

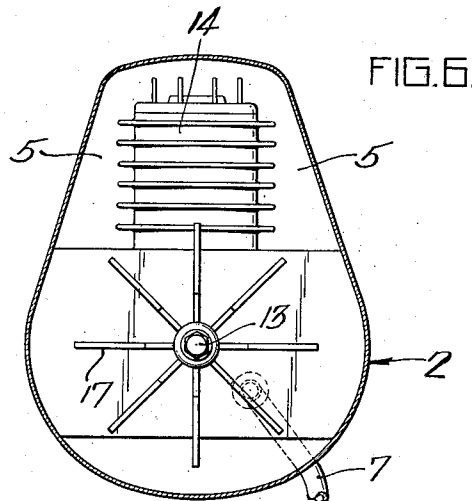
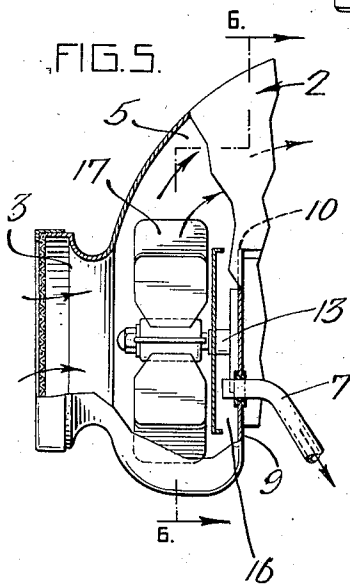
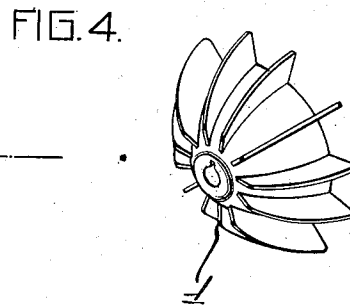
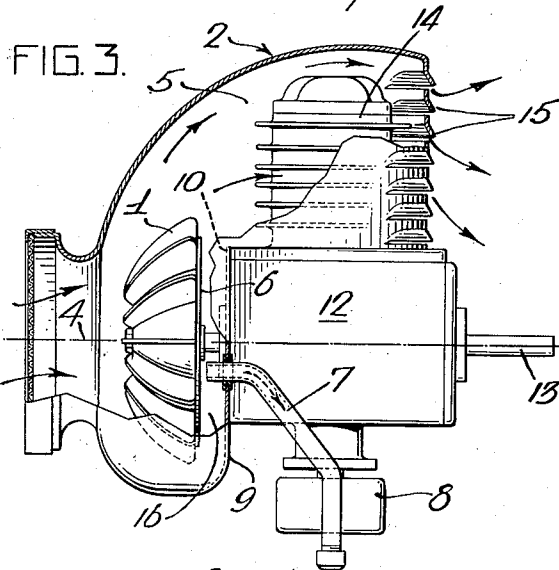
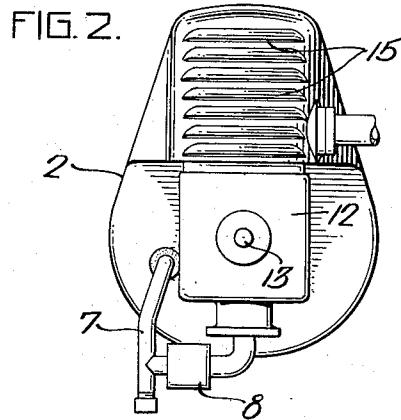
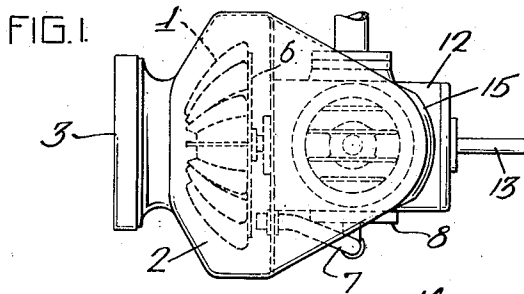
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AIR CLEANER

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## AIR CLEANER

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3 Claims. (Cl. 123—41.56)

This invention relates to apparatus for supplying clean air to the carburetor of an internal combustion engine, or to other device or mechanism which requires a supply of substantially dust-free air.

It is well known that dust or other solid matter of any kind carried by incoming air into a carburetor or engine combustion chamber tends to clog the jets and valves of the carburetor and chamber and thereby to render the engine inoperative until the solid matter is removed from all small orifices and openings through which the air must pass in controlled quantities. Furthermore, internal engine parts are subjected to excessive wear if dirt or dust is permitted to flow into the combustion chamber. Two cycle engines are especially vulnerable to foreign particles, due to the type of intake valves used, which are either reed or rotary. The necessity of providing air-cleaning means is accordingly recognized.

One of the now conventional methods of cleaning air on its way to a carburetor is to pass it through a filter, of which there are various types. Such filters are, in general, efficient and satisfactory, but have one drawback, viz.: they accumulate in themselves the solid matter filtered out of the air as it passes through them, with the eventual result of reducing the amount of air that can pass through the filter, in consequence of which the carburetor receives gradually less and less air until it is unable to deliver the requisite volume of fuel-laden air to the engine or to maintain the proper mixture of air and fuel necessary to good engine performance. Accordingly, it is necessary to clean the filter more or less frequently. Moreover, filters may get wet and freeze solid during cold weather use.

This invention obviates the need of an air filter and delivers substantially dust-free air, at the same time automatically disposing of the solid matter removed from the air.

This invention also delivers air to the carburetor at constant and slightly more than atmospheric pressure, which contributes to the efficiency of the carburetor.

This invention is applicable to any air cooled internal combustion engine or other mechanism which comprises an enclosed fan which functions so as to produce a centrifugal flow of air the course of which may subsequently be changed and so channelled and directed as to be useful.

It is conventional to provide such a fan with a screen over its intake opening. Sometimes more than one screen is incorporated, and in some instances a screen is so mounted as to rotate with the fan. Such screens, however, must be relatively coarse and open, so that they function only to exclude large particles such as chips, pebbles, grass, leaves, straw, feathers, strings or other such bodies which may be present in the air in the vicinity of the fan and associated mechanism. The screen does not filter the air to the extent of excluding small particles, for the exclusion of small particles is not necessary to the continuous and satisfactory functioning of the fan.

In the accompanying drawings:

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Fig. 1 is a top view of a small internal combustion engine made in accordance with the invention;

Fig. 2 is an end elevational view of the engine from the the power takeoff side;

5 Fig. 3 is a side view of the engine with a portion of the fan shroud or housing broken open so as to render the fan visible;

Fig. 4 is a view in perspective of the fan detached from the engine;

10 Fig. 5 is a fragmentary side elevation and partial sectional view of an engine with a different type of fan within the scope of the invention, and

Fig. 6 is a sectional view on the line 6—6, Fig. 5.

15 With reference to the drawings, the invention comprises a rotary fan 1 of centrifugal type which in operation tends to impel air radially into a shroud 2. The shroud 2 encloses the fan and has a screened opening 3 adapted to admit outside air axially to one side of the fan adjacent the axis 4 of the latter, said shroud also having another opening 5 adjacent the periphery and in the present instance at the top of the fan adapted to discharge the air in a desired direction. A radial baffle 6 forms a solid wall in proximity to the side of the fan remote from the admission opening 3; and a tube 7, constituting the air supply duct of a carburetor 8, has its intake end in proximity to the said baffle as illustrated. The baffle may be stationary or may be integral with or otherwise rotatable with the fan. The inner or rear wall 9 of the shroud extends upwardly in spaced relation to and at the back of the baffle 6 to a point near the outer periphery of the fan and in the present instance the upper edge 10 of the wall defines the lower edge of the discharge opening 5.

25 A suitable assembly in accordance with the principle of the invention, therefore, consists of a fan having a radial wall on the side of its fins or blades which lies remote from the intake opening of a shroud, so that only air newly admitted through said opening reaches the axial area of the fan, said baffle providing a space adjacent the shaft of the fan on the side remote from the said intake opening, which space is accessible during operation only to air which has been subjected to the action of the fins or blades of the fan.

30 It is not necessary that the solid wall which functions as a baffle extend to the periphery of the fan. Its essential location and extent is adjacent the axis of the fan.

35 A particular advantage from the standpoint of economy and practicability arises from the fact that the fan and other component assemblies and parts comprised in this invention are to be found in many air cooled internal combustion engines in substantially the required form, while in practically all others a fan conforming to the functional requirements of this invention can be substituted and a baffle provided separately if not made integral with the fan, and such provisions will perform all of the functions required therefrom for other purposes, the prime purpose of a fan in operative combination with an air cooled internal combustion engine being to circulate air to and around the engine cylinder or cylinders.

40 A typical air cooled engine assembly is illustrated in Figs. 1 to 4 of the drawings wherein, in addition to the elements previously described, the crankcase of the engine is shown at 12, the fan 1 being mounted on one end of the shaft 13 of the engine. The engine cylinder or cylinders 14 occupy an upright position in the discharge opening 5 of the shroud 2, said opening terminating in the present instance in louvers 15 which shield the cylinder. In the present instance the intake end of the carburetor air feed duct 7 lies in the space 16 between the baffle 6 and the inner wall 9 of the shroud 2 and slightly below the shaft 13.

Figs. 5 and 6 show an essentially similar assembly utilizing a different form of fan 17.

This invention utilizes a fan necessarily functioning for other purposes in the comprehensive engine assembly, with or without structural modification, to perform the function of cleaning air; and provides an opening into a tube which would in any event be present (ordinarily starting at a filter) to convey cleaned air to the carburetor, said opening being so disposed as to allow the movement into said tube of air from which dust and other solid matter has been removed by the operation of the fan.

In imparting velocity to air the fan incidentally imparts velocity to the dust or other solid particles present in the air. The fan with its shrouding is adapted to deliver a major portion of the air passing through it to a selected locality, radially and/or tangentially, beyond the periphery of the fan where cooling effect is desired, and dust and other small particles of solid matter are carried along with such major portion of the air, without detriment to the cooling function since there is ample space for its passage.

Such minor portion of the air as does not join the main current and promptly escape, deviates from the direction in which the dust and other particles are impelled by the direct action of the fan or by the resulting (partially deflected) current. Inertia of motion causes the dust and other solid particles to continue to travel in the direction in which they are impelled by the fan or by the air current travelling at the highest speed with the least change of direction. Accordingly, the dust and other solid particles do not travel with the slower moving air that eddies back into space near the fan shaft, remote from the main outlet and on the side of the baffle remote from the influx of outside air, where an air opening is provided for its exit into a tube leading to the carburetor.

In an experimental operative embodiment of this invention, a trap with a removable cap at the bottom was provided in the tube leading from such an opening to the carburetor, but even after running the engine for a protracted period of time no deposit of dust particles or other foreign matter was found in the trap. Meantime, throughout extensive and lengthy service tests the engine maintained peak performance and no adjustment or servicing was necessary as a result of dust or foreign matter entering the carburetor.

Incidental to directing the flow of air from the fan to the location desired, and for the purpose of so doing, a fan such as described is necessarily associated with a surrounding shroud which confines the air except where its egress is desired. Such a surrounding shroud functions to restrain the escape in undesired directions of air driven by the motion of the fan, and by confining said air to predetermined course of flow, and in so doing brings about the accumu-

lation within itself of air pressure slightly in excess of and more uniform than the atmospheric pressure outside of the shroud. This increased and uniform pressure is effective at the opening provided for the escape of air which passes therefrom to the carburetor, and results in improved functioning of the carburetor.

I claim:

1. In combination with an air cooled internal combustion engine comprising a carburetor, a centrifugal fan having air-impelling blades, baffle means at one axial side of the fan restricting the axial flow of air to the blades to one side only of the fan, shroud structure enclosing said fan and baffle and having an opening for admission of air axially to the said one side of said fan, and having also an opening for the discharge of air from the periphery of said fan, and an opening in said shroud structure adjacent the axis of said fan and on the side of said baffle remote from said blades for the delivery of air to the carburetor.

2. In combination, a centrifugal fan having an axis, shroud means substantially enclosing said fan and having an inlet port for admission of air axially to one side only of said fan, said shroud means also having a discharge port radially remote from said axis, a radial baffle at the other side of said fan, and air-withdrawal port means having an entrance near said axis between said baffle and said shroud for the withdrawal, for external use, of air which has passed radially through said fan and around said baffle into space near said axis between said baffle and the side of said shroud opposite said inlet port.

3. Apparatus for providing a supply of air from which any suspended solid matter has been removed by centrifugal impulsion, said apparatus comprising a centrifugal fan having air impelling blades and an axis, a shroud substantially enclosing said fan, an inlet opening in said shroud adjacent said axis for admission of air axially to one side only of said fan, a discharge port in said shroud radially remote from said axis for the discharge of centrifugally impelled air and solid matter suspended therein, a baffle located within said shroud on the other side of said fan between said fan and a side of said shroud opposite said inlet opening, the said baffle extending radially from said axis and having an edge remote from said axis, said baffle and said side of said shroud defining between them a space adjacent said axis into which air can enter only after first passing beyond the said edge of said baffle, and port means for withdrawing, for use outside of the apparatus, air which has passed around the edge of said baffle into said space.

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