Sept. 24, 1940. J. R. ALBERS 2,215,456

STARTING AND GOVERNING DEVICE FOR IMPELLERS

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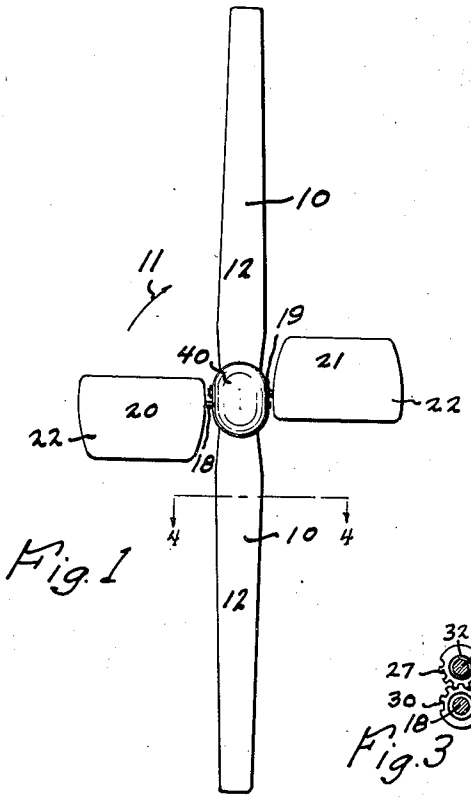


Fig. 1

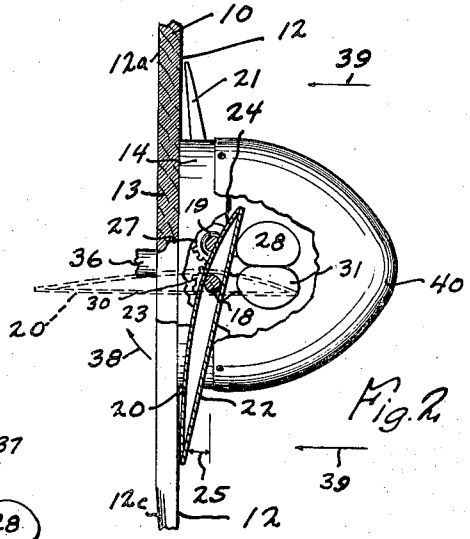


Fig. 2

Fig. 3

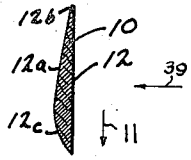


Fig. 4

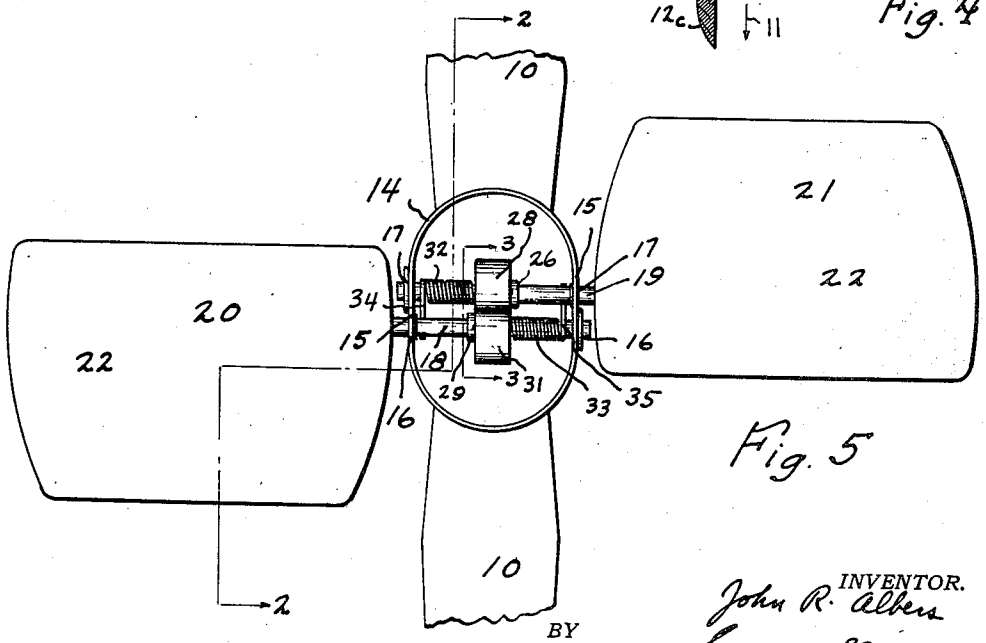


Fig. 5

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STARTING AND GOVERNING DEVICE FOR IMPELLERS

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Application January 9, 1939, Serial No. 249,995

7 Claims. (Cl. 170—75)

My invention relates to a device principally usable with wind driven impellers for electric generator units.

An object of my invention is to provide an attachment for an impeller structure in which the impeller blades require no pitch, and which attachment will provide initial starting action of the arrangement, and after speed is built up beyond a predetermined point will act as a braking means.

A further object of my invention is to provide a governing arrangement which is applied in a uniform manner as the impeller speeds are increased.

A further object of my invention is to provide an arrangement of this character which is controlled by centrifugal action.

A further object of my invention is to provide an arrangement which will balance the impeller structure.

A further object of my invention is to provide a simple structure involving a minimum number of parts.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawing, in which:

Figure 1 is a forward elevation of an impeller with my arrangement attached thereto.

Figure 2 is a fragmentary section taken approximately along the lines 2—2 of Figure 5,

Figure 3 is a detail taken along the sectional lines 3—3 of Figure 5,

Figure 4 is a sectional view taken along the lines 4—4 of Figure 1, and

Figure 5 is a forward elevation of the arrangement with the enclosing housing removed.

My invention pertains more particularly to a wind driven impeller structure wherein the impellers are adapted to rotate a shaft attached thereto in order to drive an electric generator for battery charging purposes. My invention contemplates the provision of a device which will provide starting action to a pair or more of impeller blades having no pitch, and which, furthermore, will govern the speed of the impellers so that overcharging is prevented and so that other objectionable features such as extreme vibration of towers, etc., is eliminated.

I have used the character 10 to designate a pair of impeller blades adapted to rotate in the direction of the arrow 11. The members 10 do not require any pitch in the use of my device and correspondingly have their front faces 12 flat with respect to the plane of rotation of the impeller. The rear faces of the blades face away from the wind direction are indicated by the character 12a wherein the trailing edge is indicated by the character 12b and the leading edge by the character 12c. (See Figure 4.) This rear face of the blade will usually have normally aerfoil curves and characteristics. Attached to the central portion 13 of the impellers is the substantially oval shaped cup 14 including the side walls 15.

Journalled within the side walls 15 at 16 and 17 are the shafts 18 and 19 which pass through the flaps 20 and 21 and which shafts are attached interiorly thereto (see Figure 2). The flaps 20 and 21 are preferably made of thin sheet metal and include the flat forward sides 22 (see Figure 2) and the rearward sides 23 having the leading edge 24. The flat sides 22 are normally pitched at a small angle as indicated by the character 25 (see Figure 2). Attached at 26 to the upper shaft 19 is the upper gear 27 and attached to the gear 27 is the weighted governor member 28. Similarly, attached at 29 to the lower shaft 18 is the further gear 30 which meshes with the gear 27, and attached to the gear 30 is the further lower governor member 31. Suitable torsion springs 32 and 33 are received over the shafts 19 and 18 respectively and are correspondingly attached to the gears 27 and 30.

The extremities of the springs 32 and 33 such as 34 and 35 are positioned against the shafts 18 and 19 to provide tension. It will be noted from Figure 2 that when the weighted governor members 28 and 31 are in abutting relation, that the flat sides 22 of the flaps are pitched at a minimum angle as indicated at 25. This pitch is sufficient to start rotation of the entire arrangement.

At excess speeds, however, or at those speeds where it is desired to limit the rotational speed of the shaft 36, the springs 32 and 33 and the weighted governor members 28 and 31 are so balanced that at these high speeds, the members 28 and 31 will be forced by centrifugal action in the direction of the arrow 37 (see Figure 3). Correspondingly through the enmeshment of the gears 27 and 30, the shafts 18 and 19 will be rotated swinging the flaps 20 and 21 in the direction of the arrow 38 (see Figure 2). In most positions between the minimum and maximum positions, the flaps will then act as brakes with the flap presenting resistance to the rotation of the propellers. At

the position shown in the dotted structure in Figure 2 these flaps present the greatest effective area against rotation and against the wind to provide maximum braking action. In this manner, a governing action is provided which is applied as the wind force increases, thereby effectively preventing undesirable high rotational speeds.

After the initial starting action has been applied by means of the flaps 20 and 21, the impeller blades 10 will then act to continue the rotation of the arrangement, since the wind forces, the normal direction of which is indicated by the character 39, will be applied along the blades to maintain the same in motion due to the constantly varying angle of the same in relation to the blade. Since one edge of the impeller blades 10 have the leading edge 12c curved, the blade will travel in one direction after being started since the thrust will be maintained in one direction due to the resultant angle of the wind when the propeller is in motion.

In other words, the flaps 20 and 21 initiate the motion which is continued by the blades at running speeds. The gears 27 and 30 insure an equal and uniform action in rotating the flaps to their governing position so that the effect is evenly balanced. The flaps 20 and 21 besides providing starting and governing elements, also provide additional advantages of balancing the entire structure since these members are positioned at right angles to the impeller blades. A covering member 40 is attached to the cup 14 to provide an enclosure for the governor mechanism.

It will now be seen that I have provided an impeller structure in which the impeller blades require no pitch, and which includes attachments thereto for providing initial starting action and which attachment will also act as a governing mechanism for the arrangement. It will also be seen that I have provided a governing attachment which allows application of the governing members in a uniform manner as the impeller speeds are increased and it will be seen that I have provided an arrangement of the above characteristics in a simplified form.

Some changes may be made in the construction and arrangement of the parts of my invention without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. An impeller starting and governing device comprising a pair of opposed flap members positioned substantially at right angles to the impeller blades, said flaps being normally positioned at a minimum starting pitch, means coacting with said flaps to pivot the same at a predetermined rotational speed of the impeller blades.

2. An impeller blade structure comprising a pair of opposed non-pitched impeller blades, a starting and governing device attached thereto comprising a pair of opposed flap members positioned substantially at right angles to the impeller blades, said flaps being normally positioned at a minimum starting pitch, means coacting with said flaps to pivot the same at a predetermined rotational speed of the impeller blades.

3. An impeller blade structure comprising a pair of opposed non-pitched impeller blades, a starting and governing device attached thereto comprising a pair of opposed flap members positioned substantially at right angles to the impeller blades, said flaps being normally positioned at a minimum starting pitch, means coacting with said flaps to pivot the same at a predetermined rotational speed of the impeller blades, including shafts attached to the flaps, weighted governor members attached to said shafts adapted to rotate the same when centrifugally urged outwardly.

4. An impeller blade structure comprising a pair of opposed non-pitched impeller blades, a starting and governing device attached thereto comprising a pair of opposed flap members positioned substantially at right angles to the impeller blades, said flaps being normally positioned at a minimum starting pitch, means coacting with said flaps to pivot the same at a predetermined rotational speed of the impeller blades, including shafts attached to the flaps, weighted governor members attached to said shafts adapted to rotate the same when centrifugally urged outwardly, gear members attached to said governor members and said shafts, said gear members being meshed to provide uniform pivotal action of said flaps.

5. An impeller blade structure comprising a pair of opposed non-pitched impeller blades, a starting and governing device attached thereto comprising a pair of opposed flap members positioned substantially at right angles to the impeller blades, said flaps being normally positioned at a minimum starting pitch, means coacting with said flaps to pivot the same at a predetermined rotational speed of the impeller blades, including shafts attached to the flaps, weighted governor members attached to said shafts adapted to rotate the same when centrifugally urged outwardly, gear members attached to said governor members and said shafts, said gear members being meshed to provide uniform pivotal action of said flaps, the pivotal movement of said flaps adapted to rotate the same in a plane transverse to the direction of rotation of the impeller blades to provide a braking surface against wind forces acting against the impeller blades.

6. An impeller blade structure comprising a pair of opposed non-pitched impeller blades, a starting and governing device attached thereto comprising a pair of shafts extending substantially at right angles to the impeller blades and in the plane of rotation thereof, shortened flaps attached to said shafts, centrifugal means attached to said shafts to resistingly pivot the same at a predetermined impeller speed, including gears attached to each of said shafts in meshed relation, governor members attached to said gears adapted to pivot outwardly upon said centrifugal action, said flaps being normally positioned at a starting pitch when said governor members are in abutment.

7. A starting and governing device for wind-driven impellers comprising, with a shaft and a pair of impeller-blades extending in opposite directions radially from the axis of said shaft, a pair of transverse shafts also extending in opposite directions from the axis of said shaft and at right angles to said blades, a flap-member secured upon each of said transverse shafts, said flap-members being normally positioned at a low angle to the planes of their rotation, and means acting upon predetermined rotative speeds of said impeller-blades to turn said transverse shafts and thereby vary the angle of their respective flap-members with respect to their planes of rotation.

JOHN R. ALBERS.