

No. 772,786.

PATENTED OCT. 18, 1904.

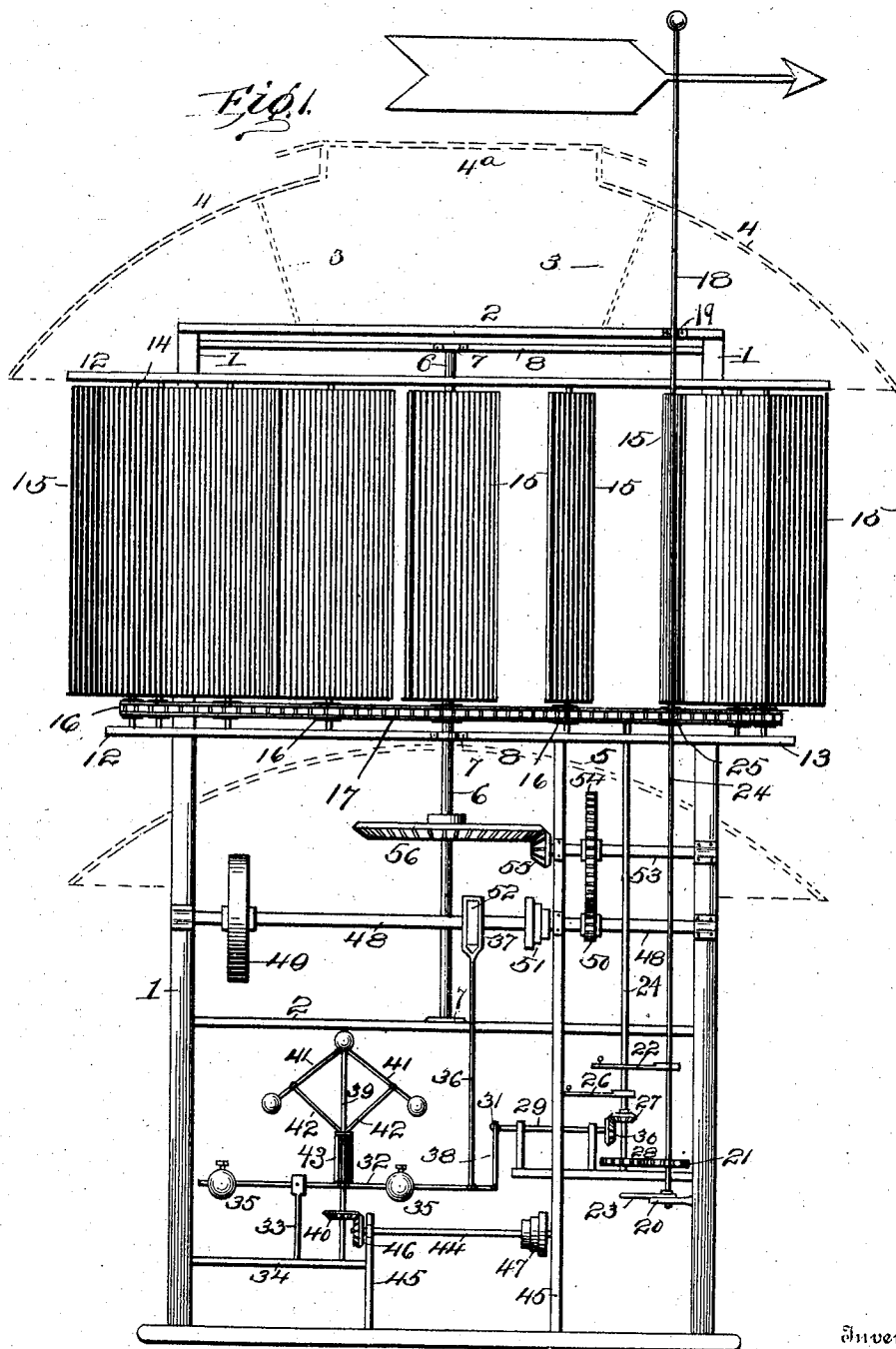
W. P. CLIFFORD.

WINDMILL.

APPLICATION FILED MAY 17, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Inventor

William P. Clifford

Obed Billman

His Attorney

Witnesses

J. H. Fowler Jr.
W. W. Gerhart.

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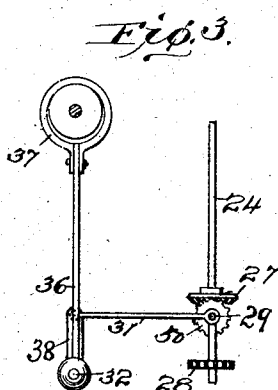
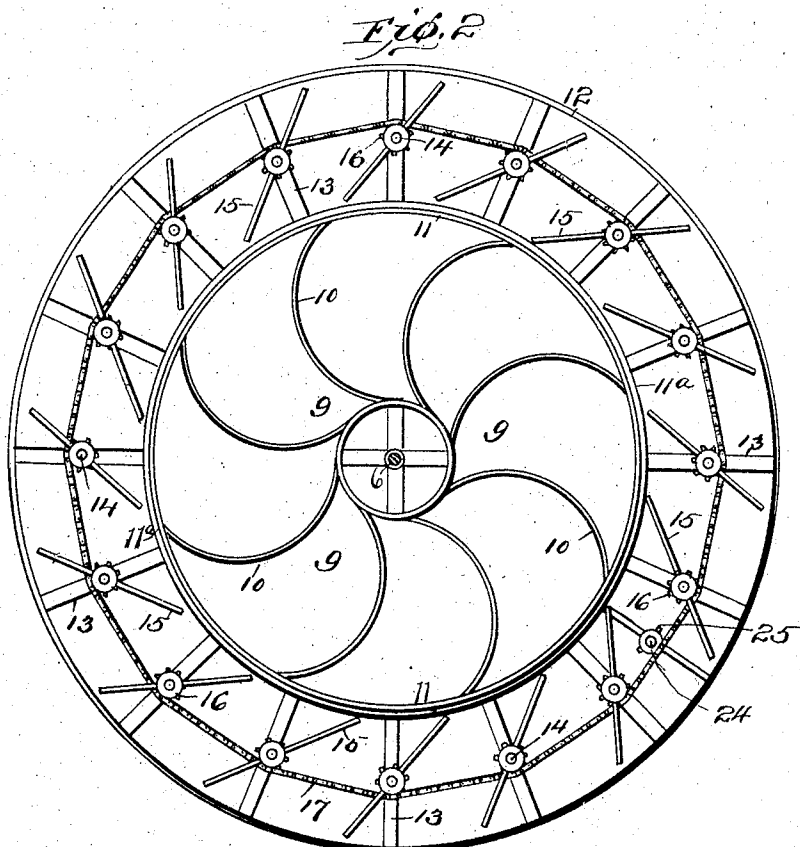
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By

Obed B. Billman

His Attorney

UNITED STATES PATENT OFFICE.

WILLIAM P. CLIFFORD, OF ICONIUM, IOWA, ASSIGNOR OF ONE-HALF TO
JOHN C. COOK, OF RUSSELL, IOWA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 772,786, dated October 18, 1904.

Application filed May 17, 1904. Serial No. 208,376. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. CLIFFORD, a citizen of the United States, residing at Iconium, in the county of Appanoose and State of Iowa, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

My invention relates to improvements in windmills, and particularly to that class of windmills having "horizontally - disposed wind-wheels;" and the paramount object of this invention is to produce a generally improved windmill which will be better suited to its intended purposes than any other invention of this class with which I am acquainted.

An object of the invention is to provide simple, inexpensive, and efficient means for directing the wind to the wind-wheel in the most advantageous manner and for automatically controlling and regulating the admission of the wind when directed thereto.

With these ends in view the invention consists in the novel construction, arrangement, and combination of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

Referring now to the drawings forming a part of this specification, Figure 1 represents a side elevation of my improved windmill. Fig. 2 is a top plan view of the wind-wheel proper and the annularly-disposed wind-guides for directing the wind to the wind-wheel. Fig. 3 is a detail view of a portion of the mechanism for controlling and regulating the wind-guides.

Similar numerals of reference indicate like parts throughout all the figures of the drawings.

Upon reference to the drawings it will be seen that the framework of my improved windmill consists of a series of uprights or supporting-beams 1, suitably secured at their base ends and provided at their upper ends with cross-beams 2, to which there is secured, by means of supporting-arms 3, a convex roofing 4, having a central opening 4^a for the exit of air that has spent its force on the wind-wheel proper. A similarly-shaped roofing or shield 5 is similarly mounted and secured to

the uprights or supporting-beams 1 beneath the wind-wheel, to be hereinafter described, and over which the air passes from beneath the wind-wheel after having spent its force in imparting motion to said wind-wheel.

6 designates a vertical driving-shaft, mounted in suitable bearings 7, secured to cross-bars 8, secured to and interposed between the supporting-beams 1.

9 designates the wind-wheel proper, carried by and secured to said driving-shaft 6 in any suitable and convenient manner, consisting of a series of concave-faced wings or fans 10, secured at their inner ends to the hub of the wheel in any suitable and convenient manner and provided at their outer upper and lower corners with annular bands 11, by means of which the wings or fans 10 are held and supported in proper position and which serve to give stability to the wheel itself.

12 designates annular bands mounted at the top and bottom of the outer stationary portion of the windmill and connected to the inner bands 11^a thereof by means of a series of cross-bars 13, adapted to contain and support the upper and lower ends of a series of shafts 14, mounted in suitable bearings therein and carrying and supporting a series of annularly-disposed wind-guides 15, arranged near the periphery of the wind-wheel at suitable points and adapted to direct the wind to the wind-wheel and regulate and control the admission thereto or to entirely exclude the same if found necessary or desirable. On the lower ends of the shafts 14 there are mounted and secured in any suitable manner a series of sprocket-wheels 16, adapted to receive and be moved by an endless sprocket-chain 17, which entirely encircles the same and by means of which the wind-guides 15 are simultaneously set at any desired inclination to regulate the admission of wind to the wind-wheel 9.

18 designates a vane-bar mounted in suitable bearings 19 and 20, secured to the framework of the mill and carrying at its lower end a gear-wheel 21 and an operating-lever 22, which said gear-wheel 21 is adapted to mesh with and be thrown into and out of engagement with a second gear-wheel by means of a

lever 23, secured to a movable block in which the lower end of said vane-bar rests. 24 designates a second bar mounted in suitable bearings and provided at its upper portion with a sprocket-wheel 25, which takes into the sprocket-chain 17, and at its lower portion is provided with an operating-handle 26, a miter-gear 27, and a gear-wheel 28. By means of the operating-handle 26, attached to the bar 24, carrying at its upper end the sprocket-wheel 25, the same may be moved to the right or left, moving the sprocket-chain 17 and the series of shafts 14, carrying the wind-guides 15, whereby said wind-guides may be set at any desired inclination to regulate the admission of the wind to the wind-wheel proper. When said wind-guides 15 have been set at the inclination desired, the lower end of the vane-bar 18, carrying the gear-wheel 21, is moved, by means of the lever 23, so that the gear-wheel 21 will mesh with the gear-wheel 28, holding said wind-guides in proper position by means of their connection with the vane-bar 18, carrying the weather-vane.

29 designates a rock-shaft mounted in suitable bearings provided at one end with a miter-gear 30, meshing with said miter-gear 27, and at the other end with a crank-arm 31. (See Fig. 3.)

32 designates a horizontally-disposed bar or arm pivotally mounted on a supporting-standard 33, secured at its base to a supporting-beam 34.

35 designates adjustable balls or weights slidably mounted on said bar or arm 32, and 36 designates a vertical bar secured near one end of the bar 32, to the upper end of which there is adjustably secured a friction-band 37, passing around a pulley hereinafter described.

38 designates another bar pivotally secured at its ends to the end of the bar 32 and the end of the crank-arm 31.

39 designates a driving-shaft mounted in a vertical position in suitable bearings and carrying at its lower end a bevel-gear 40 and at its upper end pivotally-mounted governor-arms 41, supported and secured by means of the supporting-arms 42, secured to the movable sleeve or ferrule 43, slidably mounted on the driving-shaft 39 of the governor and secured at its lower end to the horizontally-disposed arm or bar 32.

44 designates a driving-shaft mounted in suitable bearings attached to supporting-beams 45 and provided at one end with a bevel-gear 46, meshing with the bevel-gear 40 of the governor-driving shaft 39 and at its lower end provided with a cone-pulley 47.

48 designates a driving-shaft mounted in suitable bearings provided at one end with a main driving-pulley 49 and at the other with a gear-wheel 50, a cone-pulley 51, and a friction-pulley 52.

53 designates a shaft mounted in suitable bearings immediately above shaft 48 and pro-

vided with a gear-wheel 54, meshing with gear-wheel 50 and provided at its end with a pinion 55, meshing with the large bevel gear-wheel 56, secured to the vertical driving-shaft 6 of the wind-wheel 9 hereinbefore described.

To set the windmill in operation, first ascertain the direction of the wind by means of the weather-vane, (which is out of gear when mill is not in operation,) then turn vane-bar 18 by means of operating-handle 22, so the vane is about one-third ($\frac{1}{3}$) past the center of the wind-blast, then open and set the wind-guides 15 by means of the operating-handle 26, and then move the gear-wheel 21 into mesh with the gear-wheel 28 by means of the lever 23, secured to a movable block in which the lower end of said vane-bar rests, then set belt on cone-pulleys to suit velocity of wind and speed desired, and, if necessary, move adjustable balls or weights 35 on bar or arm 32 and adjust tension of vertical bar 36 for the same purpose.

When the mill is not running, the vane is disconnected from the governor mechanism by throwing the gear-wheel 21 out of mesh with gear-wheel 28 by means of the handle 23. The action of the vane is an assistant to the governor mechanism in controlling the action of the mill for the following reasons, viz: First, it gives the direction of the prevailing wind, and, second, if wind is not blowing very strong the vane is turned before connecting with governor mechanism one-fourth or one-third or more (as found best) at right angles to the center of the wind-blast, thereby assisting the governor mechanism in opening the guides to let on a larger volume of wind. If the wind is too strong, the vane is turned the other way to assist in diminishing the volume of wind admitted to the wind-wheel. It will thus be seen that the action of the vane will tend to give steady motion to the windmill.

From the foregoing description, taken in connection with the accompanying drawings, the operation and advantages of my invention will be readily understood.

When the wind is entering too forcibly and driving the wheel at a greater rate of speed than necessary, the governor mechanism will raise and carry the wind-guides 15 into the path of the wind and in front of the wings of fans 10 of the wind-wheel 9 and check the speed of the same, and vice versa.

It is evident from the foregoing description, taken in connection with the drawings, that I provide a windmill or motor which can be easily thrown into or out of operation, which will utilize all the force possible from the wind, which will be automatically regulated to insure a smooth and steady running of the windmill and machinery operated thereby, and which is simple, durable, and thoroughly efficient and practical.

Having thus described my invention, with-

out having attempted to set forth all the forms in which it may be made or all the modes of its use, I declare that what I claim, and desire to secure by Letters Patent, is—

5 1. A windmill, consisting of a suitable framework, a vertical driving-shaft mounted in said framework, a horizontally-disposed wind-wheel mounted on said driving-shaft and consisting of a series of concave-faced wings
10 or fans, annular bands secured to the outer ends of said wings or fans, inner and outer annular bands mounted near the periphery of said wind-wheel, a series of cross-bars interposed between said inner and outer annular
15 bands, a series of annularly-disposed wind-guides suitably mounted in said series of cross-bars, and means for regulating and operating said wind-guides.

2. In a windmill, the combination with a
20 vertical driving-shaft mounted on a suitable framework, a horizontally-disposed wind-wheel, provided with a series of concave-faced wings or fans, mounted on said vertical driving-shaft, and annular bands secured to the
25 outer ends of said wings or fans; of inner and outer annular bands mounted near the periphery of said wind-wheel, a series of cross-bars interposed between said inner and outer annular bands, a series of annularly-disposed
30 wind-guides suitably mounted in said cross-bars, and means for regulating and operating said wind-guides.

3. In a windmill, the combination with a horizontally-disposed wind-wheel, and a series

of annularly-disposed wind-guides suitably 35 mounted near the periphery of said wind-wheel; of means for opening and closing said wind-guides, and a weather-vane suitably mounted and provided with means whereby
40 the same may be thrown into and out of engagement with said means for opening and closing said wind-guides.

4. A windmill, consisting of a suitable framework, a vertical driving-shaft mounted in said framework, a horizontally-disposed 45 wind-wheel mounted on said driving-shaft, a series of wind-guides pivotally arranged near the periphery of said wind-wheel, means for opening and closing said wind-guides, a weather-vane suitably attached to said frame-
50 work, and means whereby the same may be thrown into and out of engagement with said means for opening and closing said wind-guides.

5. In a windmill, the combination with the 55 wind-guides, and mechanism for regulating said wind-guides; of a weather-vane suitably mounted, and means for throwing said weather-vane into and out of engagement with
60 said mechanism for regulating said wind-guides.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLIAM P. CLIFFORD.

Witnesses:

H. A. LEMASTER,
E. E. BREESE.