(Model.)

3 Sheets—Sheet 1.

J. E. GOODHUE.

WINDMILL.

No. 321,100. Patented June 30, 1885.

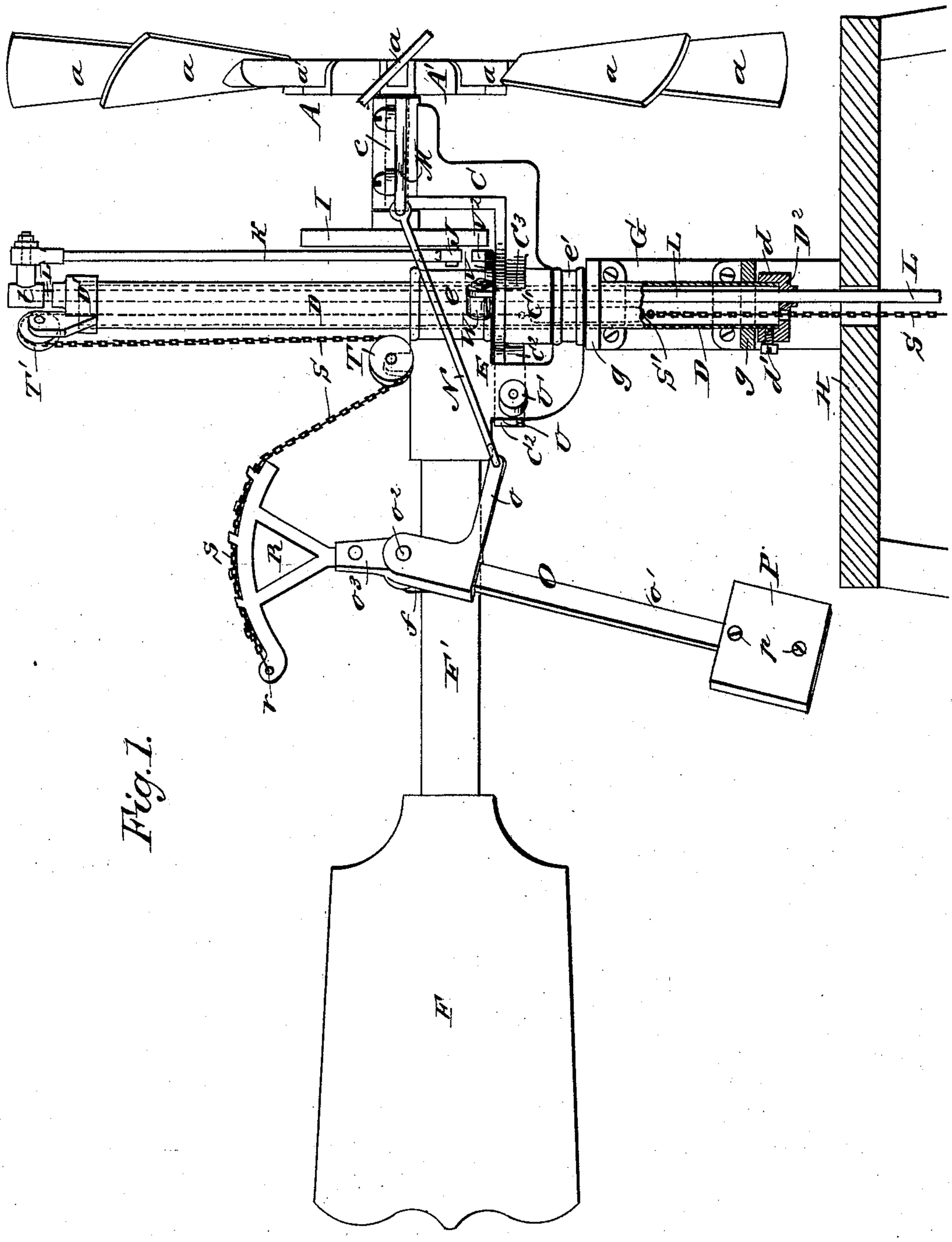

Fig. 1.

WITNESSES:

H. W. Beyer

C. Sedgwick

INVENTOR:

J. E. Goodhue

BY Munn & Co

ATTORNEYS.

(Model.) 3 Sheets—Sheet 2.

J. E. GOODHUE.

WINDMILL.

No. 321,100. Patented June 30, 1885.

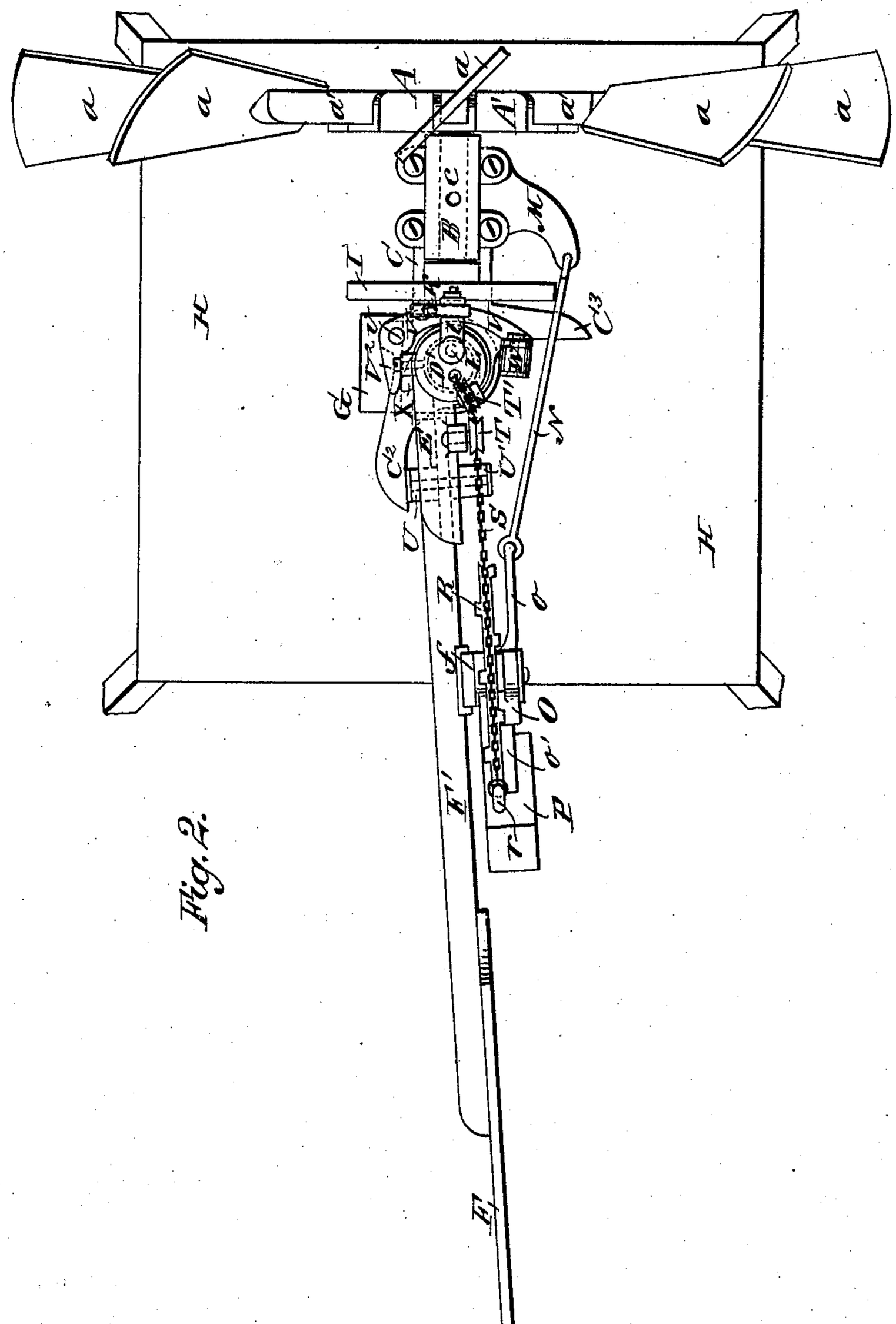

Fig. 2.

WITNESSES:

C. Sedgwick

INVENTOR:

J. E. Goodhue

BY Munn & Co

ATTORNEYS.

(Model.) 3 Sheets—Sheet 3.

J. E. GOODHUE.

WINDMILL.

No. 321,100. Patented June 30, 1885.

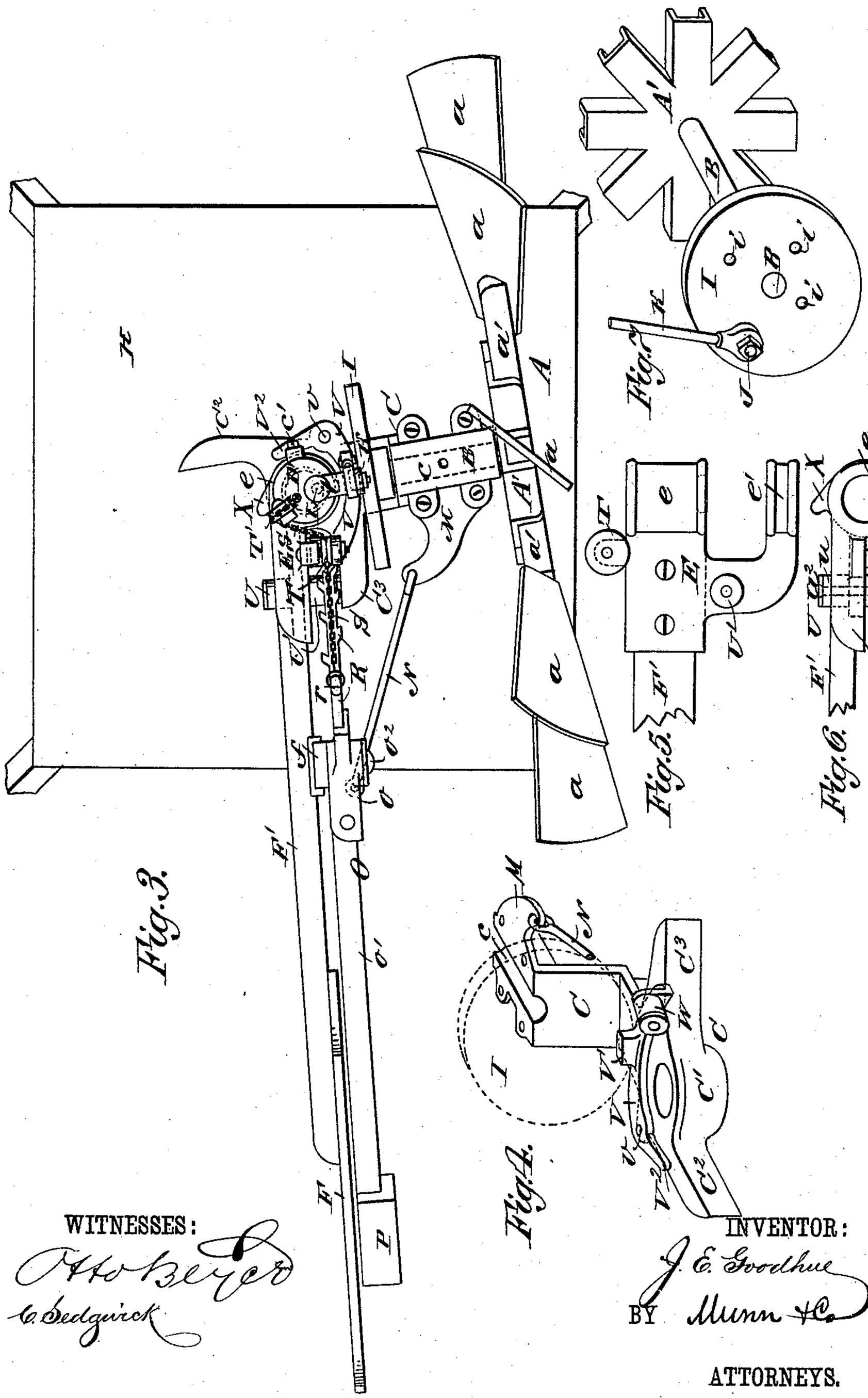

Fig. 3.

Fig. 5.

Fig. 6.

Fig. 4.

WITNESSES:

H. C. Berger

C. Sedgwick

INVENTOR:

J. E. Goodhue

BY Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE

JAMES E. GOODHUE, OF ST. CHARLES, ILLINOIS, ASSIGNORS TO GOODHUE & SONS, OF SAME PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 321,100, dated June 30, 1885.

Application filed January 24, 1885. (Model.)

To all whom it may concern:

Be it known that I, JAMES E. GOODHUE, of St. Charles, in the county of Kane and State of Illinois, have invented a new and Improved Self-Regulating Windmill, of which the following is a full, clear, and exact description.

My invention relates to self-regulating windmills of the class known as "solid-wheel mills," and has for its object to improve the construction and efficiency of these machines.

The invention consists in the peculiar construction and arrangement of parts, as hereinafter fully described, and pointed out in the claim.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly sectional side elevation of my improved windmill and part of its tower. Fig. 2 is a plan view of the mill in working position. Fig. 3 is a plan view showing the wind-wheel drawn around to stop the mill; and Figs. 4, 5, 6, and 7 are detail views of parts of the mill.

The letter A indicates the wind-wheel, which is of that class known as "solid wheels," and is made with fans *a*, secured to arms *a'*, fastened in the wheel-hub or spider A', which is fixed to the shaft B, journaled in a long box or bearing, *c*, at the top of the heavy arm C, which is bent downward and inward, and is made fast to the hollow post D by a set-screw, *c'*, passing through the hub or bearing C' of the arm, which fits the post. I hold the wheel-arm hub C' to the post D between the upper and lower eyes, *e e'*, of the upper and lower arms, respectively, of the casting E, to which casting the arm F' of the vane F is bolted, the eyes *e e'* of the casting E being loose on the post D to hinge the vane to the post, so it may swing freely around the post as the wheel swings around toward the vane. It will be seen that the lower eye, *e'*, of the vane-hinge E comes between the arm C and the head or standard G at the top of the tower H, on which the wind-mill is supported, said standard G having suitable flanges or supports, as at *g g*, in which the tubular post D is journaled so as to turn axially as the wheel A is swung around.

The letter I indicates a disk or crank wheel, which is fixed to the inner end of the wheel-shaft B, and has a series of holes, *i*, in its face (four holes being shown) made at varying distances from the center of the disk, into any one of which holes a wrist-pin, J, may be entered, so as to connect the pitman K to the disk to give a longer or shorter stroke to the pump-rod L, which is connected to the upper end of the pump-rod L by means of a pin on an arm, *l*, fixed to the pump-rod.

The pump-rod L passes through the post D, and has bearings in the upper cap, D', of the post and in the lower cap, D^2, thereof, and said cap D^2 has a flange, *d*, through which a bolt, *d'*, passes to bind it to the post D, and so said flange *d* bears against the lower flange, *g*, of standard G to prevent lifting of the post D and the wind-wheel and vane.

The wind-wheel arm C has a heavy arm, M, projecting from one side of it, which arm is connected by a rod or bar, N, with the short arm *o* of a right-angularly-shaped lever, O, on the long arm *o'* of which the weight P is held by screws *p* or otherwise, so as to be adjustable along the arm *o'*. The lever O is pivoted at a point a little above the angle where its arms *o o'* join each other, and by a pin, o^2, to a lug, *f*, on the vane-arm F'.

To the head of the lever O or to a lug, o^3, thereon is fixed the rope-wheel segment R, to which is connected, at *r*, the chain or rope S, which passes over and from the segment R to and under a pulley or sheave, T, journaled to the vane-hinge E and thence upward to and over a pulley or sheave, T', journaled to the cap D' of the tube D, and thence through this cap and the tube and its lower cap, D^2, to any convenient point at the foot of the tower, where it may be reached for pulling the wheel A out of the wind and stopping the mill.

A weight, S', connected to chain S takes up the slack of the chain as the weight P on lever O is swung upward by the turning of the arm C as the wheel A is swung around bodily by changing winds.

The arm C' has heavy lugs C^2 C^3 projecting

horizontally and at right angles to each other from its hub or eye C′, and said lugs are adapted to strike the elastic buffers U U′, fixed about in line and at opposite faces of the vane-hinge E.

I prefer to make the buffers U U′ of blocks *u* of rubber and to hold them to the vane-hinge by a single bolt, *u′*, passing through them, and with outer metal plates, u^2, to protect the rubber blocks from undue wear. The buffers serve to relieve the shock and noise of contact and prevent breakage of the parts as the lugs C^2 C^3 of the wheel-arm C swing around against them when the wheel A is running free or when it is brought to a stop by pulling the chain S, as hereinafter mentioned.

I do not limit myself to the use of buffers U U′, made with rubber blocks, as above described, as the buffers may consist of spiral, convolute, or other suitably-formed springs fixed either to the arms C^2 C^3 or to the vane-hinge.

The letter V indicates the wind-wheel brake-lever, which is pivoted at *v* to a lug on the arm C, and extends by its long arm over the lug C^3 of the arm C, and is provided with a brake block or shoe, V′, which may be pressed against the face of the disk-wheel I to stop the wind-wheel A when the wheel is pulled around by chain S, so as to bring the long arm of the lever into contact with the body of the vane-hinge E.

As best seen in Figs. 2 and 4, I fix a buffer, W, which is or may be made like the buffers U U′, to the end of the long arm of the brake-lever V, to relieve the shock and noise of contact and also to admit of the gradual application of the brake-block to the disk I in stopping the wind-wheel and to bring an even pressure of the brake on the disk to lock the wheel at rest.

The letter X indicates a lug fixed to the upper eye, *e*, of the vane-hinge E, against which lug the short arm V^2 of the brake-lever V strikes to throw the brake-block V′ back from the disk-wheel I, when the wheel A is allowed to swing back into the wind, thereby avoiding disagreeable noises and unnecessary wear of the brake-block.

The operation of the mill is as follows: Referring to Fig. 2, it will be seen that when the wheel A is facing the wind the lug C^2 of its arm or support C strikes the vane-hinge E or the buffer U thereon, and holds the shaft B of the wind-wheel out of line with the plane of the vane F, which throws more than half of the wheel to one side of the line of the central vertical axis of the mill, so that there is more pressure on one side of the wheel than on the other, and when the wind force increases the difference in pressure on the portions of the wheel at opposite sides of the plane of the vane will overcome the resistance of the weight P on the lever O, and the wheel will begin to fold around toward the lever and the weight P will rise more or less, and when in high winds the wheel swings around sufficiently to carry the end of the short arm *o* of the lever O beyond a vertical line drawn through the fulcrum o^2 of the lever the resistance of the raised weight P becomes supreme, and the weight will hold the wheel at the proper angle to control its area of resistance to the wind to just the degree required to maintain a practically uniform speed of rotation of the wheel on its axis B to impart a quite uniform motion to the pump or other machinery connected with the wheel-shaft.

The weight P never allows the wheel A to swing around so far but that the wheel will continue to work in high winds, and to stop the wheel it only is necessary to pull on the chain S, which first swings the wheel around toward the vane and out of the wind and next applies the brake-lever V to the disk-wheel I, so as to hold the wheel at rest and prevent turning of the wheel by sudden gusts of wind from the side.

When the pull-chain S is released, the wheel will swing into the wind and will be turned by it, the cam-lug X then acting to throw off the brake, as hereinbefore described.

I make special mention of the way in which the wheel-arm C is arranged to support the weight of the wheel A on the lower eye or bearing, *e′*, of the vane-hinge, which rests on the tower, which construction has two important advantages—first, there is no friction between the wheel-arm C and the tower, which, if occurring, would cause side pressure on the vane to swing the vane toward the wheel and raise the weight P by this side movement of the vane, instead of raising the weight by the swinging of the wheel around toward the vane, as should be done, and which my construction fully provides for; and, second, in pulling the chain S to stop the mill the wind-wheel always is swung around toward the vane, and not the vane toward the wheel, so that the wheel is immediately swung around out of the wind, instead of the vane being first swung around to the wheel, which then continues to run until a wind hard enough to swing both the wheel and vane together back in line with it strikes the mill; hence by my method the mill may promptly be stopped during heavy or light winds, while the vane maintains its position in line with the wind, as will readily be understood.

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

In a windmill, the combination, with the wheel A, shaft B, arm C, disk-wheel I, and the vane arm or hinge, of the brake-lever V, pivoted to arm C and adapted to strike the vane as the wind-wheel swings out of the wind, and the lug V^2 on lever V, and the cam-lug X on the vane, substantially as herein set forth.

JAMES E. GOODHUE.

Witnesses:
T. E. RYAN,
F. M. GOODHUE.