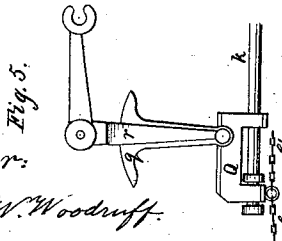
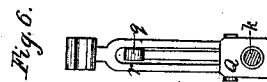
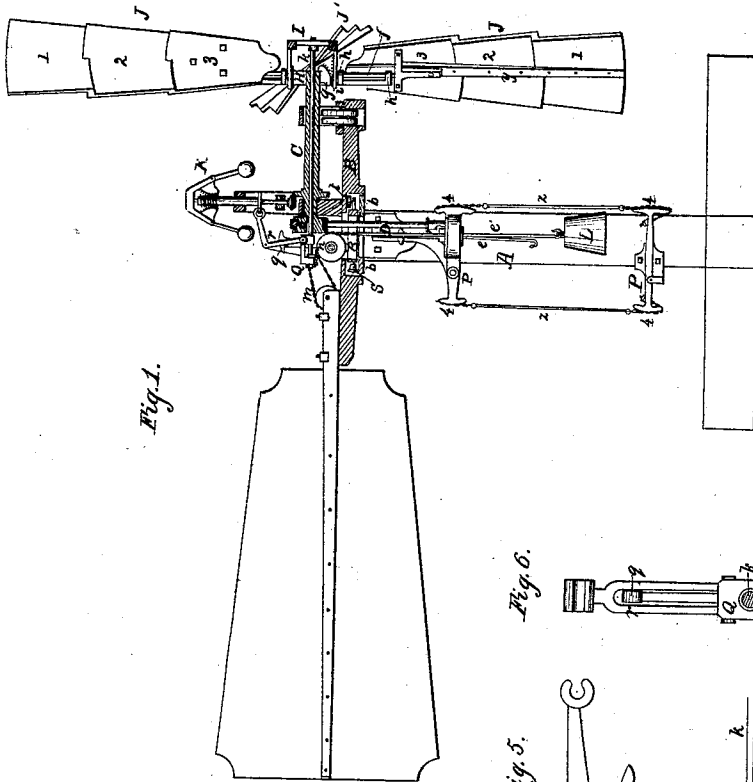
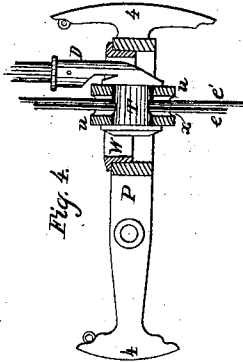
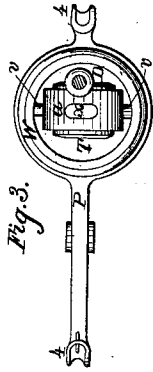
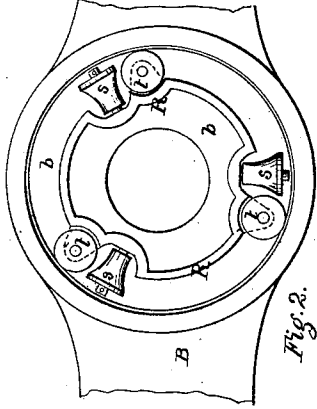


M. W. Woodruff
Wind Wheel,

No 68,404.

Patented Sept. 3, 1867.



Witnesses:
Will Hinman
A. A. Morley.

Inventor:
M. W. Woodruff.

United States Patent Office.

MORRIS W. WOODRUFF, OF BELLEISLE, NEW YORK.

Letters Patent No. 68,404, dated September 3, 1867.

IMPROVEMENT IN WIND-WHEELS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, MORRIS W. WOODRUFF, of Belleisle, in the county of Onondaga, and State of New York, have invented a new and useful Improvement in Windmills; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of the mill, the bed-plate and main shaft being shown in section, and the nearest sail removed.

Figures 2, 3, 4, 5, and 6 are detail views.

Similar letters of reference indicate corresponding parts in all the figures.

In the accompanying drawings, A is the supporting column, B is the bed-plate, and C the main shaft. The bed-plate B is supported on a circular plate, *b b*, which is open in its centre, and is bolted to one side of the column A in the usual manner, with the pitman D and regulating-rods *e e'* working down through the open centre of said plate *b*. Each sail has a heavy rod or pivot, *f*, fixed rigidly to its rear side, and this rod is held in boxes *h h*, on an arm projecting from head H, fixed on the main shaft C, and by these means each sail is hung to head H by a pivot, so that its angle to the wind may be varied for regulating the velocity of the mill. On the inner end of each pivot *f* is a segmental pinion, *g*, (the pinion shown is fixed on the pivot of the sail J', which stands pointing directly from the observer in the drawing,) which engages with a toothed rack, *i*. I is a sliding head, having four toothed racks *i*, and is fixed on the end of shaft *k*. This shaft runs through the centre of the hollow main shaft C, and is operated by a governor, K, so that when the velocity of the mill varies the governor acts to throw out or in the head I, with its racks *i*, which in turn act upon the segmental gears or pinions fixed on the ends of the pivots *f*, and by this means the angle of the sails J is changed, and the velocity of the mill thereby regulated. The weight L connects with the shaft *k* by means of a rod, *e'*, and short piece of chain passing over the pulley *n* in the usual manner, and the governor is compelled to lift this weight when the shaft *k* is thrown in for checking the velocity. The rod *e* connects also with the shaft *k* by means of a chain on its upper end, which, after passing over a pulley by the side of pulley *n*, then passes around a second pulley, *m*, in the ordinary manner, and is fastened to the shaft *k*. When the weight L is changed to the rod *e*, the shaft *k* is drawn back, so that the edges of the sails are presented to the wind, and the mill is thereby made to stand at rest. The pitman D is thrown by an eccentric, *o*, on the main shaft C, and works the pump-levers P *p*. The elbow-lever *r* of the governor takes hold of shaft *k* by means of a double collar, Q, which allows the shaft *k* to turn freely. This collar Q has an upright projection, *q*, which extends into a slot in the lower arm of the lever *r*, (as shown by figs. 5 and 6,) and all cramping action by the tendency of the collar Q to revolve with shaft *k* is thus avoided. R is a ring, to which are attached anti-friction rollers S S for the bed-plate B to turn or swing on, (see horizontal section of this part of bed-plate B, fig. 2.) To this anti-friction device I add horizontal rollers *t t* to steady the same in position laterally, so that the outer ends of rollers S cannot get in rubbing contact with the bed-plate B. Instead of the ordinary ball-and-socket connection between the pitman D and upper lever P, I employ a barrel or large wrist, T, on the end of the connecting-rod, (figs. 3 and 4,) and this wrist works in a ring, *u*, and the ring is suspended by means of ears or pivots *v v*, bearing in a horizontal ring, W, which rests in the lever P. The barrel T and ring *u* make a kind of gimbal connection between the pitman D and the lever P, while the ring W, turning freely in the lever P, allows the gimbal and pitman to turn around in the lever P when the mill turns with a change in the direction of the wind. The wrist or barrel T and ring *u* have a vertical opening through their centres, which is sufficiently roomy for the rods *e e'* to pass through, and allow a free movement of the lever and all the parts of the gimbal. The advantages of this connection are that its working friction is less and it wears much better than the ordinary ball-and-socket joint, for the reason that in the latter the top and bottom parts of the socket are cut away so much that it cannot have a fair bearing in line with the pitman, while in this device the wrist T has a square bearing against the inner surface of the ring *u* on all sides, and is therefore more durable.

The sails or wings J are built up of pieces of flat boards, united together at different angles, so that the different parts of the sails are presented to the wind at an angle proportional to their velocity and distance from the centre of motion. These sails I construct of flat pieces of board, 1, 2, and 3, placed at different angles to the wind, so that the outer ones have the same "pitch" as the inner ones, and their ends are let into each other

and securely fastened together, and then strengthened by a longitudinal stiffening strip, *y*, in the rear of, and running the whole length of, each sail, so that the several sections 1, 2, and 3 of a sail shall form one piece. To prevent lateral movement of the rods *z z* when in motion, I construct the levers *P p* with crowning heads 4 4, which hold the rods *z* at always the same distance from the centres of motion of the levers, so that when a pump-rod or churn-dasher is attached to one of the rods *z*, it moves only in a vertical direction. By these means I produce a mill which is steady and efficient in its action, and less liable to get out of order than heretofore.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The sails *J*, constructed with several flat surfaces, arranged at different angles, for equalizing their pitch in proportion to their velocity and distance from the centre of motion, substantially as herein shown and described and for the purpose specified.

2. The hollow main shaft *C*, sliding shaft *k*, carrying toothed racks *i*, and pinions *g*, in connection with the pivoted sails *J* and governor *K*, all constructed and operating substantially as and for the purpose set forth.

3. The anti-friction carriage *R S*, with horizontal steadying-rollers *t t* supporting the bed-plate *B*, substantially in the manner and for the purpose set forth.

4. The collar *Q*, having an arm or steadying projection, *q*, working in the bifurcated lower arm of governor-lever *r*, in connection with the sliding shaft *k* and pivoted sails *J*, as herein set forth and for the purpose described.

5. The gimbal connection *T-u* and ring *W*, in combination with the lever *P*, pitman *D*, and revolving bed-plate *B*, as herein shown and for the purpose set forth.

The above specification of my invention signed by me this 2d day of May, 1867.

MORRIS W. WOODRUFF.

Witnesses:

F. A. MORLEY,

Z. C. FOOT.