

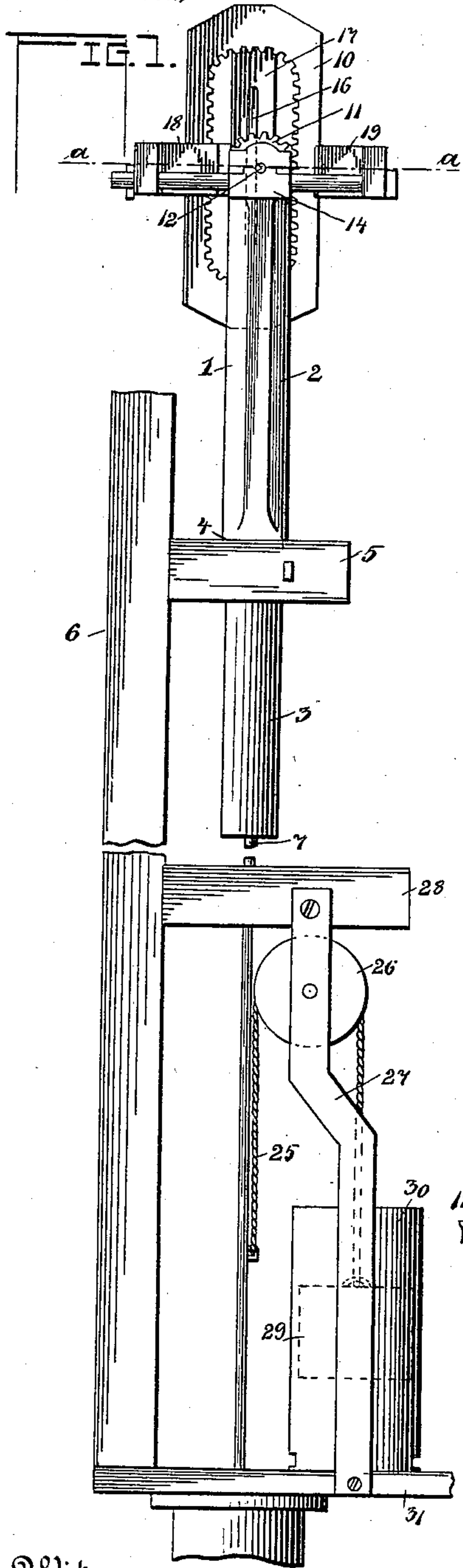
No. 610,322.

Patented Sept. 6, 1898.

W. S. DOUGLASS.
WINDMILL.

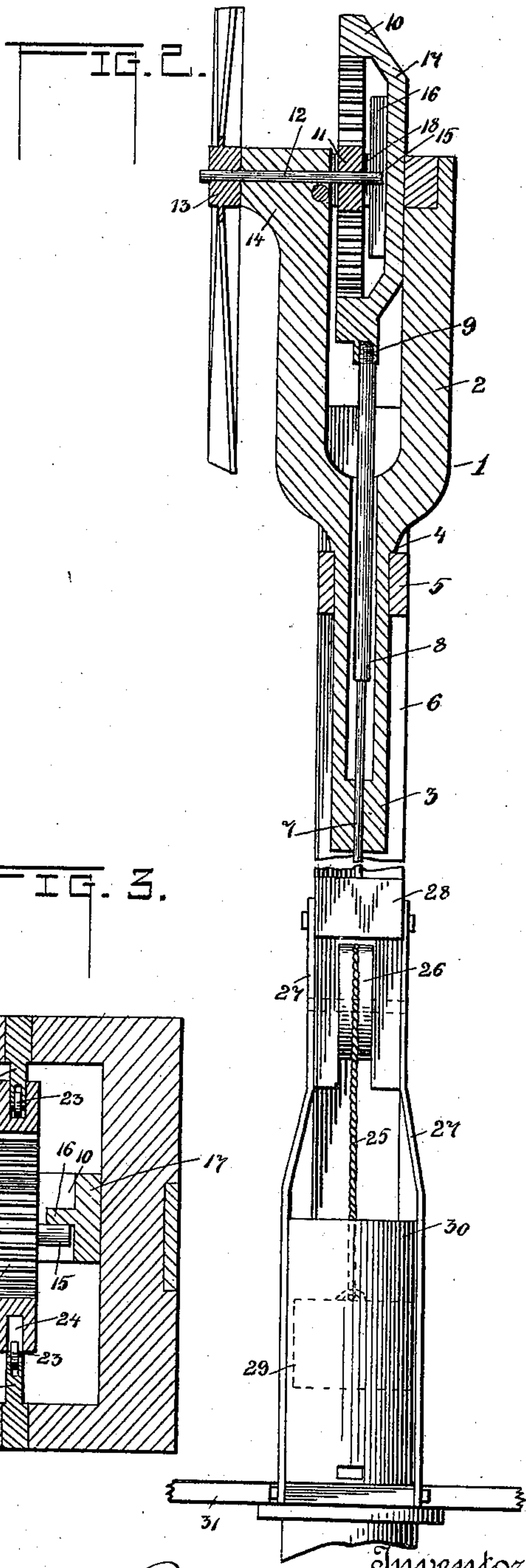
(Application filed Aug. 5, 1897.)

(No Model.)



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UNITED STATES PATENT OFFICE.

WILLIAM S. DOUGLASS, OF BELLEVUE, TEXAS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 610,322, dated September 6, 1898.

Application filed August 5, 1897. Serial No. 647,237. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. DOUGLASS, a citizen of the United States, residing at Bellevue, in the county of Clay and State of Texas, have invented certain new and useful Improvements in Windmills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

As will be hereinafter fully described and claimed, and illustrated in the accompanying drawings, my invention relates to certain new and useful improvements in windmills and
15 more particularly to the details involved in converting the rotary motion of the wind-wheel into a reciprocatory movement, whereby the power will be so utilized that it will, to all intents and purposes, be magnified,
20 enabling a greater stroke to be made, consequently increasing the capacity of the pump or other machine to which my improved wind-mill may be connected.

The object, therefore, of my invention is
25 to provide mechanism which will cooperate to produce the result above specified.

In the accompanying drawings, Figure 1 is a front view of the peculiar form of rack-bar employed by me. Fig. 2 is a central vertical
30 sectional view of Fig. 1, taken on a line at right angles thereto. Fig. 3 is a horizontal section.

Briefly stated, my invention consists in providing a rack-bar or plunger-head designed
35 to cooperate with a gear secured to the shaft carrying the wind-wheel and also in certain devices which will keep said gear in mesh with the teeth upon said rack-bar or plunger-head and for permitting said head to have the
40 necessary lateral movement to enable it to reliably cooperate with said gear-wheel.

Referring in detail to the several elements of my invention and the cooperative features required to assemble the same in an operative
45 condition, 1 is a suitable bracket having an upper bifurcated end 2 and a lower cylindrical stem 3, provided with the offset or shoulder 4, by means of which said stem may be seated in a suitable aperture provided in the arm 5,
50 the latter being secured to the post 6, forming

part of the usual frame or derrick commonly used for supporting a wind-engine in position.

The stem 3 is preferably tubular and is designed to accommodate the reciprocating
55 plunger 7, which extends downward into engagement with the pumping apparatus or other machinery to be actuated.

It will be seen that the plunger-rod 7 is connected in any preferred way to the lower end of the link 8, the upper end of said link be-
60 ing secured to the lower end 9 of the continuous rack-bar or plunger-head 10, the teeth carried thereon being disposed upon the edge of the central opening provided in said head, and are designed to cooperate with the gear-
65 wheel 11, mounted upon the driving-shaft 12, and upon the outer end of which the wind-wheel 13 is secured. Said wheel 13 may be of the usual or of any preferred construction deemed necessary to provide the requisite
70 power, and the shaft thereof may be properly mounted in suitable bearings located upon the upper end 14 of one of the bifurcated arms 2. The shaft 12 should extend entirely through
75 the gear-wheel 11, providing the hub or projecting axle 15, designed to lie first upon one side and then upon the other of the guiding or controlling rib 16, preferably formed in-
80 tegral with, though it may be otherwise attached to, the central vertically-disposed post 17, connected at either end to said rack-bar.

It will be understood that the rack-bar 10 is provided with sufficient lateral play to per-
85 mit the hub 15 to pass upon one side or the other of the rib 16 during the operation of the mill.

In Fig. 3 it will be seen that the brackets 18 are replaced by the arms 21 and 22, provided upon their free ends with the antifric-
90 tion rollers or wheels 23, said wheels being received by the grooves 24, provided in the sides of the plunger-head, thus permitting said head to be reciprocated with sufficient lateral play to permit the hub 15 to cooperate
95 with the guiding-rib 16.

By the construction I have illustrated it will be seen that the bracket 1 may be free to rotate upon the supporting-arm 5, and thus
100 freely bring the wind-wheel into proper position for utilizing the wind no matter from

which direction it may come, and by providing the usual guiding-blades for said wheel the engine will be automatically placed in position with respect to the wind to secure the best results.

Designed to cooperate with the features above set forth is the following means, which I have provided for increasing the capacity of the engine, which consists in attaching to the plunger-rod 7 a weight or spring, either of which shall be so disposed that the weight or tension thereof, as the case may be, will be directed toward cooperating with the lifting movement of the plunger.

It is well known that in the ordinary form of construction followed in producing a pump very little power is required for the downward stroke, and I have therefore found it desirable to so locate a weight or spring that the load or tension thereof will be raised during the downward stroke, thereby bringing this cooperating force into position to assist in raising the load during the upward stroke.

In the present case I have only illustrated a means for bringing a weight into this relationship with the plunger, the rope or chain 25 being connected in any suitable way to the plunger-rod, either in the derrick or below the surface of the ground and within the well, said rope or chain being arranged to pass partly around the pulley 26, secured in position within the bracket 27, attached to the subarm 28 in any preferred way.

The rope or chain 25 after passing the pulley 26 extends downward, where it is secured to a suitable weight, as indicated by dotted lines 29. If the attachment just described is to be applied above the surface of the ground, the barrel 30 may be provided for housing said weight, and thus guard against accidents in case the chain 25 should become broken, the barrel 30 being supported upon a suitable platform, as 31.

By reference to Fig. 1 it will be clearly apparent that the guiding-rib 16 will always keep the gear-wheel 11 into cooperation with first one side of the rack-bar and then the other, said gear-wheel having only a rotary movement, while the plunger-head or rack-bar has in addition to its vertical reciprocatory movement a slight lateral movement necessary to enable the gear-wheel to always keep in mesh with the rack-bar. By this arrangement it is also clear that the wind-wheel may be of any preferred diameter and may have, as during a comparatively light wind, a very slow movement, or such movement may be very rapid. The result, however, will be that a certain movement will always be imparted to the plunger-rod 7, and, further, that the action of the wheel upon the plunger-rod through the mediation of the plunger-head will always be a positive one.

I deem the cooperation of the weight 29 as being very important, inasmuch as said weight is lifted during the downstroke, when little resistance is offered by the pump, the

weight of the plunger-rod being regarded amply sufficient for this purpose. At the beginning of the upward stroke the force of the wind-wheel is augmented in proportion to the size of the weight 29, resulting in not only facilitating the pumping process, but in obviating that straining jerking movement incident to the change from lifting a load to no load, as it is well known that the actual work of pumping is performed during the upward stroke, while the wheel has nothing to do during the downward movement of the plunger-rod.

The operation of my improved plunger-rod or rack-bar may be stated to be as follows: The rotation of the wind-wheel will of course induce the rotation of the gear 11, which being upon one side of the rib 16 in mesh with the continuous part of the rack-bar engaging the same and moving the entire plunger-head until the end of the rib is reached, when the connecting horizontally-disposed part of the rack-bar will engage said gear-wheel and cause the hub 15 to pass to the other side of the rib 16, when a downward or upward movement will be imparted to the plunger-head, as the case may be, the gear 11 engaging all the teeth of the continuous rack-bar and thus imparting a reciprocatory movement to the plunger-rod 7 and enabling it to cooperate with the weight 29 for the purpose specified.

I attach importance to the outer faces of the plunger-head being loosely connected in the brackets or ways of the frame mounted on the arms of the stem, as such connection allows the plunger-head to have lateral or rocking movement in said ways, thus facilitating the passing of the free end of the shaft from one side to the other—that is to say, it allows the pinion on the shaft to make a continuous circuit of the teeth by such lateral movement, as without this movement it would be impossible for the end of the shaft to pass over and under the upper and lower ends of the rib unless the rocking movement of the head occurred at these points.

Believing that the advantages, construction, and operation of my improved wind-engine have been made fully apparent from the foregoing description, considered in connection with the accompanying drawings, I will dispense with further reference thereto.

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

In a windmill, the combination with the stem having formed therewith a pair of spaced arms extending upwardly therefrom, a frame mounted on the upper portion of the arms, and having grooves with antifriction-rollers therein, of a vertically and laterally movable rack-bar interposed between the arms in loose contact with the rollers, the plunger-head being provided with a central slot or opening having teeth formed on the inner walls thereof, a plate connected to the rear portion of the rack-bar with a rib or guideway there-

on, a shaft mounted in bearings on the front
arm of the stem, the hub or free end of which
contacts with the rib, and a pinion on the
shaft meshing with the teeth of the rack-bar,
5 whereby when motion is imparted to the mill,
the free end of the shaft and the pinion are
permitted to make a continuous circuit of
the rib and teeth, the lateral or rocking move-
ment of the rack-bar occurring when the free

end of the shaft passes over and under the 10
upper and lower ends of the rib, substantially
as specified.

In testimony whereof I affix my signature
in presence of two witnesses.

WILLIAM S. DOUGLASS.

Witnesses:

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