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AIR CLEANER

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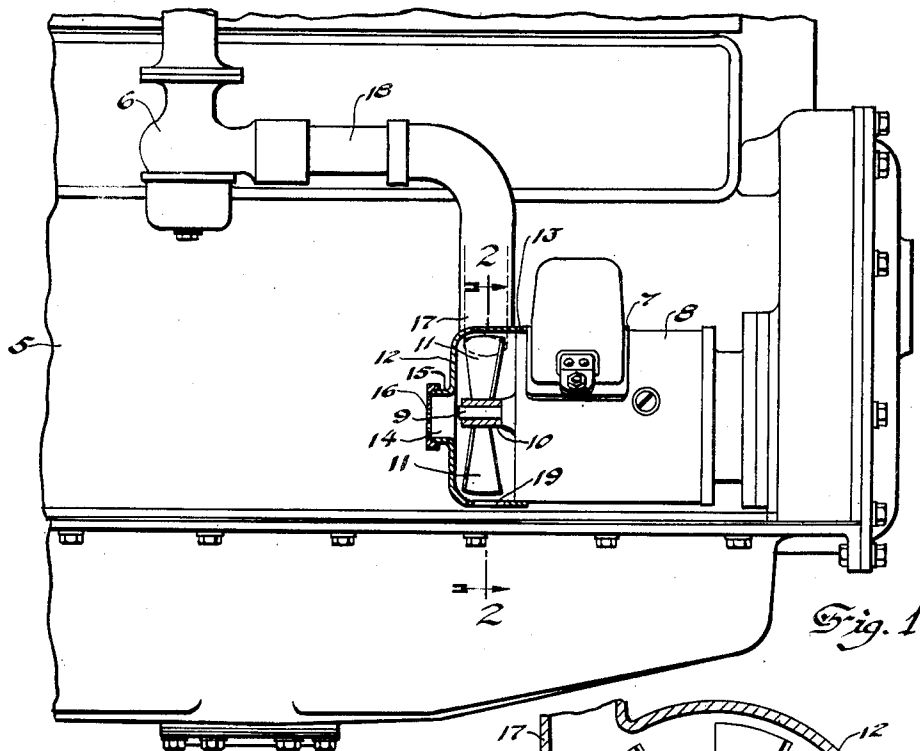


Fig. 1

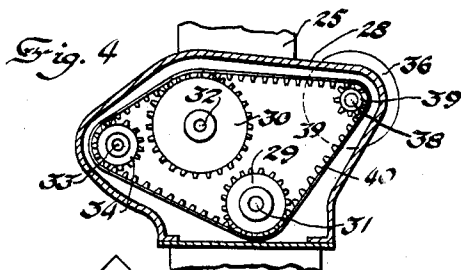
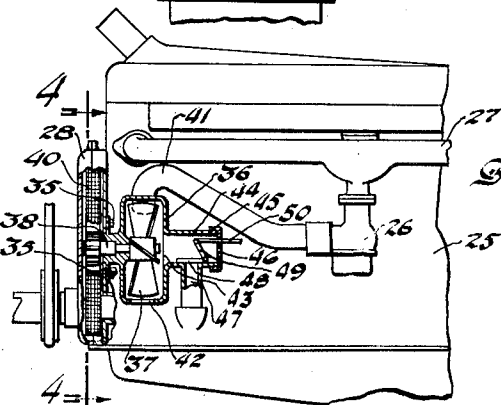


Fig. 5

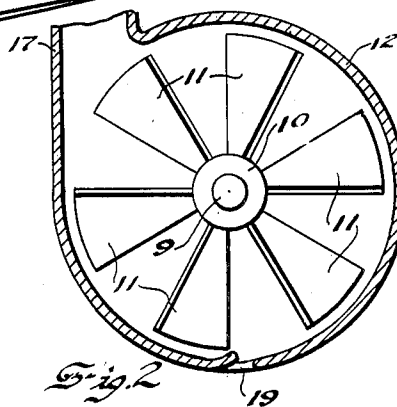


Fig. 2

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AIR CLEANER

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9 Claims. (Cl. 123—119)

This invention relates to apparatus for supplying clean air to the carburetor of an internal combustion engine.

It is desirable to have an air cleaner on the air intake line of a carburetor to remove the solid impurities from the air before it enters the carburetor and the engine cylinders. But an air cleaner of the type ordinarily used for this purpose inherently offers considerable resistance to the passage of air therethrough and sometimes, particularly at the higher engine speeds, due to this resistance, a supply of air sufficient for the needs of the engine cannot be drawn through the air cleaner by the engine suction. It is an object of this invention to provide, in combination with the carburetor of an internal combustion engine, a combined air cleaner and blower, which includes a rotatable port driven from the engine, for cleaning air and supplying the cleaned air to the air intake of the carburetor.

It is another object of this invention to provide, in combination with the carburetor of an internal combustion engine, a combined air cleaner and blower, which includes a housing, and a rotatable member within the housing driven by the engine through one of its auxiliaries such as the fan, the generator or the water pump, for cleaning air and supplying the cleaned air to the air intake of the carburetor.

It is another object of the invention to provide, in combination with the carburetor of an internal combustion engine, an air cleaner which includes a housing, and a rotatable member within the housing driven by the engine for giving the air in the air cleaner such a motion that the dirt is separated from it and the cleaned air forced from the housing to the air intake of the carburetor.

It is another object of the invention to provide an improved air cleaner.

Other objects of the invention will appear in the course of the following description. In the drawing:

Figure 1 is a fragmentary view, partly in side elevation and partly in section, of my combined air cleaner and blower installed on an internal combustion engine.

Figure 2 is a section taken on the line 2—2 of Figure 1.

Figure 3 is a view similar to Figure 1, but showing a modified arrangement of my combined air cleaner and blower on an internal combustion engine.

Figure 4 is a section taken on the line 4—4 of Figure 3.

In Figures 1 and 2 of the drawing, the reference character 5 indicates an internal combustion engine on which is provided a carburetor 6 and a generator 7 which is driven from the crankshaft of the engine.

The generator is provided with a casing 8 through one end of which the armature shaft 9 projects. Secured to the projecting end of the shaft so as to rotate therewith is a hub 10 carrying fan blades 11. The fan and the projecting end of the shaft 9 are enclosed in a housing 12 whose body portion is substantially cylindrical in shape. One end of the cylindrical portion fits tightly over the end of the generator casing, as indicated at 13, and is secured thereto. The outer end of the cylindrical portion is closed except at the center where a large opening 14 concentric with the shaft 9 is provided. The opening 14 is surrounded by an outwardly directed circumferential flange 15 which forms an air intake conduit which is screened at its outer end, as indicated at 16. An air discharge conduit 17 opens at one end tangentially into the cylindrical portion of the housing at a point opposite the ends of the fan blades and extends from the housing to the conduit 18 which opens into the air intake conduit of the carburetor 6. In the side wall of the housing opposite the ends of the fan blades and circumferentially spaced from the conduit 17, there is provided a dirt discharge opening, as indicated at 19 on the drawing.

The air intake conduit 15 may be provided with a branch leading into the crankcase, as shown in Figure 3, so that air may be drawn from under the hood or from the crankcase as desired.

In Figures 3 and 4 of the drawing, the reference character 25 indicates an internal combustion engine on which is provided a carburetor 26 and an intake manifold 27 leading from the carburetor to the intake ports in the cylinder block.

On the front end of the engine, there is provided a gear case 28 which extends laterally beyond each side of the cylinder block. The pinions 29 and 30 within the gear case 28 are keyed to the forward ends of the crankshaft 31 and the camshaft 32, respectively. Behind and secured to one lateral extension of the gear case is the generator which is provided with a shaft 33 which extends into the gear case and is there keyed to the pinion 34. Behind and secured to

the other lateral extension of the gear case by the screws 35 is a fan housing 36 within which there is located a fan 37 similar to that shown in Figures 1 and 2 and similarly mounted on a shaft 38 which extends forwardly into the gear case 28. Within the gear case there is located a pinion 39 which is keyed to the forward end of the shaft 38. The chain 40 extends around and meshes with each of the pinions 29, 30, 34 and 39 so that the camshaft, generator shaft and fan shaft are driven by the crankshaft.

The fan housing 36 is similar to that shown in Figures 1 and 2, being provided with an air discharge conduit 41 opening tangentially into one side thereof opposite the ends of the fan blades and a dirt discharge opening 42 similar to the opening 19 shown in Figures 1 and 2 and similarly located with respect to the fan blades and the air discharge conduit. The conduit 41 extends from the housing to the air intake of the carburetor 26 to which it is connected in any desired manner.

In the rear end of the housing 36 and concentric with the shaft 38, there is provided an orifice 43 which opens into the housing and the air intake conduit 44. The air intake conduit 44 is provided with two branches, one of which, 45, opens under the hood and is screened, as indicated at 46, and the other of which 47 opens into the crankcase. A pivoted valve 48 on which is provided an operating lever 49 to which is connected an operating rod 50, which may extend to the dash or any other desired point, is arranged so that it may close either of the branches 45 and 47 to communication with the interior of the housing so that air may be drawn from the crankcase or from beneath the hood as desired.

It will be clear from a comparison of the size of the pinions 34 and 39 that the fan shaft 38 rotates faster than the generator shaft 33. This gives the form of my device shown in Figures 3 and 4 the advantage that a smaller fan can be used to supply air at a given rate at a given engine speed.

As the operation of the apparatus shown in Figures 1 and 2 and Figures 3 and 4 is similar, a single description will suffice to explain both. When the engine starts, the fan rotates and the air is drawn through the intake opening into the fan housing where the blades impart to it a rotary motion which causes the dirt to be thrown to the outside of the current and finally to pass out of the housing through the dirt discharge opening. The fan forces the cleaned air out of the housing through the tangential discharge conduit and to the air intake conduit of the carburetor.

I have thus provided, in combination with the carburetor of an internal combustion engine, a combined air cleaner and blower which includes a rotatable element which is positively driven from the engine through one of its auxiliaries. This rotatable member draws air into a housing, gives it a rotary motion whereby the solid impurities are separated from it by centrifugal action, and then forces the cleaned air out of the housing to the air intake conduit of the carburetor. With a cleaner of the type disclosed, air may be supplied to the intake of the carburetor under practically any desired pressure by properly selecting the size of the fan and the velocity at which it is driven. It is obvious that my combined air cleaner and blower can be used as a supercharger if desired.

My combined air cleaner and blower may be constructed as a part of any of the engine auxiliaries, such as the generator (as shown in Figure 1), the fan or the water pump and may have its fan driven directly or, if desired, through a train of gears from the auxiliary to which it is connected.

I claim:

1. In combination, an internal combustion engine having a carburetor, an engine auxiliary having a shaft driven from the engine, a combined air cleaner and blower, including a member secured to the auxiliary to constitute therewith a housing and connected to the air intake line of the carburetor to supply air thereto, and a rotatable member within the housing driven from the shaft of the auxiliary. 85
2. In combination, an internal combustion engine having a carburetor, a combined air cleaner and blower including a housing having air intake and discharge openings and a dirt discharge opening, a rotatable member within the housing driven from the engine, a conduit opening into the air intake opening of the housing at one end and having a branch opening beneath the hood and a second branch opening into the crankcase of the engine, and means to open either or both of said branches to the air intake opening in the housing. 90
3. The combination, in an internal combustion engine, of an engine auxiliary having a shaft driven from the engine, a combined air cleaner and blower including a member secured to the shaft of the auxiliary to rotate therewith, and a housing of which the auxiliary forms a part enclosing said member. 95
4. The combination with an internal combustion engine having an air intake and an engine driven accessory device, of means to clean and deliver air to said intake including a rotor driven through said accessory device, and a casing therefor secured to the accessory device and provided with a tangential air outlet connected with the air intake. 100
5. The combination with an internal combustion engine having an air intake and an engine driven accessory device, of means to clean and deliver air to said intake including a rotor driven through said accessory device, and a casing therefor secured to the accessory device and provided with a tangential air outlet connected with the air intake and with an axial air inlet. 105
6. The combination with an internal combustion engine having an air intake and an engine operated accessory device provided with a shaft projecting beyond one wall thereof, of a fan mounted on the shaft projection, a casing associated with the accessory device and co-operating with the said wall to enclose said fan, and an outlet leading from the interior of the fan casing to said air intake. 110
7. In combination, an engine having an air intake, a combined air cleaner and blower driven by the engine and provided with an air inlet, a dirt discharge outlet, an air outlet connected to the engine intake, and an air cleaning device associated with the air inlet to said cleaner and blower to afford an initial separation of dirt from the incoming air. 115
8. In a combined air cleaner and blower, a substantially cylindrical housing with whose interior a tangentially disposed air discharge conduit communicates through an opening in the cylindrical wall, a fan mounted substantially coaxially with and within the housing with the 120

extremities of its blades in close proximity to the cylindrical wall of the housing, an air intake opening in an end wall of and substantially coaxial with the housing, and a relatively small dirt discharge opening in the cylindrical wall of the housing at a distance from the air discharge opening, said cylindrical wall being imperforate except for the mentioned air and dirt discharge openings.

9. In combination, an internal combustion engine having an auxiliary having a shaft driven from the engine, a fan on the shaft of the auxiliary, a housing surrounding the fan and having an air intake, a tangential air outlet and a dirt discharge opening, and a conduit leading from the tangential air outlet to the air intake of the carburetor, said housing including a cover positioned over the fan and closed on one side by the auxiliary.

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