(No Model.)

G. H. PATTISON.

GEARING FOR WINDMILLS.

No. 330,921. Patented Nov. 24, 1885.

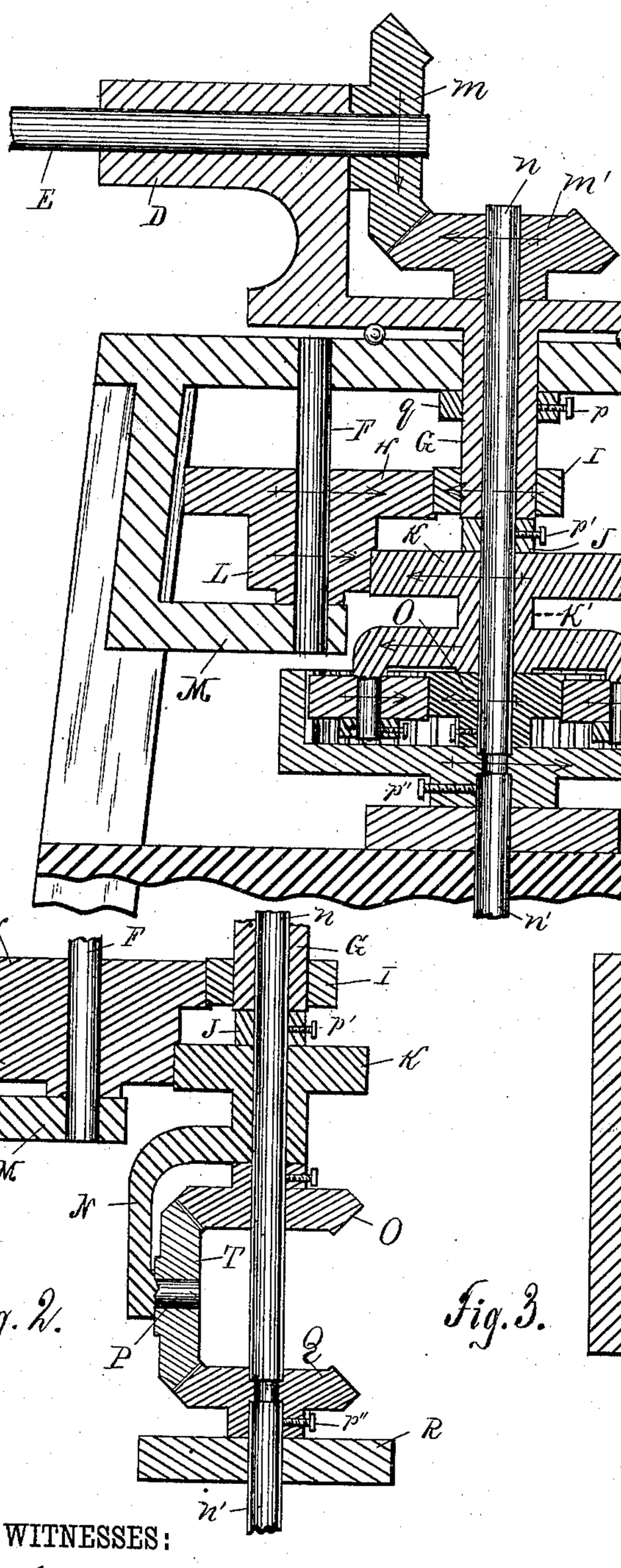

Fig. 1.

Fig. 2.

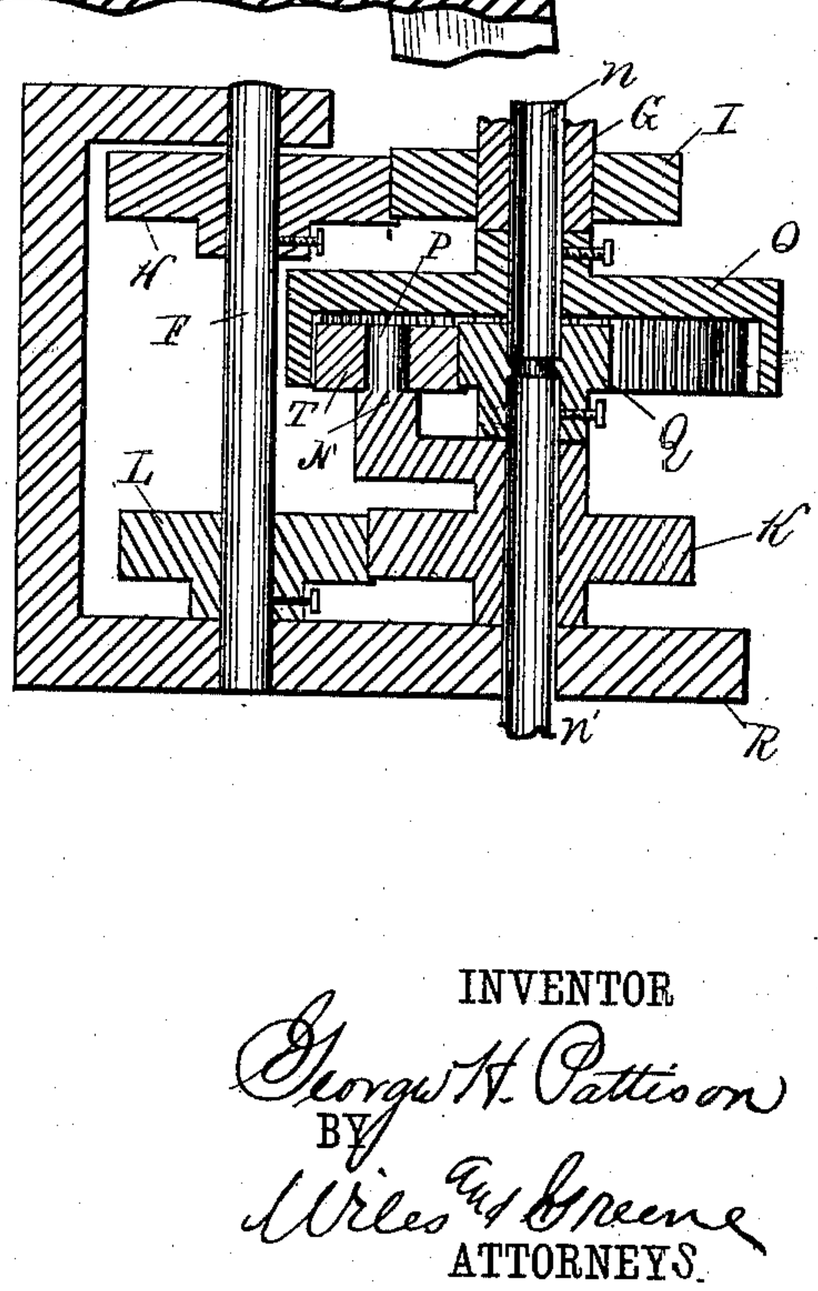

Fig. 3.

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GEARING FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 330,921, dated November 24, 1885.

Application filed September 15, 1885. Serial No. 177,215. (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 Gearings for Windmills; 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, its object being to counteract the tendency of the work performed by the mill to throw the wind-wheel 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 and turn-table with the gearing in operative position. Fig. 2 is a similar view of a modified form of the lower part of the gearing, and Fig. 3 a similar view of a second modification of a part of said gearing.

In Fig. 1, A are the posts of an ordinary windmill-tower. B is a top plate, rigidly fastened to the posts, and C is a turn-table supported by anti-friction balls *o*, which rest on the plate B. On the lower face of the turn-table is a hollow cylindrical neck, G, extending through and journaled in the plate B, and a horizontal box or bearing, D, is formed integrally with the turn-table, and forms the bearing of a wind-wheel shaft, E. In the neck G of the turn-table is journaled a preferably hollow vertical shaft, *n*, which is connected with the wind-wheel shaft E by two miter-gears, *m m'*, mounted on the shafts E *n*, respectively, and on the lower end of the neck is rigidly mounted a spur-gear, I, which engages with a spur-gear, H. The spur-gear H and a smaller spur-gear, L, formed integrally with it, are mounted on a vertical shaft, F, whose upper end is journaled in the plate B, while its lower end is journaled in a bracket, M, formed integrally with the plate. The spur-gear L engages with a spur-gear, K, mounted loosely on the shaft *n*, and below the gear, and formed integrally with it, are a neck, K′, a horizontal arm or disk, N, and two downward-extending vertical gudgeons, P, carrying loosely-mounted planet-wheels, T. On the lower end of the shaft *n*, below the arm N, is rigidly mounted a spur-gear, O, engaging the two planet-gears T, and an internal gear, Q, engages both of the planet-gears, and is mounted rigidly on the upper end of a second vertical shaft, *n′*, located in the same straight line as the shaft *n*. The lower end of the shaft *n* is stepped in a socket in the gear Q, and between the ends of the shafts *n n′* is a cylindrical opening through the gear, corresponding to the internal diameter of the shafts, and continuous therewith.

The operation of the mechanism above described is as follows: When the turn-table is stationary, if the wind-wheel shaft be rotated in its bearing in the direction indicated by the arrow on the gear *m* the gear *m′*, shaft *n*, and gear O must turn in the direction indicated by the arrows on the gears *m′* O. The turn-table being stationary, the gears I H L K are also stationary, and consequently the arm N and gudgeons P are immovable; hence the rotation of the gear O rotates the gears T about the gudgeons P in the direction indicated by the arrows thereon, and this rotation of the gears T turns the internal gear, Q, in the direction indicated by the corresponding arrow. The gear Q carries with it the shaft *n′*, and the shafts *n n′* thus turn in opposite directions. On the other hand, if the gear Q be held stationary, either by the resistance of the work or by any other means, and the turn-table be rotated in the direction indicated by the arrow thereon, the gear I must turn in the same direction as the turn-table, and the double gear H L must turn in the opposite direction. The gear K, engaging with the gear L, turns in the same direction as the gear I, and carries with it the arm N and gudgeons P, and thus revolves the planet-gears T about the shaft *n;* and since the gear Q is stationary, the gears T roll about its geared face and turn the gear O and shaft *n* in the direction indicated by the arrow on the gear—that is, in the same direction that the turn-table rotates. As shown, the gears O T T are all equal, and consequently each rotation of the gear K and arm N turns the shaft *n* four times. At the same time the gears K L H I are so proportioned that for each rotation of the gear K the gear I turns four times—that is to say, the complete

rotation of the gear K corresponds to four rotations of the shaft *n* and four rotations of the turn-table in the same direction; hence the turn-table and the shaft *n* maintain the same relative positions, and the wind-wheel shaft does not turn in its bearing. In other words, the rotation of the turn-table does not turn either the working-shaft *n'* or the wind-wheel shaft E, and the mill can swivel without affecting or being affected by the work.

The form shown in Fig. 2 is the same as that shown in Fig. 1, except that miter-gears O T Q are substituted for the spur-gears shown in Fig. 1, and the ratios of the gears I H L K are altered to correspond with the change in ratio of the gears O T Q.

In Fig. 3 the gear O, fastened to the shaft *n*, is an internal gear. The gear Q, fastened to the shaft *n'*, is the central spur-gear, and the gears H L are separated (though fastened rigidly to the same shaft) for the purpose of bringing the gear K below the planet-gearing O T Q. The only effect of this change from the form shown in Fig. 1 is to increase the speed of the shaft *n'* as compared with that of the shaft *n*. This change also requires a corresponding change in the ratio of the gears I H L K, for reasons already explained.

Whichever one of the forms of gearing shown may be used, I prefer to run the shaft *n'* to the foot of the tower, and take the power from it there, rather than at a point higher up in the tower. This is, however, not essential.

In my Patent No. 317,186 I have shown a gearing embodying many of the features of the gearing shown and described in this application. Without specifying the elements of this gearing which are to be found in said patented form, I disclaim for my present invention any novelty, except such as is set forth in the following claims, to wit:

1. The combination of the gear L, mounted on a shaft journaled in the tower of the mill, the gear K, engaging with said gear L, the gudgeon P, rigidly connected with the gear K, and the gear T, mounted on said gudgeon and free to rotate thereon and to revolve bodily with the gear K.

2. The combination of the gears H L, mounted on a shaft journaled in the tower of the mill, the gears I K, engaging with the gears H L, respectively, the gudgeon P, rigidly connected with the gear K, the gear T, mounted on said gudgeon and free to rotate thereon and to revolve about the axis of the gear K, and the gear Q, engaging with said gear T, substantially as shown and described, and for the purpose set forth.

3. The combination of two gears mounted on a vertical shaft journaled in the tower of a windmill at one side of the vertical axis of the mill, a third gear engaging one of said two gears and having its axis coincident with the vertical axis of the mill, a fourth gear engaging the other of said two gears and itself free to rotate on a vertical axis, a loosely-mounted or planet gear free to rotate on its own axis and to revolve bodily with said fourth gear, and a power-transmitting gear engaging with said planet-gear and adapted to transmit power to other machinery, whereby the rotation of said third gear, when the power-transmitting gear is stationary, rotates said planet gear on its own axis and revolves it about the axis of said fourth gear.

4. The combination of the geared turn-table, the gear K, and the gear T, supported thereby and revolving therewith, gearing connecting the gear K with the gear on the turn-table, gearing engaging the gear T on one side and connecting it with power-transmitting mechanism, and gearing engaging said gear T on the opposite side and connecting it with the wind-wheel shaft.

5. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, a gear rigidly attached to the turn-table, two independently-journaled 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 the wind-wheel shaft, the gear attached to the turn-table and said vertical shafts, one element of said train of gearing being a loosely-mounted gear supporting a planet-gear which is free to rotate on its own axis and to revolve about the axis of said loosely-mounted gear, substantially as shown and described, and for the purpose set forth.

6. In a windmill of the class described, the combination of a rotating turn-table and a gear rigidly attached thereto, a wind-wheel shaft journaled in the turn-table, a vertical shaft journaled in bearings attached to the tower, a loose gear, and a planet-gear free to rotate about its own axis and to revolve about the axis of said loosely-mounted gear, and gearing, substantially as shown and described, connecting the wind-wheel shaft, the gear on the turn-table, said loosely-mounted gear, and said vertical shaft journaled in bearings attached to the tower.

7. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, a vertical shaft geared directly to the wind-wheel shaft, a second vertical shaft adapted to transmit the power of the mill to other machinery, and a train of gearing connecting said vertical shafts and said turn-table, whereby the rotation of the wind-wheel shaft in its bearing rotates said vertical shafts in opposite directions without tending to rotate the turn-table, one element of said train of gearing being a planet-gear free to rotate about its own axis and to revolve about the axis of its support.

8. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, a vertical shaft journaled in the turn-table and geared direct-

ly to the wind-wheel shaft, a gear-wheel mounted loosely on said vertical shaft, and a planet-wheel whose shaft is rigidly fastened to said loosely-mounted gear, and gearing connecting said planet-gear with said vertical shaft, substantially as shown and described, and for the purpose set forth.

9. In a windmill of the class described, the combination of a rotating turn-table, a gear rigidly mounted thereon, and a wind-wheel shaft journaled therein, two independently-journaled vertical shafts adapted to transmit the power of the mill to other mechanism, and gearing connecting the wind-wheel shaft, the gear on the turn-table, and said two vertical shafts, whereby the rotation of the wind-wheel shaft in its bearings rotates said vertical shafts in opposite directions, one element of said gearing being a loosely-mounted gear free to rotate about its own axis and to revolve about the axis of its movable support, substantially as shown and described.

10. In a windmill of the class described, the combination of a rotating turn-table and a wind-wheel shaft journaled therein, a power-transmitting gear, a loosely-mounted gear free to rotate on its own axis and to revolve about the axis of its movable support, and gearing connecting said turn-table, said wind-wheel shaft, said power-transmitting gear, and said loosely-mounted gear, whereby the rotation of the wind-wheel shaft in its bearing rotates said loosely-mounted gear on its own axis only, and the rotation of the turn-table rotates said loosely-mounted gear on its own axis and revolves it about the axis of its movable support without rotating either the wind-wheel shaft or the power-transmitting gear.

11. In a windmill of the class described, the combination of a wind-wheel shaft journaled in a rotating turn-table, a gear rigidly fastened to said turn-table, a power-transmitting gear, an intermediate loosely-mounted gear, a planet-gear loosely mounted on a shaft rigidly attached to said intermediate gear, and gearing connecting said turn-table gear, the wind-wheel shaft, the power-transmitting gear, said intermediate loosely-mounted gear, and said planet-gear, whereby the reaction of the work performed by said power-transmitting gear has no tendency to rotate the turn-table.

12. The combination, with the rotating geared turn-table of a mill, of a wind-wheel shaft journaled therein, the gear Q, adapted to transmit the power of the mill to other machinery, and the gears *m m'* H L K O T, connecting the wind-wheel shaft, the gear on the turn-table, and the gear Q, whereby during the simultaneous rotation of the wind-wheel shaft in its bearing and of the turn-table about its own axis the speed of rotation of the gear Q bears a constant ratio to the speed of rotation of the wind-wheel shaft.

13. In a windmill of the class described, the combination of a geared turn-table and a wind-wheel shaft journaled therein, a power-transmitting shaft, the gear K, and the gear T, supported thereby and free to rotate on its own axis and to revolve with the gear K, gearing connecting the gear K with the turn-table gear, and gearing connecting the wind-wheel shaft and the power-transmitting shaft through the gears K T, substantially as shown and described.

14. In a windmill of the class described, the combination of a geared turn-table and a wind-wheel shaft journaled therein, a power-transmitting gear, a loosely-mounted gear free to rotate about its own axis and to revolve about the axis of its support, gearing connecting said loosely-mounted gear with the turn-table gear, gearing engaging said loosely-mounted gear on one side and connecting it with the wind-wheel shaft, and gearing engaging it on the opposite side and connecting it with the power-transmitting gear, whereby the rotation of said wind-wheel shaft in its bearing rotates said loosely-mounted gear on its own axis only.

15. The combination of the central gears, I and O, and the connecting-gears H L K T Q, combined and operating substantially as shown and described, and for the purpose set forth.

16. The combination, with the turn-table and the gear attached thereto, of the gear K, and the gear T, rotating on a shaft attached to the gear K, and gearing connecting the gear K with the turn-table gear, whereby the rotation of the turn-table rotates the gear T bodily about the axis of the gear K, substantially as shown and described, and for the purpose set forth.

17. The combination of the turn-table and the gear I, rigidly fastened thereto, and the gears H L K T, all combined and operating substantially as shown and described, and for the purpose set forth.

18. The combination of the turn-table C, the wind-wheel shaft E, journaled therein, the gear I, fastened rigidly to the turn-table, and the train of gearing *m m'* H L K O T Q, substantially as shown and described, and for the purpose set forth.

19. In a windmill of the class described, the combination of a geared turn-table, a wind-wheel shaft journaled therein, a power-transmitting shaft, a loosely-mounted gear free to rotate on its own axis and about the axis of rotation of its support, and a train of gearing connecting said wind-wheel shaft, said geared turn-table, and said power-transmitting shaft, whereby the rotation of the wind-wheel shaft in its bearing rotates said loosely-mounted gear on its own axis only.

20. In a windmill of the class described, the combination of a rotating turn-table, a planet-gear free to rotate about its own axis and to revolve about the axis of its rotatable support, and means connecting said turn-table and said planet-gear, whereby the rotation of the turn-table rotates said planet-gear.

21. In a windmill of the class described, the combination of a rotating turn-table, a planet-gear free to rotate on its own axis and to revolve about the axis of its rotatable support, and gearing connecting the turn-table and the planet-gear, whereby the rotation of the turn-table rotates the planet-gear, but at a different rate of speed.

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

GEORGE H. PATTISON.

Witnesses:
JAMES H. STEARNS,
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