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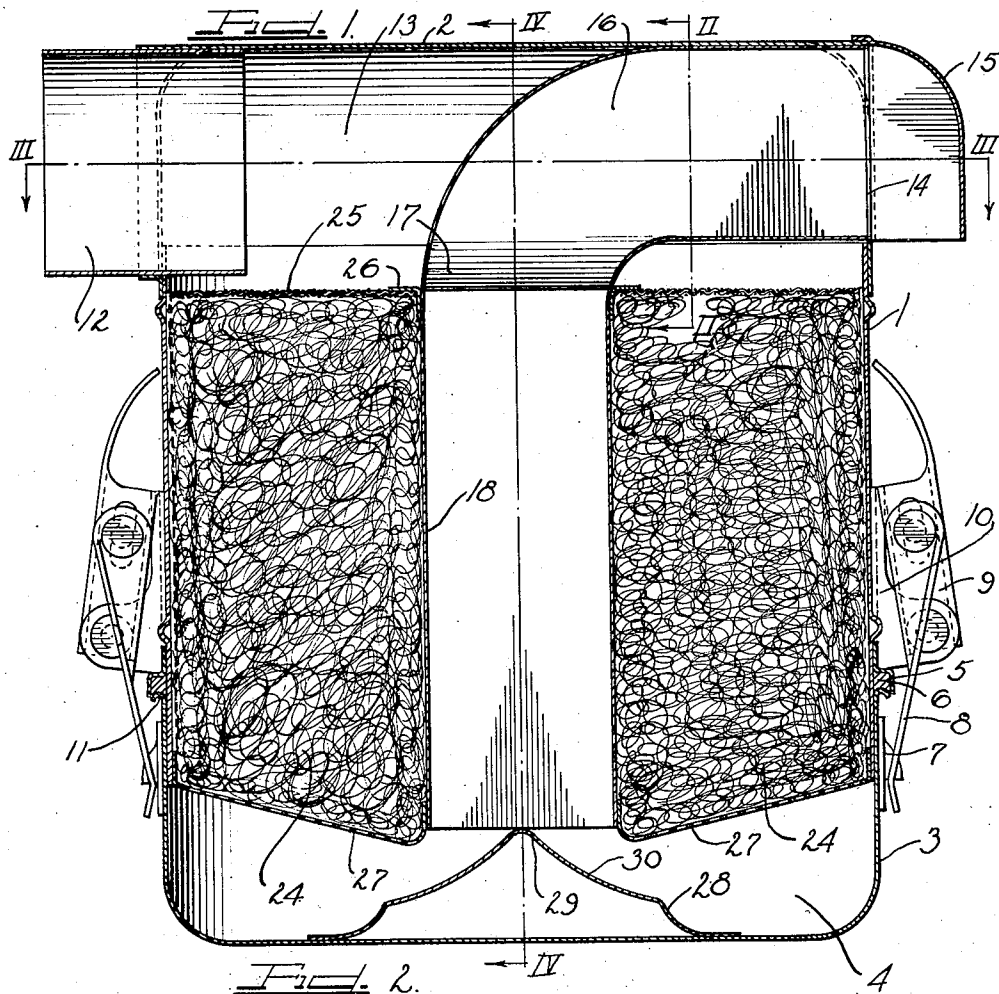
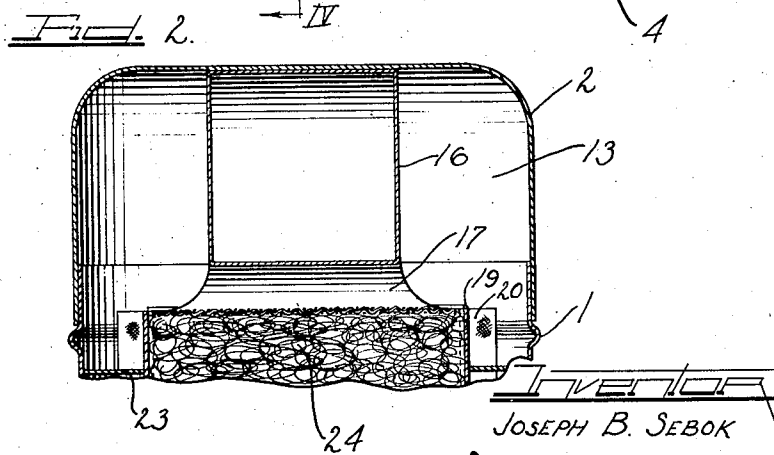
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2,365,299

AIR CLEANER

Filed Jan. 30, 1942

2 Sheets-Sheet 1



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AIR CLEANER

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Fig. 3

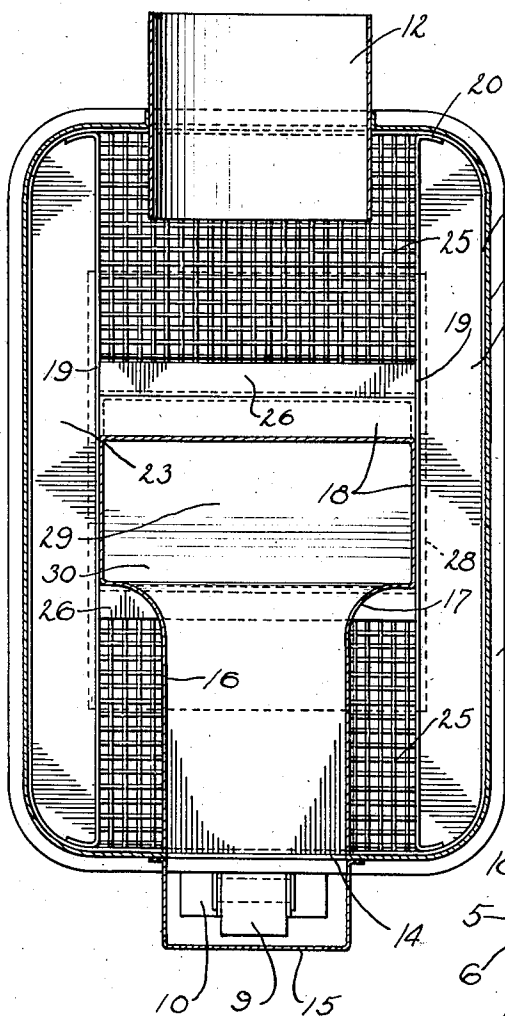
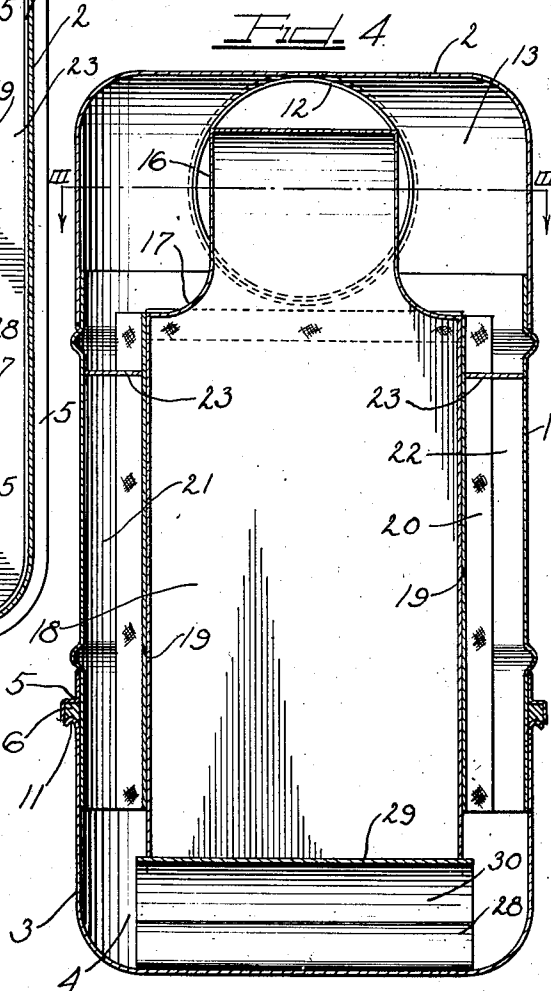


Fig. 4



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2,365,299

AIR CLEANER

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Application January 30, 1942, Serial No. 428,816

2 Claims. (Cl. 183—15)

This invention relates to improvements in an air cleaner, and more particularly to an air cleaner of the liquid bath type wherein cleansing liquid is carried in a sump adjacent the path of air traveling through the cleaner for comminglement and cleansing of the air by the liquid, the invention being highly desirable for use in connection with the carburetor of an internal combustion engine, the intake to an air compressor, and other devices requiring an adequate supply of clean air, as will be apparent to one skilled in the art.

Usually liquid bath air cleaners have what may be termed an annular inlet, that is an inlet passage adjacent the outer wall of the casing leading toward the liquid sump in the bottom of the casing, or what may be termed a center tube inlet wherein a conduit extends downwardly centrally of the casing. In either event, especially when an air cleaner is used on a motorcycle, it is desirable to provide some means for trapping the sump liquid to prevent loss thereof in the event the air cleaner is tipped materially from its normal upright operating position, such tipping frequently occurring in connection with motorcycles by virtue of the falling of the vehicle. Of course, it is also desirable to provide a cleaner that is very durable, has a high efficiency and a low restriction and which is of a relatively small size.

With the foregoing in mind, it is an important object of this invention to provide a liquid bath air cleaner of the center tube inlet type having trap means therein to catch the sump liquid in the event of tipping of the cleaner and hold this liquid within the cleaner.

Also an object of this invention is the provision of a liquid bath air cleaner of the center tube inlet type having partition means defining a liquid trap along each side of the cleaner, the cleaner being substantially rectangular in shape, which traps open only toward the bottom or liquid sump of the cleaner and are closed at the top.

Still another object of this invention resides in the provision of a liquid bath air cleaner of the center tube inlet type in which the casing is of substantially rectangular shape, and the center tube is also of substantially rectangular shape disposed transversely to the casing, with a filter mass on each side of the center tube between it and the adjacent casing end wall with adequate means for trapping sump liquid in the event the cleaner is tipped from normal operating position.

It is a still further object of this invention to provide a liquid bath air cleaner having a liquid

sump, with means defining an air passage leading toward said sump, and a baffle secured to the bottom of the cleaner in the sump arranged to guide incoming air properly and smoothly through the cleaner.

Still a further object of the invention resides in the provision of a liquid bath air cleaner with a liquid sump at the bottom thereof, provided with baffle means arranged on the casing bottom within the liquid sump directly beneath a center tube inlet conduit, the baffle being arranged and extending upwardly toward said conduit in a position to divide the air stream and guide the air properly and smoothly through the cleaner.

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 drawings, in which:

Figure 1 is a central vertical sectional view of a liquid bath air cleaner embodying principles of this invention, with parts shown in elevation;

Figure 2 is a fragmentary vertical sectional view taken substantially as indicated by the section line II—II of Figure 1, looking in the direction of the arrows;

Figure 3 is a plan sectional view taken substantially as indicated by the line III—III of Figure 1;

Figure 4 is a central vertical sectional view at right angles to the showing in Figure 1, taken substantially as indicated by the section line IV—IV of Figure 1.

As shown on the drawings:

In the illustrated embodiment of this invention there is shown an air cleaner including a casing comprising separable sections, an upper section 1 provided with a fixed closed top 2 and open at the bottom for telescopic association with another cup-like casing section 3, preferably flat-bottomed, defining an interior sump 4 for cleansing liquid. As is evident from the drawings, more especially Figure 3, the casing is preferably generally rectangular in shape, although the corner portions are rounded in keeping with facile manufacture and durability of the finished cleaner. While the particular illustrated shape is not essential to proper functioning of the cleaner, it nevertheless is a highly desirable shape in the event the cleaner is used upon a motorcycle or similar vehicle.

When the cleaner is ready for operation the casing sections 1 and 3 are removably but airtightly held together by means of simply manipulatable clamping apparatus located on each end

wall of the cleaner. This clamping apparatus includes a holding flange 5 secured in inverted position to the upper section 1 which supports a gasket 6. One each end wall of the lower section 3 a stirrup member or keeper 7 is attached. This keeper 7 is engageable by a tongue (not shown) on a pivoted latch member 8 carried by a hand actuated over center locking arm 9 pivotally connected to a bracket 10 on the upper casing section. When the hasp is engaged with the keeper 7 and the over center arm is thrown upwardly into the position seen in Figure 1 the bend of an upper outwardly turned margin 11 on the lower casing section 3 is caused to seat against the gasket 6 by the upward movement of the lower casing section due to the actuation of the clamping elements, thus establishing a positive airtight seal, all in a manner more fully described and set forth in my copending application entitled "Air cleaner," filed January 30, 1942, Serial No. 428,815.

Near the top of the cleaner casing an outlet conduit 12 projects through the end wall into a free space 13 beneath the cover 2. In the event the cleaner is mounted on a motorcycle, the outlet will be at the forward end of the cleaner, that is, toward the front wheel of the motorcycle. This outlet conduit may be connected in any suitable manner to the intake of the carburetor for the internal combustion engine driving the vehicle. An inlet opening 14 is preferably disposed opposite to the outlet in the opposite end wall which, in the event the cleaner is mounted on a motorcycle, will be disposed toward the rear wheel of the motor cycle, and in such semi-protected position the inlet is kept from contact with the ground in the event the motor cycle falls over. In this instance, the inlet opening is illustrated as polygonal or generally rectangular in shape, and is preferably protected by a depending hood 15 against mud thrown by the wheels of the motorcycle or other relatively large dirt particles which would tend to clog the inlet or interior passages of the cleaner. From the inlet opening a conduit 16 extends inwardly, this conduit being of the same shape as the opening, to a point substantially at the center of the casing, where the conduit curves downwardly, expands as indicated at 17, and merges with a center tube inlet conduit 18 of substantially rectangular shape, disposed transversely to the casing; that is, the long sides of the center tube inlet 18 are disposed transversely to the longer sides of the casing wall. The center tube 18 extends downwardly to a position contiguous with the liquid sump 4 and is entirely open at its bottom end.

A partition 19, spaced inwardly from the longer casing wall and extending the full length of the casing, is disposed on each side of the inlet conduit 18, the partition confronting a narrower wall of the conduit. As seen best in Figure 3, a partition 19 is provided with outwardly turned ends 20 which may be spot welded or otherwise secured to the inside of the casing end walls. The inlet conduit 18 extends from one partition 19 to the other. The partitions 19—19, as best seen in Figure 4, define a liquid trap 21 in one side of the cleaner and a similar trap 22 adjacent the other side. These liquid traps open to the sump 4 at the bottom but each trap is closed at the top by a cover 23. Each trap is preferably of a size sufficient to contain all of the sump liquid with the possible exception of a small quantity remaining in the filter masses to be described later. Thus, if the cleaner is mounted on a motorcycle and

the motorcycle falls toward the left the sump liquid will immediately enter and remain in the trap 21 until the motor cycle is righted, when the liquid will return to the sump and the cleaner will be ready for operation as usual. Likewise, if the motorcycle falls to the right, the sump liquid will enter the trap 22 and be held within the cleaner. The little amount of sump liquid remaining in the filter means within the cleaner has little or no chance of escaping into the carburetor if the cleaner is tipped, and whatever portion of this liquid might possibly escape into the carburetor will be quite negligible.

Disposed between the partitions 19—19 and also between the forward wall of the inlet tube 18 and the forward wall of the casing is a filter mass 24, and a similar filter mass 24 is likewise disposed between the rear wall of the inlet tube 18 and the rear casing wall. These filter masses may be of any suitable material, such as matted wavy wire, curled cattle-tail hair, cactus fiber, etc. Each filter mass is preferably retained in position at the top by a strip of hardware cloth 25 or an equivalent medium, disposed beneath the flange of an angle bracket 26 attached to the inlet conduit. At the bottom the mass is retained in position by a screen plate 27 having upturned margins attached to the casing wall and the side of the inlet conduit. It will be noted from reference to Figure 1 that the screen plate 27 is preferably on a slant from the end wall of the casing downwardly toward the center tube inlet, and at its inner end it extends somewhat below the center tube 18 to form a continuation of this tube. It will also be noted that the filter masses extend upwardly to a point above the trap closures 23—23. It is preferable that the filter masses do not terminate below these trap closures so that all of the space 13 above the filter masses, with the exception of course of that part occupied by the conduits 12 and 16, is perfectly free for clean air exiting into this space through the filter masses. This feature, plus the reduced portion 16 of the inlet conduit provides ample space for the clean air above the filter masses so as to eliminate the forward filter mass doing a material amount of work more than the rear filter mass. In other words, the rear filter mass is free from restriction thereabove.

In order to insure a more even and proper flow of air through the cleaner, as well as a smooth flow, a baffle member 28, preferably imperforate, is attached to the bottom of the casing in the liquid sump 4 directly beneath the center tube inlet 18. As seen best in Figures 1 and 4, this baffle is provided with a central upstanding ridge portion 29 which preferably extends upwardly into the extended portion of the inlet tube defined by the filter retaining members 27—27. Beneath the ridge 29, the baffle is provided with a curved portion 30 on each side thereof, shaped in keeping with the desired path of the air to function as a smooth guide for traveling air. Thus, the baffle is disclosed in position to substantially split the air stream descending through the tube 18 and smoothly guide each split portion of the air stream upwardly into the respective filter mass 24. The static level of sump liquid is preferably substantially even with the top of the baffle ridge 29, thereby initially sealing up the air inlet tube 18, so that upon starting of the engine with which the air cleaner is associated there will be a positive initial charge of sump liquid into the filter masses 24—24 to insure highly efficient operation immediately.

In operation, the instant invention is extremely simple and very highly efficient. Air enters through the opening 14 beneath the hood 15, passes through the conduit portions 16 and 17 and descends through the center tube 18. The descending air stream is split by the baffle 28 and the split stream is smoothly guided into the filter masses 24—24. The sump liquid, or a goodly portion thereof, adjacent the baffle ridge is immediately forcibly expelled into the lower portion of the filter masses, and commingled with the entering air. After the initial expulsion of the sump liquid, there will be a circulation of sump liquid within the lower portion of each filter mass, and as heavier dirt-laden sump liquid returns to the sump, more lighter relatively dirt-free liquid will be aspirated or educed by the traveling air up into each filter mass. The air rises through each filter mass to the open space 13 thereabove, the upper portions of each filter mass effectively removing the lighter dirt particles from the air as well as entrained sump liquid so that the clean air will exit from the space 13 through the outlet conduit 12 in a relatively dry state. In the event the vehicle carrying the cleaner is tipped sidewise in either direction, either the trap 21 or the trap 22 will retain the sump liquid within the cleaner so that there will be no escape of sump liquid and immediately upon righting the cleaner, it again functions at the same efficiency as previously. In order to service the cleaner it is a simple expedient to release the clamping members 9, unlatch the hasps 8, and remove the lower section 3 together with the baffle. This section may then be emptied of cleaning liquid and dirt, replenished with a fresh supply of cleaning liquid to the proper level and again clamped in position.

From the foregoing, it is apparent that I have provided a novel, compact, durable, and highly efficient liquid bath air cleaner. It will also be noted that the air cleaner is of the center tube inlet type and yet provided with ample trap means for retaining cleansing liquid within the cleaner regardless of the tipping of the cleaner from its normal operating position. Further,

novel baffle means are incorporated which insure a proper distribution of the air through the cleaner, without restriction, so that all parts are simultaneously functioning with equal efficiency. Moreover, the cleaner may be very economically manufactured, serviced, and used.

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 an air cleaner, a generally rectangular casing having an inlet opening in an end wall and an outlet opening in the opposite end wall, said casing having a liquid sump in the lower part thereof, partition means extending from end to end of said casing below said inlet and outlet openings and spaced from the side walls to define opposed traps open to said sump at the bottoms, means closing the upper ends of said traps, a rectangular inlet conduit leading from said inlet opening and extending centrally downwardly through said partition means to a point adjacent said sump, filter means between said partition on opposite sides of said inlet conduit, and a ridged baffle secured to the bottom of said casing in said sump beneath said inlet conduit.

2. In an air cleaner, a generally rectangular casing having an inlet opening in an end wall and an outlet opening in the opposite end wall, said casing having a liquid sump in the lower part thereof, partition means extending from end to end of said casing below said inlet and outlet openings and spaced from the side walls to define opposed traps open to said sump at the bottoms, means closing the upper ends of said traps, a rectangular center tube inlet leading from said inlet opening downwardly toward said sump and extending from side to side of said partition means, and a filter mass between said partitions on each side of said center tube.

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