M. L. MAHONEY.

WINDMILL.

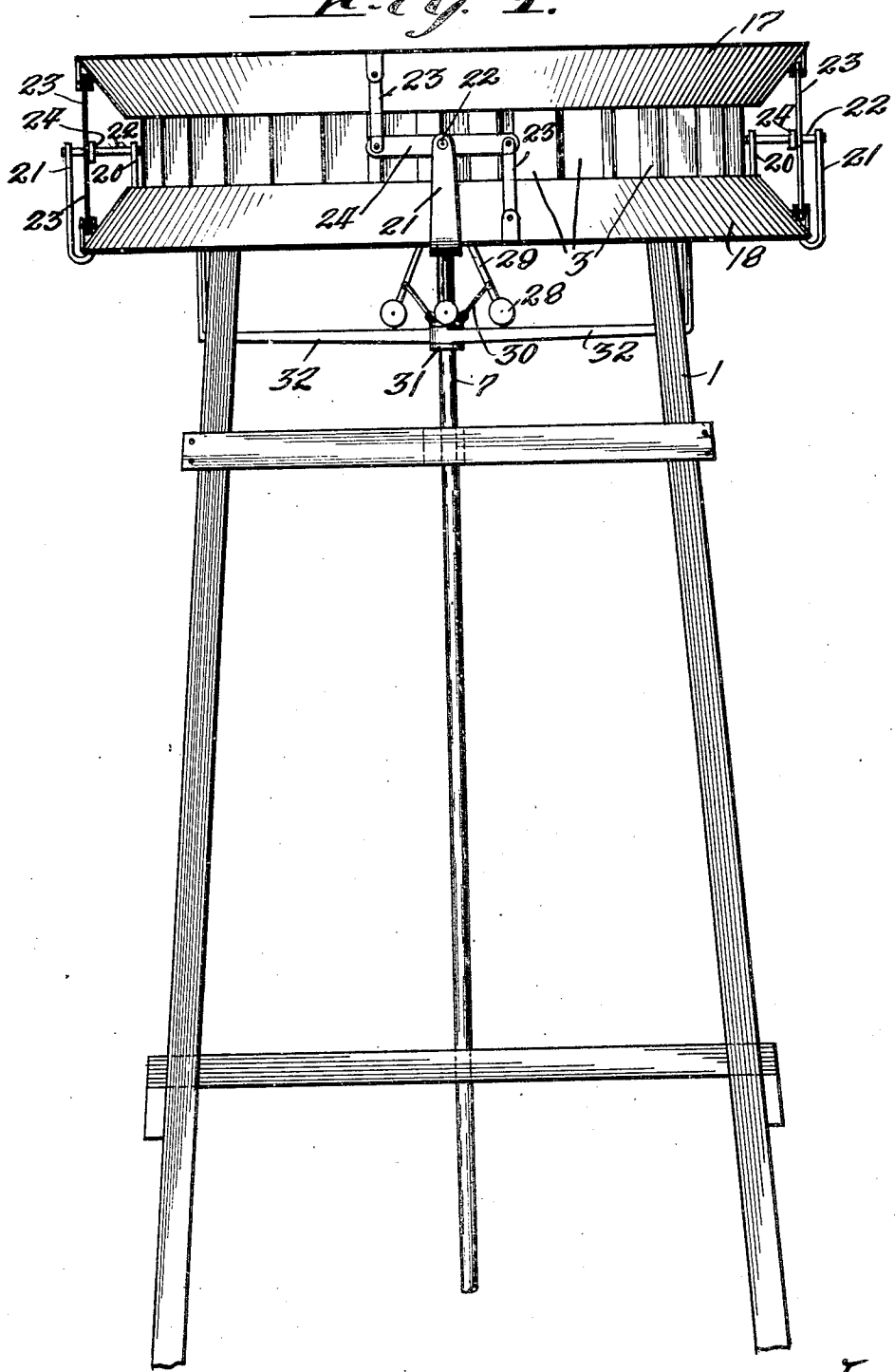
APPLICATION FILED AUG. 30, 1911.

1,036,128.

Patented Aug. 20, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

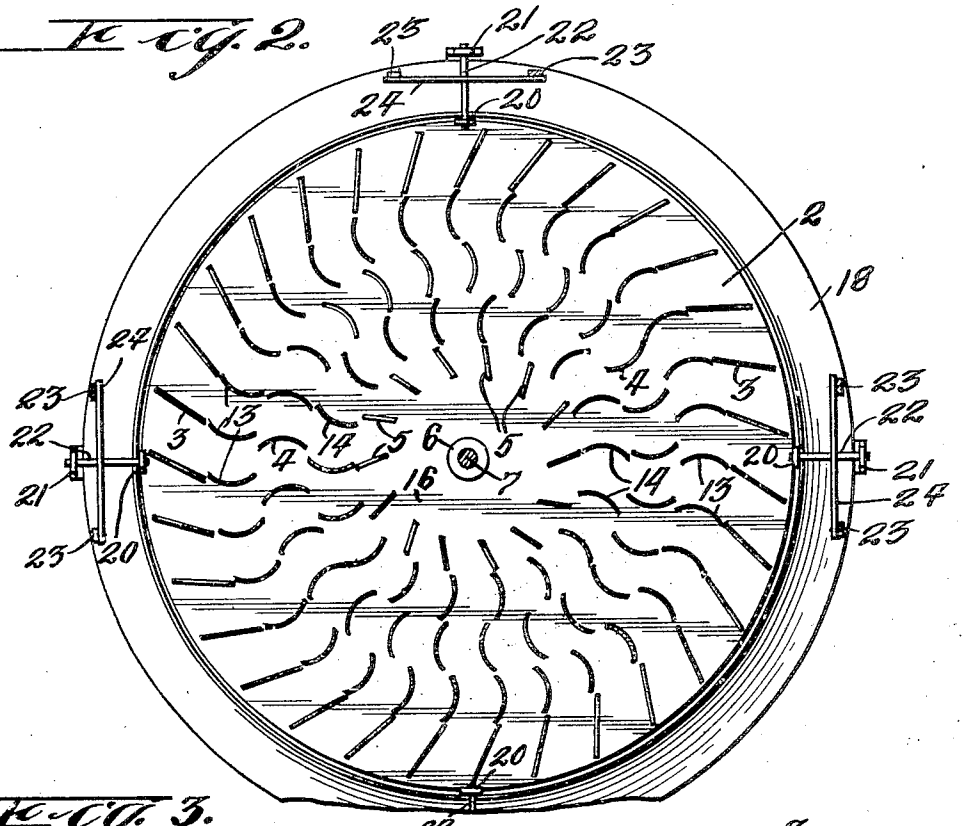
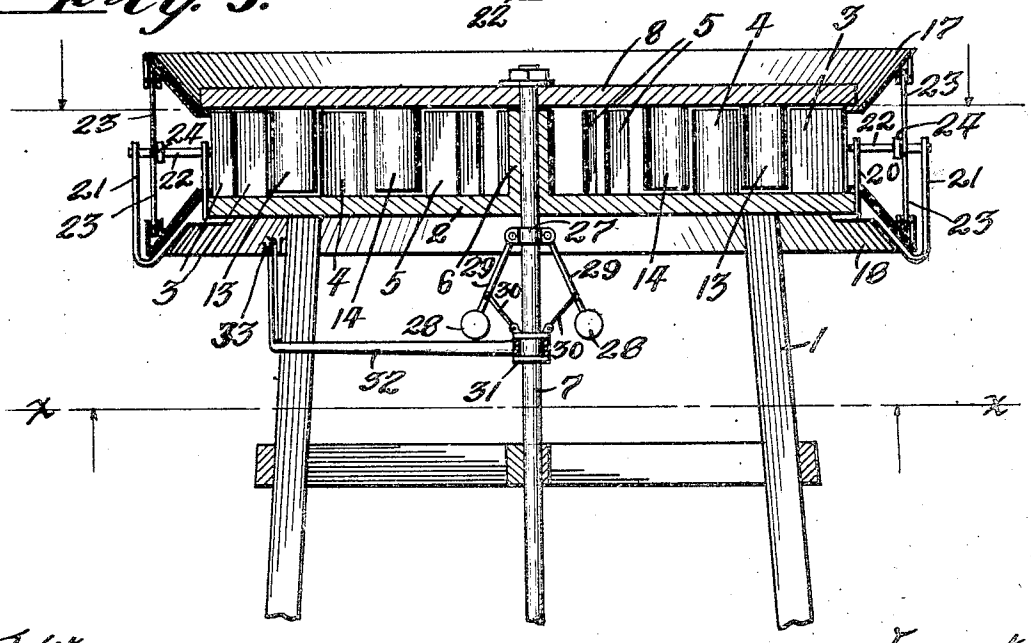


Fig. 3.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 1.

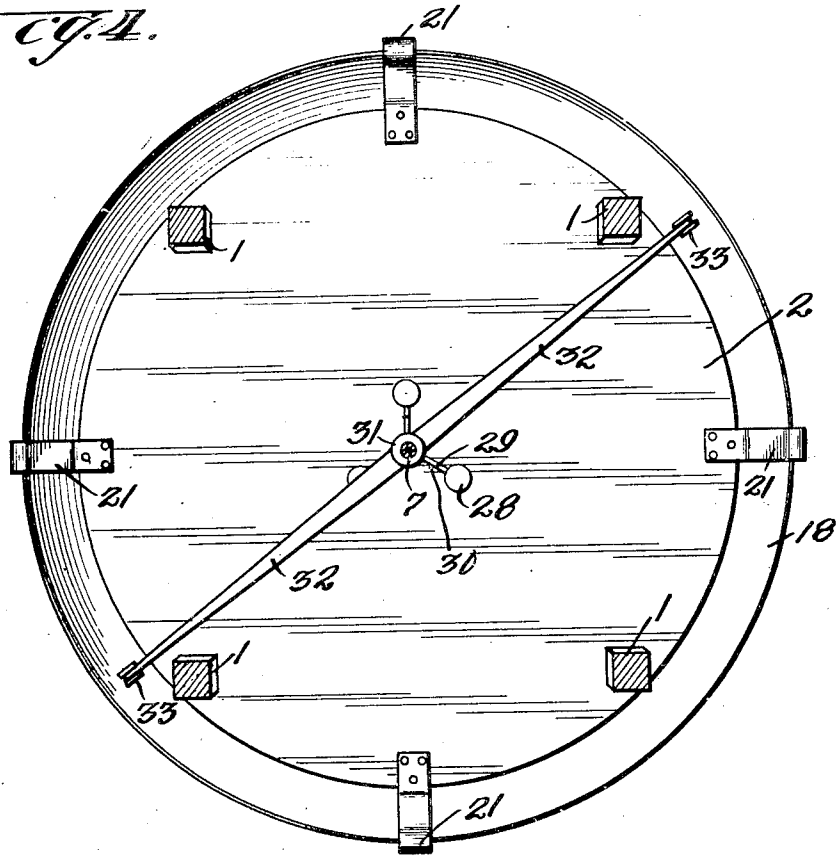
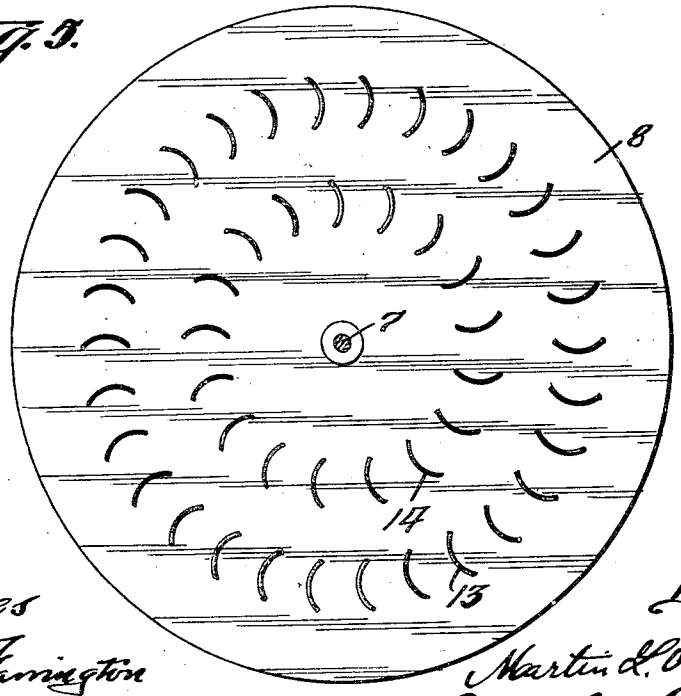


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

MARTIN L. MAHONEY, OF CORLISS, WISCONSIN, ASSIGNOR OF ONE-HALF TO SISTERS OF ST. DOMINIC, OF RACINE, WISCONSIN, A CORPORATION OF WISCONSIN.

WINDMILL.

1,036,128. Specification of Letters Patent. **Patented Aug. 20, 1912.**

Application filed August 30, 1911. Serial No. 646,824.

To all whom it may concern:

Be it known that I, MARTIN L. MAHONEY, a citizen of the United States, residing at Corliss, county of Racine, and State of Wisconsin, have invented new and useful Improvements in Windmills, of which the following is a specification.

My invention relates to improvements in wind-mills, and pertains especially to that class of wind-mills in which the rotary member revolves in a horizontal plane, and is provided with turbine vanes.

The object of my invention is to provide means whereby the momentum energy of the air may be utilized to a maximum extent; also to provide means whereby a maximum quantity of air may be delivered to the vanes of the mill and the quantity properly controlled, when the speed becomes excessive.

In the drawings—Figure 1 is a side elevation of a wind-mill embodying my invention. Fig. 2 is a plan view with the cap plate of the rotary member removed, together with the upper wind collecting and controlling ring. Fig. 3 is a sectional view, drawn to a plane cutting the axis of the transmission shaft. Fig. 4 is a sectional view, (upper section), drawn on line *x*—*x* of Fig. 3. Fig. 5 is a view of the rotary member as seen from the under side, the transmission shaft being shown in cross section.

Like parts are identified by the same reference characters throughout the several views.

The frame 1 supports a table 2, upon which concentric rows of stationary vanes or guides 3, 4 and 5 are mounted. At the center, the table 2 is provided with an upwardly projecting bearing member 6, through which a transmission shaft 7 extends and is secured at its upper end to a rotary disk 8, adapted to revolve upon the bearing member 6 in a horizontal plane. This disk 8 is provided with concentric rows of depending vanes 13 and 14 respectively, the vanes 13 extending downwardly between the rows of stationary vanes 3 and 4, and the vanes 14 extending downwardly between the rows of stationary vanes 4 and 5. The arrangement is such that the outer row of stationary vanes 3 may receive wind from any side and deliver it inwardly against the vanes 13 of the rotary member, which is thus caused to turn. The air which strikes the vanes 13 re-acts between the vanes 4 and then strikes the vanes 14 of the rotary member, re-acting therefrom between the vanes 5 into the central space 16 around the transmission shaft 7. The air is delivered from this space through the several sets of stationary and rotary vanes in reverse order, passing out on the side of least resistance opposite to that from which the wind is received. It is obvious that in each case, when the air strikes a vane on the rotary member, it will impart an additional impulse to such member.

The currents of air are concentrated upon the vanes by rings 17 and 18, the upper ring 17 being conically tapered downwardly and the lower ring 18 being conically tapered upwardly. Normally these rings will be separated, so as to expose substantially the entire space between the table 2 and the disk 8 for the delivery of air through the vanes. The rings, however, are adjustably mounted and when the speed of the rotary member (comprising the disk 8, vanes 13 and 14, and shaft 7), becomes excessive, these rings 17 and 18 may be made to approach each other and thus cut off a portion of the air delivery. To accomplish this, the table 2 is provided with bracket arms 20 and 21 connected by cross rods 22, said rods 22 having levers 24 connected with the rings 17 and 18 respectively, by links 23. The levers 24 are mounted to oscillate upon the rods 22, or if desired, such rods 22 may be made to oscillate in the bracket arms 20 and 21, and the rings are thus balanced upon the pivotal lever fulcrums. The rings will of course separate or approach each other according to the direction of movement when the arms are oscillated, thus permitting the arms to swing upon their pivotal axes. In this manner, the weight of the rings is balanced upon the rods 22, and the rings may be manipulated to draw them together or to separate them by means of a speed governor, which will now be described.

The governor is similar in construction to those in common use, the transmission shaft being provided with a collar 27, from which the governing weights 28 are supported by swinging arms 29, said arms being also connected through links 30 to a collar 31, which is mounted to slide upon the shaft 7. The

collar 31 is provided with arms 32, which are connected at 33 with the lower ring 18. When the speed becomes excessive, an outward movement of the weights 28 lifts collar 31, arms 32, and ring 18, and as this ring 18 is connected, as above described, with the ring 17, the latter will be correspondingly depressed, thus decreasing the area open for air delivery to the vanes. Owing to the fact that the rings taper inwardly and toward each other, it is obvious that the wind passing above and below the rings, will exert an aspirating effect at the lee side of the mill, that is to say, the pressure of the atmosphere at the delivery side will be reduced below the normal atmospheric pressure, while that on the windward or receiving side will be in excess of normal atmospheric pressure. I am therefore able to utilize the pressure of the air as well as its momentum energy, a certain degree of air expansion being permitted during its passage through the openings between the vanes, particularly on the outlet side where the vanes diverge from their inner to their outer margins.

I claim—

1. In a machine of the described class, the combination with a table provided with concentric sets of upwardly extending stationary guide vanes, of a superposed rotary disk supported from said table and provided with depending concentric sets of impact vanes adapted to revolve in the annular spaces between the guide vanes, and a power transmission shaft connected with said rotary disk, together with a set of wind controlling rings, and means for adjusting said rings to and from each other to increase or diminish the exposed area of the outer set of guide vanes, said rings being conically tapered inwardly and in the direction of each other and adapted to serve as concentrating guides for the delivery of air to the outer set of vanes.

2. The combination with a wind turbine, comprising a supporting table provided with stationary guide vanes, a rotary member provided with revolving vanes adapted to receive air from the guide vanes, air controlling rings encircling the table and rotary member respectively, and means for utilizing the weight of one of said rings to counteract the weight of the other.

3. The combination with a wind turbine, comprising a supporting table provided with stationary guide vanes, a rotary member provided with revolving vanes adapted to receive air from the guide vanes, supporting brackets connected with the table, air controlling rings encircling the table and rotary member respectively, and supporting connections for said rings each pivoted to a bracket and to the rings at opposite sides of the bracket pivot, and adapted to balance substantially their weight upon said brackets, said supporting connections being permitted to oscillate pivotally upon said brackets to permit the rings to approach to and recede from each other, together with a speed governor connected to actuate said rings.

4. The combination with a wind turbine, of a set of ring valves controlling the delivery of air thereto, each of said ring valves being conically tapered inwardly and in the direction of the other.

In testimony whereof I affix my signature in the presence of two witnesses.

MARTIN L. MAHONEY.

Witnesses:
F. J. ROWAN,
M. W. KALAHER.