

L. C. MATTHEWS.
WINDMILL.

APPLICATION FILED NOV. 3, 1906. RENEWED AUG. 13, 1909.

961,705.

Patented June 14, 1910.

2 SHEETS—SHEET 1.

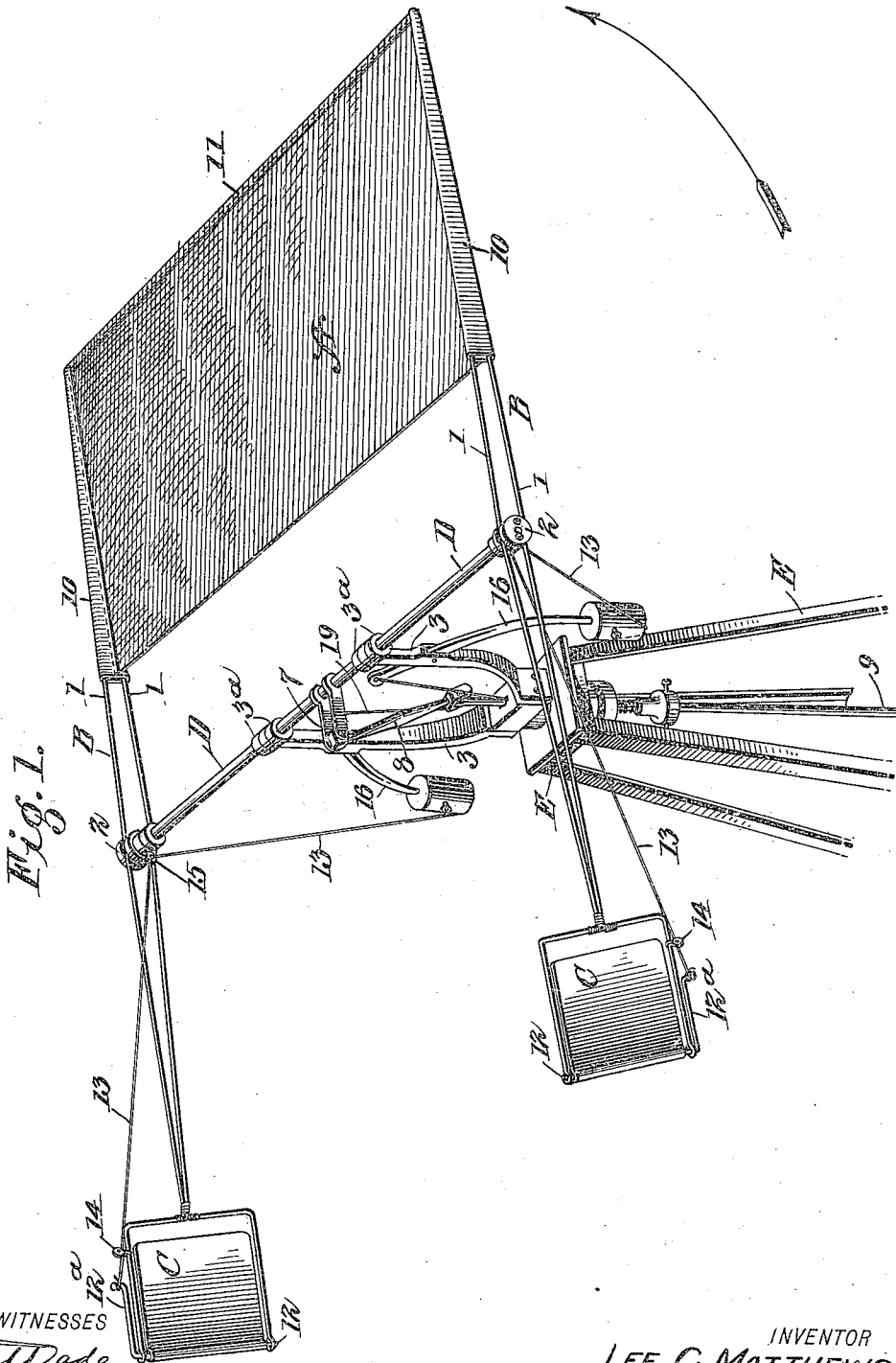


Fig. 1.

WITNESSES
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2 SHEETS—SHEET 2.

Fig. 2.

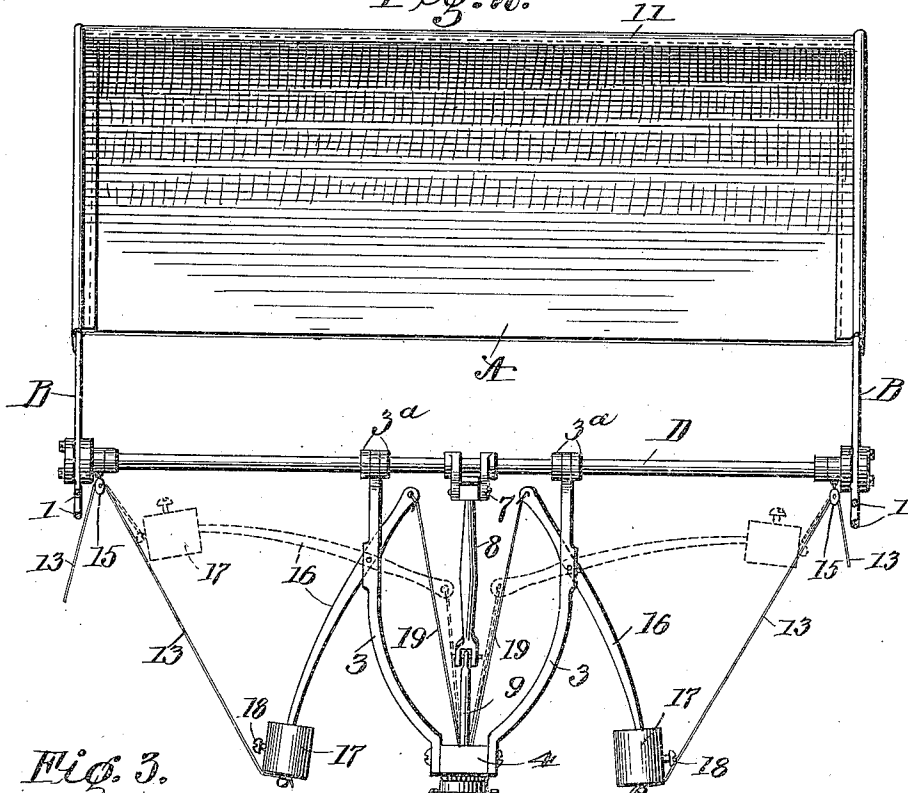


Fig. 3.

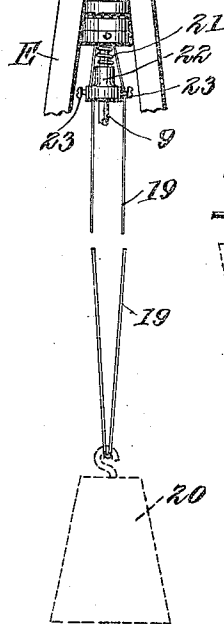
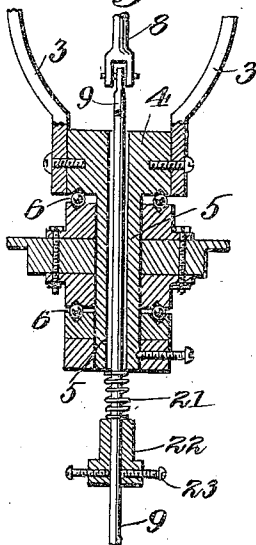
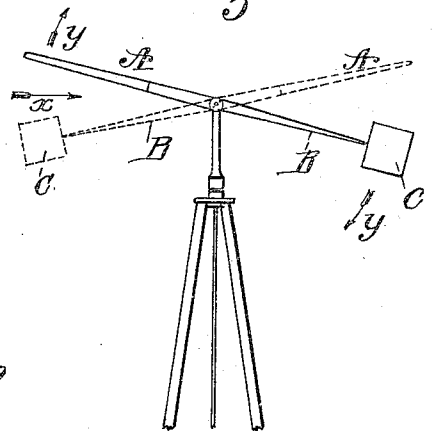


Fig. 4.



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WINDMILL.

961,705.

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To all whom it may concern:

Be it known that I, LEE C. MATTHEWS, a citizen of the United States, and a resident of San Francisco, in the county of San Francisco and State of California, have invented an Improved Windmill, of which the following is a specification.

The object of my invention is to simplify the construction and increase the efficiency of wind engines or mills, and to this end I employ a single sail which is distended in a frame mounted on the horizontal crank shaft of the mill so as to oscillate in a vertical plane and also to rotate horizontally.

The details of construction, arrangement, and operation of parts are as hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of my improved wind engine or mill, the oscillating part being shown in horizontal position. Fig. 2 is an elevation of the mill, the sail or oscillating part being shown in nearly vertical position and the frame to which it is attached being shown partly in section. Fig. 3 is an enlarged sectional view showing the bearings of the pivot shaft of the mill. Fig. 4 is a diagrammatic view for illustrating the operation of the mill.

A sail A is attached to and distended in one end of a frame B having pivoted vanes C at the opposite end. Each of the parallel side portions of the frame B is composed of two bars or rods 1, which are spread apart at the middle and secured to the heads 2 that are fixed on the horizontal crank shaft D. Such shaft has its bearings in eyes formed on the upper ends of crank bars 3 whose lower ends are secured to the enlarged head 4 of the vertical pivot shaft 5—see Fig. 3. The said vertical shaft is hollow and is supported in a bearing attached to the legs or standards E. Antifriction bearings are provided by balls 6, arranged as shown in Fig. 3. The crank 7 of the shaft D is connected by a rod 8 with the pump rod 9, which passes down through the pivot shaft 5 and is, in practice, connected with the pump in any preferred manner. For holding the shaft in due position, or to prevent its sliding longitudinally in the bearings provided by arms 3, collars 3^a are applied as shown in Figs. 1 and 2. The sail A is provided with side hems 10 to receive the bars 1, 1, of the frame B and also with an end hem 11 to receive the bar which connects the adjacent ends of

the side bars. The vanes C are pivoted upon crank shafts 12 having their bearings in the rear ends of the bars B. That is to say, such rear ends of the bars are provided with arms which are separated laterally and the shaft 12 has its bearings in the rear ends of the same. The crank arms 12^a of the shafts 12 are extended forward in the same plane with the vanes C, and cords 13 extend therefrom through guide pulleys 14 to other guide pulleys 15 attached to the crank shaft D, and thence down to the lower ends of levers 16—see Fig. 2—which are pivoted in the upper portions of the yoke or curved bars 3 that support the crank shaft D. Weights 17 are applied to the lower portions of the levers 16 and are provided with clamp-screws 18 so that they may be secured at any point on the levers 16 to which they may be adjusted. The weighted levers 16 serve to hold the vanes C in the normal working position, that is to say, thrown forward and parallel to each other and in the same plane with the respective side bars of the frame B. Thus the normal plane of the vanes C is at right angles to that of the main sail A. The vanes C may be made of sheet metal or canvas or other preferred material. Cords or wires 19 are connected with the inner upper ends of the weighted levers 16 and pass down through the pivot bearing of the mill and extend far enough to permit a weight 20 to be conveniently attached when required to throw the mill out of action. The weight 20 must be of sufficient size to overcome the gravity of the two weights 17 on arms 16 or in other words to raise them to the position shown by dotted lines Fig. 2, which position it is obvious allows sufficient slack of the cords or wires 13 to permit the vanes C to swing free, in place of being held rigidly parallel as shown in Fig. 1. When the vanes C are allowed this freedom of rotation, the mill is out of action. Thus, by attaching the weight 20 to the pendent cords or wires 19 the mill may be thrown out of action when required, and when the same is detached the weighted levers 16 resume their normal position indicated by full lines, Figs. 1 and 2, and the mill is thus rendered operative.

The wind acting against the sail A will force it up so that it swings vertically over to the opposite side from that shown in Fig. 1, and, since the side bars of the frame B are rigidly connected with the shaft D, it

is apparent that this movement will cause a partial rotation of said shaft and thus its crank 7 will be thrown downward so as to lower the pump-rod 9; but the wind acting against the vanes C will rotate the frame B with sail A, horizontally, a half of a revolution so the sail is brought back practically to its original position, Fig. 1, then the wind will act upon the sail as before and swing it over in a vertical plane. Thus, every time the sail A describes this movement there is one revolution of the crank-shaft and the pump-rod is reciprocated correspondingly. The operation of the mill consists therefore in successive vertical oscillations and horizontal rotations of the main sail and the frame B with its other attachments, the two sides of the sail A being alternately exposed to the action of the wind; that is to say, first one side being uppermost and then the other.

It is apparent that the horizontal rotation depends upon the vanes C, since the wind acting against them forces the frame D and sail A around horizontally and consequently if they be left free to rotate or oscillate on their crank shafts 12 the mill will be inoperative, and this, as before stated, is effected by suspending the weight 20 from the cords, or wires, 19 connected with the weighted levers 16 whereby the cords 13 are slackened and the vanes left free to swing laterally.

An understanding of the operation of the mill will be aided by reference to Fig. 4, wherein the dotted lines indicate the position of the oscillating main frame and sail when thrown down by the wind to the position indicated in Fig. 1, and the full lines indicate the alternate position of the frame and sail after the same have been rotated and the sail is again being acted on by the wind, which blows in the direction indicated by the arrow α , so that the sail is swung in a vertical arc in the direction indicated by the arrow γ . Dotted lines show the vanes C as on the side the wind is coming from, and, since they act on the same principle as a weather vane, they necessarily swing around to the other side of the pivot shaft, or to the position shown by the full lines in same figure, and by this operation the main sail A is placed in position for action. It will be understood that the main sail and frame make a half revolution horizontally between each of the vertical operations of the sail.

The wide edges 10 and 10 of sail A are intended to have, in a 14-mile wind, one-fourth the resistance that the vanes C and C have, but when the wind has reached such velocity that the pressure is four times as great as exerted by a 14-mile wind, the vanes C and C being held by weights of required size on arms 16 and 16, will ease to the wind while the edges 10 and 10 remain

firm or fixed, thus making the mill stationary in a hard wind. It is to be understood that the mill may be thrown out of gear in a wind of any velocity by simply moving the weights on levers 16 and 16. The main sail A can, of course, be made of any kind of material and may extend over frame B as far as desired.

The weights 17 and levers 16 may be done away with by simply running line, cable or chain 13 direct to bottom of tower and there attached to a lever having a movable weight to be adjusted to the required pressure. In order to use the power that is gained from a strong wind and to present the sail A in a position ready for action at an angle a little above the horizontal line, a spiral spring 21 (see Fig. 3) is coiled about the pump rod and arranged between the hollow pivot shaft 5 and an adjustable collar 22 which is secured on the pump rod by clamp screws 23, the spring being elastic enough to allow the sail A to descend below the horizontal line with the force of the momentum it has gained from a strong wind, thus giving the pump rod an additional long stroke and illustrating partially my claim of a short stroke of the pump rod in a light wind and a long stroke in a strong wind.

I desire it to be understood that while I preferably employ two vanes C, a single vane may suffice and is within the scope of my invention.

What I claim is—

1. The improved oscillating and rotating wind mill comprising a vertical pivot shaft, a horizontal crank shaft, supports for such crank shaft which are attached to the vertical shaft, a frame comprising an end bar and side bars, the latter being fixed on the ends of the crank shaft, a sail attached to one end of such frame, and vanes arranged at the other end of the same, substantially as described.

2. The improved wind mill comprising a vertical pivot shaft, a horizontal crank shaft, supports for the crank shaft which are attached to the pivot shaft, parallel side bars whose middle portions are secured to the ends of the crank shaft, a bar connecting the side bars at one end, a sail secured to such end bar and the adjacent portions of the side bars, vanes pivoted at the opposite ends of the side bars, weights suspended in the said supports, and means for connecting them with the vanes whereby the latter are held in normal position for operating the mill, substantially as described.

3. The improved wind mill comprising a vertical pivot shaft having vertical extensions, a crank shaft journaled in such extensions, a frame fixed on the crank shaft and having a sail at one end, and a vane at the opposite end, and means for holding the vane in normal position in a plane at right

angles to the main sail, substantially as described.

4. The improved wind mill comprising a hollow pivot shaft arranged vertically in a suitable bearing and provided with upward extensions, the horizontal crank shaft journaled in the extended portion of such hollow shaft, a pump rod working in the latter and connected with the crank shaft, an oscillating frame attached to the crank-shaft and having a sail at one end and a vane at the other, such frame being adapted to oscillate in a vertical plane and rotate in a horizontal plane, and means for holding the vanes in normal position, substantially as described.

5. The improved wind mill comprising a vertical pivot shaft having a vertical extension, a horizontal crank-shaft journaled thereon and adapted to rotate therewith, a frame attached to the crank-shaft so as to rotate with it and provided at one end with a main sail and at the other with vanes pivoted and adapted to swing in a plane at right angles to that of the sail, the pivots of said vanes being each provided with a crank, weighted levers pivoted in extensions of the pivot shaft, and cords connecting such levers with the cranks of the vanes and a pull cord connected with the opposite or inner ends of the levers whereby the said weighted levers

hold the vanes normally in operating position but may be elevated to allow the vanes to swing free and thus throw the mill out of action, substantially as described.

6. The improved wind mill comprising a vertical pivot shaft having a vertical extension, a horizontal crank-shaft journaled in said extension, a frame comprising side bars and a connecting end bar, the side bars being separated in vertical planes and a sail attached to the end bar and side bars and distended by the latter in such manner as to form vanes, or wind guides, substantially as described.

7. The improved wind mill comprising a vertical pivot shaft having a vertical extension, a horizontal crank shaft journaled in the latter, a frame attached to the crank shaft, a main sail attached to the frame at one end and the side portions of the latter being provided with wind guides, or vanes, and tail guides or vanes arranged at the opposite end of the frame, and means for holding them in normal position at right angles to the main sail, substantially as described.

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Witnesses:

ALBT. M. ARMSTRONG,
EDGAR B. HAYMOND.