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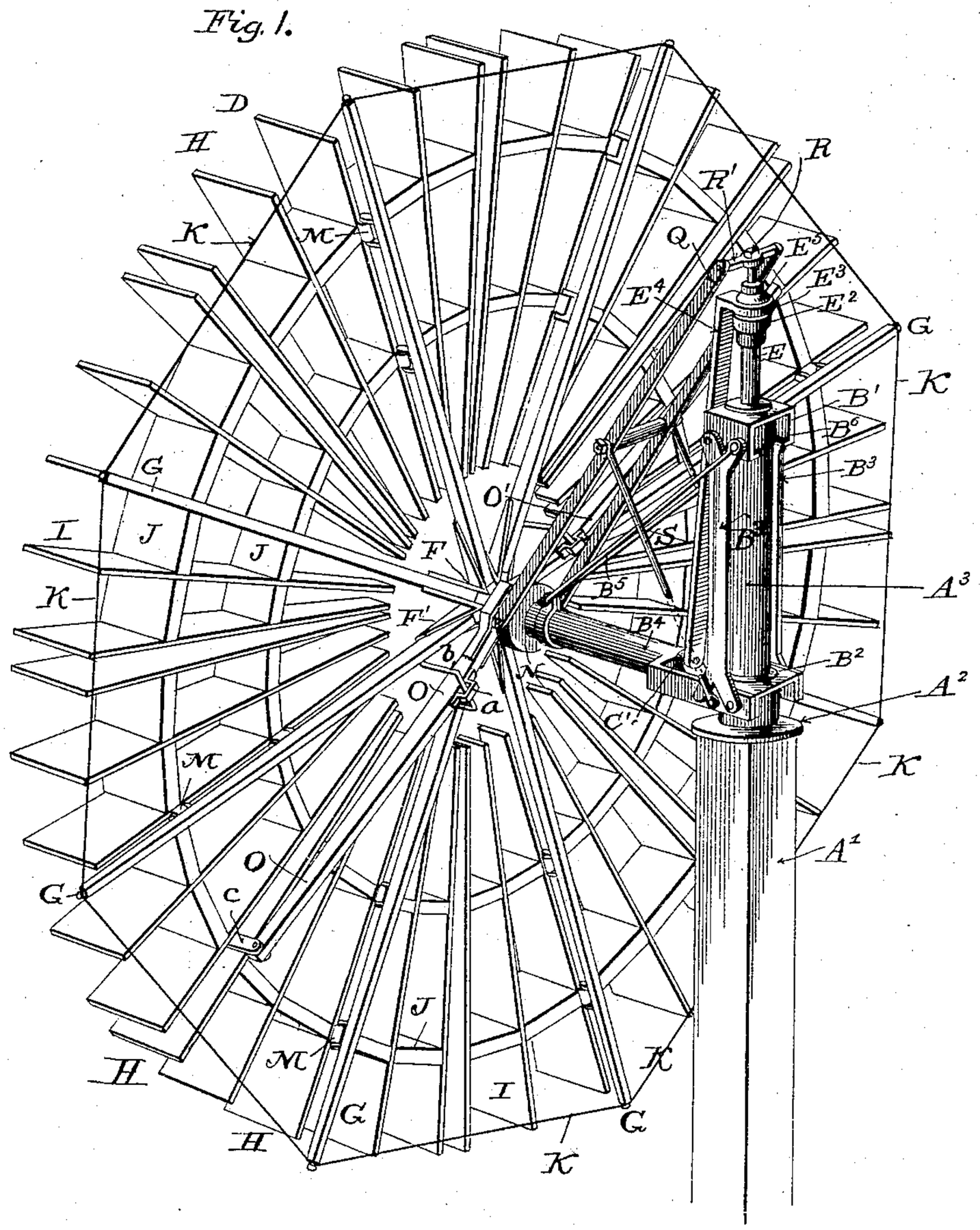
C. BROWN.

WINDMILL.

No. 375,729. Patented Jan. 3, 1888.

Fig. 1.



Witnesses:
James F. DeHamel
Walter D. Dodge.

Cary Brown,
Inventor,
by Dodger Son,
his Attys.

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C. BROWN.

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Fig. 2.

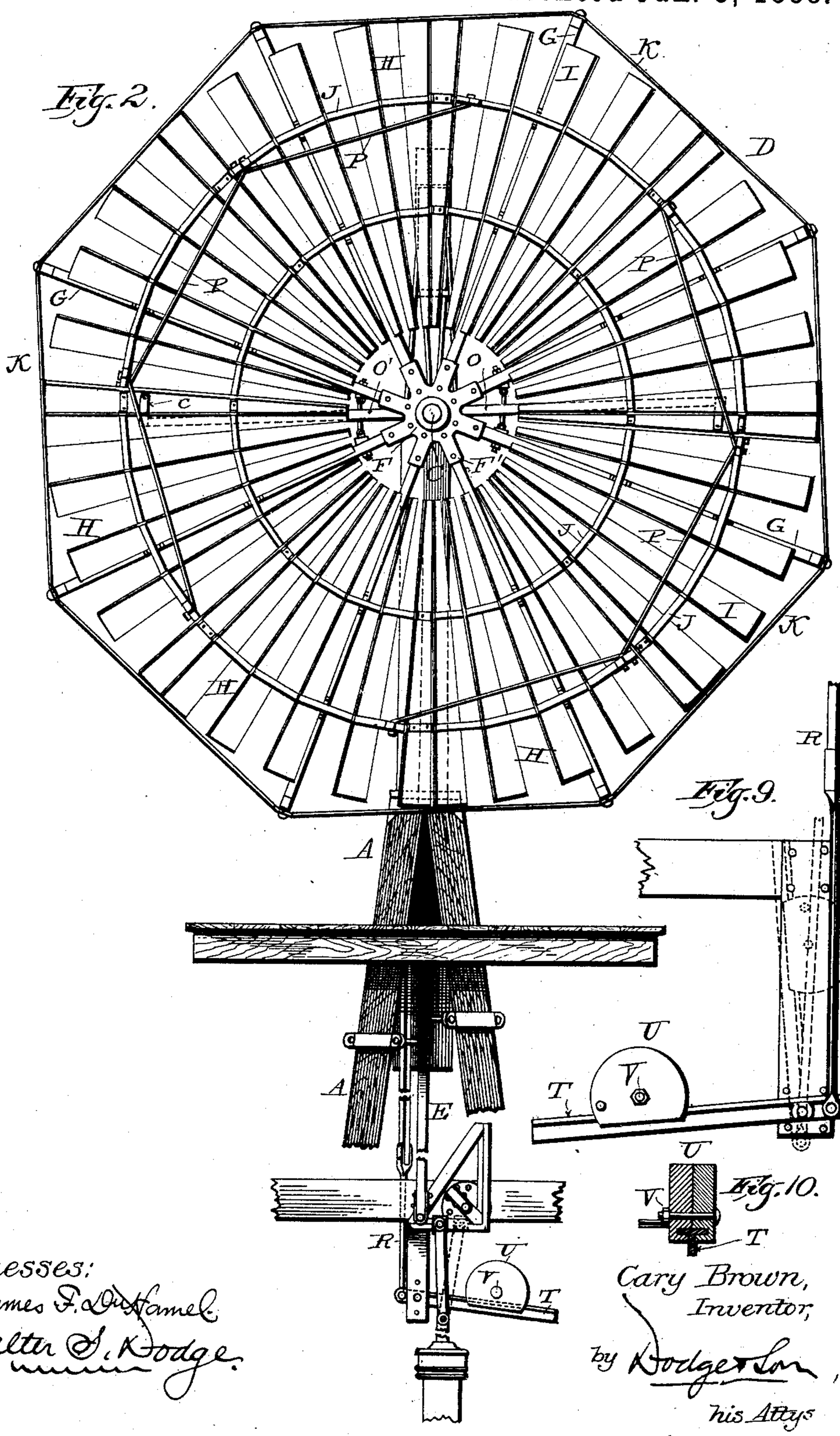

Fig. 9.

Fig. 10.

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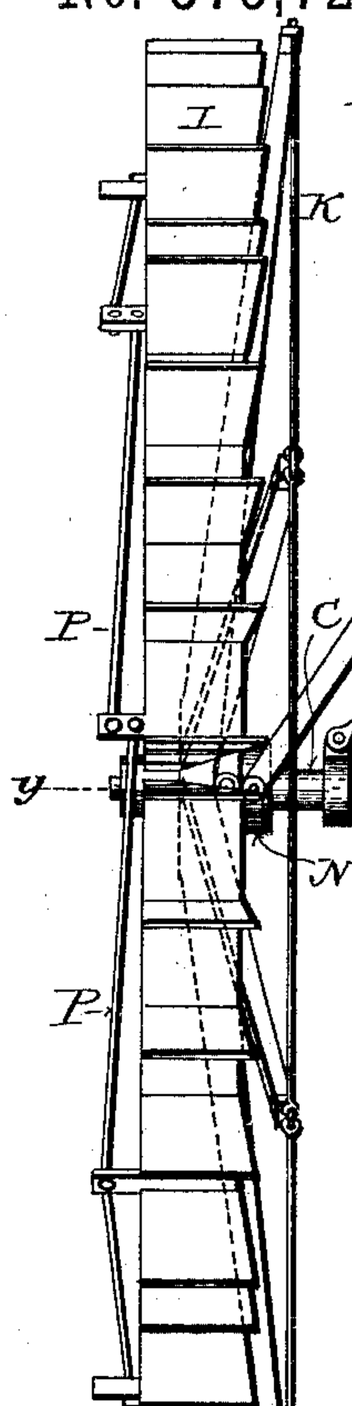
Fig. 3.



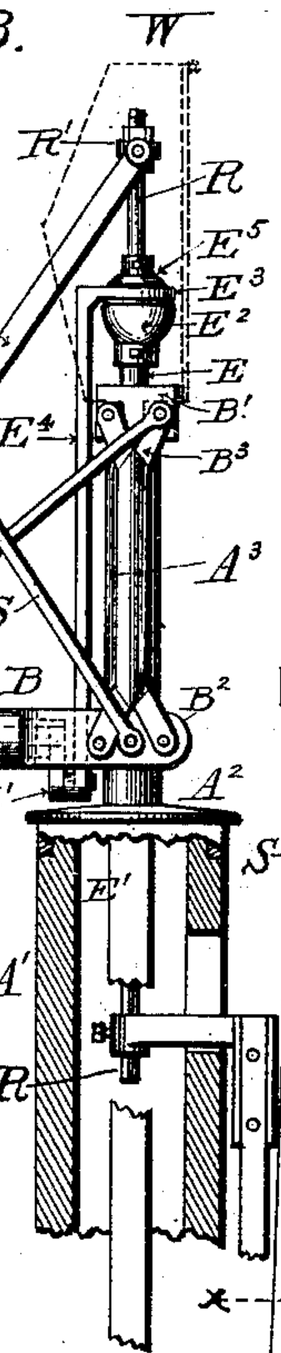


Fig. 6.

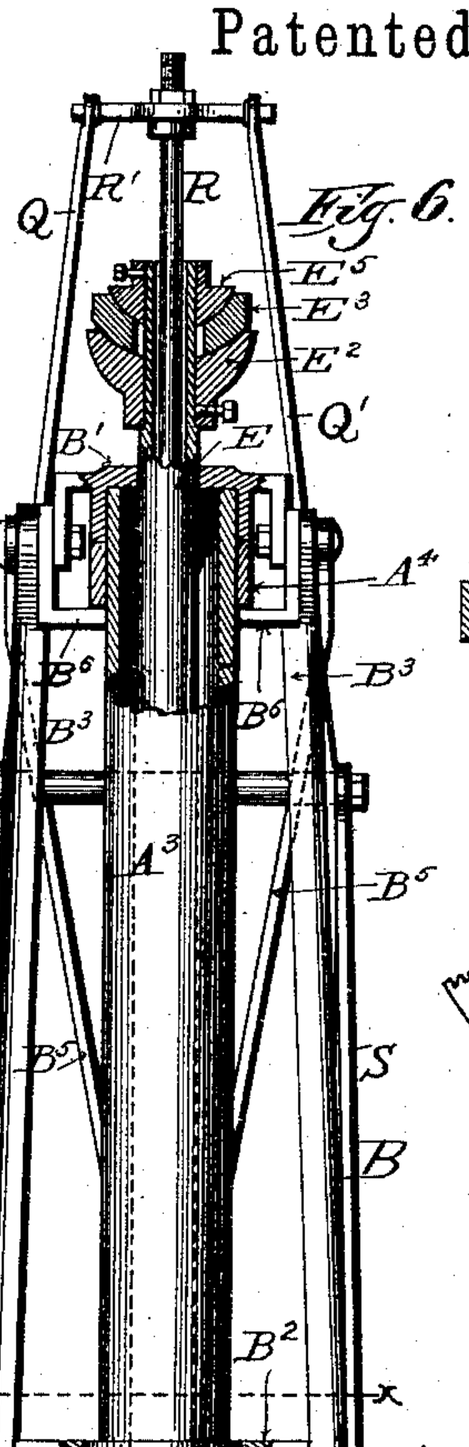


Fig. 4.

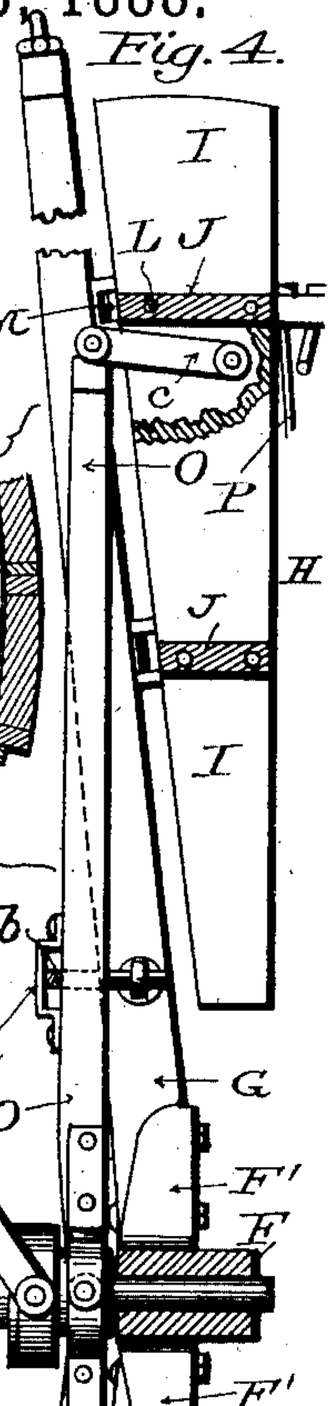


Fig. 7.
on x-x.

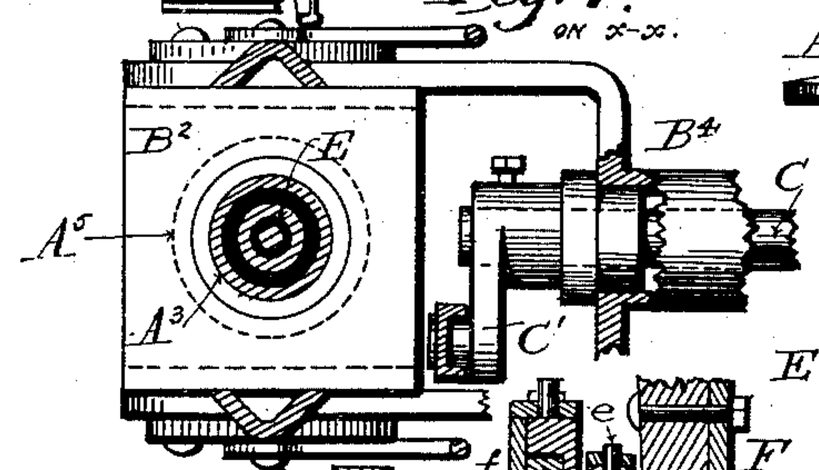


Fig. 8.
on y-y.

Fig. 5.

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UNITED STATES PATENT OFFICE.

CARY BROWN, OF FORT ATKINSON, WISCONSIN.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 375,729, dated January 3, 1888.

Application filed January 26, 1887. Serial No. 225,509. (No model.)

To all whom it may concern:

Be it known that I, CARY BROWN, of Fort Atkinson, in the county of Jefferson and State of Wisconsin, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

My invention relates to that class of rudderless windmills in which feathering-blades are employed; and the invention consists in various features and details hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a perspective view of my improved windmill; Fig. 2, a face view, and Fig. 3 an edge or side view, of the same; Fig. 4, a vertical central section through the wheel; Fig. 5, an edge view of two of the blades, showing the manner of construction; Fig. 6, an enlarged view, partly in section, of the upright column or turn-table; Fig. 7, a section on the line *x x* of Fig. 6; Fig. 8, a section on the line *y y* of Fig. 3; and Figs. 9 and 10, views illustrating the construction of the automatic governor.

A indicates a substantial framing, tower, or mast, carrying at its upper end a hollow extension or casing, A′, as shown in Figs. 1, 2, 3, and 6, the casing being provided at its upper end with a cap or cover, A^2. This cap or cover is secured rigidly to the top of casing A′, and is provided with an upright tubular post, A^3, as shown in Figs. 1, 3, 6, and 7.

Near the upper end of post A^3 is secured a collar, A^4, upon which and a similar collar, A^5, near the base of the post A^3, rests the wheel-carrying frame B, which, with the wheel, stands away behind the post A^3, or on the side away from the wind. This frame B comprises a cap, B′, to fit upon the upper end of post A^3 or the collar A^4; a collar, B^2, to fit upon the collar A^5; bars B^3, connecting the cap B′ with the collar B^2; a tubular arm, B^4, having a forked inner end, which is connected to the collar B^2, and, finally, braces B^5, connecting cap B′ with tubular arm B^4, as clearly shown in Figs. 1, 3, 6, and 7. From this construction it will be seen that the frame B may be swung in a horizontal plane about the tubular post A^3, so as to present the wheel always to the wind.

Within the tubular arm B^4 is journaled the wind-wheel shaft C, to the outer end of which is secured the wheel D, as shown in Figs. 4, 7, and 8, the inner end of the shaft C being provided with a crank-arm, C′, as shown in Figs. 1, 3, and 7.

E indicates the pump-rod, which extends upward vertically through the casing A′ and tubular post A^3, the rod E being hollow or tubular at its upper end and provided with arms or guides E′ within the casing A′, as shown in Fig. 6. These arms, it will be noticed, are separated a distance from each other, and bear against the inner faces of the hollow casing to guide or steady the rod in its movements. Near its upper end the rod E is provided with a collar, E^2, having a concave upper face, as shown in Fig. 6, said collar being adapted to receive a correspondingly-formed arm, E^3, projecting laterally from the upper end of the pitman E^4, attached to the crank-arm C′. It will be noticed that the upper face of the arm E^3 is also made concave to receive a nut or collar, E^5, secured upon the rod E and bearing upon the arm.

The arm E^3 is of course to be perforated to encircle the rod E, and, as shown in Fig. 6, the perforation will be larger than the diameter of the rod, so as to allow a limited swinging or rocking movement of the arm independently of the rod. The nut or collar E^5 will bear upon the upper face of the arm E^3 with only such force as to prevent undue play, but yet allow the arm to swing or rock horizontally as its lower end is swung by the crank-arm. This construction, forming in effect a universal joint, also permits the pitman to move with the frame B as the wheel swings about the tubular post A^3, as the latter, together with the rod E, is not capable of rotation. The collars E^2 and E^5 may be adjusted vertically to compensate for wear.

Upon the outer end of the shaft C the hub F of the wheel D is rigidly secured, the hub comprising a series of short radial arms, F′, to which are bolted or otherwise secured a series of longer radial arms or spokes, G, to which the various sections H of the wheel are pivoted, as shown in Fig. 4. The outer ends of the arms or spokes G are connected by rods K, by which the wheel is braced and stiffened.

It will be noticed that the wheel D comprises a number of sections, H, corresponding in number with the radial arms or spokes G, and that each section comprises five (more or

less) blades, I, which are rigidly connected one to the other, as illustrated in Figs. 1, 2, 3, 4, and 5.

Between the opposing faces of the radial blades I are two sets of blocks, J, and passing through the blocks and blades are bolts or tie-rods L, as shown in Figs. 4 and 5, which bind the parts rigidly together and prevent independent movement of the blades of any one section. Each section H of the wheel D is hinged or pivoted to a spoke, G, as clearly shown in Fig. 4, by means of a hinge or joint, M, which is so constructed as to allow each section to turn or swing about an axis nearly coincident with the spoke to which it is hung, in order that the blades of each section may be turned with their edges or their side faces to the wind.

In order to accomplish the turning of the blades edgewise to the wind, I employ a sliding collar, N, to which are pivoted the inner forked ends of two arms or levers, O O′, which latter are pivoted at a point between their ends to two of the spokes of wheel D, as shown in Fig. 4, the pivot being of such construction as to admit of a slight longitudinal movement of said arms or levers O O′ at the same time that they are rocked upon their pivots. One construction by which this may be accomplished is shown in Fig. 4, a loop or slotted plate, *a*, being secured to the bar to receive the straight connecting portion of a U-shaped bolt, *b*, while the ends of the latter are secured to the opposing faces of two adjacent spokes.

At their outer ends each of the levers O O′ is connected to a blade, I, of one of the sections H by means of links *c*. The levers O O′ will preferably be each connected with that blade of its particular section which is farthest removed from the pivotal point of the section in order to obtain great leverage; but of course the levers O O′ may be connected with any other blade of the section, though not to so good advantage.

In the drawings I have shown eight sections H and only two levers O O′; hence it will be seen that the sections must be so connected that they shall move in unison with the two with which said levers connect. To secure this result I divide the wheel into two groups of sections, one group to be operated by the lever O and the other by the lever O′, the several sections H of each group being connected with one another at their outer ends by means of links or rods P. The links P extend from one blade in one section to the corresponding blade in the next section, and it will be seen that as one section is rocked by means of lever O or O′ all the other sections belonging to the same group will also be rocked simultaneously and equally.

For the purpose of controlling the feathering of the blades, I provide the collar N with a rotatable sleeve or collar, *d*, which encircles tubular arm B^4, as shown in Fig. 8, said collar being furnished on opposite sides of the shaft with studs or pins *e*, to which the inner forked ends of the levers O O′ are jointed or attached. The collar *d* is provided with a flange, *f*, which fits into a socket in the main portion of the collar N, as shown in Fig. 8, in which it is retained by a plate, *g*, secured to the collar N, as shown in Fig. 8. From this construction it follows that the sleeve *d*, to which are attached the levers O O′, may be rotated in either direction independently of the collar N, and that any movement of the latter longitudinally upon the arm B^4 will cause a corresponding movement of sleeve *d* and serve to turn the section H of the wheel in one or the other direction.

To provide for the automatic governing or regulating of the sections H, I employ a governor-rod, R, which passes centrally through post A^3 and through the tubular pump-rod E to the point where the latter divides, thence outward through the side of the tower and down toward the base thereof, the upper end of rod R being provided with a cross-head, R′, from which two bars or rods, Q Q, extend to collar N. The bars or rods Q Q are jointed to or pivotally connected with the cross-head R′ and with collar N, and they are supported, at or near their mid-length, by two rods or levers, S S, pivoted at their lower ends to the swinging frame B.

The governor-rod R is pivotally connected, at its lower end, to a lever, T, which carries on the opposite side of its pivot from such connection an adjustable weight, U, made in two parts, each grooved to fit the flange of the lever T, to which the weight is clamped at any desired point by a through-bolt, V, as shown in Fig. 10. Under this arrangement the weight exerts a constant upward pressure upon rod R, which consequently draws upward upon the upper ends of bars Q, the lower ends of which move inward as the upper ends rise. The inward movement of the lower ends of the bars Q, in part due to the action of the rods or levers S, causes collar N and sleeve *d* to move inward also, thereby actuating the levers O O′, and, through them, tipping the wheel-sections H out of parallelism with the plane of rotation. As the sections are thus tipped or set at an angle, the blades, which are perpendicular to the faces of the sections, are presented obliquely to the wind, and hence the wind striking them will cause the wheel to rotate. Whenever the force of the wind exceeds the resistance of the weight U, as multiplied by the leverage given it, the sections will be forced back before the wind, and in tipping will bring their faces perpendicular to the movement of the wind, and consequently present the edges of the blades to the wind, causing the wheel to lessen its speed or to entirely stop.

It will be seen that by reason of the peculiar construction of the blade-sections the wheel is in its most compact shape and best supported and sustained when the wind blows hardest against it, and this is of course a very important feature of the wheel.

Under my plan the parts are not thrown out in such shape as to present large faces to the wind or offer great and dangerous leverage in case of sudden change of direction of the wind, and the blade-sections being pivoted at or near the middle of their front sides or faces, there is no tendency to twist or strain the sections or the spokes to which they are hung.

It will be seen, when the wheel is in motion and being retarded by application of its power, that by the peculiar relative position of the blades to each other the air which strikes the front face of one blade does not produce a counteraction by striking the rear face of the next after it has spent its force on the first, as is the case in the ordinary construction.

Upon reference to Fig. 6 it will be noticed that the cap B′ is provided with two (more or less) depending arms or fingers, B^6, which at their lower ends are bent inward and engage under the lower edge of the collar A^4, and thereby hold the frame B to its seat.

Upon reference to Figs. 3 and 4 it will be seen that the links or rods P, connecting the sections H H, are not connected directly to the blades, but will advisably be attached or secured to an arm or lug formed upon the blocks J.

In Fig. 3 I have indicated by dotted lines a cap or shield, W, which is to inclose the upper ends of the rods R and E and protect them against water and dirt. It will be provided with a hinged side or cover to permit access to the working parts. The construction of turn-table herein described and shown will be found practically advantageous in rudderless wind-wheels, the bearing B^2 A^5 in line with the shaft and the bearing B′ A^4 above the latter reducing the horizontal friction on the lower bearing to the minimum.

I am aware that it has been proposed to connect all the blades of a wind-wheel by a ring and to feather them simultaneously when the wind exceeds a predetermined force, and this construction I disclaim.

Having thus described my invention, what I claim is—

1. In a vaneless windmill, the combination, with a shaft, as C, of spokes G, sections H, each comprising a series of separated blades bound together and each section pivoted to a spoke, levers O O′, pivoted between their ends to the spokes G on the side opposite to sections H and each connected with one of the sections, and a series of links, P, connecting the sections in two groups, all substantially as shown, whereby the sections are adapted to tip or rock without the aid of special wind-deflecting devices when the force of the wind exceeds the predetermined limit.

2. A wind-wheel composed of a shaft, a hub, a series of spokes, a series of sections hinged to the outer faces of said spokes, each section consisting of a series of blades bound together with their flat faces perpendicular to the face of the section, and links connecting the sections in two groups, all substantially as shown.

3. A wind-wheel composed of a shaft, a hub, a series of spokes, a series of sections hinged to the outer faces of said spokes, each section consisting of a series of blades bound together with their flat faces perpendicular to the face of the section, links connecting the sections in two groups, and a governing device connected with the sections and serving to hold them oblique to the plane of rotation, substantially as described and shown, whereby the blades are held in position to be acted upon by the wind until a predetermined limit is reached, whereupon the sections are caused to tip or rock and present the edges of their blades to the wind.

4. In a windmill, the combination, with a suitable support, of a main shaft provided with a hub and radial spokes, a series of links connecting the outer ends of the spokes, a series of sections, H, each composed of a number of blades bound together with their flat faces perpendicular to the face of the section, the sections each being pivoted to the rear face of the spokes, and a pair of levers, O O′, mounted upon the wheel and connected at opposite ends with a governor and with the sections of the wheel, all substantially as shown and described.

5. A wind-wheel comprising a hub, a series of spokes, a series of sections pivoted to said spokes and unsupported at their ends, and comprising a number of separated blades connected together, the sections being arranged in two groups, those in each group being connected with one another, and a pair of levers, O O′, on the front face of the wheel connected with the two groups, substantially as shown and described.

6. In a windmill, the combination, with a shaft, C, of the wheel provided with the pivoted sections H, the levers O O′, pivoted to the spokes of the wheel and connected at their outer ends to the sections H, a sliding collar, N, mounted upon the shaft and pivotally connected with the inner ends of the levers O O′, and a weight connected with the collar and tending to move it away from the wheel, substantially as shown.

7. In a windmill, the combination, with a shaft, C, hub F, and spokes G, of the blade-sections H, divided into two groups and pivoted to the spokes, links P, connecting the several sections of each group, a collar, N, mounted loosely upon shaft C, and levers O O′, each pivotally connected to a spoke, to the collar N, and to one of the sections.

8. In a windmill, in combination with a shaft, a wheel provided with a series of spokes, G, a series of sections, H, pivoted to the spokes G on one face, a sliding and rotatable collar, N, levers O O′, pivoted to spokes G, connected with the collar N and serving to feather the sections H, a vertically-movable governor-rod, a weighted lever at the lower end thereof, and rods connecting the upper end of the governor-rod with the collar N, all substantially as shown.

9. In combination with shaft C, wheel D,

sliding collar N, and levers O O′, arranged and operated substantially as shown, a governor-rod, R, links Q, connecting the rod R with the collar N, and pivoted supporting rods S, all substantially as shown.

10. In combination with the fixed post A^3, provided with collars A^4 and A^5, wheel-supporting frame B, comprising horizontal sleeve B^4, cap B′, and braces B^3 and B^5, all arranged substantially as shown and described.

11. In combination with rod E, provided with concave and convex collars E^2 and E^5, the crank-shaft C and a pitman, E^4, provided with an arm, E^3, to fit between the collars E^2 and E^5, all substantially as shown.

12. In a mill of the class described, in combination with the governor-rod, the wheel D, links Q, and levers O O′, collar N, comprising flanged hub *d*, having studs *e* and cap-plate *g*, all substantially as shown and described.

13. In combination with post A^3, provided with collars A^4 and A^5, wheel-carrying frame B, provided with cap B′ and collars B^2, to rest upon the collars A^4 and A^5, and with fingers B^6, to engage the collar A^4, substantially as shown.

In witness whereof I hereunto set my hand in the presence of two witnesses.

CARY BROWN.

Witnesses:
MABEL BROWN,
GEO. C. SMITH.