Aug. 29, 1939. K. D. McMAHAN 2,171,341

FAN CASING

Original Filed June 1, 1936

Fig. 1.

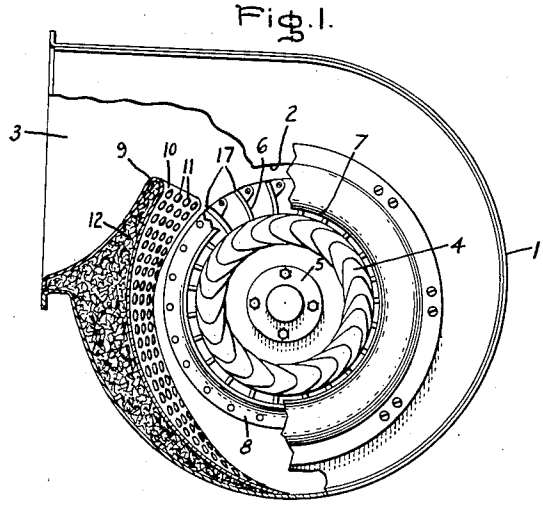
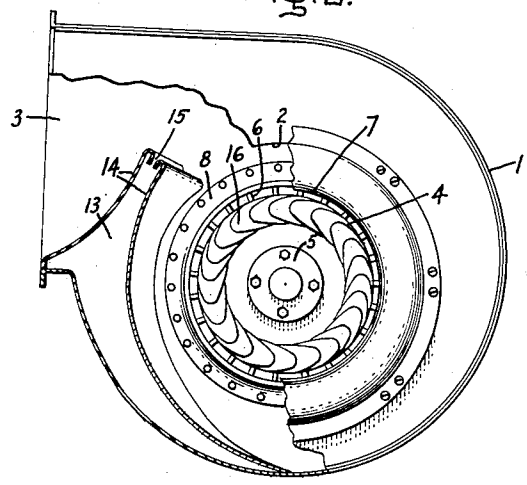


Fig. 2.



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Patented Aug. 29, 1939 2,171,341

UNITED STATES PATENT OFFICE

2,171,341

FAN CASING

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Original application June 1, 1936, Serial No. 82,780. Divided and this application April 1, 1938, Serial No. 199,462

2 Claims. (Cl. 230—132)

This application is a division of my application Serial No. 82,780, filed June 1, 1936.

The present invention relates to casings for centrifugal fans of the type having a passage around the fan to which air is discharged and a cut-off directing the air to a discharge opening.

The object of my invention is to provide an improved construction in fan casings having a cut-off decreasing the noise.

In the accompanying drawing, Fig. 1 is an end view of my improved fan casing, and Fig. 2 is an end view of a modification.

Referring to the drawing, there is shown a fan casing or scroll 1 having an intake opening 2 and an exhaust opening 3. Mounted within the casing is a fan wheel 4 consisting of a hub 5 to which is secured a plurality of blades 6 of the type described and claimed in my application Serial No. 82,780, filed June 1, 1936, extending axially therefrom. Mounted in intake opening 2, is a curved orifice ring 7 which serves to provide a smooth curved surface to the entering air to prevent any noise by the impinging of moving air against a sharp edge. Cooperating with orifice 7 to provide a smooth path within the fan casing is a shroud ring 8, which is secured to blades 6. Orifice and shroud rings 7 and 8 are of the construction clearly disclosed in my above application. Shroud ring 8 is formed as a substantial continuation of orifice 7 and curves inwardly and outwardly in the direction in which air moves over this part of the fan but of necessity is spaced from the orifice 7 a sufficient distance to provide the necessary clearance between a stationary and a moving part. In the exhaust opening 3 a cut-off 9 is provided which extends a sufficient distance within the opening 3 to prevent any eddies or reverse flow within the exhaust opening. The shape of the cut-off is, of course, subject to a great deal of modification. Cut-off 9 is formed of a plate 10 separated from the wall of the casing having a plurality of perforations 11. Within the space or chamber between the plate 10 and the wall of casing, felt or other sound deadening material 12 is provided. The perforated plate 11 and sound deadening material 12 located at the cut-off serve to eliminate much of the noise originating from the impinging of air against the cut-off at its source. As shown in Fig. 2, I may also accomplish this same result by using a cut-off with a space 13 between a solid plate 14 and the wall of the casing with an opening 15 at the inner end forming an air column acting as a cushion. The air column also acts as a sound filter of the air column type. I have found that the location of sound deadening material or an air cushion, or a sound filter, or any combination thereof, at the cut-off can more effectually eliminate this noise than by any means located at a different point,

The fan wheel 4 is connected to a source of power, not shown, such as an electric motor. The operation of the fan is described fully in my application Serial No. 82,780, filed June 1, 1936. For the purpose of the present invention it is sufficient to state that upon rotation of the fan, air is drawn axially into the intake opening 2 by the suction of the fan and by the forwardly curved front ends 16 of the fan blades and is discharged in a radial direction between the fan blades. For the purposes of the present invention, the construction of the fan is not important, that is, any centrifugal fan could be substituted for the fan illustrated.

The air, in passing between two adjacent blades, is acted upon as though the blades were a nozzle taking air in at the intake edges and discharging it at the exhaust edges 17. The discharge from each nozzle formed by adjacent blades is in the form of a jet of air which may vary in velocity throughout the nozzle discharge area. These successive jets impinging against the walls and cutoff of the casing produce a vibration having a frequency equal to the number of blades times the number of revolutions of the fan wheel per unit of time. The vibration may have one or more harmonics of this frequency. This vibration produces a noise the intensity of which depends upon the variation in the magnitude of the air velocity between successive jets.

The location at the cutoff of sound deadening material or an air cushion or other sound reducing means reduces any noise which may be produced by an uneven discharge from the fan. I find that the noise reduction by locating the sound deadening material or sound reducing means at the cutoff is disproportionately greater than the noise reduction obtained by sound deadening material or sound reducing means located elsewhere.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In combination, a centrifugal fan casing having an inlet opening and an outlet opening, a centrifugal fan mounted in said casing, and a cut-off located in said outlet formed of perforated metal walls spaced from the outer walls of said casing, to provide a chamber and having the perforations presented to the air stream moved by the fan.

2. In combination, a centrifugal fan casing having an inlet opening and an outlet opening, a centrifugal fan mounted in said casing, a cut-off located in said outlet formed of perforated metal walls spaced from the outer walls of said casing, and sound deadening material between the walls of said casing and said perforated walls.

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