(No Model.)

C. M. CONRADSON.

WIND WHEEL.

No. 264,930. Patented Sept. 26, 1882.

Fig. 1.

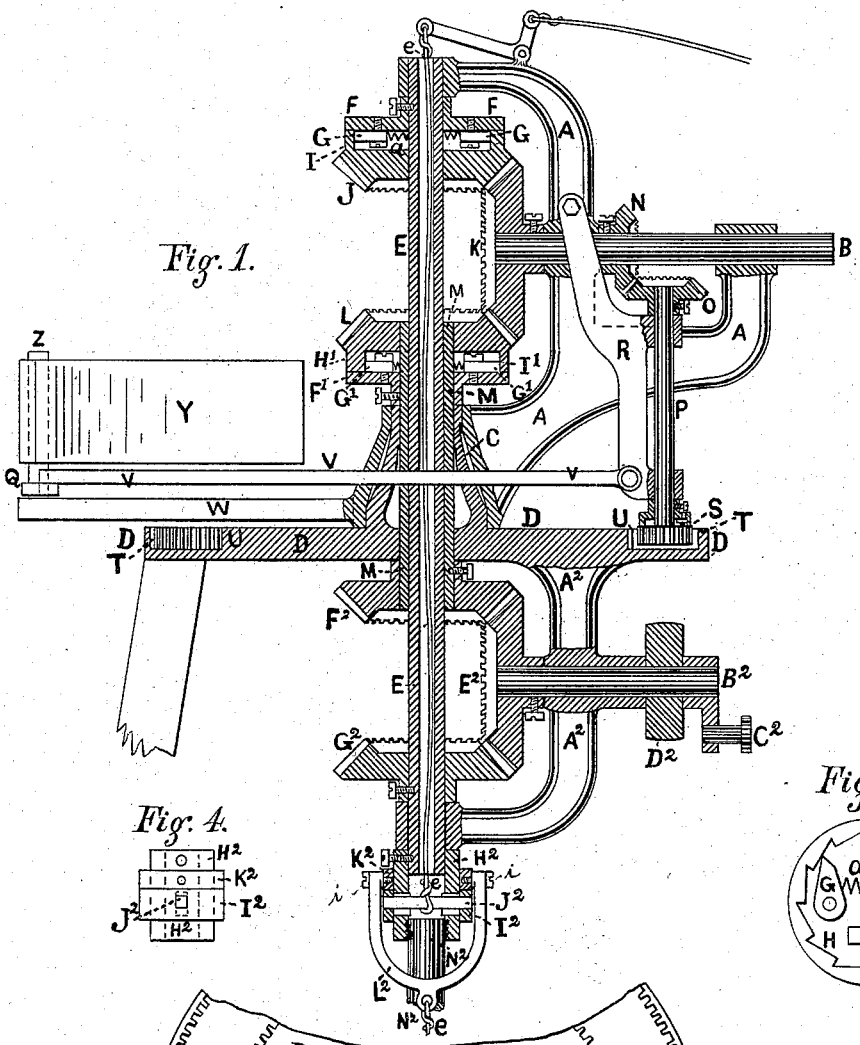


Fig. 4.

Fig. 3.

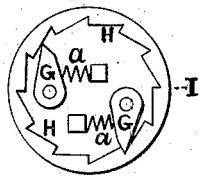
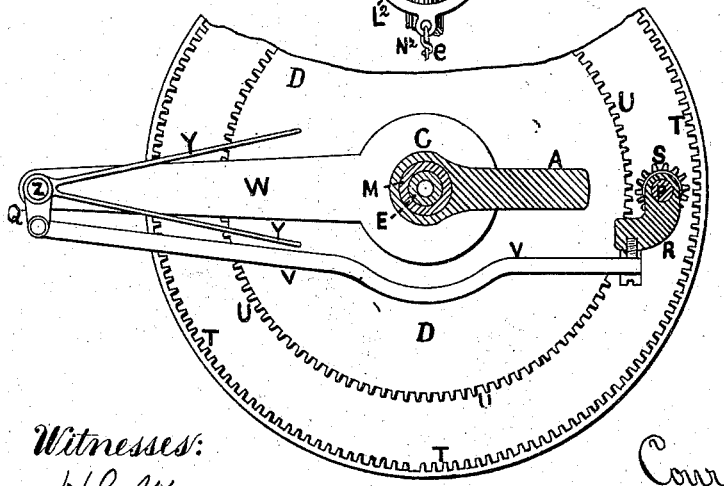


Fig. 2.



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UNITED STATES PATENT OFFICE.

CONRAD M. CONRADSON, OF MADISON, WISCONSIN.

WIND-WHEEL.

SPECIFICATION forming part of Letters Patent No. 264,930, dated September 26, 1882.

Application filed September 27, 1881. (No model.)

To all whom it may concern:

Be it known that I, CONRAD M. CONRADSON, of Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

The principal object of my invention is to insure the wind-wheel being kept at a right angle to the point from which the wind blows, and when the wind changes to automatically change the position of the wind-wheel so it shall face the wind at all times.

In wind-wheels or windmills as heretofore constructed, employing bevel-gears, the wheel tends to roll out of the direct line of the wind, thereby reducing the power available. To remedy this defect it is necessary to lock the mill in position. Consequently the constant changes in the direction of the wind strain the mill and gearing. These and other objections are fully overcome by my invention, which consists in the construction, combination, and arrangement of double or two sets of bevel-gears connected with opposite sides of the vertical tubular shafts, whereby the thrust of the driving gear or pinion is counterbalanced, and by means of pawls and ratchets the wheel is free to turn with the wind, so as to face the same direct and at all times; and it further consists in the employment of a vane connected by levers and gearing, or other suitable devices connected with the wind-wheel shaft, to automatically change the plane or direction of the wind-wheel to correspond with the changes in the direction of the wind, whereby the position of the wind-wheel is kept constantly in line with the direction of the wind, or facing at a right angle to the point from which it blows, however frequently it may change from one point to another; and it further consists in details of construction, hereinafter more fully described and set forth.

Figure 1 represents a vertical central section of the windmill-gearing constructed according to my invention. Fig. 2 represents a plan view of the automatic mechanism for changing the position of the wind-wheel to correspond with the changed direction of the wind. Fig. 3 represents a plan view of one of the pawl-and-ratchet mechanisms connected with the bevel-gears for imparting a rotary motion to the concentric hollow shafts in opposite directions. Fig. 4 represents a detail in elevation of the loose and sliding collars connected with the disengaging-wire devices.

A represents a suitable cast-iron support-frame for the wind-wheel, which is secured to the outer end of the shaft B, which has suitable journal-bearings in said frame A, the lower end of which is adapted to fit over and turn upon the conical vertical projecting hub C, formed centrally upon the horizontal circular geared rack-plate D, the upper end of said frame A being provided with a suitable vertical journal-bearing, which receives the upper end of the inner vertical hollow shaft E, and below which bearing is secured to said hollow shaft E the plate F, provided with two or more pawls, G, which are caused to engage with teeth H upon the interior of the vertical flange I, formed upon the top or back of the bevel-gear J, fitted loosely upon said vertical hollow shaft E by means of suitable springs *a*, as shown in Fig. 3.

To the inner end of the horizontal wind-wheel shaft B is secured the bevel-gear K, which gears or meshes with the loose bevel-gear L, fitted upon the upper end of the outer hollow shaft, M, and provided upon its back or lower side with a vertical flange, I′, having teeth H′, into which the pawls G′, secured to the top of the plate F′, which plate is secured to the said outer hollow shaft, M, engage by means of suitable springs, as before described, thus revolving the said hollow shafts E and M in opposite directions when the wind-wheel shaft B is rotated in the desired direction; but if revolved in the opposite direction the said pawls will slip backward over the said ratchet-teeth, and thereby permit the said vertical hollow shafts E and M to remain stationary.

It will be observed that when one pawl is engaged with a tooth of the ratchet the opposite pawl is midway between two teeth and drops into contact with the next tooth when the gear or wheel has moved half the distance of the length or pitch of the tooth. Other pawls may be employed to still further reduce the space through which one or more engage, by which means the ratchet-teeth may be

formed large and few in number and the desired strength obtained, and yet retain the equivalent of a large number of teeth.

I secure a bevel-gear wheel, N, at about mid-length, or at the point desired, upon the horizontal wind-wheel shaft B, which gear-wheel N is arranged to gear with the bevel-gear O upon the upper end of the short vertical shaft P, which shaft is journaled within the automatic adjustable frame R, the upper end of which is pivoted to the support-frame A, so it may be moved through a small or short arc about said pivot, and thereby bring the small pinion S, secured upon the lower end of the short vertical shaft P, into gear with one or the other of the circular racks T or U upon rack-plate D by means of the horizontal connecting-rod V, one end of which is pivoted to the lower end of the vibrating frame R, its opposite end being pivoted to the outer end of the short arm Q, secured to the vertical standard Z, pivoted in the horizontal extension-bar W, extending from the conical socket-bearing of the frame A, to the said vertical standard Z being secured the horizontal vibrating vane Y.

It will be seen that when the wind is blowing at a right angle with the face of the wind-wheel the small pinion S is free to revolve between the two circular racks T and U without engaging with either; but should the wind suddenly change the vane Y will be acted upon so as to force the said pinion S into gear with one or the other of said circular racks T or U, as the case may be, when the wind-wheel will be brought around until it faces the wind squarely. Then the vane Y assumes a position in line with the direction of the wind, and the pinion S is thrown out of gear again, thus automatically changing the position of the wind-wheel to correspond with the variations or changes in the direction of the wind.

It will be seen that when the vane Y operates rod V so as to cause pinion S to engage with either rack T or U it traverses the same a short distance, or until the wind-wheel upon shaft B is brought around into line with the vane Y or parallel to the same plane, when the pinion S, through the action of rod V, is disengaged from said rack T or U, as the case may be, and is free to revolve between the same again.

Beneath the rack-plate D extends an iron bracket-support, A^2, provided with a horizontal journal-bearing to support the horizontal driving-shaft B^2, its outer end being provided with a crank, C^2, or a pulley, D^2, and its inner end with a bevel-gear, E^2, which engages with a bevel-gear, F^2, secured to the lower end of the outer hollow shaft, M, and to the inner hollow shaft, E, is secured a bevel-gear, G^2, which engages with the lower side or bottom of the bevel-gear E^2, and having a bearing upon the lower end of the bracket-support A^2, which is provided with a vertical journal-bearing for the said hollow vertical shaft E. Thus, if desired, power may be taken from the said crank C^2 or pulley D^2; but it is preferable to extend the shaft E N^2 to the ground, and in order to be able to make such extension solid and provide for the disengaging-wire by which the mill is stopped, as usual, I bring the wire outside, and I attach to the lower end of the hollow shaft E, just below its bearing in the bracket-support A^2, a sleeve, H^2, which is provided with a slotted opening or hole passing diametrically through it, and within this hole is fitted a short bar or key, J^2, which is free to move up and down therein, and to this key or bar J^2 is secured the disengaging-wire *e*, which passes upward through the hollow shaft E, and connected with levers, as heretofore, to stop the wind-wheel, as usual. This key or bar J^2 extends outward or has each end secured to the loose ring I^2, which fits over the socket or sleeve H^2, and above which loose ring I^2 is placed the loose ring K^2, and having a bearing thereon, and provided with screw-holes at opposite sides, and into which pass the screws *i*, which pass through the upper ends of the loop or bail L^2, to the lower portion of which is attached the disengaging wire or cord *e*, and passing downward to the ground outside of the solid vertical shaft N^2, which has its upper end firmly secured within the said sleeve H^2, its lower end being provided with suitable gears for the communication of power and motion, as heretofore.

Having thus described my invention, what I claim is—

1. In combination with the horizontal wind-wheel shaft B, having the bevel-gear K, the two concentric shafts E and M, provided with the loose bevel-gear J, having flange I, provided with teeth H, and bevel-gear L, having flange I′, provided with teeth H′, whereby the wind-wheel is adapted to change its position to correspond with the direction of the wind, substantially as described, as and for the purposes set forth.

2. In a windmill, the combination of the vane Y, connecting-rod V, pivoted arm R, bevel-gears N and O, vibrating rotary shaft P, having pinion S, and the concentric rack-bars T and U, substantially as described, as and for the purposes set forth.

3. In a windmill, the combination, with the vertical hollow shaft E, having the disengaging-wire *e*, of the slotted sleeve H^2, bar or key J^2, loose rings I^2 and K^2, and the loop or bail L^2, provided with a disengaging wire or cord, *e*′, and the solid shaft N^2, substantially as described, as and for the purposes set forth.

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