(Model.)

4 Sheets—Sheet 1

M. R. MARTIN.

GEARING FOR WINDMILLS.

No. 261,739. Patented July 25, 1882.

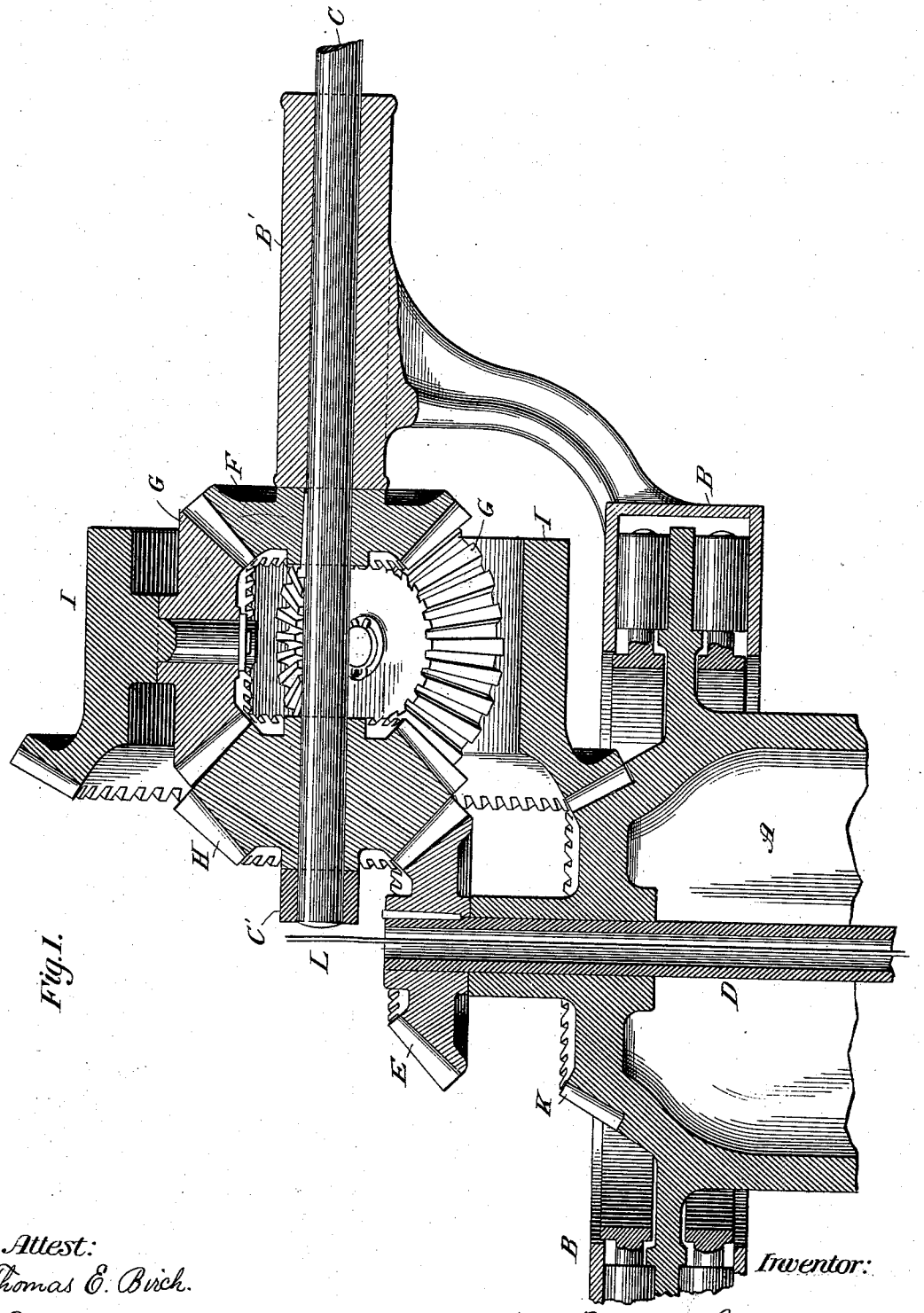

Fig. 1.

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(Model.)

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Fig. 2ª

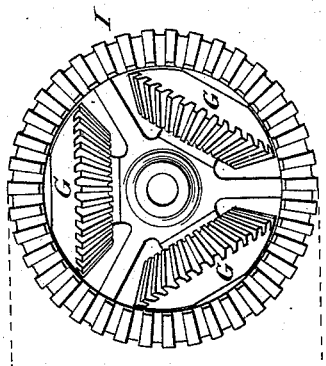
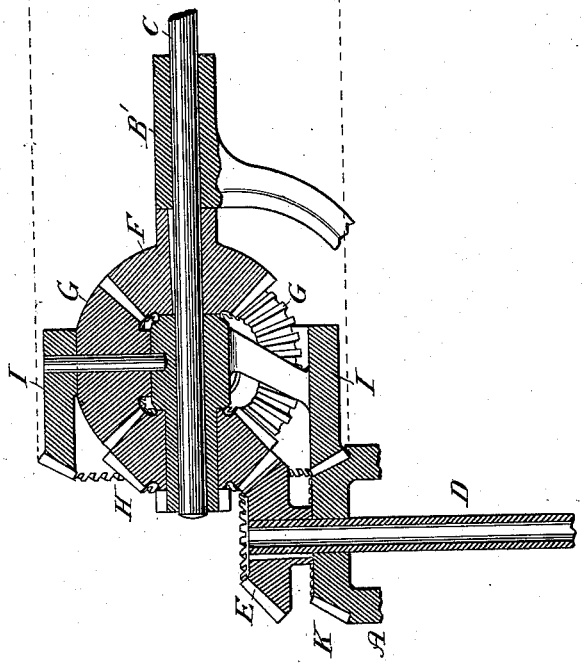


Fig. 2.



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GEARING FOR WINDMILLS.

No. 261,739. Patented July 25, 1882.

Fig. 4.

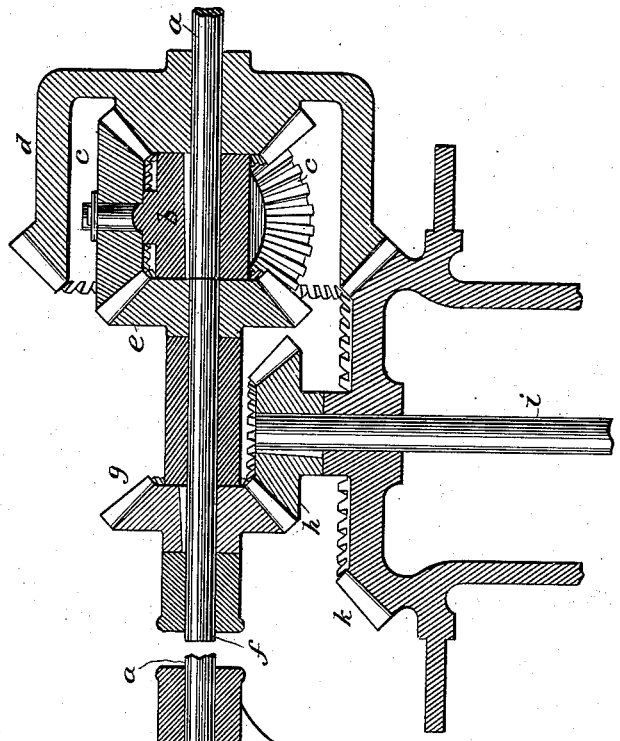
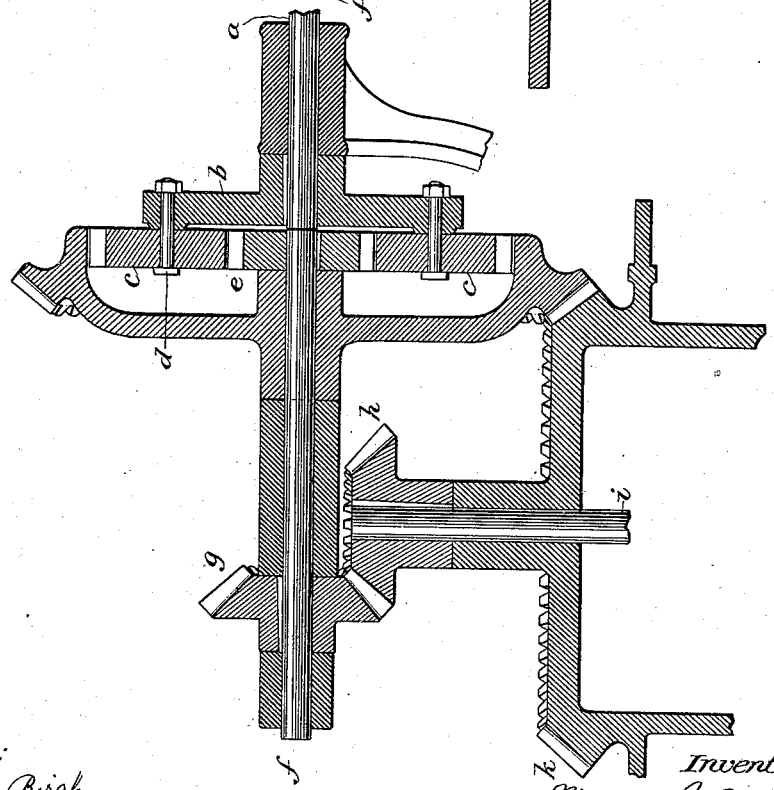


Fig. 3.



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GEARING FOR WINDMILLS.

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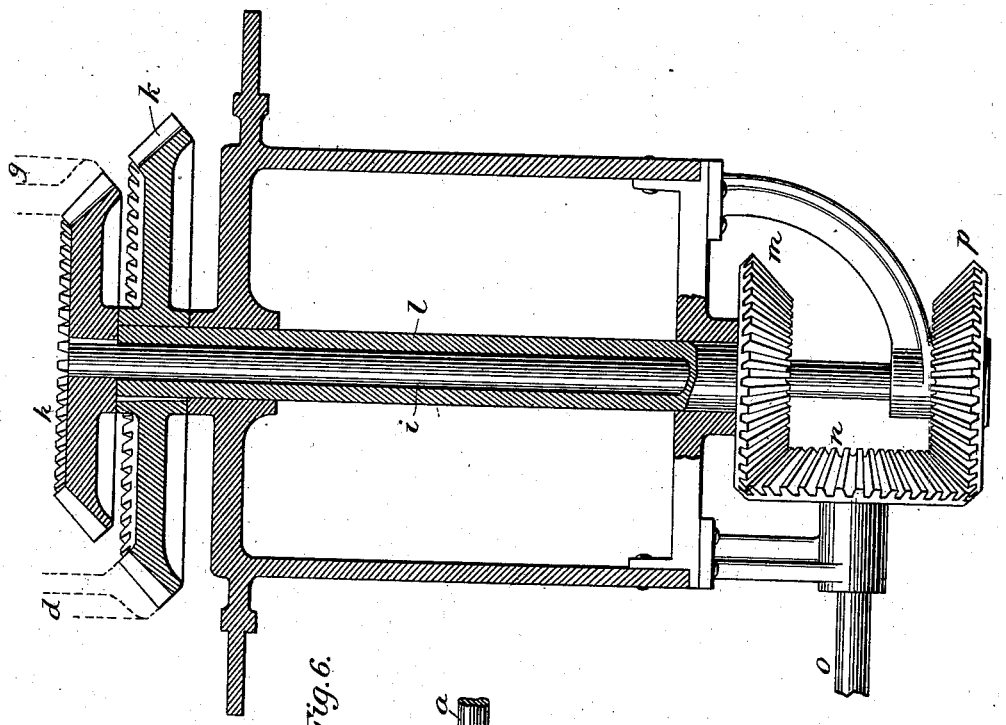

Fig. 6.

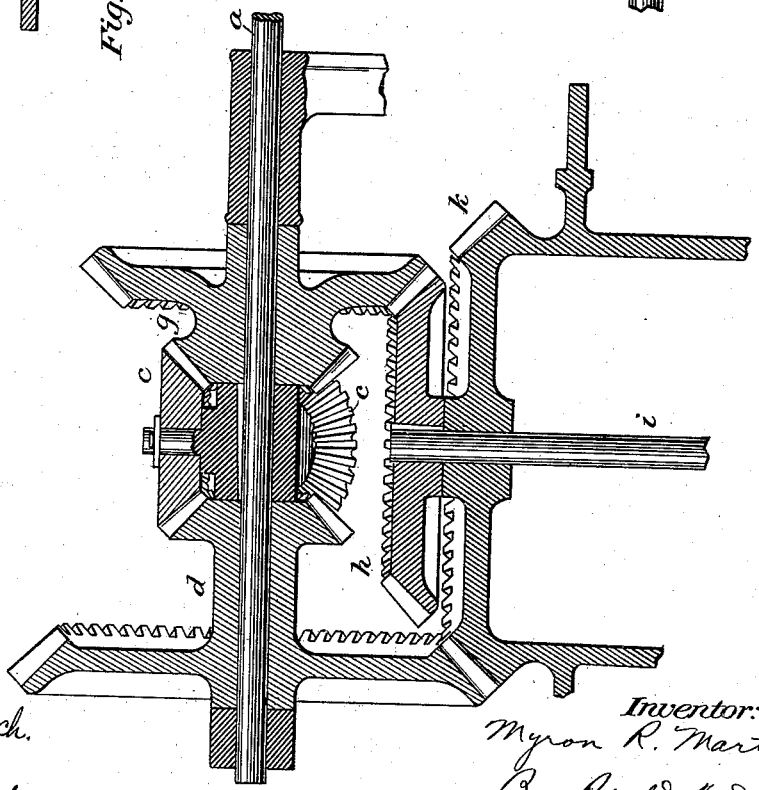

Fig. 5.

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UNITED STATES PATENT OFFICE.

MYRON R. MARTIN, OF RUTLAND, ASSIGNOR OF ONE-HALF TO THE BAKER MANUFACTURING COMPANY, OF EVANSVILLE, WISCONSIN.

GEARING FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 261,739, dated July 25, 1882.

Application filed December 8, 1881. (Model.)

To all whom it may concern:

Be it known that I, MYRON R. MARTIN, of the town of Rutland, in the county of Dane and State of Wisconsin, have invented a certain new and useful Improvement in Gearings for Windmills, of which the following is a specification.

In windmills having the wind-wheel shaft connected directly with a vertical shaft by bevel-gear wheels for operating feed-grinders and for like purposes the reaction of the vertical shaft has a tendency to shift the turn-table of the mill and throw the wind-wheel more or less out of the wind, thus greatly reducing the efficiency and working capacity of the mill. The movement of the turn-table, caused by the variation in direction of the wind and the shifting of the wind-wheel in accordance therewith, produces in such a mill sudden changes in the speed of the vertical shaft, even if the wind-wheel shaft maintains a constant speed. This is the converse operation of that first described, the construction producing one necessarily producing the other. These objections have heretofore been overcome by the use of reciprocating mechanisms transmitting the rotary motion of the wind-wheel shaft to a shaft at a lower elevation, and swiveled to permit of the free movement of the turn-table on the tower-casting; but these mechanisms are complicated and expensive and liable to get out of order.

The object of my invention is to produce means for overcoming these objections to the use of simple bevel-gears in a simpler and more efficient manner than heretofore. This I accomplish by means of a swiveled compensating-gearing, which transmits positively and constantly to the driven machinery the rotary movement of the wind-wheel shaft independent of and without being affected by the movement of the turn-table, and balances the twisting tendency caused by the reaction of the driven machinery. This construction permits the turning of the wind-wheel around the tower when not itself turning without revolving on its own axis or moving the driven machinery.

The invention can be carried into effect in a number of ways, those preferred by me being shown in the accompanying drawings, in which—

Figure 1 is a vertical section through the tower-casting and turn-table of a windmill, showing a swiveling and balancing gearing embodying my invention; Fig. 2, a similar view of the slightly-modified form of the same gearing; Fig. 2ª, an elevation of the peculiar balancing-gear wheel and the gears carried by it, and Figs. 3, 4, 5, and 6 vertical sections of other swiveling and balancing gear for windmills.

With reference to Figs. 1, 2, and 2ª, A is the tower-casting, upon which revolves the turn-table represented at B. The wheel-arm B′ is carried by the turn-table, and through it passes the wind-wheel shaft C, to the outer end of which the wind-wheel (not shown) is secured.

D is a vertical shaft passing centrally up through the tower-casting A, and carrying on its upper end a horizontal beveled-gear wheel, E, which is keyed thereto.

F is a vertical bevel-gear keyed to the wind-wheel shaft C. The gears E and F are connected by the single bevel-gears G and the double bevel-gear H. H is mounted loosely on the inner end of shaft C, and meshes on one side with E. On its other side it meshes with the gears G, which in turn mesh with F. The gears G are mounted loosely on studs within a large vertical gear-wheel, I, which engages with a horizontal bevel-gear, K, formed on or secured to the tower-casting A. Three or more gears G are employed, as shown in Fig. 2ª, in order to hold the outside wheel, I, in a central position.

In the operation of the mill the wheels F and H turn in the opposite directions, and the tendency of the reaction of the driven machinery is to turn the large wheel I around on stationary cogs K in the opposite direction to the turning of H on E. In this way the twisting tendency is balanced or compensated for. The wind-wheel can also be turned around the tower, and when not revolved by the wind will not in this movement turn on its own axis or move the driven machinery. In this movement the wheels H and I roll in the same direction on E and K, respectively, and the gears G roll on F, the parts being proportioned so

that neither F nor G will be turned. When the mill is in operation and the wind-wheel is being turned by the wind the shifting of the turn-table by the variation in direction of the wind will cause the wheel I to roll on the tower-casting. The roll of G on F caused by this movement diminishes or increases the speed of G, according to whether the driven wheels G roll on the driving-wheel F in the direction that the driving-wheel F rotates or in the opposite direction. At H and E, however, the conditions are the reverse, the driving-wheel H rolling on the driven wheel E, instead of the driven wheel on the driving-wheel.

The effect of the difference in movement of G upon the driving-wheel H is to diminish its speed when it rolls on the driven wheel E in the direction opposite to its own rotation, and to increase its speed when it rolls on E in the other direction.

It will be thus seen that the gearing is swiveled so far as the movement of the turn-table is concerned, but acts positively in response to the axial movement of the wind-wheel shaft. The speed of the driven machinery is consequently as constant as that of the wind-wheel shaft, and is not varied by the turning of the wheel around the tower.

The wind-wheel shaft C stops short of the center of the vertical shaft D, as shown, its inner end being carried by a bearing, C′, supported by the turn-table. This permits the passing of the wire L, for shipping the wind-wheel out of and into the action of the wind, through the hollow vertical shaft D, which is an advantage in windmills.

In the modification of the gearing shown in Fig. 3, *a* is the wind-wheel shaft, having a yoke, *b*, secured to its inner end, which carries loose spur-wheels *c*, meshing with a surrounding outside wheel, *d*, and with a central wheel, *e*. Wheel *e* is carried by and keyed to shaft *f*, which passes loosely through wheel *d*, and has keyed to its inner end a bevel-gear, *g*, meshing with a bevel-gear, *h*, on the vertical shaft *i*. Shaft *i* passes through the tower-casting, which has cogs *k*, with which the exterior teeth of *d* mesh. The turn-table, by bearings from which the shafts *a* and *f* are supported, is not shown.

In Fig. 4, *a* is the wind-wheel shaft, having hub *b* keyed thereto, and provided with studs which carry bevel-gears *c*, meshing on one side with inner cogs of wheel *d* and on the other side with bevel-gear *e*, keyed to independent shaft *f*. The shaft *a* turns loosely in wheel *d*. Another gear, *g*, is keyed to shaft *f*, meshing with gear *h*, which is keyed to vertical shaft *i*. Wheel *d* meshes with cogs *k* on the tower-casting.

In Fig. 5, *a* is the wind-wheel shaft, carrying bevel-gears *c*, which mesh with wheels *d g*, both loose on shaft *a*. Wheel *g* meshes with gear *h* on vertical shaft *i*. Wheel *d* meshes with cogs *k* on the tower-casting.

Each of these modified forms of gearing has the same principles of action as that first described.

It is evident that other constructions of swiveled and compensating gearings for windmills could be devised without departing from the spirit of my invention. For instance, the balancing-gear, instead of reacting on the tower-casting, can mesh with a gear carried by a shaft properly connected to produce the desired effect. Such a construction is shown in Fig. 6, in which the gear *k* is separated from the tower-casting, and is mounted on sleeve *l*. This sleeve surrounds vertical shaft *i*, and has bevel-gear *m* on its lower end, which meshes with the upper side of a bevel-gear, *n*, on a horizontal shaft, *o*. Vertical shaft *i* has a bevel-gear, *p*, meshing with lower side of gear *n*. In other respects the gearing is like that shown in Fig. 5.

In the above specification and in the following claims I have used the terms "swiveled gearing" as applied to the gears F, G, H, and E, as combined; and I have in like manner used the terms "compensating or balancing gearing" as applied to the gears I and K, as combined, for the reason that the terms referred to are the best which occur to me for the parts named, although I do not assert them to be technically correct.

What I claim is—

1. In a windmill, the combination, with the wind-wheel shaft, of the swiveled gearing, substantially as and for the purpose set forth.

2. In a windmill, the combination, with the wind-wheel shaft, of the compensating or balancing gearing, substantially as and for the purpose set forth.

3. In a windmill, the combination, with the wind-wheel shaft, of a swiveled and compensating gearing connecting the same with the machinery to be driven, and operating substantially as set forth.

4. In a windmill, the combination, with the stationary tower and the wind-wheel shaft carried by a turn-table turning upon the tower, of a compensating or balancing gearing connecting the wind-wheel shaft and driven machinery and acting upon the stationary tower, substantially as set forth.

5. In a windmill, the combination, with the wind-wheel shaft, of the swiveled gearing carried by and located upon the wind-wheel shaft, substantially as set forth.

This specification signed and witnessed this 2d day of November, 1881.

MYRON R. MARTIN.

Witnesses:
JOHN FRANTZ,
J. H. HOSKINS.