No. 650,761. Patented May 29, 1900.

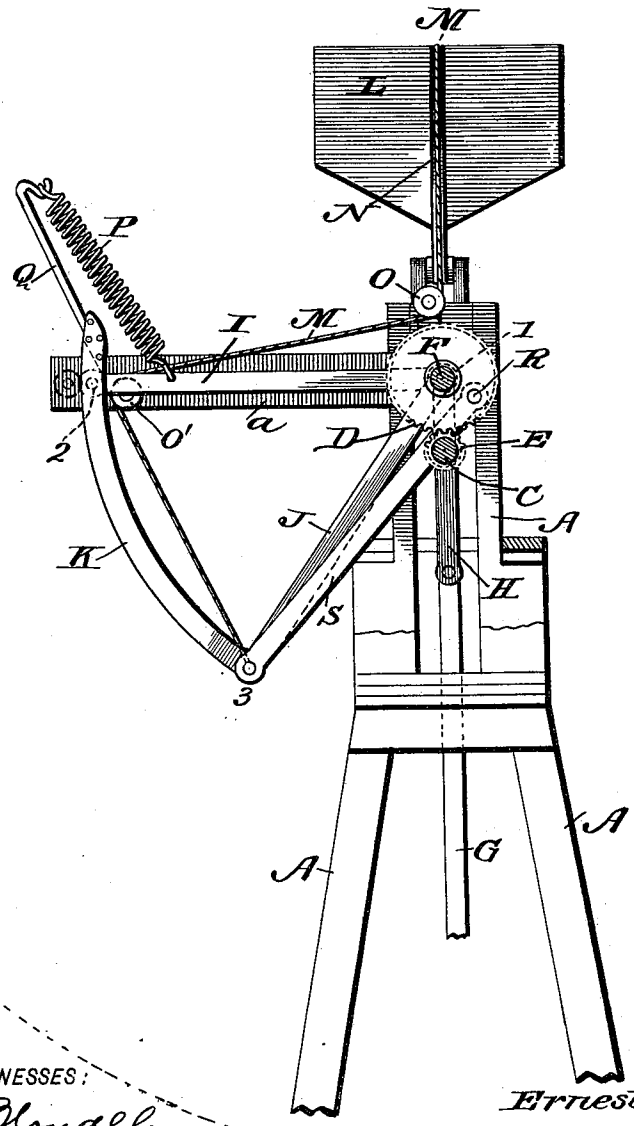
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STROKE REGULATOR FOR WINDMILLS.

(Application filed Jan. 3, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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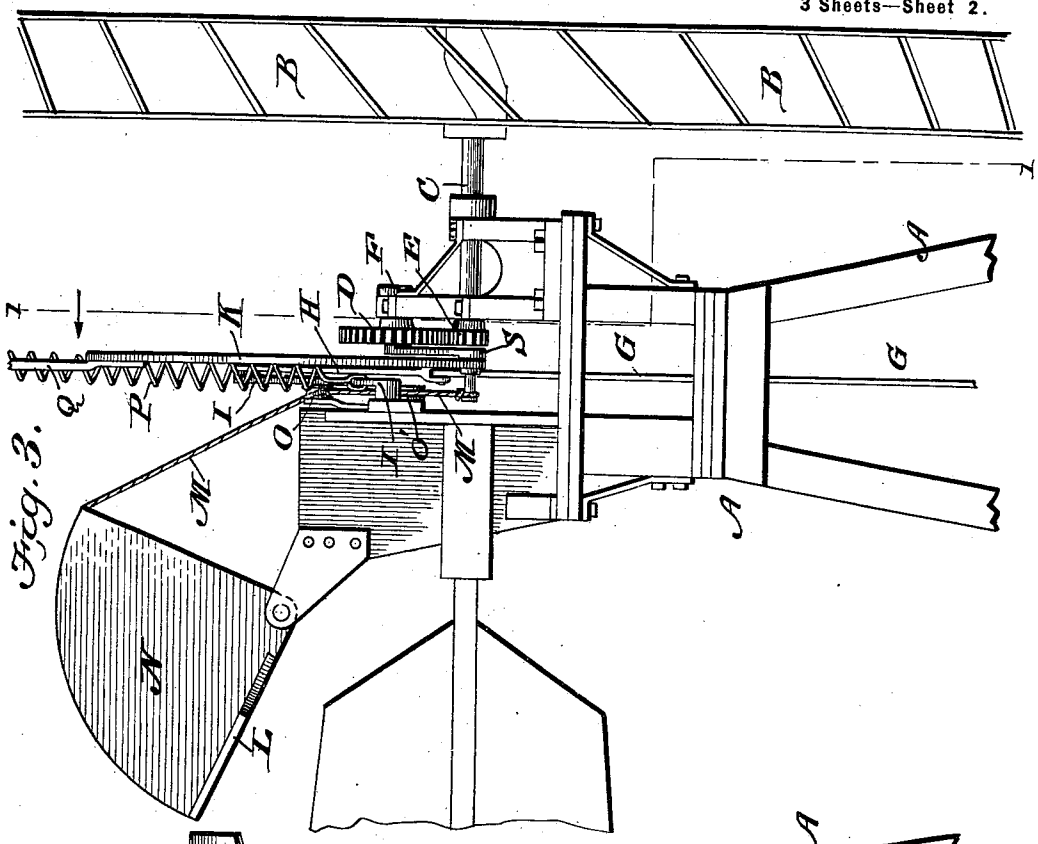


Fig. 3.

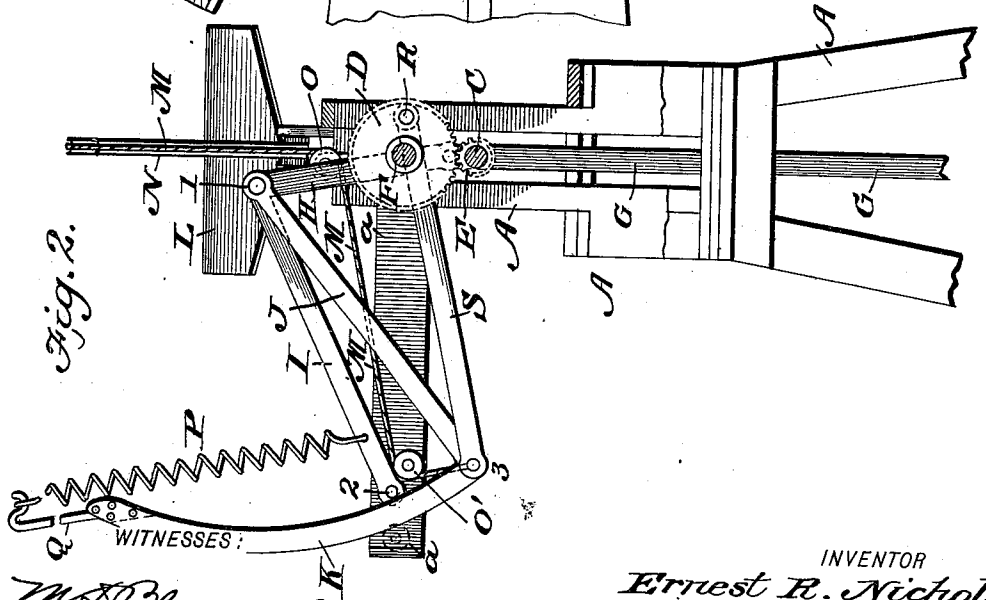


Fig. 2.

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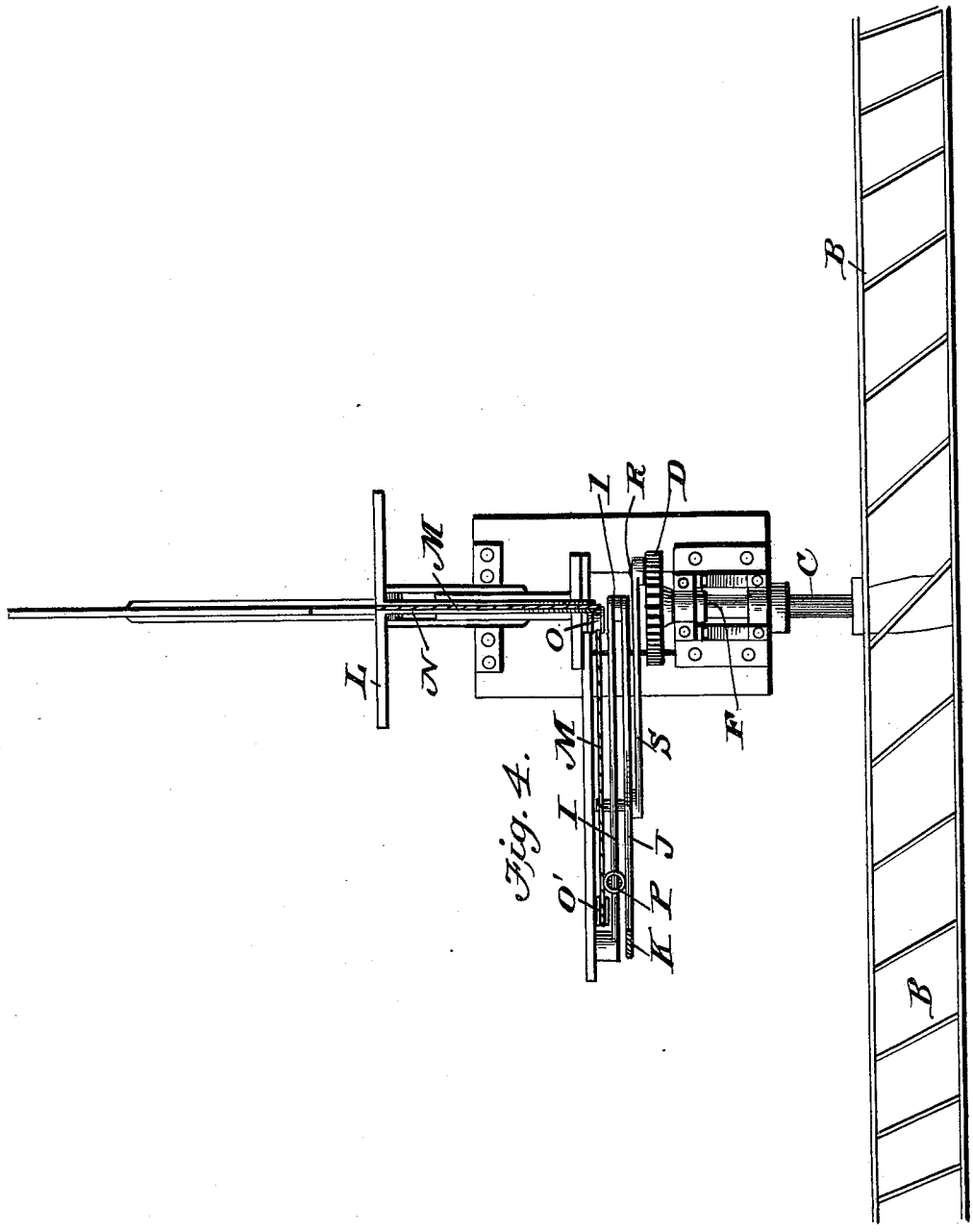


Fig. 4.

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UNITED STATES PATENT OFFICE.

ERNEST R. NICHOLS, OF MANHATTAN, KANSAS.

STROKE-REGULATOR FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 650,761, dated May 29, 1900.

Application filed January 3, 1898. Serial No. 665,366. (No model.)

To all whom it may concern:

Be it known that I, ERNEST R. NICHOLS, a citizen of the United States, and a resident of Manhattan, in the county of Riley and State of Kansas, have invented an Improvement in Power Apparatus for Wind-Wheels, &c., of which the following is a specification.

My invention has for its object to regulate the action of a wind-wheel by varying the length of stroke according to the velocity of the wind—that is to say, so that the stroke increases with the velocity, and vice versa. To effect this result, I employ a lever whose stroke is lengthened or shortened automatically, according as the force of wind is greater or less. The lever is in the form of an isosceles triangle one side of which is variable—*i. e.*, it may be lengthened or shortened to vary the length of stroke.

The details of construction, arrangement, and operation are as hereinafter set forth.

In the accompanying drawings, Figure 1 is a sectional front view on line 1 1 of Fig. 3, showing my invention as used in connection with a wind-wheel and illustrating the triangular lever expanded, as when a short stroke of the pump is being made. Fig. 2 is a view similar to Fig. 1, save that the triangular lever is contracted and the pump-stroke thereby lengthened. Fig. 3 is a side view of a portion of a wind-wheel embodying my invention. Fig. 4 is a plan view.

The stationary frame A and the wind-wheel proper, B, Fig. 3, may have any suitable construction. Said wheel is mounted vertically on a short horizontal shaft C, which is operatively connected by pinion E, gear-wheel D, and crank-pin R with the rod S.

The pump-rod G is connected at 1 with one angle of the triangular lever. The crank-pin R is connected with said lever at 3 by means of a rod S. The lever is composed of the three bars I J K, two of which—J and K—are rigidly connected, while I and J are pivoted together at their ends. The said lever has a fixed fulcrum at 2 on the horizontal arm *a* of the wind-wheel frame A. Thus the lever oscillates vertically on the center 2 and the outer end of the lower bar J is adjusted toward or from such point to contract or expand the lever and change the stroke of the pump. The bar I is, in effect, the weight-arm, and the bar K the variable-power arm, of the lever. This lever is expanded in Fig. 1 and contracted in Fig. 2. In the first case the stroke of the pump-rod G is short and in the second it is longer, corresponding to the less or greater force of the wind. The lever is automatically adjusted—that is, expanded or contracted—through the medium of a vane L. When the force of the wind is great, the vane L is thrown back, and thereby pulls on a cord or rope M, which passes over a segment N, attached to the vane L, thence over fixed pulleys O O′ to the lower outer angle 3 of the triangular lever, and thereby draws or lifts bars J toward the weight-arm I. (See Fig. 2.) When the force of the wind relaxes, the vane L rises to its former position, and the tension on rope M being thereby lessened the lever I J K expands, as before, Fig. 1, and the pump-rod stroke is again shortened. This expansion is attained in part by gravity, but positively by means of a spring P, which is connected with the outer end of the lever or weight arm I and with a vertical arm Q, attached to the curved power-arm K. The spring P obviously tends to push the latter downward, and thus to expand the triangular lever, as in Fig. 1. When the lever is contracted, the spring P is necessarily stretched correspondingly, as in Fig. 2. The bar K is curved corresponding to the arc of the circle described by the outer end 3 of the lower lever-bar, and a guide-pulley may be attached to frame-bar *a* to support the bar K in its sliding movement.

I wish it to be understood that the arrangement of the spring P may be varied, and I do not wish to restrict myself to the particular one shown; also, that I do not restrict myself to the particular means or arrangement of means shown and described for contracting the triangular lever nor to the particular gear connections of the wind-wheel, and I intend to apply my invention to any power-shaft where a variable stroke is required.

What I claim is—

1. The combination, with a power crank-shaft and a pump-rod, of a triangular lever composed of three bars one of which has a fixed fulcrum at one end, the other two bars being rigidly connected at an angle to each other and pivotally connected with the free

end of the first-named or fulcrum bar, so that they are free to move relative to said fulcrum-bar, to allow contraction or expansion of the lever, a spring tending to expand the lever, means acted on by the wind to contract said lever, and a rod connecting the lever and crank of the shaft, substantially as shown and described.

2. The combination with a wind-wheel, crank-shaft, and pump-rod, of the triangular expansible lever pivoted at a fixed point, and connected with the pump-rod, a rope attached to the outer lower angle of the lever and passing over pulleys fixed on the frame, and a hinged vane to which said rope is also attached, so that when acted on by the wind, the said inclination of the vane contracts the lever, and thus varies the stroke, as shown and described.

ERNEST R. NICHOLS.

Witnesses:
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GEO. W. WASHINGTON.