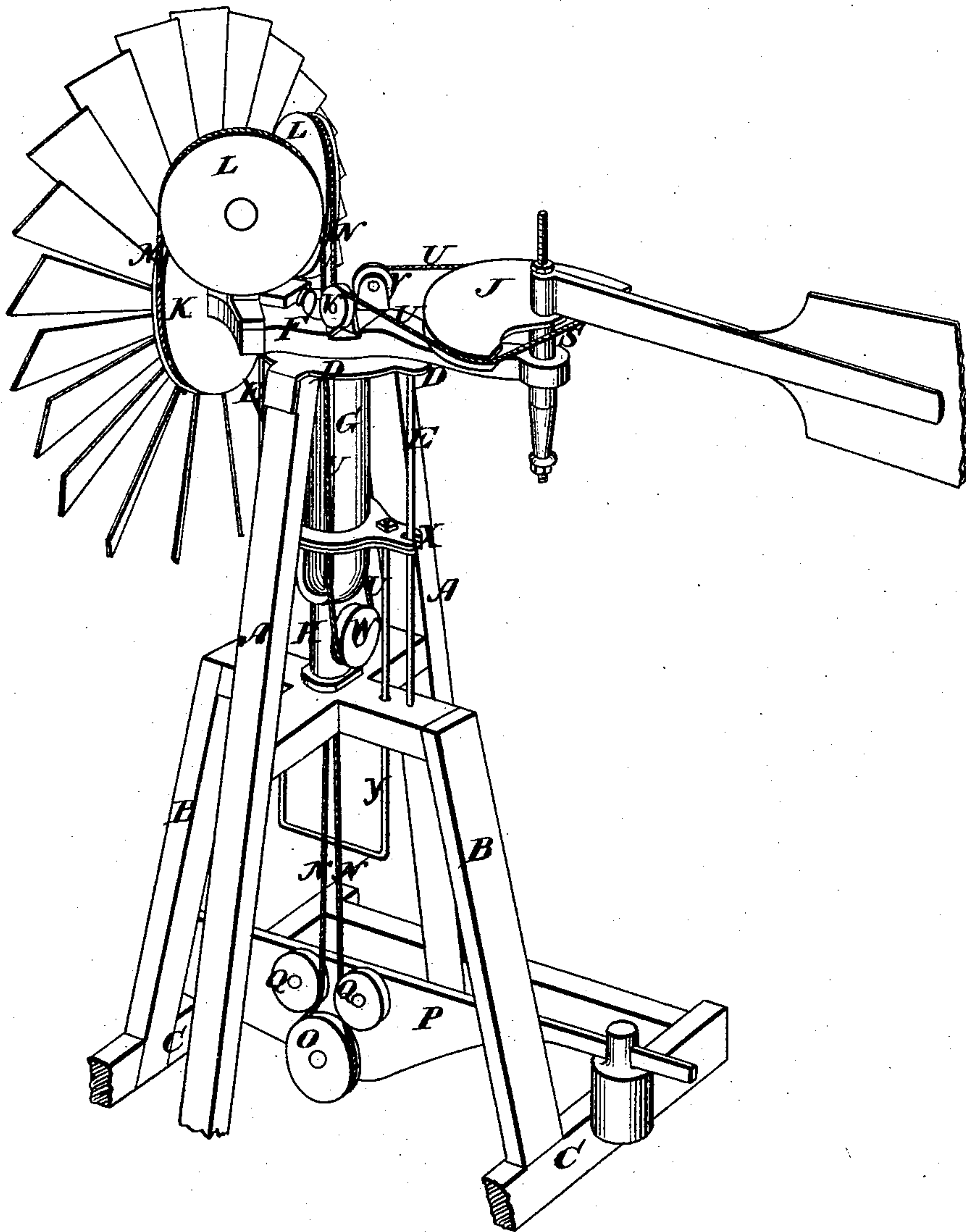


W. H. WHEELER.
Wind-Mills.

No. 155,397.

Patented Sept. 29, 1874.

Fig. 1.



Witnesses.

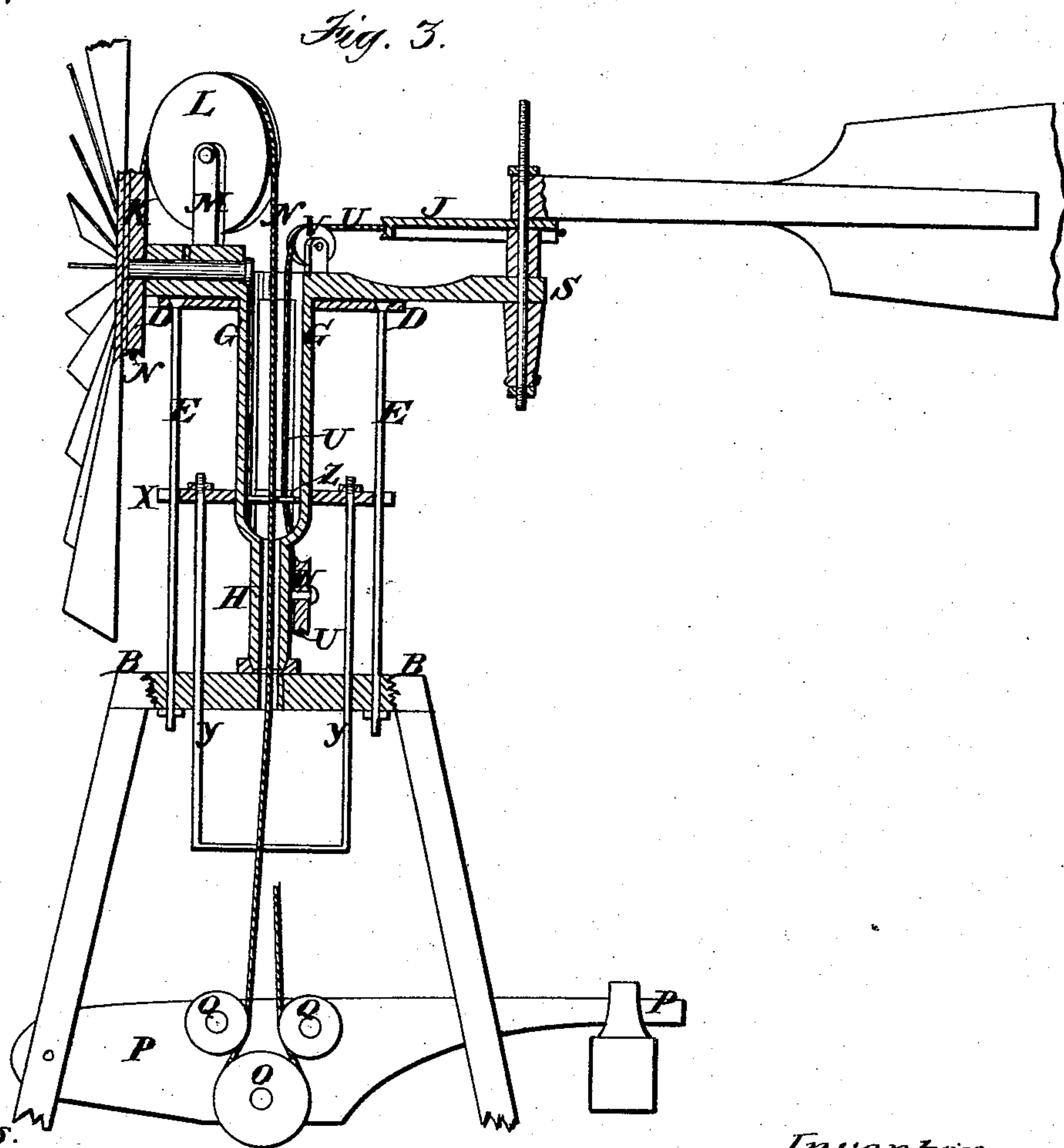
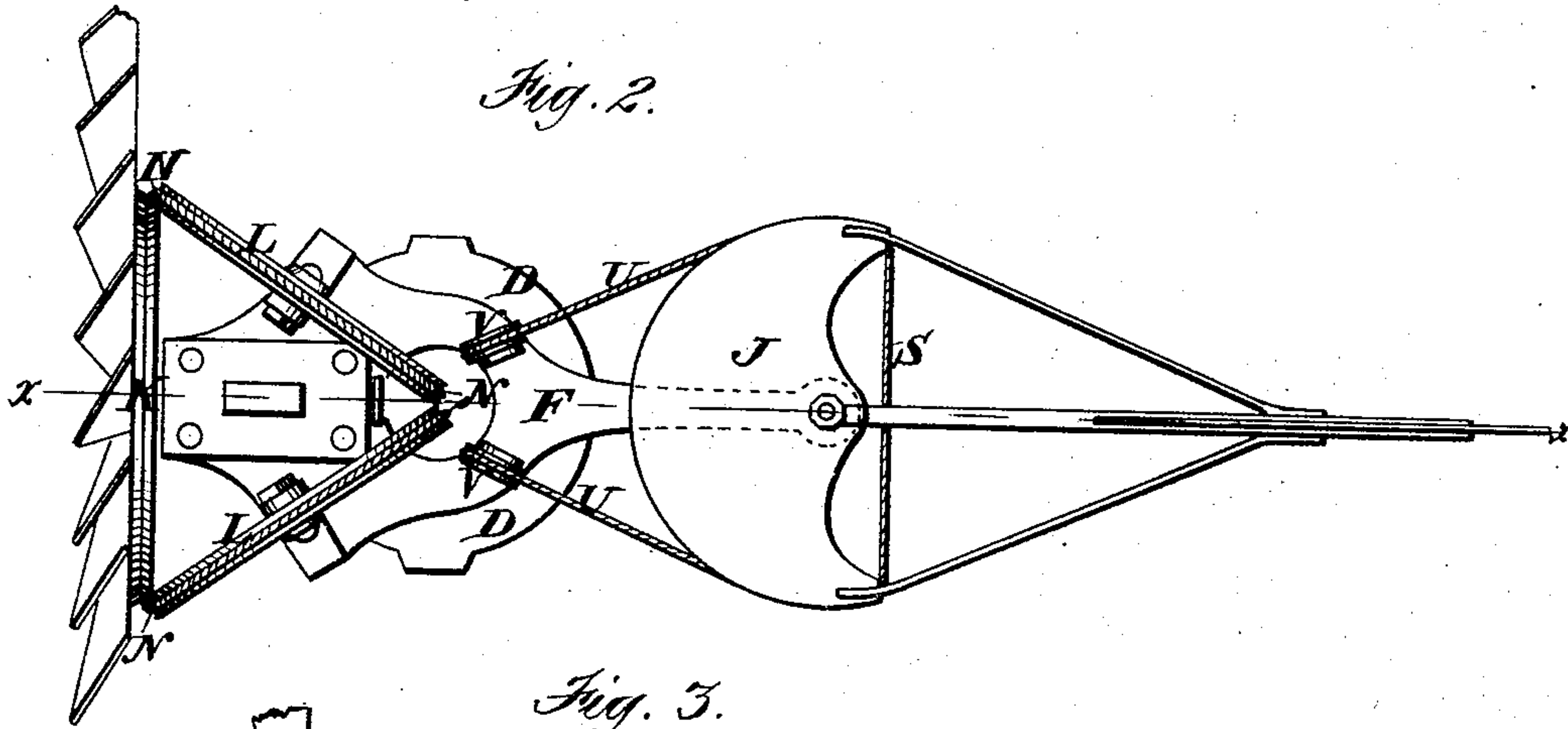
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UNITED STATES PATENT OFFICE.

WILLIAM H. WHEELER, OF BELOIT, WISCONSIN.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **155,397**, dated September 29, 1874; application filed September 24, 1873.

To all whom it may concern:

Be it known that I, WILLIAM H. WHEELER, of Beloit, in the county of Rock and State of Wisconsin, 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 same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of my improved windmill; Fig. 2, a top-plan view; and Fig. 3, a vertical section through the line *x x*, Fig. 2.

Similar letters of reference in the accompanying drawings denote the same parts.

In the construction of windmills it is usual to transmit the power of the wind-wheel to the machinery below by the employment of gearing, or a crank-shaft and pitman. These arrangements, however, are both objectionable, for the following reasons: First, the friction attending the use of the gearing is so great as to impede the force of the mill, while the irregular movements of the wind-wheel are liable to break out the teeth of the gears; second, the leverage due to the arrangement of the gears eccentrically to the vertical center of the mill tends to throw the wind-wheel out of the wind, and thereby decrease its efficiency, and impart a variable motion to the machinery below; third, the employment of the crank-shaft and pitman imparts an irregular motion to the machinery, owing to the dead-points of the crank, while the lateral vibration of the pitman creates too much friction of the parts through which it operates.

My invention is designed to avoid these objections, for the purpose of increasing the efficiency of the mill, and decreasing its cost of construction. To this end the invention consists, first, in transmitting the power of the wind-wheel to the machinery below by a wire rope or other suitable band, guided by a series of grooved pulleys, arranged, with relation to each other, so that the pulleys shall guide the rope down through the center of the mill in vertical lines nearly touching each other, to prevent binding should the rope become twisted, and so that the friction of the wheel-shaft in its bearings shall be reduced by

the lifting action of the rope in its passage over the pulleys; secondly, in the provision of means for preventing the wire rope from being unduly tightened should it become twisted by the rotation of the mill-head, and for taking out the twist; thirdly, in the provision of means for operating the vane or rudder positively in both directions with reference to the horizontal axis of the wind-wheel; and, lastly, in the combination of various parts, as I will presently describe.

In the accompanying drawings the tower of the mill is shown composed of an upright A-shaped frame, A, braced by a shorter frame, B, at right angles thereto, both frames being supported upon a suitable sill, C. D is an annular cap, secured firmly to the top of the tower, and connected to the top cross-bar of the frame B by two vertical parallel rods, E. The vertical axis of the wind-wheel is composed of the horizontal head F, from the under side of which depends the tubular axis G, passing down through the annular cap D, and stepped in a suitable socket, H, arranged at the junction of the cross-bars of the frames A B.

The tube is of sufficient length to hold the head slightly above the annular cap, so that the vertical axis shall turn freely.

I is the wind-wheel, of the usual construction, mounted upon a short shaft, J, which has its bearings upon the head in front of the tubular axis G, as shown; and K is a grooved pulley, mounted upon such shaft between the wheel and head, either against the rear face of the wheel or detached from it. L L are secondary grooved pulleys, mounted in bearings M upon the head in rear of the pulley K, so as to rotate in vertical planes. N is the wire operating-rope or other suitable band, passing under the grooved pulley K, thence over the grooved pulleys L, and down through the tubular axis G, its lower end being looped under a sheave, O, mounted upon a pivoted adjusting-lever, P, at the foot of the tower. The pulleys L are arranged at an angle to each other, so as to nearly touch over the tubular axis G, and are also arranged at an angle to the pulley K, so as to move in close proximity to the latter.

By this means the operating-rope passes

from the pulley K to the pulleys L in short vertical lines, and from the pulleys L vertically through the tubular axis of the mill, with its sides in close proximity to each other. The sides of the rope, at the lower end or loop, are held close to each other, to correspond with their position at the pulleys L, by two sheaves, Q, mounted upon the adjusting-lever above the sheave O, as shown.

By arranging the operating-rope as above described, it cannot slip off in passing from the pulley K to the pulleys L, while the parallel position of the two sides of the rope moving nearly in contact with each other permits such sides to twist or wind upon each other when the vertical axis rotates without interfering with their operation in the least. If the sides of the rope were separated a considerable distance, they would, after one or two revolutions of the vertical axis, become twisted to such an extent as to interlock, and the mill would therefore be stopped. By adjusting the lever P the operating-rope is prevented from being tightened when it becomes twisted too much, and if it is desired to take out the twist it is only necessary to raise the lever and remove the rope from the sheave O, when it can be untwisted and replaced upon the sheave and the lever again pressed down to the requisite degree. A suitable joint should be connected with the shaft of the sheave O for the transmission of power to the machinery to be operated. Owing to the lifting action of the operating-rope in passing from the pulley K to one of the pulleys L, the former pulley is raised somewhat, or is prevented from sagging with its shaft under the weight of the wind-wheel. Such shaft, therefore, is relieved in its bearings, and the friction materially reduced.

If desired, more than three pulleys may be used, and when the wind-wheel is arranged eccentrically to the vertical axis of the mill, or upon one side thereof, one or two pulleys only need be employed; in most cases but one.

R is the tail-vane or rudder, pivoted to the head at S, such pivot being provided with a horizontal grooved segment, J', as shown. U is the cord for operating the rudder. Its ends are secured to opposite sides or corners of the segment, and from thence it passes over grooved pulleys V upon the head, down through the tubular axis G, and out through the open sides of the latter, and is looped under a sheave, W, upon the foot of said tubular axis, as shown. X is an annular guide surrounding the tubular axis above the sheave, being secured to the upper ends of an operating-frame, Y, which passes down through the cross-bar of the tower-frame B, within reach of the operator at the foot of the tower. The

annular guide is directed in its movements by lugs or ears fitting against or around the vertical guide-rods E, as shown. The annular guide is grooved in its inner circumference, and within this groove is placed a ring so as to rotate freely. Z is a lug projecting from the inner edge of the ring, to which one side of the rudder-cord is firmly secured. By moving the operating-frame Y up and down the guide-ring is moved with it, and, being connected directly to the operating-cord, swings the rudder or vane positively to the right or left of the vertical axis, for the purpose of regulating the speed of the mill. The loose ring holds the operating-cord in the same position under all circumstances, because, as the vertical axis rotates, the ring also rotates within the annular guide. This guide may be made of two plates fastened together and rabbeted at their inner edges to receive the ring, or it may be made in one piece and grooved to receive the ring.

A side vane or wind-gage may be attached to the mill-head, although I prefer to use only the single hinged or pivoted rudder.

Having thus described my invention, what I claim is—

1. The combination of the secondary guide-pulleys with the grooved pulley on the shaft of the wind-wheel, arranged with relation to each other substantially as described, for the purposes specified.

2. The grooved pulleys K L, arranged as set forth, and the wire rope N, in combination with the wind-wheel shaft and the head or vertical axis, substantially as described, for the purpose specified.

3. In combination with the grooved pulley K of the wind-wheel shaft, the secondary pulleys L, and the wire rope, the adjusting-lever, arranged at the foot of the tower, substantially as described, for the purposes specified.

4. In combination with the grooved pulleys K L, the wire rope, and the adjusting-lever, the sheaves O Q, substantially as described, for the purpose specified.

5. The combination of the annular guide, the loose ring, the operating-cord of the rudder, and the sheave arranged upon the vertical axis with the grooved segment J of the rudder, substantially as described, for the purpose specified.

6. The combination of the adjustable annular guide and the loose ring with the rudder and vertical axis of the wind-wheel, substantially as described, for the purpose specified.

WILLIAM H. WHEELER.

Witnesses:

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