

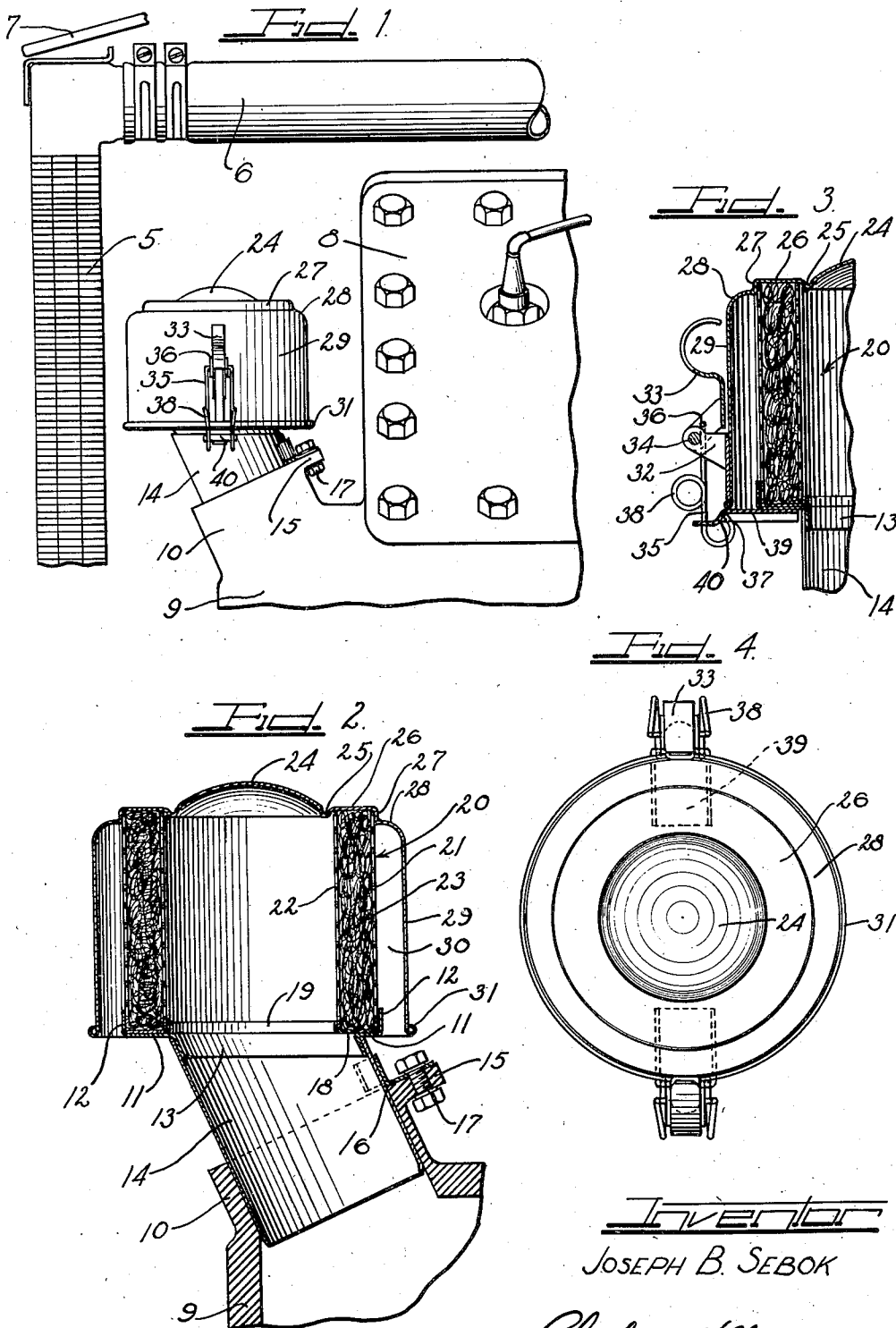
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CRANKCASE AIR CLEANER ASSEMBLY

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CRANKCASE AIR CLEANER ASSEMBLY

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This invention relates to improvements in a crankcase air cleaner assembly, and more particularly to an air cleaner assembly for a crankcase breather or ventilation system, the cleaner being positionable over the opening leading to the crankcase of an internal combustion engine through which lubricant is usually supplied to the crankcase, although the invention may have other uses and purposes as will be apparent to one skilled in the art.

While air cleaners of various types are commonly used with the carburetor intake of an internal combustion engine, it is also frequently desirable to have an air cleaner associated with the crankcase breather or ventilation system, because, especially in dusty areas, dirt is prone to enter directly into the crankcase, and thus directly into the lubricant circulated through the engine. In connection with mechanized equipment for military usage there is a very great likelihood of damage to the internal combustion engine from dirt entering the engine through the crankcase opening, because vehicles of this character seldom travel a paved highway, but frequently travel one after the other over rough terrain with a substantially continuous cloud of dust around the vehicles.

With the foregoing in mind, it is an important object of this invention to provide a highly efficient, economical, and readily serviceable crankcase breather or ventilation system air cleaner.

Another object of this invention resides in the provision of a crankcase air cleaner of a simplified type, in which the covering and the filter element may be readily separated, not only one from the other, but both from the mounting means for the air cleaner, so that these mounting means may stay in position upon the crankcase, and if oil is to be added to the crankcase, it may be added directly through these mounting means.

Another feature of the invention resides in the provision of a crankcase air cleaner designed for the operating parts of the air cleaner to be vertically disposed, and yet equipped with means for easily and simply attaching the air cleaner to an opening in a sloping wall of the crankcase, or to an opening at an angle to the horizontal.

Still a further object of the invention resides in the provision of a crankcase air cleaner including a base element attachable to a crankcase, a separable filter element, and a separable cover, with means on the cover engageable with means on the base element to clamp the parts in opera-

tive position, with the filter element clamped between the cover and base element.

Still another object of the invention resides in the provision of a crankcase air cleaner in which a base element may be permanently affixed to a crankcase, a filter element disposed on the base element, and a cover element placed over the filter element, and resilient clamping means used to join the cover and base element clamping the filter element therebetween, and permitting ready removal of the filter element for servicing.

While some of the more salient features, characteristics and advantages of the present invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a fragmentary elevational view disclosing parts of an internal combustion engine including a crankcase equipped with an air cleaner assembly embodying principles of the present invention;

Figure 2 is a fragmentary vertical sectional view through the air cleaner and adjacent portion of the crankcase of Figure 1;

Figure 3 is a fragmentary vertical sectional view, with parts in elevation, through the air cleaner taken substantially at right angles to the section of Fig. 2; and

Figure 4 is a top plan view of the air cleaner. As shown on the drawing:

In the illustrated embodiment of this invention, I have illustrated the air cleaner assembly in association with the internal combustion engine and crankcase of a military vehicle commonly termed a tank. With reference more particularly to Figure 1, the structure illustrated is disposed at the rear end of the tank and includes a radiator core 5 with the usual water hose 6 leading away therefrom, and a portion of the armor plate 7 extending obliquely upward from the top rear part of the radiator. Only sufficient of the internal combustion engine is illustrated to indicate the disposition of the crankcase cleaner assembly, and this portion includes a cylinder head 8, with a crankcase 9 projecting below the cylinder head. The crankcase 9 has an opening defined by a neck portion 10 and the air cleaner is mounted on this neck portion.

With reference to Figure 2, it will be seen that the illustrated embodiment of the air cleaner incorporates a base member shaped to provide a horizontally extending portion 11 which terminates outwardly in an upstanding flange 12, and terminates inwardly in an obliquely depending

neck flange 13 which defines a central aperture through the base member. Due to the inclination of the axis of the neck portion 13, the horizontal portion 11 of the base member is preferably wider at one side, the left as viewed in Figure 2, than at the other side, the right as seen in Figure 2. Securely attached to the neck flange 13 is a conduit 14 also disposed obliquely, in keeping with the oblique neck 10 on the crankcase 9. This conduit 14 is designed for a press fit within the neck 10. Such press fit is ordinarily sufficient to maintain the cleaner in position on the crankcase, but where exceptional conditions frequently prevail as is the case in connection with military vehicles, an additional securement may be desirable to prevent accidental dislodgement of the cleaner or eliminate the likelihood of carelessness in mounting the cleaner. To this end, the neck portion 10 of the crankcase is provided with an outstanding or offset lug 15, and a complementary angle flange 16 is secured to the neck portion 14 leading from the air cleaner. Both the flange 16 and lug 15 are apertured and a suitable bolt 17 may extend therethrough so as to positively maintain the air cleaner attached to the crankcase.

The base means or structure of the air cleaner also includes a seat member 18, which is annular in character, having a central aperture therethrough. This member 18 rests upon the horizontal portion 11 of the base member above described, terminates at its outer edge adjacent the upstanding flange 12, and terminates at its inner portion in another upstanding flange 19 which defines the central aperture. Thus, it will be seen that the two flanges, namely the inner flange 19 and the outer flange 12, provide an upwardly opening annular channel. The seat member 18, the base member including the portion 11, the flange 12 and the neck flange 13, the conduit 14 and the angle flange 16 are all preferably secured together such as by spot-welding or an equivalent method into an integral structure. This integral structure may remain fixed to the crankcase at all times, there being no need to remove it unless it has become damaged and a replacement is necessary. If oil or other lubricant is to be added to the crankcase, it may be added directly through the opening defined by the flange 19 and neck flange 13, and through the conduit 14 into the crankcase.

Seated in the above described channel defined by the flanges 12 and 19 is a hollow cylindrical filter element generally indicated by numeral 20. This filter element may include an outer cylinder 21 of hardware cloth, an inner cylinder 22 of hardware cloth, and a mass 23 of filter material disposed therebetween. This filter mass 23 may be of any suitable substance, knitted steel gimp, for example, being one satisfactory substance. The filter element 20 is preferably disposed with its axis in vertical position, as seen in Figure 2 and when in such position it seats firmly in the channel defined by the flanges 12 and 19, the obliqueness of the neck flange 13 and conduit 14 adequately accommodating the slope of the crankcase intake 10, and yet maintaining the filter element in vertical position.

A cover member is disposed over the filter element; that is, the cover member is freely seated on the upper end of the filter element just as the lower end of the filter element is freely seated in the channel defined by the flanges 12 and 19. The cover member is preferably one integral structure and embodies a central domed

portion 24 around which is an inwardly extending bead 25 to provide an inside flange for the filter element 20. The cover extends from the bead 25 in a higher horizontal portion 26 to overlie the filter element, and is then provided with a downwardly turned portion 27 to provide an outer flange for the upper end of the filter element. From this flange 27, the cover preferably curves outwardly as indicated at 28 into a depending skirt 29 spaced away all around from the filter element to provide a passage 30 therebetween for incoming air. It will be noted that the bead 25, and the portions 26 and 27 provide in effect an inverted annular channel which is seated over the upper end of the hollow cylindrical filter element 20. The skirt 29 preferably extends at least as far as the seat member 18, although it may extend somewhat therebelow, as illustrated. The lower end of the skirt is preferably provided with a bead 31 to lessen restriction to incoming air.

The various separable parts of the air cleaner are maintained firmly in operating position by suitable resilient over center clamping means as seen in Figures 1 and 3. In the illustrated instance a pair of diametrically opposed clamping arrangements are utilized, although as many clamping arrangements as may be deemed most desirable may be incorporated. Since both clamping arrangements are identical, only one need be described herein. With reference more particularly to Figure 3, it will be seen that a bracket 32 is secured to the lower portion of the skirt 29 of the cover member. An over center lever 33 is pivoted to the bracket as indicated at 34 and a hasp or locking member 35 is pivoted to the lever as indicated at 36. The hasp or latch 35 is preferably of wire, in the form of a U, and the cross blade of the U is turned upwardly as indicated at 37 in Figure 3. In the body portion of each leg of the hasp is a convolution as indicated at 38 to give resiliency to the hasp. The cross leg of the U engages a plate 39 which may be spot-welded or otherwise secured to the horizontal portion 11 of the above described base member. This plate projects outwardly beyond the skirt 29 of the cover and is stepped down as indicated at 40 to provide a shoulder for engagement by the cross yoke of the hasp 35. It will be seen that when the lever is in locked position as is seen in Figure 3, the cover of the cleaner is held in tight association with the base member, and the hollow filter element 20 is clamped between the cover and the base member in its respective channel formation. By virtue of the fact that the pivot points 36 of the hasp are inside the pivot point 34 for the lever, tension is automatically placed in the clamping arrangement.

In operation, entering air passes into the open pocket defined by the skirt 29, enters the inlet passage 30, passes laterally through the filter element 20, and enters the crankcase. When it is desired to service the cleaner, it is a simple expedient to loosen the clamping arrangement by merely throwing down the levers 33, lifting off the cover together with the filter element if the filter element sticks to the cover, and separating the cover and filter element if desired. There is no need to move any of the base structure, this being left firmly attached to the crankcase. The filter element may be readily washed in gasoline, kerosene or some equivalent substance and if desired dipped into an oil before being placed back in operative position in the cleaner.

From the foregoing, it is apparent that I have provided a very simple and highly efficient crankcase cleaner suitable for either a crankcase breather or a crankcase ventilation system. It will be noted that the cleaner sets in upright position during operation even though there may be an oblique arrangement at the crankcase opening. The cleaner is simple in construction, readily assembled and just as readily dismantled for servicing, is substantially foolproof, highly durable, and economical to manufacture and use.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a crankcase breather or ventilation air cleaner, an annular base member including a horizontal seat portion having a central aperture with a neck depending from the inside edge of said portion and an upstanding flange on the outside edge of said portion, another annular member on said seat portion and having an upstanding flange on its inner edge which together with the first said flange provides a channel, a filter element seated in said channel, and a cover on said filter element.

2. In a crankcase breather or ventilation air cleaner, an annular base member including a horizontal seat portion having a central aperture with a neck depending from the inside edge of said portion and an upstanding flange on the outside edge of said portion, another annular member on said seat portion and having an upstanding flange on its inner edge which together with the first said flange provides a channel, a hollow filter element with one end freely seated in said channel, a skirted cover freely seated on the other end of said element, the skirt of said cover extending the full length of the exposed portion of said filter element and being spaced therefrom, and releasable means to connect said cover and said base member with the filter element clamped therebetween.

3. In combination, a crankcase having an opening disposed on an angle to the horizontal, an air cleaner for disposition in an upright position, a sloping outlet conduit on said air cleaner for press fit in the crankcase opening with the air cleaner then disposed in upright position, a flange lug projecting from the crankcase adjacent said opening, a flange projecting from said conduit, and securing means extending through both said lug and said conduit flange to hold the cleaner on the crankcase in addition to the press fit.

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