C. L. GULLEY & W. L. MANN.

WINDMILL.

APPLICATION FILED JUNE 30, 1913.

1,162,912. Patented Dec. 7, 1915.

FIG. 1.

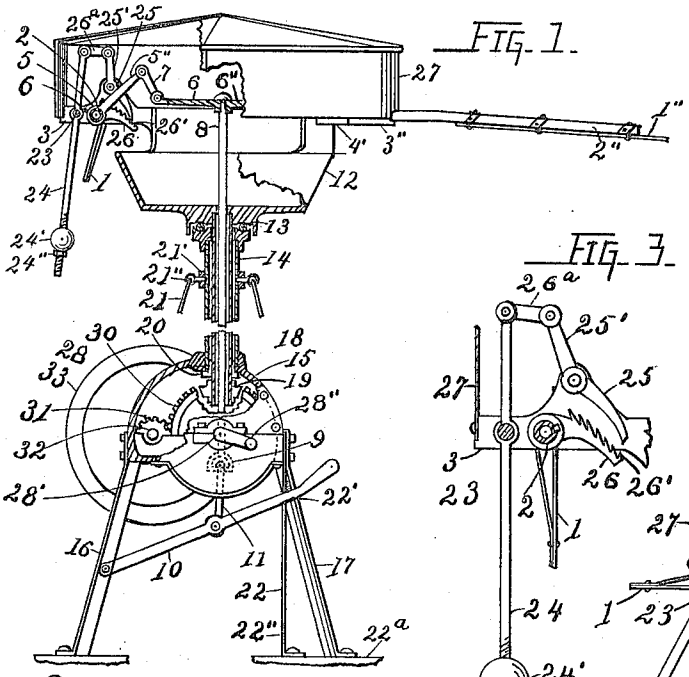
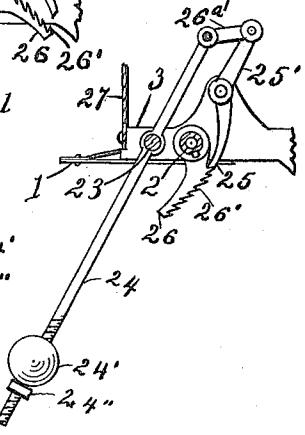


FIG. 3.

FIG. 4.



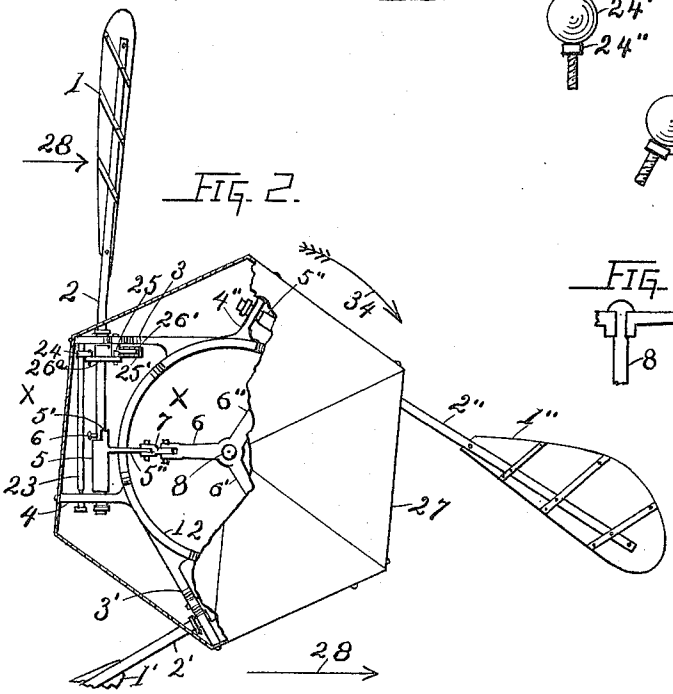
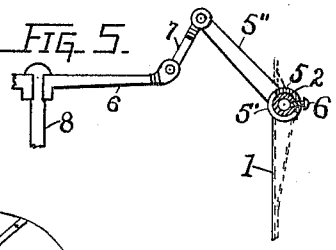


FIG. 2.

FIG. 5.



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WINDMILL.

1,162,912. Specification of Letters Patent. Patented Dec. 7, 1915.

Application filed June 30, 1913. Serial No. 776,648.

To all whom it may concern:

Be it known that we, CHARLES L. GULLEY and WILLIAM L. MANN, citizens of the United States, residing at St. Joseph, in the county of Buchanan and State of Missouri, have invented certain new and useful Improvements in Windmills, of which the following is a specification, reference being had therein to the accompanying drawing.

Our invention relates to improvements in wind mills, which have for their objects, the provision of a wind mill which shall exert the maximum amount of energy, be simple in construction, easily erected and extremely cheap in cost of manufacture.

Further objects are, to so construct a wind mill, that power for various purposes can more cheaply and conveniently be transmitted therefrom to other mechanisms, than can be done, from wind mills, now generally in use; also, to provide automatic speed regulating means, by the use of which, a uniform speed is maintained, even though the wind should vary from low to high extremes; also to provide manually operated starting and stopping means for said mill, which shall be positive in its action and convenient for the operator.

We attain these objects by the mechanism illustrated in the accompanying drawing, in which:—

Figure 1 is a side elevation, certain parts being broken away to avoid obscurity. Fig. 2 is a top plan, a certain portion of the hood being broken away, to disclose the mechanism within the same. Figs. 3 and 4 are enlarged views, in detail of the governing mechanism, showing two positions of the same. Fig. 5 is an enlarged view in detail, of certain portions of the manual controlling mechanism.

Referring to Fig. 1, wind vanes 1, 1′, and 1″ are secured on the outer end portions of their respective vane shafts 2, 2′, and 2″. Each of said vane shafts is provided with automatic speed regulating means and with manual controlling means; and since said parts are alike in their construction and operation, a detailed description of but one vane, with its shaft and connected parts is deemed sufficient. While three vanes are shown, it is evident that any desired plurality of the same could be used. The inner end portion of vane shaft 1, is rotatably mounted, in a horizontal position, in bearing brackets 3 and 4, formed integral with mill head 12, which is adapted to be rotated in a horizontal plane. The outer end portion of shaft 2, when in normal position, as seen in Fig. 1, is extended at an incline, outward, upward and forward from the rotatably mounted portion of said shaft.

Vane 1 is then secured on said outer portion, in position, inclined downward and backward therefrom, with such major portion thereof below, and such minor portion above said shaft, that the center of gravity of the thus connected parts causes their described positions to be normally maintained. Said vane is preferably made of sheet metal of any desired size, thickness and weight, and since its angle of inclination to the vertical is not arbitrary, and may be from five to forty-five degrees, as desired, and farther, since the weight of said vane is a factor in determining the degree at which it should be secured on said shaft, the degree of normal inclination of same, is neither shown in detail nor described. While said vane is traveling against the wind it is feathered thereby, and this arrangement materially assists in the feathering of said vane, thereby enabling a breeze of slow speed to oscillate said vane to its feathered position, as seen at 1″, in Fig. 1 and at 1, in Fig. 4. It will be understood that said vane and its shaft are carried by mill head 12, in its said rotation, and that said vane is caused by gravity to oscillate from said feathered position to its normal position, and to be farther oscillated by pressure of air, until its face is presented to the wind, while traveling with the same, which blows in the direction indicated by arrow 28. Controlling sleeve 5 is loosely mounted on shaft 2, and has lug 5′ and controlling arm 5″ formed therewith. Set screw 6 is secured in shaft 2, and is carried against lug 5′ for limiting rotation of said shaft in either direction, as seen in Fig. 5. This limitation of the rotation of shaft 2, is such, that vane 1 is normally stopped in a vertical position, while traveling with the wind, and is stopped in a horizontal position, while in the position of vane 1″, traveling against the wind, see Fig. 2. The free end of controlling arm 5″ is pivotally connected with the rod arm 6, by link 7. Said rod arm is formed integral with similar arms 6′ and 6″, secured on the upper end of controlling rod 8. The lower end of said rod is provided with swivel 9, pivotally connected with treadle 10, by con-

necting rod 11. Mill head 12 is rotatably mounted on antifriction bearing 13, supported on the upper end of supporting pipe 14. The lower end of said pipe is rigidly secured in the apertured top of gear case 15, mounted on rear leg 16, and two front legs 17, but one of the latter being shown. The upper end of hollow drive shaft 18 is rigidly secured in the lower portion of head 12, and extends downward therefrom, through pipe 14. The lower end of said shaft has bevel pinion 19 secured thereon, and is provided with bearing 20, secured in the top of base 15 and in the lower end of pipe 14. Said pipe 14 is provided with a plurality of guy rods 21, secured to the upper end portion thereof, by guy collar 21′ and screw eyes 21″, screwed through said collar and into said pipe.

The previously described controlling rod 8 passes through the center of hollow drive shaft 18. One end of the previously mentioned treadle 10, is pivotally secured to rear leg 16, while its free end portion is engaged with ratchet 22′, formed in the edge of ratchet bar 22, for holding said treadle and the therewith connected controlling means, in the operative position shown. Said ratchet bar has its upper end secured to base 15, and its lower end secured to platform 22^a. Said bar has ratchet 22″ formed in the lower portion thereof, for holding said treadle 10 and said controlling means in position for stopping the wind mill, as hereinafter described.

Referring to Fig. 1, governor shaft 23 has its ends rotatably mounted in the outer end portions of brackets 3 and 4, on a level with shaft 2. Said governor shaft has governor arm 24 rigidly secured thereon. Centrifugally operated governor weight 24′ is screwed to any desired point on the threaded lower end portion of said arm, for adjusting the centrifugal force of the same, and is secured in said adjustment by lock nut 24″.

The upper end of arm 24 is pivotally connected by rod 26^a with the free end of pawl arm 25′, formed with pawl 25, rotatably mounted on the inner surface of an upwardly extended portion of bracket 3, at a point above the level of and inward from shaft 2, seen in Fig. 3. Said pawl is rotated by said connected governor arm for moving the lower, free end of said pawl, from the position seen in Fig. 3, into various positions, toward the left, for engagement of same with various ones of ratchet teeth 26′, formed in the free end portion of ratchet arm 26, the other end of which is rigidly secured on shaft 2. Said pawl is shown in the extreme one of said positions, in Fig. 4, and is returned therefrom to the position seen in Fig. 3, by return movement of said governor arm. The lower edge of sheet metal hood 27 is secured on the outer ends of brackets 3 and 4. Said hood covers and protects the upper portion of the mechanism from the action of the elements. Bevel pinion 19 drives bevel gear 28, secured on shaft 28′, rotatably mounted in gear case 15. Crank 28″, (adapted to drive a pump,) is formed on the outer end of shaft 28′. Spur gear 30 is formed on the periphery of bevel gear 28, and engages spur pinion 31, secured on drive shaft 32, rotatably mounted in said gear case. Drive wheel 33 is secured on one of the ends of said drive shaft.

In operation, while mill head 12 is carrying vane 1 at a very low speed, and while said vane is traveling with the wind, said vane and the parts of its governor are in the position seen in Fig. 3. While such slow speed is maintained, the gravity of weight 24′ overcomes the weak centrifugal force exerted thereon, to such an extent that action of the latter force, on said weight, is imperceptible, and the free end of pawl 25 remains in the position shown in Fig. 3, beyond all positions reached by ratchet teeth 26′. When the speed of the mill's rotation is increased the thereby increased centrifugal force causes weight 24′ to swing outward toward the left, to a perceptible extent, which, when carried far enough, causes the free end of pawl 25 to move toward the left from the position seen in Fig. 3, until said free end presses against the adjacent one of ratchet teeth 26′. Said pawl so remains, until vane 1 has moved from the position seen in Fig. 3, to its feathered position, seen in Fig. 4, with said ratchet teeth thereby moved far toward the left, and far from said pawl. At this juncture, the free end of pawl 25 is still farther moved toward the left, and held by the described governor, at such point as its free centrifugally operated movement may determine. When vane 1 again travels with the wind, it is thereby reversely oscillated from the feathered position seen in Fig. 4, toward the vertical position seen in Fig. 3, thereby moving the free end of arm 26 toward the right. These movements continue until one of ratchet teeth 26′ is moved against the free end of pawl 25, thereby stopping said reverse oscillation of vane 1 and holding the same in a partially feathered position. This position is maintained and can not be changed by the described governor, until said vane is again feathered and until arm 26 is thereby moved from the free end of pawl 25. At this latter juncture the thus liberated pawl, allows the described governor to again move its free end to such position as the free action of said governor may determine. When due to high wind, the speed of the mill has reached the maximum, the described governing parts assume the position seen in Fig. 4, with vane 1 thereby held edgewise to the wind contin-

ually, until the same causes the speed of the mill to be lowered; upon which said governor again stops vane 1 at such angle of inclination to the wind as the centrifugal force of weight 24′ may determine. When it is desired to stop the mill, the operator grasps the free end of treadle 10 and releases this portion from treadle ratchet 22′, presses said free end downward, thereby lowering controlling rod 8, spider arm 6, and by its described connections with controlling sleeve 5, seen best in Fig. 5, rotates said sleeve and carries the lower edge of lug 5′ against screw 6, and thereby rotates vane shaft 2, until vane 1 is thus rotated to a horizontal position, presenting its lower edge to the wind, which from lack of resistance to said wind, causes the mill to stop. At this juncture, said operator moves the free end portion of treadle 10 into ratchet 22″, for holding the same and its attached parts in this position.

While we have shown crank 28″ for driving a pump, and the described gears for transmitting power from said mill to other mechanisms, not shown, it is evident that any other well known means of power transmission, such as direct belt drive, and the like, could be used, without departing from the spirit of our invention; which we reserve the right to do.

Having fully described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. In a wind mill, a rotatably mounted wind mill head adapted to be rotated in a horizontal plane; bearing brackets formed with and extending from said head; a horizontally extended vane shaft rotatably mounted in said brackets and extending outward therefrom; a wind vane secured on the outer extended portion of said shaft said vane being so positioned on said shaft that said vane is oscillated with said shaft by the action of currents of air; stopping means mounted on the inner end portions of said shaft whereby said shaft and the thereby carried vane are normally stopped with the face and the upper edge of said vane alternately presented to said currents of air; a ratchet arm having ratchet teeth formed in the face thereof said arm being secured on the inner end portion of said vane shaft; a pawl pivotally mounted on one of said brackets; a pawl arm formed with said pawl; a governor arm pivotally mounted between said brackets; a governor weight adjustably secured on the lower end portion of said arm; a connecting rod whereby the upper end of said governor arm is pivotally connected with the free end of said pawl arm; the whole being adapted to move the free end of said pawl into variable positions for being variably engaged by said ratchets, thereby variably stopping oscillating in one direction of said vane shaft.

2. In a wind mill, a head mounted to rotate in a horizontal plane; a vane shaft oscillatably mounted on said head and extended horizontally therefrom; a wind vane secured on the extended portion of said shaft, said vane being so positioned on said shaft that it is oscillated by action thereon of wind for alternately feathering said vane and facing the same to the wind; a stud secured on said shaft; a controlling sleeve loosely mounted on said vane shaft; a lug formed on one end of said sleeve, said lug being adapted to engage said stud and thereby limit oscillation of said shaft while said mill is in operation, said lug also being adapted by said engagement to rotate said shaft; a controlling arm formed with said sleeve; and control actuating means extending from the free end of said arm to the ground whereby said arm is actuated for rotating said sleeve and shaft and detachably holding the thereon secured vane in feathered position.

In testimony whereof we affix our signatures in the presence of two witnesses.

CHARLES L. GULLEY.

WILLIAM L. his × mark MANN.

Witnesses:
CHARLES O. DUNN,
EVA MANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."