

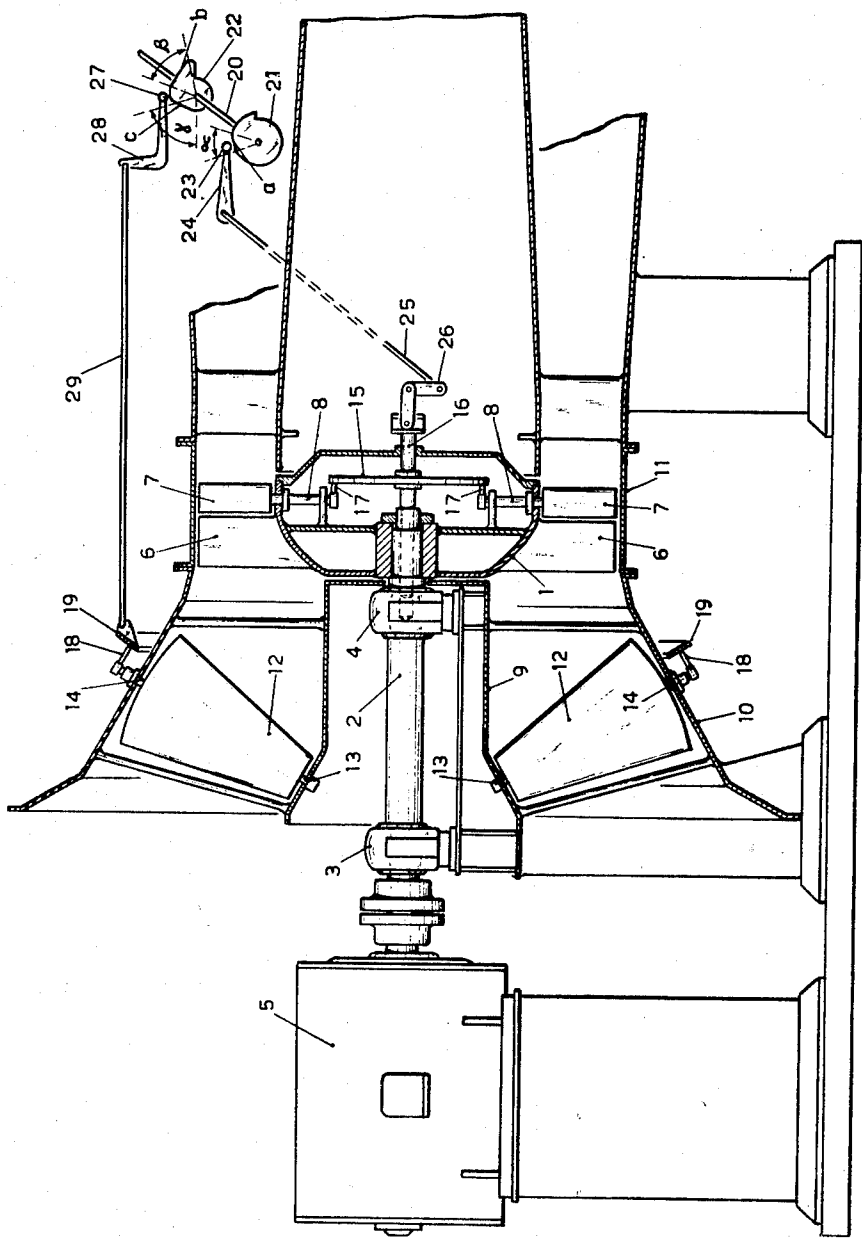
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AXIAL FLOW FANS

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AXIAL FLOW FANS

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3 Claims. (Cl. 230-114)

This invention relates to an axial flow fan, the impeller hub of which has a conical circumferential surface, having its diameter increasing in the direction of flow and a set of adjustable guide vanes being arranged at the inflow side of the casing.

The capacity of fans of this kind may be varied within wide limits, but the efficiency for mean loads is rather poor.

The invention has for its object to remove said drawback and to this end the hub of the impeller is provided with adjustable blades located behind fixed blade-parts and said adjustable parts of the blades and the guide vanes being adjusted in such a manner, that for small and large loads only the guide vanes and for mean loads only the impeller blades are adjusted.

Tests have shown that by adjusting the rear parts of the impeller blades for mean loads a better efficiency is obtained than by varying the capacity of the fan in said range of loads by means of the adjustable guide vanes at the inflow side of the casing. For smaller loads and also for higher loads, however, a more favourable efficiency is obtained by varying the capacity only by means of the guide vanes at the inflow of the casing, so that the fan according to the invention will present the highest possible efficiency over the whole range of loads.

The invention will be further described with reference to the accompanying drawing showing a schematic longitudinal sectional view of a fan according to the invention.

The impeller hub 1 is of conical shape and secured on a shaft 2 supported in bearings 3 and 4 and driven by means of an electric motor 5. Secured on the impeller hub 1 are fixed blades 6 and the hub carries behind said blade-parts adjustable blade-parts 7 having their stems 8 rotatably journaled in the hub 1.

The shaft bearings 3 and 4 are supported in the core body 9 of the suction mouth 10 of the fan casing 11. In the suction mouth 10 adjustable guide vanes 12 are provided and said vanes being supported by journals 13 in the mouth of the core body 9 and by journals 14 in the outer wall of the suction mouth 10 of the casing. At the outside of the suction mouth 10 the guide vanes 12 each carry a lever 18 and said levers are connected to an adjusting mechanism, comprising an axially slidable ring 19.

For adjusting the blade-parts 7 of the impeller an adjusting disc 15 may be provided, which is secured on an axially slidable rod 16 and rotates together with the impeller. The disc 15 is connected to levers 17 each secured on the stem 8 of a blade-part 7, so that by axial displacement of the disc 15 the blade-parts 7 are rotated.

The mechanism for adjusting the inlet guide vanes 12 is coupled to that for adjusting the rear portions 7 of the impeller blades in such a manner that when adjusting the guide vanes 12 for large and small loads the blade portions 7 remains stationary and that when adjusting the

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blade portions 7 for means loads the position of the guide vanes 12 is not varied.

To this end a shaft 20 for adjusting the blade portions 7 and the guide vanes 12 may carry two cam discs 21 and 22. Cam disc 21 cooperates with a roller 23 carried by a lever 24 secured on a shaft 25, which carries at its opposite end a lever 26 coupled to slidable rod 16 of disc 15.

Cam disc 22 cooperates with a roller 27 carried by a bell crank lever 28 which by means of rod 29 is connected to the slidable adjusting ring 19 of the guide vanes 12. The active part of cam disc 21 is denoted by a and extends through an angle α . Cam disc 22 has two active parts b and c extending through angles β and γ respectively. The cam discs 21 and 22 are annularly displaced relatively to each other in such a manner that when cam disc 21 is active for adjusting the blade portions 7 of the impeller cam disc remains inactive and when cam disc 22 is active for adjusting the guide vanes 12 cam disc remains inactive so that said vanes 12 are not adjusted. With said arrangement a large range of loads is controlled by adjusting the impeller blades and only the smaller and larger loads are obtained by adjusting the guide vanes 12.

What I claim is:

1. An axial flow fan, comprising a casing, an impeller journaled in said casing including a hub with blades rigidly secured thereon and additional blades adjustably mounted on said hub behind said fixed blades, guide vanes adjustably mounted in the inflow side of said casing, means connected to said adjustable blades for adjusting said blades, means connected to said guide vanes for adjusting said vanes, and control means connected with both said adjusting means and operative to actuate only one of said adjusting means at a time to adjust the impeller blades while the guide vanes remain stationary and to adjust the guide vanes while the impeller blades remain stationary.

2. An axial flow fan, comprising a casing, an impeller journaled in said casing and including a hub with blades rigidly secured thereon, and additional blades adjustably mounted on said hub behind said fixed blades, guide vanes adjustably mounted in the inflow side of said casing, means connected to said adjustable blades for adjusting said blades, means connected to said guide vanes for adjusting said vanes, and control means connected with both said adjusting means and operative to actuate only one of said adjusting means at a time, said control means including a common control element having one portion engaging said blade adjusting means and another portion engaging the vane adjusting means, said portions being offset from each other so that the common element actuates during one part of its movement the means for adjusting the impeller blades and during another part of its movement actuates the means for adjusting the guide vanes.

3. An axial flow fan, comprising a casing, an impeller journaled in said casing and including a hub with blades rigidly secured thereon, and additional blades adjustably mounted on said hub behind said fixed blades, guide vanes adjustably mounted in the inflow side of said casing, means connected to said adjustable blades for adjusting said blades, means connected to said guide vanes for adjusting said vanes, and a control shaft, said control shaft carrying a first cam for actuating the adjusting means of the impeller blades, and a second cam for actuating the guide vanes, said first cam having a single active part and said second cam having two active parts which are angularly displaced with respect to each other and to the active part of said first cam.

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