

(Model.)

3 Sheets—Sheet 1.

C. C. HILL & L. PETERSEN.

WINDMILL.

No. 268,403.

Patented Dec. 5, 1882.

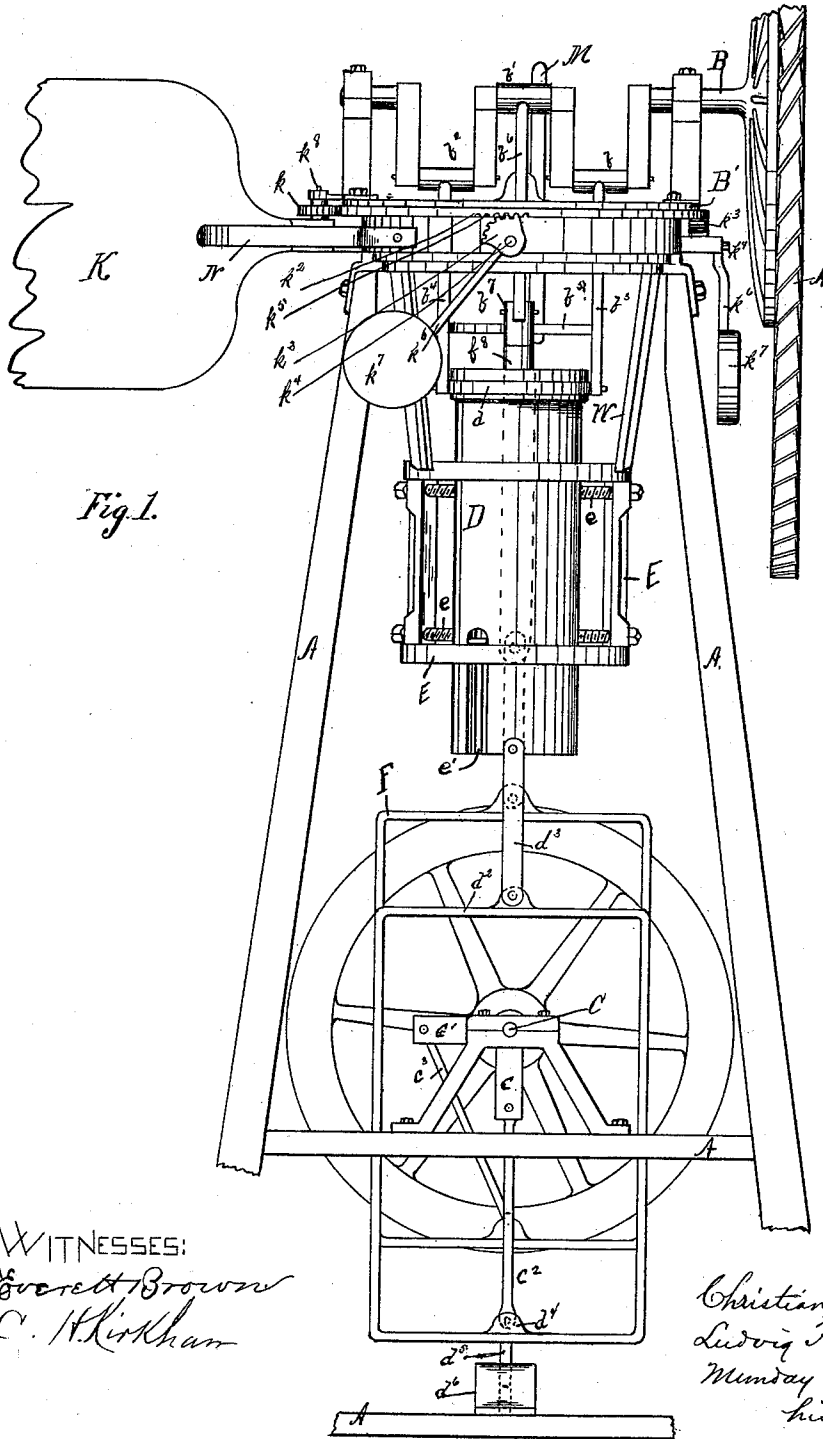


Fig. 1.

WITNESSES:
Severett Brown
C. Kirkham

INVENTORS:
Christian C. Hill &
Ludvig Petersen by
Munday Evans & Co
his attys.

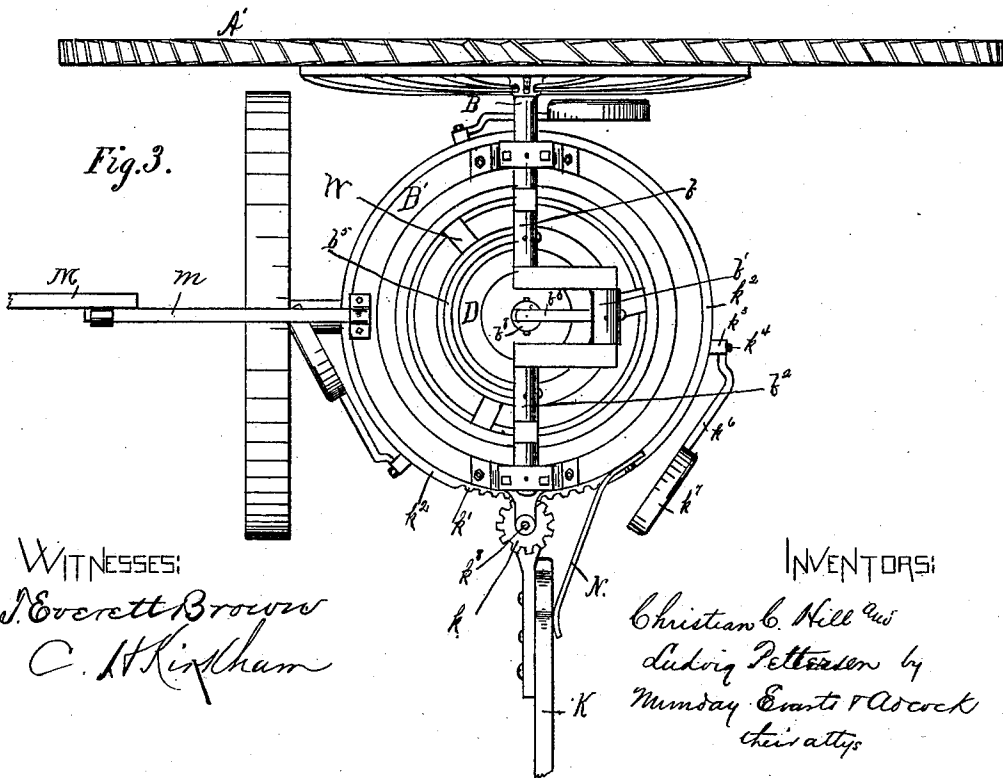
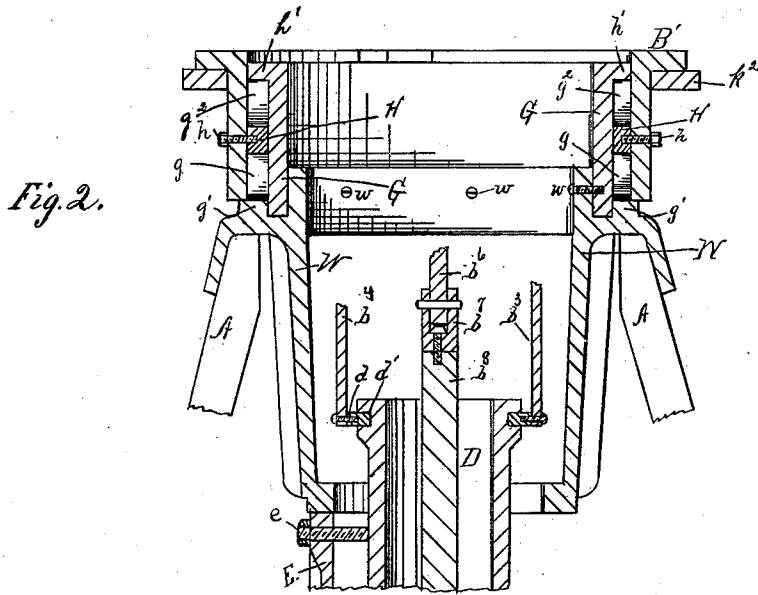
(Model.)

3 Sheets—Sheet 2.

C. C. HILL & L. PETERSEN. WINDMILL.

No. 268,403.

Patented Dec. 5, 1882.



WITNESSES:
J. Everett Brown
C. H. Ripham

INVENTORS:
Christian C. Hill and
Ludvig Petersen by
Munday Evans & Co. attys.

(Model.)

3 Sheets—Sheet 3.

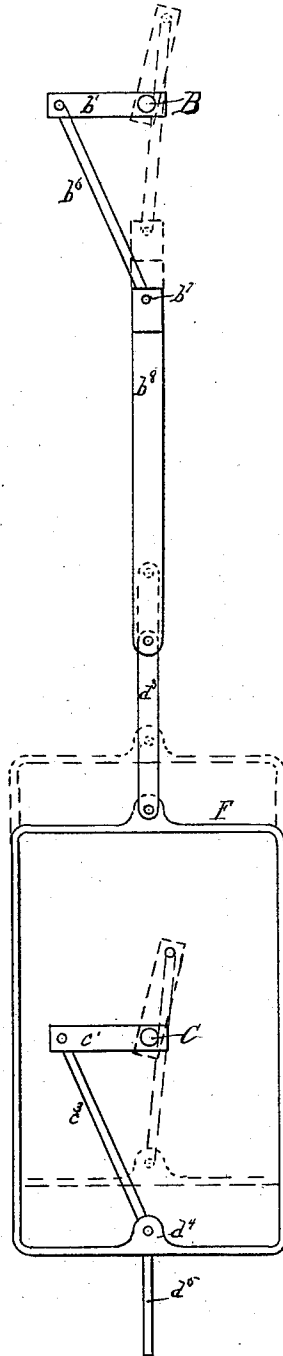
C. C. HILL & L. PETERSEN.

WINDMILL.

No. 268,403.

Patented Dec. 5, 1882.

Fig. 4.



WITNESSES—
S. Everett Brown
A. M. Munday

INVENTORS—
Christian C. Hill and
Ludvig Petersen by
Munday Evans and Adams,
their Attys.

UNITED STATES PATENT OFFICE.

CHRISTIAN C. HILL AND LUDVIG PETERSEN, OF CHICAGO, ILL., ASSIGNORS TO THEMSELVES AND SAMUEL K. WHITE, OF SAME PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 268,403, dated December 5, 1882.

Application filed March 23, 1881. (Model.)

To all whom it may concern:

Be it known that we, CHRISTIAN C. HILL and LUDVIG PETERSEN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

Our invention relates to improvements in mechanism for transmitting power in wind-mills, and for governing and adjusting the wind-wheel to the wind; and the same consists in transmitting the rotary motion of the wind-wheel shaft to a crank-shaft below by means of a pitman-rod attached to the crank of the wind-wheel shaft, and having its lower end connected to the lower end of a corresponding pitman-rod of equal length on the crank-shaft below by means of a central swivel-rod or tube-connection, to permit of the free rotation of the turn-table upon which the wind-wheel shaft is mounted.

Heretofore motion has been transmitted from one swiveling crank-shaft to another by means of a swiveling connection connecting the two pitman-rods; but heretofore such connection has been attached to the lower end of one pitman-rod and the upper end of the other, or, in other words, not made equal in length to the distance between the crank-shafts, so that the varying inclination of the pitman-rods would necessarily cause great irregularity in the operation of the device.

It is the object of our invention to remedy this difficulty and provide an efficient device for transmitting motion from the swiveling crank-shaft of the wind-wheel to the corresponding crank-shaft below.

To avoid a dead-center and increased friction and cause the mechanism to work smoothly and evenly, we employ two cranks, one at right angles to the other, on the lower shaft, and three cranks on the upper shaft, the middle one being at right angles to the two outer ones, which are parallel to each other. The connection between the corresponding cranks on the two shafts being formed by the two equal pitman-rods connected at their lower ends to the central swivel-rod, the variation due to the change in the inclination of one pitman-rod to the central connecting swivel rod or tube is compensated for by the corresponding change

in the inclination of the other pitman-rod, so that the two cranks will always remain parallel to each other, or at equal inclinations to a horizontal plane, which would not be the case if the swivel connecting-rod were not extended down below the lower crank, but made shorter, so that the upper instead of the lower end of the pitman-rod would be connected to its extremity.

Our invention also consists in employing, in connection with a tail-vane, a small regulating-vane secured on an arm at or nearly at right angles to the axis of the wind-wheel, whereby the force of the wind, in connection with the compensating-weights, is made to govern the direction of the tail-vane, and thus to veer the wheel in and out of the wind as the force of the same decreases or increases.

It also consists in the novel devices and combinations of devices herein shown.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a side elevation of a device embodying our invention. Fig. 2 is a central vertical section of the same. Fig. 3 is a plan view of the same; and Fig. 4 is a detail side view of the middle set of connections, pitman-rods, and cranks.

In said drawings, A represents the frame of the machine, and A' is the wind-wheel.

B is the wind-wheel shaft, mounted in suitable bearings on the turn-table B'. This shaft is provided with three cranks, b , b' , and b^2 , the two outer ones parallel to each other, and the middle one, b' , at right angles to the other two.

C is the lower shaft, mounted in suitable bearings in the frame, to which the rotary motion of the wind-wheel shaft is to be communicated. It is located near the ground, and may be provided with band or gear wheels, or other suitable devices, for communicating the power to the machine or apparatus designed to be operated by the windmill. This shaft is provided with two cranks, c and c' , at right angles to each other, corresponding in length to the cranks on the shaft B.

The pitman-rods b^3 and b^4 , which are journaled to the cranks b and b^2 , are pivoted at their lower ends, at diametrically-opposite points, to the collar d , fitted in a suitable shoulder or groove, d' , on the upper end of the hol-

low tube or piston D, so as to form a swivel-joint connection therewith, to permit of the free revolution of the turn-table.

d^2 is a rectangular frame, surrounding the shaft C, connected at its upper end, by means of a strap, d^3 , with the hollow tube D, and provided at its lower end with a stud or bracket, d^4 , to which the lower end of the pitman-rod c^2 , which is journaled to the crank c , is pivoted. The pitman-rod c^2 is made the same length as the pitman-rods b^3 and b^4 , and the distance between the collar d and the stud d^4 , to which the pitman-rod c^2 is pivoted, is equal to the distance between the shafts B and C. The rectangular frame d^2 should be made long and wide enough to give room for the pitman c^2 and crank c .

d^5 is a guide-rod secured to the bottom of the frame d^2 , working in a suitable hole in the block d^6 to guide the motion of the frame.

The tube D works up and down in a guide-frame, E, secured to the main frame, the tube bearing against the inner ends of the adjusting-screws e , by which it may be accurately centered in its motion. The tube D is prevented from turning or causing any twisting strain upon the frame d^2 or other parts by means of a lug secured to the guide-frame E, working in the groove e' in the tube D. The pitman-rods b^3 and b^4 are secured together by a curved brace, b^5 , in order to secure a more even action of the two pitmen.

The pitman-rod b^6 , which is journaled to the crank b' , is connected by a swivel-joint, b^7 , to the piston-rod b^8 , which works up and down in the hollow tube D. The lower end of this piston-rod b^8 is connected to the rectangular frame F, similar in all respects to the frame d^2 , heretofore described. The pitman-rod c^3 , which is journaled to the crank c' , is pivoted to the lower end of this frame. By employing two sets of similar cranks and connections the friction is materially diminished, as the force or strain is thereby rendered evenly balanced on every part.

The principle and operation of this part of our invention will be readily understood from Fig. 4 of the drawings, in which the parts are shown in two positions, one being in dotted lines. As the swivel-connection, consisting of the rod b^8 and frame F, which connects the lower extremities of the pitman-rods b^6 and c^3 is equal in length to the distance between the crank-shafts B and C, it is obvious that the pitman-rods b^6 and c^3 will always remain parallel to each other, or at an equal inclination to a vertical line passing through the centers of the crank-shafts, so that the cranks b' and c' will always be in corresponding positions, thus perfectly transmitting the motion from one shaft to the other without any loss or irregularity. The other set of connections and cranks operate in the same manner, and, excepting for the purpose of avoiding a dead-center, only one set need be employed.

The turn-table B', upon which the wind-wheel shaft is mounted, is supported on a se-

ries of friction-rollers, g , which rest upon a flat circular track, g' , consisting of a projection or shoulder on the tubular casting W, which is secured to the frame. The rollers g are confined in place between the casting G, which is secured to the casting W by the bolts w , as an interior circular wall, and the turn-table B' as an exterior circular wall. A ring, H, equal in width to the length of rollers g , is secured to the turn-table by means of bolts or screws h , and rests upon the rollers, and thus supports the turn-table on the rollers. Above this ring H, and between it and the upper exterior projecting edge, h' , of the casting G, we provide another set of friction-rollers, g^2 , so that the cap or projection h' will not bear directly against the ring H. In this way we secure a very smoothly and easily turning turn-table.

The tail-vane K is secured to a vertical shaft, k^1 , mounted in bearings attached to the turn-table, and which is provided with a small pinion, k , which meshes with cogs k' , cut in the ring k^2 , which encircles the turn-table. The segment-gears k^3 , mounted on pivots k^4 , which are secured to the turn-table, mesh with cogs k^5 , cut in the under side of the ring k^2 , and these segments are provided with arms k^6 , which carry the governing-weights k^7 . These weights, connected in this way with the tail-vane, tend to keep the wind-wheel in the wind, as the wheel cannot veer out of the wind without raising these weighted arms, and the more it veers out of the wind the greater is the tendency of the weights to bring it back, as the higher the arms are raised the greater is the acting distance of the weights.

M is a small governing-vane attached to the arm m , which is secured to the turn-table. This vane is arranged nearly parallel to the surface of the wind-wheel, so that the force of the wind acting against the same tends to turn the wheel out of the wind, which tendency, however, is counterbalanced by the weights, unless the wind is too strong, in which case the two vanes are turned parallel to each other and the wheel turned out of the wind. The greater the force of the wind the greater, of course, is the tendency of this vane M to turn the wheel out of the wind, so that the vane M, in connection with the tail-vane and governing-weights, constitutes a self-regulating device for controlling the wind-wheel.

N is a spring secured to the turn-table for the purpose of keeping the tail-vane in place and preventing its swinging around in the wrong direction.

It is obvious that the frames d^2 and F, which are described as rectangular, may be made of other equivalent forms, or that any other suitable connection may be substituted in place of the frames. We however prefer to use the frames.

What we claim is—

1. The combination of the upper and lower crank-shafts, with a pitman-rod journaled to each of said crank-shafts, and a swivel-connection connecting the extremities of said pitman-

rods, said connection, independent of the pitman-rods, being equal in length to the distance between said crank-shafts, substantially as specified.

5 2. The combination of shaft B, provided with cranks b b' b^2 , pitman-rods b^3 b^4 b^6 , collar d , hollow tube D, piston-rod b^5 , provided with a swivel-connection with piston-rod b^6 , frames d^2 and F, pitman-rods c^2 c^3 , and shaft C, provided
10 with cranks c and c' , all arranged and combined substantially as described.

3. The combination of the turn-table, provided with an interior ring, H, the tubular casting W, provided with exterior shoulder or
15 track, g' , and friction-rollers g , substantially as specified.

4. The combination of the turn-table, provided with an interior ring, H, tubular casting W, provided with exterior shoulder or track, g' , casting G, provided with projection h' , and
20 friction-rollers g and g^2 , all arranged and operating substantially as specified.

5. The combination of the turn-table, movable cogged ring k^2 , segment-gears k^3 , provided with weighted arms, tail-vane provided with
25 pinion k , and governing-vane, substantially as specified.

CHRISTIAN C. HILL.
LUDVIG PETERSEN.

Witnesses:

EDMUND ADCOCK,
EVERETT BROWN.