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AIR CLEANER AND WASHER

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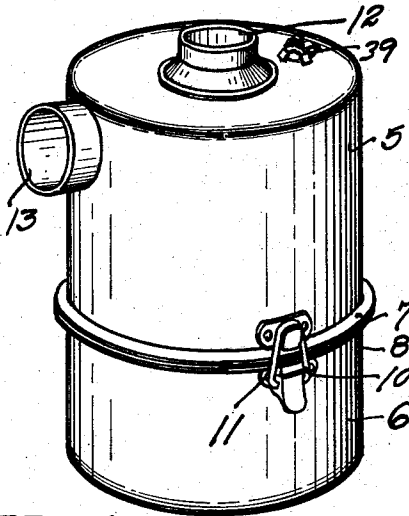


Fig. 1

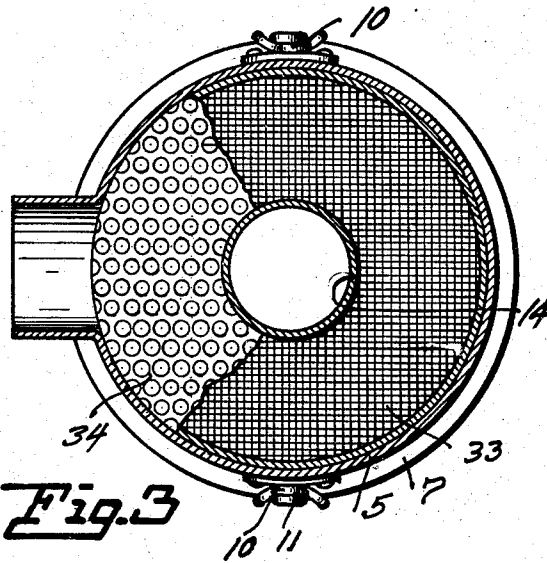


Fig. 3

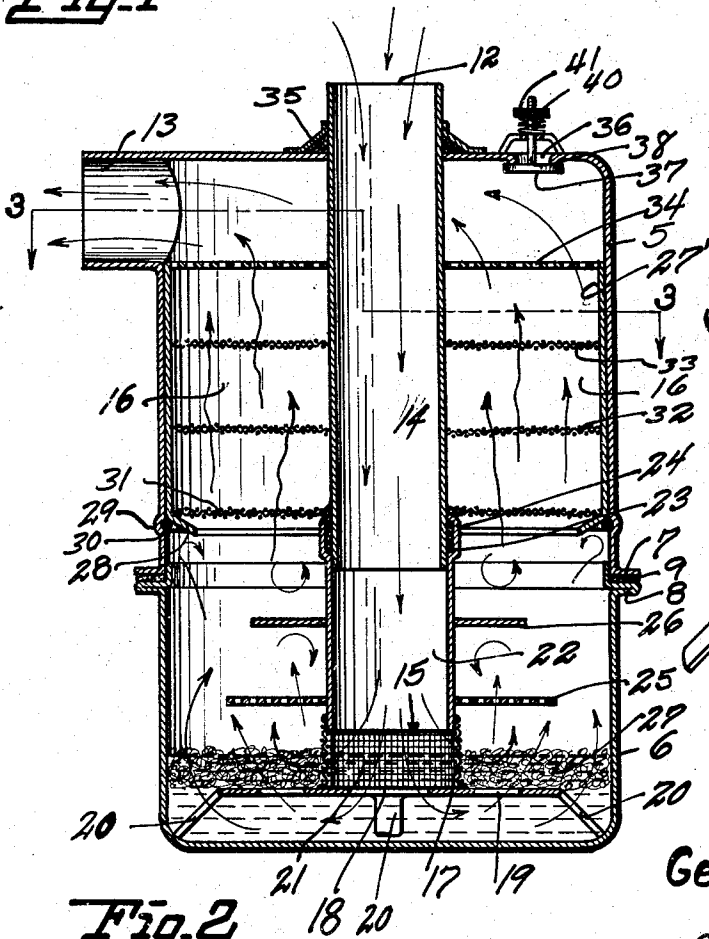


Fig. 2

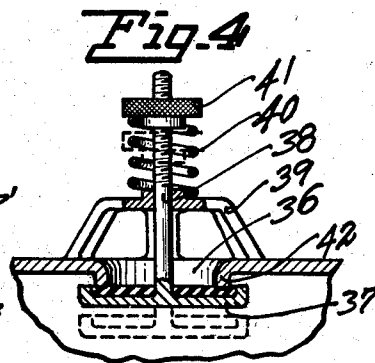


Fig. 4

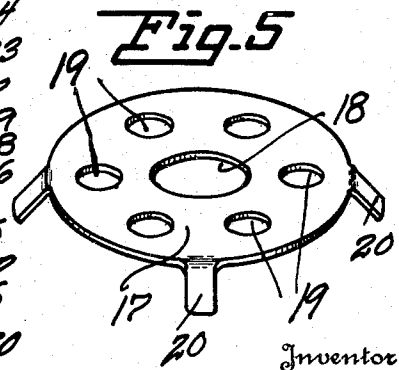


Fig. 5

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AIR CLEANER AND WASHER

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4 Claims. (Cl. 183—12)

My invention relates to air cleaners and washers that are particularly adapted for removing dust from air prior to its entry into an internal combustion engine. The primary objects of my invention are to provide an air cleaner embodying improved detachable baffle and filtering elements permitting quick and easy servicing of the device. A further object is to provide an adjustable automatic valve to compensate for high speeds of the engine, which requires a relatively large volume of air.

In the drawing; Figure 1 is a view in exterior perspective of the air cleaner; Fig. 2 is a view in central vertical section of the cleaner; Fig. 3 is a view in horizontal section taken substantially on a broken line 3—3 of Fig. 2; Fig. 4 is an enlarged detail view in central vertical section of the relief valve; and, Fig. 5 is a detail view in perspective of the bottom baffle element.

Referring in detail to the drawing, the housing of the device comprises an upper member 5 and a lower pan member 6. The open bottom of the upper member is provided with an outwardly projecting flange 7 and the open top of the pan member is provided with an angular flange 8 that is arranged to receive the flange of the upper member. A gasket 9 is interposed between said flanges and forms an air tight connection when the two housing members are clamped together. The clamping means comprises snap fasteners 10 of a type commonly used on suit-cases, secured to the lower pan member and arranged to hook over lugs 11 fixed to the upper housing member so that when closed they will draw the two members tightly together.

The upper housing member is provided with a central intake port 12 and an air outlet 13. A central vertical pipe 14 divides said housing member into a small entry compartment 15 and a large outlet compartment 16. The lower pan member 6 is partly filled with oil and a lower baffle plate 17 rests on the bottom of said pan being immersed in the oil, and is supported by means of legs 20. Said baffle has a main central opening 18 which is surrounded by smaller equally spaced annular openings 19, as shown most clearly in Fig. 5. A short tubular screen member 21 is mounted perpendicularly on the center of the baffle plate 17 around the hole 18. Said screen extends upwards and joins a lower tubular member 22 of the same diameter as the upper tubular member 14. The screen 21 may be secured at its ends by soldering or other convenient means.

The lower tubular member 22 has an enlarged annular collar portion 23 for the purpose of re-

taining packing material 24. This forms an air tight seal between the upper and lower tubular members, and at the same time allowing for dis-jointing of the two members for cleaning and servicing. Secured to the aforesaid member shortly above the screen connection is an annular perforated baffle plate 25. Disposed approximately midway between this baffle plate and the collar 23 is a solid baffle plate 26 which is slightly smaller in diameter than the first.

Resting on the bottom baffle plate 17 is a pad 27, preferably of either loosely packed steel wool or copper gauze. This prevents violent agitation of the oil and aids materially in the cleansing action.

The large compartment 16 of the upper housing member 5 has a cartridge member mounted therein. Said cartridge comprises an outer cylindrical casing 27' whose bottom edge is provided with an inwardly and downwardly projecting flange 28. Said flange rests on a circular spring wire ring 29 set in a groove 30 in the upper housing 5, thus retaining the cartridge in place.

The cartridge member is closed at its upper end by means of a perforated sheet metal disc 34. The bottom end is closed by means of a fine wire mesh screen 31, and two intermediate fine wire screens 32 and 33 are disposed therebetween. As seen from the drawing the outer edges of the screens 31, 32, 33, and perforated disc 34 are secured to the outer cylindrical casing 27', and their inner edges are secured to the central vertical pipe 14. Thus these parts are all integral and are removed as a unit for cleaning by removing the pan member 8 and the wire ring 29. A packing gland 35 is provided in the top of the upper housing member 5 for the central vertical pipe 14 to extend through, forming an air-tight joint therebetween.

To compensate for excessive quantities of air that might be required by the engine at high speeds, an opening 36 is provided in the top of the upper housing member. This is closed by a disc 37 which seats against the downwardly turned rim flange 42. The disc is mounted on a rod 38 which is journaled in a tripod resembling super-structure 39. A compression spring 40 is disposed on the rod between the superstructure and an adjustment nut 41, by means of which the tension of the spring 40 may be varied to meet the requirements of the particular motor on which the cleaner is placed.

In the operation of my device, at each suction stroke of the engine to which its air outlet 13 is ordinarily connected, outside air is drawn in through the inlets 12 and passes downwardly

through the entry compartment 15. As shown by the arrows some of the air passes through the oil bathed screen 21 and the remainder passes down through the hole 18 into the oil and up through holes 19 or around the edge of the baffle plate 17 and up through the pad 27, which greatly assists the oil in the removal of the heavier dust and also serves to retain the oil equally distributed across the bottom and prevents its splashing around. The baffle plates 25 and 26 cause eddies in the air flow which throws out the heavier drops of oil. The air then passes up through wire screens 31, 32, 33, and baffle 34 whereby all the finer particles of dust and any oil carried in suspension is completely removed from the air before it passes outwardly to the engine. When an engine is running at slow or moderate speed sufficient air is delivered through the inlet 12 but when some engines are running at high speed they require more air and, therefore, the auxiliary inlet 36 has been closed by a yieldable valve 37 which is normally closed but will be drawn inwardly by the increased suction exerted when the engine is running at high speed. Adjusting the nut 41 to regulate tension of the spring 40 will control the suction required to draw the valve inwardly to an open position and, therefore, the valve can be regulated to accommodate itself to the engine with which the cleaner is associated. As soon as the speed of the engine is reduced to such an extent that additional air is not needed, the spring returns the valve to a closed position and flow of air through the auxiliary inlet cut off.

Having thus described my invention, it being understood that the device shown herein is merely intended as an illustration of its principles and workings and that minor changes may be made therein without departing from the scope and spirit of the invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. An air cleaner comprising a housing having separable upper and lower sections, an air inlet tube extending vertically in said housing with its upper end projecting through the top of the housing and its lower end spaced from the bottom of the housing, a perforated baffle plate supported in spaced relation to the bottom of the housing, a cylindrical screen rising from said baffle plate and surrounding the lower end of said tube, a disk of screening in said housing in spaced relation to the baffle plate and upper end of the cylindrical screen, a pad of porous material between the disk and plate, baffle disks about said tube above the cylindrical screen having their margins spaced from walls of the housing, and screen disks surrounding the tube above the baffle

plates, an outlet being formed in a side of the housing above the upper screen disk.

2. An air cleaner comprising a housing having a side outlet at its top, an inlet pipe extending vertically in the housing with its upper portion extending through the top of the housing and its lower end spaced from the bottom of the housing, a porous pad spaced from the bottom of the housing about the lower end of the pipe and defining a fluid chamber in the lower portion of the housing, baffles spaced vertically from each other above the pad and spaced from walls of the housing, screens spaced vertically from each other between the baffles and the outlet, an auxiliary air inlet being formed in the top of the housing, and an inwardly opening closure for the auxiliary air inlet yieldably held closed.

3. An air cleaner comprising a housing having an air outlet at its top and an air inlet conduit extending vertically through the housing with its upper end opening through the top of the housing and its lower end spaced from the bottom of the housing, baffles and screens about the conduit spaced vertically from each other, an auxiliary air inlet being formed in the top of the housing and surrounded by an inwardly extending flange, a bridge rising from the top above the auxiliary air inlet, a closure disk in the housing having a stem extending upwardly through the inlet and bridge, a spring about the stem above the bridge, and a nut threaded upon the stem and engaging the upper end of the spring to tension the spring and yieldably hold the disk against the flange to close the auxiliary air inlet.

4. An air cleaner comprising a housing having an upper section and a lower section detachably connected with the upper section, the upper section having an air outlet, an inlet pipe extending axially in the upper section with its upper end projecting through the top of the upper section, a cylindrical casing fitting snugly in the upper section and having an inturned flange bordering its lower end, a resilient ring removably mounted in the upper section and engaging the under face of the flange to support the casing, a perforated disk at the upper end of said casing disposed under the outlet, screen disks in the casing spaced from each other vertically, the perforated disk and screen disks having close fit about the pipe and being firmly secured to the casing for removal therewith as a unit from the upper housing section when the lower housing section is removed, a baffle plate supported in the lower housing section and spaced upwardly from the bottom thereof, a conduit rising from said baffle plate and detachably engaged with the lower end of said pipe, and baffle disks about said conduit.

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