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WINDMILL.

No. 428,849. Patented May 27, 1890.

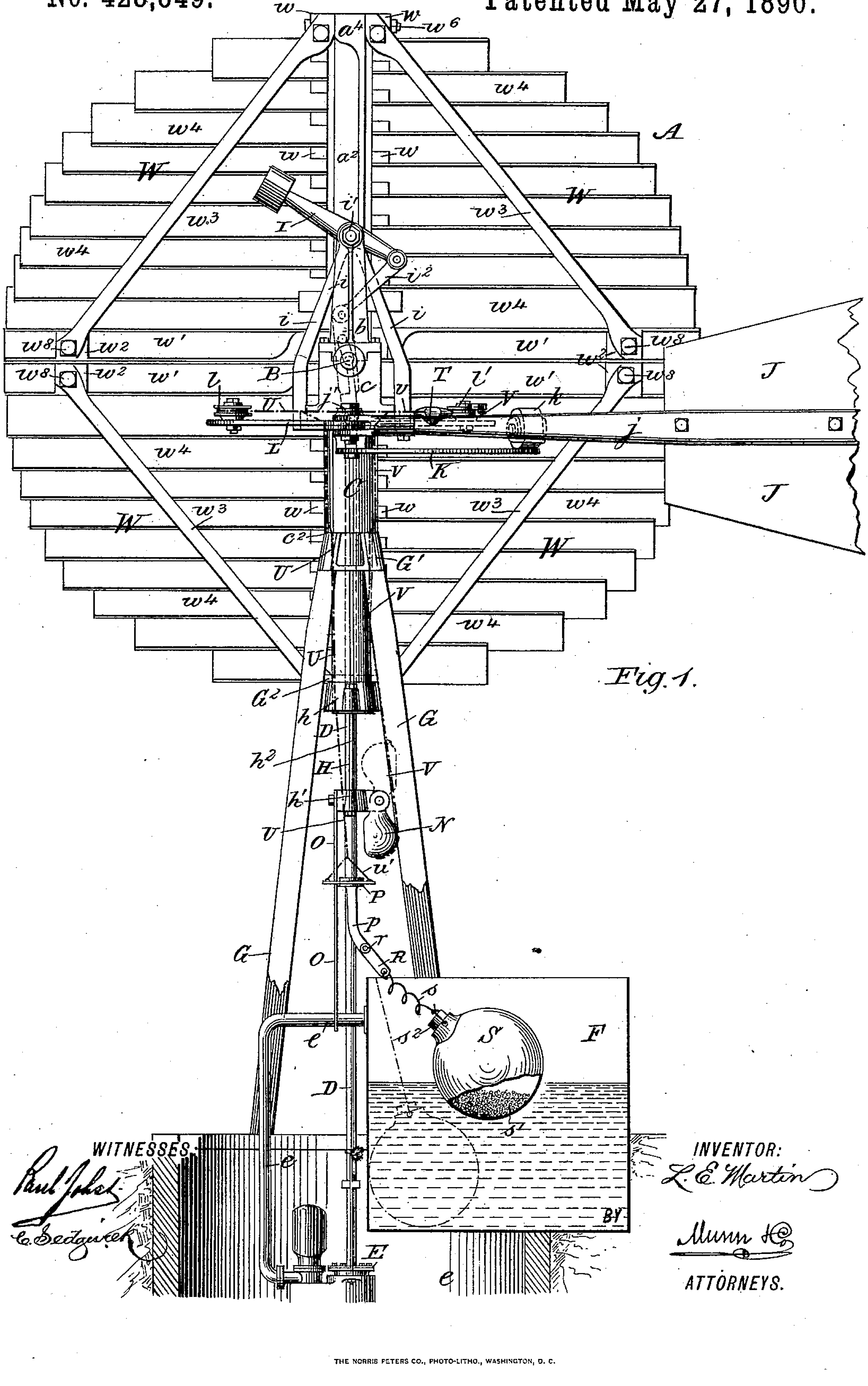

Fig. 1.

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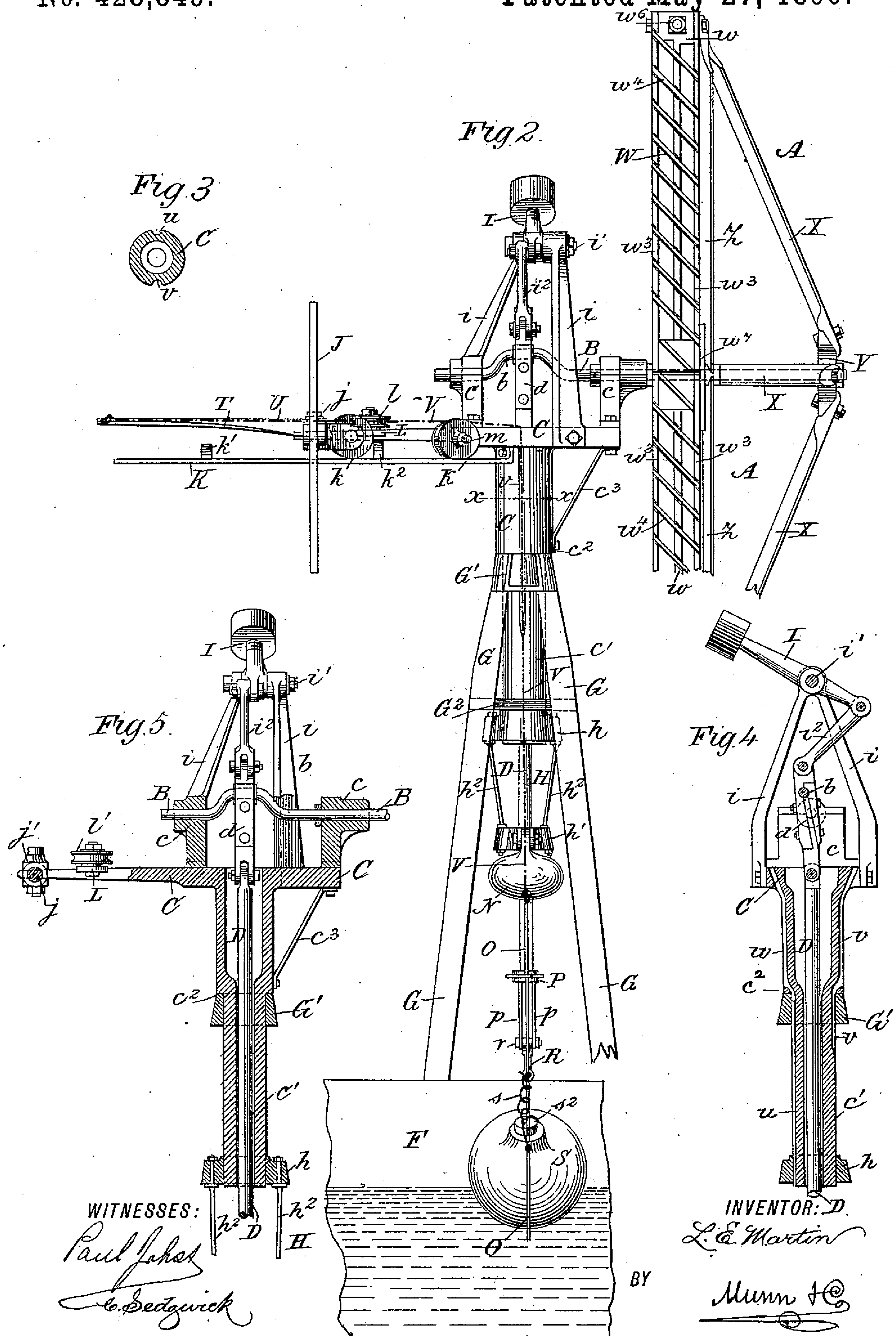

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Fig. 6.

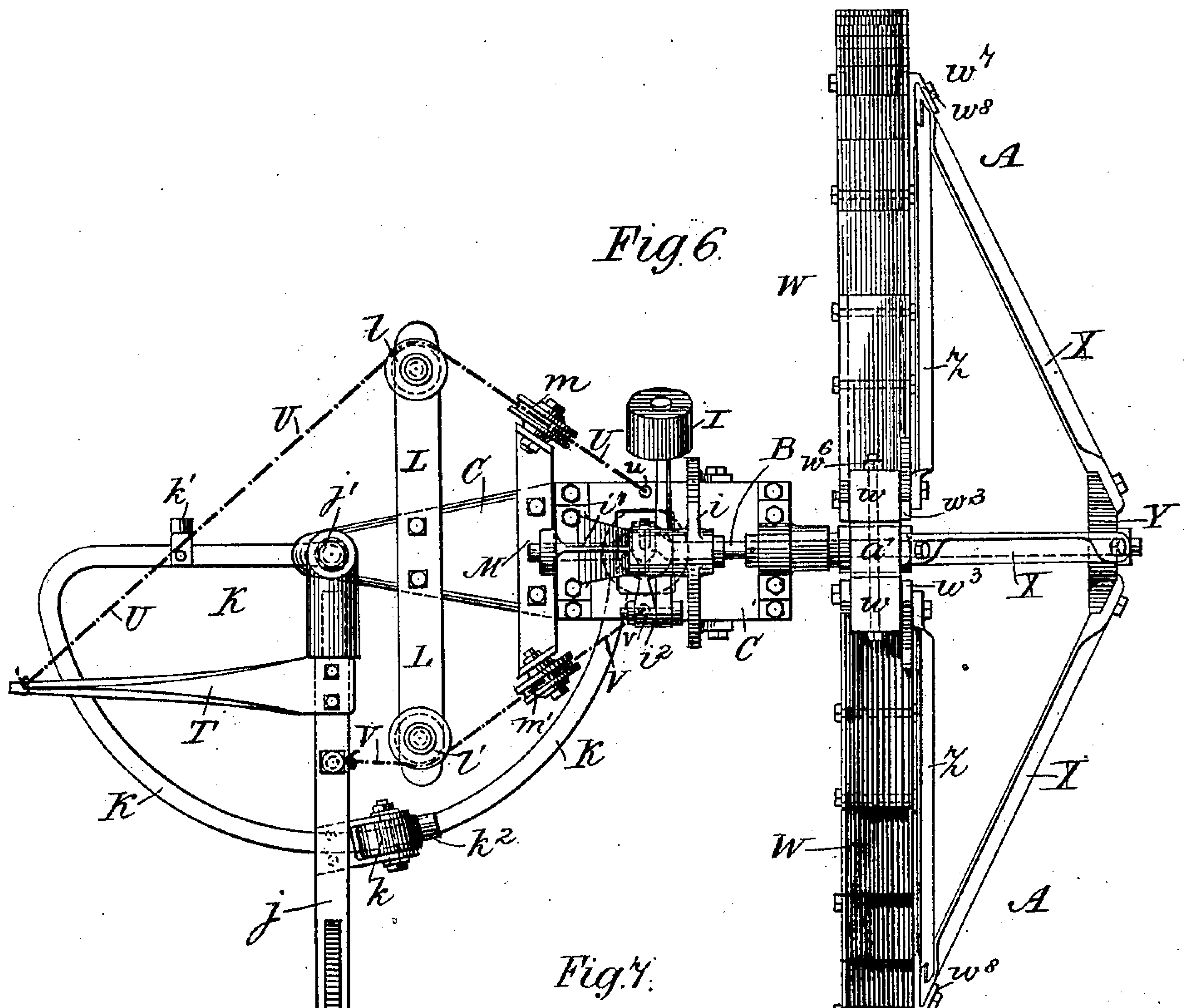


Fig. 7.

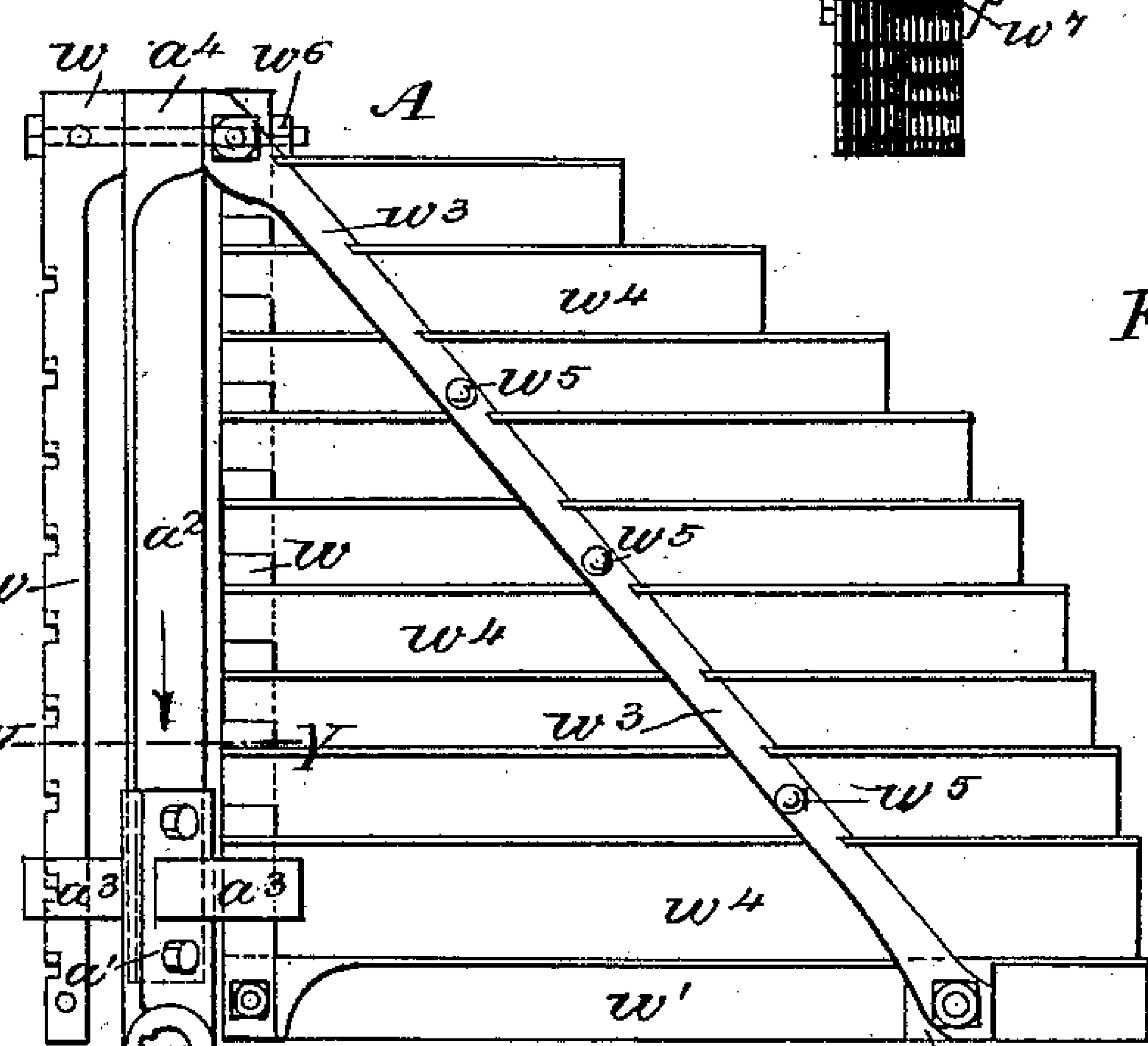


Fig. 8.

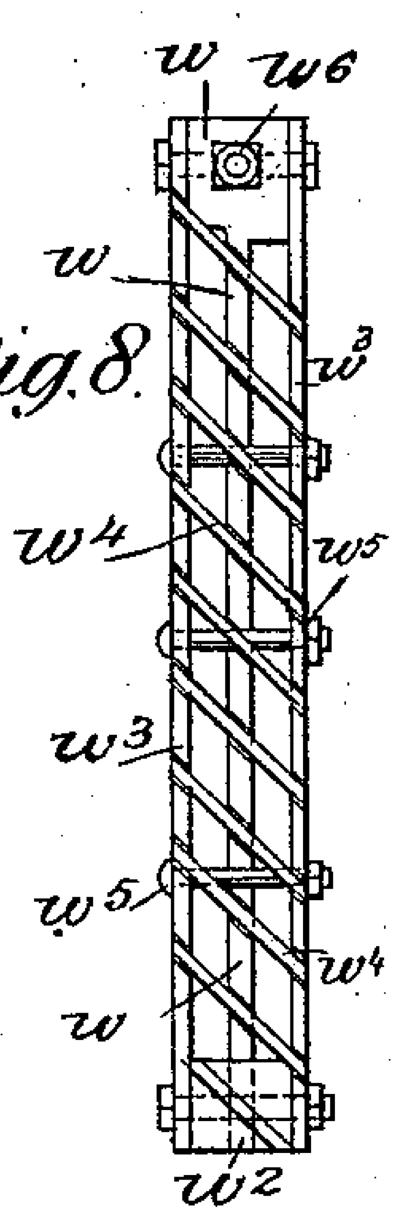
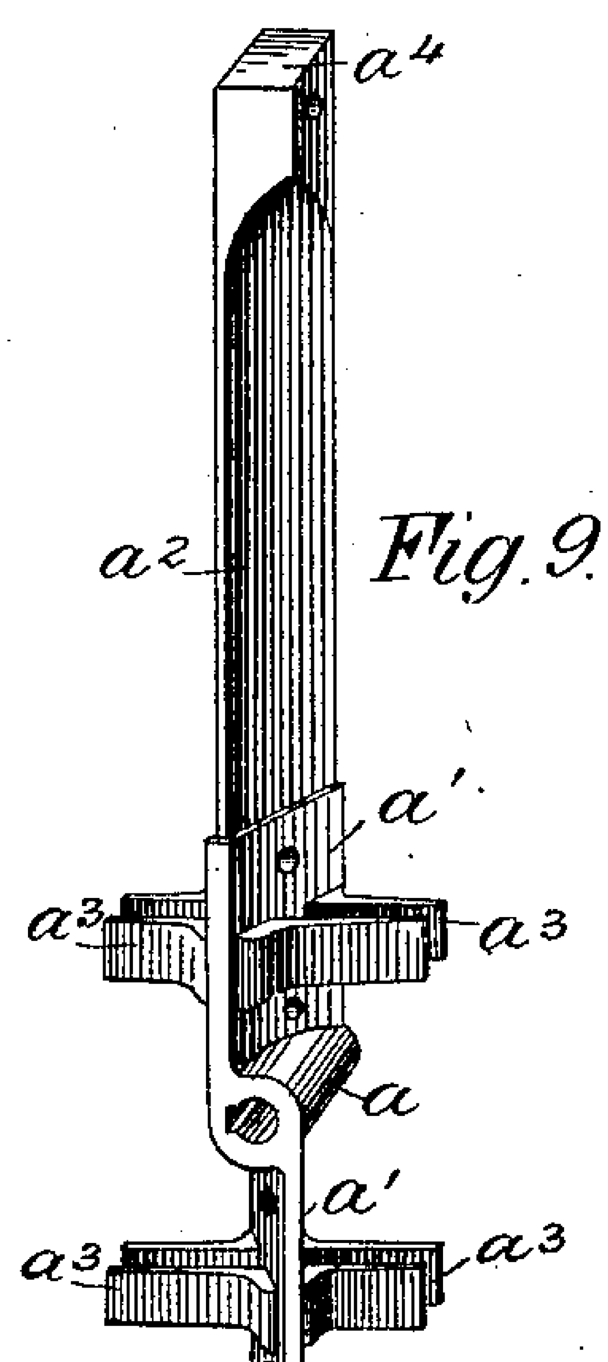


Fig. 9.



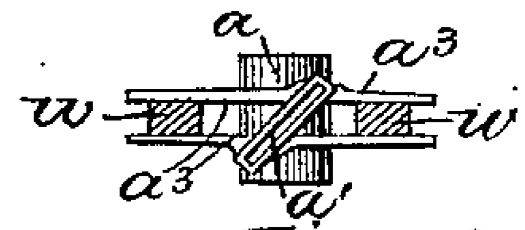
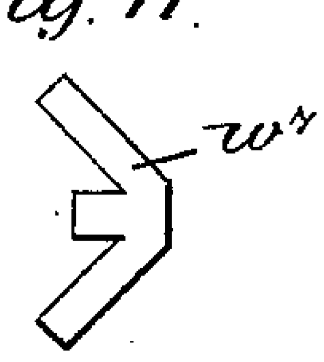


Fig. 10.

Fig. 11.



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UNITED STATES PATENT OFFICE.

LINCOLN E. MARTIN, OF EMERY, (DAKOTA TERRITORY,) SOUTH DAKOTA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 428,849, dated May 27, 1890.

Application filed July 6, 1889. Serial No. 316,697. (No model.)

To all whom it may concern:

Be it known that I, LINCOLN EDMOND MARTIN, of Emery, in the county of Hanson and Territory of Dakota, have invented a new and Improved Windmill, of which the following is a full, clear, and exact description.

The invention consists in certain novel features of construction and combinations of parts of the windmill, all as hereinafter described and claimed.

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 is a rear view of my improved windmill, shown out of gear, and the pump, which is shown in a well from which water is pumped to the tank having a float, which, when the water falls too low, will pull the mill into gear again. Fig. 2 is a view of the mill, taken at right angles to Fig. 1, and partly broken away. Fig. 3 is a detail cross-section of the main head-casting of the mill, taken on the line *x x* in Fig. 2. Fig. 4 is a detail vertical sectional view of the head-gearing of the mill, taken in the plane of Fig. 1. Fig. 5 is a detail vertical sectional view of the gearing, taken in the plane of Fig. 2. Fig. 6 is a plan view of the mill. Fig. 7 is a face view of one quarter-section of the wind-wheel and parts of adjacent sections thereof. Fig. 8 is an outside edge view of the wind-wheel section. Fig. 9 is a perspective view of the wind-wheel hub and one of the two main or fixed bars or arms of the wheel. Fig. 10 is a detail view in section on the line *y y* in Fig. 7, and Fig. 11 is a front face view of one of the brace-irons of the wind-wheel.

The wind-wheel A, which has a peculiar construction, hereinafter explained, is keyed or otherwise fixed to a shaft B, which is journaled in bearings *c c*, formed on or fixed to the main casting or head-plate C of the mill, and, as shown, has a cranked portion *b*, to which is held by a halved coupling-link or pitman *d* the upper end of a pump-rod D, which passes down through the hollow pendent stem or shank of the head-plate C, and is connected in any suitable manner with a pump E, which may be in a well or near it, and is adapted to discharge water taken by it from the well into an adjacent float-tank F through a pipe *e* to maintain a water-supply to buildings or farms for household or stock purposes. The tubular shank of the main casting or head-plate C is reduced at its lower part *c'* to provide a shoulder c^2, which rests and turns on top of a casting or cap-plate G', which is secured to the top of the mill-frame or tower G, and preferably by a bolted dovetailed connection of the tower corner-posts. The head-plate shank portion *c'* also has a bearing in a lower casting or plate G^2, fixed to the tower, and projects a little below this plate to receive the upper collar *h* of a skeleton frame H, to which is connected a weight, by which the mill is pulled out of gear, as hereinafter described. A metal brace c^3, bolted to the top and shank of the head-plate C at the side next the wind-wheel prevents breakage of the plate by the overhanging weight of the wheel.

In bearings *i i*, secured to the head-plate C, is journaled or held a shaft *i'*, which is the pivot or fulcrum of a counterweighted lever I, which at its light shorter end is pivoted to one end of a link or rod i^2, which at its other end is pivoted to the upper portion of the pump-rod pitman *d*, a little above the crank *b* of the wind-wheel shaft. This counterweighted lever I assists the movements of the cranked shaft past its dead-center as it is turned by the wind-wheel.

The wind-vane J is pivoted by its arm *j* to the extremity of the rearward prolongation of the head-plate C at *j'*, and to the vane-arm is suitably held a box or shackle carrying a guide and anti-friction roller *k*, which runs on a track K, which is fixed to the head-plate and has the general form shown in Fig. 6 of the drawings. The outer portion of this track K is curved in the arc of a circle having the vane-pivot *j'* as a center, and to the track are fixed two stops or detents k' k^2, against which, respectively, the vane-roller *k* rests when the mill is thrown into and out of gear. The roller now rests against the stop k^2, as the mill is shown out of gear in the drawings.

To the head-plate C is bolted a transverse bar or plate L, which at opposite ends carries rollers or sheaves *l l'*, which turn on vertical axes, and a transverse bar or plate M, which is also bolted to the head-plate, carries at its extremities the rollers or sheaves m m', which turn on horizontal axes, the plate L being outside of the plate M, all as shown most clearly in Fig. 6 of the drawings.

The skeleton frame H, above mentioned, consists of the upper collar h, which is bolted or otherwise fastened to the reduced lower end c' of the stem of the head-plate C, so as to turn with the head-plate, and a lower collar h', connected to the upper collar by a couple of tie-rods h^2. The collar h' has a central bore, through which the reciprocating pump-rod D freely passes, and at one side of this collar are provided a pair of lugs or ears, to and between which is pivoted one end of a weight N. To the lower collar h' of the frame H is fixed the upper end of a rod O, which extends downward quite a little distance and passes freely as a guide through a plate or swivel piece P, through which the pump-rod D also passes freely. This plate P has fixed to its under side a couple of parallel arms p p, which range downward one at each side of the pump-rod, and at their lower parts are bent to one side to allow pivoting to them at r of the upper ends of an arm or stirrup R, which thus is held clear of the pump-rod, and to the extremity of which arm is connected one end of a chain or rope s, the other end of which is connected to a float S, which is in the tank F, and is preferably made as a hollow ball or sphere filled with lead or shot s' to an extent which will cause the float to have sufficient weight to lift the weight N as the mill is swung around into gear by the falling weight S, when the level of water in the tank falls too low. After the float is charged with a sufficient quantity of shot or lead I purpose forcing air into it and then sealing or closing its mouth by a cork s^2. (See Fig. 1 of the drawings.)

It will be noticed that as the head-plate C swings around as the wind-wheel A comes into or goes out of gear the skeleton frame H will also turn a little, as also will the swivel-plate P, which is, however, restrained from independent turning by the guide-rod O, on which the plate P slides as the mill is thrown into or out of gear; and as the plate-arms p p and stirrup R are turned only as the head-plate C and frame H are turned there is no danger of entanglement of the float rope or chain s with the pump-rod.

To the vane-arm j and next its metal pivot-socket is fixed a laterally-projecting arm T, to the extremity of which is secured one end of a rope or chain U, which passes thence to and outside the guide-pulley l on the bar L, and over the guide-pulley m on the bar M, and thence downward through a hole and a guide-groove u in the main head-plate C, and through passages in the collars h h' of the frame H to a bail u', which is attached to the swivel-piece P, to which the float S is connected, as hereinbefore explained. To the vane-arm j, a short distance from the arm T, is connected one end of a rope or chain V, which passes thence to and outside the guide-pulley l' on the bar L to and over the pulley m' on the bar M, and thence downward through a hole and a groove v in the head-plate C to the lower end or part of the weight N, with which it is connected. The ropes U V are of such relative length that when the weight N is down the float S is up, and vice versa.

It is obvious that when the pump E has been operated long enough to cause the rising water in the tank F to lift the float S to the required height the weight N will fall, and by drawing on the rope V will pull the mill around out of gear or to the adjustment shown in Figs. 1, 2, and 6 of the drawings, and the pump will then stop; and when the water is exhausted sufficiently from the tank the float S will fall with the water-level, and the superior weight of the float will cause it to pull down the arm R, plate P, and rope U, and thereby pull the mill back into gear as the weight N is lifted, whereby the pump E will be started again to replenish the water-supply in the tank until the next time the float S is lifted sufficiently to allow the weight N to fall and again pull the mill out of gear.

I describe the peculiar construction of the wind-wheel A as follows: The wheel is made with a metal hub a, which is provided with two diametrically-opposite wing portions a' a', made hollow to serve as sockets into which the inner ends of two wooden bars a^2 a^2 are fitted and bolted. The sockets a' stand at angles of about forty-five degrees with the axis of the wind-wheel shaft, and the two sockets are inclined one the reverse of the other. Each socket is provided at opposite faces with a pair of lugs a^3 a^3, which at their opposing faces range at right angles to the plane of the wind-wheel shaft, and each pair of lugs is adapted to receive between them the inner part of the radial bar w of the adjacent quarter-section W of the wind-wheel. The bars a^2 are made thin from their sockets a' nearly to the outer end, which is built up to make a square or rectangular block a^4, to which the outer ends of the bars w w of two adjacent sections W of the wheel are bolted. The thin body or blade portions of the opposite bars a^2, which, like their sockets a', stand at reversely-inclined angles to the plane of rotation of the wheel, form effective fan-blades to increase the power or driving capacity of the wheel.

Each of the four fan or blade sections W of the wind-wheel is made with a bar w', which is bolted to the inner end of the bar w, and ranges about at right angles therewith, and for the most part is formed as an inclined fan or blade to the wheel, and near its outer end is thickened or built up at w^2 at opposite sides to allow bolting to it of the ends of a pair of brace-bars w^3 w^3, which at their other ends are bolted to the outer end of the bar w. The bars w w' and w^3 w^3 thus form a strong triangular frame, in which the series of fan blades w^4 of the section W are held. These blades w^4 are each notched at the inner end to fit around the section-bar w, which also is notched to receive the center of the notched end of the blade, and each blade w^4 is also notched at opposite edges to fit around or over the opposing edges of the stay-bars w^3, which are also notched at their outer edges to receive the blades. It is obvious when the blades w^4 are thus fitted to the section and brace-bars w w^3 w^3, and after bolts w^5 are passed through the bars w^3 w^3 and the blades—say for every fifth or sixth blade—the entire series of blades will be securely held to each section W of the wind-wheel. Figs. 7 and 8 of the drawings clearly show the construction of one of the sections; but in practice there will be a larger number of fan-blades w^4 in the sections than are represented in the drawings.

In assembling the parts of the wind-wheel the four sections W will be laid so that their bars w lie parallel with the two main-wheel bars a^2 a^2, and the bars w' of the sections will then also lie parallel, (see Fig. 1 of the drawings,) whereupon the ends of the bars w and a^2 will be secured by bolts w^6, ranging parallel with the wheel-face, and the outer parts of the pairs of bars w' will be secured together by means of angular metal plates w^7 (shown in Fig. 11 of the drawings) and applied at the outer face of the wheel and fastened by bolts w^8. When this is done, a series of stay-bars X will be bolted to the outer frame-bars of the wheel and to a casting or band Y, fixed to the outer end of the shaft B, on which the wheel is keyed fast. The outer ends of two of the stay-bars X are preferably bolted to central lugs on the stay-plates w^7, and the outer ends of the other two stay-bars are preferably bolted to the enlarged ends a^4 of the wheel-bars a^2. These stay-bars X are formed at their center parts and for most of their length as inclined blades, which take the wind and assist in rotating the wheel. I also employ a series of four auxiliary brace or stay bars Z, which overlie the outside frame-bars w^3 of the wheel-sections W. One end of each of these stay-bars Z is fixed to an outer end of the outside bar w^3 near the extremity a^4 of the wheel-bar a^2, and the other end of each bar Z is notched and interlocked with the extremity of the stay-bar X, to which the angle-iron brace w^7 is fixed. The stay-bars X, like the ones Z, are formed flat for the most part, and are set at inclines, so as to catch the wind and assist in turning the wheel.

As shown in Figs. 1 and 2 of the drawings, the blades w^4 of one half of the wheel or in two of its sections W incline in the same direction, and the blades of the other half or in the other two of its sections W incline in the opposite direction. It will be noticed that when the mill is in operation the two wheel-arms a^2 a^2 take most of the resistance independently of direct pressure on the wind-wheel shaft, and as the outer ends of the wind-wheel sections W are braced to each other the leverage of the sections will be directly applied through the arms a^2 a^2 to rotate the wheel without overstraining its shaft. Should any portion of the wheel be broken, it may be readily and cheaply repaired, even to the extent of renewal of one entire quarter-section of the wheel.

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

1. In a windmill, the combination, with the hub a, provided with sockets a', of the bars a^2, secured in the sockets, the parallel bars w, secured to the sockets and bars a^2, the blades w' w^4, secured to bar w, and the stay-bars w^3, substantially as herein shown and described.

2. In a windmill, the wind-wheel made with a central hub a, provided with reversely-inclined sockets a' a', having lugs a^3, bars a^2, fitted in said sockets, and four separable fan-blade sections held to the bars and between the lugs a^3 and to each other, substantially as herein set forth.

3. In a windmill, the wind-wheel made with a central hub, two radial bars fixed thereto, a series of separable fan-blade sections held to said bars and to each other, a casting or band Y, held to the outer part of the wind-wheel shaft, a series of braces X, connected to said part Y and to the outer part of the wheel, and a series of braces Z, interlocked at one end with two braces X, and connected at the other end to the outer parts of the fan-blade sections, substantially as herein set forth.

4. In a windmill, the wind-wheel consisting of a central hub a, provided with reversely-inclined sockets a' a', having pairs of lugs a^3 a^3, bars a^2 a^2, fitted in said sockets and formed as fan-blades, and four separable blade-sections W, each made with a triangular frame of bars w w' w^3 w^3, and fan-blades w^4, held therein, said bars w being placed between the pairs of lugs a^3 and bolted to the outer ends of the bars a^2, brace-irons w^7, fixed to the ends of the sections W, a casting or band Y, held to the outer part of the wheel-shaft, and braces X, held at one end to the casting Y and at the other end to the brace-irons w^7 and bars a^2, substantially as herein set forth.

5. In a windmill, the wind-wheel fan-blade sections W, consisting of a triangular frame formed of bars w w' w^3 w^3, blades w^4, notched to the bars w w^3, and bolts or stays w^5, passed through the parts w^3 w^4, substantially as herein set forth.

LINCOLN E. MARTIN.

Witnesses:

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BARBARA HOTCHKIN.