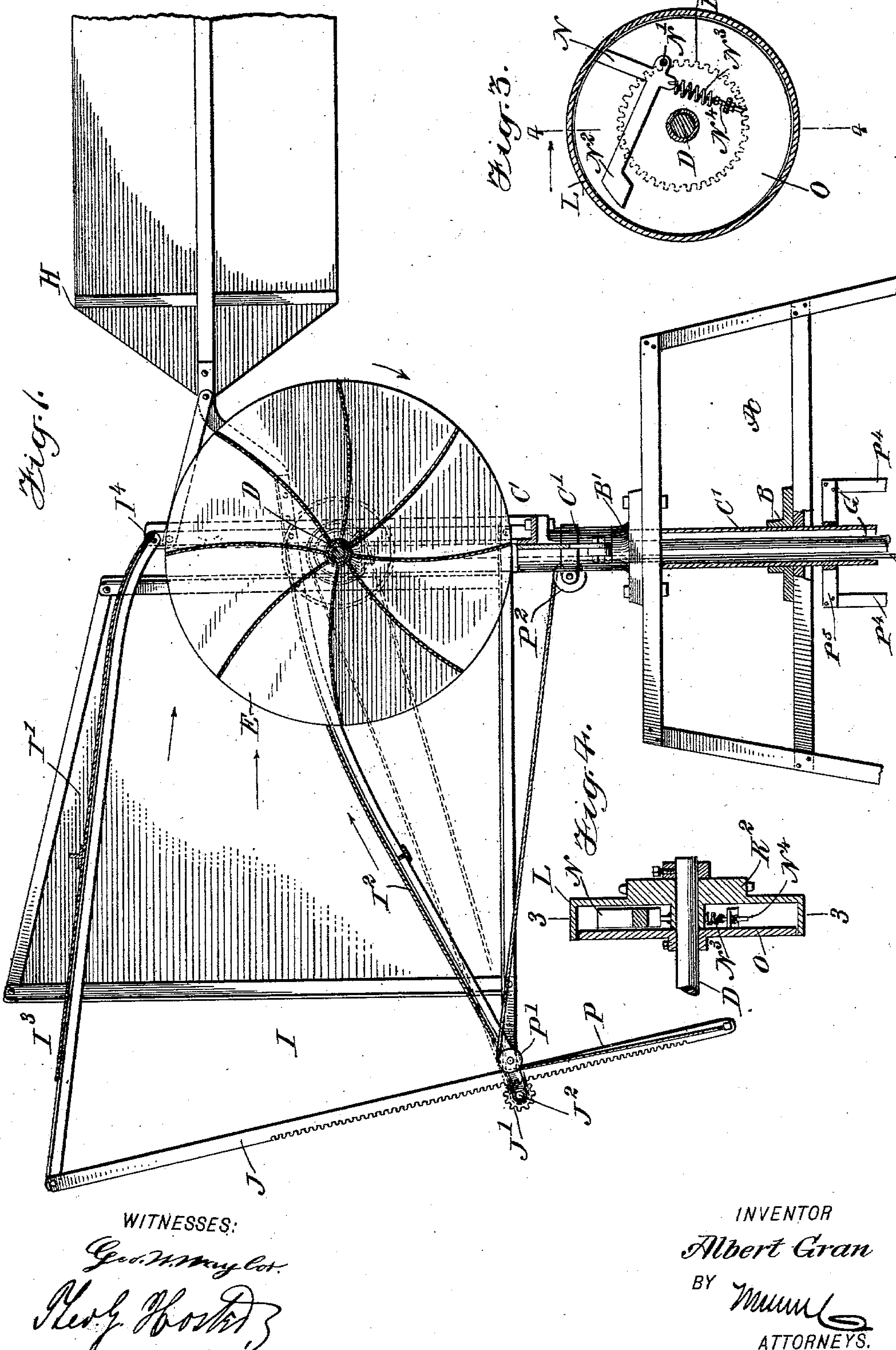
No. 744,065. PATENTED NOV. 17, 1903.

A. GRAN.

WIND MOTOR.

APPLICATION FILED OCT. 10, 1902.

NO MODEL. 3 SHEETS—SHEET 1.



WITNESSES:

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ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 2.

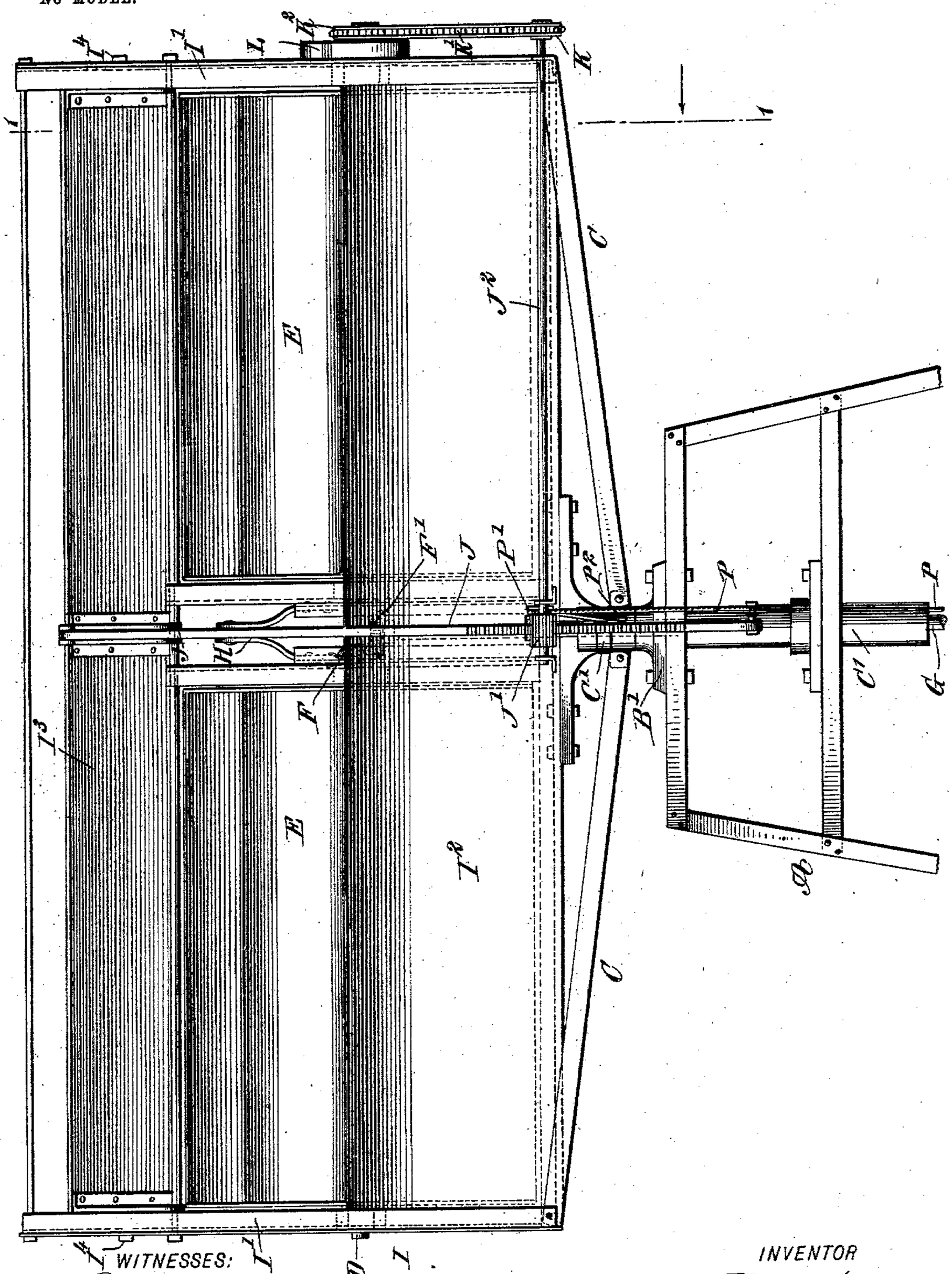

Fig. 2.

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NO MODEL. 3 SHEETS—SHEET 3.

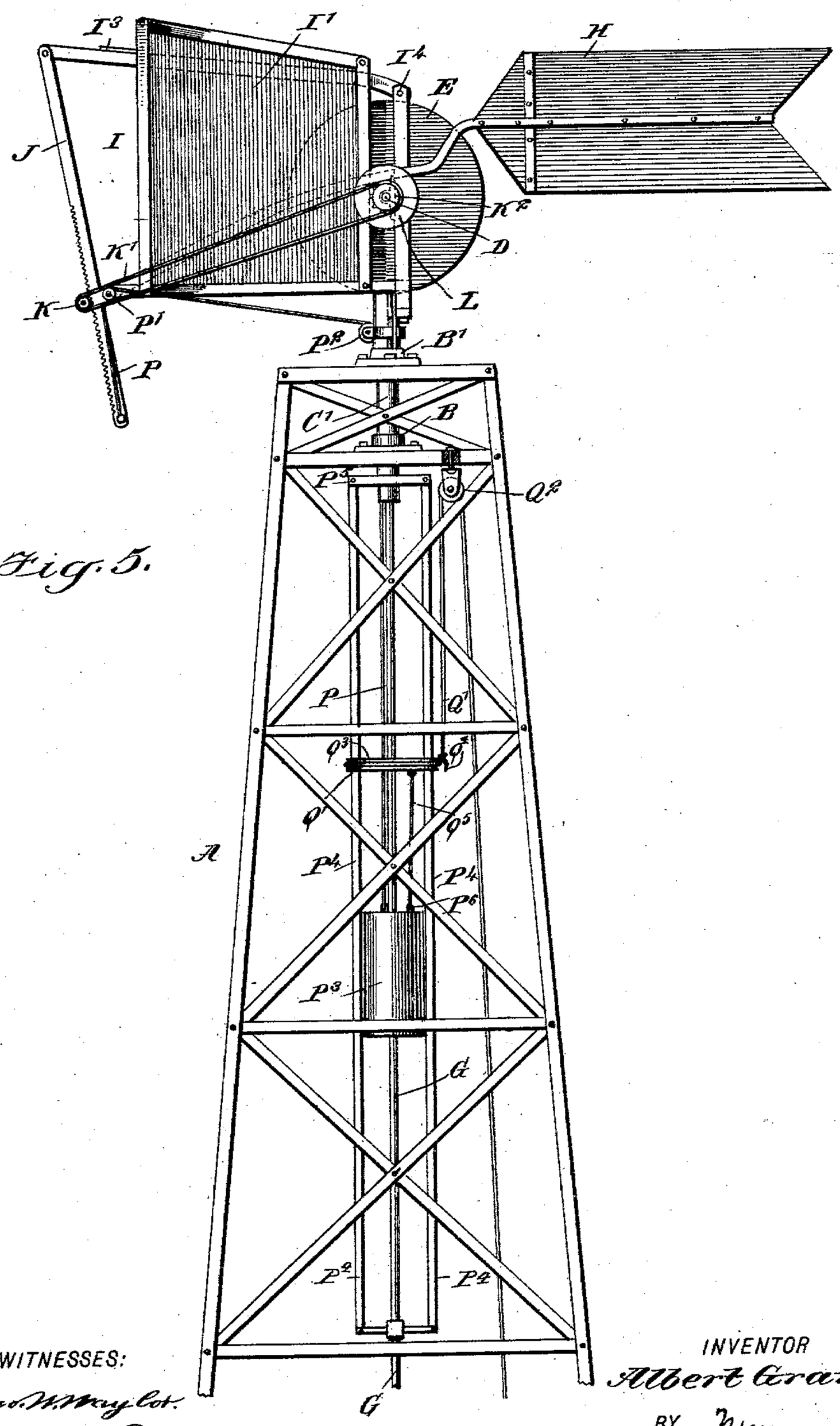

Fig. 5.

WITNESSES:

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Geo. J. Hooker

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No. 744,065. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

ALBERT GRAN, OF CHICAGO, ILLINOIS.

WIND-MOTOR.

SPECIFICATION forming part of Letters Patent No. 744,065, dated November 17, 1903.

Application filed October 10, 1902. Serial No. 126,709. (No model.)

To all whom it may concern:

Be it known that I, ALBERT GRAN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Wind-Motor, of which the following is a full, clear, and exact description.

The invention relates to wind-motors such as shown and described in the Letters Patent of the United States No. 705,922, granted to me July 29, 1902.

The object of the present invention is to provide a new and improved wind-motor arranged to permit automatic adjustment of the chute directing the wind to the wind-wheel to insure uniform running of the motor both in a heavy and light breeze.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal sectional elevation of the improvement on the line 1 1 of Fig. 2. Fig. 2 is a front elevation of the same. Fig. 3 is an enlarged sectional side elevation of the governor, the section being on the line 3 3 of Fig. 4. Fig. 4 is a transverse section of the same on the line 4 4 of Fig. 3, and Fig. 5 is a reduced side elevation of the improvement.

The tower or like support A is provided on its top with spaced bearings B and B', in which is mounted to turn the hub C' of a frame C, provided in its sides with bearings for a shaft D, carrying a wind-wheel E, preferably provided with curved buckets, as plainly illustrated in Fig. 1. On the shaft D is secured a bevel gear-wheel F in mesh with a bevel gear-wheel F', secured on the upper end of a vertically-disposed shaft G, extending through the hub C', down through the tower A, to the ground to connect at its lower end with the pump or other machinery to be driven. Thus when the wind-wheel E is rotated its rotary motion is transmitted by the gear-wheels F and F' to the shaft G for the latter to actuate the machinery to be driven.

On the frame C for the wind-wheel is secured a vane H for holding the front of the wind-wheel E at all times to the wind, the latter being directed to the open ends of the buckets at the front of the wheel and near the top thereof by a chute I, having side walls I' secured to the frame C, and a bottom I^2, which extends upward and inward at the front of the wheel E to the peripheral surface of the said wheel, at about the middle thereof, as plainly indicated in Fig. 1. This bottom I^2 is supported from the sides I' and serves to direct the wind into the buckets of the wind-wheel E at the upper front portion thereof. The chute I is further provided with a top I^3, extending between the sides I' and fulcrumed at I^4 on the frame C, directly above the center of the wind-wheel, and on the free end of the said top I^3 is pivoted a downwardly-extending rack J in mesh with a pinion J', secured on a shaft J^2, journaled in suitable bearings carried by the framework of the chute I, and on the outer end of the said shaft J^2 is secured a sprocket-wheel K, connected by a sprocket-chain K' with a sprocket-wheel K^2, formed or secured on a governor-wheel L, mounted to rotate loosely on the wind-wheel shaft D. (See Figs. 2, 3, and 4.)

The inside of the rim of the governor-wheel L is adapted to be engaged by a lever N, fulcrumed at N' on the inside of a disk O, secured on the wind-wheel shaft D and serving to close the open end of the governor-wheel L. The lever N is provided with a weighted arm N^2 and is connected with a spring N^3, attached to a bolt N^4, held adjustably on a disk O to allow of regulating the tension of the spring N^3. Now when the wind-wheel E is rotated by the wind passing through the chute I onto the buckets of the wind-wheel E then the disk O rotates with the shaft D, and when the speed of the wind-wheel increases beyond a normal rate of speed then the weighted arm N^2 of the lever N causes the latter to swing by centrifugal force into engagement with the governor-wheel L to rotate the latter with the disk O, shaft D, and wind-wheel E, and the rotary motion thus given to the governor-wheel L is transmitted by the sprocket-wheels K^2 K and sprocket-chain K' to the shaft J^2, which by the pinion J' causes the rack J to

move downward, so that the top I^3 is swung downward to reduce the size of the opening or entrance of the chute I, and thereby cut off some of the wind from the wind-wheel E to reduce the latter's speed. When the speed of the wind-wheel falls below a normal rate, then the tension of the spring N^3 causes a return swinging movement of the lever N to disconnect the disk O from the governor-wheel L to allow of opening the top I^3 to admit more wind by the chute I to the wind-wheel E. In order to hold the top I^3 normally in a full open position and to return the top to this open position after the governor is out of action, I provide the following device: The free end of the rack J is connected with one end of a rope, cord, or chain P, extending upwardly over a pulley P', journaled in the framework of the chute I, the rope then extending inwardly over a pulley P^2, journaled on the hub C' and guiding the rope to the inside of the hub for the rope to then extend downwardly to support a weight P^3, mounted to slide on vertical guideways P^4, hung on a cross-bar P^5, secured to the lower end of the hub C', as plainly shown in Figs. 1 and 5. The weight P^3 has a tendency to push the rack J upward to hold the top I^3 in an uppermost open position; but when the speed of the windmill increases beyond a normal rate then the governor, acting on and turning the pinion J', causes the latter to move the rack J downward to move the top I^3 downward, and thereby reduce the entrance of the chute I to admit less wind to the wind-wheel. It is understood that when the rack J moves downward, as described, the weight P^3 is drawn upward on its guideways P^4, and when the speed of the windmill diminishes back to a normal rate then the weight overcomes the centrifugal action of the governor and causes a return or upward movement of the rack J and top I^3 to open the chute I to its full capacity.

Mounted to slide on the guideways P^4 is a sleeve Q^3, connected by a rope or chain Q^5 to the staple P^6 on the weight P^3, and loosely mounted on the said sleeve is a ring Q^4, with which the hook Q on one end of the rope Q' is adapted to be engaged, said rope passing over a pulley Q^2, journaled in the upper portion of the tower A, as plainly shown in Fig. 5. The downward-hanging end of the rope Q' is under the control of the operator standing on the ground, so that when the hook Q is engaged with the ring Q^4 and the operator pulls on the downward-hanging end of the rope then the weight P^3 slides upward on its guideways, and thus relieves the rack-bar J and top I^3 of its pressure to allow the top I^3 to completely close the entrance of the chute, and thereby stop the windmill.

It is understood that the shaft G extends loosely through an opening in the middle of the counterbalancing-weight P^3 for the top I^3 of the chute, so that the shaft can rotate independently of the said weight, which has a free up-and-down movement on its guideways P^4, and the latter and the weight turn with the hub C' and frame C, controlled in its turning motion by the vane H, it being expressly understood that the vane H holds the chute I and wind-wheel E always to the wind to utilize the force of the wind to the fullest advantage. When the top I^3 is in a normal open position, as shown in Fig. 1, then the inner end of the chute next to the wind-wheel E is somewhat contracted to cause compression of the wind and immediate expansion thereof as soon as it reaches the buckets of the wind-wheel E.

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

1. A wind-motor, comprising a wind-wheel, a chute for directing the wind to the wind-wheel having a hinged member, a bar pivotally connected with the hinged member, a governor actuated by the wind-wheel, mechanism for operating the bar from the governor, and a counterweight connected with the said bar for returning the hinged member of the chute to its normal position, as set forth.

2. A wind-motor comprising a wind-wheel, a chute for directing the wind to the buckets of the wind-wheel and having a hinged top, a counterweight for the top, to hold the latter normally open, a governor actuated by the said wind-wheel, and means connecting the governor with the said hinged top, to swing the latter down on an increase in the speed of the wind-wheel, the said means comprising a rack pivotally connected with the said top, a pinion in mesh with the said rack, a shaft carrying the said pinion, and a gearing connecting the said shaft with a wheel on the governor, as set forth.

3. A wind-motor, comprising a frame mounted to turn, a wind-wheel journaled in the frame, a chute held on the frame for directing the wind to the wheel and having a hinged top, a vane rigid on the frame for holding the chute to the wind, a governor actuated by the wind-wheel, a bar hinged to the hinged top, mechanism for operating the rod from the governor, and means connected with the said rod for returning the hinged top of the chute to its normal position, as set forth.

4. A wind-motor, comprising a frame mounted to turn, a wind-wheel journaled in the frame, a chute held on the frame for directing the wind to the wind-wheel, said chute having fixed sides and bottom and a hinged top, a vane rigid on the frame for holding the chute to the wind, a governor on the wheel-shaft, a bar hinged to the hinged top of the chute, mechanism for operating the rod from the governor, and a counterweight connected with the said bar for returning the top of the chute to its normal position, as set forth.

5. A wind-motor, comprising a frame mounted to turn, a wind-wheel mounted in the frame, a chute held on the frame for directing the wind to the wind-wheel, said chute having a hinged member, a vane rigid with the

frame for holding the chute to the wind, a rack hinged to the hinged member of the chute, a pinion meshing with the rack, a governor actuated by the wind-wheel, means for operating the pinion from the governor, and means connected with the rack for returning the hinged member of the chute to its normal position, as set forth.

6. In a wind-motor, the combination with a wind-wheel, a chute for directing the wind to the wheel, said chute comprising fixed sides and bottom and a hinged top, a bar having its upper end hinged to the top, a governor on the wheel-shaft, mechanism for operating the bar from the governor, and means connected with said bar for returning the top to its normal position, as set forth.

7. In a wind-motor, the combination with a wind-wheel, and a chute for directing the wind to the wheel, said chute having a hinged member, of a pinion carried by the chute, a rack connected with the hinged member of the chute and meshing with the pinion, a governor on the wheel-shaft, and gearing between the pinion and governor, as set forth.

8. In a wind-motor, the combination with a wind-wheel, and a chute for directing the wind to the wheel, said chute having a hinged top, of a shaft mounted on the chute and provided with a pinion and sprocket-wheel, a rack pivoted to the hinged top of the chute and meshing with the pinion, a governor on the wheel-shaft, and provided with a sprocket-wheel, and a sprocket-chain passing around said sprocket-wheels, as set forth.

9. In a wind-motor, the combination with a supporting-frame, a wind-wheel mounted thereon, and a chute for directing the wind to the wheel, said chute having a hinged member, of a pinion carried by the chute, a rack pivoted to the hinged member of the chute and meshing with the pinion, a governor on the wheel-shaft, gearing between the governor and pinion, a weight having guided movement on the frame, and a cord having one end secured to the weight, passed over guides and its other end secured to the said rack, as set forth.

10. In a wind-motor, the combination with a wind-wheel, of a chute for directing the wind to the wheel, said chute having a hinged top, a rack hinged to the said top, a pinion meshing with the rack, a governor on the wheel-shaft, mechanism for operating the pinion from the governor, a weight, and a flexible connection between the weight and rack, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERT GRAN.

Witnesses:
PETRUS ANDERSON,
AUGUST BAUM.