

UNITED STATES PATENT OFFICE

1,961,228

FAN

Harry A. Knox, Davenport, Iowa

Application April 7, 1932, Serial No. 603,800

1 Claim. (Cl. 230—135)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

5 This invention relates to a fan.

The principal object of the invention is to provide a fan whose velocity will be automatically varied inversely to the speed of the motor driving the fan.

10 A further object is to provide an arrangement of the vanes which will insure equal loading over the entire area of the vane.

To these and other ends, the invention consists in the construction, arrangement and combination of elements described hereinafter and pointed out in the claim forming a part of this specification.

A practical embodiment of the invention is illustrated in the accompanying drawing, wherein:

20 Fig. 1 is a view in front elevation of a fan constructed in accordance with the invention.

Fig. 2 is a longitudinal sectional view through a portion of the fan.

25 Fig. 3 is a view in side elevation of one of the vanes and indicating in dotted lines the deflected position at high speed.

The fan is of the Sirocco type comprising a hub 6, which in the present instance is the driven flywheel of an engine, and oblong vanes 7 arranged annularly about the hub and supported in spaced relation thereto with their trailing portions on a baffle plate 8 and with their leading portions on a ring 9 carried by spokes 10. The baffle plate 8 and spokes 10 are secured respectively to the margin and the periphery of the hub 6 by means of bolts 8a and 10a.

35 The baffle plate 8 is inclined with respect to the hub 6 and its periphery is on a shorter radius than the periphery of the ring 9 so that the vanes supported by these members are inclined relative to the axis of rotation of the fan. By virtue of this arrangement the leading portion of the vane being required to travel through a greater circle in the same unit of time will have a higher velocity than the trailing portion for a purpose which will appear hereinafter.

40 The vanes are mounted in slots 11 and 12 respectively formed in the baffle plate 8 and the ring 10. A set of spaced lugs 13—13 at each end of the vane serve to engage the sides of the baffle plate and ring and hold the vane against lateral displacement with respect thereto. The vanes are held against withdrawal from the slots by 45 means of wire cables 14—14 passing through

apertures in the vanes and each having its ends secured in a turnbuckle 15.

The vanes 7 are flexible and are capable of being deflected to position indicated in dotted lines in Fig. 3, when the fan is being driven at the rate of 2,000 R. P. M. The flexibility of the blades is determined on a basis of initial deflection at 500 R. P. M. As the deflection varies between these velocities the area of the vane will automatically vary, being decreased as the velocity increases. 65 This provision effects a considerable saving in motive power.

The flexibility of the vanes is preferably obtained by forming them of a plurality of leaves of varying height. In the present instance four 70 leaves are employed, designated a, b, c, and d, secured at their base by means of rivets 16. The leaf d is essentially a reinforcing strip and may be of thicker metal without flexibility to facilitate mounting of the vane in the slots 11 and 12. 75

As shown in Fig. 2 a shroud 17 terminates adjacent the leading edge of the vanes.

In operation the air passing through the fan tends to pile up against the baffle plate 8 so that where the vanes are disposed parallel to the axis of rotation there is an unequal loading or distribution and the trailing portion of the vanes performs most of the work. By inclining the vanes as proposed herein and giving the leading portion a higher velocity the pressures and loading 85 are equally distributed over the entire area of the vanes. By thus eliminating the ineffective portions of the vane it is possible to reduce their size. This arrangement is also of particular advantage in connection with the use of flexible 90 vanes as it prevents distortion of the vanes.

I claim:

A fan including a hub, a baffle plate secured in an inclined position on the periphery of the hub, spokes on the periphery of the hub and 95 spaced from the baffle plate, a ring carried by the spokes, said ring and baffle plate formed with a plurality of slots, an annular series of flexible vanes mounted in the slots of the ring and baffle plates, lugs on the vanes engageable with the sides of the ring and baffle plate, and a cable passing through all of the vanes and holding them in place. 100

HARRY A. KNOX,

105

110