

J. LOCHHEAD.

WIND-MILL.

No. 188,743.

Patented March 27, 1877.

FIG. 1.

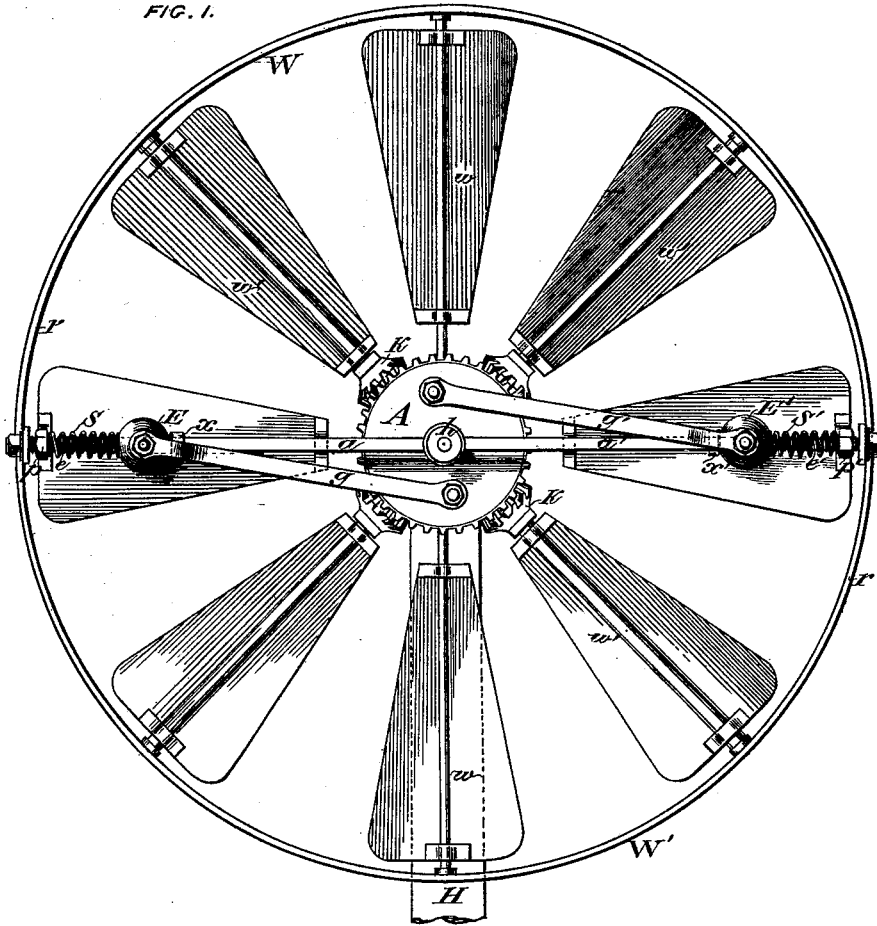
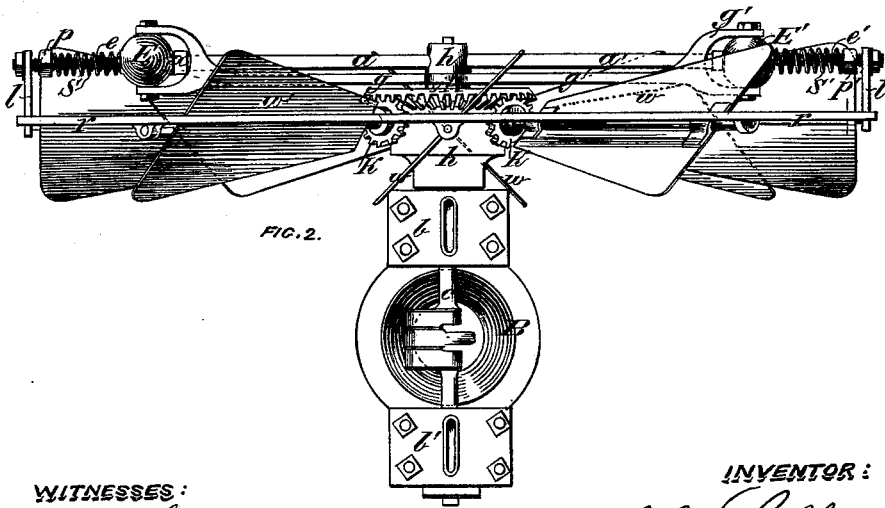


FIG. 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. 188,743, dated March 27, 1877; application filed January 10, 1877.

To all whom it may concern:

Be it known that I, JOHN LOCHHEAD, of the city and county of San Francisco, State of California, have invented certain Improvements in Windmills, of which the following is a specification:

My invention in windmills consists in making the wheel itself, fitted with sails or wings, a self-governor, so as to prevent too great a speed being attained when actuated by the wind, thereby securing the pump-rods or their attachments from being broken or too readily worn out by unnecessary speed; also, my invention relates to mechanism provided on the wheel, whereby it may be adjusted so as to preserve such limit to the speed as may be desirable. This I accomplish by causing every alternate wing or sail to be movable, and to be turned from the same angle as the fixed sails gradually to an angle in an opposite direction, by means of the action induced by the centrifugal force of sliding weights arranged on supplementary arms running from the hub toward the rim of the wheel, said weights being connected by jointed arms to a beveled wheel, or its equivalent, placed in the center of the windmill-wheel, which beveled wheel is so arranged as to gear into beveled pinions, or their equivalents, provided on the hub ends of these alternate movable wings, so that when these weights, by the revolution of the windmill, fly out on these supplementary arms toward the rim, they may cause this beveled wheel and these pinions to turn sufficiently for that purpose, and, consequently, prevent the windmill-wheel from running above the required speed, while, as this speed diminishes, these weights will be gradually brought back toward their original position by spiral springs fitted around these supplementary arms acting on these weights from the rim toward the center; also, by providing each of these arms with a thread on the portion covered by the spiral spring, and by fitting nuts onto these threaded parts, these nuts may be made to adjust the tension of these springs to the speed required, since the weights will not act till the adjusted tension is overcome.

Figure 1 is a longitudinal vertical elevation of a windmill fitted with the mechanism embodying my invention. Fig. 2 is a plan of the same windmill.

With reference to the drawings, W W' is the windmill-wheel, which is provided with a rim, *r*, and hub *h*, and is fitted to a stand, H, by an ordinary swiveling block, B, whereby it may be turned round into a proper position for action whenever the wind may strike it from any quarter.

The wheel W W' is fitted by its hub *h* to a crank-shaft, *c*, so as to admit of a pump or other connecting-rod being attached thereto for operating within this swiveling block B, provided with crank-shaft bearings *b b'*. Between this hub *h* and rim *r* are fitted alternately, with fixed wings *w w w*, loose sails *w' w'*, which pivot in journals arranged in the same, and are provided at their hub ends with beveled pinions *k k k*, made to gear into a large centrally-placed toothed wheel, A, fitted loosely on this hub *h*. From the center of this hub *h*, on the outer side of the wheel A, rods are fixed, so as to meet extended brackets *l l'* from the rim *r*, to which they are also attached, and form supplemental arms *a a'* to the wheel W W', in line with one another. On each of these arms a sliding weight, E E', is fitted, and connected to the central wheel A by a rod, *g g'*. Near the rim *r* of the windmill-wheel, and between the connecting-bracket *l l'* of each rod and its sliding weight E E', a spiral spring, S S', is fitted onto this rod, so as to act on this weight, and to press it back to its original position on the slackening of the speed of the windmill when it has been thrown out from the center by the centrifugal force induced by the revolution of the same. The portion *e e'* of each of these rods encompassed by this spring S S' is threaded and provided with a nut, *p p'*, so that such spiral spring S S' may be compressed thereby toward each weight, E E', according to the tension and limit to the speed of the windmill required. Each of these rods or supplementary arms is also provided with a stop-ring, *x x'*, so as to limit the movements of these sliding weights toward the center, and form their initial starting-points when actuated in the direction of the rim *r*.

By this arrangement, when the wind acts against this windmill it will turn so as to pivot round into a position for receiving the full effect of the wind force. This force will operate at the commencement, or on the windmill

when at rest, on both the fixed and loose wings or sails, which are arranged, as stated, at the same angle; but as the speed of the windmill gradually increases, so as to cause the sliding weights *E E'* to overcome by their centrifugal force the pressure of the spiral springs *S S'*, the alternate wings *w'* will gradually cease to give motion to the wheel, and as the speed still further increases they will tend to act against the fixed sails *w w*, so as to at last preserve a certain speed, and place a limit thereto by being actuated continuously in a contrary direction by the connecting-rods *g g'* engaging the beveled wheel *A*, geared to the loose-sail pinions *k k k* as the weights *E E'* approach the rim *r*.

This limit of speed can be readily arranged by the compression or adjustment of these spiral springs *S S'* by means of the adjusting-nuts *p p'*, provided on these threaded supplementary arms *a x a' x'*, so that the windmill will have to make a certain number of revolutions in a certain time before these sliding weights will commence to operate, as described.

In this general arrangement I claim, as an advantage over the usual form of governors on windmills, the placing of the governor on

the wheel itself, thereby preventing the friction arising from the contact of revolving mechanism with stationary governor-connections.

I claim as my invention—

1. In a windmill, the wheel-governor described, consisting of the sliding weights *E E'* on fixed supplementary arms *a x a' x'*, connected by jointed rods *g g'* to the central beveled wheel *A*, or its equivalent, in combination with the alternate movable sails *w' w' w'*, provided with beveled pinions *k k k*, or their equivalents, and the spiral springs *S S'*, arranged as herein shown, substantially as and for the purposes specified.

2. The threaded supplementary arms *a x a' x'*, provided with adjusting-nuts *p p'*, spiral springs *S S'*, and sliding weights *E E'*, connected to the central wheel *A* by jointed rods *g g'*, or their equivalents, in combination with the movable sails *w' k w' k*, described, substantially as and for the purposes herein set forth and specified.

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Witnesses:

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