No. 717,197. Patented Dec. 30, 1902.

J. F. HOAG & C. R. BECKMAN.

WIND WHEEL.

(Application filed Feb. 25, 1902.)

(No Model.)

Fig. 1.

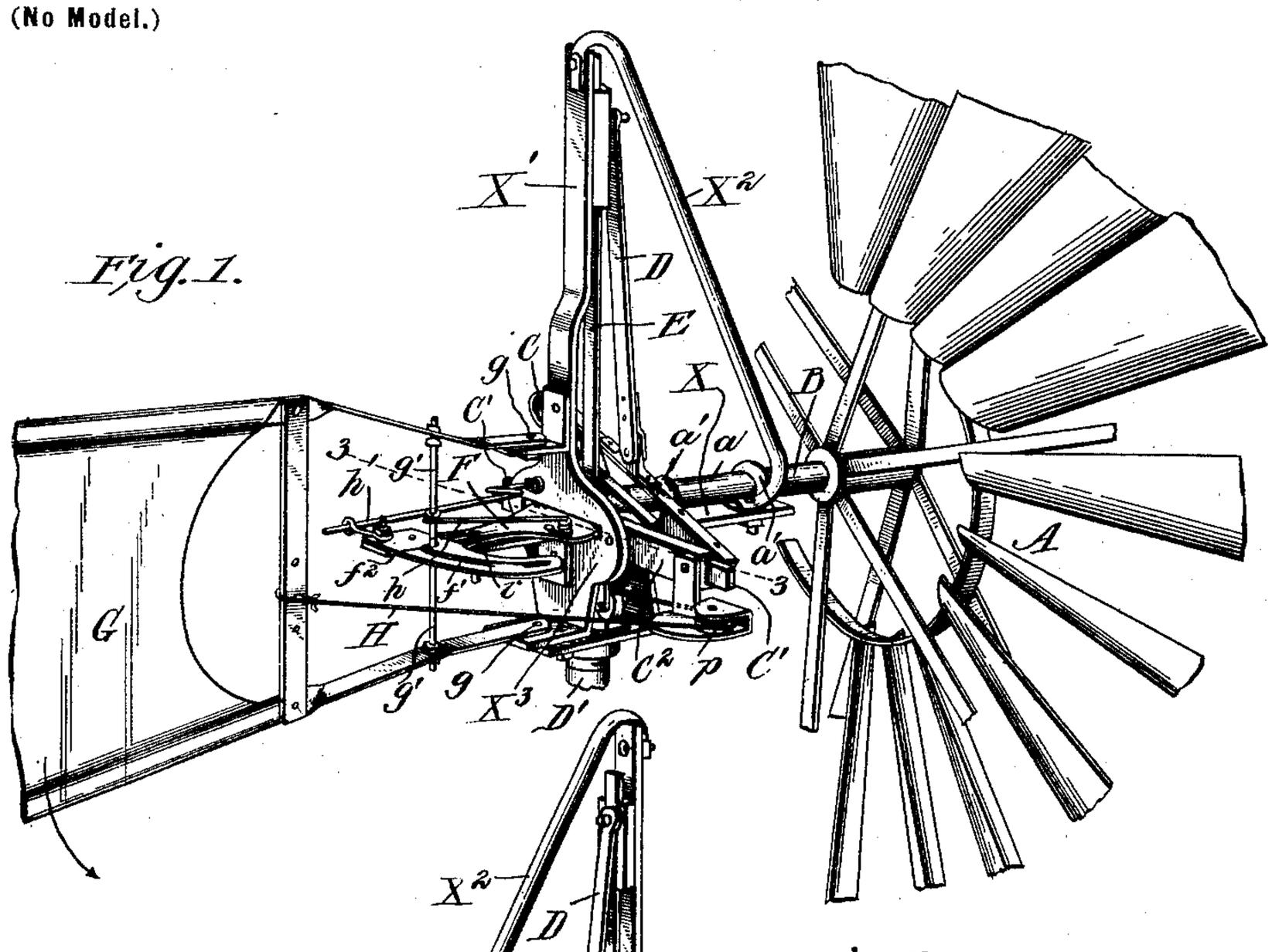

Fig. 2.

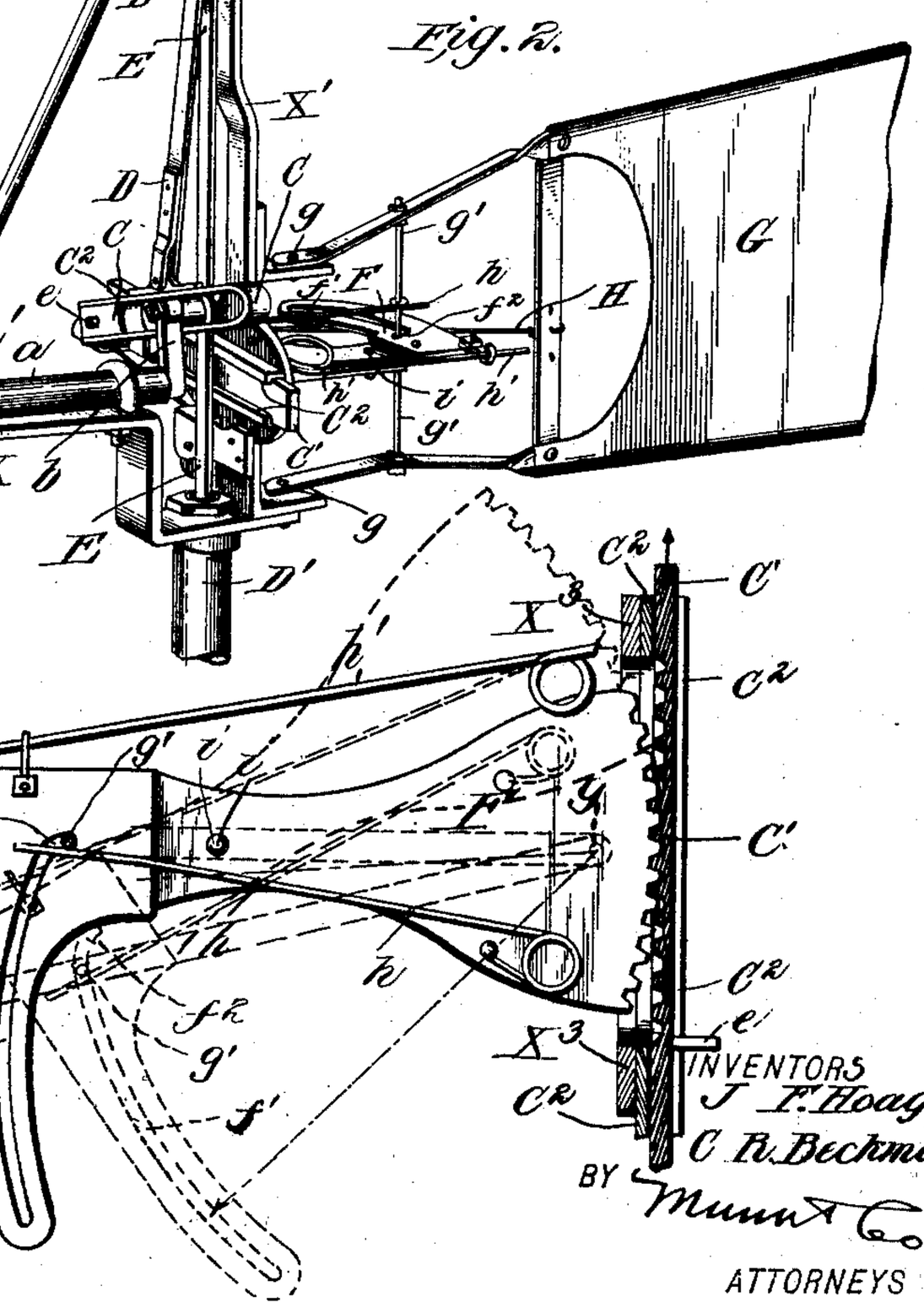

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN F. HOAG AND CLAUS R. BECKMAN, OF PALISADE, NEBRASKA.

WIND-WHEEL.

SPECIFICATION forming part of Letters Patent No. 717,197, dated December 30, 1902.

Application filed February 25, 1902. Serial No. 95,522. (No model.)

To all whom it may concern:

Be it known that we, JOHN F. HOAG and CLAUS R. BECKMAN, of Palisade, in the county of Hitchcock and State of Nebraska, have invented a new and useful Improvement in Wind-Wheels, of which the following is a specification.

Our invention is in the nature of an improvement in wind-wheels by which the stroke of the pump-rod is lengthened as the wind increases, so as to cause the work done to be increased in proportion as the power of the wind increases without increasing the speed of the wheel to an undesirable velocity.

It consists in the peculiar construction and arrangement of the operative parts whereby this result is obtained, which we will now proceed to describe with reference to the drawings, in which—

Figure 1 is a perspective view taken from the rear side of the wheel. Fig. 2 is a perspective view from the front with the wheel removed from its shaft, and Fig. 3 is a horizontal section on line 3 3 of Fig. 1.

In the drawings, A represents the wheel proper, which may be of any suitable or desired construction. This wheel is rigidly attached to a shaft B, which rotates in a long bearing or sleeve *a*. This sleeve is secured by yokes *a' a'* to a horizontal arm X of the main frame X X' X². X² is an inclined brace which connects the outer end of the horizontal portion X of the frame to the top of the upright standard X'.

The inner end of the wheel-shaft B is provided with a rigid crank-arm *b*, bearing a wrist-pin and roller, which latter plays in a slot of a vibrating arm C and imparts to it an oscillating motion about its pivotal center *e* as the crank of the wheel-shaft revolves. This slotted arm C is on its upper side jointed near its middle to a pitman-rod D, which extends up to near the top of the upright X' and is jointed to a pin on the upper end of the pump-rod E, which upper end of said pump-rod is arranged in suitable vertical guides formed on or attached to the upper end of upright X'. The lower end of this pump-rod extends down through the supporting-tube D' and connects with the pump mechanism below. As the wheel-shaft rotates it will be seen that the roller of the crank *b*, playing in the slot of arm C, imparts to the pitman D and pump-rod a reciprocating motion. The slotted arm C is made adjustable along a horizontal line, so as to cause the crank-arm roller to play in its slot close to the rocking center *e* of that arm or farther off from it, as may be desired. When said crank-arm roller plays in the slot close to the center of the arm, the definite throw of the crank will impart a long stroke to the pitman and pump-rod, and when said roller plays in the outer end of the slot it will impart a shorter throw to the pitman and pump-rod. This adjustment is made to correspond to the force of the wind, as follows: The slotted arm is pivoted at *e* to a horizontal rack-bar C', which slides in a guide C², fixed to the framework, and the back side of this rack-bar has its teeth engaged with teeth on a curved segment F, which is pivoted at *i* to an offsetting arm of the framework. This framework at X³, Fig. 1, and also the guide C² have long horizontal slots through them, in which the segment F plays to engage the rack-bar C'. By a lateral swing of the segment F on its pivot *i* its teeth, engaging the rack-bar C', are made to slide the axial pin *e* of slotted arm C closer to or farther from the crank. The movement of the segment F is effected by the deflection of the guiding-tail G, as follows: This tail is pivoted at *g g* to offsets from the main frame X³ and has a vertical rod *g'*, that passes through a cam-slot *f' f²* in the segment F. A spring-arm *h*, mounted on the segment F, tends to press the rod *g'* into the short bend *f²* of the slot, and another spring-arm *h'* is fixed at one end to the stationary frame X³ and at the other end to segment F and tends to restore the tail G to its position on its pivots *g g* whenever it has been deflected. This deflection may be made by a pull-rope H, passing over a pulley *p* and thence over another in a vertical plane to convenient reach from below or in any other well-known way.

The operation of our wind-wheel is as follows: When the wheel is thrown full face to the wind and only a moderate breeze is blowing, the tail is parallel with the direction of the wind and the axial center *e* of slotted arm C is thrown farthest away from the pump-rod and the crank *b* plays in the extreme outer end of the slotted arm, where it exerts the

greatest leverage, but in which position the stroke of the pitman and pump-rod is shortest. If, however, a strong breeze be blowing, the tail G is then turned around in the direction of the arrow, and this, in causing the segment F to turn on pivot *i*, shifts through the rack-bar the slotted arm C, so that its center is close to the crank, and the latter plays then in the portion of the slot between the pitman and the center *e*, and as the crank has a definite throw the movement of the pitman and pump-rod is increased in length, so as to get a longer and more effective stroke. As it is not desirable to have the tail change the position of the slotted arm C for more than about one-eighth of the swing of the wheel out of the wind, the tail is made to swing the wheel out of the wind only until rod g' passes out of the curved part f^2 of the slot in the segment, and for the rest of the movement said rod g' travels in the longer slot f', where it has no effect in further moving the slotted arm. When the wheel has been turned one-eighth out of wind, or one-eighth of ninety degrees, the stroke is at its longest, and then the rod g' passes into the longer slot f', whose curve is described about the pivots $g\,g$ of the tail. This stroke of the pump-rod is maintained until the wheel is edgewise to the wind and is out of running position and until it comes back to the position where rod g' drops into the short curve f^2 of the slot again. The segment, with cam-slot, is pivoted behind the tail-pivots just according to the length of stroke desired. The farther back it is pivoted the shorter the leverage and the quicker it will act on the slide and the farther over it will throw the slide and the longer it will make the stroke of the pump-rod. It will be seen that the pitman when on the shortest stroke will have the crank *b* working on one side of the point of connection of pitman D with arm C, (the right side of Fig. 2,) and as the wind forces the slide and slotted arm over the pitman soon works directly up and down over the crank, and when the slide and slotted arm are forced farther over for the longest stroke of the pitman the crank *b* will be working on the left side of the point of connection between the pitman and slotted arm. Thus it will be seen that three different kinds of leverage are obtained. The return movement of the wheel about its vertical pivots is controlled by the two springs *h* and *h'*—that is to say, after the tail has been deflected by cord H the spring *h* forces the rod g' through the long slot f' into the short end f^2, and the spring *h'* then restores the tail to its normal position in line with the wind.

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

1. A wind-wheel having a variable gear for increasing the length of stroke of the pump-rod with the increased power of the wind, said gear being connected to and adjusted by the movement of the guiding-tail through the first part of its motion only substantially as described.

2. A wind-wheel having a variable gear for varying the length of stroke, comprising a crank on the wheel-shaft, a slotted and vibrating arm in which the crank plays, an adjustable slide carrying said slotted arm, and mechanism connecting said slide to the guiding-tail, whereby the lateral movement of the tail is made to alter the position of the slotted arm in relation to the crank and change the leverage of the crank upon said slotted arm substantially as described.

3. A wind-wheel having a variable gear for varying the length of the stroke, comprising a crank on the wheel-shaft, a slotted and vibrating arm in which the crank plays, an adjustable slide carrying said slotted arm and having teeth on one side, a toothed segment pivoted in rear thereof and meshing with the toothed slide, and a guiding-tail connected to and acting upon said toothed segment substantially as described.

4. A wind-wheel having a variable gear for varying the length of stroke, comprising a crank on the wheel-shaft, a slotted and vibrating arm in which the crank plays, an adjustable slide carrying the slotted arm and having teeth on one side, a toothed segment pivoted in rear thereof and engaging the teeth of the slide, said segment having also a cam-slot described in two parts, the guiding-tail having a rod passing through said cam-slot, a spring mounted on the segment and bearing against the tail-rod, and another spring controlling the deflection of the tail on its own pivots substantially as described.

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Witnesses:
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