk E toward the wheel C. J is a laterally-projecting arm from the axis A, and carries pulleys *j j'* on its outer end. K is a cord, connected at one end to the pulley F, and, passing around the pulley *j*, is connected at its other end to one side of the rudder L. The rudder or tail-vane L is pivoted on an axis, *l l'*, parallel with, but to one side of, the axis A; or it may be pivotally attached to axis A and rotated in a path concentric with said axis A. *l''* is a brace for the rudder L, and *m* are stops, one on each side of the rudder-stem, and have sockets in their ends, in which are seated rubber bumpers *m' m''*. N is an arm projecting from the axis A, and connected with the vane L by an ordinary link, *n*, and weighted rod *n'*. P is a cord, passing from one side of the rudder L, over the pulley *j'*, and thence over a pulley, *p*, carried on the upper end of the axis A, and thence downward to near the ground, where it may be taken hold of to throw the wheel "out of the wind" in the ordinary manner. Q is the connecting-rod, receiving motion from a crank, *d'*, on the shaft D.

The operation is as follows: It is not deemed necessary to repeat here the well-known principle of regulation of the speed of this class

of windmills by the deflection of the wheel, as shown by dotted lines at Fig. 1. The necessary deflexure is produced by our devices as follows, viz: Any increase of speed of the wind-wheel, from increased velocity of the wind, will, by centrifugal force, throw the weights H outward, and, through the bell-crank levers G, press the disks E E' outward, and thereby draw the pulley F against the hub of the wind-wheel, and, by frictional contact therewith, rotate said pulley with the wheel and wind the cord K thereon, shorten it, and thereby turn the wheel at an angle to the direction of the wind, and proportioned to its velocity, and, should the velocity be great enough, the frictional contact between the pulley F and wheel-hub will be sufficient to carry the wheel around until its plane of rotation is parallel with the side of the vane L, and the wheel-edge to the wind, and thereby entirely stop its rotation in gales or very high winds. The weighted rod *n'* operates in the ordinary manner to bring the parts back toward their normal position, when there is a decreasing force of wind. The bumper *m'* strikes the projection *r* when the wheel is brought parallel with the rudder, and the bumper *m''* strikes the arm N when the wheel is in its normal position, or at right angles to the rudder.

What we claim as new is—

1. In a windmill having a rigid-sail wheel and a flexible tail-vane or rudder, one or more

centrifugal weights, H, combined to operate with the wind-wheel and tail-vane or rudder, substantially as described, and for the purpose specified.

2. The spring I, arranged to operate with the disk E, bell-crank levers G, rods *h*, weights H, and wheel C, substantially as and for the purpose specified.

3. The friction-pulley F, arranged to operate with the wind-wheel C, cord K, and flexible tail-vane or rudder L, substantially as and for the purpose specified.

4. The friction-pulley F, arranged to operate with the disks E E', rods *e*, bell-cranks G, rods *h*, weights H, wind-wheel C, cord K, and flexible tail-vane L, substantially as and for the purpose specified.

5. In a windmill having a rigid-sail wheel and flexible tail-vane or rudder, the weighted rod *n'*, combined to operate with one or more centrifugal weights, H, and with the wheel and tail-vane, substantially as and for the purpose specified.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Witnesses:

A. W. ALBER,
J. S. SMITH.