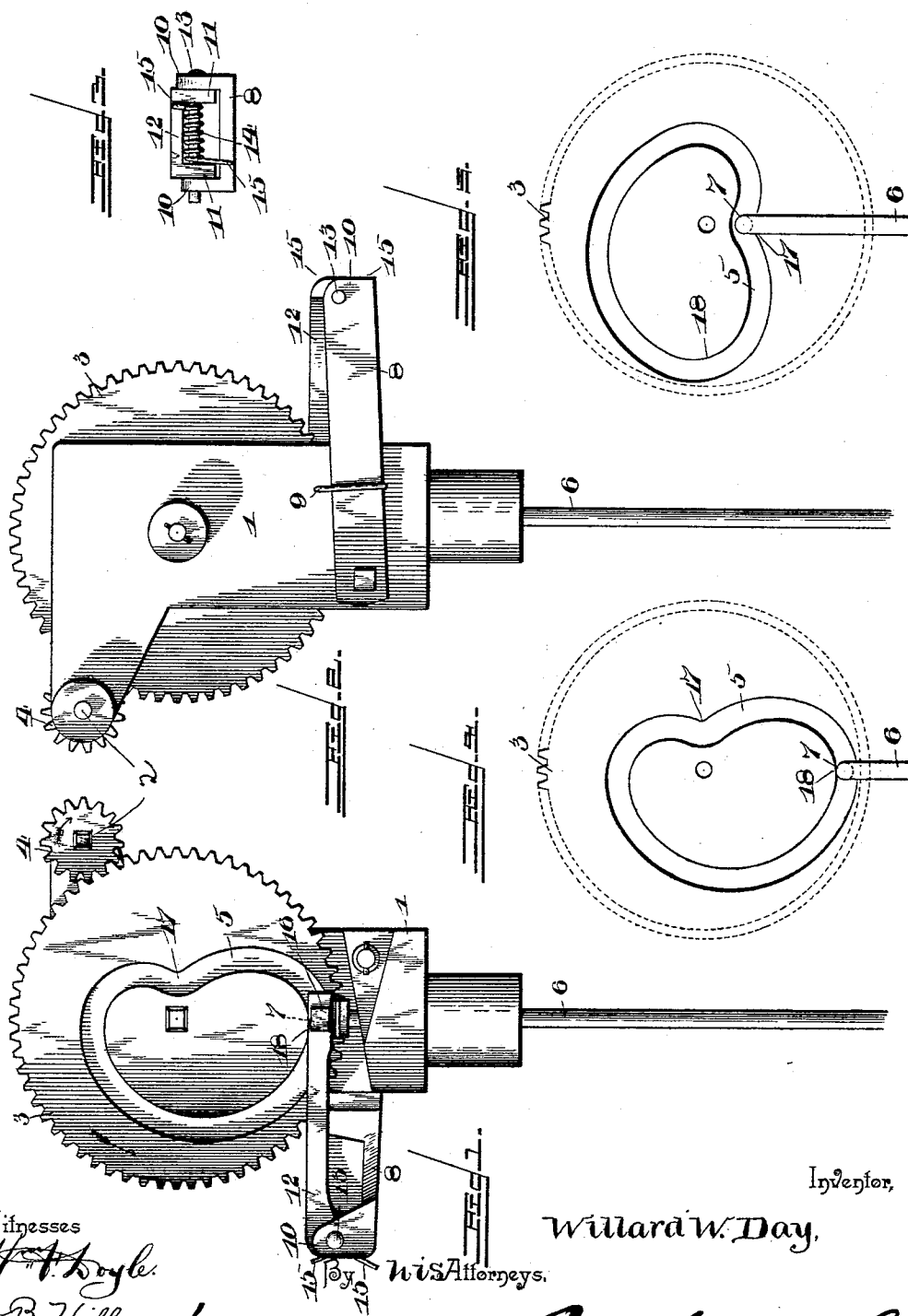


(No Model.)

W. W. DAY.
WINDMILL GEARING.

No. 569,277.

Patented Oct. 13, 1896.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLARD WARNER DAY, OF KOSSUTH, OHIO.

WINDMILL-GEARING.

SPECIFICATION forming part of Letters Patent No. 569,277, dated October 13, 1896.

Application filed February 19, 1896. Serial No. 579,941. (No model.)

To all whom it may concern:

Be it known that I, WILLARD WARNER DAY, a citizen of the United States, residing at Kossuth, in the county of Auglaize and State of Ohio, have invented a new and useful Windmill-Gearing, of which the following is a specification.

Various means have been devised to enable wind-engines to operate in light winds without materially diminishing their speed or requiring the shortening of the stroke or the increasing of the leverage, but so far as known such devices have not been generally adopted by reason of their failure to meet all requirements or because they are not positive in action and cannot be relied upon to perform the required work in light winds.

This invention is designed to interpose a mechanism between the axis of the wind-wheel and the power-transmitting medium whereby the machine, pump, or other device to be operated will be actuated in light winds and the reciprocating part have the full stroke imparted thereto.

The improvement consists, essentially, of a gear-wheel driven from the shaft of the wind-wheel in such a manner as to make one complete revolution at each four complete revolutions of the wind-wheel shaft and to supply the said gear-wheel on one side or face with a cam groove or way of such outline that during three-fourths of the revolution of the said gear-wheel the pump-rod or reciprocating part will be caused to make a stroke to lift the column of water or perform effective work, and during the remaining one-fourth of a revolution of the said gear-wheel the pump-rod will be lowered or the reciprocating part receive a back stroke preparatory to again moving forward to carry the load.

The improvement further consists in certain details of construction and novel combinations of parts, which hereinafter will be more fully set forth, illustrated, and finally claimed.

In the accompanying drawings, Figure 1 is a side elevation of a windmill-head having the invention applied. Fig. 2 is a reverse side view thereof. Fig. 3 is a detail view showing the joint between the pivoted arm and the guide-bar. Figs. 4 and 5 are diagrammatical views showing the relative disposi-

tion of the parts when the pump-rod or reciprocating part is at the limit of its stroke in each direction.

Corresponding and like parts are designated in all the figures of the accompanying drawings and referred to in the following description by the same reference-characters.

The windmill-head 1 may be of any pattern, and has an arm supporting the wind-wheel shaft 2, upon which is fitted a pinion 4, which meshes with a gear-wheel 3, having a cam groove or way 5 in its face or side to impart a reciprocating movement to the pump-rod 6, the latter having a traveler 7 to operate in conjunction with the cam-groove 5 to attain the desired object. An arm 8 is pivoted to the windmill-head 1 and operates in a guide or keeper 9 and extends about horizontally, and is formed at its free end with vertical ears 10, between which are received corresponding ears 11 at the outer end of a guide-bar 12, a pin 13 passing through the ears 10 and 11 and pivotally connecting the parts 8 and 12. A spring 14 of the coil type is mounted upon the pin 13 between the ears 11 and has oppositely-extending end portions 15, which engage, respectively, with the adjacent ends of the parts 8 and 12, so as to lower the inner end of the guide-bar 12 and assist materially in lowering the pump-rod 6. This guide-bar 12 is pivotally connected at its inner end to the upper end of the pump-rod 6, and the traveler 7 is mounted upon the inner end of the bolt or pin 16, pivotally connecting the parts 6 and 12.

The gear-wheel 3 and pinion 4 are of such relative size and proportion that it requires four complete revolutions of the pinion 4 to make a single complete revolution of the gear-wheel 3, and the cam groove or way 5 is so formed that during three-fourths of the revolution of the gear-wheel the pump-rod 6 is caused to rise and lift the column of water, and during the remaining one-quarter of the revolution of the gear-wheel the pump-rod descends, being assisted by its weight and the weight of the attached parts and the action of the spring 14. The cam groove or way 5 is elliptical or oval in shape and has an indentation 17 in one side adjacent to one end and contiguous to the shaft or spindle upon which the gear-wheel 3 is mounted.

When the traveler 7 occupies the lowest position of the cam groove or way 5, it is at the limit of its downward movement, and when it comes opposite the extremity of the indentation 17 it is at the limit of its upstroke. From the extremity of the indentation 17 to the lower end of the cam-groove, at a point immediately below the spindle or shaft upon which the gear-wheel is mounted, is almost a perpendicular fall. Hence but little work is required on the part of the wind-engine to return the pump-rod to the limit of its lowest stroke.

While the traveler is moving from the extremity of the indentation to the point 18, the pinion 4 makes a complete revolution and the gear-wheel a quarter of a revolution, and when moving from the point 18 to the indentation 17 in the direction of the arrow the pinion 4 makes three complete revolutions and the gear-wheel three-quarters of a revolution. Practical demonstration has shown that the best results are attained by proportioning the parts substantially as shown and herein described.

The purpose of the guide-bar 12 is to compel the upper end of the pump-rod to move in a nearly-perpendicular direction and to prevent its binding against the sides of the vertical opening in the windmill-head through which it reciprocates, and the pivoted arm 8 also assists in effecting this end, since it compensates in a measure for the accurate movement of the free end of the guide-bar, as will be readily comprehended.

Having thus described the invention, what is claimed as new is—

1. In a windmill, the combination of a rotatable part driven from the wind-wheel shaft and having a cam groove or way on one side, a rod reciprocated by means of the said cam groove or way, an arm pivotally supported at its inner end, and a bar having pivotal connection with the outer end of the pivoted arm and pivotally secured at its inner end to

the power-transmitting rod, substantially as and for the purpose set forth.

2. In a windmill, the combination of a pump-rod, a rotatable part driven from the wind-wheel shaft and having a cam groove or way to effect a reciprocating movement of the pump-rod, an arm having pivotal connection with the windmill-head, a guide-bar having pivotal connection with the pump-rod and with the said pivoted arm, and a spring interposed between the pivoted arm and the guide-bar to produce a relative closing of these parts and a lowering of the pump-rod, substantially as set forth.

3. In a windmill, the combination of a gear-wheel having a cam-groove in one face of approximately oval or elliptical form and having an indentation in one side adjacent to an end of the cam-groove and the spindle upon which the gear-wheel is mounted, a pinion mounted upon the wind-wheel shaft and meshing with the gear-wheel to rotate the latter once during each four revolutions of the said pinion, a pump-rod having a traveler operating in the cam-groove, a guide-bar having pivotal connection with the pump-rod and provided with pendent ears at its outer end, a pivoted arm having vertical ears to receive the pendent ears of the guide-bar, a pin pivotally connecting the ears of the guide-bar and pivoted arm, and a spring mounted upon the pin between the adjacent ears of the guide-bar and having its end portions exerting an outward pressure upon the ends of the guide-bar and pivoted arm, the parts being arranged to operate substantially in the manner set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLARD WARNER DAY.

Witnesses:

JOHN N. BAILEY,
C. F. BAILEY.