(No Model.)

2 Sheets—Sheet 1.

J. STIMPSON.

WINDMILL.

No. 502,785. Patented Aug. 8, 1893.

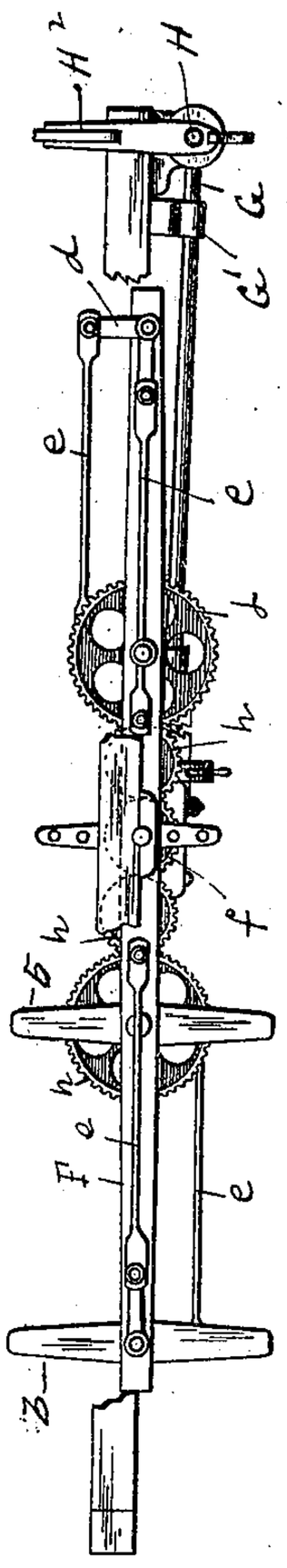

Fig. 1.

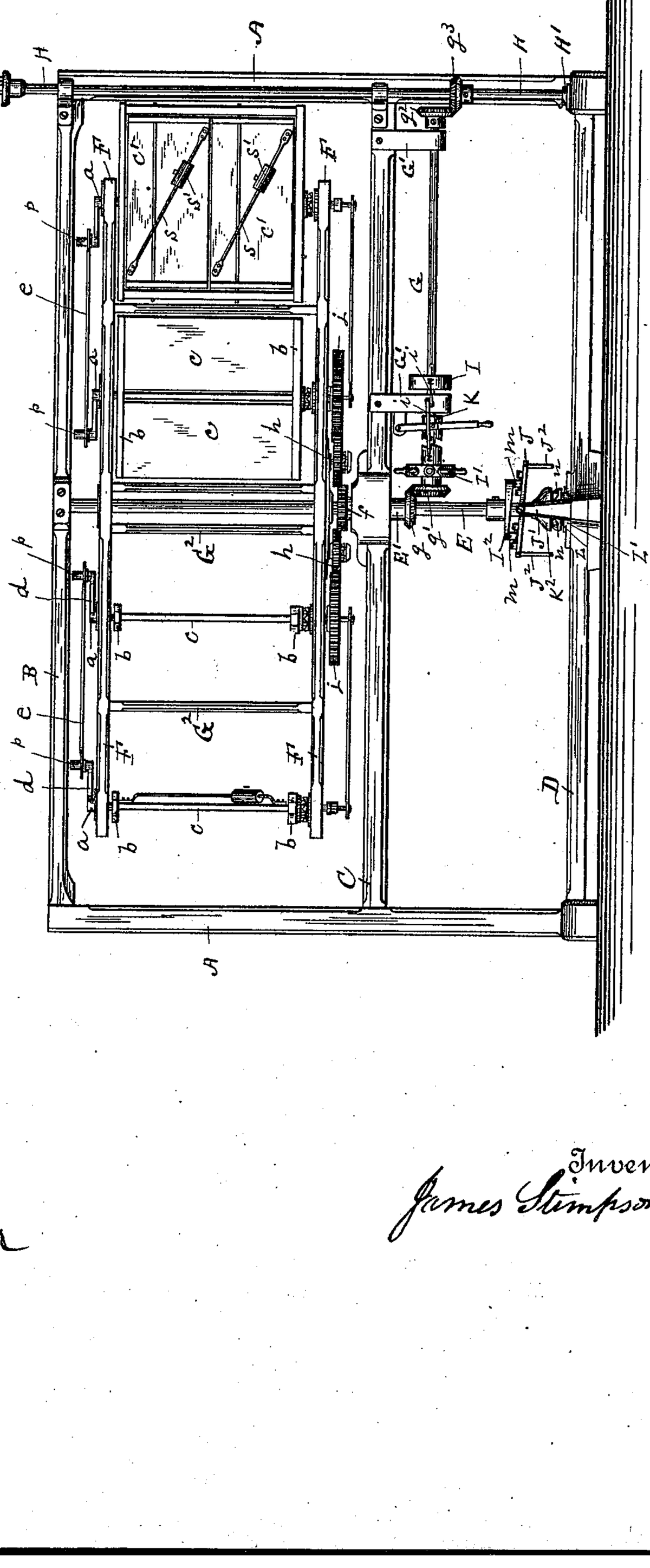

Fig. 2.

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(No Model.)

2 Sheets—Sheet 2.

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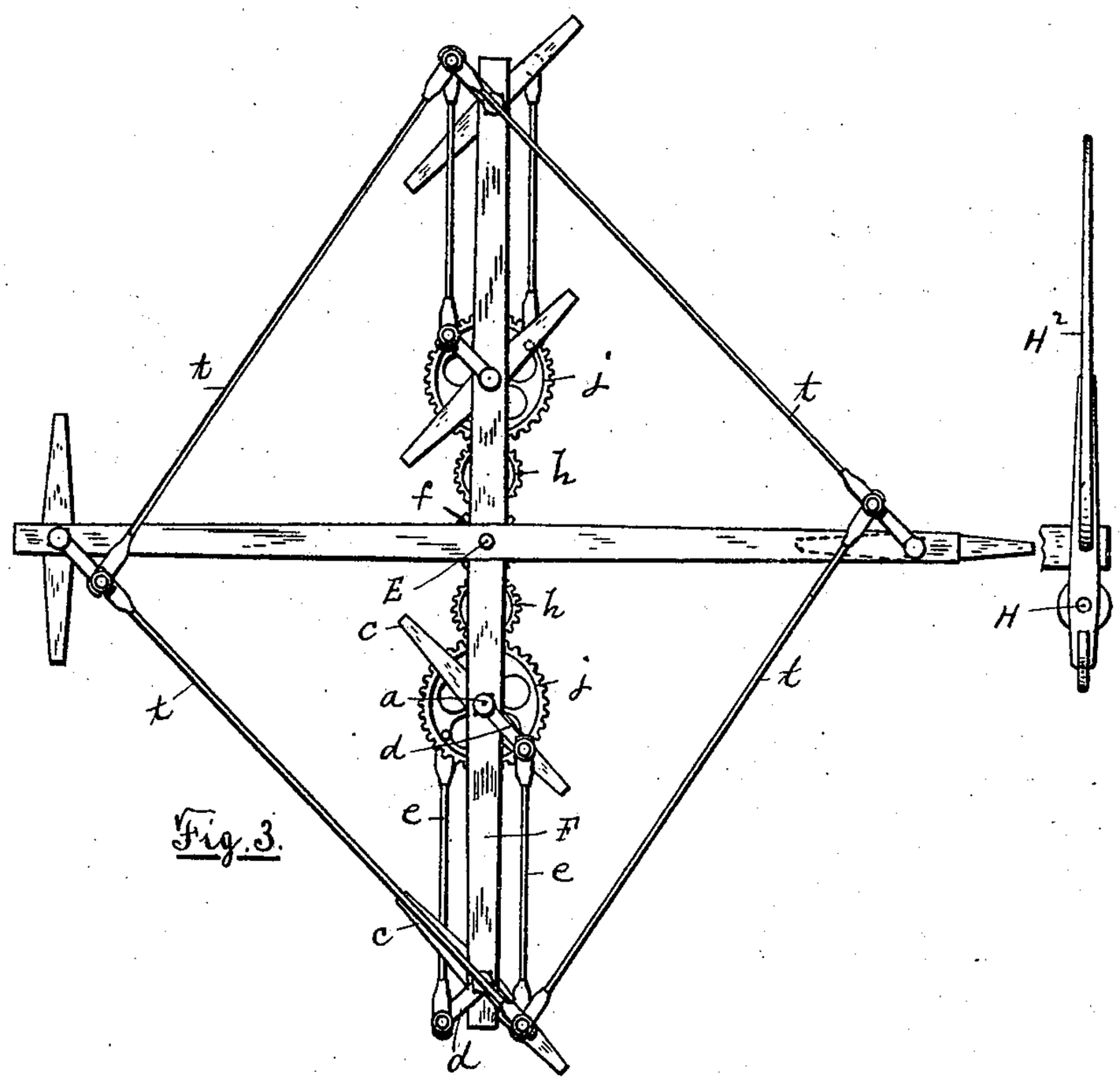


Fig. 3.

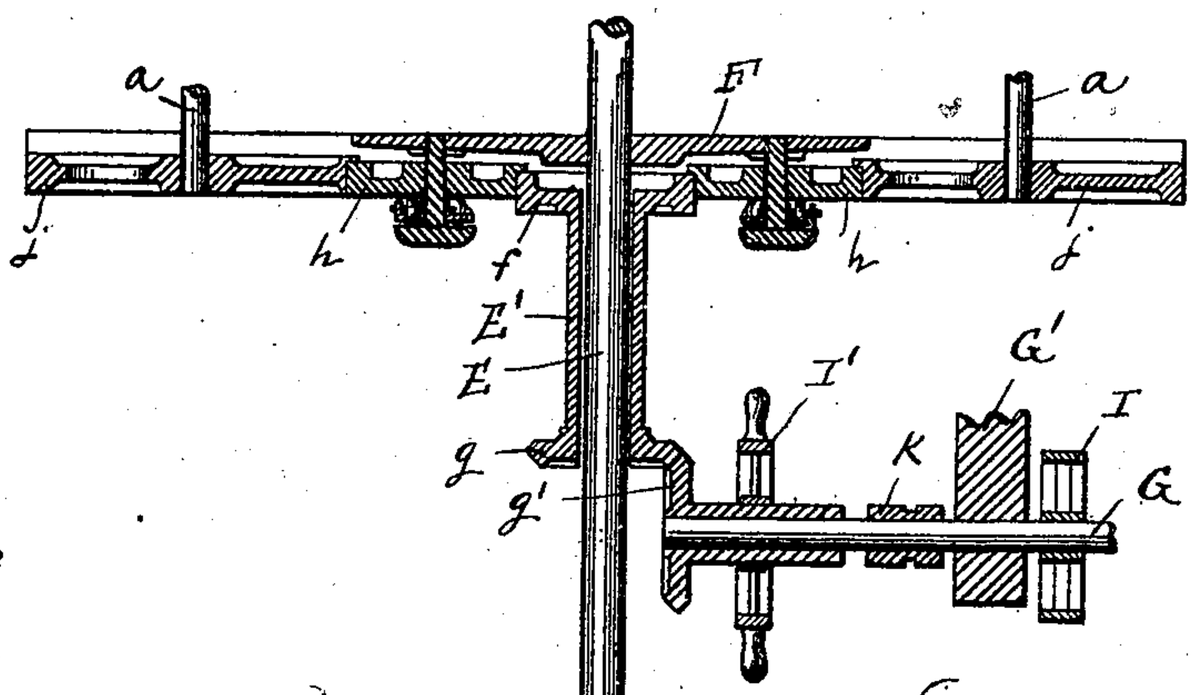


Fig. 4.

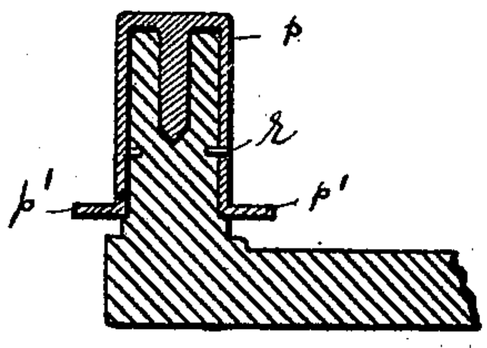
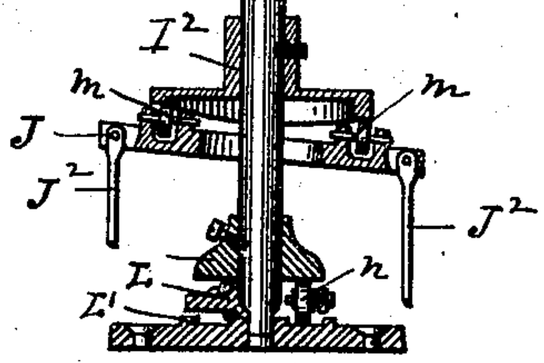


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES STIMPSON, OF BALDWINVILLE, MASSACHUSETTS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 502,785, dated August 8, 1893.

Application filed October 21, 1889. Serial No. 327,704. (No model.)

To all whom it may concern:

Be it known that I, JAMES STIMPSON, a citizen of the United States, residing at Baldwinville, in the township of Templeton, county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in Windmills, of which the following is a specification, reference being had to the accompanying drawings, representing a windmill embodying my invention, and in which—

Figure 1 represents a plan view of the wind mill with a portion of the upper horizontal rail removed in order to clearly disclose the operating portions of the mill. Fig. 2 is a front elevation of the wind mill. Fig. 3 is a top view of a portion of a wind mill having four arms, the supporting frame work of the mill not being shown. Fig. 4 represents a portion of the upright rotating shaft, and a sectional central view of the system of gearing by which the position of the sails are varied. Fig. 5 is a central vertical sectional view of one of the crank pins and inclosing cap upon which the crank connecting rods are journaled.

Similar letters refer to similar parts in the several figures.

My invention relates to that class of wind mills having an upright rotating shaft carrying radial horizontal arms, which support sails arranged, in connection with the operating mechanism to vary their positions as the upright shaft rotates, in order to receive the impact of the wind during the entire rotation of the shaft.

The nature and scope of my present invention are clearly set forth in the following description and subjoined claims.

In the drawings A, A, denote the upright posts and B, C, D the upper, middle and lower horizontal rails, together forming the frame work of the mill.

E is a vertical shaft supported by a step bearing upon the lower rail and journaled in the upper and middle rails. Between the upper and middle horizontal rails are the radial arms F, the upper and lower arms being connected by the cross bars G^2. Pivoted in the radial arms F are the sails *c*, capable of turning about vertical axes in the center of each sail.

I do not confine myself to any special method of mounting the sails in the radial arms, but a preferable manner is shown in the accompanying drawings; *a*, *a*, denoting vertical shafts which are journaled in the radial arms and carry the cross pieces *b*, *b*, between which are wooden sails *c*, *c*. The radial arms F, F, are placed upon opposite sides of the upright shaft and carry two sails upon each side, although a greater or less number can be used if desired. The vertical shafts carrying the sails are provided with cranks *d*, *d*, at their upper and lower ends and the simultaneous movement of each pair of sails is secured by the connecting rods *e*, *e*, connecting the crank pins. Journaled in the middle horizontal rail C is a hollow shaft E′ inclosing the upright shaft E and carrying a spur gear *f* upon its upper end and a beveled gear *g* upon its lower end, which engages a similar beveled gear *g′* upon the horizontal shaft G, journaled in hangers G′, G′, depending from the middle rail C. The opposite end of the shaft G carries a beveled gear g^2 engaging the beveled gear g^3 upon the upright shaft H, which is supported by a step bearing H′ and is journaled in bearings upon the frame work of the mill. The upper end of the shaft H carries a vane H^2 by which the shaft H is made to rotate as the direction of the wind varies, causing a corresponding rotation of the hollow shaft E′ and spur gear *f*. The spur gear *f* is engaged upon opposite sides by the intermediate pinions *h*, *h*, turning upon studs held in the under side of the radial arms F, F, and communicating motion to the gears *j*, *j*, attached to the vertical shafts *a*, *a*, carrying the pair of sails nearest the central upright shaft E. The gears *j*, *j*, being twice the size of the central gear *f* and driven by intermediates *h*, *h*, of equal size as the central gear, the shafts carrying the sails will make one half a revolution as the upright shaft E revolves once, bringing the sails in position to receive the force of the wind as shown in Fig. 1 of the drawings, where the sails upon the right hand side are shown as presenting their broadsides to the wind which is blowing in the direction indicated by the vane H^2: as the sails are carried half way around by the rotation of the central shaft E, they are turned one quarter revolution presenting their edges to the wind, as represent-

ed upon the left hand side of Fig. 1; at one quarter revolution of the central shaft E, the sails will assume a position intermediate the two above described, as indicated at *c*, *c*, Fig. 3 each of the four sails then receiving the force of the wind.

It will be obvious that in case the wind were stationary the spur gear *f* would be a fixed gear held in one position by the vane H^2, but in case the direction of the wind were to vary, the rotation of the upright shaft H would cause the spur gear *f* to rotate and vary the position of the sails so that the surfaces would be brought in proper position to catch the force of the wind and maintain the rotation of the central shaft E.

In Fig. 2 I have shown a means by which the vane can be disconnected from the hollow shaft E′, and which consists of a clutching device comprising a sliding collar *k*, having a spline connection with the horizontal shaft G and provided with clutch teeth engaging similar teeth upon the hub of the beveled gear *g′*, which turns loosely upon the shaft G and is held in place by collars in the usual and well known manner, but not shown in the drawings.

For the purpose of securing a position of the sails, which shall correspond with the position of the wind when the clutching device is engaged I place a cylindrical wheel I upon the shaft G and I provide the wheel I and also the hub of the beveled gear *g′* with similarly graduated surfaces. Upon the hanger G′ pointers *i i* are attached, which extend over the graduated surfaces to indicate the corresponding position of the beveled gear *g′* and shaft G, when the clutching device is engaged. In order to bring the sails into the proper position to correspond with the direction of the wind, a hand wheel I′ is attached to the hub of the beveled gear *g′*, allowing the gear to be turned on its shaft and rotate the sails about their axes.

Attached to the central shaft is a cam I^2, acting against the friction rolls *m*, *m*, journaled in the rocking bar J pivoted in the upright supports J′, J′, and to the ends of the rocking bar J I connect the pump rods J^2, J^2. At the lower end of the central shaft I attach a collar K^2 resting upon the friction rolls *n*, held in the rotating truck L and running upon a track L′ resting upon the lower horizontal bar D, in order to receive the weight of the central shaft E. Similar trucks are placed beneath the central sails *c*, *c*, and also beneath the intermediate pinions *h*, *h*, to sustain their load and reduce the friction of the operating parts. The connecting rods *e*, connecting the upper cranks are journaled upon the caps *p*, which inclose the ends of the crank pins and are provided with the concentric steel pins entering holes in the crank pins and forming a bearing; the caps being provided with flanges *p′* to support the ends of the connecting rods, and the caps are held from being lifted off the ends of the crank pins by a spur or pin *r* entering an annular slot or groove in the crank pin.

In order to adjust the power of the mill independently of the intensity of the wind I construct the sails as shown in the sail represented at *c′* in Fig. 2, consisting of a rectangular frame pivoted in the arms F, F, as already described, but carry one or more sails *c′ c′* pivoted in the rectangular frame by horizontal axes placed within the surface of the sail but eccentrically thereto so as to present unequal surfaces to the action of the wind, and upon one surface of the sail I place an oblique rod *s* attached at its ends to the sail and having a sliding weight *s′* adjustably fixed to the rod by a set screw.

As represented in Fig. 2 the surface of the sail below the axis is slightly greater than the surface above it, and as the sliding weight is placed below the axis of the sail the force of the wind, which is exerted upon the lower portion of the sail in excess of that exerted upon the upper portion, will act to raise the weight and rotate the sail upon its horizontal axis, and presenting the edge of the sail to the wind whenever the force of the wind striking against the surface of the sail is greater than the counterweight *s′*.

In Fig. 3 a top view of a mill is shown having four radial arms, two carrying two sails each and two having but one sail each, the latter having a simultaneous movement by means of the connecting rods *t*, *t*.

I am aware that it is not new to journal the sail-shafts of a wind mill in radial arms carried by a vertical shaft, and to operatively connect the shafts of the sails with a shaft carrying a vane, whereby the direction of the wind is made to determine the position of the sails. Such a construction was shown in the patent to Perry, No. 146,548, and also in the patent to Gilman, No. 330,014, and I do not claim the arrangement therein shown; the object of my invention is to provide such an arrangement of all the operating parts as will bring the sail regulating mechanism below the sails, so as to enable it to be conveniently housed and within reach of the attendant, and to provide means for easily and conveniently disconnecting the sails from the vane-shafts, so as to render the entire mill inoperative at will, by changing the position of the sails, relatively to the direction of the wind and to provide means for determining the position of the sails when it is desired to again bring the mill into operation by the connection of the sails and vane-shaft.

I am also aware that it is not now new to attach a weight to the pivoted sail of a wind mill to act as a counter-balance to the force of the wind. Such is shown in the patent to Tefft, No. 325,025, where the attached weight acts by its centrifugal force to turn the sail partially out of the wind. I do not claim such. The purpose and arrangement of the sail weight shown and described by me are not to provide a counter-balance to the force of the

wind but a direct resistance to the wind, which is capable of being adjusted as desired. I therefore apply the weight to the larger, instead of the smaller section of the sail and provide means whereby the position of the weight can be varied relatively to the axis of the sail.

I am, however, aware that a weight applied to the larger section of a pivoted sail, by which the inertia of the weight is made to offer a direct resistance to the force of the wind is not in itself new, such an arrangement of a weighted sail having been shown in the patent to Heyworth and Fessel, No. 108,593, and I do not claim such broadly. The object of my device is to afford means for adjusting the resistance of the sail to the wind as desired, by means of an oblique rod attached at its opposite ends to the larger and smaller sections of the sail and carrying a weight, capable of sliding thereon and of being adjustably attached thereto; but

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

1. In a wind mill, the combination of the vertical shaft E, radial arms F attached to said shaft, sails *c* carried upon shafts journaled in said radial arm, hollow shaft E′ inclosing the shaft E and placed below said sails and radial arms F, a gear *f* upon the upper end of said hollow shaft and operatively connected with said sail shafts, a gear *g* upon the lower end of said hollow shaft, a vertical shaft H journaled eccentrically to said hollow shaft E′ and carrying a vane H^2 and a gear g^3, a horizontal shaft G carrying the gears *g′* and g^2 engaging the gears *g* and g^3 respectively, substantially as described.

2. In a wind mill, the combination of the vertical shaft E, radial arms F attached to said shaft, sails *c* carried upon shafts journaled in said radial arm, hollow shaft E′ inclosing the shaft E and placed below said sails and radial arms F, a gear *f* upon the upper end of said hollow shaft and operatively connected with said sail shafts, a gear *g* upon the lower end of said hollow shaft, a vertical shaft H journaled eccentrically to said hollow shaft and carrying a vane H^2 and a gear g^3, and intermediate connecting mechanism between said gear g^3 and said gear *g* comprising a clutching mechanism, whereby said sail shafts and said vane shaft are connected and disconnected at will, substantially as described.

3. In a wind mill, the combination of the two parallel and vertical shafts E and H supported upon step bearings and journaled in the frame-work of the mill, radial arms carried by said shaft E, sail bearing shafts journaled in said radial arms, a hollow shaft E′ inclosing said shaft E below said radial arms and journaled in the frame-work of the mill, said hollow shaft being operatively connected with said sail-shafts, a vane carried by said shaft H, whereby it is turned by a change in the direction of the wind and a horizontal shaft G connecting said hollow shaft E′ and said vane shaft, substantially as described.

4. In a wind mill, the combination with a sail pivoted by a horizontal axis dividing said sail into two sections of unequal area, with the lower of said sections the larger, of the rod *s* attached at its ends to the upper and lower sections of the sail and preferably in an oblique position, or diagonal to said sail, and a weight *s′* adjustably attached to said rod, substantially as described.

5. In a wind mill, the combination of a vertical shaft E, provided with radial arms F, sails carried upon shafts journaled in said arms, a hollow shaft E′ inclosing said shaft E below said radial arms and operatively connected with said sail-shafts, a gear *g* carried by said hollow shaft, a horizontal shaft G, a gear *g′* turning on said shaft G and having a clutch connection therewith and engaging said gear *g*, the hub of said gear *g′* being provided with a graduated surface, a shaft H carrying a vane H^2 and operatively connected with said horizontal shaft, a wheel I attached to said horizontal shaft and having its face graduated to correspond with the graduated hub of the gear *g′*, pointers supported by the fixed frame-work of the mill and extending over said graduated surface and a hand wheel I′ applied to the hub of the gear *g′*, substantially as described.

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