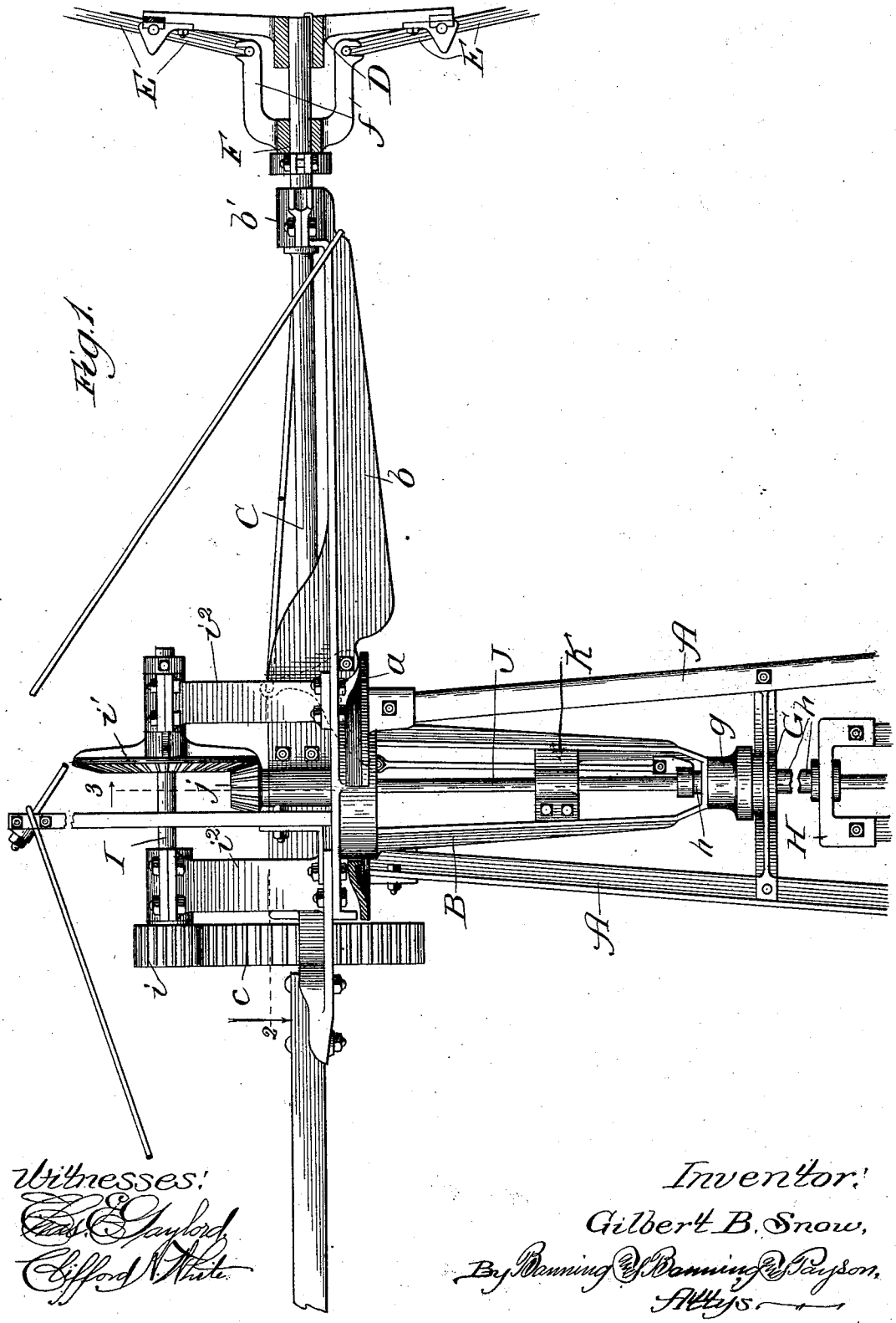
(No Model.) 3 Sheets—Sheet 1.

G. B. SNOW.

WINDMILL.

No. 508,852. Patented Nov. 14, 1893.



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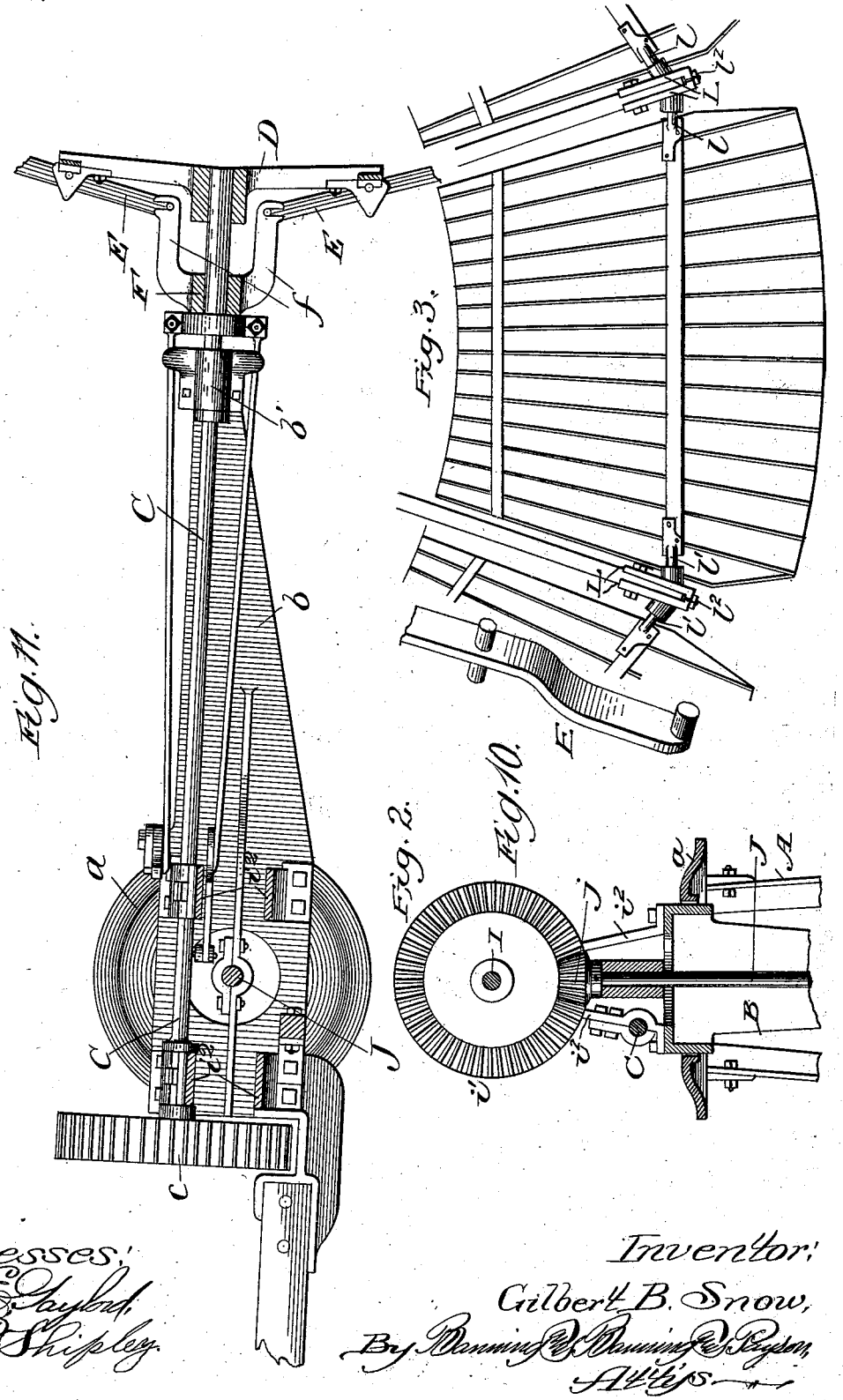
THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

G. B. SNOW.

WINDMILL.

No. 508,852. Patented Nov. 14, 1893.



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(No Model.) 3 Sheets—Sheet 3.

G. B. SNOW.

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Fig. 6.

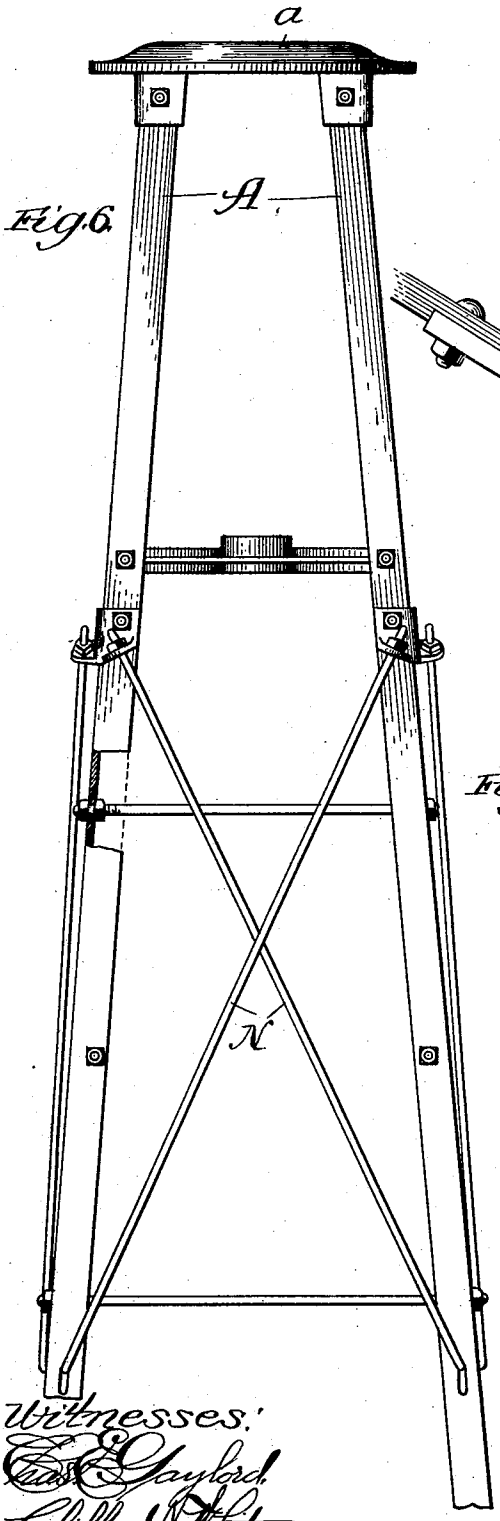


Fig. 4.

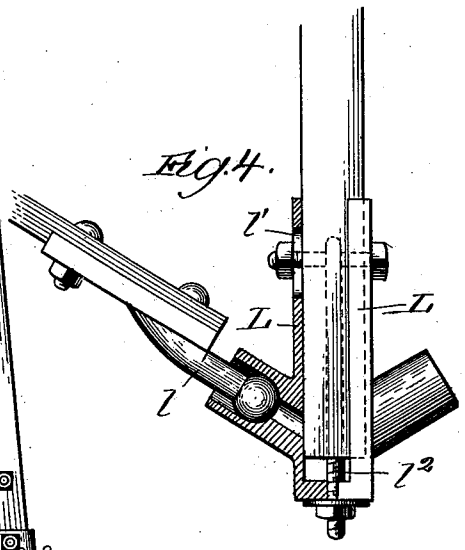


Fig. 5.

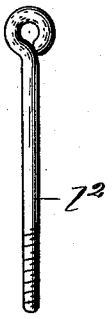


Fig. 7.

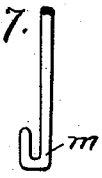
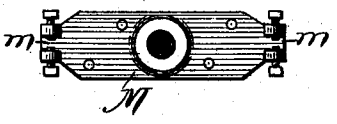


Fig. 8.

Fig. 9.



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UNITED STATES PATENT OFFICE.

GILBERT B. SNOW, OF ELGIN, ILLINOIS, ASSIGNOR TO THE ELGIN WIND POWER AND PUMP COMPANY, OF SAME PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 508,852, dated November 14, 1893.

Application filed May 26, 1892. Serial No. 434,416. (No model.)

To all whom it may concern:

Be it known that I, GILBERT B. SNOW, of Elgin, Kane county, Illinois, have invented a new and useful Improvement in Windmills, of which the following is a specification.

The object of my invention is to make a simple, economical and efficient windmill; and the invention consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a broken sectional elevation of part of the upper portion of a windmill provided with my improvements; Fig. 2 a vertical sectional view on line 3 of Fig. 1; Fig. 3 a broken elevation of a portion of the wind wheel showing the connection between the sails and arms; Fig. 4 an enlarged sectional elevation of one of the pivotal sections between the fan and arm portions of the wheel; Fig. 6 an elevation of the tower; Fig. 8 a sectional elevation of the step or bearing for the vertical power shaft which is connected to the horizontal power shaft; Figs. 5, 7, 9 and 10 detail views of parts, Fig. 10 showing the inner portion of one of the flat levers used for operating the sails or fans; and Fig. 11 a plan sectional elevation showing the position of the horizontal shaft and wind wheel with reference to the vertical shaft or pivotal point of the mill.

A is the tower, and *a* a metallic ring or cap at the top thereof; B the main frame having a loose bearing in the ring *a*; *b* an outwardly extending arm or part thereof, and *b'* a box or bearing therein; C a horizontal shaft, and *c* a gear on the inner end thereof; D the spider; E flat levers for operating sails or fans; F a sliding head loosely mounted on the shaft C, and provided with arms *f*; G a step, base or support for the ball bearing, and *g* the cap portion thereof; H mechanism for shifting the sails, and *h* a sleeve or tube connecting the upper end thereof to a rod attached to the bell crank; I a counter shaft mounted above the shaft C, having a pinion *i* on one end meshing with the gear, and also a beveled gear *i'* meshing with the beveled pinion *j* and vertical power shaft J, and i^2 boxes or brackets connecting the horizontal shaft and counter shaft together; L bearing plates bolted to the outer end of the arm of the windmill and supporting the fan sections through the medium of a plate, *l*, to which they are rigidly fastened, *l'*, a slot in one end of the bearing plate, and l^2 an eye bolt fitting in the arm; M the step plate, base or support for the vertical shaft, *m* slots therein forming ears, and *m'* a yoke connecting the gearing of the vertical and horizontal shaft; and N braces securing the tower together, and *n* hooks or turned portions at the lower ends thereof.

The mechanism for shifting the sails of the windwheel is connected at its upper end to a sleeve or tube which passes through the lower bearing of the main frame, and on the upper end of this tube is attached a head from which a rod extends upwardly to a bell crank fulcrumed in the arm *b* of the frame, to one arm of which it is attached. To the other arms of the bell crank I attach bearing rods or links, which connect with a sliding head. As the construction and operation of these parts will be apparent from the drawings, further description thereof is considered unnecessary.

In windmills as heretofore constructed, it has been found difficult to overcome the heavy side draft to which the mill is subjected by reason of the tendency of the upright shaft to twist, which causes the mill "to creep" and the horizontal shaft to get out of position with reference to the course on the wind. In actual operation the torsion on the upright shaft, caused by the resistance of the machinery which it drives, gradually twists the wind wheel out of line or direction of the wind, which results in partial or total loss of power. The first object of my invention is to overcome this objection, which I do by so forming the horizontal shaft and its connections that it occupies an off-center position toward the side to which the mill tends "to creep."

In constructing my improved windmill, I connect the main horizontal and counter shafts together by boxes or brackets, so cast as to form bearings for both said shafts, and thus cause them at all times to occupy the

same relative position with reference to each other. In other words, I form in each of the boxes or brackets a bearing for the horizontal shaft which shall always occupy a certain definite and fixed position with reference to the bearing for the counter shaft in the same box or bracket. In ordinary mills, I find it advisable to so place the horizontal shaft that its inner end shall be off the center about three inches at one side, of the vertical shaft, which passes through the pivotal point of the mill while the outer end bearing the wind wheel is on the center—that is, in line with the direction of the wind and vertical shaft or pivotal point of the mill. I do this by forming the bearings in the boxes or brackets in such way that when the horizontal and counter shafts are put in place, the former will have its outer end in line with the direction of the wind and vertical shaft, and its inner end in advance of the vertical shaft in the direction toward which the mill has a tendency to creep. (See Figs. 2 and 11.) The result is that the horizontal shaft being thus rigidly set, the mill has a constant tendency "to creep" into position, and not out of position, with reference to the course of the wind.

In windmills as heretofore constructed, it has been found difficult to make a light and durable connection between the arm and wind wheel, and there has been no way of taking up the slack caused by wearing away of the bearings.

The second object of my invention is to overcome this difficulty, which I do by making a bearing between the arm and fan, having some or all the following peculiarities: The bearing consists essentially of two plates formed with slots, and adapted to be secured by a bolt passing through the slots, the bolt also serving to secure the plates to the arm, inserted between them, by passing through a hole therein. An eye-bolt may be inserted in the lower end of the arm, and the bolt securing the parts together passed through its eye. This eye-bolt may be provided with screw threads on its lower end, or other means may be employed for producing adjustment. The fan sections are connected to the bearing plates by means of a tilt bar fitting in the bearing thereof. Each end of the tilt bar is provided with a ball, and each bearing plate with a corresponding socket, so that the ends of the tilt bars rest in their bearings after the manner of a ball and socket joint, thus leaving the sections free to adjust themselves to different positions as required by varying currents of wind. The socket or bearing surface itself is preferably large, to increase its durability. When the bearing has become worn, the slackness or wear may be taken up by forcing or moving the bearing plates up by means of a nut on the lower end of the eye-bolt, or in any other convenient way. As will be seen, this connection between the fan sections and arms is light and durable, and provides for adjustment in such a way as to take up the wear or slack as desired.

In windmills as heretofore constructed, there has been no way of allowing the step or bearing for the vertical shaft at the lower end thereof to adjust itself to different positions as required by the slackening or loosening incidental to wear.

The third object of my invention is to overcome this difficulty, which I do by providing for automatic adjustment of the vertical shaft on the step plate. As the vertical shaft wears down into the step-plate, the yoke and gearing adjust themselves to the changed position resulting from wear. I provide for this adjustment by forming the step-plate with upwardly projecting ears, and placing the lower ends of the yoke between the ears. See Figs. 9 and 10. Set screws passing through the ears from either side, see Fig. 10, serve to hold the yoke and gearing steady; but the set screws should not be tightened to an extent that will interfere with the automatic adjustment of the yoke and gearing as required by wear. In this way, I prevent binding resulting from wear, and secure ready automatic adjustment of the parts mentioned.

It will of course be understood that I do not intend to limit myself to minor features or details of construction, or to the use of all my improvements together in a single windmill. On the contrary, I intend to vary form and construction, and to omit parts or use equivalents as circumstances may suggest or render expedient.

I claim—

1. In a windmill, a main horizontal shaft having its outer end secured on the center or in line with the direction of the wind and vertical shaft, and its inner end in an off-center position or in advance of the vertical shaft toward the side to which the mill tends to creep, whereby the wind wheel is held in proper position with reference to the wind, substantially as described.

2. In a windmill, the combination of a main horizontal shaft having its outer end secured on the center or in line with the direction of the wind and vertical shaft, and its inner end in an off-center position or in advance of the vertical shaft, a counter shaft, and boxes or brackets securing the two shafts together and having a bearing therein for each, whereby the two shafts are held in fixed position with reference to each other, and the wind wheel in proper position with reference to the wind, substantially as described.

3. In a windmill, the combination of fan sections each provided with a tilt bar having a ball at its respective ends, an adjustable bearing formed of slotted plates bolted to the arm, each having a socket corresponding to the balls of the tilt bar, the bearing plates being provided with an eye-bolt screw-threaded at its lower end and a nut thereon for taking up slack produced by wear,

and the tilt bar and bearing plates being secured together by the balls fitting into their respective sockets, substantially as described.

4. In a windmill, the combination of a step-plate for the vertical shaft at the lower end thereof, and a yoke connecting the gearing and vertical and horizontal shafts loosely secured to the step-plate, whereby binding is prevented and the yoke and gearing enabled to adjust themselves to changed positions resulting from wear, substantially as described.

GILBERT B. SNOW.

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