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H. V. IVERSON

2,441,635

WINDMILL

Filed June 12, 1945

2 Sheets-Sheet 1

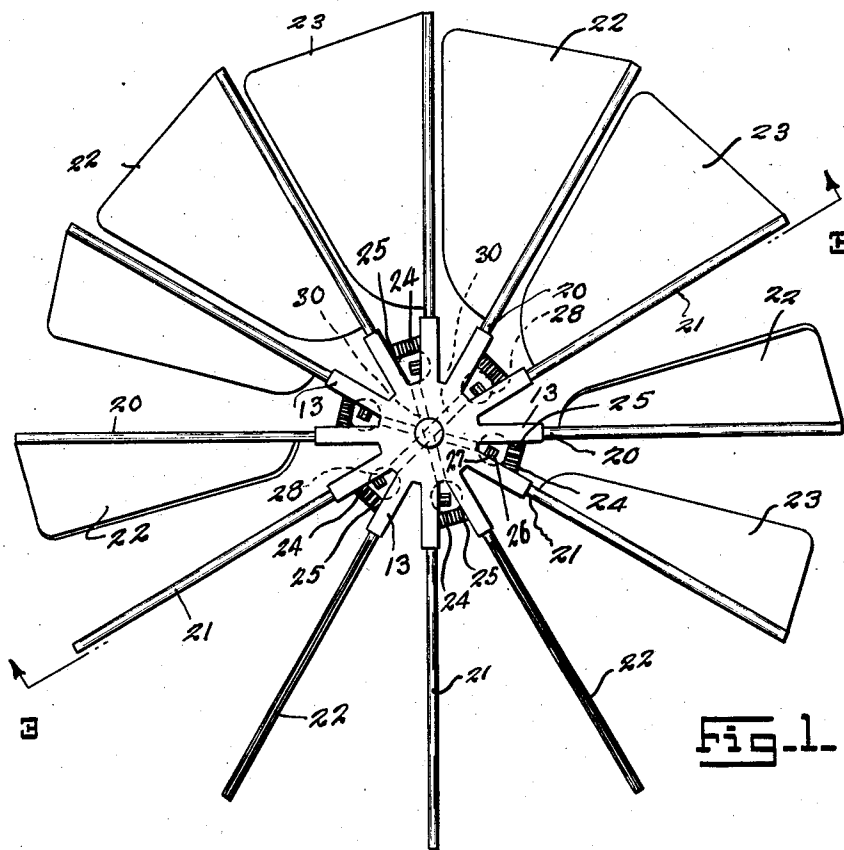


Fig. 1.

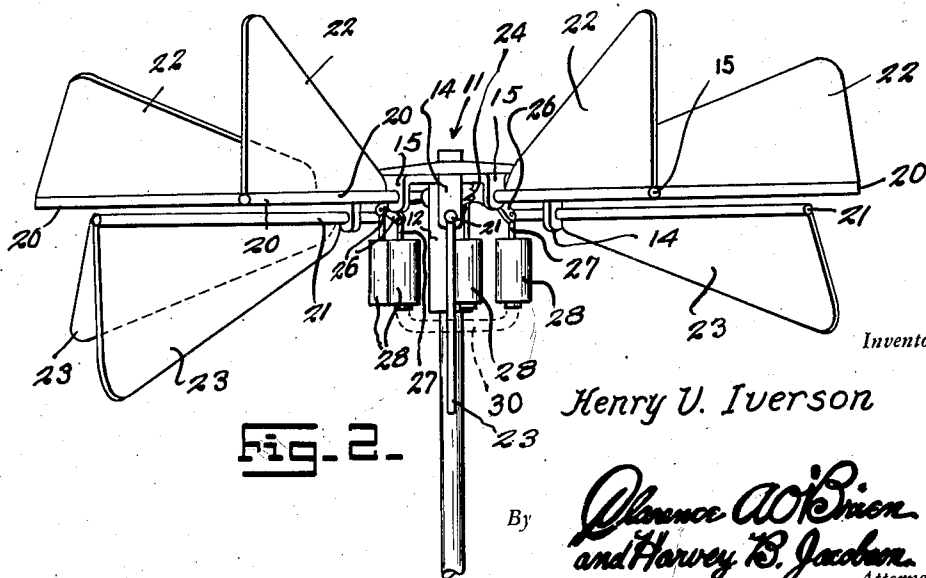


Fig. 2.

Inventor

Henry U. Iverson

By *Clarence A. O'Brien*  
*and Harvey B. Jacobson*  
Attorneys

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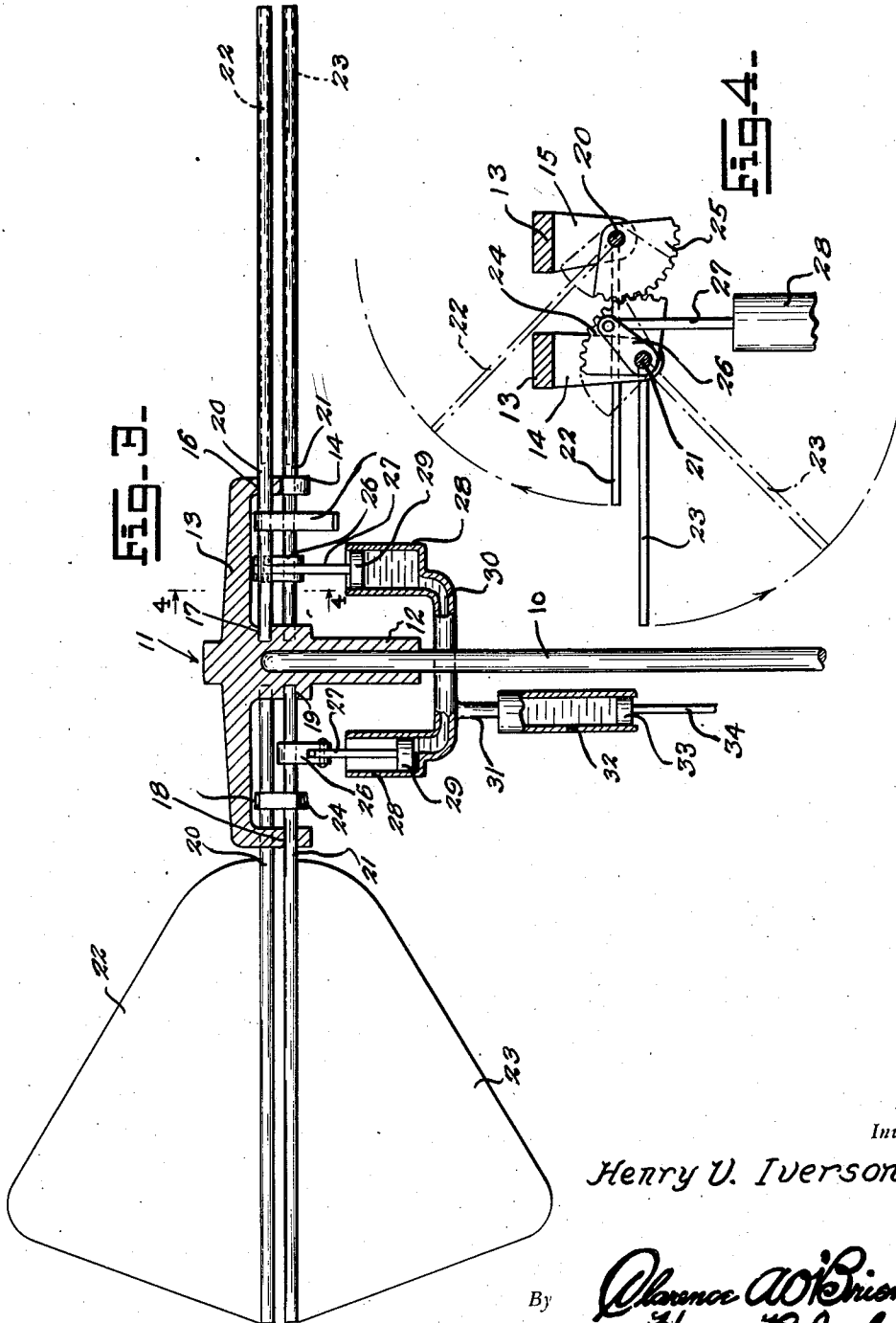
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Inventor

Henry U. Iverson

By

Clarence A. O'Brien  
and Harvey B. Jackson  
Attorneys

# UNITED STATES PATENT OFFICE

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## WINDMILL

Henry V. Iverson, Burlington, N. J.

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1 Claim. (Cl. 170-62)

1

This invention relates to a windmill, and more particularly to a device for turning wind power into mechanical energy.

A primary object of this invention is the provision of an improved windmill characterized by a series of vanes rotating in a horizontal orbit around a vertical shaft, including means whereby the vanes are oscillated from horizontal to vertical position during the course of rotation thereof.

An additional object of the invention is the provision of such a device characterized by means whereby adjacent vanes are adapted to be extended upwardly and downwardly from a central horizontal plane, in order to effect a maximum of wind resistance during certain portions of the rotation of the device, and a minimum of wind resistance when returned to horizontal position, during other positions of the rotation of the device.

A further object of the invention is the provision of a hydraulic mechanism associated with each set of blades adapted to turn the same from horizontal to vertical position, and vice versa in accordance with the position of rotation of the assembly.

A still further object of the invention is the provision of a neutralizing unit, including a hydraulic cylinder, associated with each individual pair of vanes, whereby all of the vanes can be turned to horizontal or neutral position, thus precluding rotation of the device by wind pressure.

Still another object of the invention is the provision of such a device which will be sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture and assemble.

Other objects reside in the combinations of elements, arrangements of parts, and features of construction all as will be more fully pointed out hereinafter and disclosed in the accompanying drawings wherein there is shown a preferred embodiment of this inventive concept.

In the drawings, wherein like reference numerals denote like parts throughout the several views:

Figure 1 is a top plan view of one form of device embodying the instant inventive concept.

Figure 2 is a side elevational view of the device shown in Figure 1, certain parts thereof being broken away.

Figure 3 is an enlarged sectional view taken substantially along the line 3-3 of Figure 1.

Figure 4 is a sectional view taken substantially

2

along the line 4-4 of Figure 3, and viewed in the direction indicated by the arrows.

Referring to the drawings in detail, a main drive shaft 10 is mounted to rotate about a vertical axis and carried at the upper end of said shaft is a spider designated generally 11. This spider comprises a central hub portion 12 from the upper end of which radiate arms 13. The outer ends of alternate arms 13 terminate in depending lugs 14 while the intermediate arms are provided at their outer ends in depending lugs 15 of less length than the lugs 14. Formed in the lugs 15 are radial openings 16 which align with an annular series of peripheral sockets 17 formed in the hub 12 adjacent its upper end, and formed in each lug 14 near its lower end is a radial opening 18. The openings 18 align with an annular series of peripheral sockets 19 formed in the hub 12 which latter series of sockets is spaced downwardly from the sockets 17 so that the axes of the openings 18 and 19 lie in a horizontal plane below the axes of the openings 16 and sockets 17.

Mounted in the openings 16 and sockets 17 is an upper series of radial shafts 20 each of which is rotatable about a horizontal axis which lies perpendicular to the axis of the shaft 10, and mounted in the openings 18 and the sockets 19 is a second or lower series of radial shafts 21 each of which is rotatable about a horizontal axis which also lies perpendicular to the axis of shaft 10 but below the plane of the axes of the shafts 20.

Carried adjacent the outer ends of the shafts 20 are blades or vanes 22 which are adapted to move upwardly through a 90° arc to a vertical position as will be more fully hereinafter explained. A similar blade or vane 23 is carried adjacent the outer end of each shaft 21, but unlike the vanes 22, each vane 23 is adapted to move downwardly through a 90° arc to a vertical position.

As best shown in Figure 4 each of the shafts 20 carries a segmental gear 24, adapted to mesh with a similar gear segment 25 carried by an adjacent shaft 21, and each of the shafts 21 carries a lever 26, to which is secured a piston rod 27, extending downwardly into a hydraulic cylinder 28, and having a piston 29 at the extremity thereof. The bases of diametrically opposed cylinders 28 communicate with each other through conduits 30, from which a conduit 31 leads to a neutralizing cylinder 32, positioned within which is a piston 33 having a piston rod 34, adapted to be moved in any desired manner, as for example, manually. As best shown in

Figure 3, each of the cylinders 28 is connected by the conduit 30 with a cylinder 28 diametrically opposed thereto and on the opposite side of the assembly. The arrangement is therefore such that when one of the shafts 21 is rotated, to a vertical position, fluid within its respective hydraulic cylinder 28 is forced downwardly through the conduit 30, into the diametrically opposed cylinder 28, which in turn forces its piston 28 upwardly and turns the opposite vane 22 to horizontal or neutral position. Conversely, each of the vanes 22 acting on its shaft 20, and being geared by virtue of the gears 25 and 26 to the immediately adjacent lower shaft 21 and its associated vane correspondingly turns a diametrically opposed lower shaft 21.

With the arrangement shown, it is necessary to have only one hydraulic cylinder for each associated pair of shafts 20 and 21, said rotation of one of the shafts will actuate the cylinder, and correspondingly actuate the opposite shaft of the pair to present a combined vane surface 22 and 23 in vertical position to be engaged by the wind, or conversely in horizontal position to present a minimum of resistance thereto on the return rotation.

It will be readily understood that movement of the piston rod 34 acts through the fluid contained in the cylinder 23 to level the fluid content in the cylinders 28 forcing the pistons respectively to their uppermost points, and thus turning all blades to horizontal position, in such manner as to render the device inoperative.

From the foregoing it will now be seen that there is herein provided an improved windmill, accomplishing all the objects of this invention, and others including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown

and described, it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

5 In a device of the character described, a rotatable spider, a plurality of rods journaled for rotation in said spider, said rods comprising staggered radial upper and lower rows, vanes secured to each of said rods, gearing between adjacent 10 rods in upper and lower rows to rotate the rods and vanes simultaneously, and hydraulic means connecting diametrically opposite upper and lower rows whereby rotation of a rod in one row will occasion opposite rotation of an opposite rod 15 in the other row, said hydraulic means including fluid filled cylinders, a connecting passage between diametrically opposite cylinders, pistons connected to each of said rods and operable in said cylinders, and means for moving all of the 20 blades to the inoperative position, said last-mentioned means including a neutralizing cylinder having a piston therein and means for moving said piston to neutralize the fluid pressure in each of said first mentioned cylinders.

25 HENRY V. IVERSON.

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