

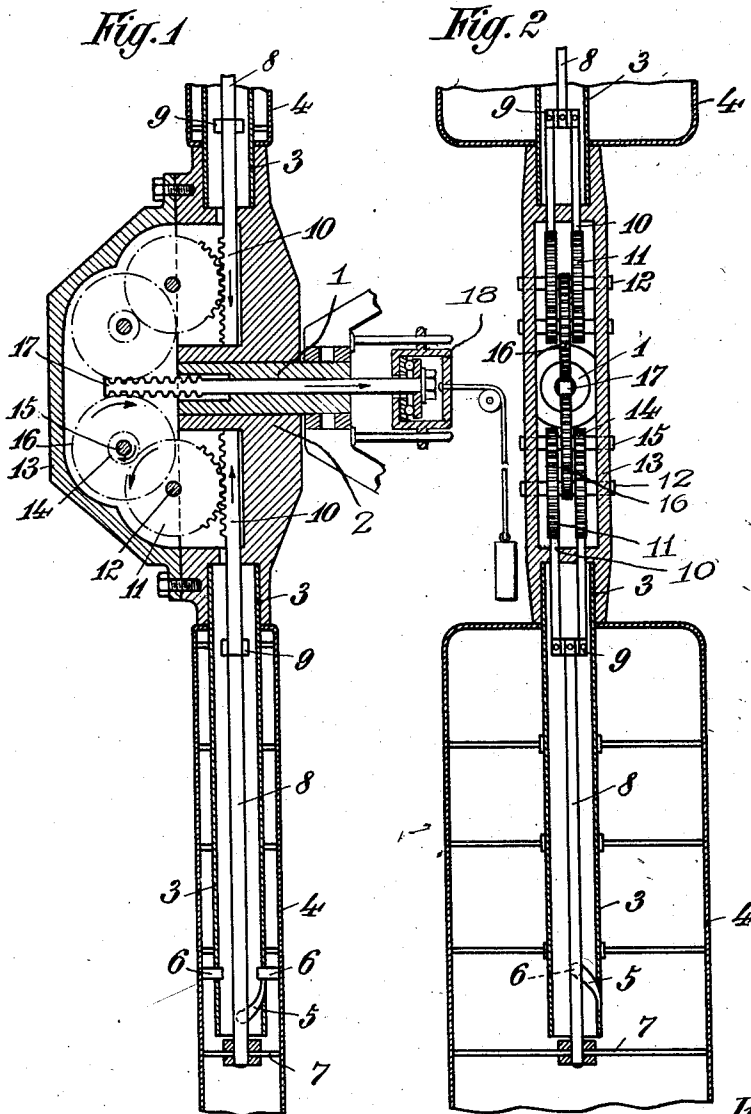
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DEVICE FOR REGULATING WIND WHEELS

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DEVICE FOR REGULATING WIND WHEELS

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This invention relates to a device for regulating the number of revolutions, as well as the performance, of wind-wheels by turning and at the same time shifting the vanes upon their arms with the aid of curved guide members, the difference between the centrifugal force arising in the vanes and a uniform counter-force being used as the re-adjusting power. The present improved device is distinguished from the known devices for regulating wind-wheels by the feature that the ratio of transmission of regulating members inserted between the vanes and the counter-force is not varied so that the regulation is astatic over its entire range and the power which the wind-wheel produces and delivers is uniform even in the case of storms and heavy squalls or gusts. The counter-force counteracting the centrifugal force arising in the vanes is transmitted to the mechanism by means of a rack extending through the hollow main shaft of the wind-wheel and being coupled, by the intermediary of suitable gearings, with a system of rods located in every vane and extending in, and parallel to, the axis passing through the centre of gravity of the respective vane. Owing to this arrangement and combination of the parts the curved guide members taking part in effecting the turning of the vanes on said axis are loaded only with the slight re-adjusting power required for producing that turning.

I am aware of the fact that it has already been proposed, with regulating devices for wind-mill vanes, to couple their shutter or shutters by means of rods and levers with cog-wheels carried by the vanes-holding rim and meshing with a cylindrical rack which is longitudinally movable and located in the hollow wind-wheel shaft. This arrangement and combination of parts has not, however, a uniform ratio of transmission on account of the lever connection. Maintaining the ratio of transmission with turnable propeller vanes is known, the respective arrangement being such that the shifting of a rack with steep thread is used to shift another steep thread carrying the vane which is prevented from shifting. The shifting of the rack is effected in this case either manually or by means of a

motor. The centrifugal force arising in the vanes while they are rotating is, thus, not utilized in that known device.

The invention is illustrated diagrammatically and by way of example on the accompanying drawing on which Figure 1 is an axial section through a two-vane wind-wheel, one of the vanes being partly broken away, and Figure 2 is a section located at right angles with respect to Fig. 1.

On the drawing, 1 denotes the hollow main shaft of the wind-wheel, and 2 a hub secured thereto; 3 are two hollow arms holding the vanes 4 which are turnable, as well as shiftable, upon these arms. The vanes are, of course, flat, and pins 6 projecting inwardly from the large faces of the wings engage curved slots 5 provided in the arms 3 whereby the arms are turned when they are shifted, and reversely. In order to relieve the parts 5 and 6 from the centrifugal force arising when the vanes are rotating, crossed rods 7 couple each vane with a rod 8 located axially in the arm 3 in such a manner that the vane can turn upon the arm.

The inner end of the rod 8 is connected with two parallel rods 10 by means of a cross-piece 9; the inner halves of the rods 10 are transformed into racks located within the hollow hub 2, and these racks mesh with cog-wheels 11 firmly connected with an axle 12 supported in the sides of a flat casing 13 connected with the correspondingly shaped hub. There are two wheels 11, corresponding to the two racks 10, and both mesh with pinions 14 firmly connected with an axle 15 also supported in said flat casing. A cog-wheel 16 located between said pinions and also secured to the axle 15 meshes with a rack rod 17 located in the bore of the hollow main shaft 1. This rack is subjected to a pull exerted in the direction of the arrow either by the tension of a spring or by a weight or by an electromagnet, or a solenoid respectively, or the like, the respective pull constituting a uniform counter-force.

Owing to the provision of two racks 10 located one at the left and the other at the right of the rod 8, the driving gear for each vane can be arranged symmetrically with re-

spect to it whereby oscillations are completely prevented.

The counter-force means 18 tends constantly to pull the rack 17 in the direction indicated by the appertaining arrow and, therefore, to move also the racks 10, by the intermediary of the cog-wheel gearings, in the direction indicated by the appertaining arrow. Now, when the vanes are rotating around the axis of the shaft 1, of course with it and the hub 2, as well as with the casing 13, with a speed that lies below a certain predetermined limit, or a certain maximum speed respectively, the counter-force draws the vanes radially inwards so that their inner ends contact with the outer ends of the hub, as in the figures. If, however, that limit or maximum speed is surpassed, the centrifugal force becomes greater than the counter-force, in consequence whereof the vanes move outwards along the arms 3 whereby the curved slots 5 of these latter act upon the pins 6 and cause thereby a corresponding turning of the vanes upon the arms, the direction of this turning being such that the pressure which the wind has exerted upon the vanes is now less than before. The result of this is that the rotational speed becomes less, and the centrifugal force becomes smaller, also in proportion to the counter-force, and the vanes are now drawn inwards upon their arms by the counter-force until the forces balance one another and equilibrium has, therefore, been re-established.

It is obvious that the ultimate effect of the device consists in a uniform number of revolutions and uniform performance. Equilibrium exists only at a certain definite number of revolutions, irrespective of the position of the vanes upon their arms.

All operating parts of the regulation device are housed in the chamber formed by the hub and the casing, and are, therefore, securely protected.

I claim:

1. A device for regulating wind-wheels to obtain a uniform rotational speed, comprising, in combination with the main shaft, the hub of the wheel, and hollow arms projecting radially forth from the hub, vanes located upon said arms and being adapted to be shifted and simultaneously therewith to be turned thereon, rods located in said hollow arms in the axis passing through the point of gravity of each vane, a rack at the inner end of each of said rods, a gearing meshing with said rack, and a common central rack meshing with all said gearings and subjected to the action of a counter-force.

2. A device for regulating wind-wheels to obtain a uniform rotational speed, comprising, in combination with the main shaft, the hub of the wheel, and hollow arms projecting radially forth from the hub, vanes located upon said arms and being adapted to be shift-

ed and simultaneously therewith to be turned thereon, rods located in said hollow arms in the axis passing through the point of gravity of each vane, two parallel racks at the end of each of said rods, gearings meshing with the racks of each of said rods, and a common central rack meshing with all said gearings and subjected to the action of a counter-force.

3. A device for regulating wind-wheels to obtain a uniform rotational speed comprising a hub; a pair of arms projecting from said hub; a rod axially provided in each arm and having a gear rack at the inner end; a vane mounted on each arm and secured to the outer end of the rod; a rod slidably mounted in axial relation to the hub and having a gear rack at the inner end and counter-force means at the outer end; a plurality of gear wheels in the hub meshing with the gear racks of the rods; and means on the vanes and arms for turning the vanes at the increase or decrease of the force of air to maintain the wind-wheel at a uniform speed.

4. A device for regulating wind-wheels to obtain a uniform rotational speed comprising a hub; a pair of arms projecting from said hub; a rod axially provided in each arm and having a gear rack at the inner end; a vane mounted on each arm and secured to the outer end of the rod; a rod slidably mounted in axial relation to the hub and having a gear rack at the inner end and counter-force means at the outer end; a plurality of gear wheels in the hub meshing with the gear racks of the rods; and pins and cooperating slot means on the arms and vanes adapted to turn the vanes at the increase or decrease of the force of the air when the centrifugal force of the vanes and the counter force become unequal to maintain the wind-wheel at a predetermined uniform speed.

In testimony whereof I have affixed my signature.

ERICH HESSE.