No. 648,968. Patented May 8, 1900.

# C. R. LOBDELL.

## WINDMILL.

(Application filed Jan. 13, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

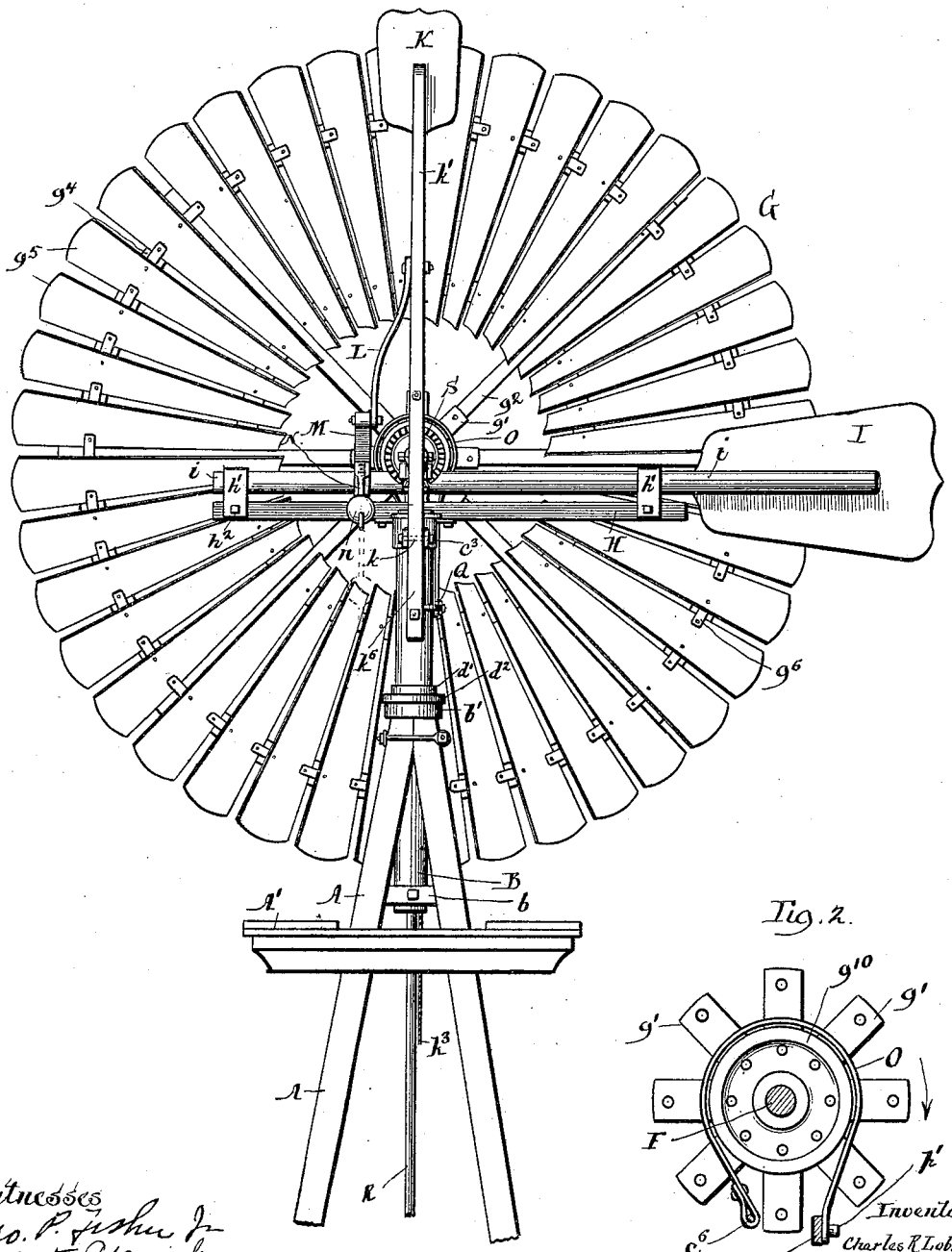


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Fig. 2.




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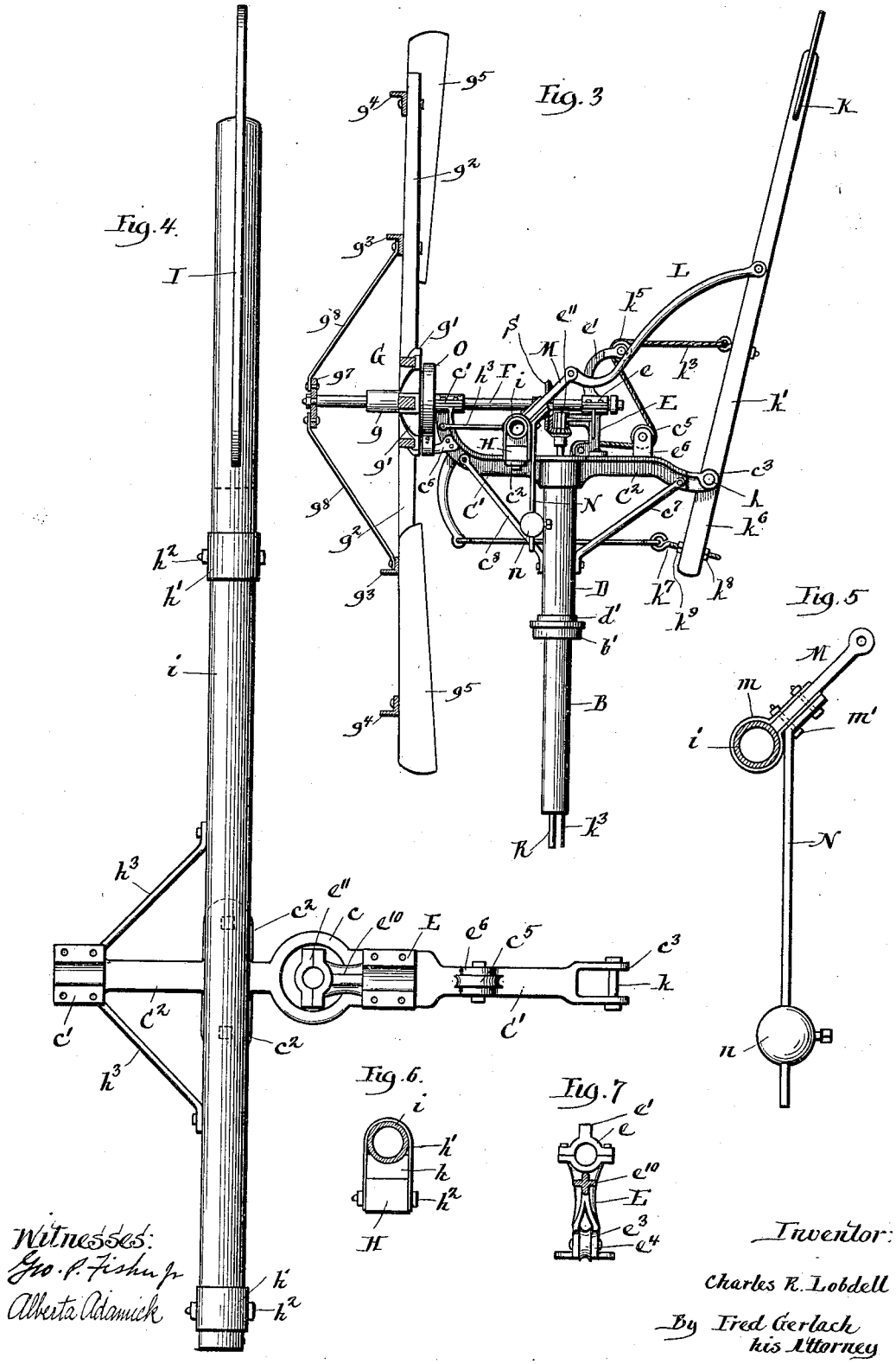
3 Sheets—Sheet 2.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 8.

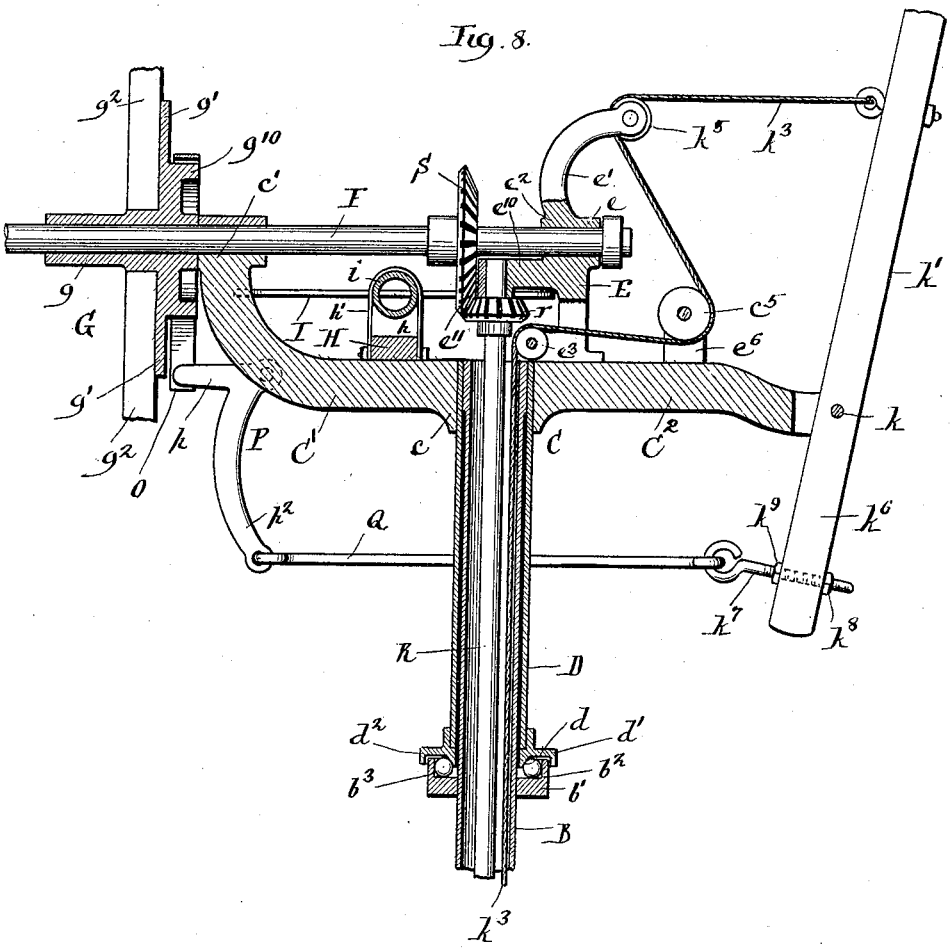



Fig. 9.

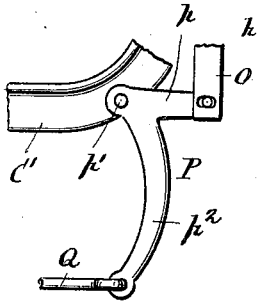
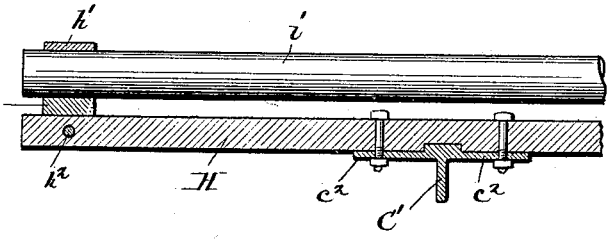



Fig. 10.

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# UNITED STATES PATENT OFFICE.

CHARLES R. LOBDELL, OF WAUKEGAN, ILLINOIS.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 648,968, dated May 8, 1900.

Application filed January 13, 1899. Serial No. 702,022. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES R. LOBDELL, a citizen of the United States, residing at Waukegan, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Windmills, of which the following is a full, clear, and exact description.

The invention relates to that class of windmills in which the drive-wheel is mounted on a revolving frame or turn-table shiftable to a plane parallel and transverse to the wind by suitable controlling-vanes.

One object of the invention is to provide an improved construction which is simple and in which the angularity of the wheel with respect to the wind is regulated by vanes which respond sensitively to the varying velocity of the wind, and a further object is to provide a brake mechanism for the wheel which is operated and controlled by the vane.

The invention consists in the novel features of construction hereinafter described, illustrated in the accompanying drawings, and more particularly defined by claims at the conclusion hereof.

In the drawings, Figure 1 is a view in side elevation of the upper part of a tower with a windmill embodying the preferred form of the invention. Fig. 2 is a detail view of the wheel hub and brake. Fig. 3 is a view in end elevation, the wheel being shown in section. Fig. 4 is an enlarged plan of the shifter-vane, its shaft, and the bracket wherein the wheel and controlling mechanism are mounted. Fig. 5 is a detail side view of the vane-shaft, the arm whereby it is shifted, and the counterweight for the vanes. Fig. 6 is a detail end view of vane-shaft and one of its bearings. Fig. 7 is a detail side view of the bearing in which the inner end of the wheel-shaft is mounted. Fig. 8 is a sectional view, upon an enlarged scale, through the tubular standard and supporting-bracket. Fig. 9 is a detail view of the bell-crank lever for shifting the brake-band. Fig. 10 is a sectional view through the cross-bar whereon the vane-shaft is mounted.

A denotes the upper portion of a tower of usual construction, and A′ a platform sustained thereby.

B is a tubular standard or center post secured in tower A by bars $b$ and is provided with a collar $b'$, secured thereto and arranged to rest upon the posts of tower A. Collar $b'$ is formed with an annular groove $b^2$, designed to retain a series of rollers or balls $b^3$. A revoluble supporting-frame C has secured thereto a sleeve D, which surrounds center post B and is provided at its lower end with a bearing cone or collar D, having an inclined edge $d$, which rests upon the balls $b^3$ in collar $b'$ of the center post. Adjacent the edge $d$ sleeve D is provided with a collar $d'$, having a depending flange $d^2$ to prevent the entry of dust to the bearing-balls. Supporting-frame C comprises a central portion or hub $c$, in which the sleeve D is secured, an arm C′, extended laterally to form a journal $c'$ for the drive-wheel shaft, and an oppositely-extended arm $C^2$ for supporting an auxiliary vane. A journal-bracket E is secured upon arm $C^2$ of the revoluble supporting-frame C. Rods $c^7$ and $c^8$ may be used to further secure sleeve D and arms C′ and $C^2$ of the frame together. In journal $c'$ on arm C′ and journal-bracket E is mounted a shaft F, to the outer end of which a drive-wheel G is secured. The drive-wheel G comprises a hub $g$, having radial lugs $g'$, in which a series of spokes $g^2$ are secured. Annular bands $g^3$ and $g^4$ of angle-iron are secured to spokes $g^2$, and these bands serve to sustain a series of sails $g^5$, which are secured thereto by metal straps $g^6$. A disk $g^7$, secured to the outer terminal of wheel-shaft F, and braces $g^8$, secured to said disk and band $g^3$, rigidify the wheel against axial strains.

Arm C′ of the supporting-frame is provided with lugs $c^2$, upon which is bolted a bolster or cross-bar H, preferably of wood, which serves to sustain a rocking shifter-vane I. Upon cross-bar H are secured bearing-blocks $h$, having curved seats in which is mounted a shaft $i$, whereto the shifter-vane I is secured. Straps $h'$ are extended over shaft $i$ and secured by bolts $h^2$ to cross-bar H and serve to retain the shaft within the curved seats of bearing-blocks $h$. Shaft $i$ is preferably formed of a tube-section slitted centrally at its projecting end to receive vane I, which projects beyond the sails of the drive-wheel. Vane I may be tilted about its shaft to assume a vertical position to cause the drive-wheel to assume a position with its end toward the wind, or the vane I may be shift-

ed to a horizontal position to cause the drive-wheel to assume a position with its face toward the wind. At intermediate positions the shifter-vane causes the drive-wheel to assume a corresponding intermediate position.

The end of arm $C^2$ of the supporting-frame is bifurcated, as at $c^8$, to receive a pivot-bolt $k$ of a vibratory arm $k'$, to which an auxiliary vane K is secured. Arm $k'$ is extended upwardly from its pivot and has secured thereto the auxiliary vane K at its upper end and is arranged with its face approximately parallel with the face of the drive-wheel. Near its mid-length vane-arm $k'$ has pivoted thereto a pitman L, the other end of which is pivotally connected with a crank-arm M, secured to the shaft $i$ of the shifter-vane. Crank-arm M is preferably secured to shaft by a strap $m$, which passes around shaft $i$ and is clamped thereto by bolts $m'$ passing through the strap and crank-arm. Bolts $m'$ also pass through and secure a weight-arm N, having a counterweight $n$ adjustably secured thereto. Auxiliary vane K serves to control and shift the shifter-vane I. Counterweight $n$ serves to hold the auxiliary vane normally in position to retain the shifter-vane in position to cause the drive-wheel to assume a position toward the wind. A cable $k^3$, secured to vane-arm $k'$ at $K^4$, permits the auxiliary vane to be manually shifted. Cable $k^3$ extends over a sheave $k^5$, mounted in an arm $e'$, projected from the cap $e^2$ of bearing $e$ in bracket E, thence around a sheave $c^5$, mounted in lugs $e^6$ on arm $C^2$ of the supporting-frame, and thence over a sheave $e^3$, mounted in lugs $e^4$ of the journal-bracket E, and through center post B to the base of the tower.

Vane-arm $k'$ is projected below its pivot, as at $k^6$, and has an eyebolt $k^7$ adjustably secured therein, as by nuts $k^8$ and $k^9$. The drive-wheel is provided with a brake-wheel $g^{10}$, preferably formed integral with hub $g$. A brake-band O has one of its terminals secured to an arm $c^6$, which projects from arm C′ of the supporting-frame and is rigidly secured thereto. The other terminal of band O is secured to the short arm $p$ of a bell-crank lever P, which is pivotally secured to arm C′ of the supporting-frame by a bolt $p'$. A rod Q connects eyebolt $k^7$ and long arm $p^2$ of the bell-crank lever P.

Journal-bracket E is formed with a horizontal arm $e^{10}$, which is provided with a journal-bearing $e^{11}$, wherein is mounted the upper end of a vertical shaft R, which passes through the center post and serves to transmit power to the lower portion of the tower, as well understood in the art. A beveled gear-wheel S, secured to shaft F of the drive-wheel, engages a beveled gear-wheel $r$ on vertical shaft R and imparts revolution to the vertical shaft when the wheel is driven. In operation when the velocity of the wind increases the pressure against the auxiliary vane K causes the auxiliary vane to overcome the counterweight $n$ and by pitman L shifts the crank-arm M, which rocks the shaft $i$, and thus effects a corresponding shift of the shifter-vane I, which in turn causes the drive-wheel to assume a position oblique to the wind. Thus it will be seen that the drive-wheel responds sensitively to the varying pressure on the auxiliary vane. If the velocity of the wind becomes too high, the auxiliary vane receiving a corresponding pressure shifts by pitman L, crank-arm M, and shaft $i$ the shifter-vane I to its vertical position, when the drive-wheel will swing to a position parallel to the wind and the vane-arm $k'$ simultaneously, by eyebolt $k^7$, connecting-rod Q, and bell-crank lever P, draws the band O against brake-wheel $g^{10}$ of the drive-wheel hub $g$ and stops the further revolution of the drive-wheel. When the auxiliary vane is manually shifted by cable or wire $k^3$ to swing the drive-wheel out of action, the brake-band O is drawn against the brake-wheel. Thus it will be seen that whenever the windmill is out of action the brake will be "set" and prevent the revolution of the drive-wheel. When the velocity of wind decreases, the counterweight $n$ on arm N causes the vane-shaft $i$, shifter-vane I, and auxiliary vane K to return to normal position with the drive-wheel transverse to the wind. It will be observed that the weight-arm N is vertical when the auxiliary vane is in normal position. Such arrangement is advantageous because the force is differentially applied to vary correspondingly with the pressure against the auxiliary vane by the wind, so that when the mill is driven by a light wind the weight is applied to offer little resistance to the auxiliary vane, and thus permits the vane to respond sensitively to the varying velocity of even light winds.

It will be seen by reference to Fig. 2 that the drive-wheel revolves in the direction of the arrow and that the brake-band is arranged to be drawn from the fixed arm $c^6$ by the brake-wheel, thus causing the band when brought in contact with the brake-wheel to be drawn tightly against the brake-wheel. Eyebolt $k^7$ in the lower end of the vane-arm, by adjustment of nuts $k^8$ and $k^9$, may be set to operate the brake at the proper moment. Such adjustment permits the brake mechanism to be operated by the vane at such velocity of the wind as may be regarded as the maximum.

It will be understood that the working angle of the controlling-vane K and its arm $k'$ may be varied by the adjustment of crank-arm M upon shaft $i$ of the shifter-vane I. Thus, for example, if it is desired to have the controlling-vane K work more nearly in a vertical plane than that shown in Fig. 3 of the drawings it may be shifted accordingly by loosening or withdrawing bolts $m'$ of the crank-arm, which will cause the strip $m$ to loosen its hold around shaft $i$, and thus permit crank-arm $m$ to be adjusted on the vane-shaft $i$. It will also be observed that when

such adjustment has been effected the brake mechanism may be caused to operate the brake at the proper moment by a shift of nuts $k^8$ and $k^9$ along eyebolt $k^7$.

Manifestly the details of construction may be varied by the skilled mechanic without departing from the spirit of the invention.

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

1. In a windmill the combination with a revoluble supporting-frame, a shaft and wheel mounted thereon, of a rocking shifter-vane and shaft $i$ for said vane, a cross-bar secured to lugs projecting from said supporting-frame, bearing-blocks on said cross-bar in which said shaft $i$ is mounted, a crank-arm adjustably secured to said vane-shaft, a vane-arm $k'$ pivotally mounted in the bifurcated end of an arm $C^2$ of the supporting-frame and a pitman connecting said vane-arm and said crank-arm.

2. In a windmill the combination with a revoluble supporting-frame comprising laterally-projecting arms C′ and $C^2$, a vertical sleeve D secured thereto and having a collar $d'$ at its lower end, a center post B within said sleeve, a collar $b'$, rollers or balls $b^3$, a shaft and wheel mounted on said supporting-frame, a rocking shifter-vane, a shaft $i$ for said vane, a cross-bar secured to lugs projecting from said supporting-frame, bearing-blocks on said cross-bar in which said shaft $i$ is mounted, a crank-arm adjustably secured to said vane-shaft, a vane-arm $k'$ pivotally mounted in the bifurcated end of an arm $C^2$ of the supporting-frame and a pitman connecting said vane-arm and said crank-arm.

3. In a windmill the combination with a revoluble supporting-frame having laterally-projecting arms C′ and $C^2$ and a shaft and wheel mounted thereon, of a shifter-vane I, a shaft $i$, bearing-blocks on said shaft $i$ mounted upon a cross-bar secured to lugs projecting from the supporting-frame, of a vane-arm $k'$ pivotally mounted in the bifurcated end of arm $C^2$, a vane K secured to said arm at its upper end, a crank-arm $m$ secured to shaft $i$, a pitman connecting said vane-arm and said crank-arm, said vane-arm K′ being extended below its pivot, a brake mechanism for said wheel, comprising a band and bell-crank lever pivoted to said supporting-frame and having a short arm for operating said band and having its other arm connected to the lower end of said vane-arm by a rod Q.

4. In a windmill the combination with a revoluble supporting-frame having laterally-projecting arms C′ and $C^2$ and a shaft and wheel mounted thereon, of a shifter-vane I, a shaft $i$, bearing-blocks on said shaft $i$ mounted upon a cross-bar secured to lugs projecting from the supporting-frame, of a vane-arm $k'$ pivotally mounted in the bifurcated end of arm $C^2$, a vane K secured to said arm at its upper end, a crank-arm $m$ secured to shaft $i$, a pitman connecting said vane-arm and said crank-arm, said vane-arm K′ being extended below its pivot, a brake mechanism for said wheel, comprising a band and bell-crank lever pivoted to said supporting-frame and having a short arm for operating said band said vane-arm being provided with an eyebolt $k^7$ adjustably held therein by nuts and a rod Q connecting said eyebolt with said bell-crank lever.

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