(No Model.) 3 Sheets—Sheet 1.

# A. J. CORCORAN.

## WINDMILL.

No. 404,604. Patented June 4, 1889.

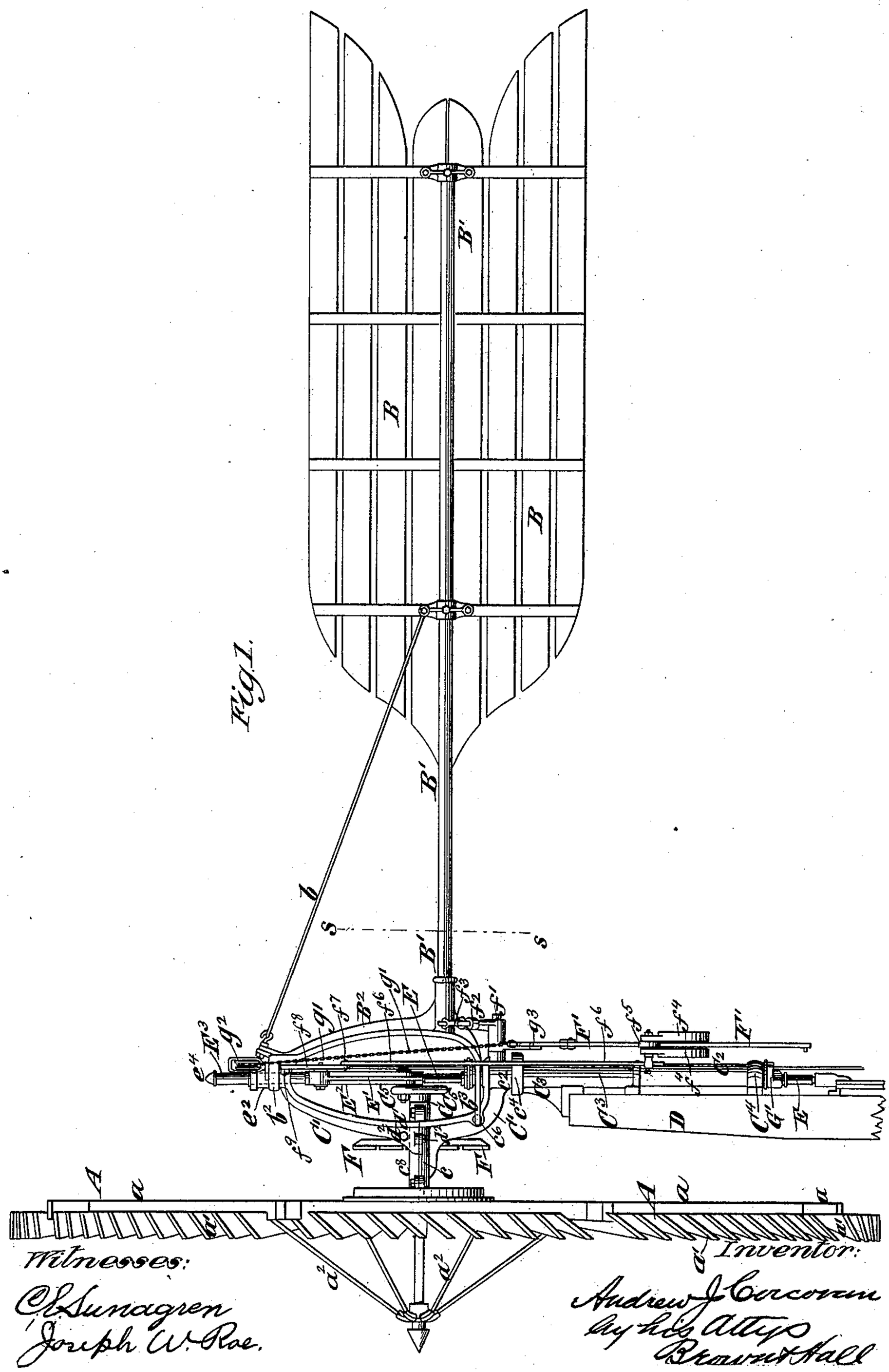


Fig. 1.

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(No Model.)

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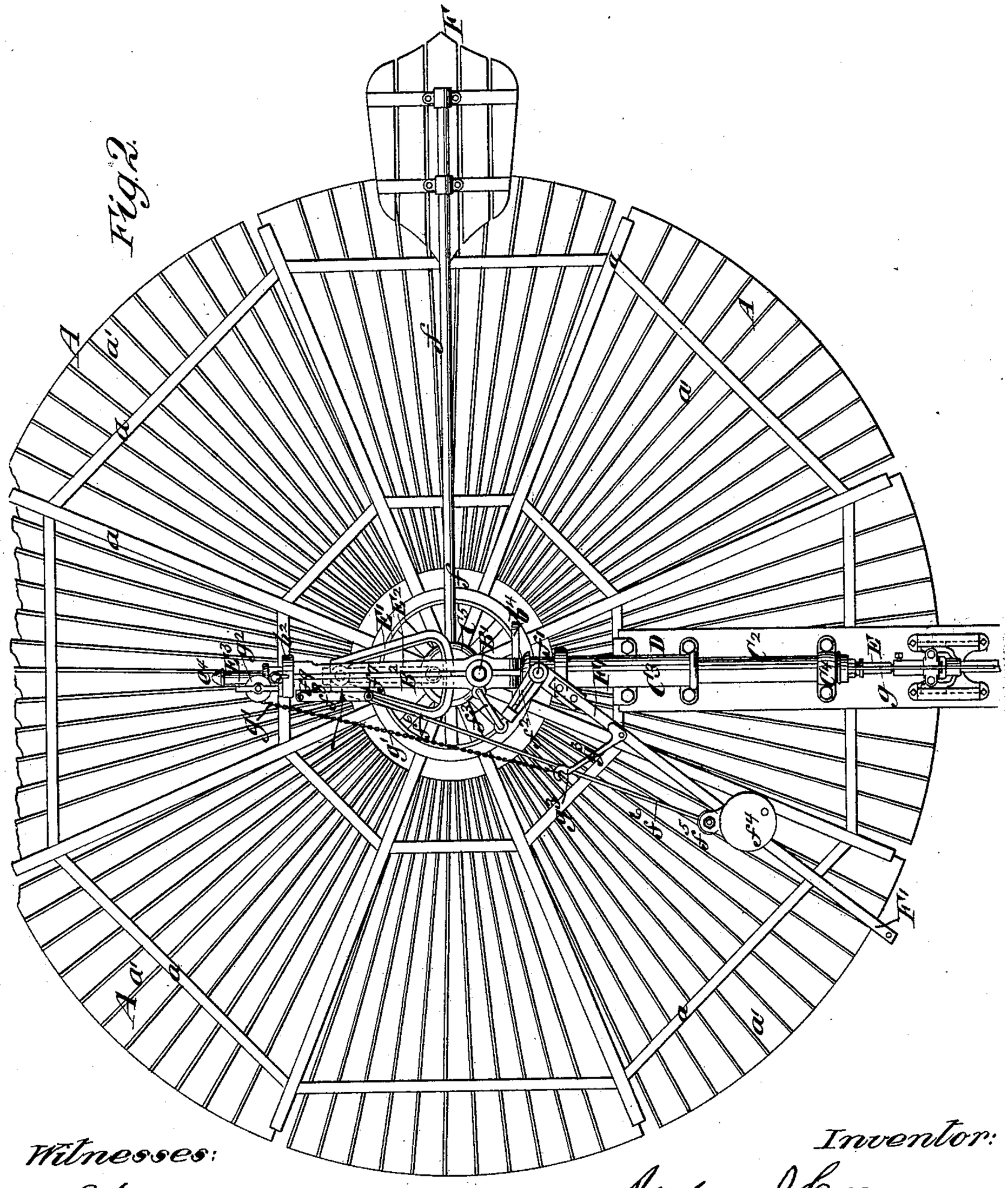
Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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## WINDMILL.

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Fig. 4.

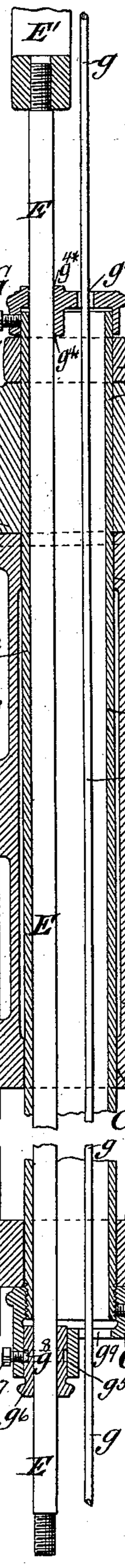


Fig. 3.

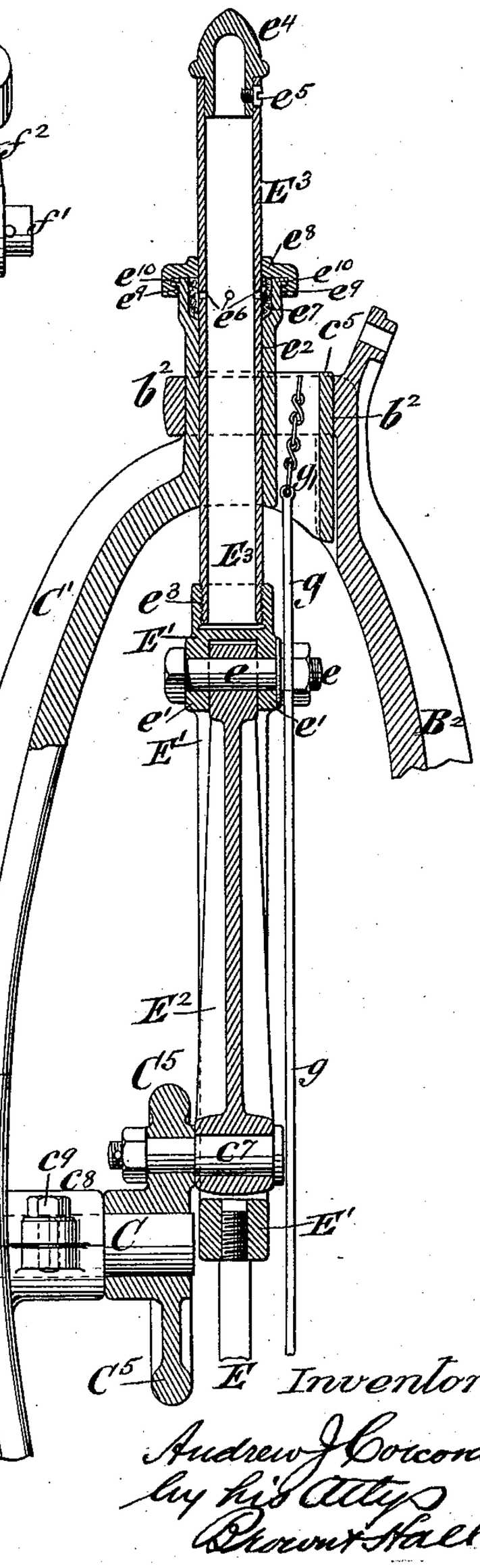
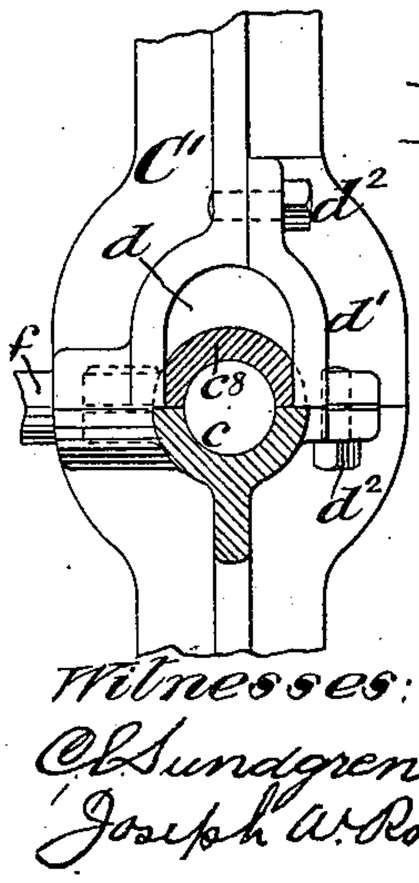


Fig. 5.



Witnesses:
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# UNITED STATES PATENT OFFICE.

ANDREW J. CORCORAN, OF JERSEY CITY, NEW JERSEY.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 404,604, dated June 4, 1889.

Application filed March 19, 1888. Serial No. 267,599. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW J. CORCORAN, of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Windmills, of which the following is a specification.

The windmill to which my invention relates includes a wind-wheel mounted upon a horizontal axis or shaft on which is a crank, and through a connecting-rod a reciprocating motion is imparted from this crank to a vertical rod, which may operate a pump or other elements of machinery. The main shaft, on which is the crank, is mounted horizontally in a bearing formed in the main frame, which surmounts a tubular pivot or shaft, through which the reciprocating rod works. The tubular pivot or shaft, with its surmounting frame, is fitted to turn in a hollow post or support, and mounted concentrically with this pivot is a tail-piece, from which extends the tail-bar carrying the main vane, which serves to hold the wind-wheel in the wind. Secured to a bar which extends from the main frame of the machine, and so that it stands in a plane parallel with and projecting beyond the wind-wheel, is a side vane, and when the wind blows with undue violence it exerts a tendency upon this side vane to turn the wind-wheel out of the wind, and thus stop the operation of the machine. The main frame and pivot and the tail-piece are connected by a weighted lever, and when the wind blows with such violence that by acting on the side vane it turns the wheel out of the wind the said lever is raised.

One object of my invention is to construct the upper guide-rod, which forms an upward prolongation of the reciprocating rod, so as to provide for the ample and economical lubrication of its bearing. The reciprocating connecting-rod, which operates through the tubular pivot, is square or of such other transverse section that it cannot readily turn in its guides. It is in any case of such transverse section that its exterior surface is at different distances from its center in different directions, and I provide guides at the top and bottom of the main pivot, through which the said rod works, and to which the rod is fitted in such manner that it is prevented from twisting. To guide the connecting-rod, I apply caps to opposite ends of the main pivot. One of these caps has in it a guide fitting the said rod, and in the other cap I provide a bore or socket, within which is turnable a guiding-bushing, also fitting the rod. The cap having the fixed guide, which may be upon the top of the main pivot, being properly secured in place, the lower cap is turned so as to bring the guiding-bushing in line with the upper guide, the guiding-bushing being free to turn in its bore or socket, so that the connecting-rod may be without twist, and then the guiding-bushing is secured against turning in the bore or socket to which it is fitted, so that the connecting-rod may be worked truly and without twisting.

A further object of the invention is to provide means whereby the weight which is applied to the lever connecting the main frame and pivot with the tail-piece will, whenever said lever is raised by the action of the wind upon the side vane, be moved outward upon the lever away from its pivot, and whereby the weight will exert a constantly-increasing force of resistance to the raising of the lever as the latter is lifted by the wheel swinging out of the wind.

A further object of the invention is to provide the main frame with a yoke within which is a bearing for the main shaft, and which is so constructed that it may be opened upon the side for removing the cap of the bearing and the main shaft itself by a lateral movement of the cap and shaft from the bearing.

The invention will be hereinafter more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of the upper portion of a mill embodying my invention, looking at the edge of the windmill and directly toward the side of the main vane. Fig. 2 is a rear elevation of the machine, the main vane being removed and the tail-bar thereof being in section through the dotted line *s s*, Fig. 1. Fig. 3 is a partly-sectional elevation, upon a larger scale, of the upper portions of the main frame and the tail-piece which carries the vane, including also the crank and pitman and a portion of the reciprocating rod, which is operated by the rotary motion of the wind-wheel. Fig. 4 is a vertical section, upon the same scale as Fig. 3, of the lower portion of the main frame and tail-piece, the main pivot and the

hollow post or support wherein it is turnable; and Fig. 5 is a transverse section of the main frame upon the dotted line $x\,x$, Fig. 3, looking toward the right hand from said line and including a portion of said frame above and below the bearing of the main shaft.

Similar letters of reference designate corresponding parts in all the figures.

A designates the wind-wheel, which, as here represented, consists of a frame $a$, which may be of wood or metal, and vanes or blades $a'$ secured thereto. The wheel may be braced at the center by brace-rods $a^2$, applied as shown in Fig. 1. The wind-wheel A is held in the wind by the main vane B, which always stands pointed toward the direction from which the wind is blowing. This vane B is mounted upon a tail-bar B′, and this tail-bar B′ is fast in a pivoted tail-piece $B^2$, and to it is applied a brace-rod $b$, which extends from the top of the tail-piece $B^2$. The wind-wheel A is mounted upon a main shaft C, which is journaled in a suitable bearing $c$ in a main frame C′. This main frame C′ is supported upon a main pivot $C^2$, which is vertical, and is shown most clearly in Fig. 4. The main pivot $C^2$ is mounted in a hollow post or support $C^3$, which is recessed out usually, and forms bearing-surfaces $c'$ within it at the top and bottom for the main pivot $C^2$.

$C^4$ designates a lower guide or bearing, which is secured to the same structure D to which is attached the hollow post or support $C^3$, and which forms a lower bearing for the main pivot $C^2$. The main frame C′ is secured fast to the upper end of the tubular main pivot $C^2$, and the lower end or the eye of said frame, which fits upon the pivot, forms a shoulder $c^2$, which rests upon the bearing $c^3$, formed by the upper end of the hollow post or support $C^3$, and this bearing supports the weight of the entire structure resting upon the main pivot $C^2$. The upper end of the hollow post or support $C^3$ may have an annular flange $c^4$, which forms an oil-cup surrounding the thrust-bearing $c^3$ and to prevent dripping of the oil downward.

The manner in which the tail-piece $B^2$ is supported is best represented in Figs. 3 and 4. At the lower end the tail-piece $B^2$ has an eye $b'$ turnable upon the upper end of the main pivot $C^2$, which projects above the eye of the main frame C′, fitted upon said pivot, and at the upper end of the main frame is a hub or cylindric neck $c^5$, which is surrounded by an eye $b^2$ upon the upper end of the tail-piece $B^2$. Upon the lower end of the tail-piece $B^2$, and extending at angles of rather more than ninety degrees from the eye or socket $b'$, are horns or projections $b^3\,b^4$; and in the main frame C′, in such position as to strike against one or other of these horns or projections when the main pivot $C^2$ turns, are india-rubber or other spring buffers $c^6$, which strike against one or other of the horns $b^3\,b^4$ of the tail-piece $B^2$.

I here make no claim to this construction of the tail-piece with its horns or abutments, or of the main frame C′ with its bumpers $c^6$.

Upon the main shaft C is a crank $C^5$, (here shown as a disk, and in which is fitted a crank-pin $c^7$.)

E designates a vertically-reciprocating rod, to which motion is imparted by the crank $C^5$. A yoke E′ surmounts this rod E, within which operates the pitman $E^2$, jointed upon the crank-pin $c^7$, and the upper end of this pitman $E^2$ is fitted to a wrist-pin $e$, secured in an eye or fork $e'$ in the upper part of the yoke E′. Surmounting the yoke E′, and in line with the rod E, forming a continuation thereof, is an upper guide-rod $E^3$, which is fitted to an upper bearing $e^2$, formed within the circular hub or projection $c^5$ upon the top of the main frame C′, as best shown in Fig. 3.

The lubrication of the bearing $e^2$, through which the upper guide-rod works, is ordinarily a difficult matter, and by the construction here shown I provide for its automatic and economical, yet ample, lubrication. The upper guide-rod $E^3$ is hollow through at least that portion of its length which works in the bearing $e^2$, and, as here shown, it is formed by a piece of tube inserted into a socket $e^3$ in the upper end of the yoke E′. This guide-rod $E^3$ is closed at the upper end by a cap or stopper $e^4$, which may be secured in place by a screw $e^5$, and when this cap or stopper $e^4$ is removed the guide-rod may be filled with oil or grease, and, if desired, it may also be packed with cotton waste or analogous capillary material. In the portion of the rod $E^3$ which works in the bearing $e^2$ are one or more lateral openings $e^6$, through which the grease or lubricant may exude to supply the bearing-surfaces of $e^2$ and the guide-rod $E^3$, and at the upper end of the bearing $e^2$ is constructed a cup or counterbore $e^7$, which is closed by a cap $e^8$. As here represented, this cap has an inwardly-projecting flange $e^9$, which engages with an outwardly-projecting flange $e^{10}$ on the top of the oil-cup $e^7$. The flange $e^9$ may be notched at different points around its circumference, as may be also the flange $e^{10}$, and the cap $e^8$ may be applied by passing it downward over the notched flange $e^{10}$ and then turning it so that the inwardly-extending portions of the flange $e^9$ will lock under the outwardly-extending lugs or portions of the flange $e^{10}$. The cup $e^7$ is usually filled with waste or like material.

The bearing $c$ for the main shaft C has a cap $c^8$, which is secured in place by bolts $c^9$, and this cap is fitted within a yoke $d$ in the main frame C′, as best shown in Fig. 5. One side of this yoke is formed by a removable piece $d'$, secured in place by bolts $d^2$. When the main shaft is to be removed from its bearing $c$, the bolts $d^2$ are removed and the removable cap portion $d'$ of the main frame C′ taken out. Then the bolts $c^9$ are removed,

and the cap $c^8$ and the main shaft C may be removed laterally from the bearing $c$ and out of the main frame C′.

Presented in a plane parallel with the plane of the wind-wheel A, and projecting laterally beyond the circumference thereof, is a side vane F, which is mounted upon a bar $f$, secured fast in the main frame C′, and any increased force of the wind blowing against this vane tends to turn the wind-wheel A out of the wind.

F′ designates a lever, which is fulcrumed at $f'$ upon a stud secured in the main frame, as best shown in Fig. 4, and this lever F′ has a shorter arm $f^2$ extending upward and connected by a link or shackle connection $f^3$ with the tail-piece $B^2$, as best shown in Fig. 1. The tail-piece and the vane B always stand in a line in which the wind is blowing, and consequently as an increased force of the wind upon the side vane F tends to turn the wind-wheel and the main frame C′ with the main pivot $C^2$ the fulcrum $f'$ of the lever F′ is moved, and as the shorter arm $f^2$ of the lever is held fast by the tail-piece $B^2$ the lever F′ is raised or swung upward on its fulcrum.

To the lever F′ is applied a weight $f^4$, and according to my invention the weight as the lever F′ is swung upward is moved outward upon the lever and thereby increases the resistance which the lever offers to the swinging of the wheel A out of the wind by the increased force against the side vane F.

The weight $f^4$ is composed of two parts, as shown in Fig. 1, having interposed between them a roller $f^5$, which runs upon the upper edge of the lever F′, and from the weight $f^4$ a rod or connection $f^6$ extends upward to the point $f^7$, where it is pivoted to a link or rod $f^8$, hung at the point $f^9$ from the main frame C′. Consequently, as the lever F′ swings upward, the link $f^8$ swings upon its upper pin, from which it is hung, in the direction indicated by the arrow thereon in Fig. 2, and as said lever is swung up toward a horizontal position the weight $f^4$ is slid downward toward its outer end, and thus opposes an increased load to the rising of the lever.

Upward through the main pivot $C^2$ extends a governor-rod $g$, which is connected at its upper end with a chain $g'$, which passes over a pulley $g^2$ at the upper end of the main frame C′, and this chain $g'$ is connected to an arm $g^3$ upon the lever F′. Consequently, by pulling downward upon the governor-rod $g$, the lever F′ is lifted and the wind-wheel A is swung round out of the wind.

It is necessary to provide a suitable guidance for the reciprocating rod E, which is operated by the crank $C^5$, and which works upward and downward through the tubular main pivot $C^2$. This rod is of such form that it will be guided in a direct line and cannot turn or twist in its guides. In any case it should be of such transverse section that its exterior surface is at different distances from its center, measuring in different directions from the center, and one of the most convenient forms to secure this result is to employ a square rod E, which is here represented. Upon the opposite ends of the main pivot $C^2$ are applied caps G G′, which are turnable upon the pivot and may be secured in place by set-screws $g^4$.

As here represented, the cap G, which is at the upper end of the main pivot $C^2$, has a guide $g^{4*}$ formed integral with it, and through which operates the rod E, the rod being fitted to the guide so that it cannot turn therein. The cap G, having been turned upon the main pivot $C^2$, is secured in such position that its guide $g^{4*}$ will hold the rod E in proper position. The cap G′ upon the lower end of the main pivot $C^2$ is likewise turned so that a cylindric bore or socket $g^5$, with which it is formed, will be in line with the rod E.

To the cylindric bore or socket $g^5$ is fitted a guiding-bushing $g^6$, which may be held in place within the bore or socket by a set-screw $g^7$. In the guiding-bushing $g^6$ is an external circumferential groove or recess $g^8$, which receives the end of the set-screw $g^7$, and which will consequently hold the guiding-bushing vertically in position even when the set-screw is loosened, so as to permit the guiding-bushing to turn readily within the bore or socket $g^5$. The upper cap G having been adjusted so that its guide $g^{4*}$ is in proper position, and the lower cap G′ having been turned so that its bore or socket $g^5$ is also in proper position, the set-screw $g^7$ is loosened, and the guiding-bushing $g^6$, which corresponds in its central hole to the form of the rod E, is left free to turn, so that the rod E may hang in proper line and straight, and then the set-screw $g^7$ is tightened, thereby holding the guiding-bushing $g^6$ against turning, and providing a proper guide for the square rod E at the lower end as well as at the upper end of the tubular main pivot $C^2$.

In the caps G G′ are formed openings $g^9$, which are eccentric to or out of line with the rod E, and through which the governor-rod or pull-rod $g$ works loosely.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a windmill, of a main frame having an upper vertical bearing, a reciprocating rod surmounted by an upper guide-rod fitting said bearing, the portion of the guide-rod working in said bearing being hollow to form a reservoir for lubricant, and having in its portion working in said bearing one or more lateral openings for the escape of lubricant to the bearing-surfaces, substantially as herein described.

2. The combination, in a windmill, of a tubular main pivot and surmounting frame, a hollow post or support wherein the pivot may turn, a reciprocating rod working through the pivot and having its transverse section such that its exterior surface is at different dis-

tances from its center in different directions, and guides for said rod having surfaces against which said rod bears, conforming in shape to the shape of the rod, said guides being secured on the pivot so as to move with the pivot, one of said guides being arranged near the top of said pivot and the other near the bottom thereof, substantially as specified.

3. The combination, in a windmill, of a tubular main pivot and a surmounting frame, a hollow post or support wherein the pivot may turn, a reciprocating rod working through the tubular pivot and having such a transverse section both near the top and the bottom of the pivot that its outer surface is at different distances from its center measuring in different directions from its center, a cap applied to one end of the pivot and having a guide fitting the said rod, and a cap applied to the other end of the pivot and turnable thereon, and having a bore or socket, and a guiding-bushing conforming in shape internally to the rod and turnable in said bore or socket to guide said rod without twisting, substantially as herein described.

4. The combination, with the main pivot $C^2$ and its surmounting frame C′, of the hollow support $C^3$, the caps G G′, applied to opposite ends of the pivot, the cap G having a guide $g^{4*}$, and the cap G′ having a guiding-bushing $g^6$ turnable within it, and both caps having the openings $g^9$, the reciprocating rod E, of square or analogous transverse section, fitting the guides $g^{4*}$ $g^6$, and the pull-rod $g$, working through the openings $g^9$ in the caps G G′, substantially as herein described.

5. The combination, with a wind-wheel A and a main shaft on which it is supported, of a main pivot $C^2$, and a surmounting main frame C′, having a yoke $d$, wherein is the bearing for the main shaft, and one side of which is formed by a removable side piece $d'$, and a cap for the said bearing held within the yoke and secured in place independently of the said removable side piece $d'$, substantially as herein described.

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Witnesses:
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