July 28, 1931. A. A. BULL 1,816,633

AIR CLEANER

Filed Nov. 9, 1927

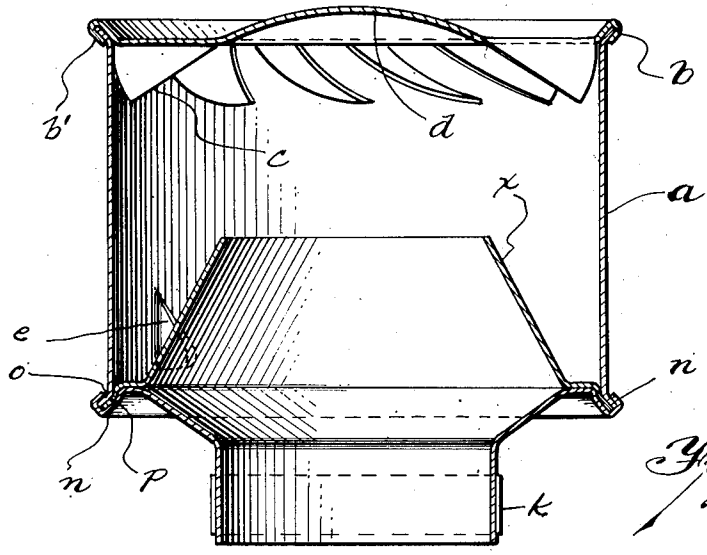


Fig. 1

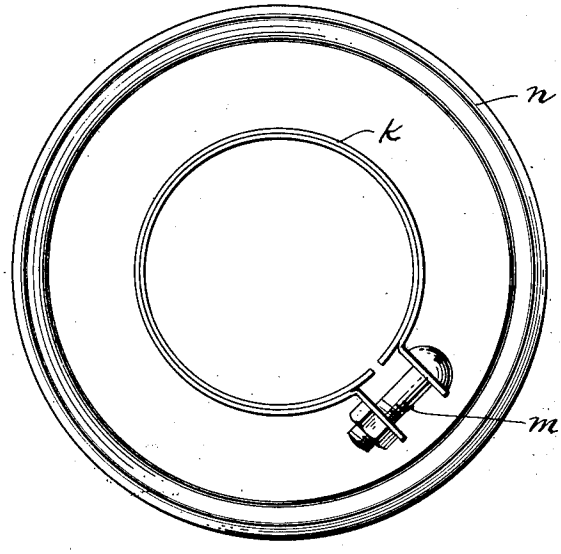


Fig. 4

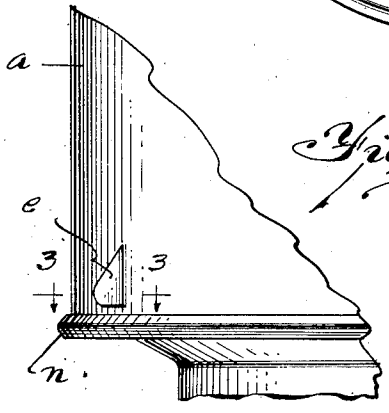


Fig. 2

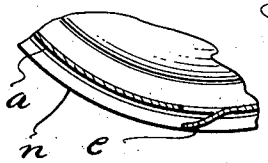


Fig. 3

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Patented July 28, 1931 1,816,633

UNITED STATES PATENT OFFICE

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AIR CLEANER

Application filed November 9, 1927. Serial No. 232,010.

This invention relates to air cleaners. In my prior application, No. 26,860 I have described and broadly claimed an air cleaner which works on the principle of utilizing a helical current of air for separating and discharging the solid matter through a comparatively restricted orifice directly to the atmosphere.

The present invention relates to an improvement on this type of cleaner in which the standpipe utilized in the cleaner is very materially enlarged between the outer and inner end for the purpose of cutting down the restriction to the flow of air through the carburetor; for the purpose of eliminating noise in the cleaner; and for the purpose of increasing the velocity of the swirling air currents to more effectively eject the solid matter to the atmosphere.

Fig. 1 is a vertical section of my improved air cleaner.

Fig. 2 is an enlarged detail of one corner of the cleaner showing the baffle and discharge port.

Fig. 3 is a section taken on the line 3—3 of Fig. 2.

Fig. 4 is a bottom view of the same.

a designates the cylindrical shell of the cleaner. Over this fits a cap *b* which has a folded flange *b'* which folds over the outwardly flared end of the cylindrical shell *a* thereby clamping this cap in position. This cap is sheared to provide the helical vanes *c*, and is pressed up at the center to form the dome *d*.

These vanes *c* direct the air current in a centrifugal whirl, the current being directed not only outwardly but downwardly. This builds up a slight pressure or inertia at the bottom of the shell which is capable of discharging the solid matter through a very restricted orifice directly to the atmosphere. If the orifice be at all large this will not be possible, as the air sucked through such an orifice will more than counter balance the small force tending to eject the solids. This much of the construction is old and is shown and claimed in my prior application, except that the cap constructed by shearing a single piece of sheet metal is not shown in such prior application.

In my prior application I utilize a cylindrical standpipe to cause the air to turn in its path to the carburetor, and I prefer to utilize also a baffle or trap at the bottom of the shell to prevent the solids from being drawn back over the top of the standpipe.

In my present construction I find it unnecessary to utilize the trap and in place of the cylindrical standpipe I utilize a standpipe and outlet conduit which form a double cone, but which in principle simply requires an enlargement of the pipe between the extremities for the purpose of limiting the restriction.

I find that one of the complaints about air cleaners having standpipes is that such standpipe tends to restrict the air input into the carburetor by reason of causing the air to flow through a considerable length of conduit before it enters directly into the carburetor, and thereby in a measure interferes with the input into the engine. Furthermore, the cylindrical standpipe in some cases sets up objectionable noises, a condition which it is rather difficult to explain.

I have found that by enlarging the standpipe between the extremities, some very useful functional features are added to the air cleaner. One of the chief ones is that by reason of enlarging the passageway, the restriction and interferences to a free flow of the air into the carburetor is considerably cut down, hence the volume of air flowing into the carburetor is not materially interfered with by the use of the cleaner. At the same time the objectionable noise which appears in some of these installations is very much minimized or eliminated.

A further very important achievement is that this flaring of the standpipe from the top toward the bottom gradually restricts the passageway for that portion of the whirling current which bears the separated solids. The consequence is that in accordance with well understood principles this increases the velocity of the air stream forced out through the small orifice *e*. This very much increases the ejection efficiency of the cleaner.

I find that with this construction it is not necessary to use a trap or baffle as the ejecting efficiency of the cleaner is such that the baffle can be eliminated, thereby very much cheapening the structure.

The lower end of the cleaner is provided with a clamping ring *k*, together with the bolt and nut *m* by which the cleaner may be clamped over the carburetor intake pipe.

Another feature of construction is the lock-seam *n* formed by means of the stamping that forms the bottom of the cleaner. This stamping is clamped over the turned out or flared flanges *o* and *p* of the shell *a* and the standpipe *x*, respectively. This makes a very cheap and effective assembly, and holds the parts in place.

What I claim is:

1. In an air cleaner, the combination of a shell provided near one end with a relatively small discharge port leading directly to the atmosphere, means at the opposite end for giving the air a whirling and helical direction toward the discharge end to thereby build up a relatively small pressure or energy to discharge the solids out of the relatively small port, and a stand pipe at the discharge end of the cleaner having a substantial enlargement between its ends, said enlargement forming a baffle at the discharge end of the cleaner adjacent said discharge port and also cutting down the path of the swirling current bearing the solids for the purpose of increasing the velocity at the point of discharge.

2. In an air cleaner, the combination of a shell provided adjacent one end with a relatively small discharge port leading directly to the atmosphere, means at the opposite end for giving the air a whirling and helical direction toward the discharge end to thereby build up a relatively small pressure or energy to discharge the solids out of the relatively small port, and an imperforate open ended outlet conduit at the discharge end of the cleaner in the form of a conical enlargement flaring outwardly toward the bottom of the cleaner from the inlet end of the conduit.

3. In an air cleaner, the combination of a shell provided adjacent one end with a relatively small discharge port leading directly to the atmosphere, means at the opposite end for giving the air a whirling and helical direction toward the discharge end to thereby build up a relatively small pressure or energy to discharge the solids out of the relatively small port, and a combined baffle and standpipe at the discharge end of the cleaner having a double cone enlargement intermediate its ends for the purpose specified, the intersection of the double cone being substantially in a plane with the discharge end of the cleaner.

4. In an air cleaner, the combination of a shell provided adjacent one end with a relatively small discharge port leading directly to the atmosphere, means at the opposite end for giving the air a whirling and helical direction toward the discharge end to thereby build up a relatively small pressure or energy to discharge the solids out of the relatively small port, and means adacent the discharge end of the cleaner for gradually cutting down the path of the swirling current bearing the solids for the purpose of increasing the velocity at the point of discharge.

5. In an air cleaner, the combination of a cylindrical shell provided with a restricted discharge orifice at its side having an outwardly directed tangentially positioned baffle, vanes located in the inlet end of the shell for giving the air a swirling helical motion to discharge the solids by the pressure or energy built up directly through the restricted orifice to the atmosphere, and an outlet conduit having an outwardly flared inlet forming a baffle at the discharge end of the cleaner adjacent the said discharge orifice.

6. In an air cleaner, the combination of a shell having at one end a flared out flange, a discharge orifice adjacent the flange, a conical standpipe having at its lower end a flared out flange arranged to match against the aforesaid flared out flange and a bottom wall having a turned over edge adapted to clamp over the flared out flanges to form a lock seam for locking the parts together, said bottom wall forming a continuation of said standpipe.

7. In an air cleaner, the combination of a shell, a standpipe in one end of the shell, a bottom wall secured to the end of the shell and having a pipe-like portion forming a continuation of the standpipe and means carried on said pipe-like portion for attaching the cleaner to a carburetor intake.

8. In an air cleaner, the combination of a shell, a relatively small discharge port positioned adjacent one end and leading directly to the atmosphere, an integral inlet cap having downwardly sheared vanes and an upwardly formed dome secured to the other end of the shell, and a conical member forming a combined baffle and end for the discharge end of the shell.

In testimony whereof I affix my signature.

ARTHUR A. BULL.