W. A. GUZEMAN.

WIND-MILL.

No. 192,502. Patented June 26, 1877.

Fig: 1.

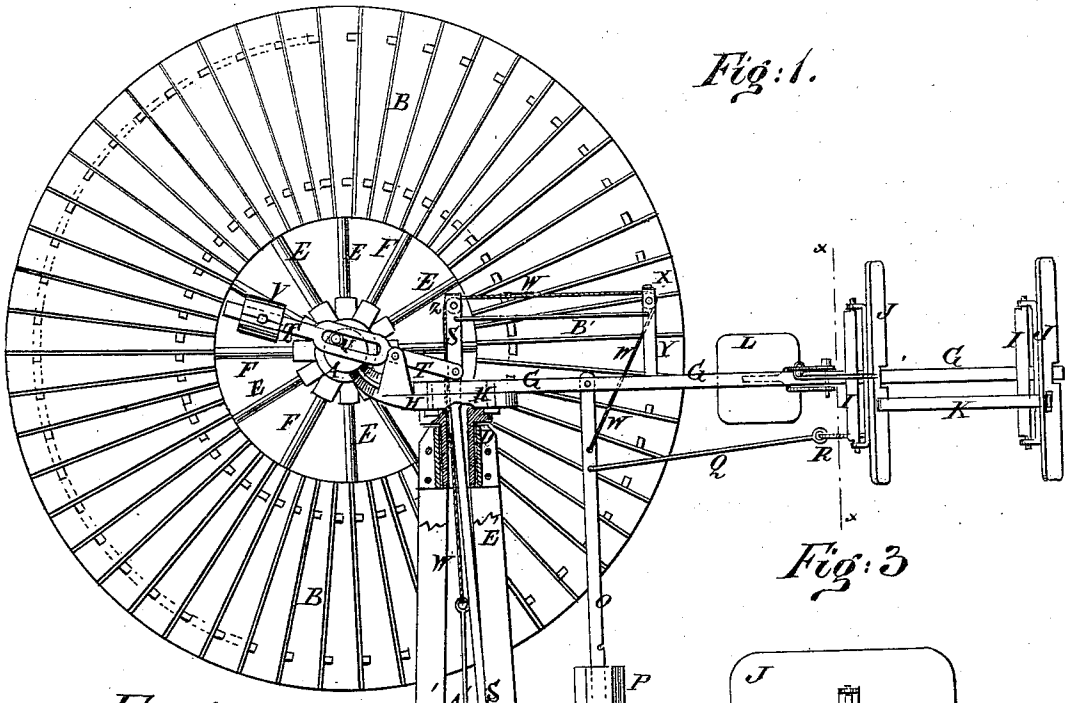


Fig: 3

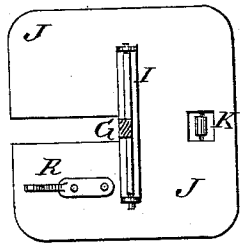


Fig: 4.

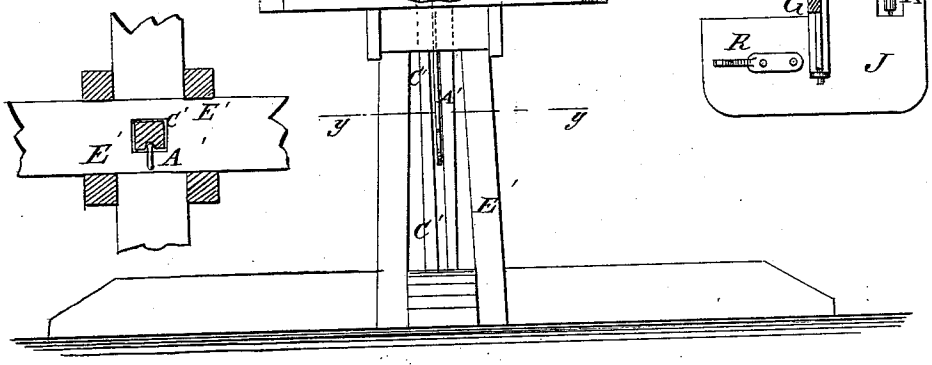
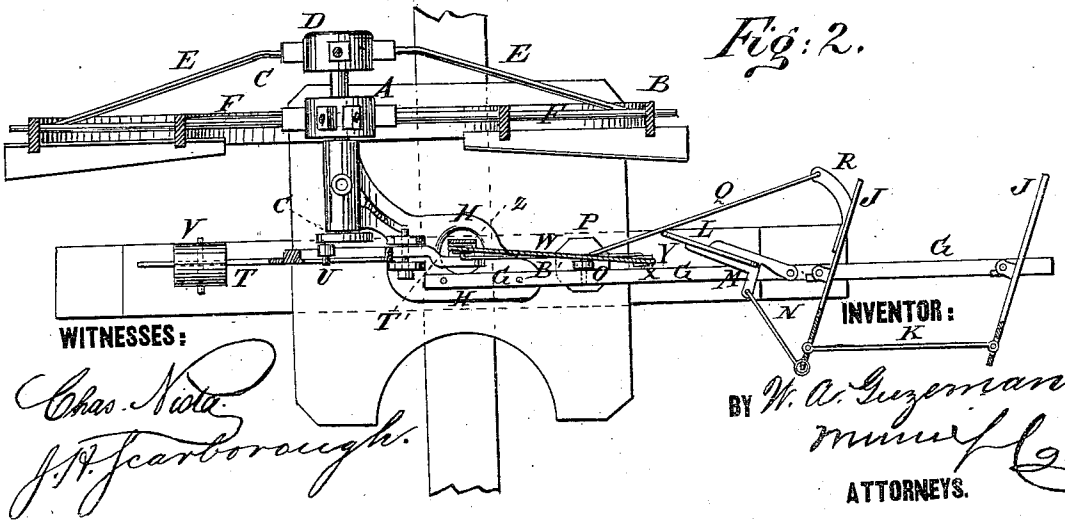


Fig: 2.



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IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **192,502**, dated June 26, 1877; application filed April 16, 1877.

To all whom it may concern:

Be it known that I, WILLIAM A. GUZEMAN, of Washington, in the county of Washington and State of Iowa, have invented a new and useful Improvement in Windmills; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front view of my improved windmill, parts being broken away to show the construction. Fig. 2 is a top view of the same, partly in section, to show the construction. Fig. 3 is a detail section taken through the line *x x*, Fig. 1. Fig. 4 is a detail section taken through the line *y y*, Fig. 1.

The same letters of reference are used to indicate corresponding parts.

My invention shows a windmill which is automatic—that is, self-regulating—and belongs to that class of windmills which have a solid wheel—that is, a wheel whose fans or sections are immovable—and in order to have its speed regulated or to be protected from violent winds must be so arranged in connection with a vane as to swing around automatically, and receive the force of the wind obliquely on its face or directly upon its edge; and more particularly relates to the manner of thus regulating the wheel to the wind, as well as to the construction of the wheel, and to the device by which the mill can be controlled—that is, started, stopped, or speed or power regulated at the will of an operator.

Windmills of this class have been heretofore constructed with wheel and vane so arranged in relation to each other as to be at, or nearly at, right angles when in operation, and to swing toward each other until they become parallel, or nearly so, when at rest or during violent winds. They have also been so arranged as to receive the wind on the side of the wheel farthest from the vertical central axis of the mill, and the vane extends behind the wheel. This has been the invariable method employed to obtain a self-regulating windmill.

My windmill differs from others in being so arranged as to have the face side of the wheel nearest the vertical axis of the mill, the wind striking it on that side when in operation, and in being provided with a rigid vane-shaft placed parallel with, and in front of, the wheel. This vane and shaft will be more fully described hereinafter.

Heretofore in the construction of windmills only one spider or hub has been used. In my invention the wheel is constructed with two hubs. The main hub A, to which the main spokes F of the wheel B are attached, is used in the ordinary way. The wheel-shaft C, instead of terminating at this hub A, extends some inches back, and on this extended end the second hub, D, is placed. To this second hub D another set of spokes, E, are attached. This last set of spokes is placed at an acute angle to the wheel-shaft C, and their outer ends are fastened to the main set of spokes F, or to the outer fellies of the wheel B, thus setting in a bracing position, giving great additional strength to the frame of the wheel, and preventing it from being dished by the force of the wind, as is very frequently the case when constructed in the usual manner.

One of the most novel features of my invention consists of the vane, as arranged in connection with the wheel to constitute the most accurate automatic governor and protector in wind-storms. The vane-shaft G is fixed in an immovable position by being firmly attached to the turn-table H on the side opposite the center of the vertical axis of the mill from and in front of the wheel B, and at, or nearly at, right angles to the wheel-shaft C, and consequently parallel with the face of the wheel B.

The vane-shaft G, at a point beyond the outer edge of the wheel B, is supplied with one or more cross-arms, I, firmly bolted thereto at right angles to the shaft G, and in a perpendicular position. To these cross-arms I sections J are attached by being hinged. The hinges are fastened to each end of the cross-arms I and to the sections J on a perpendicular line equidistant from the two edges of the sections J. These sections J are so constructed as to swing from a parallel to a rectangular position with the shaft G, and must be so

hinged as to have an equal portion on each side of the shaft when open or at right angles, so as to prevent the twisting of said shaft G from excess of side weight, and to be easily changed from one position to another in the wind, which would not be the case if there should be more wind-surface on one side of the hinged line than on the other. When two or more sections J are used, which is desirable on large mills, they should be so connected by a rod, K, that they will be in a line with each other when closed, or parallel when open or partly open, and at all times be in a relative position to each other and the wind.

To the shaft G another and smaller section, L, is attached by being hinged with one edge to the shaft G, or to another cross-arm at a point a few inches from the cross-arm of the main section J, and toward the center of the mill, and on the side of the shaft G next to the wheel.

This small section L is connected with one of the main sections J, substantially as shown, by a projecting arm, M, on the small section L, and by a rod, N, in such a manner as to be with detached edge toward the center of the mill, and nearly parallel with the vane-shaft G when the main sections J are open, and to swing out and back with detached edge farthest from the wheel, and nearly parallel with the vane-shaft G, and consequently with the main sections J when they are closed.

At a point on the vane-shaft between the main sections J and the turn-table H is attached a bar, O, hanging like a pendulum, and supplied with an adjustable weight, P, on the lower end. This bar O is connected with one of the main sections of the vane by a rod, Q, extending from a point about one-third of the length of the bar O from its hinged end, and to a projecting arm, R, on the main section J.

This combination of shaft G, cross-arms I, main sections J, small section L, projecting arms M R, connecting-rods N Q, weight P, and bar O, constitute the vane or governor of the mill, and its effectiveness will be well understood by the following explanation: By the weight P the main sections J will be held open or across the shaft G, admitting free passage to the wind, and thus forcing the wheel around so as to stand with its face squarely to the wind. This position places the small section L so as to offer its flat surface to the wind, by which it would be forced back and away from the wind if it were not for its connection with the main section J and weight P, which holds it against a certain pressure, but when the force against the section L is sufficient to more than counterbalance this weight P, then all the sections of the vane work, the small section L being forced away from, and the main sections J being turned with their flat surface to, the wind. When this occurs the whole mill is swung round so as to offer less surface of the wheel B to the wind.

When the force is sufficient to raise the weight P entirely up, and the main sections J are closed, or are parallel with the shaft G, then the wheel B will be held with its edge to the wind, and consequently be at rest, and all the parts, the wheel B, main sections J, and small section L will stand edgewise to the wind, and in the safest position to prevent destruction by storms.

It will be seen that as the wind decreases the main sections J will open and offer their reverse sides to the wind, and, standing obliquely thereto, will tend to immediately force the wheel into working position.

Heretofore the counter-balance used on windmills has been so arranged that the force of the wind would have to be sufficient to force the wheel and vane out of its direct course before it could be disturbed; consequently they are imperfect governors. Some inventors, to remedy this defect, have resorted to a series of weights, using a light one to start with, and connecting with others as it is raised.

In my invention I arrive at the most perfect arrangement of the counter-balance in the simple manner of hinging the weight-bar O like a pendulum, the weight P thus offering comparatively little resistance while in a vertical position; but this resistance is increased with the force of the wind, and as the weight P is raised higher. By this arrangement it will be seen that my mill, at all times and in all degrees of wind, is under the control of the wind.

All mills of this class have been constructed either with a side vane, or by setting the wheel-shaft at one side of the center of the vertical axis of the mill, or by hinging the vane and wheel-shaft out of a direct line, and by these means creating a side pressure; consequently, the wind never strikes the face of the wheel at a right angle, but always obliquely, thereby diminishing the wind-surface and the effective power of the wheel.

It will be seen in my invention that to counterbalance the slight side pressure that would be on the vane, I set the wheel-shaft C on the opposite side of the vertical axis of the mill from the vane, thus allowing the wheel to receive the full force of the wind in a direct manner.

In other mills the wheel-shaft is placed at one side of the vertical axis, to acquire a side pressure and a governing principle. I use this side position to overcome this side pressure, and to more perfectly balance the mill on the tower, and not as a governing device, as my mill would work and be governed as well as other mills if the wheel-shaft were directly over the center of the vertical axis.

In mills designed for pumping, the power is transmitted from the wheel to the pitman

S by a lever, T. This lever T is attached at one end to the pitman S, and pivoted to the turn-table H at a point equidistant from the center of the wheel-shaft C and the center of the vertical axis of the mill. This lever T is constructed with a slot, which is made twice as long as the crank U on the end of the wheel-shaft C, and in which works an anti-friction roller, placed on the crank-pin. On the side of the slot farthest from the crank U is formed a flange, for the purpose of retaining the anti-friction roller in its proper place.

The end of the lever T farthest from the pitman S is supplied with an adjustable weight, V. The object of this weight V is to act as a counterpoise to the plunging-rod of the pump, thereby leaving only the weight of water to be raised by the power of the mill.

Other windmills have been constructed with a lever connecting the crank of the wheel-shaft to the pitman; but none have been provided with an anti-friction roller on the crank-pin, nor has the lever been constructed with a flanged slot, nor with any adjustable weight, or in any manner designed for a counterpoise.

The object of constructing the lever T so as to have a movable weight, V, is to more readily adjust it to the weight of the pump-rod used.

Almost all kinds of windmills are supplied with some kind of a device for bringing the mill under the control of an operator while on the ground. This device usually consists of a hollow pitman, through which a chain or rod connected with the governor of the mill works, or of a hollow swivel, through which the pitman works, and to which the chain or rod is attached. In all these devices the object is to prevent the chain from twisting around the pitman as the mill shifts with the wind.

In all devices heretofore used for this purpose the chain in the hollow pitman or the hollow swivel remain at rest while the mill is working, and, consequently, is on a constant wear, caused by the friction at each stroke of the pitman.

In my invention it will be seen that the chain W at one end is connected to the weight-bar O of the governor, passing up and over a pulley, X, attached to the upper end of a bar, Y, hinged at its lower end to the vane-shaft G, thence over a pulley, Z, attached to the upper end of the pitman S, and down the center of the vertical axis of the mill.

The lower end of the pitman S is cranked and enlarged, so as to serve as a swivel in connection with the plunging-rod of the pump.

Through the center, endwise of this cranked or enlarged end of the pitman S, a small hole is drilled, through which passes a small rod, A′, connected to the chain W. This rod A′ continues on down to the ground, and by pulling down on this rod A′ the governor of the mill is worked, and the speed of the mill regulated.

To keep the mill at rest, the lower end of the rod A′ must be attached to a pin or cleat on the plunging-rod.

By the arrangement of the pulley Z on the upper end of the pitman S, it will be seen that the chain W and rod A′ travel with the pitman S, and entirely avoid the wear and friction inevitable in other mills.

The object of attaching the pulley X on the upper end of an arm, Y, that has its lower end hinged to the vane-shaft G, and for connecting this pulley X and arm Y by a rod, B′, to the pulley Z on the upper end of the pitman S, is to prevent the tightening or slackening of the chain as the pitman S is carried up and down at each revolution of the wheel.

The wooden rod C′, connecting the pitman S with the pump-rod, is grooved on one side either the full length or for three or four feet down from the end connected with the pitman.

The small rod A′, by which the mill-governor is controlled, is confined in this groove by staples or cleats at short intervals along the wooden rod.

The bed-plate D′ is firmly fastened to the top of the tower E′, and has a flat rim or surface on top, upon which the turn-table H may rest, or the turn-table H may be mounted on travelers or anti-friction balls, placed between the turn-table and bed-plate, as may be desired.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is—

1. The turn-table provided with one arm for supporting the bearings of the wheel-shaft, and another for supporting rigidly the shaft itself, the arms being at right angles to each other, and at one side of the vertical center, as and for the purpose described.

2. A windmill with its vane-shaft G rigidly attached to its turn-table H, and at right angles to the wheel-shaft C, and in front of and parallel with the face of the wheel B, substantially as herein shown and described.

3. The combination of sections J L, constituting the vane, and connected with each other and the weight-bar O by rods K N Q, and projecting arms M R, substantially as described, and for the purpose set forth.

4. The arrangement of the pulley X on the upper end of the bar Y, hinged to the vane-shaft G, and connected by the rod B′ to the pulley Z, attached to the upper end of the pitman S, and the chain W, and rod A′, traveling with the pitman S, substantially as described, working in the manner and for the purpose named.

5. The combination, with a solid pitman, having pulley on one end, and connected at the other with swiveled pump-rod, of the

chain, passing along its side, and connected with a small rod passing through the perforated swiveled end of pitman, causing the chain, rod, and pitman to travel together, and thus avoid friction, as set forth.

6. The combination of the pitman, counterpoise weight, crank-pin, having anti-friction roller, and slotted lever or walking-beam, the latter pivoted to the turn-table, and having flange to keep the roller in place, as specified.

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Witnesses:
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