Sept. 24, 1929. H. G. KAMRATH 1,729,390

AIR CLEANER BLADE

Filed Dec. 29, 1926

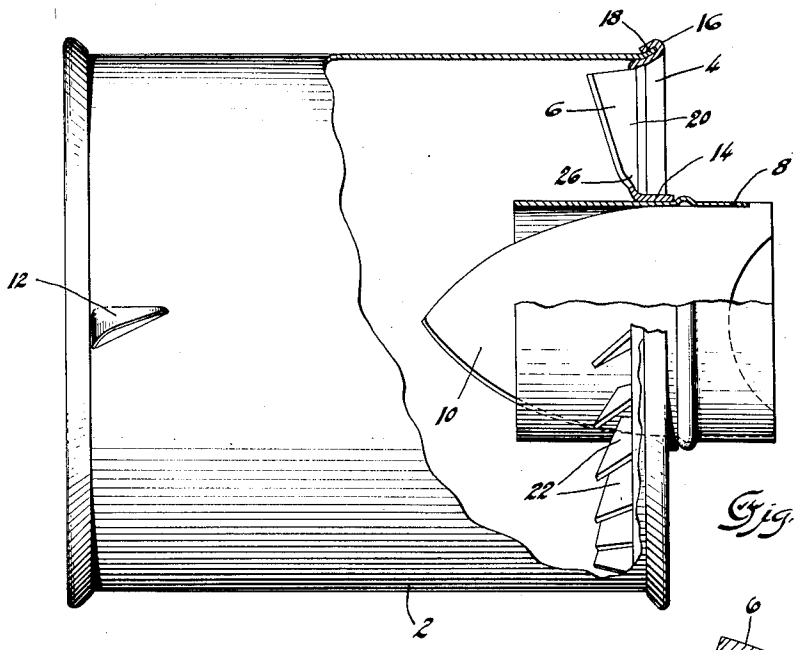


Fig. 1

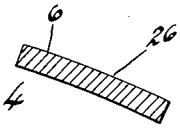


Fig. 4

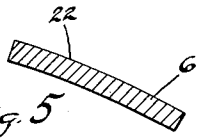


Fig. 5

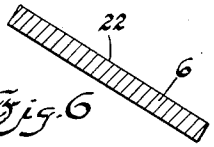


Fig. 6

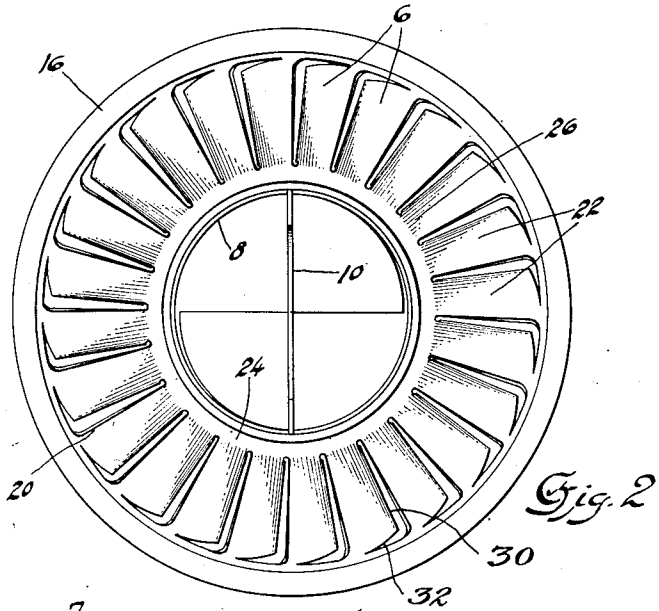


Fig. 2

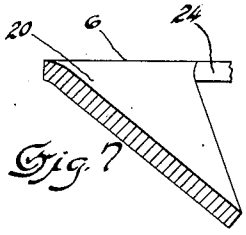


Fig. 7

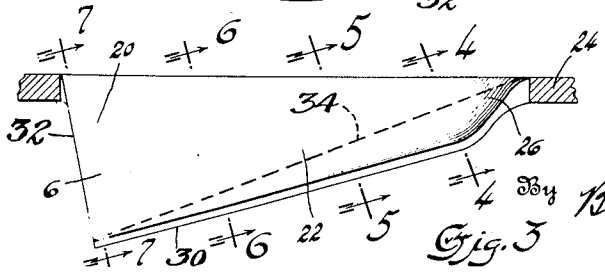


Fig. 3

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UNITED STATES PATENT OFFICE

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AIR-CLEANER BLADE

Application filed December 29, 1926. Serial No. 157,761.

This invention relates to air cleaners and particularly to a blade to be used in cleaners of the centrifugal type.

According to the preferred embodiment of my invention the blade is given a form possessing two important advantages. Thus it is shaped to direct the air outwardly as well as in a whirling path so that the air travels through the casing in a thin whirling stream closely hugging the casing wall. This increases the velocity of the air stream and facilitates separation of dust. To achieve the outward movement of the air, it has heretofore been considered necessary to employ special surfaces in addition to the blades themselves. By eliminating such special surfaces the construction is much simplified and cheapened without loss of efficiency. The blade is also shaped so as to reduce restriction to air flow to a minimum. This is accomplished by offsetting the body of the blade rearwardly in the direction of air flow, so as to increase the size of the passages between adjacent blades.

Obviously if but one of the above advantages is desired, the blade may be shaped so as to give the desired characteristic alone.

Referring to the drawing:

Fig. 1 is a longitudinal view of an air cleaner having blades embodying my invention, parts being broken away and parts in section to better illustrate the invention.

Fig. 2 is an end view of the cleaner shown in Fig. 1.

Fig. 3 is a side view of one of the blades.

Figs. 4, 5, 6 and 7 are sectional views taken on the corresponding section lines of Fig. 3.

Reference character 2 indicates the casing of my cleaner. In one end of the casing is secured annulus 4 in which my improved blades 6 are formed. Within the annulus is secured the clean air discharge conduit 8 and within the conduit 8 is secured air straightener 10. The rear end of the casing 2 is provided with port 12 for the discharge of dust.

The cleaner illustrated is but one of many types of centrifugal cleaners in which my improved blades may be employed. This cleaner is assembled of sheet metal parts for simplicity and economy of construction and while this construction is to be preferred in most cases, it is to be understood that the design of blade which is the subject matter of this application may equally well be used in cleaners of machined or cast construction.

In the specific design illustrated the annulus 4 is provided with an interior flange 14 in which the conduit 8 is seated and to which it is secured and with an external flange 16 secured to the flange 18 on the casing 2, by crimping. The blades 6 are pressed rearwardly from the metal of the annulus and are accurately formed so that they direct the air both outwardly and in a whirling path. Thus the forward edges 20 of the blades as clearly illustrated in Figs. 1 and 3, extend in a radial plane perpendicular to the axis of the cleaner. The remaining portions 22 of the blades as best illustrated in Fig. 3, slope both rearwardly and outwardly toward the casing wall.

In the specific design illustrated the main portion of the blades 6 may be defined as the warped surface produced by a line moving along the lines defined by the forward and rearward edges of the blades and maintaining at all times a constant angle with the line of the forward edge as illustrated by the parallel section lines 4—4, 5—5, 6—6 and 7—7. If desired, a sightly curved generating line may be employed instead of a straight line. By reference to Figs. 4 to 7, it will be noted that the angle which the sections shown in these figures make with the plane of the annulus increases progressively.

It will be noted by reference to the figures that the blades have but two free edges, one numbered 30 extending radially and the other numbered 32 extending substantially circumferentially. In other words, the inner ends of the blades are in radial continuity with the central portion of the annulus 4.

It will also be noted that the inner ends of the blades are connected with the central portion 24 of the annulus 4 by means of a curved portion 26. Thus, in effect the major portions of the blades are bodily offset rearwardly of the annulus. The purpose of this is to increase the gap between adjacent

blades and thereby reduce the obstruction to air flow to a minimum. This bodily offsetting of the blades may be geometrically defined by noting that, as shown in Figure 3, the angle which the free radial edge 30 of the blade 6, when extended, makes with the plane of the plate is less than the angle which an imaginary line 34 drawn from the outer end of the free radial edge of the blade makes with a point in the plane of the plate and in the line defining the innermost portion of the plate.

The warping of the blade as described will cause the air entering the cleaner to be directed in a thin whirling stream hugging the inner wall of the casing. This will much more effectively separate out dust particles than former types of cleaners in which there was no outward deflection of the entering air. Upon reaching the closed end of the cleaner the dust is discharged through port 12, and the air stream reverses its direction passing outwardly through port 8 to the carburetor or other apparatus to be supplied with air. The straightener 10 performs its usual function of assisting in the discharge of the air column. The offsetting of the blades by the use of the curved connecting portion 26 greatly increases the air gap between adjacent blades and reduces restriction to flow. While the blade possesses these important advantages, it costs about the same to make as the blades of the prior art.

It is understood, of course, that the terms "forwardly," "rearwardly," and the like, used in the specification and claims of this application are to be construed in a relative sense only for it is obvious that the parts may be reversed without altering their function.

I claim:

1. An air cleaner comprising a casing having an open end, a plate in the open end of the casing formed to provide a central portion and a plurality of blades extending radially therefrom, said blades being shaped to provide substantially radial portions and portions bodily offset from the plane of the plate adapted to impart a whirling motion to the entering air, the inner ends of said offset portions being connected with the central portion of said plate by sharply curved continuations thereof.

2. In the combination as defined in claim 1 the offset portions of said blades being warped to direct the air outwardly as well as rearwardly.

3. An air cleaner comprising a casing, a blade associated with the casing for imparting a whirling motion to the air passing therethrough, said blade having a radial portion and a portion extending to one side of the plane in which said radial portion lies, said last named portion being characterized by a sharp curve connecting it to the radial portion adjacent the center of the cleaner and blending into a relatively flat portion extending to the tip of the blade to reduce restriction of flow to a minimum.

4. An air cleaner comprising a casing having an open end, a plate spanning the open end of the casing formed to provide an annular series of blades each extending at an angle to the plane of the plate and arranged to impart a whirling motion to the entering air, said blades being warped to simultaneously throw the air in an outwardly direction, the inner ends of said blades being in radial continuity with said plate, and said ends being provided with offset bends to increase the gap between adjacent blades and reduce restriction to air flow.

5. In an air cleaner the combination of a cylindrical casing, a plate spanning the open end of the casing and formed to provide an annular series of blades bent out of the plane of the plate to impart a whirling motion to the entering air, the air directing surfaces of each of said blades being in the form of a plane warped to give the air particles a greater component of motion in a radial direction to cause them to follow the inner wall of the casing in a thin stream.

6. An air cleaner comprising a casing having an air inlet, a clean air outlet, and an outlet for the discharge of dust separated from the air stream passing through the casing, and a plurality of blades associated with said casing for directing the air in a whirling path, each of said blades having its body portion extending rearwardly in angular relation to the direction of flow of the entering air to direct the air in a whirling path, the body of said blade likewise sloping outwardly toward the periphery of the cleaner to simultaneously direct the air in a thin stream along the casing wall, the inner end of the blade extending sharply forwardly from the rearward edge of the blade to the forward edge to reduce obstruction to flow.

7. In an air cleaner, a substantially cylindrical casing having one end open to provide an air inlet, a plate spanning the open end of the casing out of which are integrally formed an annular series of blades bent out of the plane of the plate to impart a whirling motion to the entering air, substantially the whole of the free radial edge of each of the blades being located in a line which makes a smaller angle with the plane of the plate than a line drawn from the outer end of the said free radial edge of the blade to a point in the plane of the plate and in the line defining the innermost portion of the blade.

8. In an air cleaner, a substantially cylindrical casing having one end open to provide an air inlet, a plate spanning the open end of the casing out of which are integrally formed an annular series of substantially radial blades for imparting a whirling motion

to the entering air, substantially the whole of a side edge of each of the blades being located on one side of the plane of the plate, each of said blades being twisted between its ends so that the angle which the generating line of the blade which extends at substantially right angles to a radius of the blade makes with the plane of the blade adjacent the axis of the casing is less than the angle which the said generating line makes with the said plane at points radially outward therefrom.

In testimony whereof I affix my signature.

HERBERT G. KAMRATH.