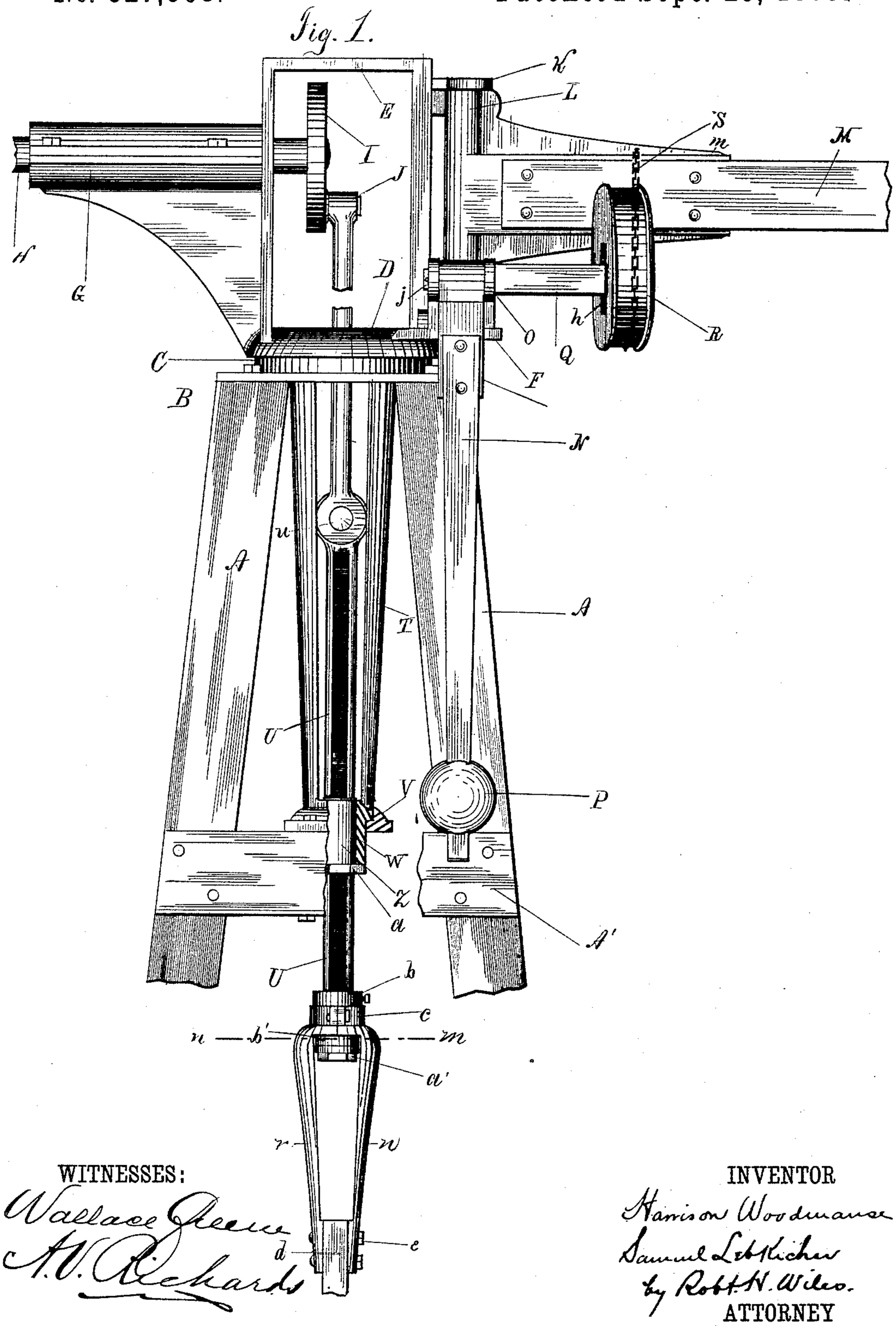
(No Model.) 2 Sheets—Sheet 1.

H. WOODMANSE & S. LEBKICHER.

WINDMILL.

No. 327,508. Patented Sept. 29, 1885.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

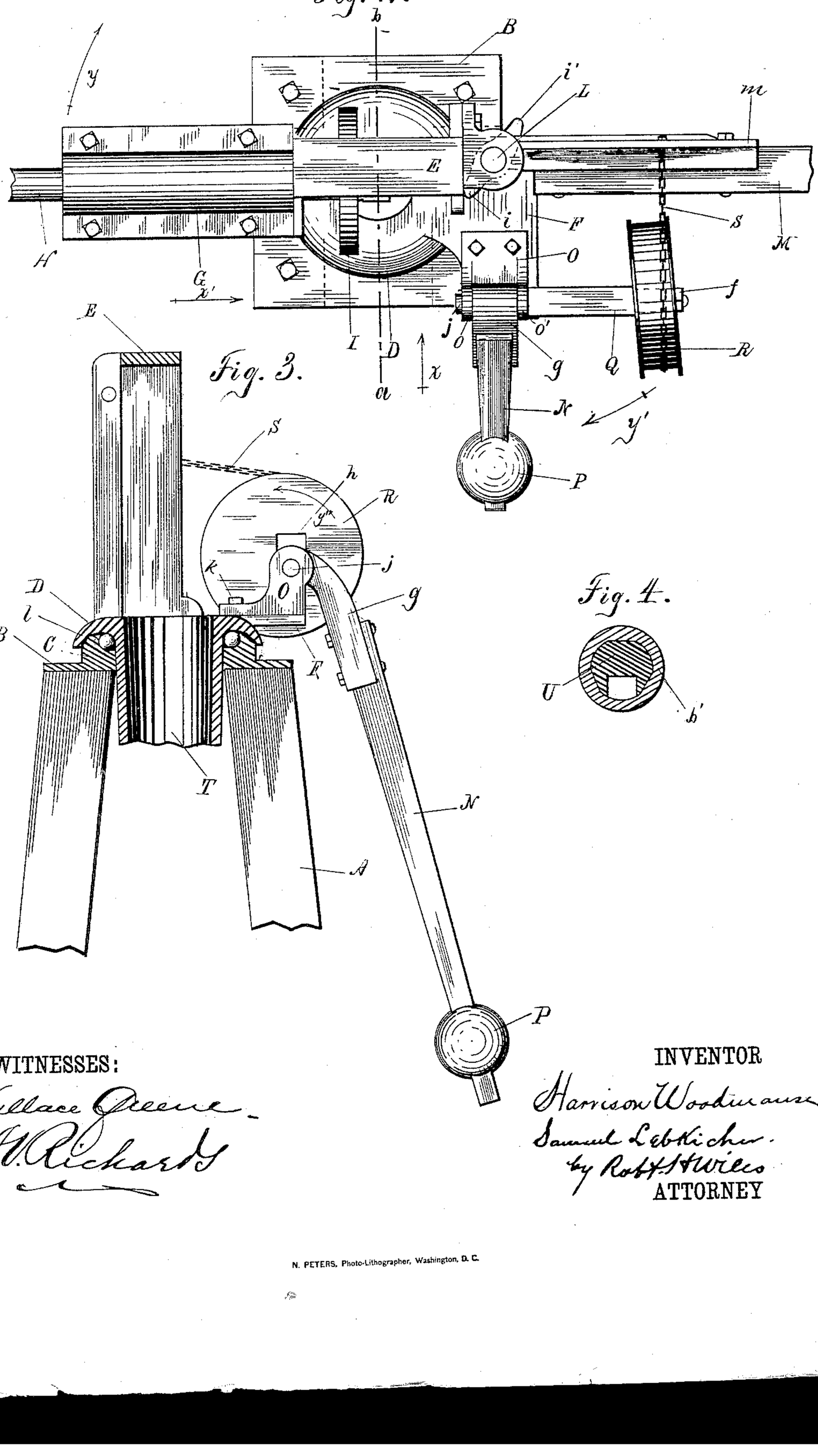

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

HARRISON WOODMANSE AND SAMUEL LEBKICHER, OF FREEPORT, ILLINOIS;
SAID LEBKICHER ASSIGNOR TO SAID WOODMANSE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 327,508, dated September 29, 1885.

Application filed April 7, 1884. (No model.)

To all whom it may concern:

Be it known that we, HARRISON WOODMANSE and SAMUEL LEBKICHER, residents of Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Windmills; and we 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 pertains to make and use the same.

Our invention relates to improvements in windmills, and more especially to improvements in the means for governing the wind-wheel, and in the fittings and connections of the pitman used in pumping.

The construction of the windmill is fully explained and described in the following specification and shown in the accompanying drawings, and the improvements referred to are set out in the claims forming part of the specification.

In the accompanying drawings above mentioned, Figure 1 is a side elevation of the working parts of the mill, looking in the direction indicated by the arrow *x*, Fig. 2, the pitman J being broken in two, and the lower part thereof being turned ninety degrees from the position of the upper part, in order to show more fully the details of the connecting-rod U. Fig. 2 is a plan of the working parts of the mill; Fig. 3, an elevation of the regulating-lever and the means of operating the same, looking in the direction indicated by the arrow *x'*, Fig. 1, the tower and turn-table being cut by a vertical plane passing through the line *a b*, Fig. 2, and the half opposite the regulating-lever removed; and Fig. 4, a horizonal section of the connecting-rod U and washer *b'* through the line *m n*, Fig. 1.

In these views, A is the tower of the mill, B C the top plate thereof, and D the turn-table, which rests on a series of anti-friction balls interposed between it and the plate B C. With the turn-table is formed integrally the bearing G, in which is journaled the wind-wheel shaft H; and a frame, E, provided with ears K K on the side opposite the bearing G, is also formed integrally with the turn-table. In the ears K K is journaled the vertical pivot L, which supports the horizontal mid-rib M of a regulating-vane, of any desired form, the rib swinging freely about the pivot as an axis of oscillation. The pivot L is provided with two lugs, *i i'*, which form the limits of motion of the vane, since one of them, *i*, strikes the frame E when the mill is "in the wind," while the other, *i'*, strikes the frame when the mill is "out of the wind." The vane is hinged slightly off the center, as is common in mills of this class, and is so arranged with reference to the wind-wheel that the latter, in going out of the wind, swings about the vertical axis of the mill in the direction indicated by the arrow *y*, Fig. 2.

A horizontal plate, F, is formed integrally with the turn-table D on the side opposite the bearing of the wind-wheel, and to the upper face of the plate is fastened, by means of bolts K, a casting, O, provided with two parallel vertical ears, *o o'*, which are practically at right angles to the vane M when the mill is in the wind. In the ears *o o'* is journaled a horizontal shaft, *j*, which extends outward from the ear *o'*, forming a square arm, Q. The outer end of the arm Q is reduced in thickness, and the reduced portion passes through a slot, *h*, in a preferably circular plate or pulley, R. One of the side faces of the pulley rests against a shoulder at the inner end of the reduced part of the arm Q, and a nut, *f*, screwed on the outer end of the arm Q, rests against the other face of the pulley and secures it in place. The loosening of the nut *f* loosens the pulley, and it may be moved on the arm Q so as to change the position of the arm in the slot *h*, and thus vary the eccentricity of the pulley. A chain, S, is fastened at one end to the vane, while the other end passes over and partly around the pulley and is fastened thereto. Between the ears *o o'* hangs a casting, *g*, which is rigidly fastened to the shaft *j*, and to the casting *g* is bolted a lever, N, provided with an adjustable weight, B.

When the wind-wheel is in the wind, as shown in Fig. 2, the lever N hangs nearly vertical, or in the position shown in Fig. 3; but as the wind-wheel swings out of the wind in the direction indicated by the arrow *y*, Fig. 2, the lever N, shaft Q, and pulley R swing with it in the direction indicated by the arrow *y'*, the distance between the pulley and the vane increases, and the pulley is rotated in the direc-

tion indicated by the arrow *y''*, Fig. 3, thus raising the free end of the lever N and the weight P, which is fastened thereon. The weighted lever thus resists any tendency of the wind-wheel to go out of the wind, and its resistance increases as it approaches a horizontal position, and is least when it is nearest vertical. At the same time the rotation of the pulley R varies the leverage of the chain on the arm Q and shaft *j*, the leverage being greatest when the lever N is vertical and least when it is at its highest point. This variation in leverage may be increased or diminished at will by varying the eccentricity of the pulley. If the pulley be formed as shown, the leverage decreases as the wheel goes out of the wind, and the increasing resistance of the weighted lever is thus multiplied by the rotation of the pulley; in other words, the use of the eccentric pulley renders the wheel easier to start out of the wind, but constantly increases the resistance of the weighted lever as the wheel swings toward the vane.

It is evident that the pulley R need not necessarily be in the form of a circle or a segment of a circle, but may be a cam of such form as to vary the leverage in any desired way; but the form shown is probably as good as any. Since only a part of the circumference of the pulley is used, the remainder may be cut away, if desired, and the operation of the device will still be the same.

We are aware that the combination, with the turn-table and vane of a windmill, of a weighted lever hung on a shaft journaled in the turn-table is not new, and that it is a common expedient to attach a crank-arm to said lever-supporting shaft and connect said crank-arm with the vane by means of a chain, rope, or band.

We are also aware that a non-adjustable centrally-mounted sector has been attached to said shaft in place of the crank-arm, and connected by a suitable cord with the vane. When the crank-arm is used, the leverage brought to bear on the shaft varies in a ratio which cannot be changed, and when the centrally-mounted sector is substituted for the crank-arm the leverage is constant and invariable. The use of an eccentric or cam gives a varying leverage, increasing or decreasing as desired, and if the cam or eccentric be made adjustable, as shown and described, the variation of leverage is not only subject to the control of the mechanic who constructs the mill, but of its operator at any time after completion.

On the wind-wheel shaft H is rigidly mounted a crank-plate, I, provided with a suitable crank-pin, which passes through the upper end of the pitman J, the lower end of the pitman being connected with a connecting-rod, U, Fig. 1. The connecting-rod (which is channeled for the passage of a chain or wire for drawing the mill out of the wind from below) slides reciprocally in a bushing, Z, inserted in the lower end of the cone T, which is formed integrally with the turn-table D. The upper end of the bushing is flanged outwardly, and the lower end is provided with a nut, *a*, which lies below the end of the casting T and holds the bushing in place. By taking out the connecting-rod U and taking off the nut *a*, the bushing Z may be readily removed when worn and replaced by a new one.

At the lower end of the connecting-rod U is a nut, *a'*, screwed on the rod, and immediately above the nut the rod is slightly flattened and conforms to the inner surface of a washer, *b'*, Figs. 1 and 4, which surrounds the rod and rests on the nut. The washer sustains the weight of the swivel *n n* and pump-rod *d*, the swivel-ring *c* being formed by bolting together the two semi-annular halves of the swivel. Above the swivel is a ring, *b*, surrounding the rod U and fastened thereon by a set-screw. The swivel can thus turn on the connecting-rod, but has no longitudinal play thereon, and the washer *b'* prevents the rotation of the swivel from affecting the nut *a'*.

It has been customary heretofore to form the connecting-rod U with a flange at the lower end, and pass it upward from below through the opening in the lower end of the cone T. In order to secure greater strength, however, the joint *u* between the pitman J and connecting-rod U has been enlarged until its diameter is greater than that of the opening in the bottom of the cone, and it is therefore necessary to make the lower end of the connecting-rod as small as the body thereof, and pass it downward from above through the bottom of the cone. Having done this, some retaining device must necessarily be substituted for the flange at the bottom of the connecting-rod, and the nut *a'* and washer *b'* are believed to constitute as simple and effective a device as can be used, since they are readily detachable, and at the same time are not liable to accidental loosening or separation from the rod to which they are attached.

Having now described our invention and explained its operation, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination of the turn-table of a windmill of the class described, a suitably-journaled horizontal shaft mounted on said turn-table, a weighted lever rigidly attached to said journaled shaft and oscillating in a vertical plane upon the reciprocal rotation of said shaft in its bearings, a pulley adjustably mounted on said lever-supporting shaft, and a band or chain, one end of which is attached to the regulating-vane of the mill, while the other passes partly around and is fastened to said pulley, whereby the changing of the angle between the vane and the wind-wheel rotates said pulley, and thereby raises or lowers the free end of the weighted lever.

2. In a mill of the class described, the combination of the turn-table of the mill, a suitably-journaled horizontal shaft mounted thereon, a weighted lever suspended from and rigidly fastened to said horizontal shaft, a pulley mounted eccentrically on said lever-sup-

porting shaft, and a chain or, band, one end of which is attached to the regulating-vane of the mill, while the other end thereof passes partly around and is fastened to said eccentric pulley, whereby the changing of the angle of said vane to the wind-wheel rotates said eccentric pulley, and thereby exerts a varying force on said weighted lever, substantially as shown and described, and for the purpose set forth.

3. The combination of the turn-table D, journaled shaft *j*, weighted lever N, rigidly attached to said shaft, pulley R, rigidly and eccentrically mounted on said shaft and provided with means whereby its eccentricity may be varied, the regulating-vane M, and the band or chain S, connecting said vane and pulley, substantially as shown and described, and for the purpose set forth.

4. The combination of the turn-table D, cone T, formed integrally therewith, bushing Z, provided with an annular retaining-flange at its upper end and screw-threaded at its lower end, the nut *a*, securing the lower end of said bushing, and the connecting-rod U, sliding within the same, substantially as shown and described, and for the purpose set forth.

5. The combination of the connecting-rod U, collar *b*, swivel *n c*, washer *b'*, and nut *a'*, all combined and operating substantially as and for the purpose set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

HARRISON WOODMANSE.
SAMUEL LEBKICHER.

Witnesses:
WALLACE GREENE,
J. A. CRANE.