

(No Model.)

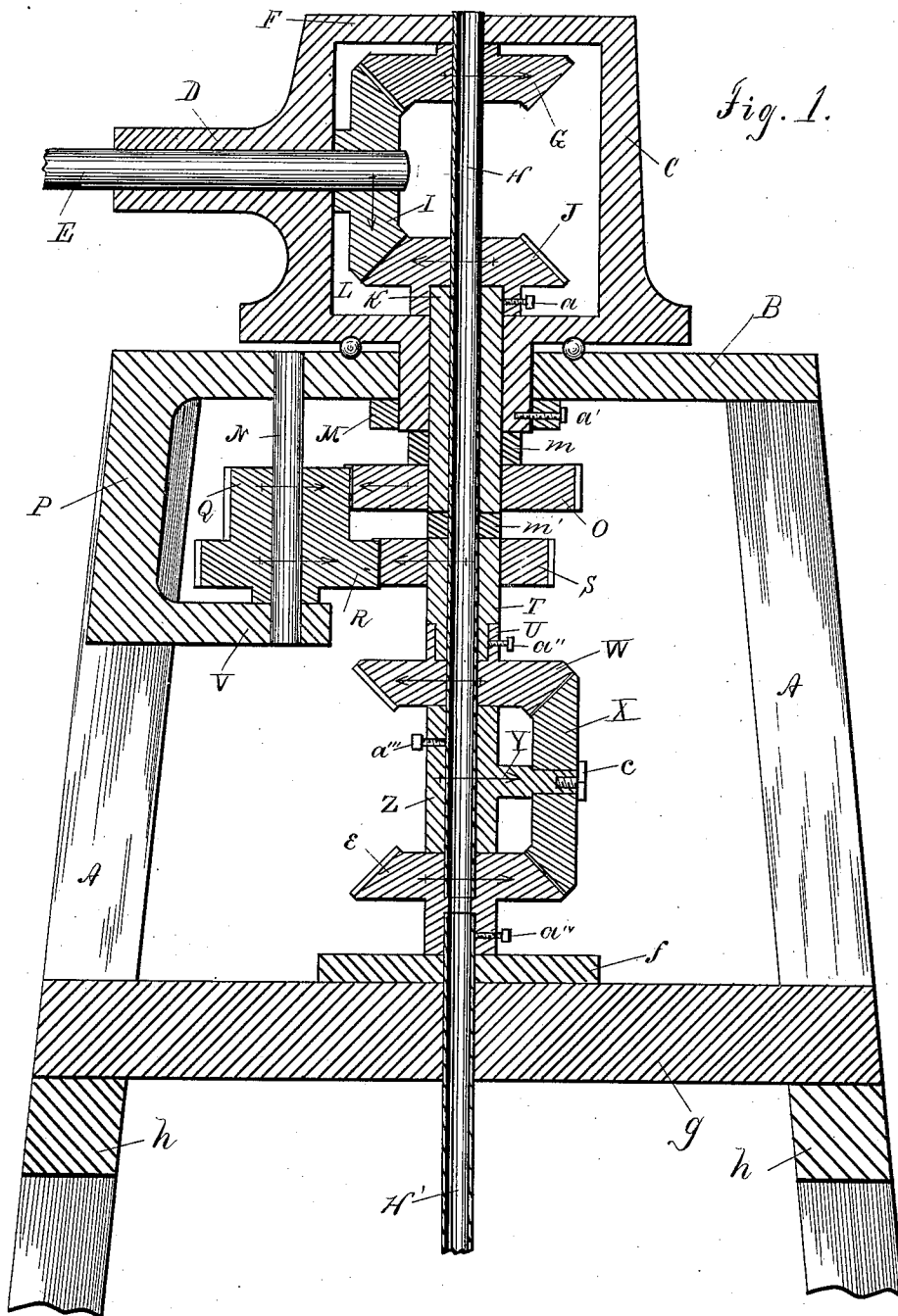
2 Sheets—Sheet 1.

G. H. PATTISON.

WINDMILL GEARING.

No. 323,725.

Patented Aug. 4, 1885.



WITNESSES:

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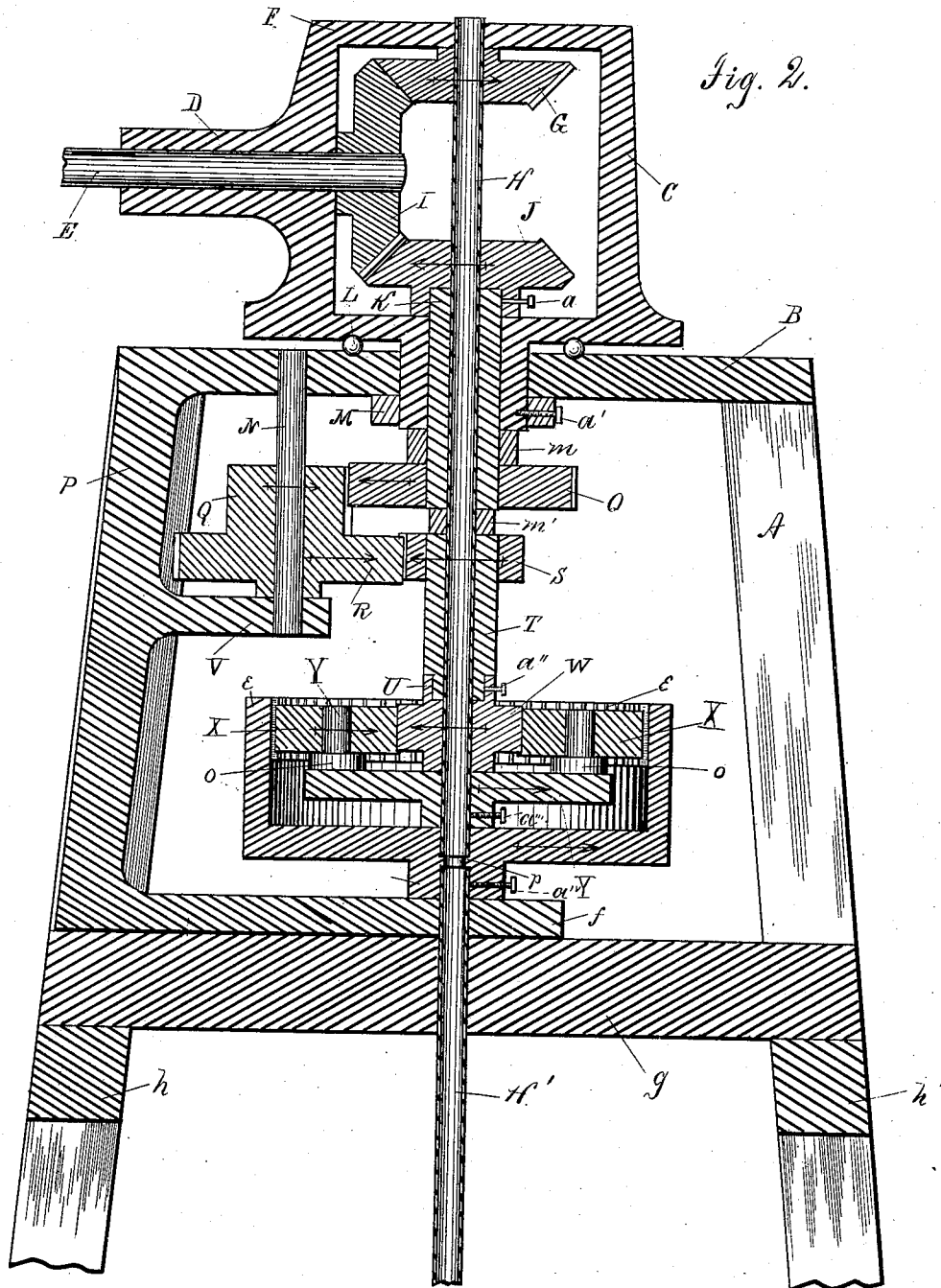
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WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE H. PATTISON, OF FREEPORT, ILLINOIS.

WINDMILL-GEARING.

SPECIFICATION forming part of Letters Patent No. 323,725, dated August 4, 1885.

Application filed July 1, 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 windmills of the class known as "power" mills, its object being to counteract or neutralize the reaction of the work performed by the mill, which tends, unless so neutralized, to throw the wind-wheel of the mill out of the wind.

The invention is fully described and explained in the following specification, and shown in the accompanying drawings, in which—

Figure 1 is a central vertical section of a windmill-tower, on which is mounted one form of the gearing constituting my invention, and Fig. 2 a similar view of a slightly different form of the gearing.

In Fig. 1, A A are the posts of an ordinary windmill-tower, and B is a top plate or cap rigidly fastened to the posts. On the plate B rests a turn-table, C, preferably concentric with the plate, and turning freely on a series of anti-friction balls, L, interposed between the turn-table and the plate in the ordinary manner. On the lower face of the turn-table is an integrally-formed cylindrical neck, which is journaled in and extends downward through the plate B, and a collar, M, is fastened to the neck below the plate, and prevents accidental upward movement of the turn-table. A box or bearing, D, is formed integrally with the turn-table, and a wind-wheel shaft, E, is journaled in said bearing, and has on its inner end a rigidly-mounted miter-gear, I. The gear I engages with two miter-gears, G J, the gear J being rigidly mounted on a sleeve, K, which is journaled in the neck of the turn-table, while the gear G is rigidly mounted on a preferably hollow shaft, H, journaled at its upper end in the top of the turn-table and extending downward through the sleeve K.

On the lower end of the sleeve K is rigidly

mounted a spur-gear, O, which engages with a spur-gear, Q, mounted on a vertical shaft, N, the shaft N being journaled at its upper end in the top plate, B, while its lower end is journaled in a bracket, V, preferably integral with the top plate. A second spur-gear, R, is formed integrally with or rigidly attached to the gear Q, and the spur-gear R engages with a similar gear, S, mounted on a sleeve, T, which turns loosely on the shaft H.

On the lower end of the sleeve T is a miter-gear, W, and below the gear W is a collar, Z, fastened rigidly to the shaft H, and provided with a horizontal gudgeon, Y, on which is loosely mounted a miter-gear, X, which engages with the miter-gear W.

Below the collar Z is a miter-gear, e, engaging with the miter-gear X, and mounted rigidly on a vertical shaft, H', journaled in the lower, and standing in the same straight line with the shaft H. The shaft H' extends downward to the foot of the tower, and may be connected in any desired manner with the mechanism to be operated by the mill. The lower end of the shaft H is stepped in a socket in the upper surface of the gear e, and is thus held in alignment with the shaft H', and the gear e is axially bored to correspond with the internal diameter of the shafts H H', thus forming a continuous cylindrical opening throughout the entire length of the central vertical shafting of the mill.

The operation of this mechanism is as follows: When the wind-wheel shaft E and the gear I turn in the direction indicated by the arrow on the gear, the gears G J are evidently rotated in the opposite directions indicated by the arrows thereon; and while the spur-gear O turns with the gear J, the collar Z and gudgeon Y turn with the gear G, thus carrying the gear X bodily about the axis of the mill in the direction indicated by the arrow on the gudgeon. The rotation of the gear O is transmitted through the gears Q R to the gear S, the gears O Q R S being so proportioned that each rotation of the gear O produces two rotations of the gear S; and since the gear W is rigidly fastened to the gear S, it follows that the gear W turns in the same direction as the gear O, but makes two rotations for each rotation of the gear O. Thus

while each rotation of the shaft E in its bearing rotates the collar Z, gudgeon Y, and gear X once in one direction about the vertical axis of the mill, the gear W is rotated twice in the opposite direction. The consequence of this combined rotation of the shaft H and the gear W is that each rotation of the shaft H turns the gear *e* and the shaft H' four times in the same direction—that is, the rotation of the wind-wheel shaft in its bearing rotates the shafts H H' in the same direction.

When the turn-table is rotated without rotating the wind-wheel shaft in its bearing, the turn-table and the shaft H turn in the same direction and at the same rate of speed; and consequently the gear W turns in the same direction as the shaft H, but rotates twice for each rotation of the shaft. The result of this combined motion of the shaft H and gear W is that the gear X is rolled about the gear *e* without tending to turn said gear or the shaft H' to which it is attached—that is, the rotation or "swiveling" of the turn-table has no tendency to rotate the wind-wheel shaft in its bearing or to affect the work performed by the mill.

As has already been stated, the gears O Q R S are so proportioned that the gear S rotates twice for each rotation of the gear O, and this proportion must be preserved so long as the gears W *e* are of the same diameter, in order to maintain the perfect balance of the gearing. If the gears W *e* be made unequal the relative proportions of the gears O Q R S may be varied accordingly; and, in fact, the proportions of the different gears may be so varied as to destroy the balance of the gearing entirely, or to approach it as nearly as may be desired. At the same time, therefore, that I have clearly indicated the principle governing the construction of a perfect mechanism of the class shown, I do not intend to limit my invention to the combination of gears of such proportions as to produce a perfectly balanced gearing.

The gearing shown in Fig. 2 is very similar to that shown in Fig. 1, the tower and turn-table, the shafts E H H' N, the sleeves K T, and the gears G I J O Q R S being combined in the same way as the similarly-lettered corresponding parts in Fig. 1. The gear W on the sleeve T is a spur-gear, however, instead of a miter-gear; the gear X, which engages with the gear W, is a planet-gear instead of a miter-gear; and the gear *e*, which engages the planet-gear, is an internal gear. In both the forms shown the gear X is mounted on a gudgeon, Y, fastened to and rotating with the upper vertical shaft, H, and the gear *e*, with which the gear X engages, is fastened to the lower vertical shaft, H'.

The operation of this mechanism is the same as that of the one shown in Fig. 1, except that the use of the spur-gears W X *e* varies the relative speeds of the shafts H H'; and this change of the gearing requires a corresponding change in the relative sizes of the

gears O Q R S. The gears W X X being all equal, the gears O Q R S must be so proportioned that one rotation of the gear O produces four rotations of the gear S; otherwise the mechanism will not be perfectly balanced. With the exception of the variation in speed, the operation of this mechanism is the same as that already described, and it is therefore unnecessary to explain it further.

In my Patent No. 308,375, issued November 25, 1884, I have shown a windmill-gearing embodying many features of the gearings shown and described in this application. Without stating in detail the features of the gearing shown and described herein, which are covered by the claims of the patent referred to, I hereby disclaim any novelty for this invention except such as is set forth in the following claims, viz:

1. In a windmill of the class described, the combination of the turn-table of the mill, a wind-wheel shaft journaled therein, two suitably-journaled central vertical shafts, and a third vertical shaft journaled in the tower of the mill, and gearing connecting said wind-wheel shaft and said vertical shafts, whereby the rotation of the wind-wheel shaft in its bearing rotates said central vertical shafts in the same direction.

2. In a windmill of the class described, the combination, with a rotating turn-table, of a wind-wheel shaft journaled therein, a vertical shaft driven by gearing from said wind-wheel shaft, a sleeve on the vertical shaft, and connected by gearing with the wind-wheel shaft, a loose gear having its axis coincident with the vertical axis of the mill and rotating freely about its axis, and gearing connecting said loose gear with said vertical shaft and said sleeve, whereby the rotation of the wind-wheel shaft rotates said sleeve and said loose gear at different rates of speed.

3. In a windmill of the class described, the combination, with a rotating turn-table, of a wind-wheel shaft journaled therein, a loose gear having its axis coincident with the vertical axis of the mill, a loosely-mounted gear engaging with said loose gear and free to rotate on its own axis and to revolve about the vertical axis of the mill, three vertical shafts arranged substantially as shown and described, and a vertical sleeve having its axis coincident with the vertical axis of the mill, and gearing connecting said wind-wheel shaft, said vertical shafts, and said sleeve, whereby the rotation of the turn-table rotates said sleeve and said loose gear at different rates of speed.

4. In a windmill of the class described, the combination of a turn-table free to rotate about the vertical axis of the mill, a wind-wheel shaft journaled in said turn-table, three vertical shafts arranged substantially as shown and described, and a train of gearing connecting the wind-wheel shaft and the three vertical shafts, one element of said train of gearing being a loosely-mounted gear-wheel free to ro-

tate about its own axis and to revolve about the vertical axis of the mill, substantially as and for the purpose set forth.

5. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, two independently-journaled vertical shafts adapted to transmit the power of the mill to other mechanism, a third vertical shaft journaled in suitable bearings attached to the tower of the mill, and gearing, substantially as shown and described, connecting said wind-wheel shaft and said vertical shafts, 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.

6. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, two independently-rotating vertical shafts adapted to transmit the power of the mill to other mechanism, a third vertical shaft journaled in bearings attached to the tower of the mill, and a train of gearing connecting said wind-wheel shaft and said vertical shafts, one element of said train of gearing being a loosely-mounted gear free to rotate about its own axis and to revolve about the vertical axis of the mill, whereby the resistance of the work to be performed by the mill tends to retard the rotation of the wind-wheel shaft in its bearing, but not to rotate the turn-table.

7. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, a loose gear having its axis coincident with the vertical axis of the mill, a loosely-mounted gear engaging with said loose gear and free to rotate about its own axis and to revolve about the vertical axis of the mill, the three vertical shafts arranged substantially as shown and described, and gearing connecting said loose gear, said loosely-mounted gear, said three vertical shafts, and the wind-wheel shaft, whereby, during the simultaneous rotation of the turn-table about the vertical axis of the mill and of the wind-wheel shaft in its bearing, the power transmitted by said vertical shafts bears a constant ratio to the speed of rotation of the wind-wheel shaft.

8. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, two vertical power-transmitting shafts one above the other, gearing connecting the upper end of said upper vertical shaft with the wind-wheel shaft, a loosely-mounted gear connected with said upper vertical shaft near its lower end, and having a rotation on its own axis and a bodily rotation about said vertical shafts, and gearing connecting said loosely-mounted gear with the lower vertical power-transmitting shaft and with the wind-wheel shaft, whereby the rotation of the wind-wheel shaft in its bearing rotates said vertical shafts in the same direction, but at different rates of speed.

9. In a windmill of the class described, the combination of a wind-wheel shaft, a vertical shaft connected directly by gearing with said wind-wheel shaft, a loose gear free to rotate about its own axis and about the axis of rotation of its support, and connected by a supporting-arm with said vertical shaft, and gearing connecting said loose gear with the wind-wheel shaft, whereby the rotation of the wind-wheel shaft in its bearing rotates said loose gear about its own axis and about the vertical axis of the mill.

10. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, a vertical power-transmitting shaft, and a sleeve mounted loosely on said shaft, said vertical shaft and said sleeve being both geared directly to the wind-wheel shaft, a loose gear free to rotate on its own axis and about the vertical axis of the mill, and connected with said vertical shaft by means insuring their uniform rotation, and gearing, substantially as shown and described, connecting said loose gear and said sleeve.

11. In a windmill of the class described, the combination, with the wind-wheel shaft, of a vertical shaft, N, journaled in bearings attached to the tower of the mill, gearing connecting said shaft with the wind-wheel shaft, a gear adapted to transmit power to mechanism to be operated by the mill, and gearing connecting the vertical shaft N with said power-transmitting gear, substantially as shown and described, and for the purpose set forth.

12. The combination of the wind-wheel shaft E, the vertical shafts H H', the gear e, attached to the shaft H', the gear W, loosely mounted on the shaft H, the gear X, engaging with the gears e and W and rotating bodily with the shaft H, gearing connecting the wind-wheel shaft E with the vertical shaft H, and gearing, substantially as shown and described, connecting the wind-wheel shaft with the gear W, whereby the rotation of the wind-wheel shaft in its bearing rotates the two shafts H H' in the same direction.

13. The combination of the wind-wheel shaft E, the vertical shaft H, and gearing connecting the shaft H with the wind-wheel shaft, the loose gear W, rotating freely on the shaft H, the loose gear, X engaging the gear W, and having a rotation on its own axis and a bodily rotation in unison with the rotation of the shaft H, and gearing connecting the wind-wheel shaft E with the loose gear W, whereby the rotation of the wind-wheel shaft in its bearing rotates the shaft H and the gear W at different rates of speed, substantially as shown and described, and for the purpose set forth.

14. The combination of the wind-wheel shaft E, journaled in the turn-table of the mill, the vertical shaft H, and the sleeve K, rotating freely thereon, the gear I on the wind-wheel shaft, and the gears G J, engaging the gear I, and mounted on the shaft H and sleeve K,

respectively, the gear-wheel O, mounted on the lower end of the sleeve K, and engaging with gearing whose shaft is journaled in bearings attached to the tower, the loosely-mounted
5 gear X, rotating on its own axis, and having a bodily rotation about the shaft H and in unison with the rotation of said shaft, the gears W S, connecting the gear X with the
10 gearing whose shaft is pivoted in the tower, and the gear e, engaging with the gear X, and adapted to transmit power to other mechanism, substantially as shown and described, and for the purpose set forth.

15 15. The combination of the wind-wheel shaft E, journaled in the turn-table of the mill, the two vertical power-transmitting shafts H H', and the gears I G J O Q R S W e, connecting the wind-wheel shaft with the shafts H H', whereby the rotation of the turn-table rotates
20 the upper but not the lower of the two shafts

H H', substantially as shown and described, and for the purpose set forth.

16. The combination of the wind-wheel shaft E and gear I, the vertical shaft H, and gear G, the gears J O Q R S W, and the loose gear
25 X, mounted on a shaft, Y, rigidly connected with the shaft H, substantially as shown and described, and for the purpose set forth.

17. The combination of the wind-wheel shaft E and the train of gearing I G J O Q R S W
30 X e, all connected and combined substantially as shown and described, and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 35

GEORGE H. PATTISON.

Witnesses:

JAMES I. NEFF,

JAMES H. STEARNS.