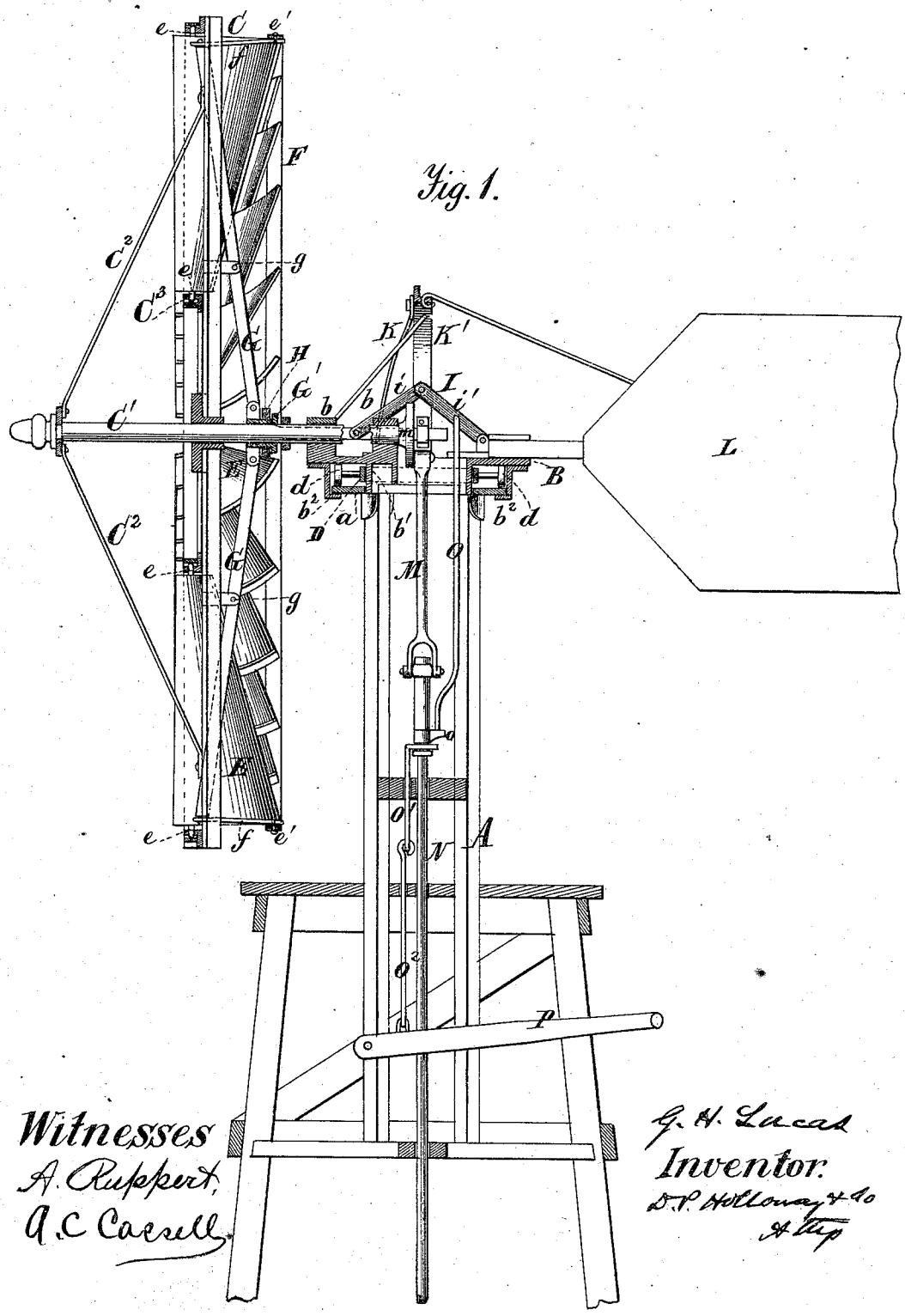
2 Sheets--Sheet 1.

G. H. LUCAS.
Wind-Mill.

No. 160,922. Patented March 16, 1875.

Fig. 1.



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2 Sheets--Sheet 2.

G. H. LUCAS.

Wind-Mill.

No. 160,922. Patented March 16, 1875.

Fig. 2.

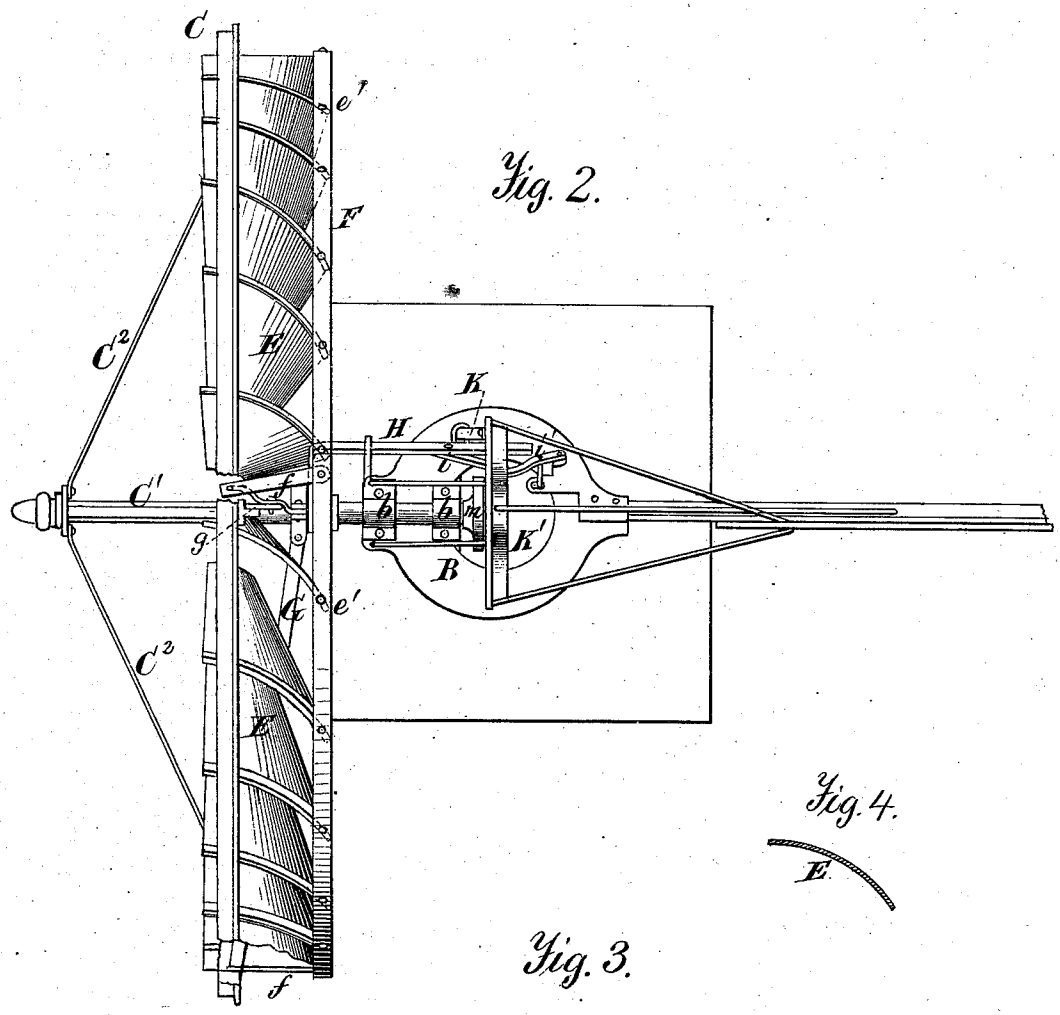
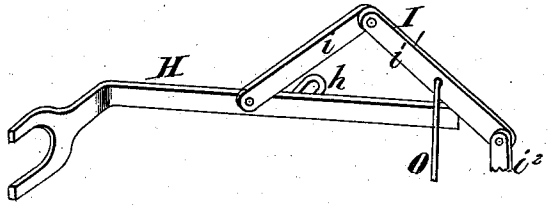


Fig. 4.

Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE H. LUCAS, OF PEKIN, ILLINOIS.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **160,922**, dated March 16, 1875; application filed February 9, 1875.

To all whom it may concern:

Be it known that I, GEORGE H. LUCAS, of Pekin, in the county of Tazewell and State of Illinois, have invented certain Improvements in Windmills, of which the following is a specification:

This invention relates to that class of windmills the wheels of which have sails capable of automatically adjusting themselves to stand more or less in the wind, according to its force, and thus to govern the velocity of rotation of the wheel. My improvement consists, first, of certain novel combinations of devices for governing the position of the sails; secondly, in making the sails concave in cross-section, the curvature being regular and the same in degree from end to end, so that the sails, which are tapering in width, as usual, will constitute true tapering segments of a cylinder. This particular form I have found to be exceedingly effective, and aside from this possesses the advantage of greater ease of manufacture as compared with sails presenting irregular curves.

In the annexed drawings, Figure 1 is a vertical section of my improved windmill. Fig. 2 is a plan view of the same. Figs. 3 and 4 are detail views, hereinafter more particularly referred to.

The same letters of reference are used in all the figures in the designation of identical parts.

The wind-wheel and its connections are supported upon the top of a tower, A, a strong frame-work of wood or iron, suitably secured at its base. The turn-table B, which supports the shaft C^1 of the wind-wheel C in bearings *b b*, rests upon a series of rollers, *d*, which run upon a circular track, *a*, fixed upon the top of the tower, and turn on arms radially projecting from a ring, D. The turn-table has a circular downwardly-projecting flange, b^1, which fits snugly in the circular opening in the track *a*, and serves as the axis of the roller-frame D, which encircles it. Two or more brackets, b^2, are fixed to the under side of the turn-table, hooking under the projecting edge of track *a* to properly hold the turn-table down to its seat on the rollers *d*. The rim and the hub of the wind-wheel are connected by a number of spokes, as usual, on which a flanged ring, C^2, is fastened. The sails E turn on studs or journals *e*, projecting from their respective ends, near their outer rectangular edge, in bearings in the flanged ring C^2 and the rim of the wind-wheel. The sails are tapering in width, as clearly shown, and are bent transversely upon a regular curve from end to end, so that they are in fact true tapering segments of a hollow cylinder. Their contour is most clearly illustrated in Fig. 4. The several sails are also pivoted at *e'* to an encircling-ring, F, which is connected by links *f* to a series of levers, G, fulcrumed at about their mid-length on arms *g*, projecting from the spokes of the wind-wheel, and all united at their inner converging ends by a sleeve, G', upon the shaft C^1 of the wheel. By sliding this sleeve upon the shaft the levers G will be oscillated, and the ring F actuated so as to turn all the sails simultaneously on their journals *e*, and set them more or less in the wind. The sleeve G' is controlled by a sliding shifter, H, (best seen in Fig. 3,) which is connected to the arm *i* of the toggle I, the other arm i^1 of which is pivoted at its outer end to a fixed lug, i^2, on the turn-table B. By straightening the toggle I more or less the sleeve G' can be properly adjusted by the shifter H, and the sails arranged to take the required amount of wind. To provide for an automatic adjustment of the sails according to the force of the wind, a spring, K, is introduced, fixed at one end to a standard, K', erected on the turn-table B', and reaching with its loose end into an eye, *h*, on the shifter H. The spring is so arranged and its resistance so calculated that it will, through the intermediate means described, hold the sails fully in the wind until the wheel attains its desired maximum speed. If the wind should then increase in strength, it will turn the sails against the force of the spring sufficiently out of the wind to prevent any excess beyond the proposed maximum speed, and as the wind decreases in strength, the spring will gradually return the sails to their original positions. One or more springs may be used for this purpose, as well as springs different from the particular one shown. The tail-vane L is rigidly connected to the turn-table in line with the wheel-shaft. All the component parts of the wheel, the turn-table and connections, and the tail-vane are preferably made of metal, the sails and vane of sheet-iron. The shaft C^1 extends

quite a distance beyond the wheel, affording support for braces C^2. The standard K′ and the tail-vane are also suitably braced to the turn-table and to each other, as clearly shown. The inner end of the wheel-shaft C^1 carries a crank-disk, *m*, for operating the pump-rod N through the pitman M, in the usual manner. From the arm *i*′ of the toggle I a rod, O, reaches down into the tower, and is connected to a sleeve, *o*, on the pump-rod N, the sleeve being in turn connected by rods O^1 and O^2 to a hand-lever, P, at the base of the tower, through means of which lever the toggle may be operated for the purpose of adjusting the sails by hand.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the sails E, ring F, links *f*, levers G, sleeve G′, shifter H, and spring K, substantially as and for the purpose specified.

2. The combination of the sails E, ring F, links *f*, levers G, sleeve G′, shifter H, spring K, and the toggle I, and hand-lever P, with intermediate connections, substantially as and for the purposes specified.

3. The sails E, in the form of tapering segments of a hollow cylinder, substantially as specified.

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

GEORGE H. LUCAS.

Witnesses:

LOUIS A. WILDHACK,

FRANK SHAW.