

March 24, 1925.

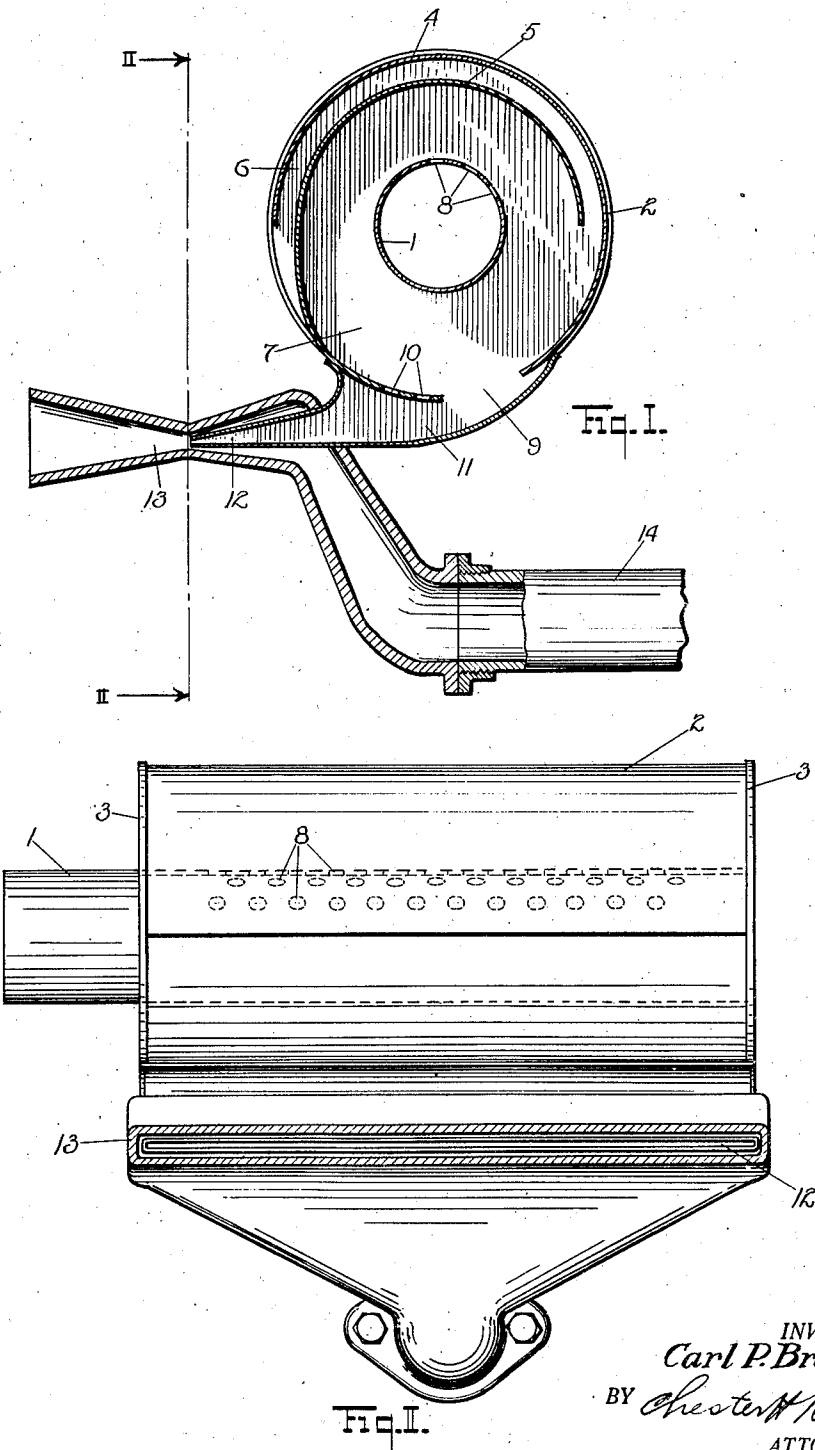
1,530,645

C. P. BROCKWAY

AIR CLEANER

Filed Sept. 13, 1920

2 Sheets-Sheet 1



INVENTOR.
Carl P. Brockway
BY *Chester H. Braselton*
ATTORNEY

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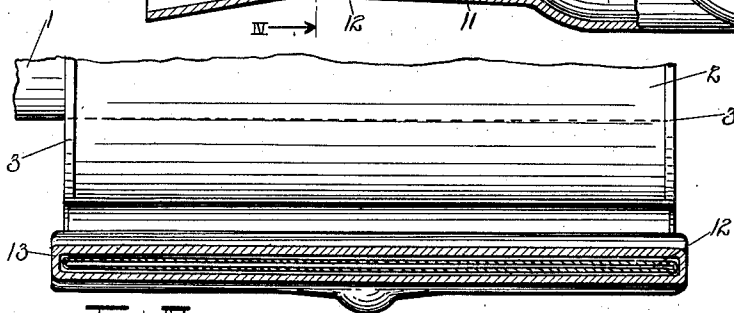
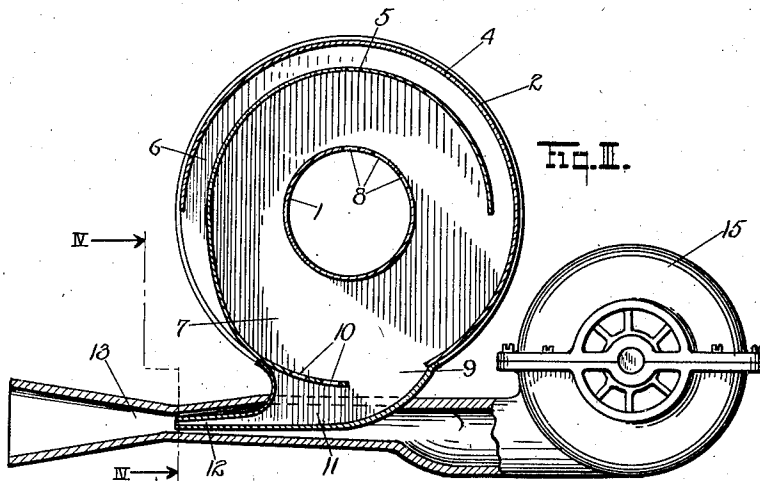


Fig. IV.

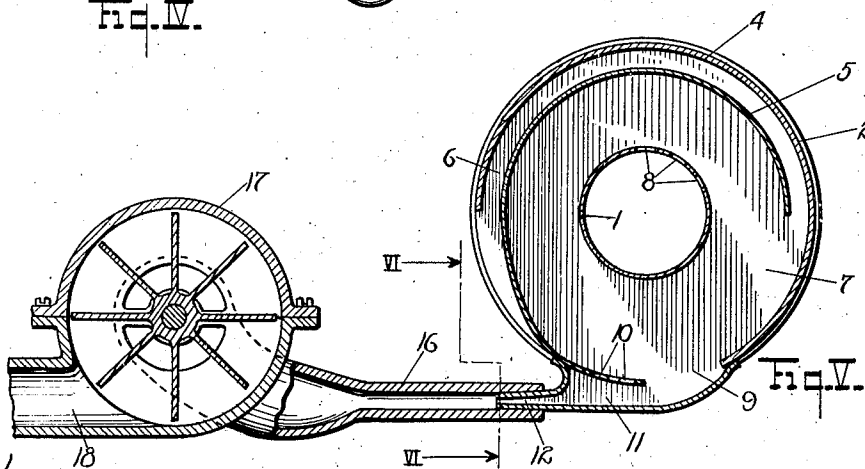


Fig. V.

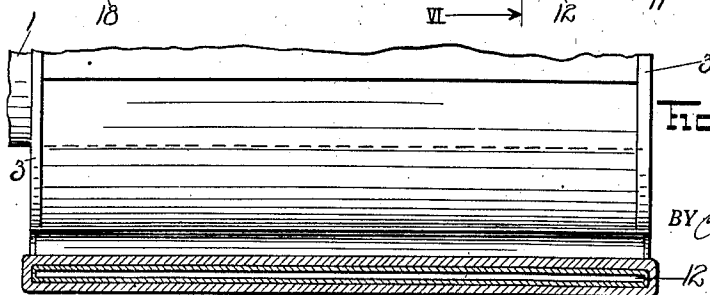


Fig. VI.

INVENTOR.
Carl P. Brockway
BY *Chester H. Braselton*
ATTORNEY

UNITED STATES PATENT OFFICE.

CARL P. BROCKWAY, OF TOLEDO, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STROMBERG MOTOR DEVICES COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AIR CLEANER.

Application filed September 13, 1920. Serial No. 410,023.

To all whom it may concern:

Be it known that I, CARL P. BROCKWAY, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Air Cleaners, of which I declare the following to be a full, clear, and exact description.

This invention relates to improvements in air cleaners or purifiers, especially those employed for cleaning air used in internal combustion engines, and has for its object the provision of means for the purpose specified which shall be economical to manufacture and efficient in operation.

The principal object of this invention is the provision of an air cleaner which has its dust laden air discharged by a pressure reducing means.

Another object is to provide an air cleaner in which the dust is separated by centrifugal force and discharged from the dust box by a separately created blast.

Another object is to combine the air cleaner with an internal combustion engine in which the blast is obtained from the engine exhaust.

Other objects will appear as I proceed with a detailed description of the particular embodiment of the invention which for the purposes of illustration I have shown in the accompanying drawings in which,

Figure I is a transverse section through the center of the air cleaner and showing its relation to the exhaust pipe of an internal combustion engine.

Figure II is a side elevation of the air cleaner and showing the exhaust pipe in section on line 2-2 of Fig. I.

Figure III is a transverse section through the cleaner and showing it operatively associated with a blower.

Figure IV is a section on line 4-4 of Figure III.

Figure V is a view similar to Figure III but showing the cleaner associated with the induction pipe of the blower.

Figure VI is a section on line 6-6 of Figure V.

The air offtake pipe through which the clean air leaves the apparatus is indicated by numeral 1. When the cleaner is used in connection with an internal combustion engine this pipe is attached to the air intake of the carburetor. When the cleaner is used

for other purposes this pipe may be attached to any suction creating means, or in case the air to be cleaned is forced through the cleaner rather than drawn through by suction, the pipe 1 may constitute simply a clean air discharge pipe. The separating chamber of the cleaner shown is made up of two parallel end pieces 3 joined by a sheet metal element bent into a convolute wall 2 which has spaced overlapping portions 4 and 5 upon the upper side thereof, forming an air inlet 6 to the interior 7 of the separating chamber. The offtake pipe 1 extends from end to end within the chamber 7, the end opposite the outlet being closed by the end plate 3. The pipe 1 is provided with a series of perforations 8, preferably on or near its top portion, which serve to allow the clean air to enter pipe 1. The wall 2 is provided with one or more perforations 9 throughout its length in the bottom of chamber 7 which serve as a free outlet for the outer "skim" of dust laden air to separate out by centrifugal force assisted by gravity. The bottom may also be provided with a series of smaller perforations 10, similar to the perforations 8 above, which serve to allow some of the air which passed out through opening 9 to reenter the chamber 7 after having deposited the greater part of the suspended dirt particles. A dust box 11 is provided extending throughout the length of the separating chamber on its under side and enclosing the perforations 9 and 10. The walls of the dust box 11 are drawn out to form a narrow outlet nozzle 12 which extends the full length of the chamber 7 and discharges in the throat of a rectangular shaped Venturi tube 13. This Venturi tube is shown in Figure I as constituting the outlet of the exhaust pipe 14 of an internal combustion engine, not shown.

In the operation of this device, the air is drawn by the suction of the engine into the inlet 6 and is whirled at a high velocity in the narrow passageway between plates 4 and 5 and discharged tangentially into chamber 7 where it continues its rotating motion around the cylinder 1. The outer skim of the rapidly revolving air contains most of the dirt due to centrifugal force acting with greater effect on the heavier particles, and this outer skim of dust laden air is directed down into the dust box 11 by the edges of the opening 9. The cleanest air is of course

nearest the center of the whirl, therefore the air which is drawn by the suction of the engine down through the perforations 8 and on through the offtake pipe 1, is practically freed of dust particles. The high velocity of the exhaust gases from the engine discharging through the venturi 13 creates a vacuum in the nozzle 12 of the dust box, which causes the dust laden air to be drawn from the box 11 and discharged with the exhaust. The exhaust pipe is here shown discharging into the atmosphere but the air cleaner will also operate where the exhaust is led through a muffler.

15 In Figures III and IV, the dust box 11 of the air cleaner is cleaned by the blast from the blower 15 creating a vacuum in the throat of the venturi 13, in much the same way in which the engine exhaust created the vacuum in the arrangement of Figure I.

20 In Figures V and VI, the outlet 12 of the dust box 11 is connected to the induction pipe 16 of a blower 17, and the suction in the blower intake draws the dust laden air from box 11 and discharges it through pipe 18.

25 In the arrangement shown in Figures III to VI the air cleaner may be used to obtain clean air for any purpose and is not limited to a use in connection with an internal combustion engine. It is also obvious that any pressure producing means or vacuum producing means may be used for cleaning out the dust box 11 instead of the blowers illustrated in Figures III and V.

30 While I have described my invention in detail and as being embodied in certain forms I do not intend to be limited thereto, as it is obvious that the same may be varied without departing from the scope of the invention as defined in the appended claims.

I claim as my invention:

45 1. An internal combustion engine in combination with means for cleaning the air as it is drawn into the engine for combustion purposes, and comprising a centrifugal separator connected with the suction intake of the engine for delivering air thereto, a set-

50 tling chamber for the dust, an ejector connected with the settling chamber, and means connecting the ejector with the exhaust conduit of the engine for operating the ejector with the engine exhaust gases.

55 2. An air cleaner for internal combustion engines, comprising, in combination, a cylindrical chamber with a tangential inlet and a horizontal axial outlet, a peripheral pocket at the lowermost portion of the periphery to collect solid material, and engine operated means for continuously withdrawing the accumulation of material from said pocket by ejector action.

60 3. An air cleaner comprising, in combination, a cylindrical chamber with a tangential inlet and an axial outlet, a peripheral pocket to collect solid material, and a foraminated baffle projecting opposite to the direction of rotation part way across said pocket.

65 4. An air cleaner comprising, in combination, a cylindrical chamber with a tangential inlet and an axial outlet, a peripheral pocket to collect solid material, and a foraminated baffle projecting part way across said pocket.

70 5. An air cleaner comprising, in combination, a chamber with a tangential inlet and an axial outlet, a peripheral pocket to collect solid material, and foraminated baffle means choking eddy currents in said pocket, but permitting passage of solid material to said pocket.

75 6. An internal combustion engine in combination with means for cleaning the air as it is drawn into the engine for combustion purposes, and comprising a centrifugal separator connected with the suction intake of the engine for delivering air thereto, an ejector connected with the separator, and means connecting the ejector with the exhaust conduit of the engine for operating the ejector with the engine exhaust gases.

80 In testimony whereof, I affix my signature.

CARL P. BROCKWAY.