G. W. TARR.

WINDMILL.

APPLICATION FILED DEC. 18, 1914.

1,193,310.

Patented Aug. 1, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

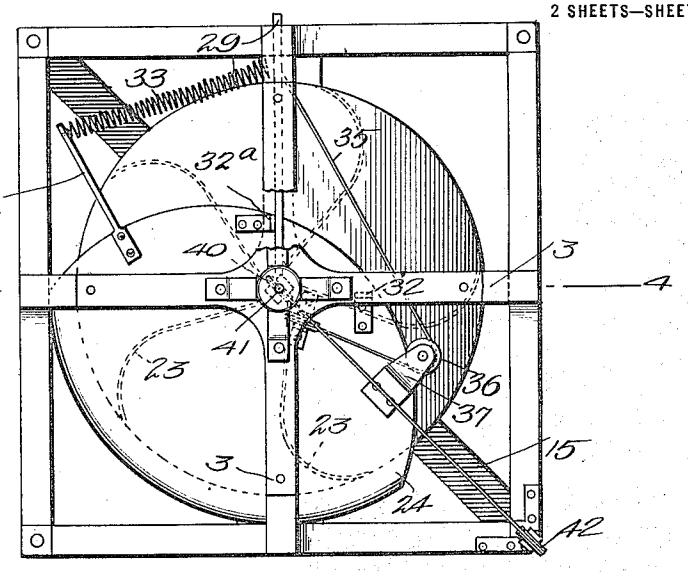
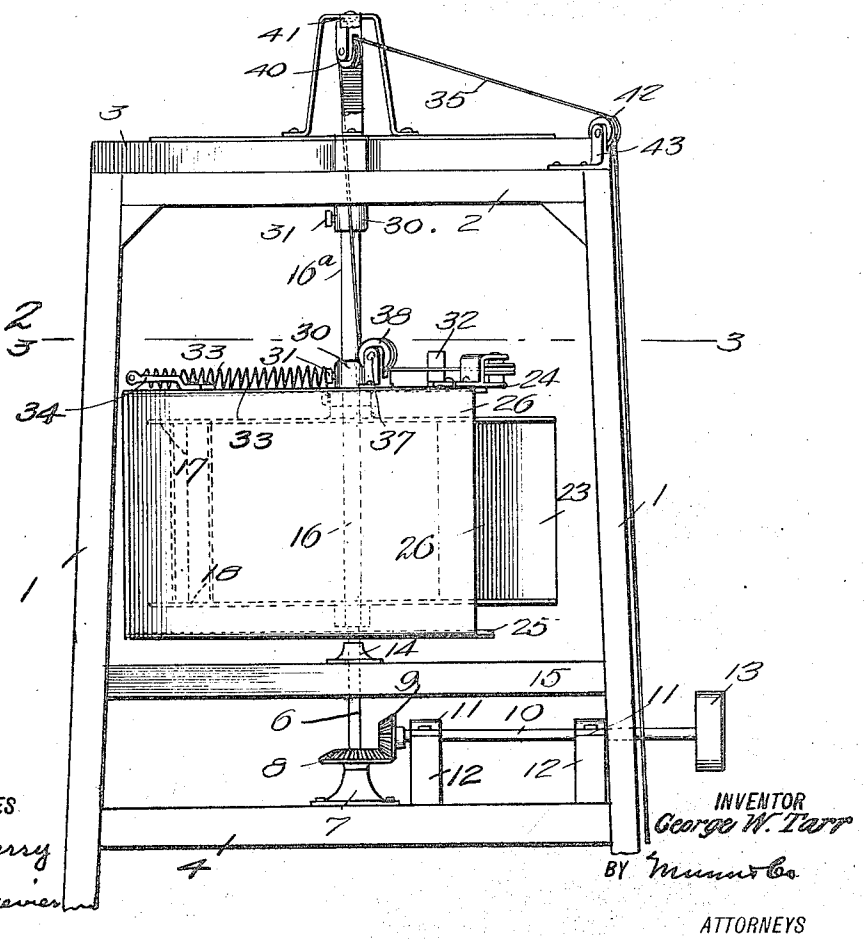


Fig. 2.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

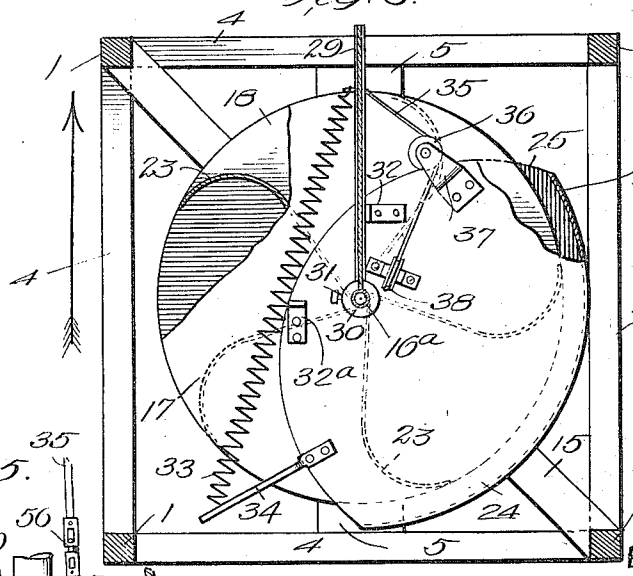


Fig. 5.

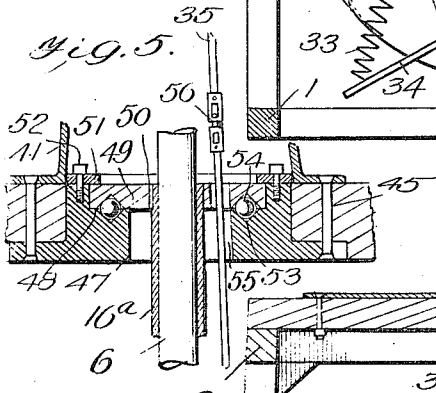


Fig. 6.

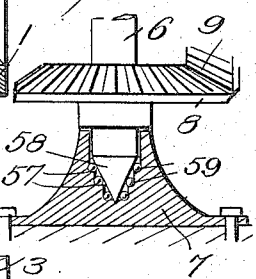
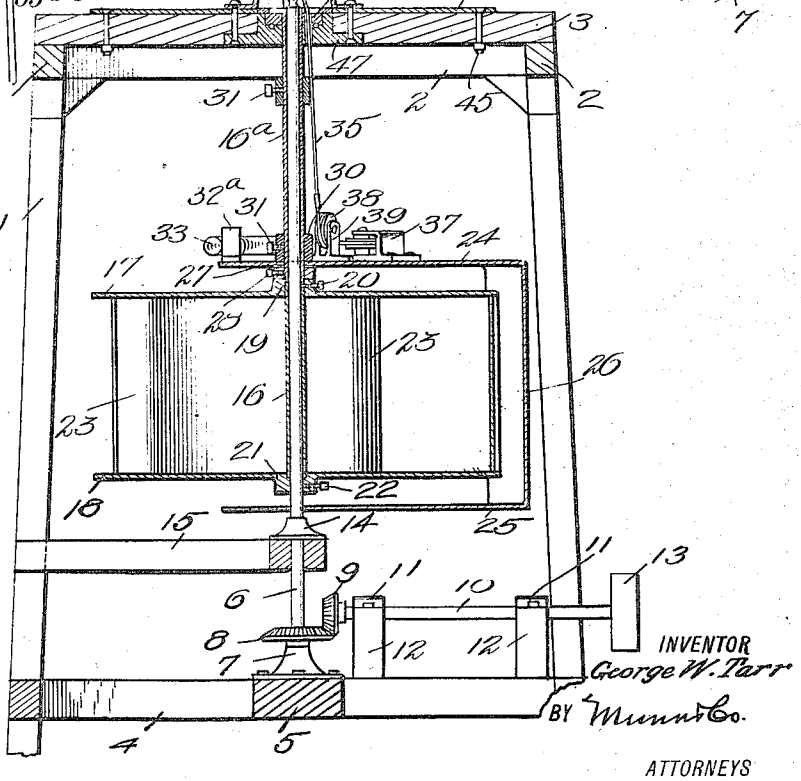


Fig. 4.



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UNITED STATES PATENT OFFICE.

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WINDMILL.

1,193,310. Specification of Letters Patent. Patented Aug. 1, 1916.

Application filed December 18, 1914. Serial No. 877,905.

To all whom it may concern:

Be it known that I, GEORGE W. TARR, a citizen of the United States, and a resident of Santa Barbara, in the county of Santa Barbara and State of California, have invented a new and useful Improvement in Windmills, of which the following is a specification.

My invention is an improvement in wind mills, and has for its object to provide a mill of the character specified, wherein simple and easily operated mechanism is provided in connection with the mill for permitting the speed of the mill and the power exerted by the mill to be varied in accordance with conditions.

In the drawings:—Figure 1 is a top plan view of the improved mill, Fig. 2 is a side view, Figs. 3 and 4 are sections on the lines 3—3 of Fig. 2 and 4—4 of Fig. 1, respectively, Fig. 5 is an enlarged sectional view of the upper bearing for the wheel shaft, and Fig. 6 is a similar view of the lower or step bearing for the said shaft.

The present embodiment of the invention is shown in connection with a frame consisting of four uprights 1, inclining inwardly toward each other at their upper ends, and connected at their tops by suitable outer cross bars 2, and inner cross bars 3, the bars 3 being arranged at a higher level than the bars 2.

The uprights 1 are also connected below the bars 2 by cross bars 4, and opposite bars 4 are connected by a cross plate 5 at the center of the frame. The wheel is supported on a vertical shaft 6, which is journaled at the intersection of the cross bars 3 at its upper end and in a step bearing on the plate 5 at its lower end.

Just above the step bearing 7 the shaft 6 is provided with a bevel gear 8, which meshes with a similar gear 9 on a driven shaft 10, the said shaft being journaled in sectional bearings 11 on bearing supports 12 on the frame. The shaft 10 is provided at its outer end with a pulley 13, by which the power of the shaft may be delivered to the mechanism to be operated. The shaft 6 passes through a bearing 14 just above the bevel gear 8, and the said bearing 14 is supported on a brace 15, arranged diagonally of the frame.

The wheel proper comprises a sleeve or tubular casing 16, mounted on the shaft 6, and upper and lower disks 17 and 18 are connected with the sleeve in vertically spaced relation. The disk 17 is provided with a hub 19, fitting the sleeve and secured thereto by a set screw 20, while the disk 18 has a hub 21, fitting the shaft 6, and the lower end of the sleeve and secured to the sleeve by a set screw 22.

Blades 23 connect the disks, the said blades extending tangentially from the sleeve 16 to near the peripheries of the disks 17 and 18, each blade being concave or curved at its outer end. The blades are similarly arranged, and are adapted to receive the wind on their concave faces.

A hood comprising upper and lower segmental plates 24 and 25 connected by a curved or arc-shaped vertical plate 26 is mounted on the shaft, each of the plates 24 and 25 having an opening for the shaft. The plate 24 is arranged above the disk 17 and rests upon a collar 27 secured to the sleeve 16^a by a set screw 28. The lower plate has merely an opening for the shaft, and this plate 25 is spaced below the disk 18.

The plate 26 is formed on an arc, having the same center as the disks 17 and 18, and the said plate is of a length to cover between one-third and one-half of the periphery of the wheel. It will be evident that since the wheel is arranged to rotate on a vertical axis and has its blades extending vertically and on every side of its axis of rotation, the said wheel will be rotated from the wind in any direction without requiring any turning of the wheel to bring it into position to engage the wind as is the case with a vertical wheel rotating on a horizontal axis.

The hood or shield 24—25—26 is movable with respect to the wheel to completely or partially cut off the wind from the wheel, and means is provided adapted to be acted upon by the wind to hold the hood in the desired position. This means is a vane 29, in the form of a rectangular plate or sheet having at one end and at each corner of the said end a bearing 30 fitting upon a second sleeve 16^a arranged on the shaft 6 above the sleeve 16 and above the bearing 27 of the plate 24 of the hood.

A set screw 31 is threaded through each bearing for engaging the sleeve to prevent rotary movement of the bearing with respect to the sleeve and it is obvious that by loosening the said screws the vane may be adjusted angularly with respect to the shaft

6. The lower edge of the vane 29 is just above the plate 24 of the hood and the vane is movable with respect to the hood, within limits, prescribed by stops 32 and 32ª secured to the plate 24. These stops 32 and 32ª are arranged at an angle of 90° with respect to each other, so that the hood and the vane may be moved with respect to each other through an arc of 90°.

A coil spring 33 is connected at one end to one face of the vane, and at the other to an arm 34 extending outwardly from the plate 24 on the opposite side of the stop 32ª from the stop 32, and the spring normally acts to draw the vane toward the stop 32ª.

The vane is moved in the opposite direction or in opposition to the spring by means of the flexible member 35, a cord or wire in the present instance, the said flexible member being connected at one end to the vane on the opposite face from the spring. From the vane the flexible member passes around a pulley 36 journaled in a bracket 37 extending outwardly from the plate 24, at the opposite side from the arm 34. The flexible member then passes inwardly beneath a pulley 38, journaled in the bracket 39 on the plate 24, and thence upwardly through an opening at the intersection of the bars 3 to and over a pulley 40, which is suspended from a four-arm supporting bracket 41, arranged at the center of the frame above the cross bars 3 and connected to the said bars. The flexible member then passes outwardly to one corner of the frame over a pulley 42 journaled in the bracket 43, and thence to the foot of the tower, formed by the framework. When traction is made on the lower end of the flexible member the vane 29 will be drawn toward the stop 32 against the resistance of the spring 33.

The wind acting upon the vane 29 will hold it parallel with the direction of the wind. When for instance, the wind is blowing in the direction shown by the large arrow at the left of Fig. 3, the vane will be parallel with the said arrow. When the vane is in contact with the stop 32 the covering plate 26 of the hood or shield will cover those blades of the wheel which are moving toward the wind, leaving the blades moving from the wind uncovered. Were there no protection, that is, were the entire wheel uncovered, theoretically there would be no movement of the wheel since the pressure would be equal on both sides of the center. The concavity of each blade might however, cause the wheel to move, but the power would be small.

With the blades 23 radial to the wheel, the air currents would have no effect on the wheel, since the pressure on each side of the center would be the same. Therefore in order that the wheel may operate it is necessary to cover the blades on one side of the center and the hood is provided for this purpose. Normally the hood and vane occupy the relative position shown in Fig. 1, the spring 33 being contracted and the vane being in contact with the stop 32ª.

The air currents will always hold the vane parallel to the direction of motion of the current, and the spring 33 is of sufficient strength to constrain the hood to move with the vane. With a wind blowing in the direction indicated by the large arrow at the left of Fig. 3, the vane would occupy the position shown in Figs. 1 and 3, and with the parts in normal position the hood would occupy the position shown in Fig. 1, that is, in a position to cover the blades 23 from the moving air currents, and there would be no movement of the wheel.

In order to permit access of the air currents to the wheel traction is made on the free end of the flexible member 35. When traction is so made the vane is swung toward the stop 32, placing the spring 33 under tension and if the traction on the cord is continued the vane will finally engage the stop 32 and the air current holding the vane parallel to the direction of motion, the hood will swing in a direction to uncover the blades at the left of the shaft 6 to the action of the air currents.

In Fig. 3 is shown the position of greatest power of the wheel. In this arrangement all of the blades at the left of the shaft are uncovered and the air currents will engage the concave surfaces of the blades and will rotate the wheel. By uncovering more or less of the wheel the speed and the power may be varied.

A reinforcing plate 44 is secured to the upper faces of the bars 3, by means of bolts and nuts 45, and the bracket 41 is connected to the reinforcing plates and to the bars 3 by bolts and nuts 46. A bearing block 47 is provided for the upper end of the sleeve 16ª, the said block being arranged in an opening at the intersection of the bars 3, and the upper face of the bearing block is counterbored or recessed as indicated at 48 to receive a second bearing block 49. The bearing blocks 47 and 49 have registering center openings for the sleeve and shaft, and the block 49 is keyed to the sleeve as indicated at 50.

The block 49 is held in place in the counterbore 48 by means of a ring 51, secured to the block 47 by set screws 52. The inner edge of the ring just laps over the outer edge of the block 49, and the abutting faces of the blocks 47 and 48 have registering annular grooves 53 for receiving a ball bearing composed of balls 54. The blocks 47 and 49 also have registering openings 55 for the flexible member 35. This flexible member may be a cord or wire and may be composed of sections as shown coupled by cou-

plers as indicated at 56. The bearing 7 is provided with a recess in its upper end, and the recess is successively counterbored to form three annular shoulders 57. The lower end of the shaft 6 is pointed or tapered as shown at 58, and ball bearings 59 are arranged between the tapered portion and the annular shoulders 57.

The bearing block 47 does not touch the sleeve 16ª, only the bearing block 49 engages the sleeve and there is an annular space between the sleeve 16ª and the bearing block 47. The block 49 may rotate with the sleeve on the block 47, and the space between the block 47 and the sleeve permits the passage of the flexible member 35, to permit this member to pass entirely around the shaft 6.

I claim:—

1. In combination, a horizontally disposed wind wheel, a vertical shaft therefor, a hood inclosing a portion of the wheel and adapted to control the effective force of the air upon the wheel, a sleeve loose upon the shaft above the hood, a vane attached to the sleeve and movable therewith, a bracket attached to the framework of the wind wheel in line with the shaft, a guide pulley having swivel connection with the bracket, other guide pulleys mounted upon the hood and framework, a flexible connection attached to the hood and passing over the several guide pulleys, a spring between the hood and the vane to move the hood to expose more or less of the wheel to the action of the wind, and stops upon the hood to engage the vane.

2. In combination, a framework, a vertical shaft, a wind wheel attached to the vertical shaft, a hood mounted loosely upon the shaft and inclosing a portion of the wheel and adapted to control the effective force of the air thereon, a sleeve loose upon the shaft above the hood and wheel, a vane secured to the sleeve, a recessed bearing carried by the framework and receiving the shaft and sleeve, a second bearing supported within the recessed bearing and having the loose sleeve fastened thereto, means attached to the recessed bearing and overhanging the recess thereof to retain the second bearing in place therein, a spring between the hood and vane, stops on the hood to limit the movements of the vane, a bracket mounted upon the framework in line with the shaft, a guide pulley having swivel connection with the said bracket, other guide pulleys mounted upon the hood, and a flexible connection attached to the hood and passing over the several guide pulleys and extending within convenient reach.

GEORGE WESLEY TARR.

Witnesses:
J. S. HOUSTON,
MARY E. BOYLE.