

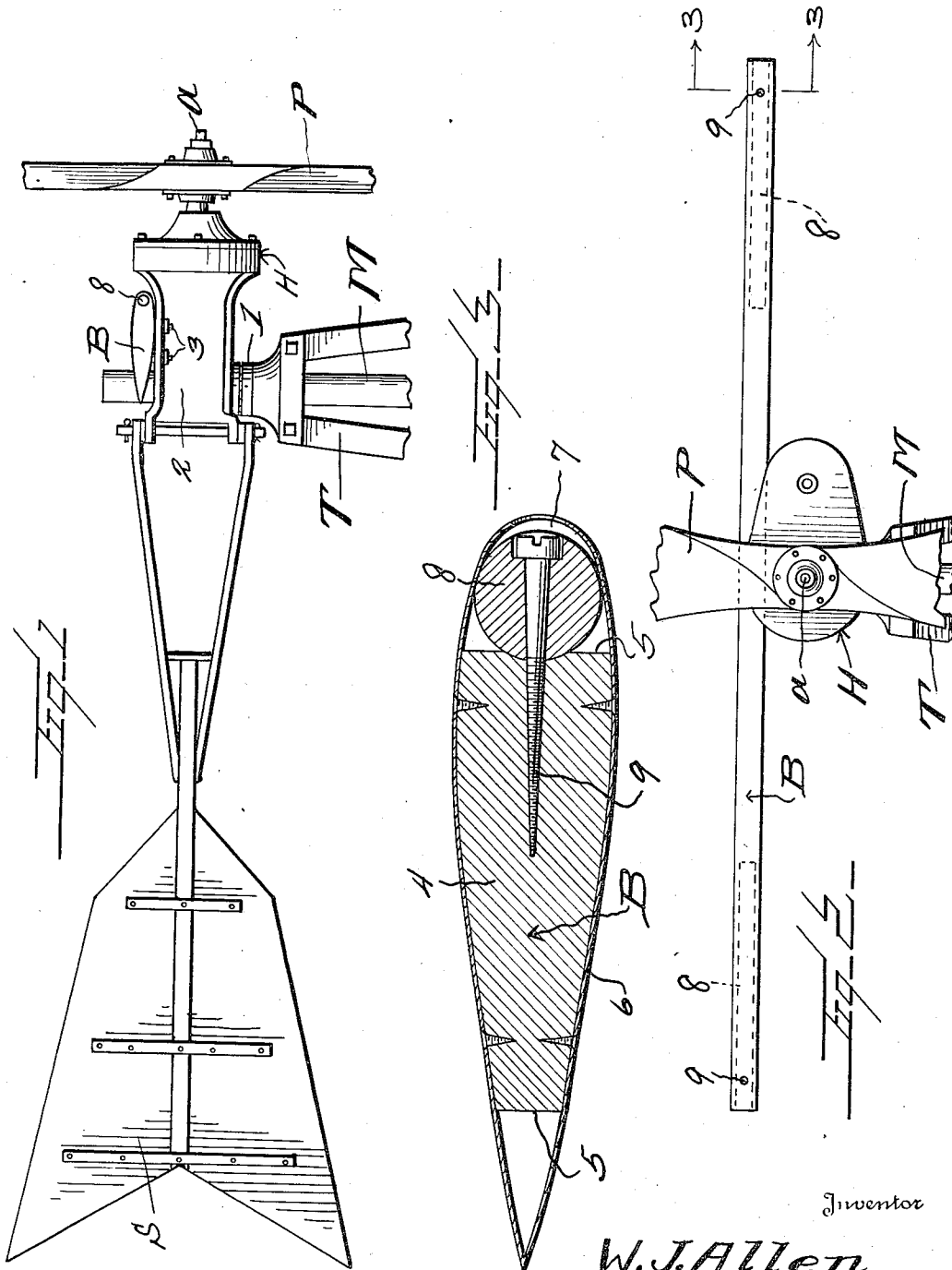
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COUNTERBALANCE

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COUNTERBALANCE

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This invention relates to a counterbalance for a windmill and more particularly to a windmill of a type employing a propeller turning about a substantially horizontal axis, and it is primarily an object of the invention to provide a counterbalance to absorb the vibration which would otherwise set up a damaging stress on the power unit and mounting or tower when the propeller is revolving at a high rate of speed.

It is also an object of the invention to provide a counterbalance to absorb all vibration set up during the operation of the windmill so that the propeller and power unit will swing around evenly in changing winds thereby assuring an even flow of power.

It is well known that it is a frequent occurrence to have the wind currents switch around from one direction to another very quickly. When this takes place with a propeller revolving about a horizontal axis at a fairly high rate of speed, a shock or vibration is set up. This vibration occurs because the propeller blade when in a horizontal position is not as easily turned, due to gyroscopic action. Another object of the invention is to eliminate this disadvantage.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved counterbalance whereby certain important advantages are attained and the device rendered simpler, less expensive and otherwise more convenient and advantageous for use, as will be hereinafter more fully set forth.

The novel features of my invention will hereinafter be definitely claimed.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawing, wherein:—

Figure 1 is a fragmentary view in elevation illustrating a counterbalance constructed in accordance with an embodiment of my invention;

Figure 2 is a fragmentary view in front elevation of the structure as illustrated in Figure 1;

Figure 3 is a sectional view taken substantially on the line 3—3 of Figure 2.

As disclosed in the accompanying drawing, T denotes the crown portion of a conventional tower having associated therewith a power head H of a general type for generating electricity and which includes a two-blade propeller P rotating about a horizontal axis a.

The head H has associated therewith a conventional tail structure S and said head is operatively connected, as at 1, with a conventional

vertical mast pipe M supported by the tower structure T for free rotation whereby the propeller P may readily and quickly swing around as the direction of the wind changes.

It is important that means be provided to absorb the vibrations resulting from this swinging of the propeller while the propeller is revolving on its horizontal axis and which vibrations set up damaging stress on the power head or unit H and mountings therefor and upon the tower.

As herein embodied I provide a counterbalance bar B for absorbing the objectionable vibrations. This bar B rests upon the casing 2 of the head or unit H with the center of balance of the bar B directly over the center of pivot. This bar B is anchored, as at 3, to the casing 2 in any preferred manner. The bar B is so constructed and mounted to provide a weight at each end of the bar equal to all the weight, including the weight of the bar, the motor parts and propeller, at the opposite side using as a center the shaft or mast pipe M.

This bar B is of a weight substantially the same as the weight of the propeller P and the bar B is about two-thirds as long as the propeller P. This bar B swings around with the head or unit H and the propeller P when the direction of wind changes with about the same relative speed and action as would the propeller P if rotating about a vertical axis. The bar B resists sudden turning due to its inertia and, therefore, slows the action of swing of the head H and propeller P down to the speed that the same would swing if the propeller P was rotating about a vertical axis. This eliminates all vibration. It is also to be noted that the bar B is mounted on the casing 2 of the head or unit H behind the propeller P. By being so positioned the bar B smooths out the air currents which have been caused to spiral or twist by going through the propeller P. This rolling or twisting of air back of the propeller retards to a certain degree the generating power vacuum but the bar B eliminates this disadvantage thus assuring increased power being developed at the same wind speed.

As disclosed in the accompanying drawing, the bar B comprises a body portion 4 of suitable material having its front and rear longitudinal edge faces 5 straight and substantially perpendicular to the transverse axis of the bar B. The body portion 4 is contained within a sheath 6 of metal which extends a desired distance fore and aft of the body. The forward extended portion of the sheath 6 provides a hollow nose 7 for the

bar B and this nose 7 is rounded in cross section. The bar B at a desired distance inwardly from the nose tapers evenly on the top and bottom to a sharp edge at the back. This sharp edge, as herein disclosed, is afforded by the rear marginal portion of the sheath 6. It is desired that the top and bottom of the bar B have the same taper and length of surface to allow the air streams to be divided and meet equally at the rear of the bar B.

The added weight necessary to balance the offset weight and propeller as herein disclosed is in the form of an elongated member 8 of selected weight and which is inserted within the nose of the bar B at an end thereof and held in place by a retaining screw 9 or the like. When desired, a member 8 may be applied within the nose of the bar B at both end portions thereof as the requirements of practice may determine.

While I have hereinbefore referred to the windmill as being of a type for use in the generating of electricity I do not wish to be understood as limiting myself in this particular.

From the foregoing description it is thought to be obvious that a counterbalance constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as hereinafter claimed.

I claim:

1. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the unit at right angles to the propeller axis, the center of balance of the bar being directly over the center of pivot.

2. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the power unit at right angles to the propeller axis, the center of balance of the bar being directly over the center of pivot, the bar at each end portion being of a weight substantially equal to the weight of the power unit and propeller at the opposite side of the vertical axis of the power unit, said vertical axis about which the power unit rotates being the center.

3. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the unit at right

angles to the propeller axis, the center of balance of the bar being directly over the center of pivot, said bar being positioned rearwardly of the propeller.

4. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the unit at right angles to the propeller axis, the center of balance of the bar being directly over the center of pivot, the forward marginal portion of the bar being rounded in cross section and the rear portion of the bar tapering to provide a relatively sharp rear edge.

5. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the unit at right angles to the propeller axis, the center of balance of the bar being directly over the center of pivot, the forward marginal portion of the bar being rounded in cross section and the rear portion of the bar tapering to provide a relatively sharp rear edge, the top and bottom of the bar having the same taper and length of surface.

6. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the unit at right angles to the propeller axis, the center of balance of the bar being directly over the center of pivot, the bar being of a length less than the length of the propeller.

7. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the unit at right angles to the propeller axis, the center of balance of the bar being directly over the center of pivot, the forward marginal portion of the bar at an end thereof being tubular, a weighted member for insertion within such tubular portion, and means for holding the weighted member in position.

8. In combination with a windmill including a power unit supported for rotation about a vertical axis under the influence of a vane and having a propeller rotating about a horizontal axis, a balance bar mounted upon the power unit and extending beyond opposite sides of the unit, the center of balance of the bar being directly over the center of pivot, a weighted member, and means for holding said weighted member to the forward marginal portion of the bar at an end thereof.

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