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AIR CLEANER

Filed Aug. 28, 1929

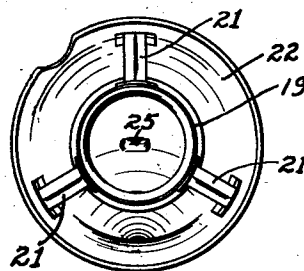
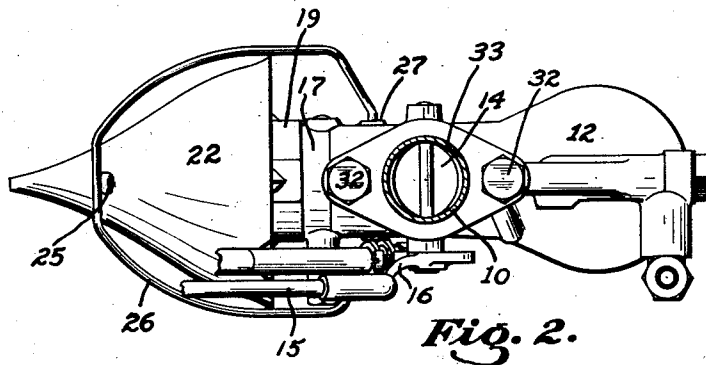
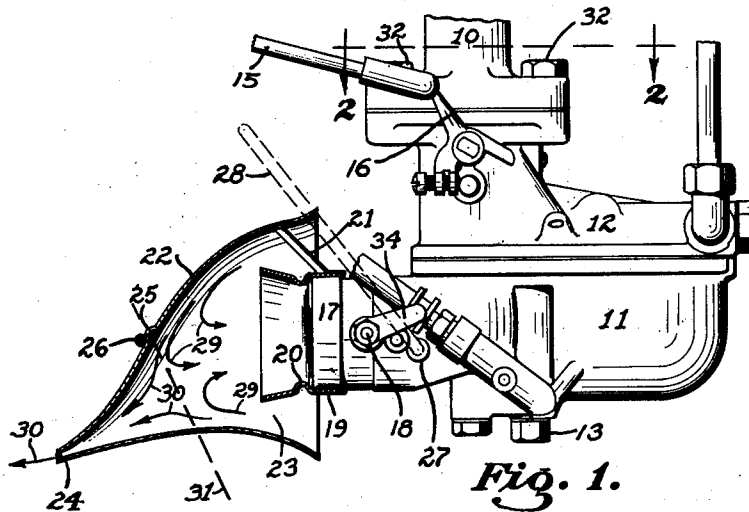


Fig. 3.

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AIR CLEANER

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The object of my invention is to provide an air cleaner of simple, durable and inexpensive construction.

A further object of my invention is to provide an air cleaner for use with the carburetor of an internal combustion engine which will separate the dust particles from the air consumed in the carburetor so that only dust free air will be permitted to enter the engine.

Still a further object of my invention is to provide an air cleaner having comparatively few parts, all of which are stationary. This air cleaner is therefore well able to last the life of the engine with which it is used.

Still a further object of my invention is to provide an air cleaner which will not restrict the free passage of air to the engine carburetor, thereby allowing the engine to develop its full rated power. Most air cleaners create a drag on the incoming air of the engine carburetor which materially reduces the power output of the motor. Further, when screens or filters are used they become lodged with dirt and the restriction to the air is increased which disrupts the normal functioning of the carburetor. Under these conditions an excessive amount of fuel is drawn into the carburetor by the increased air suction. The economical operation of the engine is thereby prevented with this sort of cleaner. In the applicant's cleaner no screens, filters or the like are used, and the particles of dirt which are separated from the air are immediately removed from the cleaner so that it cannot become clogged or stopped in any way.

Still a further object of my invention is to provide an air cleaner in which the inertia of the dirt particles is used to separate these particles from the air. In this device the greater part of the air current entering the cleaner reverses upon itself and enters the engine carburetor, while the remaining portion of the air continues through the cleaner and is discharged through an opening in the rear of the device. This remaining portion of the air carries practically all the dust particles with it so that only clean and dust free air enters the engine carburetor.

Still a further object of my invention is to

provide an air cleaner in which a portion of the air current from the engine fan is conducted into the cleaner and in which the remaining air current creates a zone of partial vacuum in the rear of the cleaner so that part of the air entering the cleaner will be drawn outwardly through the rear end of the cleaner by this partial vacuum.

With these and other objects in view my invention consists in the arrangement, construction, and combination of the various parts of my improved device, as described in the specification, claimed in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 shows a side elevation of an internal combustion engine carburetor having my improved air cleaner mounted thereon, the air cleaner being shown in section to better illustrate the operation of the device.

Figure 2 shows a sectional view taken on the line 2—2 of Figure 1, and

Figure 3 shows a front elevation of the air cleaner detached from the carburetor.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate generally the intake manifold of an internal combustion engine having a carburetor fastened thereto by means of bolts 32. This carburetor is of the conventional type having a float chamber 11 which is secured to a cover member 12 by means of a bolt 13. A gas passage way 33 is provided in the cover member 12 and a butterfly valve 14 is pivotally mounted in this passage way to control the flow of gas to the intake manifold 10. A control rod 15 and crank 16 are provided for operating the valve 14. An air inlet duct 17 is cast integrally with the float chamber 11 and extends rearwardly therefrom. A second butterfly valve 18, commonly called a choke valve, is provided in the air duct 17 and is operated by the crank 34.

It will be noted that the carburetor just described is a conventional carburetor and is not changed in any way to adapt itself to my improved air cleaner. Further, it will be understood that this improved air cleaner may be used not only with all types of internal combustion engines, but also with

Diesel type engines and, in fact, any place where dust free air is desired. The type of carburetor and method of securing the air cleaner to the carburetor is optional with the user.

The air cleaner is provided with a sleeve 19 which extends a short distance over the rear end of the air duct 17. This sleeve is provided with a reduced portion 20 which forms a shoulder against which the air duct 17 bears. Three sheet metal arms 21 are secured to the forward end of the sleeve 19 and extend outwardly therefrom and support the cleaner casing.

The casing of my improved air cleaner consists of a conical shaped member 22 having its large end adjacent to the air duct 17. The outer ends of the arms 21 are secured to the large end of the casing 22 and fasten this casing and the sleeve 19 together. The large end of the casing 22 being considerably larger than the sleeve 19 an annular passage way 23 is thus formed between these two parts which is only obstructed by the relatively small arms 21.

A small opening 24 is provided in the small end of the casing 22, the purpose of which will be later described. It will be noted from Figure 1, that the small end or apex of the casing 22 is not in line with the axis of the large end but is bent downwardly a considerable distance from this axis. The purpose of this construction is twofold. First, a much simpler method of securing the casing to the carburetor is obtained, and secondly, the opening 24 in the small end of the casing operates so that the gravity of the dust particles need not be overcome during their separation from the air.

A detent 25 is provided in the casing 22 at the point where the axis of the large end intersects the wall of the cone, due to the small end being bent downwardly. This detent 25 is formed from the metal of the cone and co-acts with a bail 26 which is pivotally secured to the air duct 17 in a pair of bearings 27.

The free position of the bail 26 is shown in Figure 1 by the dotted lines 28. It will be readily seen that when the bail 26 is in this free position, the sleeve 19 may be assembled on the air duct 17 and the air cleaner secured to the carburetor by springing the bail over the detent 25. The purpose of the bail 26 is to provide a simple method of assembling the air cleaner to the carburetor and one which will not rattle or shake loose. Although the air cleaner may be readily removed this is seldom necessary because the dust particles which are separated from the air do not collect in the cleaner.

The air from the engine fan, not shown in the drawings, is blown rearwardly past the carburetor. The forward or large end of the casing 22, being placed in this air stream,

collects some of the air and conducts it to the rear end of the sleeve 19 where the major portion of the air reverses upon itself and enters the air duct 17 of the carburetor.

The rear end of the casing 22 is bent downwardly so that it also is in the air stream of the engine fan. As the air passes this end of the casing, a partial vacuum is formed rearwardly of the opening 24 which draws some of the air entering the large end of the casing, out through the opening 24. Arrows 29 show the path taken by the major portion of the air in the casing while arrows 30 show the path taken by the small portion through the opening 24.

It may be seen that the air entering the sleeve 19 is traveling in the opposite direction from that leaving through the opening 24 and that at a point between these two elements all the air is either stationary or is traveling in the direction of the opening 24. The dotted line 31 designates this approximate position in the casing at which all of the air flows in the direction of the opening 24.

As the mixture of air and dust enters the casing the particles of dust, being heavier than the air, continue in a straight path until they strike the walls of the casing. The dust particles then follow the walls to a point rearwardly of the dotted line 31. The inertia of the dust particles prevents them from reversing their direction as readily as the clean air so that these particles are all projected rearwardly of this dotted line. All of the air rearwardly of this point in the casing is traveling in the direction of the opening 24 so that all of the dust particles which are projected into this area will be carried out of the cleaner through the opening 24.

Of course the direction of some of the extremely fine and light particles of dust may be reversed and the particles drawn through the carburetor but only extremely small particles are sufficiently light enough for the air current to overcome their inertia. The larger and heavier the particle of dust, the more certain it is that it will be projected rearwardly of the dotted line 31 and will be carried out through the opening 24. Once the dust particle has reached this position, there is no air current or other force which will tend to draw it into the carburetor.

Many advantages arise through the use of my improved device, the foremost being that no drag or restriction is placed in the air inlet of the carburetor so that the engine used with this cleaner may develop its maximum power.

A further advantage is that the device is extremely simple and cheap to manufacture and assemble on the engine carburetor. Still a further advantage is obtained because the device never requires cleaning and retains its efficiency indefinitely.

Some changes may be made in the construction

tion, arrangement, and combination, of the various parts of my improved device without departing from the spirit of my invention, and it is my intention to cover by my claims such changes as may reasonably be included within the scope thereof.

I claim as my invention:

1. In an air cleaner, an open ended conical shaped casing having its vertex placed below the axis of the large end of said casing, a sleeve adapted to form a clean air outlet for said cleaner, and means for securing said sleeve to said casing adjacent to the large end of said casing.

2. In an air cleaner, an open ended conical shaped casing having its vertex placed below the axis of the large end of said casing, a sleeve adapted to form a clean air outlet disposed within the large end of said casing, and a plurality of arms extending between said sleeve and casing, to support said casing on said sleeve.

3. In an air cleaner, adapted to be attached to an engine carburetor, an open ended conical shaped casing having its vertex placed below the axis of the large end of said casing, a detent formed on said casing at substantially the intersection of said axis and the wall of said casing, and a bail arranged to co-act with the said carburetor and detent to secure the said casing to said carburetor.

4. In an air cleaner, adapted to be attached to a carburetor, an open ended conical shaped casing, a sleeve adapted to fit over the air inlet of said carburetor, a plurality of arms connecting said sleeve and the large end of said casing, and a bail arranged to detachably secure the said casing to the said carburetor.

5. In an air cleaner, adapted to be attached to a carburetor, an open ended conical shaped casing having its vertex placed below the axis of the large end of said casing, a sleeve adapted to be secured over the air inlet of said carburetor, a plurality of arms extending radially from said sleeve to support the large end of said casing, a detent formed on said casing at substantially the intersection of said axis with the wall of said casing, and a bail arranged to co-act with said carburetor and said detent to secure the said sleeve on said carburetor.

6. In an air cleaner for an internal combustion engine carburetor, an open ended conical shaped casing having its large end facing the air stream created by the fan of said engine, and having its small end turned rearwardly from said air stream, so that air will be forced into the large end and drawn out of the small end of said casing, and a clean air outlet supported within the large end of said casing so that air entering said outlet must reverse its direction from said air stream.

7. In an air cleaner adapted to be used in connection with an internal combustion en-

gine having a fan, a conical shaped casing having its large end facing the air stream created by said fan so as to force air into said casing, a dirt outlet disposed in the small end of said casing turned away from said air stream so that the dirt may be drawn out by suction, and a clean air outlet disposed within the large end of said casing so that air entering the clean air outlet must reverse its direction within said casing to thereby cause the dirt to continue through the dirt outlet.

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