No. 723,988. PATENTED MAR. 31, 1903.

# O. S. CHURCH.

## WINDMILL.

APPLICATION FILED JUNE 13, 1902.

NO MODEL.

Fig. IV

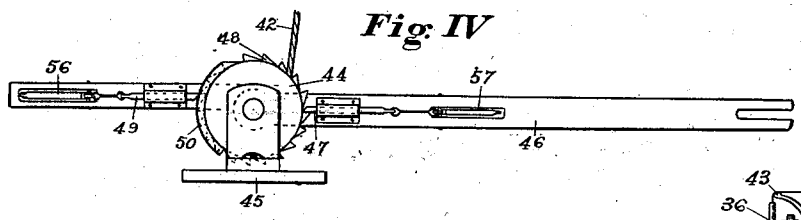



Fig. I




Fig. V

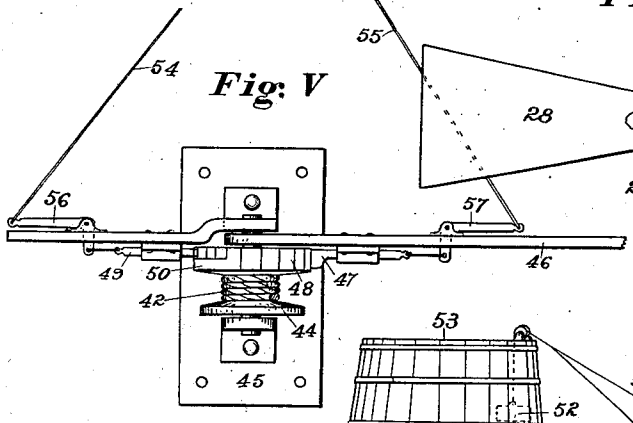






Fig. II

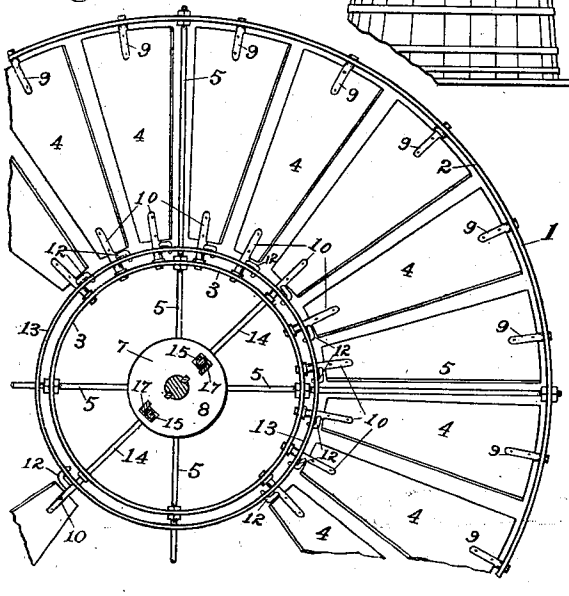
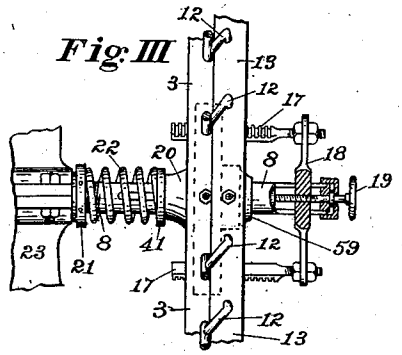



Fig. III




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# UNITED STATES PATENT OFFICE.

OBADIAH S. CHURCH, OF SAN FRANCISCO, CALIFORNIA.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 723,988, dated March 31, 1903.

Application filed June 13, 1902. Serial No. 111,529. (No model.)

*To all whom it may concern:*

Be it known that I, OBADIAH S. CHURCH, a citizen of the United States, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Windmills; and I 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.

My invention relates to windmills for motive power and to certain useful improvements therein.

My improvements consist in a motor-wheel arranged to slide on the shaft on which it is supported, such movement by means of proper devices turning the vanes of the wheel more or less oblique to the wind, so as to produce a constant or some predetermined amount of power irrespective of the force of the wind and as the requirements of the work to be done; also consists in stop mechanism, operated by a float in the supply-tank, to turn the vanes out of the wind when the tank is full.

The objects of my invention are to secure by automatic means safety to the wind-wheel in storms, also to regulate its work to the duty required.

Referring to the drawings herewith and forming a part of this specification, Figure I is a side elevation of a windmill constructed with my improvements and adapted for pumping water. Fig. II is a partial front view of the wheel. Fig. III is an enlarged broken view of the inner or first ring of the wind-wheel and the supporting-shaft. Fig. IV is an enlarged side view of the mechanism for moving the wind-wheel on its shaft. Fig. V is a plan view of Fig. IV.

The wind-wheel 1 is composed of an outer ring 2 and an inner ring 3, between which are held a series of pivoted vanes 4, the inner ring 3 being connected by the spokes 5 to a central nave 7, that slides on the shaft 8 and is held from turning thereon by keys, as shown in Fig. II.

The vanes 4 are held at their ends by the pivots 9 and 10, the latter being provided with short cranks 12, that serve to turn the vanes. These cranks 12 at their outer ends pass through a movable ring 13, held by the spokes 16, that are attached to a loose collar 59 on the shaft 8, as shown in Fig. I. This ring 13 when turned either way moves all the pivots 10 uniformly and the vanes 4 accordingly, setting the latter more or less oblique to the wind or parallel to its course to stop the wheel.

The ring 13 is moved by means of two rods or shafts 14, that are extensions of two of the vane-pivots 10, as seen in Fig. II, provided with tooth-pinions 15, engaged by the fixed racks 17, so that longitudinal movement of the wheel turns the ring 13 and sets the vanes 4, as before explained.

The racks 17 are attached to a cross-bar 18, that passes through or is attached to the shaft 8, and may be adjusted outward or inward by means of the screw and hand-wheel 19, so the obliquity of the vanes 4 can be set to a normal position for working or for wind of an average force.

The disk 7, its nave 20, and the wind-wheel 1, supported thereby, slide on the shaft 8 and are opposed by a spring 22, so that in case of an overpressure of wind on the front of the wheel 1 it slides back on the shaft 8, the racks 17 turning the pinions 15 and setting the vanes 4 at a more acute angle to the wind, so the turning strain or power of the wheel is automatically adjusted by and in proportion to the force of the wind. When the force of the wind diminishes, the spring 22 presses the wheel outward accordingly, the vanes 4 being at the same time turned to the required angle by the devices that have just been described.

As the force required to move the wheel back and compress the spring 22 will vary with the work or resistance applied to the shaft 8, I provide an adjustable collar 21, that can be set out to compress the spring 22 and adapt its force to the resistance or work to be performed. This collar is movable longitudinally on the shaft 8 and is adjustably held in position by set-screws bearing on the shaft, two of which appear in the enlarged view Fig. III.

To permit the wheel 1 to face the wind from various points, the shaft 8 is supported in a frame 23, attached to a revoluble plate 24, resting on a ball-bearing 25 and held thereon by three or more roller-guides 26, that revolve loosely on the studs 27, as shown in Fig. I.

A vane 28 is provided to turn the plate 24 in the usual manner.

The main plate 29 is bolted to a frame 30 or any suitable structure to support the parts at an elevation. To employ the power of the wheel, any kind of suitable gearing connects to the shaft 8, and as such wind-wheels are commonly applied to pumping water I show that construction in the present drawings by means of a tooth-pinion 31 on the end of the shaft 8, that gears into a crank-wheel 32, mounted on a superposed frame or support 33, as shown in Fig. I.

A link 34 connects the wheel 32 to a sleeve on the reciprocating pump-rod 35, that has a hollow cylindrical extension 36 at the top passing through a bearing 37 on the bracket 38, so the operating parts can revolve around the pump-rod 35 without turning the same.

In the case of pumping water I provide a means of stopping the machinery when a sufficient supply of water has been raised, operating as follows: A lever 39 is attached to the frame 23 and provided with pins or rollers at 40, that bear behind the collar 41 on the nave 20 of the disk 7. This lever 39 is preferably made forked or with an inclosed eye around the nave 20, with pins 40 at each side. I do not confine myself to a particular construction of these parts. To the top of the lever 39 is attached a cord 42, that passes over a pulley 43 and down through the hollow extension 36 and top of the pump-rod 35 to the bottom of the plate 29 and from there is wound on a spool 44. (Shown enlarged in Figs. IV and V.) This spool 44 is supported on a frame 45 and is turned by a ratchet-lever 46, connected to the pump-rod 35. This lever 46 is provided with a spring-pawl 47, that when the lever 46 is moved upward and downward by the pump-rod 35 engages the teeth 48 on the end of the spool 44, thus slowly winding the cord 42, moving inward the lever 39, drawing the wheel 1 inward on the shaft 8, and by the mechanism before explained setting the vanes 4 in a position to stop the wheel. A detent-pawl 49 is provided to prevent the spool 44 from turning backward while being wound, and to prevent overwinding I provide a blank space or guard 50 on the flange of the spool 44, that stops the action of the pawl 47 when the winding of the cord 42 has progressed far enough to stop the wheel 1. The teeth 48, however, extend all the way around at one side of the flange of the spool 44, as shown at 51 in Fig. V, so the detent 49 will continue engaged at all points. The blank space 50 is required, because the wheel 1 when drawn back and the vanes 4 turned with their edge to wind will continue for some time to revolve, and the gearing would be overstrained or broken if the spool 44 continued to be wound after the wheel 1 was drawn back into its inert position.

To disengage the pawls 47 and 49, I provide a float 52 in the tank 53, connected by cords 54 and 55 to the bell-crank levers 56 and 57, that when the float 52 sinks withdraw the pawls 47 and 49 and permit the cord 42 to unwind from the spool 44 and by releasing the lever 39 sets the wheel 1 in motion.

Having thus explained the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a windmill, a main wheel consisting of two concentric rings with a series of wind-vanes radially pivoted between them, said wheel being longitudinally movable on its supporting-shaft, a spring opposing the backward movement of said wheel under pressure, means to turn all the vanes on their pivots as the wheel recedes, and a hand-wheel and screw, with intermediate adjusting means between said screw and the pivots of said vanes, whereby the latter are simultaneously set at any required angle to the wind, substantially as specified.

2. In a windmill, a main wheel longitudinally movable on its supporting-shaft, pivoted vanes in said wheel, means to rotate one of said vanes as the wheel recedes, crank-levers on all the pivots of said vanes, and an independent ring to which the outer ends of all of said levers are pivoted, whereby the movement of one of said pivots turns all the vanes simultaneously and uniformly, substantially as specified.

3. In a windmill, a main wheel longitudinally movable on its supporting-shaft, pivoted vanes therein, connecting means between all of said vanes whereby they turn simultaneously and uniformly when one is turned, pinions on one or more of the vane-shafts, and fixed racks engaging said pinions, whereby when the wheel recedes under wind-pressure said vanes are turned simultaneously and uniformly, substantially as specified.

4. In a windmill, a wheel provided with a series of pivoted vanes connected by an annular band or ring 13 to turn the vanes uniformly on their pivotal supports, the wheel mounted longitudinally movable on its supporting-shaft, and the vane-pivots connected by tooth-pinions to a rack fixed to this shaft, whereby the vanes are turned by longitudinal movement of the wheel on its supporting-shaft, substantially as specified.

5. In a windmill a main wheel longitudinally movable on its supporting-shaft, a series of pivoted vanes in the wheel connected by a ring or band 13, and the cranked shafts 14 provided with toothed pinions and racks to turn these latter as the main wheel is moved backward or forward on its supporting-shaft, substantially as specified.

6. In a windmill, a main wheel longitudinally movable on its supporting-shaft, pivoted vanes therein, a resilient agency opposing the backward movement of said wheel, pinions on one or more of the vane-shafts, fixed racks engaging said pinions, crank-levers on all the vane-shafts with connecting means whereby when the wheel recedes under wind-pressure all the vanes are turned simultane-

ously and uniformly, substantially as specified.

7. In a windmill, a main wheel longitudinally movable on its supporting-shaft, pivoted vanes in said wheel, an adjustable cross-bar attached to the supporting-shaft, racks carried by said cross-bar and pinions on the vane-pivots in coöperation, crank-levers on all the vane-pivots, and a ring connecting the outer ends of all said crank-levers, whereby they are constrained to move in unison, substantially as specified.

8. In a windmill, a main wheel, longitudinally movable on its supporting-shaft, pivoted vanes in said wheel, supported between two concentric rings, crank-levers on all the vane-pivots, a ring connecting the outer ends of said levers, pinions on some of the vane-pivots, racks engaging with said pinions whereby the vanes are angularly adjusted, and means for setting said racks in the required position, substantially as specified.

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

OBADIAH S. CHURCH.

Witnesses:
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