April 2, 1929. F. R. POTTS 1,707,924

WINDMILL

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Fig. 1.

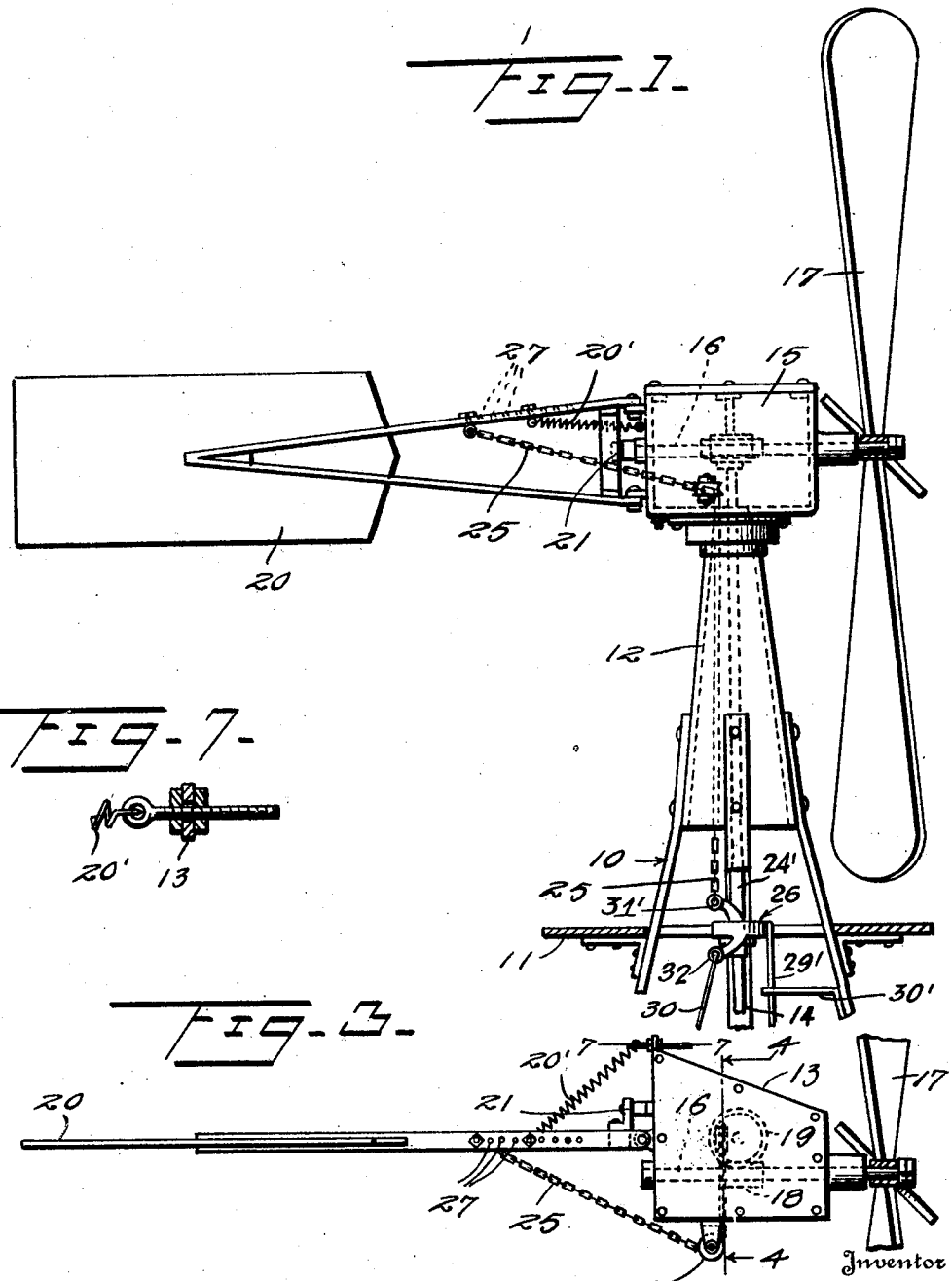


Fig. 7.

Fig. 3.

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Fig. 2.

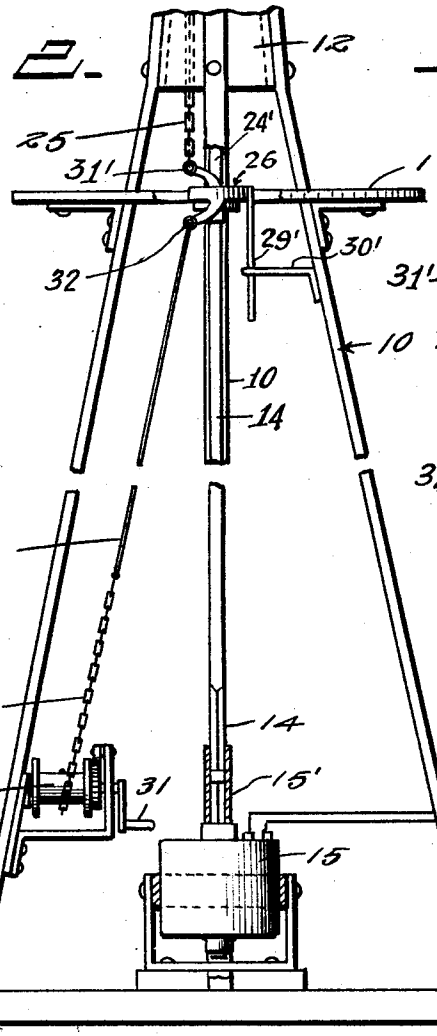
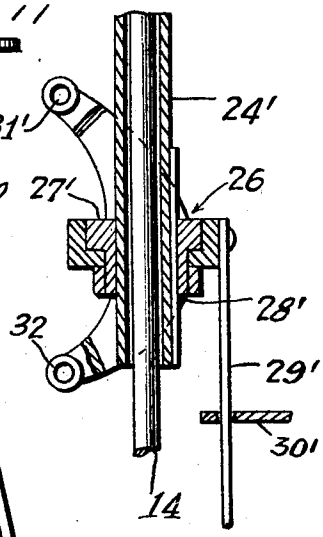


Fig. 6.



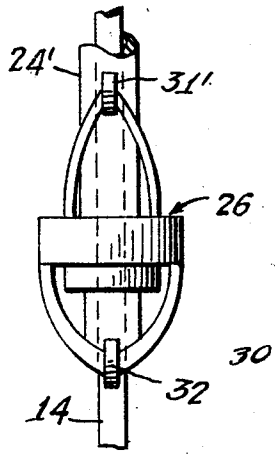
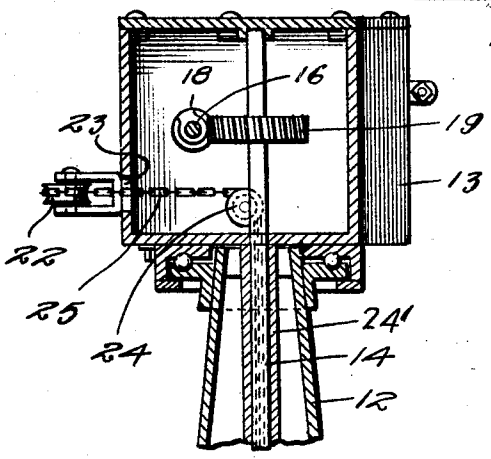


Fig. 5.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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WINDMILL.

Application filed July 2, 1926. Serial No. 120,104.

This invention relates to new and useful improvements in windmills, and particularly to windmills which are arranged for driving electric generators.

One object of the invention is to provide a device of this character which is automatic in its operation to move the blades into and out of the wind.

Another object is to provide a device of this character which may be thrown out of the wind, by hand, using the same means which operates automatically.

Other objects and advantages will be apparent from the following description when taken in connection with the accompanying drawings:

In the drawings:

Figure 1 is an elevation of a windmill made in accordance with the present invention, showing the upper structure.

Figure 2 is an elevation of the lower structure of the windmill, showing the manually operable cut out, and the generator driven by the mill.

Figure 3 is a top plan view of the wheel and vane.

Figure 4 is an enlarged vertical sectional detail view on the line 4—4 of Figure 3.

Figure 5 is an elevation of the member 26.

Figure 6 is a vertical sectional detail view of the member 26, on the line 6—6 of Figure 5.

Figure 7 is an enlarged section on the line 7—7 of Figure 3.

Referring particularly to the accompanying drawings, 10 represents a tower on which is supported the platform 11, and supported on the upper end of the tower is the frame 12, of the wind-wheel. Rotatably supported on the upper end of the frame 12, and operable on antifriction bearings, is a casing 13, into which extends the upper end of the vertical shaft 14, said shaft extending down to the lower end of the tower, where it is detachably connected with the shaft of the generator 15. Extending horizontally through the casing 13 is the drive shaft 16, of the wind-wheel 17, and secured on this shaft is a spiral gear wheel 18, which engages with a spiral gear 19, on the shaft 14, whereby to drive the generator 15. Pivotally mounted on the rear end of the casing 13, for horizontal swinging movement, are the converging arms of a vane 20, a spring 20′ being connected to one arm of the vane, and to the casing through the medium of an eye bolt adjustably secured by nuts received by the bolt to an ear formed with the casing as best shown in Figure 7 whereby to normally urge the vane in one direction. Carried by the inner end portions of the arms of the vane is a cross strip having secured thereto midway its ends, a right angle shape bracket having a lug 21 thereon which is arranged to engage with a stud extending from the casing to limit the swinging movement of the vane in the direction in which it is urged by the spring 20′. On one side of the casing there is mounted a horizontal pulley 22, and in said side of the casing, adjacent the pulley, is an opening 23. Mounted within the casing, opposite said opening, is a vertical pulley 24. Connected to the arm of the vane to which the spring 20′ is connected, is one end of a chain 25, said chain passing over the pulley 22, through the opening 23, over the pulley 24, and downwardly through the frame 12. Keyed on the lower end of a sleeve 24 secured to the casing 13 and surrounding the shaft 14 is a swivel 26 which includes an upper part 27′ mounted on the sleeve for rotation therewith and a lower part 28′ rotatably receiving the upper part and held against rotation by a rod 29′ secured thereto and passing for slidable movement through an opening formed in a bracket 30′ secured to the tower 10. The upper and lower parts are each provided with arms curved laterally therefrom and terminating in eyes 31′ and 32, and connected to the upper end thereof is the other end of the said chain 25. In the last mentioned arm of the vane 20 are formed a series of openings 27, for interchangeable reception of the adjacent end of the spring 20′, whereby to cooperate with the bolt to regulate the tension of the spring, and the degree of pull exerted thereby on the vane. Mounted on the lower portion of the tower is a winding drum 28, around which is wound a length of chain 29, having connected therewith of a wire 30 which is secured to the eye 32 of the lower part of the swivel 26. The drum is provided with a crank handle 31, by means of which it is adapted to be rotated, to wind the chain so as to exert pull on the chain 25, to cause the vane to be swung around, and thus turn the casing to present the edge of the wheel to the wind.

As the wind wheel rotates, by the pressure of the wind thereagainst it has a tendency to rotate the casing 13 on its bearings due to the change of direction of the wind. The pressure of the wind, however, is directed against

the inner edge of the vane 20 when in the position as shown in Figures 1 and 2 of the drawings, and in view of the fact that the spring 20′ maintains said vane at right angles against the pull of the chain 25 as shown, the wind wheel will be held in the face of the wind. Should the wind pressure become excessive, the tendency of the wheel to rotate the casing will become greater and finally this would be accomplished against the tension of the spring 20′ with the result the angle between the vane and casing will be reduced, whereby the edge of the wheel will be presented to the wind and said wheel greatly checked in its rotation or completely stopped. As soon as the wind pressure has reduced in force to an extent less than the force of spring 20′, the spring will immediately restore the vane to the position as shown, with the face of the wheel presented to the wind. Thus it will be seen that the wheel is automatically controlled so that excessive rotation thereof will be prevented whereby to protect the gears, shafts and the generator 15.

When it is desired to retain the wheel out of the face of the wind to stop the rotation of the shaft 14, the chain 29 is wound about the drum 28 to draw the vane against the tension of the spring 20′ in a plane parallel with the casing, and regardless of the rotation of the casing 13, the swivel will allow this operation and follow with the movement of the parts accordingly, with the result efficient operation of the parts is assured.

The lower end of the shaft 14 is connected with the generator shaft by means of a slidable collar 15′, which is adapted to be moved upwardly on the shaft 14, to permit the removal of the generator.

At a point on the casing where the spring 20′ is connected there are provided the lock nuts which permit of adjustment of the spring, to regulate the tension thereof.

While I have shown a vertical windwheel, I wish it understood that a horizontal wheel may be used, or any other suitable type employed, by a simple rearrangement of the gears, within the skill of any mechanic.

What is claimed is:

1. A windmill comprising a tower, a frame supported by said tower, a casing mounted for rotation on said frame, a drive shaft extending horizontally through said casing, a driven shaft geared to the drive shaft and passing vertically through said casing, a generator detachably receiving the lower end of said driven shaft and being operated thereby, a wind wheel secured to the drive shaft, converging arms having their remote ends pivoted to the casing, a vane secured to the adjacent ends of said arms, a strip bridging the arms, a bracket secured to said strip, a lug secured to the bracket, a stud extending from the casing and arranged in the path of the lug, a coil spring having one end adjustably secured to the casing and its opposite end adjustably secured to one arm whereby the tension of the spring may be varied, said spring being adapted to urge the vane to a position at right angles to the wheels, and means including a swivel for manually operating the vane against the tension of the spring.

2. A windmill comprising a tower, a frame supported by said tower, a casing mounted for rotation on said frame, an ear formed with said casing, arms pivoted to said casing and one of said arms being provided with a series of openings, a vane secured to said arms, a rotatable shaft carried by said casing, a wind wheel secured to the rotatable shaft, a shaft extending through said casing, frame and tower and rotated by said rotatable shaft, an eye bolt adjustably secured in said ear, a coil spring having one end secured in the eye of the eye bolt and its opposite end adjustably secured to the arm through the medium of one of the openings therein, said coil spring being adapted to retain the vane at right angles to the wheel, a swivel, a drum, and means between the swivel and said drum and swivel and said arm respectively for manually operating the vane upon rotation of said drum.

In testimony whereof, I affix my signature.

FISHER R. POTTS.