

(No Model.)

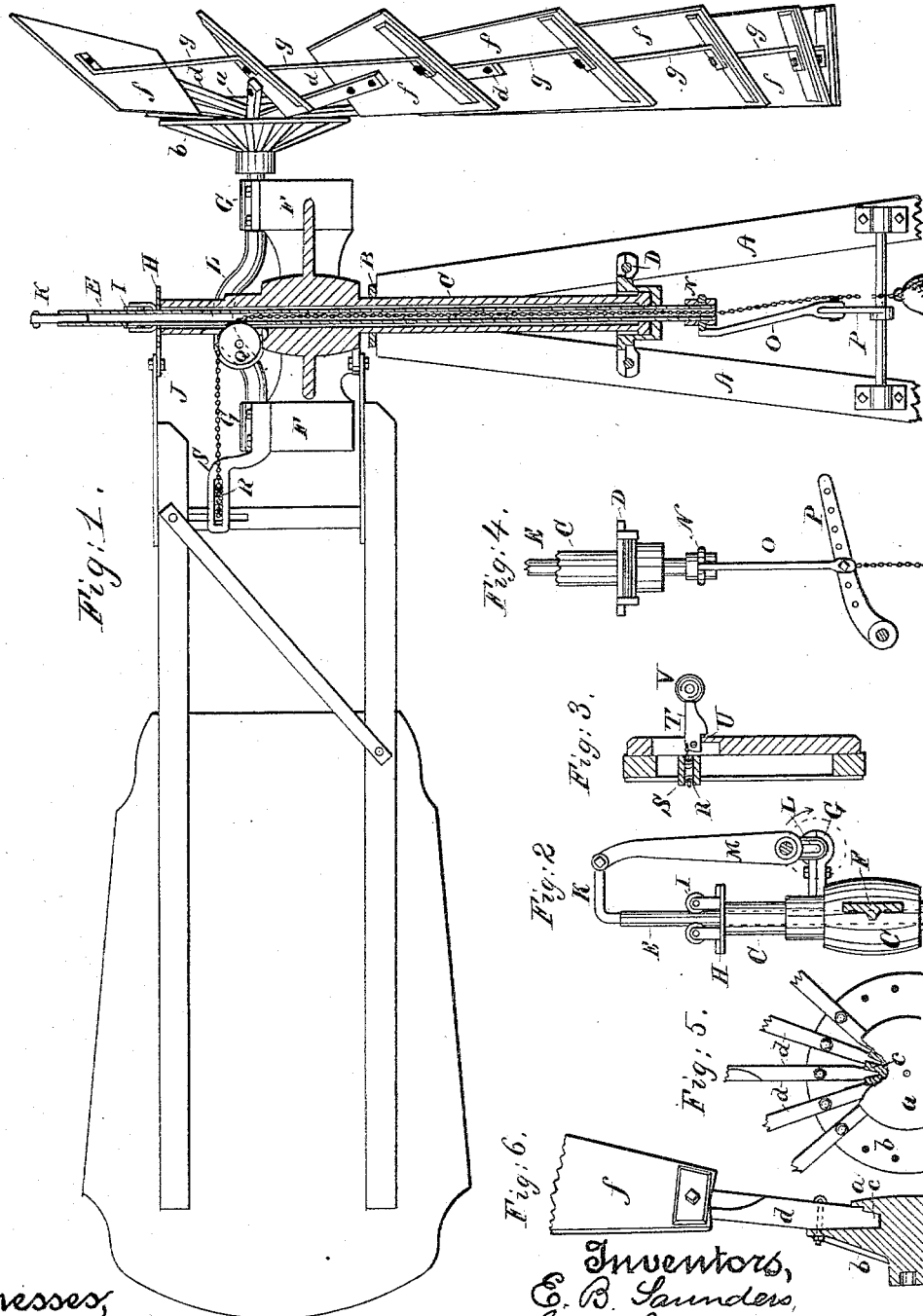
2 Sheets—Sheet 1.

E. B. SAUNDERS & G. J. BENTLEY.

WINDMILL.

No. 304,136.

Patented Aug. 26, 1884.



Witnesses,  
Geo. H. Strong.  
J. H. House

Inventors,  
E. B. Saunders,  
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(No Model.)

2 Sheets—Sheet 2.

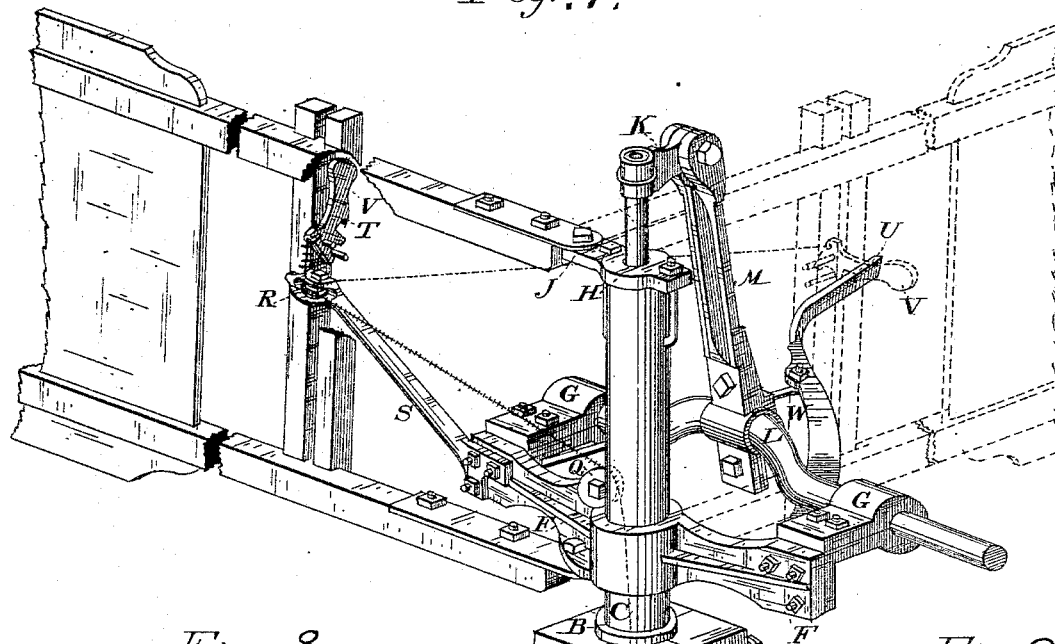
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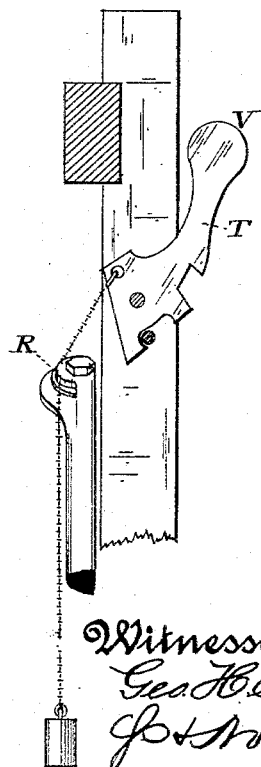
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*Fig. 7.*

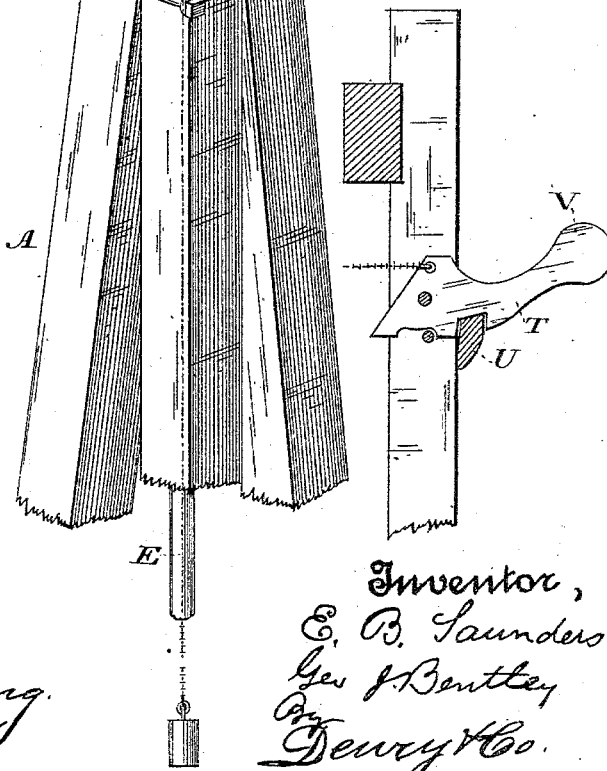


*Fig. 8.*



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*Fig. 9.*



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# UNITED STATES PATENT OFFICE.

EGBERT B. SAUNDERS AND GEORGE J. BENTLEY, OF SAN JOSÉ, CALIFORNIA.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 304,136, dated August 26, 1884.

Application filed November 30, 1883. (No model.)

*To all whom it may concern:*

Be it known that we, EGBERT B. SAUNDERS and GEORGE J. BENTLEY, of San José, county of Santa Clara and State of California, have  
5 invented an Improvement in a Windmill; and we hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to certain improvements in windmills; and it consists of a tubular vertical post with a hollow channeled step,  
10 in which it rests; a frame cast upon the upper part of the wrought tube, and having upon it the journal-boxes of the wheel-shaft; a cap for the tube, having a support for the upper arm  
15 of the vane and an anti-friction guide for the pump-rod; a hollow pump-rod with an arm for direct connection with the crank-shaft by means of a pitman, without the intervention of a vibrating bar, and having a slot in one  
20 side to admit the regulating-chain; a means for holding the wheel in the wind, and a novel construction of the wind-wheel, all of which will be more fully explained by reference to the accompanying drawings, in which—

25 Figure 1 is a vertical section taken through the center of the vertical hollow post. Fig. 2 is a detail showing the pitman M, in connection with the arm K and guide-rollers I. Fig. 3 is a view of the weighted lever T and pulley  
30 R. Fig. 4 is a side view of the arm O, showing its connection with the lever P, &c. Fig. 5 is a front view of the hub, with part of flange *a* broken to show lugs *c*. Fig. 6 is a side sectional view of same, or cross-section of same.  
35 Fig. 7 is a perspective of the vane and its connections. Figs. 8 and 9 are details of the lever T and catch U.

A is the frame or standard of our mill, which may be made in any suitable or desirable manner.  
40 In the present case we have shown it as composed of four posts, with a sufficiently wide base, converging toward the top, where they are bolted or otherwise united and suitably braced, in the usual manner. Through  
45 the center of the top a hole is made vertically, into which a ring or guide, B, is inserted, and the tubular post C passes down through it to a sufficient distance for steadiness, and its lower end rests in a step, D, having flanges  
50 outside and inside of the foot of the tube, so

as to form a channeled cup to hold oil, and in which the lower end of the tube rests and turns. This step has flanges, by which it is firmly secured to the posts A. The central  
55 portion has a hole through it, through which the hollow pump-rod E passes, and by which its lower end is guided as it reciprocates.

The post C consists of a wrought-iron tube, and has a frame consisting of a hub, with arms  
60 F cast directly upon the upper part of it, so as to rest upon the flange of the upper guide-ring, B.

The boxes G, in which the wheel-shaft turns, are formed upon the ends of these arms, which project to one side, so that the shaft revolves  
65 out of line with the tube C, and allows space for the crank to turn just opposite to the tube without striking it.

Upon the top of the tube C is a cap, H, having the journals or supports of the guide-  
70 rollers I fixed to it, and a projection, J, at one side, which serves for the attachment of the hinge of the upper arm of the vane or rudder. The lower arm is hinged beneath the cast hub or arm F, as shown. 75

The rollers I form an anti-frictional guide, between which the pump-rod E moves. This rod is also formed of a hollow tube, and has a rigid arm, K, projecting from its top, so as to stand above the crank L, with which it is  
80 connected by a rod or pitman, M. When the crank is turned, the pitman moves outward on its downward stroke, and comes up on the inside and close to the post C, so as to give a partial outward thrust upon the arm K in  
85 lifting the pump-rod, and this counteracts the tendency of the horizontal arm to push the pump-rod to one side as it is lifted. The guide-rollers I relieve the pump-rod from friction as it reciprocates. 90

A ring or collar, N, is loosely connected with the lower end of the pump-rod, (which projects below the tube C as far as may be necessary,) and this ring has an arm, O, extending  
95 down from one side to connect directly with the pump piston-rod, or, as in the present case, with a lever, P, having its fulcrum at one end, and having means for attaching the rod so as to change the leverage and stroke of the pump, as shown. 100

The tubular post C is slotted just above the casting F and in line below the upper hinge-joint of the rudder-vane, to allow the regulating-chain to pass through to the inside of the hollow pump-rod E, which is also slotted for the purpose. This chain extends down through the center of the pump-rod to a point within reach, near the ground, and has a weight attached to it. The offset of the arm O at the bottom of the pump-rod allows the chain to work within the tube without interfering with the operation of the pump. At the upper end the chain emerges from the tubes and passes over a pulley, Q, thence around a horizontal pulley, R, supported by an arm, S, which projects from F, and thence to a weighted lever, T, having its fulcrum in a vertical bar between the upper and lower arms of the rudder-vane, and at such a distance from the hinges that the weight acting upon the chain will pull the vane around until it stands parallel with the wheel-shaft. When, however, the wind becomes too strong, its action upon the vane overcomes the weight and turns it to a greater or less angle with the wheel-shaft, the wheel being at the same time turned out of the wind in the usual manner. If the wind decreases, the wheel-shaft and vane more nearly approach a line, and the wheel is thrown into the wind. When it is desired to throw the wheel permanently out of the wind, the weight is removed from the chain, or supported so that it does not hang from it. The vane will then swing around, and the lever T, which has a notch or latch upon its lower edge, passes over a catch, U, the weight V upon the lever holding it down, so that the two remain locked until the chain is pulled down or the weight again allowed to hang from it. The catch U is supported at the ends of one or more arms or braces, W, which project from the frame F to a point as distant from the vertical hinge-line of the vane as the latch-lever.

The wheel-hub is made in one piece, with front and rear flanges, *a b*, the latter having the greatest diameter, and having holes opposite the arms, so that bolts may pass through to secure them in place. Lugs *c* are formed upon the flange *a*, so as to project into the channel between the flanges and between the arms *d*, which carry the fans. These arms, being properly shaped at their inner ends, are driven between the lugs, and are then bolted through the rear flange, *b*, as shown, so as to be held firmly in place. The outer ends of the arms are flattened diagonally from corner to corner, in the usual manner, and the blades or fans *f* of the wheel are bolted to them, so as to stand at the desired angle with the wheel-face. These blades extend to a considerable distance beyond the ends of the arms, and angular braces *g* are bolted between them, extending from one to another about a foot from the outer ends, and forming a continuous brace around the whole circumference of the wheel.

The braces *g* are preferably made of iron or

steel or some elastic material, having their ends bent in opposite directions, as shown, so as to be bolted to the front of one blade and the rear of the next one. The effect of these elastic braces is to produce a twist in the blades from their points of attachment to the arms *d* toward their outer end, where the angle with the plane of the wheel-face is less than at the inner end. This gives a better result in the running of the wheel.

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

1. In a windmill, a vertical tubular turning-post, an annular supporting-step and guiding-ring upon the standard, and a journal-frame for the wheel-shaft, cast upon it at a point below the upper end, in combination with a cap secured to the upper end, having guides, between which the pump-rod moves, and a projection to which the upper arm of the rudder-vane is hinged, the lower arm being hinged to the arm of the wheel-shaft frame, substantially as herein described.

2. In a windmill, a vertical tubular turning-post having a cap with a projecting arm at the top, and a journal-box frame for the wheel-shaft, fixed to the tube below the cap, in combination with a rudder-vane having its upper and lower arms hinged, respectively, to the cap and the journal-box frame, and having a lever or bar for the attachment of a chain, and direction-pulleys fixed to the journal-box frame to lead the chain to the interior of the post and pump-rod below the cap, substantially as herein described.

3. In a windmill, a vertical tubular turning-post with a cap at the top and a shaft-journal-box frame below, with means for hinging the rudder-vane arms to them, in combination with a weighted latch-lever fulcrumed in the rudder-vane frame, a corresponding catch supported at right angles with the wheel-shaft from its journal-box frame, and a chain having one end attached to the lever, direction-pulleys, over which it passes to the interior of the post and pump-rod, and a weight suspended from the lower end of the chain, substantially as herein described.

4. In a windmill, a tubular pump-rod passing through the vertical tubular turning-post, friction-rollers journaled upon a cap at the top of said post, between which the pump-rod is guided, and an arm projecting at right angles from the top of the pump-rod, in combination with a pitman connecting the outer end of this arm with the wheel-shaft crank, so that an upward and outward thrust shall be given by the crank as it rises, substantially as herein described.

5. In a windmill, a hollow tubular pump-rod passing through the vertical tubular turning-post, with guide-rollers at the top, and having an arm projecting at right angles from its upper end, and connected with the wheel-shaft crank, as shown, in combination with a

collar, within which its lower end turns loosely, and an arm extending down from one side of the collar, and connected with a vibrating lever, to which the pump piston-rod may be connected out of line with the lower end of the pump-rod, substantially as herein described.

5 6. In a windmill, the hollow slotted turning-post and the hollow slotted pump-rod reciprocating within it, in combination with the  
10 rudder-vane hinged to the turning-post, the direction-pulleys, and the chain extending over these pulleys from the rudder to the interior of the pump-rod and downward within it, substantially as herein described.

15 7. In a windmill, the wheel-hub having the

rear flange of larger diameter than the front one, and perforated for bolts to secure the arms, a channel between the front and rear flanges to receive the ends of the arms, and lugs projecting into the channel from the front flange, between which the arms are fixed, substantially as herein described.

In witness whereof we have hereunto set our hands.

EGBERT B. SAUNDERS.  
GEORGE J. BENTLEY.

Witnesses:

H. E. WILCOX,  
M. H. HYLAND.