June 27, 1933. I. T. MOORE 1,915,689

WINDMILL

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Fig. 1

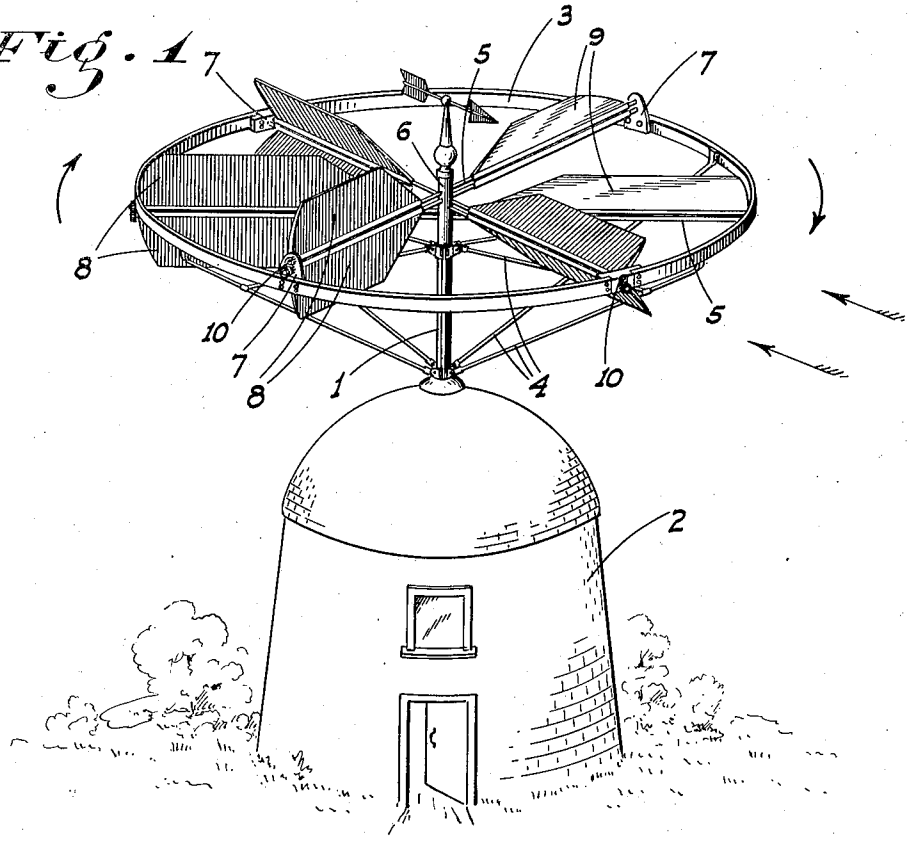


Fig. 2

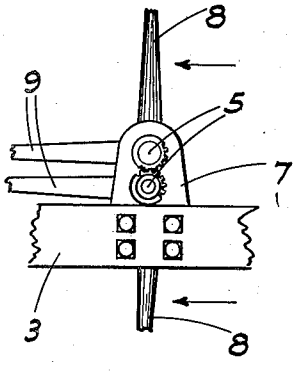


Fig. 3

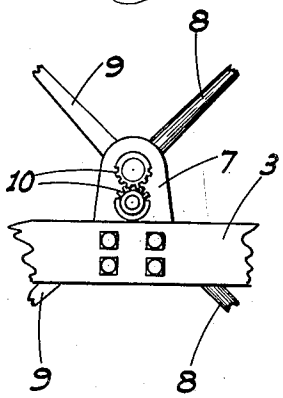
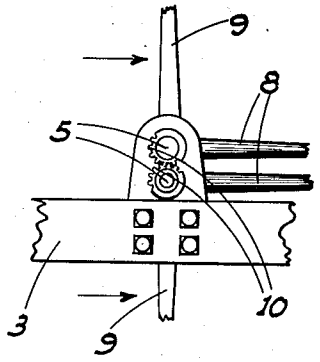


Fig. 4



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Fig. 5

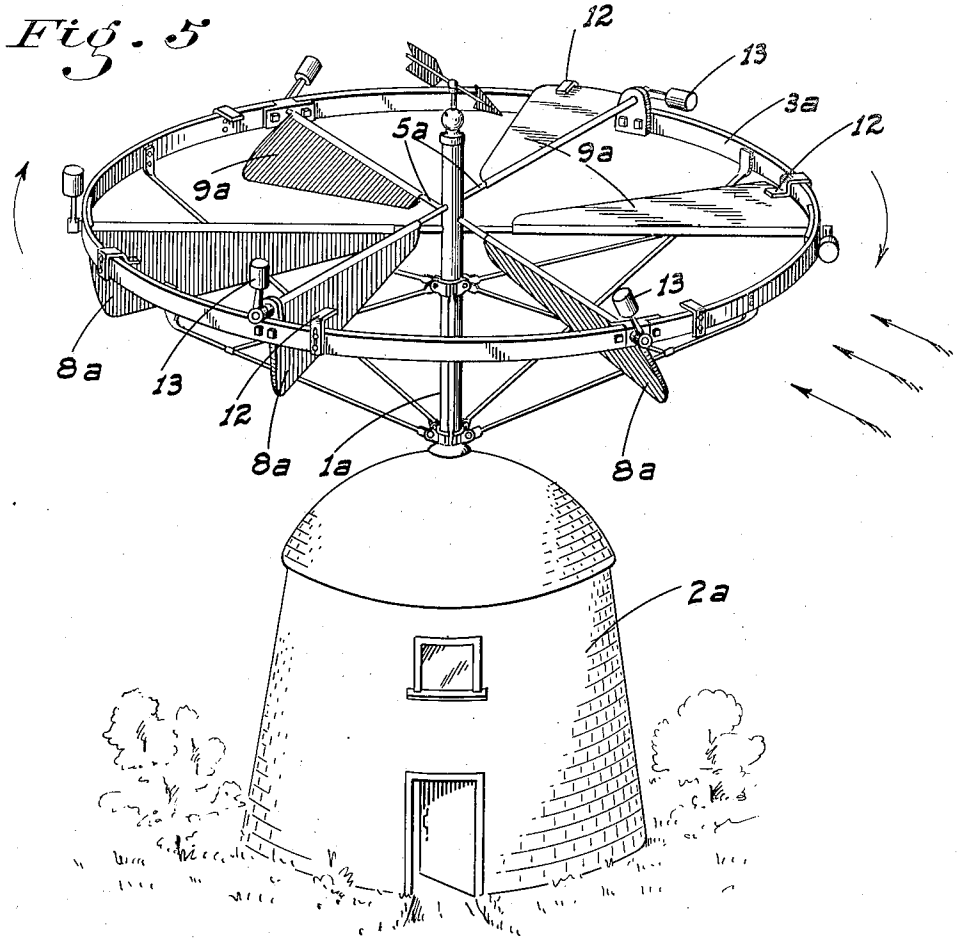


Fig. 6

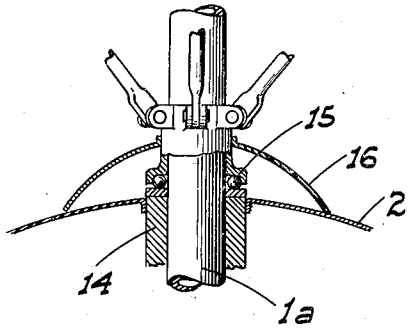
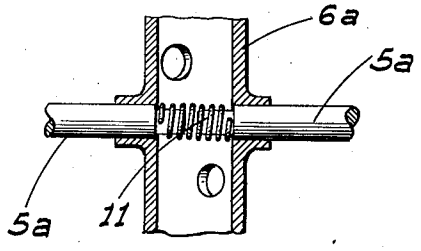


Fig. 7



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Patented June 27, 1933 1,915,689

UNITED STATES PATENT OFFICE

IRWIN T. MOORE, OF LIVERMORE, CALIFORNIA

WINDMILL

Application filed August 26, 1932. Serial No. 630,486.

This invention relates to windmills, my principal object being to provide a windmill, the oppositely disposed vanes of which are so arranged and connected to each other that those engaged by the wind, and the wind itself, will hold the opposite ones automatically deflected or folded so that they will then lie edgewise to the wind. In this manner the vanes in action may be set so as to be disposed at right angles to the wind thus giving the greatest efficiency while at the same time they offer a minimum of resistance when moving against the wind.

The windmill is particularly intended to be of the horizontal type but it may be made to lie in the usual vertical position, or with a horizontal axis, if desired.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claim.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a perspective view of the preferred type of windmill.

Figs. 2, 3 and 4 are fragmentary diagrammatic end elevations of a vane unit showing the opposite pairs of vanes in various positions relative to each other.

Fig. 5 is a perspective view of a modified form of windmill.

Fig. 6 is a fragmentary vertical section showing the mounting of the windmill shaft on its support, suitable for either type of windmill.

Fig. 7 is a fragmentary vertical section showing a yieldable connection between adjacent vane-shaft sections, particularly intended for the type of windmill shown in Fig. 5.

Referring now more particularly to the characters of reference on the drawings, and particularly at present to Figs. 1 to 4, the numeral 1 denotes the vertical axial shaft of the windmill supported in and projected upwardly from a tower or building 2 in which the pump etc. driven by the windmill is housed. A band 3 of relatively large diameter surrounds the upper portion of the shaft concentric therewith and is securely connected to and braced from the shaft above the house by diagonal and radial braces 4.

Extending diametrically of the band at evenly spaced intervals thereabout are vertically spaced pairs of parallel shafts 5, spaced apart in somewhat close relation vertically. All the shafts are journaled in a bearing block 6 which is formed as the upper portion of the shaft 1, as well as in bearing boxes 7 mounted on the band. The different pairs of shafts are of course spaced vertically from each other so that they may all project through the block 7 without interference.

The shafts 5 and vanes 8 fixed on and extending lengthwise thereof form one end toward the center and similar vanes 9 at the other ends of the shafts. One pair of vanes however is fixed on the respective shafts so that they lie in planes at right angles to those of the opposite pair, or in such relation that when the vanes 8 are vertically disposed the opposite pair 9 are horizontally disposed in superimposed and facing relation to each other, and extending rearwardly of the shafts 5 relative to the direction of rotation of the windmill.

The vertical vanes are then obviously in position to be efficiently engaged by the wind, and cannot swing or lean back with the wind on account of the engagement of the folded vanes 9 with each other. The two shafts 5 of each pair are connected together by segmental gears 10 arranged so that the pairs of vanes will positively fold and unfold together.

As soon as any vane unit, with the rotation of the windmill, turns so that the corresponding shafts are moved beyond a position parallel to the wind plane, the wind begins to act against the back faces of the vertical vanes, starting to close or fold them, while opening the closed vanes. At the same time the wind also presses between the closed

or folded vanes, forcing them open and also imparting a closing movement to the other vanes. This intermediate or partially opened and closed position of the vanes is shown in Fig. 3. With a further rotation of the windmill, the opening and closing of the previously closed and opened vanes is completed, the previously closed vanes being now in position to be fully engaged by the wind, as shown in Fig. 4. When this vane unit in turn again moves out of the wind the relative position of the opposed pairs of vanes is again reversed.

In Figs. 5 to 7 a modified arrangement is shown. In this case each vane unit is single, the vanes 8*a* and 9*a* being mounted on alined shaft sections 5*a* connected at their adjacent ends by a torque spring 11 within the central bearing block 6*a*. In this arrangement the vanes 8*a* when vertical depend from the shaft and the corresponding horizontal vanes 9*a* face away from the wind, being held from upward movement by stops 12 projecting from the band 3*a*. Counterweights 13 applied to the ends of the shaft sections act to balance the vanes so that they normally lie in positions at right angles and parallel to a windplane respectively so that they are always in position to take advantage of the slightest breeze.

The springs 11 between the shaft sections prevent possible breaking or warping of the vanes in a high wind, since while the springs are sufficiently strong to resist ordinary wind pressures and hold the vanes vertical, they yield under excessive pressure and permit the vertical vanes to flatten out backward, or with the wind. It may here be noted that this same arrangement may be used in connection with the vane shafts of the first described type if desired.

The axial shaft 1*a* of the windmill is journalled in a sleeve 14 within the housing 2*a*, being supported from the top of the sleeve, which is at the top of the housing, by a thrust bar 15. A hood 16 is secured to the shaft above the bearing and overhangs the same and protects it and the top of the bearing sleeve from the elements. This mounting arrangement also may be used as well in the first described type of windmill.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claim.

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

A windmill including an axial support, longitudinally alined and separate shaft sections projecting across the same, said sections terminating adjacent each other within the support, vanes on the outer ends of the shaft sections, and a torque spring connecting the shaft sections at their adjacent ends and arranged to cause the vanes to normally lie at right angles to each other and yieldably resist turning of the shaft sections relative to each other in one direction.

In testimony whereof I affix my signature.

IRWIN T. MOORE.