(No Model.)

G. H. PATTISON.

WINDMILL GEARING.

No. 329,770. Patented Nov. 3, 1885.

Fig. 1.

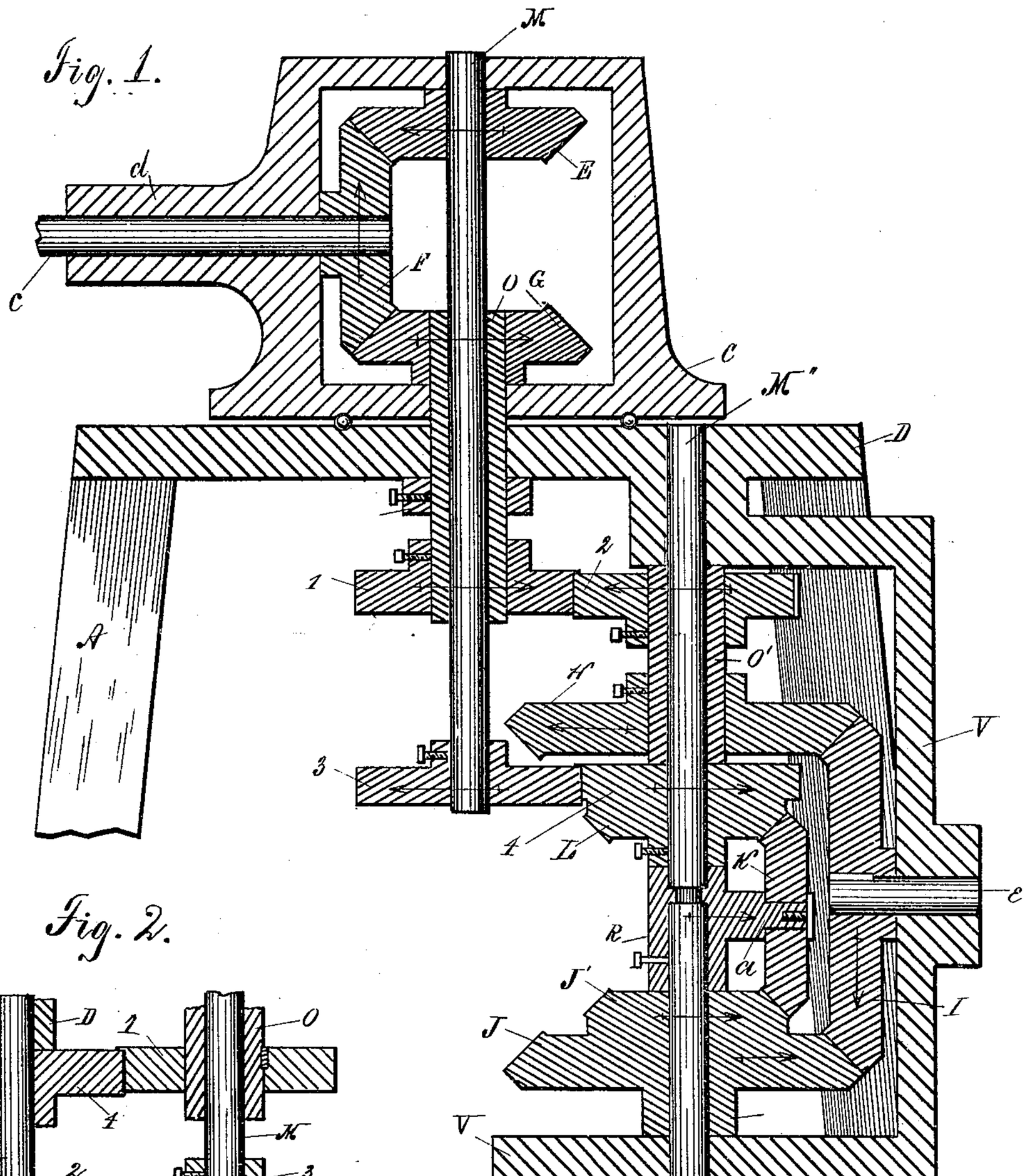


Fig. 2.

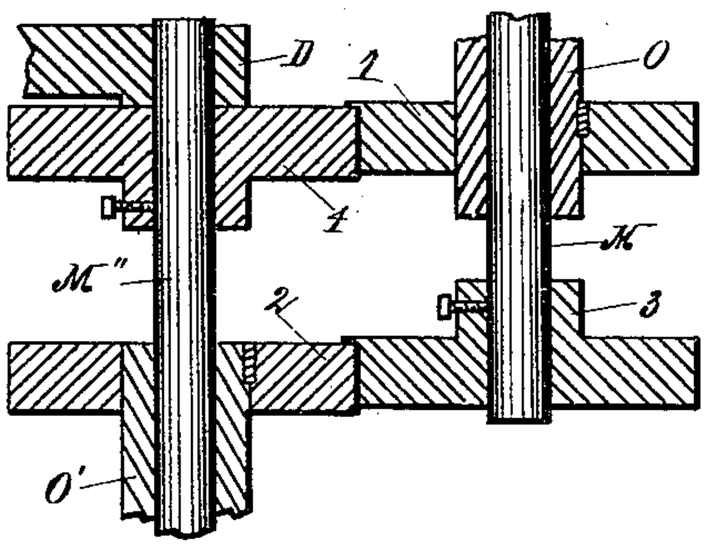
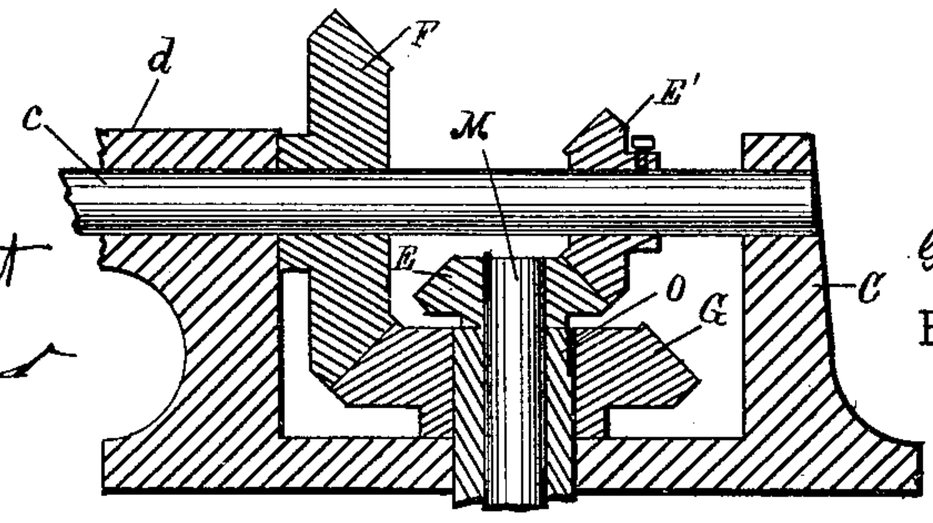


Fig. 3.



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WINDMILL-GEARING.

SPECIFICATION forming part of Letters Patent No. 329,770, dated November 3, 1885.

Application filed September 29, 1885. Serial No. 178,532. (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," as distinguished from pumping-mills.

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 one form of my improved gearing; Fig. 2, a similar view of a modification of a part of the gearing, and Fig. 3 a similar view of a modification of the upper part of the gearing.

In the first figure, A are the posts of an ordinary tower, and D is a top plate fastened to the posts. C is a turn-table resting on the top plate, but separated therefrom by anti-friction balls, permitting the free rotation of the turn-table, and *c* is a wind-wheel shaft journaled in a bearing, *d*, which forms part of the turn-table. F is a miter-gear mounted rigidly on the inner end of the wind-wheel shaft, and E G are two similar gears engaging with the gear F at its highest and lowest points, respectively, the gear G being rigidly mounted on a hollow shaft or sleeve, O, journaled in the turn-table, and the gear E being rigidly mounted on a preferably hollow shaft, M, which is journaled in the top of the turn-table, and also in the sleeve O, through which it extends, and below which it projects. At one side of the vertical axis of the mill are two independently-journaled vertical shafts, M″ M′, one above the other, the lower of said shafts being the power-transmitting shaft of the mill, and on the shaft M″ is mounted loosely a sleeve, O′. The sleeves O O′ are connected by spur-gears 1 2, mounted on the respective sleeves, and the shafts M M″ are connected by spur-gears 3 4, mounted on the shafts, respectively. A miter-gear, H, is fastened rigidly to the sleeve O′, and a miter-gear, L, is cast integrally with the gear 4, or otherwise fastened rigidly to the shaft M″. It is evident that if the wind-wheel shaft *c* be rotated the shafts M O must turn in opposite directions, and since the gears H L turn in opposite directions, they bear the same relation to each other as if they were mounted on the shafts O M, respectively, instead of on the shafts O′ M″. In other words, the shafts O′ M″ are really continuations of or substitutes for the shafts O M, and are set at one side of the axis of the mill merely for convenience in construction and operation. The remainder of the gearing, which is precisely the same as that shown in my Patent No. 308,375, consists of a miter-gear, I, mounted on a stationary shaft, *e*, and engaging with the gear H, a double-faced miter-gear, J J′, mounted loosely on the shaft M′, and having the face J, in engagement with the gear I, and a miter-gear, K, engaging the gear L and the face J′ of the double-faced gear J J′. The gear K is mounted loosely on a horizontal gudgeon, *a*, formed integrally with a sleeve, R, which is fastened to the shaft M′, so that the gear K has two motions, a rotation on its own axis and a revolution about the axis of its supporting-shaft M′.

The operation of the gearing above described is as follows: When the turn-table is stationary, and the wind-wheel shaft rotates in its bearing in the direction indicated by the arrow on the gear F, the gears E G and the shafts O M, with their spur-gears 1 3, turn in opposite directions. The rotation of the gear 1 is transmitted, through the gears 2 H I J, to the gear J′, and the rotation of the gear 3 is communicated directly to the spur-gear 4 and the gear L attached thereto, the rotation of the gears J′ L being in the same direction and at the same rate of speed. This uniform rotation of the gears J′ L carries the gear K bodily about the axis of the shaft M′, and thus rotates the shaft itself, to which the gear K is connected by the sleeve R. Thus the rotation of the wind-wheel shaft in its bearing rotates both the shafts M″ M′ in the same direction. On the other hand, if the turn-table be rotated while the shaft *c* is stationary in its bearing, the gears E G turn in

the same direction and at the same speed, and consequently the gears J′ L turn in opposite directions at the same rate of speed. The result of this rotation of the gears J′ L is the rotation of the gear K on its shaft *a* without any motion whatever about the axis of the shaft M′; hence the rotation of the turn-table has no effect on the wind-wheel shaft or the shaft M′; but since the rotation of the turn-table turns the gear E, it must also turn the shaft M and gear 3, and consequently the gear 4 and shaft M″. Therefore the rotation of the turn-table rotates the upper, but not the lower, of the two shafts M″ M′. In fact the operation of this mechanism is substantially the same as that of the gearing shown in my Patent No. 308,375, above referred to. The difference between the mechanism shown here and that shown in the patent mentioned consists in the transfer of the power-transmitting shaft and the axis of revolution of the loosely-mounted gear from a position coincident with the vertical axis of the mill to a position at one side of the vertical axis of the mill, but parallel thereto.

The form shown in my patent above mentioned is but one example of a class of gearings in which a gear on the wind-wheel shaft engages with two gears corresponding to the gears E G, and in which the rotation of said two gears is transmitted through other gearing to a power-transmitting shaft, one element common to all of said gearings being a loosely-mounted gear free to rotate on its own axis and to revolve about the vertical axis of its rotating support. In all the forms of the class the axis of revolution of the loosely-mounted gear may be coincident with the vertical axis of the mill or at one side thereof, as shown and described herein.

The modification shown in Fig. 2 consists, simply, in connecting the sleeve O with the shaft M″ and the shaft M with the sleeve O′, thus changing the direction of rotation of each of the parts O′ M″; but since these two parts, in the form shown in Fig. 1, rotate in opposite directions, the reversal of the motion of both has no substantial effect on the operation of the mechanism.

I am aware that many of the features of the gearing shown herein are described in the specification and covered by the claims of the patent already referred to, and I therefore disclaim for the invention constituting the subject of this application all novelty except such as may be set forth in the following claims.

I claim—

1. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, and a gear mounted on said wind-wheel shaft, two gears engaging said gear at opposite points, and gearing connecting the two gears which engage the gear on the wind-wheel shaft, one element of said connecting-gearing being a loosely-mounted gear free to rotate on its own axis and to revolve about a vertical axis at one side of the vertical axis of the mill.

2. In a windmill of the class described, the combination of a rotating turn-table and a wind-wheel shaft journaled therein, a gear-wheel mounted rigidly on the wind-wheel shaft, and two gear-wheels engaging said gear-wheel at opposite points, a power-transmitting shaft parallel to the vertical axis of the mill, but at one side thereof, and a train of gearing connecting the power-transmitting shaft and the two gears which engage the wind-wheel-shaft gear, one element of said connecting-train being a loosely-mounted gear free to rotate on its own axis and to revolve about the axis of its rotating support.

3. In a windmill of the class described, the combination of a rotating turn-table and a wind-wheel shaft journaled therein, a vertical shaft and a vertical sleeve, and gears mounted on the upper ends of said shaft and sleeve, respectively, gearing mounted on the wind-wheel shaft and engaging both of said gears, gears mounted on the lower ends of said vertical shaft and sleeve, respectively, and gears engaging said last-mentioned gears, respectively, and rotating on an axis at one side of the vertical axis of the mill.

4. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, and a gear mounted on the wind-wheel shaft, a vertical shaft and a vertical sleeve coincident with the vertical axis of the mill, and gears mounted on said shaft and sleeve, respectively, and engaging the wind-wheel-shaft gear at opposite points, two independently-journaled vertical power-transmitting shafts at one side of the vertical axis of the mill, and gearing connecting said power-transmitting shafts with the shaft and sleeve coincident with the vertical axis of the mill, one element of said connecting-train being a loosely-mounted gear free to rotate on its own axis and to revolve about the axis of its rotating support.

5. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, and a gear-wheel mounted on said wind-wheel shaft, two gear-wheels engaging the wind-wheel-shaft gear at opposite points, a power-transmitting shaft parallel to the vertical axis of the mill, but at one side thereof, and a train of gearing connecting said power-transmitting shaft with the two gears which engage the wind-wheel-shaft gear, one element of said connecting train of gearing being a loosely-mounted gear free to rotate on its own axis and to revolve about the axis of said power-transmitting shaft, whereby during the simultaneous rotation of the wind-wheel shaft in its bearing and of the turn-table about the vertical axis of the mill the motion of the power-transmitting shaft bears a constant ratio to the motion of the wind-wheel shaft.

6. In a windmill of the class described, the

combination of a rotating turn-table, C, a wind-wheel shaft, *c*, journaled therein, and a gear, F, on said shaft, the gears E G, engaging the gear F, the gears 3 and 1, rotating with the gears E G, respectively, the gears 2 and 4, one engaging with the gear 1 and the other with the gear 3, the power-transmitting shaft M′, at one side of the vertical axis of the mill, and a train of gearing connecting the shaft M′ with the gears 2 and 4, one element of said train of gearing being a loosely-mounted gear free to rotate on its own axis and to revolve about the axis of the shaft M′.

7. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, and a gear-wheel mounted on said shaft, two gears engaging the wind-wheel-shaft gear at opposite points, two independently-journaled vertical shafts at one side of the vertical axis of the mill, and gearing connecting said power-transmitting shafts with the two gears which engage the wind-wheel-shaft gear, whereby the rotation of the turn-table rotates one of said power-transmitting-shafts, but not the other.

8. The combination, with the turn-table of a windmill, the wind-wheel shaft journaled therein, the gear F, mounted on said shaft, and the gears E G, engaging the gear F, of the vertical shaft M′, at one side of the vertical axis of the mill, the three gears L J′ K, rotating about the axis of the shaft M′, and gearing, substantially as shown and described, connecting the gears L J′ K with the gears E G.

9. The combination of the turn-table C, wind-wheel shaft *c*, and gears E F G 1 2 3 4 H I J J′ K L, substantially as shown and described, and for the purpose set forth.

10. The combination of the turn-table C, the wind-wheel shaft *c*, and the gear F, mounted on said shaft, the gears E G, engaging the gear F, the gears 1 and 3, rotating with the gears G E, respectively, and the gears 2 and 4, engaging the gears 1 and 3 and communicating the motion thereof to other mechanism, substantially as shown and described.

11. The combination, with the rotating turn-table of a windmill, the wind-wheel shaft journaled therein, and gearing mounted on the wind-wheel shaft, of a vertical shaft and a vertical sleeve coincident with the vertical axis of the mill, gears mounted on said shaft and sleeve and engaging the wind-wheel-shaft gearing, spur-gears mounted on the lower ends of said vertical shaft and sleeve, respectively, and a train of gearing connecting said spur-gears, one element of said train of gearing being a loosely-mounted gear free to rotate on its own axis and to revolve about the axis of its rotating support.

12. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, and a gear-wheel mounted on said wind-wheel shaft, a power-transmitting shaft, M′, at one side of the vertical axis of the mill, two gears engaging the wind-wheel-shaft gear at opposite points, and a train of gearing connecting said two gears with the shaft M′, one element of said train being a loosely-mounted gear free to rotate on its own axis and about the axis of its rotating support, whereby the turn-table may rotate without rotating either the wind-wheel shaft or the shaft M′.

13. The combination, with the rotating turn-table of a windmill and a wind-wheel shaft journaled therein, of two independently-journaled and independently-rotating vertical shafts at one side of the vertical axis of the mill, and gearing constructed, substantially as shown and described, of a train of gearing connecting said wind-wheel shaft with said vertical shafts, whereby the rotation of the wind-wheel shaft rotates the vertical shafts in the same direction.

14. The combination, with the rotating turn-table of a windmill and a wind-wheel shaft journaled therein, of two independently-journaled vertical shafts lying in the same straight line at one side of the vertical axis of the mill, and gearing, substantially as shown and described, connecting the wind-wheel shaft and said vertical shafts, whereby the simultaneous rotation of the wind-wheel shaft in its bearing and of the turn-table about the vertical axis of the mill rotates said vertical shafts in the same direction, but at different rates of speed.

15. The combination, with the turn-table and journaled wind-wheel shaft of a windmill of the class described, of a vertical shaft, M′, at one side of the vertical axis of the mill, and adapted to transmit the power of the mill to other mechanism, and a train of gearing constructed substantially as described, and connecting the shaft M′ with the wind-wheel shaft, one element of said train of gearing being a loosely-mounted gear free to rotate about its own axis, but connected to the shaft M′ by means insuring bodily rotation of the gear with said shaft.

16. The combination, with the rotating turn-table of a windmill, a wind-wheel shaft journaled therein, and a gear-wheel mounted on said shaft, of a vertical power-transmitting shaft at one side of the vertical axis of the mill, a gear-wheel, I, mounted on a shaft journaled in a stationary bearing, and two gear-wheels engaging the wind-wheel-shaft gear at opposite points, and gearing engaging the gear I at opposite points and connecting it with the power-transmitting shaft and with the two gears which engage the wind-wheel-shaft gear, substantially as shown and described, and for the purpose set forth.

17. The combination of the shaft *c*, the vertical shafts M M″, and the gears E F G 1 2 3 4 H I J J′ K L, substantially as shown and described, and for the purpose set forth.

18. In a windmill of the class described, the combination of a rotating turn-table, a wind-wheel shaft journaled therein, a vertical shaft and a vertical sleeve connected with the wind-

wheel shaft by gearing rotating them in opposite directions, a power-transmitting shaft, and a train of gearing connecting said vertical shaft and sleeve with said power-transmitting shaft, one element of said train of gearing being a loosely-mounted gear free to rotate on its own axis and to revolve about a vertical axis at one side of the vertical axis of the mill.

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.