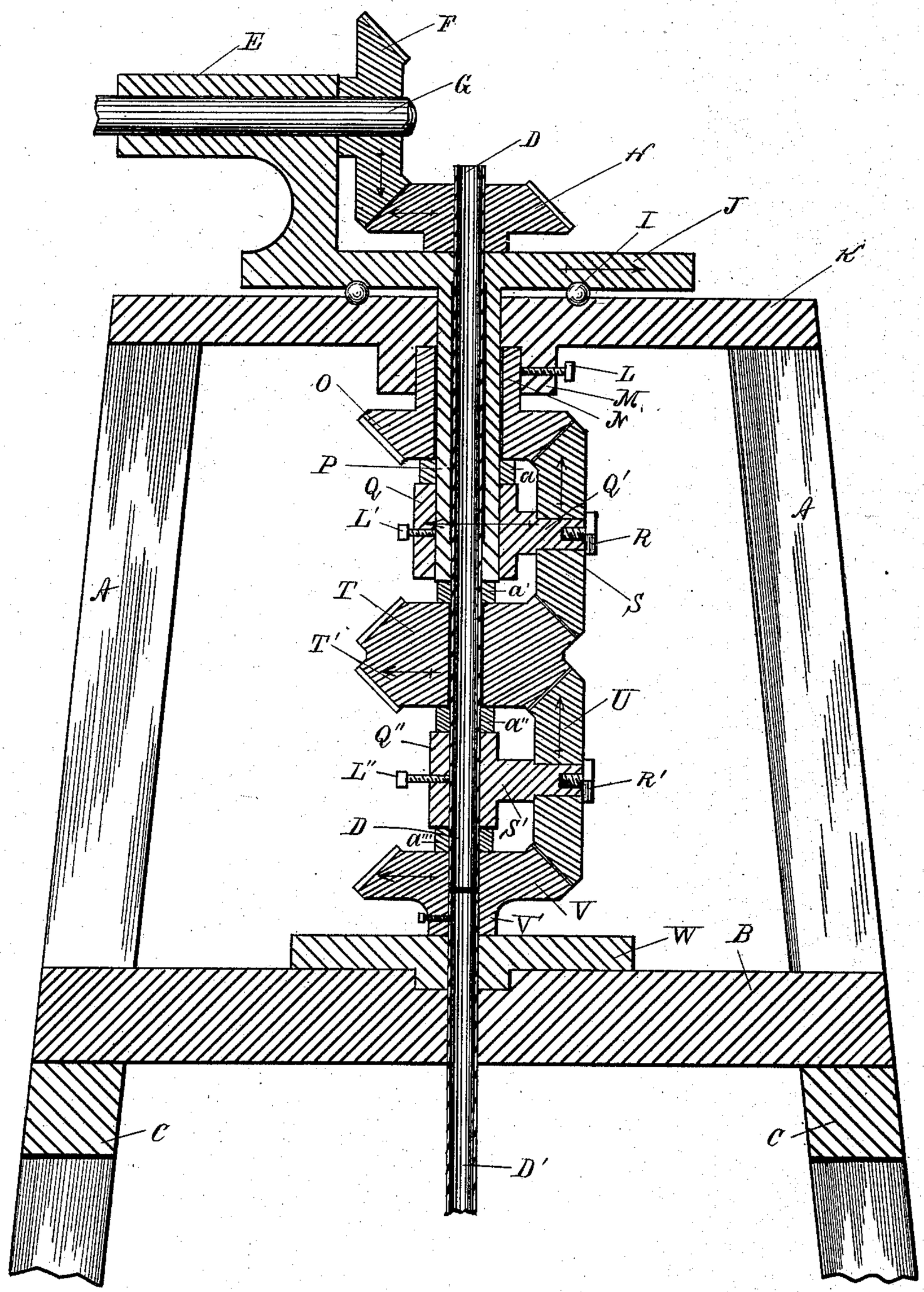
(No Model.)

G. H. PATTISON.

WINDMILL GEARING.

No. 322,314. Patented July 14, 1885.



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WINDMILL-GEARING.

SPECIFICATION forming part of Letters Patent No. 322,314, dated July 14, 1885.

Application filed June 8, 1885. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. PATTISON, a resident of Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Windmill-Gearings; and I 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.

My invention relates to improvements in gearings for power-windmills, and is fully described and explained in the following specification, and shown in the accompanying drawing, which is a central vertical section of a gearing constructed in accordance with my invention and attached to a windmill-tower of ordinary construction.

In the drawing, A are the posts of the tower. K is a top plate, rigidly attached to and connecting the tops of the posts. M is a tubular neck, dependent from the top plate and preferably concentric therewith, and O is a miter-gear formed on the lower end of the neck or rigidly attached thereto by the set-screw L, as shown. Above the plate K is a turn-table, J, resting on the ordinary anti-friction balls I, and provided with an integrally-formed horizontal bearing, E, above the top plate, and an integrally-formed dependent tube, P, extending downward through the neck M and gear O, and journaled therein. A wind-wheel shaft, G, is journaled in the horizontal bearing E, and a preferably hollow vertical shaft, D, is journaled in the tube P, and miter-gears F H connect the two shafts G D. Below the gear O is a collar, Q, rigidly fastened on the tube P, and an outwardly-extending gudgeon, Q′, is formed integrally with the collar and serves as the shaft of a loosely-mounted miter-gear, S, engaging with the miter-gear O. Below the collar Q is a loose double-faced miter-gear, T T′, concentric with the shaft D, and below the double-faced gear is a collar, Q″, rigidly fastened to the shaft D, and provided with an outwardly-extending gudgeon, S′, which carries a loosely-mounted miter-gear, U. The upper miter-face, T, of the double gear T T′, engages the gear S, and the lower face, T′, engages the gear U. Below the collar Q″ is a miter-gear, V, engaging the gear U and rigidly mounted on a vertical power-transmitting shaft, D′, which is journaled in a suitable bearing, W, attached to the tower. The lower end of the shaft D is stepped in the gear V to insure its alignment with the shaft D′, and vertical motion of any of the parts of the train of gearing is prevented by the interposition of a series of washers, *a a′ a″ a‴*, in the manner shown in the drawing.

The operation of the gearing when the turn-table is stationary and the power of the mill is sufficient to rotate the shaft D′ is as follows: The wind-wheel shaft and the gear F being rotated in the direction indicated by the arrow on the gear, the shaft D and gear H turn in the direction indicated by the arrow on the gear H, carrying the sleeve Q″, the arm S′, and the gear U in the same direction. The turn-table and the gear O on the tower being both stationary, the gears S T T′ are all stationary, and consequently the bodily rotation of the gear U about the vertical axis of the mill rolls the gear about the gear T′, and thus rotates it about its shaft S′ in the direction indicated by the arrow on its face, thus rotating the gear V in the direction indicated by the arrow thereon. The gears T′ V being of the same diameter, each bodily rotation of the gear U rotates the gear V and its shaft D′ twice; or, in other words, each rotation of the shaft D rotates the shaft D′ twice in the same direction. At the same time that the rotation of the shaft G tends to turn the shaft D′ the resistance of the work performed by the mill reacts through the entire train of gearing, the effect of the reaction being as follows: The primary result of the reaction is a tendency to roll the gear F about the gear H, and thus rotate the turn-table in the direction indicated by the arrow thereon one complete rotation for each complete rotation of the gear F. The second result of the reaction is a tendency to roll the gear U about the gear V, and thus to rotate the double-faced gear T T′ in the direction indicated by the arrow thereon, the gear T T′ making two rotations for each rotation of the shaft D. The two rotations of the gear T T′ would roll the gear S once about the immovable gear O, thus rotating the turn-table once in the direction indicated by the arrow on the gudgeon Q′ and collar Q—that is to say, the reaction of the work, acting through the gears F H,

tends to turn the turn-table in one direction, and the same reaction, acting through the gears U V, tends equally to rotate the turn-table in the opposite direction. The two opposing forces neutralize each other, and the turn-table remains unaffected by the reaction arising from the resistance of the work. The same thing may be shown in another way by holding the gear V stationary and rotating the turn-table. If the turn-table be rotated in the direction indicated by the arrow on the collar Q and gudgeon Q′, the gear S will be rotated bodily in the same direction, and thereby rolled about the immovable gear O. The double rotation of the gear S will rotate the gear T T′ twice for each rotation of the turn-table, and the two rotations of the gear T T′ will roll the gear U once about the gear V, and thus rotate the shaft D one complete turn—that is to say, the shaft D and the turn-table J turn in the same direction and at the same rate of speed, and therefore the two gears F H remain constantly in the same relative positions, and the shaft G is unaffected by the rotation of the turn-table. The turn-table may thus be rotated without turning either the wind-wheel shaft or the power-transmitting shaft D′, and this shows conclusively that the swiveling of the mill is not affected by the work in any way.

As shown in the drawing, the gears O T are of equal diameter, and the gears T′ V are also of equal diameter, and the consequence of this ratio of the gears is that a rotation of the gears T T′ has the same effect on the turn-table as on the shaft D. The ratio of the gears O T to each other may be varied at will; but whenever it is so changed the ratio of the gears V T′ to each other must be changed in the same way, in order that the perfect balance of the mechanism may be preserved. The ratio of the gear O to the gear T may be made somewhat greater or less than the ratio of the gear V to the gear T′; but any inequality of these ratios is to that extent a departure from the perfect form of the gearing.

Having now described and explained my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a windmill of the class described, the combination, with the tower of the mill, of a turn-table rotating freely thereon, a wind-wheel shaft journaled in the turn-table, a vertical shaft journaled in and extending downward through the turn-table and connected with the wind-wheel shaft by suitable gears, a gear-wheel attached rigidly to the tower and concentric with the vertical shaft journaled in the turn-table, a second vertical shaft journaled in suitable bearings in the tower and adapted to transmit the power of the mill to mechanism to be operated thereby, a loosely-mounted gear rotating bodily with the vertical shaft journaled in the turn-table and having an independent rotation on its own axis, and gearing, substantially as shown and described, connecting said loosely-mounted gear with the power-transmitting shaft and with the turn-table and the gear attached to the tower, whereby the rotation of the turn-table rotates the upper but not the lower of said vertical shafts.

2. In a windmill of the class described, the combination, with the tower of the mill, of a turn-table rotating freely thereon, a wind-wheel shaft journaled in said turn-table, a suitably-journaled vertical shaft connected by suitable gears with the wind-wheel shaft, a gear-wheel attached rigidly to the tower and concentric with the vertical shaft, a gear-wheel mounted loosely on said vertical shaft, a gear-wheel mounted loosely on a shaft connected rigidly with said vertical shaft at a point below the loosely-mounted gear on said vertical shaft, a second vertical shaft adapted to transmit the power of the mill to other mechanism, and gearing connecting said loosely-mounted gears with the turn-table and the gear attached to the tower, and also with said power-transmitting vertical shaft, whereby the rotation of the wind-wheel shaft in its bearing does not tend to rotate the turn-table and the rotation of the turn-table does not tend to rotate the wind-wheel shaft in its bearing.

3. In a windmill of the class described, the combination, with the tower of the mill, of a turn-table rotating freely thereon, a wind-wheel shaft journaled in the turn-table, a vertical shaft coincident with the axis of the turn-table and connected by suitable gears with the wind-wheel shaft, a gear-wheel attached rigidly to the tower and concentric with said vertical shaft, a gear-wheel mounted loosely on said vertical shaft above the lower end thereof, a shaft connected rigidly with said vertical shaft at a point below said loosely-mounted gear, and a second gear mounted loosely on the shaft so connected with the vertical shaft, a second vertical shaft adapted to transmit the power of the mill to other mechanism, and gearing connecting said loosely-mounted gears, said power-transmitting shaft, said turn-table, and the gear attached to the tower, whereby the resistance of the work performed by the mill tends to retard the rotation of the wind-wheel shaft in its bearing, but not to rotate the turn-table.

4. In a windmill of the class described, the combination, with the tower of the mill, of a turn-table rotating freely thereon, a wind-wheel shaft journaled in the turn-table, a suitably-journaled vertical shaft coincident with the axis of the turn-table and connected by suitable gears with the wind-wheel shaft, a gear-wheel attached rigidly to the tower of the mill and concentric with said vertical shaft, a second vertical shaft adapted to transmit the power of the mill to other mechanism, a gear-wheel mounted loosely on said vertical shaft first mentioned, and gearing connecting said loosely-mounted gear with the turn-table, with the gear attached to the tower, and with the gear attached to the power-trans-

mitting shaft, whereby the rotation of said loosely-mounted gear when the power-transmitting shaft is held stationary rotates the turn-table and said first-mentioned vertical shaft at the same speed and in the same direction.

5. In a windmill of the class described, the combination, with the tower of the mill and a gear-wheel rigidly attached thereto, of a turn-table rotating freely on the tower and concentric with said gear, a wind-wheel shaft journaled in the turn-table, two independent vertical shafts standing in the same straight line but rotating independently, one of said shafts being connected with the wind-wheel shaft by suitable gears and the other being the power-transmitting shaft of the mill, a loosely-mounted gear encircling the upper of said vertical shafts, and gearing, substantially as shown and described, connecting said loosely-mounted gear with said lower vertical shaft and with the gear attached to the tower.

6. The combination, with the tower and turn-table of the mill and the gear O, rigidly attached to the tower, of the wind-wheel shaft G, journaled in the turn-table, the upper and lower vertical shafts, D D′, the gears F H, connecting the upper shaft with the wind-wheel shaft, the loosely-mounted gear T T′, rotating freely about the shaft D, the gear V, rigidly attached to the shaft D′, the gear-wheel S, connecting the gears O T, and the gear-wheel U, connecting the gears T′ V, the gear S, having a rotation on its own axis and a bodily rotation about the vertical axis of the mill, and the gear U, having a rotation on its own axis and a bodily rotation in unison with the rotation of the shaft D, substantially as shown and described, and for the purpose set forth.

7. In a windmill of the class described, the combination, with the tower and turn-table of the mill, of a wind-wheel shaft journaled in the turn-table, a gear rigidly attached to the tower and concentric with the turn-table, two independently-journaled vertical shafts standing in the same straight line, the upper shaft being connected with the wind-wheel shaft by suitable gearing and the lower being the power-transmitting shaft of the mill, a loosely-mounted gear rotating freely on the upper of said shafts, and gearing connecting said loosely-mounted gear with the lower vertical shaft with the gear attached to the tower and with the turn-table, whereby the turn-table and said loosely-mounted gear rotate at different rates of speed.

8. The combination, of the top plate, K, of the tower, the turn-table J, having the tubular neck P, the wind-wheel shaft G, vertical shafts D D′, and gears F H O S T T′ U V, the double-faced gear T T′ being loosely mounted on the shaft D.

9. The combination of the tower-plate K, the turn-table J, the gear O, attached to the tower, a vertical shaft, D, connected, substantially as described, with the other elements of the mechanism, the gears S U V and the gear T T′ encircling the shaft D.

10. In a windmill of the class described, the combination, with the tower and turn-table of the mill, of a wind-wheel shaft journaled in the turn-table, a gear rigidly attached to the tower and concentric with the turn-table, two independently-journaled vertical shafts, one connected with the wind-wheel shaft by a suitable gearing and the other being the power-transmitting shaft of the mill, a loosely-mounted gear rotating freely on the shaft connected with the wind-wheel shaft, and gearing connecting said loosely-mounted gear with the power-transmitting shaft with the gear attached to the tower and with the turn-table, whereby the turn-table rotates at a slower rate of speed than said loosely-mounted gear.

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

GEORGE H. PATTISON.

Witnesses:

JAMES H. STEARNS,

WM. B. THOMAS.