(No Model.)

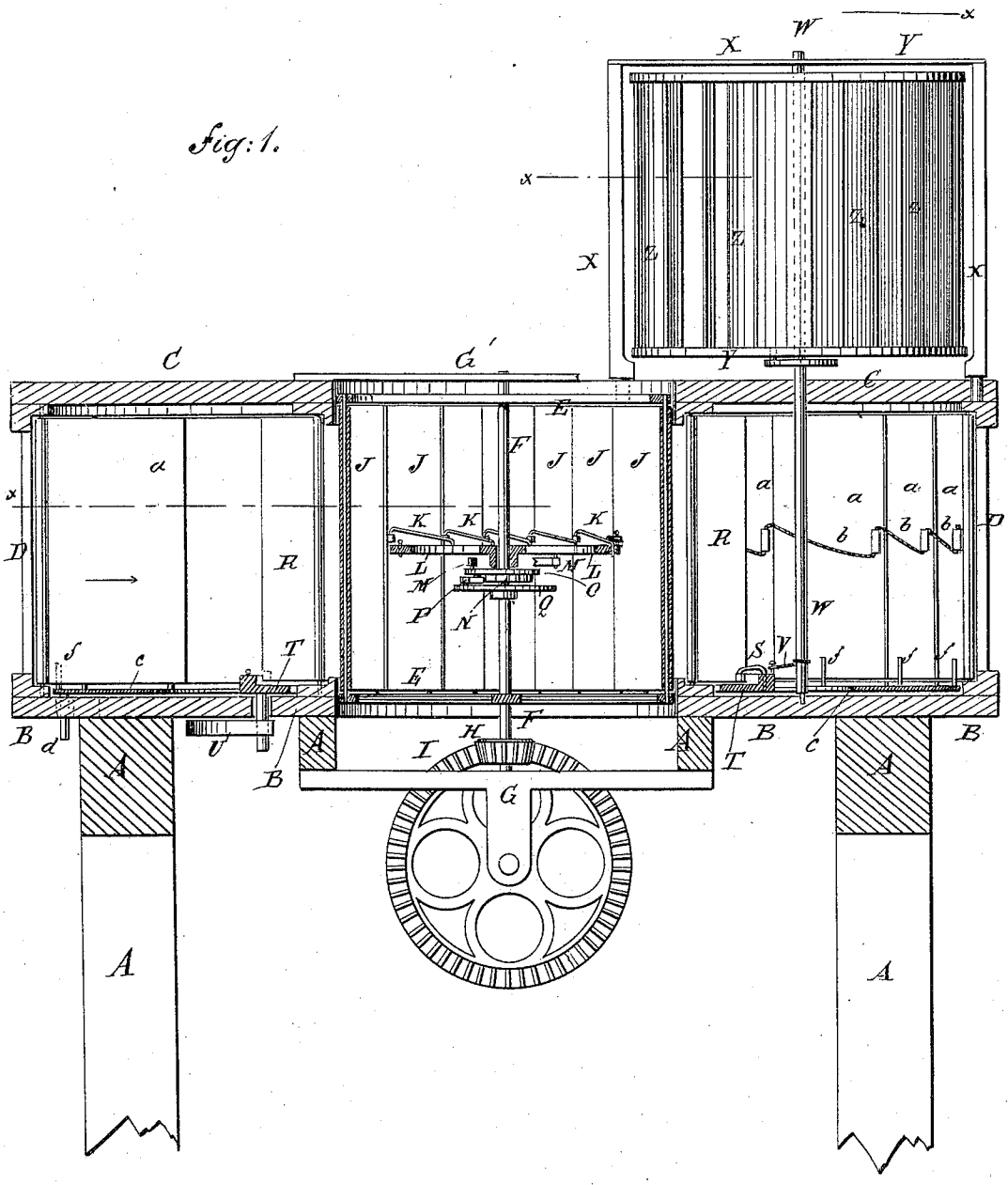
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W. P. BADGER.

WINDMILL.

No. 285,948. Patented Oct. 2, 1883.

Fig. 1.



WITNESSES:

Chas. Nida

C. Sedgwick

INVENTOR:

W. P. Badger

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N. PETERS. Photo-Lithographer. Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig: 2.

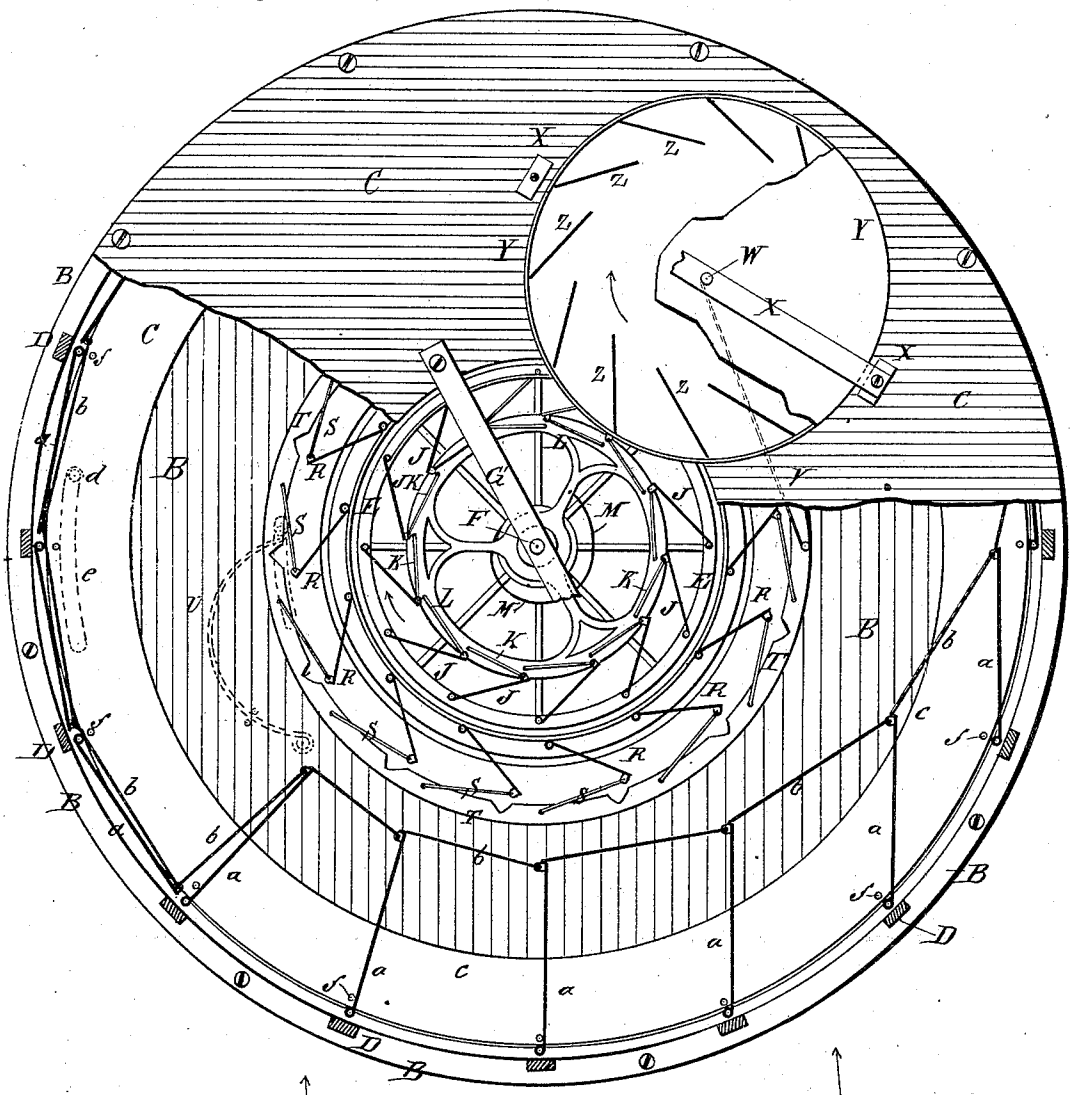
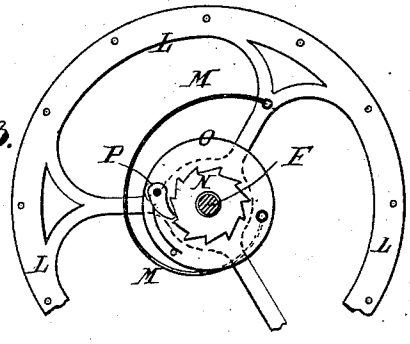


Fig: 3.



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UNITED STATES PATENT OFFICE.

WILLIAM P. BADGER, OF MUSCOTAH, KANSAS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 285,948, dated October 2, 1883.

Application filed February 3, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM PRENTICE BADGER, of Muscotah, in the county of Atchison and State of Kansas, have invented a new and useful Improvement in Windmills, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1, Sheet 1, is a sectional side elevation of my improvement. Fig. 2, Sheet 2, is a plan view of the same, partly in section, through the broken line *x x x*, Fig. 1. Fig. 3 is an under side view of a part of the fan-regulating wheel, showing its spring, pawl, and ratchet-wheel.

The object of this invention is to provide windmills constructed in such a manner as to run at uniform speed in light and heavy winds; also, to provide a wind-chamber connected with said wind-wheel, and constructed so as to increase the number of square feet of wind-pressure in the wheel. The ultimate object is to get a uniform motion from a variable wind, and with it an increased power.

A represents the frame of the building or tower that supports the windmill, and to the top of which is attached a circular plate or floor, B, of a diameter equal to three times the diameter of the required wind-wheel.

Above the plate B, and at a distance therefrom equal to the height of the required wind-wheel, is placed a plate or floor, C, similar to the plate B, and connected therewith and supported by posts D.

Through the centers of the plates B C is formed a circular opening of a diameter equal to the diameter of the required wind-wheel.

Within the openings of the plates B C are placed two skeleton wheels, E, which are made with hubs, spokes, and rims, to allow the wind to have free egress through the said wheels. The hubs of the wheels E are attached to a vertical shaft, F, the lower end of which revolves in a step or thrust bearing, G, connected with and supported from the frame of the mill, and its upper end revolves in a bearing in a bar, G′, attached to the top plate, C, or other suitable support.

With the lower part of the shaft F are connected the gear-wheels H I, from which motion is communicated to the machinery to be driven.

To the rims of the wheels E are pivoted the outer edges of a series of wings, J, of such a size and number as when closed up to fill the circumference of the wind-wheel. The wings J are arranged to open inward, and to the middle parts of their inner edges are hinged the outer ends of rods K, the inner ends of which are hinged to the rim of a skeleton wheel, L, of about half the diameter of the wheels E. The hub of the wheel L is loose upon the shaft F, and with the said wheel is connected the outer end of a coiled or other suitable spring, M, the inner end of which is attached to the ratchet-wheel N, or to a disk or flange, O, formed upon or attached to the said ratchet-wheel. The ratchet-wheel N is loose upon the shaft F, and with its teeth engages a pawl, P, pivoted to a disk, Q, or other support attached to the shaft F, so that the tension of the spring M can be regulated by turning the ratchet-wheel N. With this construction the tension of the spring M and the force of the wind tend to open the wings J, and the centrifugal force engendered by the revolution of the wind-wheel tends to close the said wings, and the spring M should have such a tension that the resultant of these three forces will hold the said wings in a favorable position to receive the wind under ordinary circumstances—as, for instance, under the impulse of a wind blowing at the rate of five miles an hour, or at any other force for which the spring M has been set.

Should the force of the wind increase, the centrifugal force engendered by the increased velocity of the wind-wheel will partially close the wings, and thus bring them into a less favorable position to receive the wind, so that the speed of the wheels will be lessened. Should the force of the wind decrease, the decreased velocity of the wheel will lessen the centrifugal force and allow the spring M to open the wings more widely, and thus bring them into a more favorable position to receive the wind, so that the speed of the wheel will be increased. The wheel will thus be kept at a uniform speed, though driven by a variable wind.

To the inner edges of the plates B C, or to

rings attached to the said edges, are hinged the inner corners of a number of doors, R, of such a number and size as when closed to entirely close the opening between the inner edges of the plates B C, and prevent the wind from having access to the wind-wheel. The doors R open outward, and when open serve as chutes to guide the wind against the wings of the wind-wheel.

To the lower parts of the free edges of the doors R are hinged the ends of rods S, the other ends of which are hinged to the annular plate T, placed upon the plate B, and kept in place by a guide attached to the said plate B, so that the doors R can be opened and closed by moving the said annular plate T in one or the other direction. The annular plate T is moved in the direction to open the doors R, and against the wind-pressure by a spring, U, the other end of which is secured to or connected with the lower plate, B, of the wind-chamber. The spring U should be connected with the plate B by means of a ratchet-wheel and pawl in the same manner as the spring M is connected with the shaft F, so that the said spring U can be set to hold the doors R against any desired amount of wind-pressure. With this construction, as the force of the wind increases above the point of resistance of the spring U, the said spring yields, and the doors R are partially closed, changing the angle at which the wind strikes the wings of the wind-wheel, and thus lessening the effective force of the wind. As the force of the wind decreases, the spring U draws the doors R farther open, so as to direct the wind against the wings J at a more effective angle, so that the wind will be made to exert a uniform effective force upon the wings of the wind-wheel.

To the annular plate T is attached, by a pin, screw, or other suitable means, the end of a cord, V, which is extended in the opposite direction from that in which the spring U presses, and is attached at its other end to the lower part of a shaft, W. The lower end of the shaft W revolves in a step-bearing in the bottom plate, B, or in some other suitable support. The shaft W passes through and revolves in a bearing in the top plate, C, and its upper end revolves in a bearing in a frame, X, attached to the said top plate, C.

To the shaft W, above the top plate, C, and within the frame X, is attached a wind-wheel, Y, made with a closed top and bottom and with stationary inwardly-projecting inclined wings Z, as shown in Figs. 1 and 2. With this construction the pressure of the wind against the wings Z of the wind-wheel Y has a tendency to turn the said wheel Y, wind the cord V around the shaft W, and turn the annular plate T in the direction to close the doors R and shut off the wind from the wind-wheel E J. This tendency is assisted by the pressure of the wind against the doors R, and is resisted by the tension of the spring U, so that the said doors R will be moved in the direction to close them, as the force of the wind increases, and in the other direction as the force of the wind decreases.

To the plates B C, at the inner sides of the posts D, are pivoted the edges of a series of doors, *a*, which are made of such a size and number as when shut to entirely close the outer circumference of the wind-chamber. The free edges of the hinged doors *a* are connected by cords *b*, which should be of such a length as to be slightly slack when the said doors are fully opened.

Upon the bottom plate, B, at the inner sides of the posts D, is placed an annular plate, *c*, which is moved by an arm, *d*, projecting through a curved slot, *e*, in the bottom plate, B, and its movements are limited by the said arm *d* coming in contact with the ends of the slot *e*.

To the plate *c*, at the inner side and slightly in the rear of the pivots of the doors *a* when the arm *d* is at the rear end of the slot *e*, are attached pins *f*, which, when the plate *c* is moved forward, press against the doors *a* and close the said doors, fastening them shut until the pins *f* are withdrawn by moving the plate *c* back. With this construction, when the doors *a* are shut and fastened, no wind can enter the wind-chamber, and the wind-wheel will remain stationary. When the doors *a* are unfastened, the said doors upon the side of the wind-chamber toward the wind will be opened by the pressure of the wind, and the other doors will be held shut by the said pressure, so that the wind will fill the wind-chamber and will pass through the chutes formed by the doors R, and will act upon all the wings of the wind-wheel E J at the same time. With this construction the wind can be admitted to and shut off from the wind-wheel, as may be desired, and when admitted will regulate by its varying force the positions of the doors R and wings J, so that the wind-wheel will be driven at uniform speed.

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

1. A windmill constructed substantially as herein shown and described, and consisting of a wind-wheel having inwardly-opening wings held open by a spring-pressed regulating-wheel, and an annular wind-chamber provided at its inner circumference with hinged doors held open by a spring-pressed annular plate, and provided at its outer circumference with hinged doors opening inward, as set forth.

2. In a windmill, the combination, with a wind-wheel, E J, of an annular wind-chamber, B C D, having doors at its inner and outer circumferences, substantially as herein shown and described, whereby the delivery of the wind to the wind-wheel can be regulated as set forth.

3. In a windmill, the combination, with the inner edges of the bottom and top plates, B C, of the wind-chamber, of the hinged doors R, the annular plate T, and the spring U, substan-

tially as herein shown and described, whereby the said spring will hold the said doors open against the wind-pressure, as set forth.

4. In a windmill, the combination, with the hinged doors R, the annular plate T, and the spring U, of the cord V, the shaft W, and the wind-wheel Y, having closed ends and stationary inclined inwardly-projecting wings Z, substantially as herein shown and described, whereby the said doors will be held by wind-pressure against the pressure of the said spring, as set forth.

5. In a windmill, the combination, with the outer edges of the bottom and top plates, B C, of the wind-chamber, of the doors *a*, hinged to open inward, substantially as herein shown and described, whereby some of the said doors will be opened and others closed by the wind-pressure, keeping the said wind-chamber filled with wind and causing the wind to act upon all the wings of the wind-wheel at the same time, as set forth.

6. In a windmill, the combination, with the wind-chamber B C D and the hinged doors *a*, of one or more annular plates, *c*, having pins *f*, substantially as herein shown and described, whereby the said doors can be readily closed and fastened, as set forth.

WILLIAM P. BADGER.

Witnesses:
JAMES HAZLETT,
J. S. GAYLORD.