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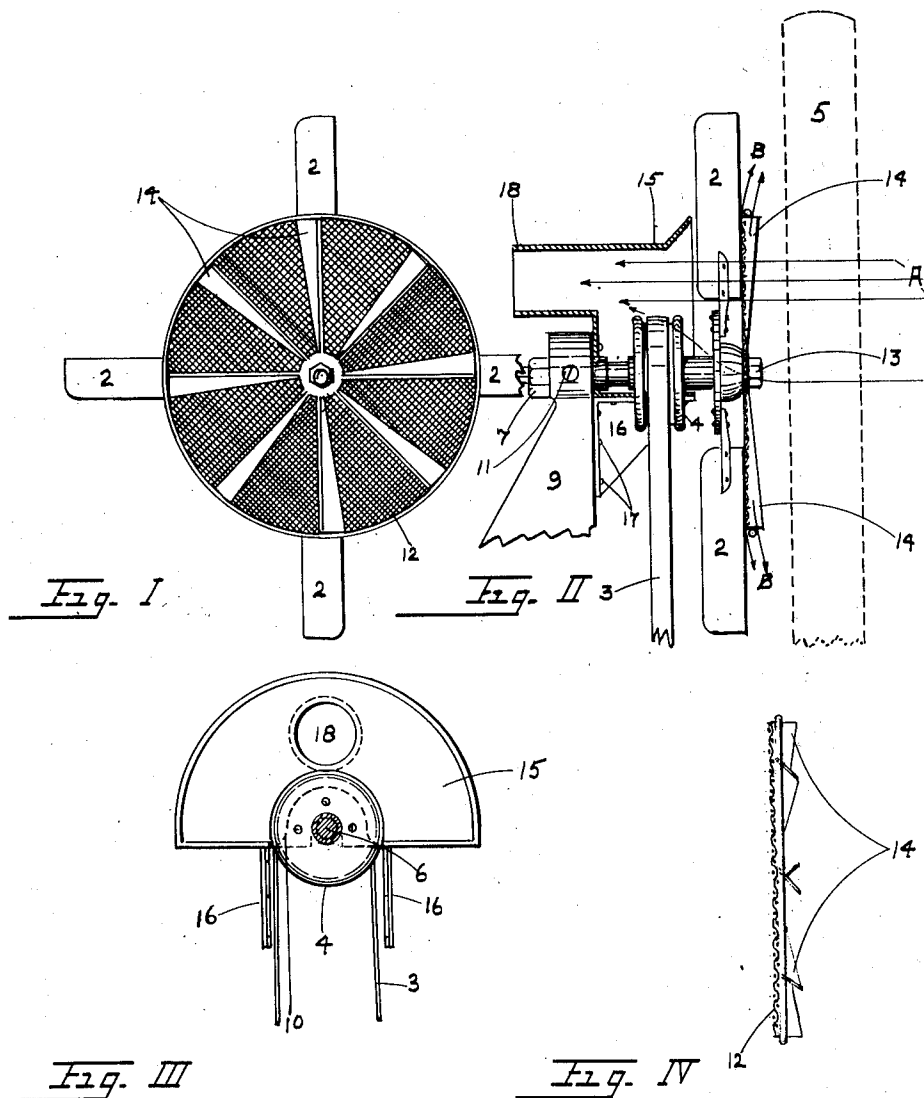
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COMBINED FAN AND AIR CLEANER

Filed Aug. 21, 1925

2 Sheets-Sheet 1



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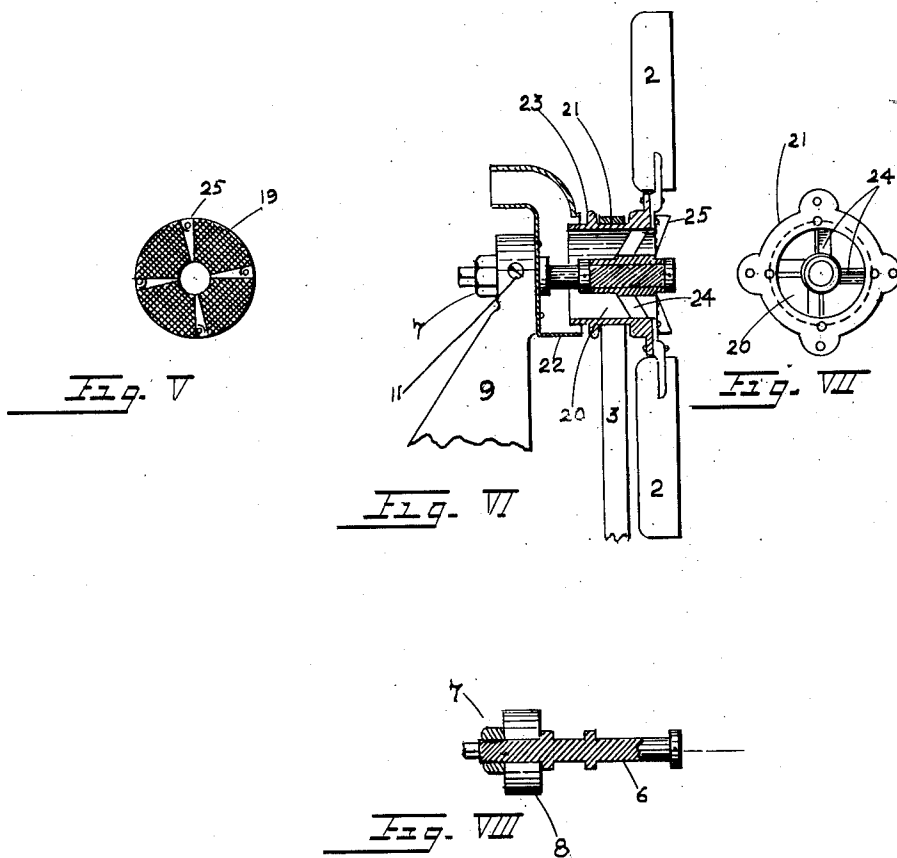
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UNITED STATES PATENT OFFICE

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COMBINED FAN AND AIR CLEANER

Application filed August 21, 1925. Serial No. 51,544.

This invention relates to air cleaners and more particularly to a combined air cleaner and cooling fan used in conjunction with an internal combustion engine.

5 One of the objects of the invention is to provide an air cleaner for delivering air that is substantially free from particles of dust or abrasive material.

10 Another object of the invention is to provide an air cleaner for an internal combustion engine that will deliver air without introducing a material resistance to the passage of the air.

15 Another object of the invention is to provide a combined air cleaner and cooling fan for an internal combustion engine, that will deliver clean air in amounts commensurate with the engine requirements.

20 A further object of the invention is to provide a combined cooling fan and air cleaner, that is easily accessible for cleaning and repairing.

25 Other objects relating to details of construction and economies of manufacture, will appear from the description to follow covering certain embodiments of the invention, which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

30 Figure I is a front elevation of the combined fan and air cleaner.

35 Fig. II is a side elevation showing the position of the combined fan and cleaner, with reference to a radiator, the receiving air casing being shown in section.

Fig. III is a front view of the air receiving casing and fan pulley but with the fan blades removed.

40 Fig. IV is a side elevation of the cleaner screen showing the radial ribs.

Fig. V is a front view of a screen used with a modified form of the invention.

45 Fig. VI is a side elevation partly in section of a modified form of the invention with the screen shown in Fig. V secured to the fan hub.

Fig. VII is a front view of the fan hub shown in Fig. VI.

50 Fig. VIII is a view partly in section of the fan spindle shown in Fig. VI, illustrating

the eccentric mounting used in adjusting the fan pulley.

Referring to the drawings, in which the same numerals denote the same parts throughout the several views, I have illustrated a rotating fan, having blades 2, driven by any suitable means through belt 3 which passes over pulley 4. Fans of the type shown are frequently used in connection with the cooling system of an internal combustion engine and Figure II illustrates such a use, the position of the cooling radiator 5 being shown in broken lines. Fan 1 is preferably located behind and adjacent to radiator 5 so that air may be drawn therethrough as indicated by arrows A. Rotation of the fan is permitted by freely mounting it on shaft 6 which is secured in eccentric block 8 by nut 7 (see Fig. VIII). Eccentric block 8 is rotatable in support 9 and serves to adjust the tension of belt 3. After the desired adjustment is attained eccentric 8 may be locked in position by screw 11.

A screen 12, preferably formed of metal fabric, is fastened to the fan by any suitable means, such as nut 13, so as to rotate with the fan and present its flat surface normal to the air stream, indicated by arrows A. Although it is not essential to my invention broadly, I may fixedly mount on screen 12 radial ribs 14, which serve the dual purpose of deflecting heavier than air particles of material outwardly from the air stream, and acting as auxiliary fan blades to draw air through radiator 5.

Immediately behind fan 1 is an air receiving casing 15, which is held in position adjacent the rear edge of fan blades 2, by brackets 16 secured to support 9 by rivets 17. Casing 15 is closely fitted around shaft 6 and pulley 4 and has an opening 10 to permit belt 3 to operate the fan. An outlet connection 18 communicating with the interior of casing 15 directs the air passing through the screen toward the engine carburetor (not shown) or other parts where clean air is desired, it being understood that a suitable conduit is to be attached to connection 18.

The operation of the combined fan and air cleaner described is as follows. Rotation of

the fan 1 because of blades 2 and ribs 14, draws air through radiator 5 in the direction of arrows A. Clean air, because of its low specific gravity, readily passes through screen 12 into casing 15 and thence into connection 18, but heavier than air particles will contact with the mesh wires of the screen and be thrown outward by centrifugal force as indicated by arrows B, and where ribs 14 are employed in addition to the screen, as illustrated in the drawing, centrifugal force action upon the dust particles is increased.

The form of the invention shown in Figures V, VI, VII and VIII differs from the form previously described, in that screen 19 secured to fan 1 is smaller in diameter and covers the entrance to an annular passage 20 in fan hub 21. Casing 22 secured to support 9 surrounds the rear portion of hub 21 and is spaced therefrom to allow for adjustment of belt 3 by eccentric 8, the effective opening of the annular space between casing 22 and hub 21 being reduced by projecting the casing 22 forwardly so as to have its opening adjacent flange 23, on hub 21. Spokes 24 are provided within passage 20 to strengthen the hub and to act as auxiliary fan blades for drawing air through the passage. Ribs 25 may be secured to screen 19 and serve to assist the screen in deflecting heavier than air particles away from the passage and to direct clean air through screen 19 and passage 20.

It may be seen from the preceding description that I have provided a combined fan and air cleaner in which the screen, by reason of its normal position with respect to the air stream, will not change the original direction of the air and that all heavier than air particles of material will be deflected at right angles to the air stream to points where ample space is available for their reception and disposition.

While I have shown somewhat in detail certain embodiments of my invention, it is to be understood that this showing and description are illustrative only, and that I do not regard the invention as limited to the details of construction illustrated and described, except insofar as I have included such limitations within the terms of the following claims, in which it is my intention to claim all novelty inherent in my invention, broadly as well as specifically.

I claim:

1. In a combined fan and air cleaner, a rotating fan, a fan hub having an air passage therethrough, a screen attached to said fan for covering the entrance of said passage, means for causing air to pass through said passage, a receiving casing for directing air from said passage, said casing being adjacent said hub and in spaced relation thereto, and a flange on said hub for bridging the space between said hub and casing.

2. In a combined fan and air cleaner, a rotating fan, an adjustable fan pulley having an air passage therethrough, a screen attached to said fan for covering the entrance of said passage, means for causing air to pass through said passage, a receiving casing for directing air from said passage, said casing being adjacent said pulley and in spaced relation thereto for permitting axial adjustment of said pulley, and a flange on said pulley adapted to extend beyond said casing in all positions of adjustment of the pulley.

3. In a combined fan and air cleaner, a rotatable fan having blades, a screen attached to the front side of said fan, near the center thereof, in such a manner as to leave the ends of the blades projecting beyond the screen, a stationary casing adjacent the rear of said fan for receiving the portion of the air stream from said fan which passes through said screen, radial dust deflectors secured to said screen extending beyond the inner opening of the casing and said casing being arranged so that the remainder of the air stream passes over the outside surface thereof.

4. In a combined fan and air cleaner, a rotatable fan having blades, a screen attached to the front side of said fan near the center thereof in such a manner as to leave the ends of the blades projecting beyond the screen, a stationary casing adjacent the rear side of said fan for receiving only that portion of the air stream from said fan which passes through said screen, and means for deflecting particles of solid material out of the portion of the air stream passing through said screen and into the remainder of the air stream.

5. In a combined fan and air cleaner, a rotatable fan having blades, a screen attached to the front side of said fan near the center thereof in such a manner as to leave the ends of the blades projecting beyond the screen, a stationary casing adjacent the rear side of said fan for receiving only that portion of the air stream from said fan which passes through said screen, and radial vanes secured to the front side of said screen to deflect solid particles out of the portion of the air stream passing through said screen and into the remainder of the air stream.

6. In a combined fan and air cleaner, a fan having a cylindrical open ended hub and blades mounted thereon, a screen attached to said fan and covering the front open end of said hub, whereby a portion of the air stream created by said fan passes through said screen and said hub, and the remainder thereof passes over the outer surface of said hub, means within said hub to assist in impelling air therethrough, and a casing adjacent the rear open end of said hub for receiving the screened air.

In testimony whereof, I affix my signature.
CHARLES Y. KNIGHT.