(No Model.)

G. H. PATTISON.

WINDMILL.

No. 317,186. Patented May 5, 1885.

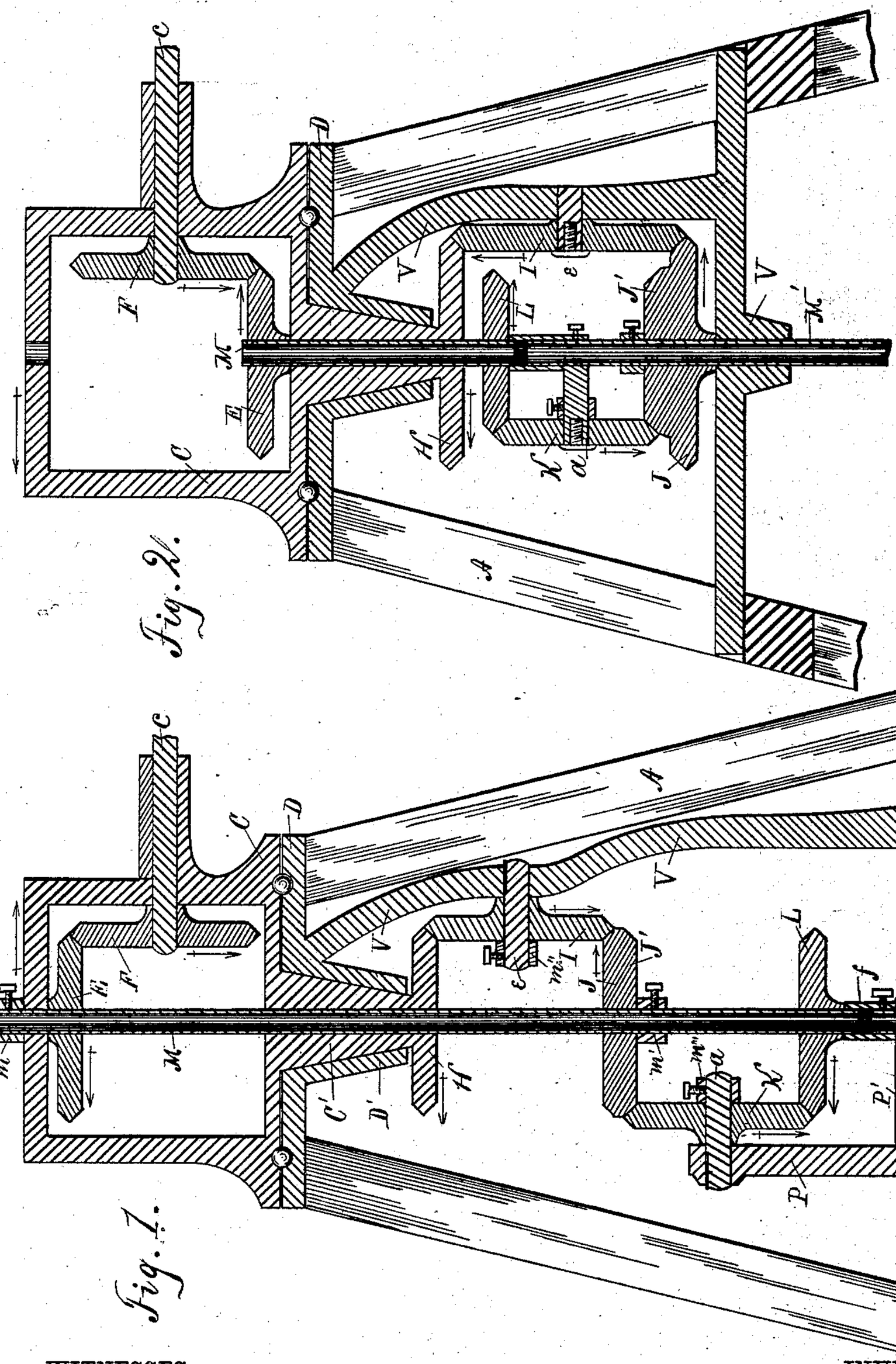

Fig. 2.

Fig. 1.

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WINDMILL.

SPECIFICATION forming part of Letters Patent No. 317,186, dated May 5, 1885.

Application filed June 12, 1884. (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 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 windmills of the class in which the power of the wind-wheel is expended in rotating a vertical shaft connected with any desired mechanism, and more especially it relates to devices for overcoming or preventing the tendency of the wind-wheel in that class of mills to go out of the wind in consequence of the reaction or resistance of the work to be performed. The mechanism employed for this purpose is fully explained and described in the following pages and shown in the accompanying drawings, in which—

Figure 1 is a central vertical section of a windmill-tower, in which is arranged gearing constituting one form of my invention, and Fig. 2, a central vertical section of a tower in which is arranged gearing constituting a slightly modified form of the invention.

In all these views the arrows on the gears indicate motions in the same directions as if the gears were shown in elevation instead of in section. Thus the lower half of the beveled gear F of the wind-wheel shaft is meant to be represented as moving from front to rear, or away from the eye.

In Fig. 1, A is a windmill-tower of ordinary form; D, a stationary plate attached to the top thereof and provided with a hollow conical bearing, D′, dependent from its center, and C an ordinary turn-table resting on anti-friction balls in an annular groove in the plate D, and provided with a conical sleeve, C′, dependent from its center and rotating freely in the bearing D′. A horizontal wind-wheel shaft, *c*, is journaled in the turn-table C, and may be rotated by a wind-wheel of any desired form mounted rigidly on its outer end. On the inner end of the wind-wheel shaft is rigidly mounted a miter-gear, F, which engages with a similar gear, E, rigidly mounted on a preferably hollow vertical shaft, M, whose upper end is journaled in the top of the turn-table, while its lower end rests and is journaled in a short sleeve, *f*, rigidly attached to a second vertical shaft, M′, extending downward from and in the same line with the shaft M. The shaft M′ is journaled in a suitable bearing in a casting, V, extending across the tower and attached to the timbers thereof, and provided with an integrally-formed brace extending upward to join the plate D.

On the lower end of the conical sleeve C′ is formed a horizontal miter-gear, H, turning with but not independently of the turn-table, and engaging with a vertical gear, I, which is loosely mounted on a stationary horizontal shaft, *e*, keyed in the brace V. The gear I engages with the upper face, J, of a double-faced horizontal miter-gear, J J′, mounted loosely on the shaft M, and the lower face, J′, of said gear meshes with a vertical miter-gear, K, loosely mounted on a short shaft, *a*, which is keyed in a vertical arm, P, formed integrally with a crank, P′, which is rigidly fastened to and turns with the shaft M′. The vertical gear K engages, also, with a similar horizontal gear, L, rigidly mounted on and turning with the shaft M. The shaft M is supported either by a collar, *m*, fastened on its upper end above the top plate of the turn-table, or by the sleeve *f*, which is represented as sustaining the gear L. A collar, *m′*, fastened to the shaft M, supports the gear J J′, and suitable collars, *m″* *m‴*, hold in place the gears I K, respectively.

The movement of the mechanism shown in Fig. 1, so far as the same arises from the rotation of the wind-wheel shaft and not from the rotation of the turn-table, is as follows: Supposing the wind-wheel, the shaft *c*, and the gear F to turn in the direction indicated by the arrow on the gear, the gear E must turn in the direction indicated by the corresponding arrow, and the gear L, rigidly mounted on the same shaft M that carries the gear E, must move in the same direction therewith, and since the power of the mill is communicated, primarily, to the gear E, to be by it transmitted to the work below, the reaction of the work through the gear E must tend to

turn the wind-wheel and its shaft together with the turn-table in which the shaft is journaled in a direction opposed to the direction of rotation of the gear E—that is, in the direction indicated by the arrow on the top plate of the turn-table. The rotation of the gear L turns the gear K on its shaft in the direction indicated by the arrow thereon, and the rotation of the gear K, could it be transmitted through the gears J′ J, I, and H would turn them in the directions indicated by their respective arrows—that is to say, the tendency of the gear K to turn the train of gearing connected with it, resolves itself into a tendency to turn the gear H in the direction indicated by the arrow thereon and in the direction opposed to that in which the turn-table tends to rotate under the influence of the reaction of the work through the gear E. Since the gear H and the turn-table are formed in a single piece, or rigidly connected, the reaction of the work through the gear E neutralizes the reaction of the gear K through the train of gears ending with the gear H, and therefore the rotation of the wind-wheel shaft in its bearing does not turn the gears J I H, and since the gears J I H do not turn on their axes under the influence of the gear K the latter, in order to rotate on its shaft, must roll about the gear J′ in the direction of rotation of the gear L. This it accordingly does, carrying with it the arm P and crank P′, and turning the shaft M′ in the direction indicated by the arrow on the crank P′—that is, in the same direction as that in which the shaft M turns; hence it appears, first, that the resistance offered by the work to the rotation of the vertical shaft reacts equally in two opposite directions on the turn-table C, and therefore has no tendency to rotate the turn-table; and, second, that so long as the wind-wheel shaft turns in its bearing without rotating about the vertical axis of the mill the two shafts M M′ must rotate in the same direction. If, however, the turn-table be rotated while the wind-wheel shaft is prevented from turning in its bearing, the gears E H L must all turn in the same direction, and the gear J J′ must turn in the opposite direction to the gear L and at the same rate of speed as that of said gear. The consequence of this opposite rotation of the gears J′ L must be to turn the gear K on its shaft without rotating or tending to rotate it about the vertical axis of the mill. In other words, the rotating of the turn-table has no tendency whatever to turn the shaft M′ or to perform any work whatever, and therefore the work offers no resistance to the rotation of the turn-table, as the mill regulates or governs.

The mechanism shown in Fig. 2 is substantially the same as that shown in Fig. 1. The tower A, plate D, turn-table C, shaft *c*, gears F E H I J J′ K L, and shafts M M′ have precisely the same functions as the similarly-lettered parts in Fig. 1. The position of the gear E below instead of above the gear F reverses the direction of the rotary forces throughout the entire mechanism, and the change in the form of the double gear J J′ necessitates certain changes in the relative positions of the gears J J′ K L; but the result of the combined motions is the same as in the other mechanism. The reaction of the work through the gear E tends to turn the turn-table in one direction, while the reaction through the gear K tends to turn it in the opposite direction. The two reactions are equal and neutralize each other, and the turn-table is therefore unaffected by the resistance of the work. In this mechanism, as in the other, the rotation of the wind-wheel shaft in its bearings tends to turn the shafts M M′ in the same direction and at the same speed, while the rotation of the turn-table tends to rotate the shaft M without affecting the shaft M′; and it is evident that in both these forms the rotation of the wind-wheel shaft in its bearings at the same time that the turn-table rotates about the vertical axis of the mill must turn both the shafts M M′, but at different rates of speed, the question which of the two shafts moves the faster being determined by the direction of rotation of the turn-table. In both the forms the turn-table, which forms the bearing of the wind-wheel shaft, has a gear formed integrally on or rigidly attached to it, and this turn-table gear is connected and combined with a train of gearing, one element of which is a gear-wheel rigidly mounted on the wind-wheel shaft. Another element, intermediate between the geared turn-table and the gear on the wind-wheel shaft, is the loosely-mounted gear K, free to rotate about its own axis and also about the axis of rotation of its support, and it is by means of this combination of gearing that the wind-wheel shaft rotates in its bearing without rotating the turn-table, and the turn-table rotates about the vertical axis of the mill without rotating the wind-wheel shaft in its bearing.

In both the mills hereinabove described and shown in the drawings the two hollow shafts M M′ are in the same vertical line and form a continuous tube. This is important, since the cord for drawing the mill into or out of the wind can pass downward from the mill through this tube, and works much freer than when it passes through a tortuous and obstructed course. I consider it preferable to take the power from the vertical shaft M′ at the base of the mill rather than to transmit it from said shaft to other mechanism higher up in the tower and thence to the base of the mill, as is done in other mills of this general class.

I am aware that some of the features of the mechanisms shown and described in this application are covered by the claims of my Patent No. 308,375, dated November 25, 1884.

Without enumerating or specifiying here the features or elements covered by the claims of said prior application, I hereby disclaim generally, so far as this application is concerned, any novelty for the parts so covered already; and I hereby state that I do not desire or in-

tend to claim such parts in this application, except it be in connection with other elements forming novel combinations.

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 of a geared turn-table free to rotate about the vertical axis of the mill, a wind-wheel shaft journaled in the turn-table, and a gear-wheel rigidly attached thereto, two independently-rotating vertical shafts adapted to transmit the power of mill to other mechanism, and a train of gearing, substantially as shown and described, connecting the wind-wheel shaft, the two vertical shafts, and the geared turn-table, whereby the rotation of the wind-wheel shaft in its bearing turns said vertical shafts in the same direction.

2. In a windmill of the class described, the combination of a geared turn-table free to rotate about the vertical axis of the mill, a wind-wheel shaft journaled in said turn-table, two independently-rotating vertical shafts lying in the same straight line and adapted to transmit the power of the mill to other machinery, and gearing, substantially as shown and described, connecting said wind-wheel shaft, said two vertical shafts, and the gearing of said turn-table, whereby the rotation of the wind-wheel shaft in its bearing rotates said vertical shafts in the same direction and at the same rate of speed.

3. In a windmill of the class described, the combination of a geared turn-table rotating freely about the vertical axis of the mill, a wind-wheel shaft journaled in said turn-table, two independently-rotating vertical shafts adapted to transmit the power of the mill to other machinery, and gearing, substantially as shown and described, connecting said wind-wheel shaft, said vertical shafts, and the gearing of said turn-table, whereby the rotation of the turn-table about the vertical axis of the mill rotates one of said vertical shafts, but not the other.

4. In a windmill of the class described, the combination of a geared turn-table rotating freely about the vertical axis of the mill, a wind-wheel shaft journaled in said turn-table, two independently-rotating vertical shafts standing in the same straight line and adapted to transmit the power of the mill to other mechanism, and gearing, substantially as shown and described, connecting said wind-wheel shaft, said vertical shafts, and the gearing of said turn-table, whereby the simultaneous rotation of the turn-table about the vertical axis of the mill and of the wind-wheel shaft in its bearing rotates said vertical shafts in the same direction, but at different rates of speed.

5. In a windmill of the class described, the combination of a geared turn-table rotating freely about the vertical axis of the mill, a wind-wheel shaft journaled in said turn-table, two independently-rotating vertical shafts adapted to transmit the power of the mill to other mechanism, and gearing, substantially as shown and described, connecting said wind-wheel shaft, said vertical shafts, and the gearing of said turn-table, whereby the rotation of the wind-wheel shaft in its bearing rotates both of said vertical shafts in the same direction, and whereby the rotation of the turn-table rotates one of said vertical shafts, but not the other.

6. In a windmill of the class described, the combination of a geared turn-table free to rotate about the vertical axis of the mill, a wind-wheel shaft journaled in said turn-table, two independently-rotating vertical shafts standing in the same straight line and adapted to transmit the power of the mill to the work to be performed thereby, and gearing, substantially as shown and described, connecting the wind-wheel shaft, the two vertical shafts, and the gearing of the turn-table, whereby the reaction of the work performed tends to retard the rotation of the wind-wheel shaft in its bearing, but not to rotate the turn-table about the vertical axis of the mill.

7. The combination of the turn-table C and gear H, rigidly fastened thereto, the wind-wheel shaft *c*, journaled in the turn-table, and the gear-wheel F, mounted rigidly on said shaft, the independently-rotating vertical shafts M M′, and gears E L, rigidly mounted on said shaft M, the gear K, engaging with the gear L, and means connecting said gear with the shaft M′, and adapted to insure uniform rotation of said gear and shaft about the vertical axis of the mill, and gearing connecting said gear K with the gear H, and adapted to transmit the reaction of the gear K to the turn-table, whereby the rotation of the shaft *c* rotates the shafts M M′ in the same direction, and the rotation of the turn-table rotates the shaft M, but not the shaft M′, substantially as shown and described, and for the purpose set forth.

8. The combination of the turn-table C and gear H, rigidly attached thereto, the wind-wheel shaft *c*, journaled in said turn-table, the vertical power-transmitting shaft M′, the loosely-mounted gear-wheel K, free to rotate on its shaft and to rotate about the vertical axis of the mill and connected with the shaft M′ by means adapted to insure the uniform rotation of the gear and the shaft about the vertical axis of the mill, and gearing connecting said gear K with the wind-wheel shaft and with the gear H, whereby the rotation of the wind-wheel shaft in its bearing rotates the gear K about its own axis and about the vertical axis of the mill, while the rotation of the turn-table rotates the gear K on its own axis, but not about the vertical axis of the mill.

9. The combination of the turn-table C and gear H, rigidly fastened thereto, the wind-wheel C, journaled in said turn-table, the vertical shaft M, and the loosely-mounted gear-wheel K, free to rotate on its own axis and about the shaft M, and gearing connecting said gear K with the wind-wheel shaft and with

the gear H, whereby the rotation of the wind-wheel shaft in its bearing rotates said gear-wheel about the shaft M, while the rotation of the turn-table rotates said gear on its shaft, but not about the shaft M.

10. The combination of the geared turn-table C, free to rotate about the vertical axis of the mill, the gear-wheel I, mounted on a shaft journaled in a stationary bearing, gearing engaging said gear-wheel at one point and connecting it with the geared turn-table, and gearing engaging with said gear-wheel I at an opposite point and connecting it with the vertical power-transmitting shaft of the mill and with the wind-wheel shaft, substantially as shown and described, and for the purpose set forth.

11. The combination of the turn-table C and gear H, rigidly attached thereto, the shaft *c* and gear F, the shaft M, the gear E, mounted on the shaft M and engaging with the gear F, the gear L, mounted on the shaft M, and gearing connecting the gear L and the gear H, one element of the train of gearing connecting the gears L and H being a loosely-mounted gear capable of rotation about its own shaft and at the same time capable of rotation about an axis at right angles to its shaft.

12. The combination of the turn-table C and gear H, rigidly attached thereto, the shaft *c* and gear F, the shaft M and gears E and L, and the gears I, J, J′, and K, together with suitable supports for said gears, all constructed, combined, and operating, substantially as shown and described, and for the purpose set forth.

13. In a windmill of the class described, the combination of a rotating geared turn-table, a wind-wheel shaft journaled therein, two independently-journaled vertical shafts, and gearing connecting said turn-table and said vertical shafts, whereby the rotation of the turn-table rotates the upper but not the lower of said vertical shafts.

14. In a windmill of the class described, the combination of a rotating geared turn-table, a wind-wheel shaft journaled therein, a loosely-mounted gear-wheel free to rotate about its own axis and about the axis of revolution of its movable support, and gearing connecting said loosely-mounted gear with said turn-table and with said wind-wheel shaft, whereby the rotation of the wind-wheel shaft in its bearings rotates said loosely-mounted gear about its own axis and about the axis of rotation of its support, while the rotation of the turn-table rotates said gear on its own axis, but not about the axis of rotation of its support.

15. In a mill of the class described, the combination of a suitably-journaled wind-wheel shaft, a geared turn-table free to rotate about the vertical axis of the mill, and a chain of gearing connecting the wind-wheel shaft, the turn-table, and the machinery to be operated, one element of said gearing being a loosely-mounted gear-wheel free to rotate about its own axis and about the axis of rotation of its movable support, whereby the rotation of the turn-table has no tendency to cause the rotation of the wind-wheel shaft in its bearing, and the rotation of the wind-wheel shaft in its bearing has no tendency to cause the rotation of the turn-table.

16. In a windmill of the class described, the combination of a geared turn-table rotating freely about the vertical axis of the mill, a wind-wheel shaft journaled in said turn-table, two independently-rotating vertical shafts adapted to transmit the power of the mill to other mechanism, and a train of gearing connecting said wind-wheel shaft, said vertical shafts, and the gearing of said turn-table, one element of said train of gearing being a loosely-mounted gear-wheel free to rotate about its own axis and about the axis of revolution of its movable support, whereby the rotation of the wind-wheel shaft in its bearing rotates both of said vertical shafts, and the rotation of the turn-table rotates the upper but not the lower of said vertical shafts.

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

GEORGE H. PATTISON.

Witnesses:
GUS. CHAFFEE,
T. D. WILCOXON.