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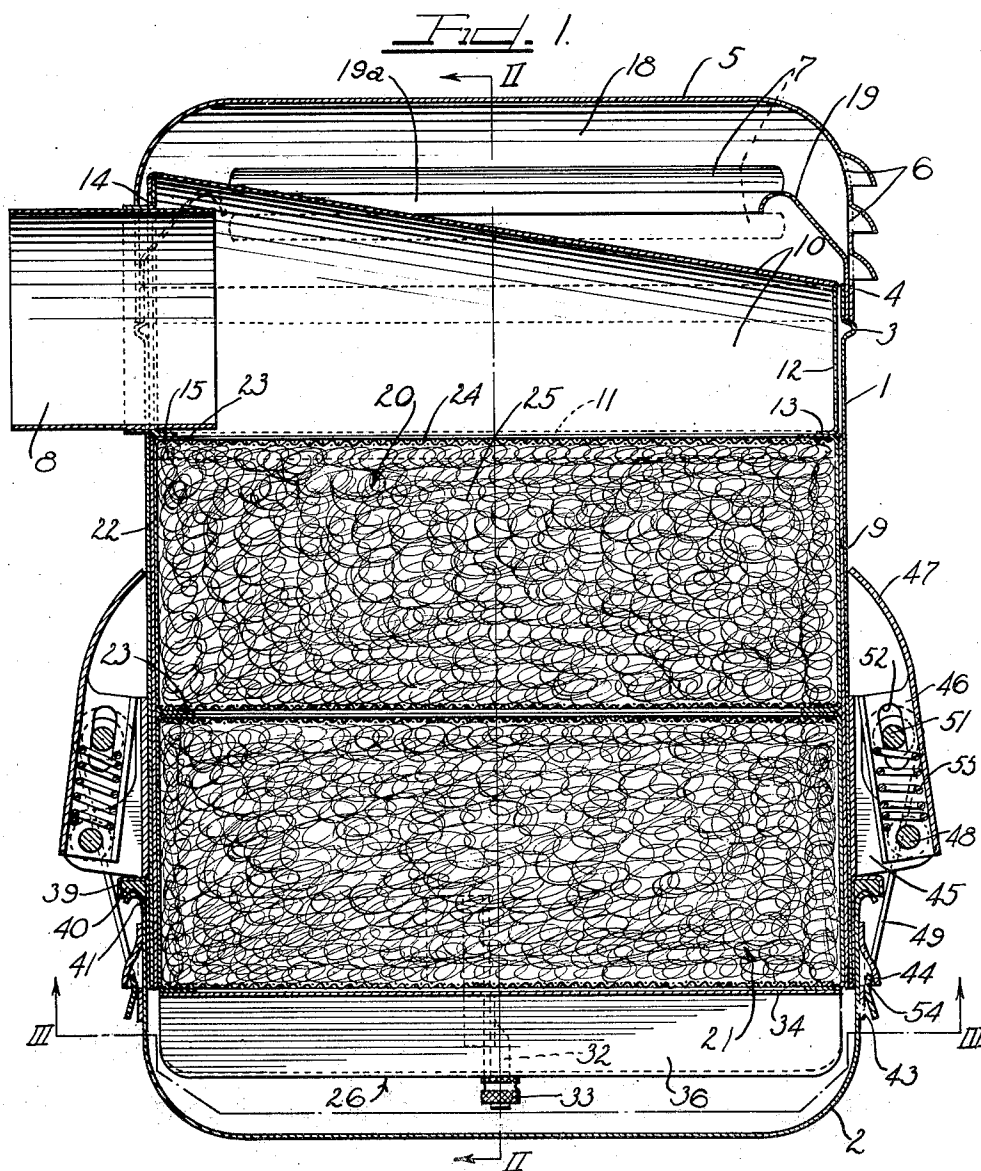
J. B. SEBOK

2,393,660

AIR CLEANER

Filed Jan. 30, 1942

3 Sheets-Sheet 1



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Atty.

Jan. 29, 1946.

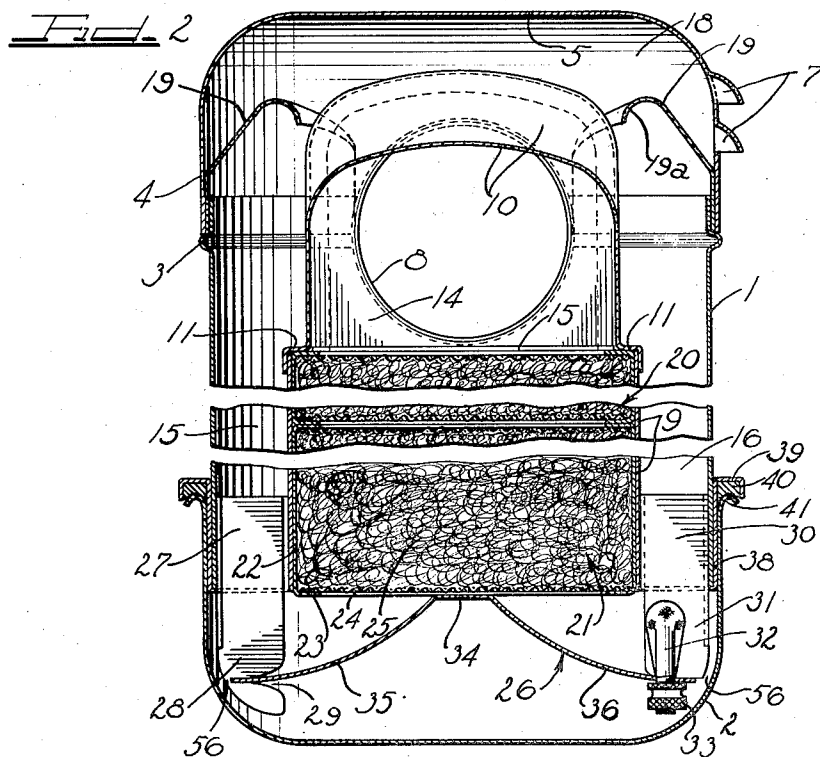
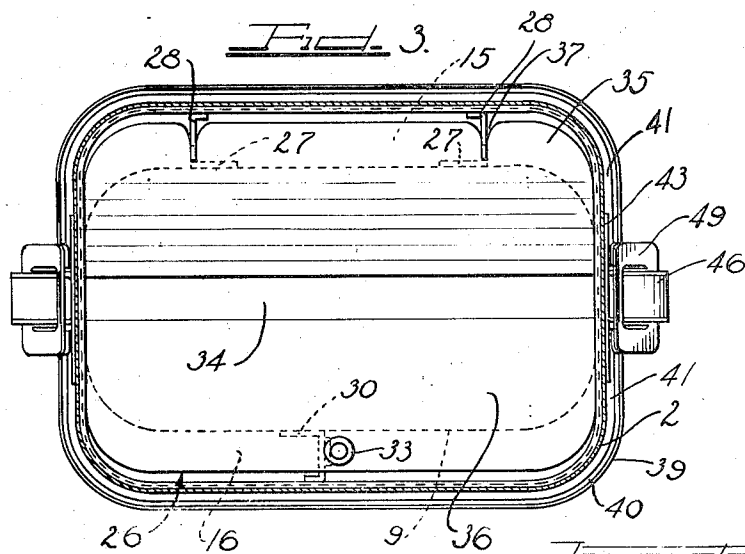
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AIR CLEANER

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Fig.

Jan. 29, 1946.

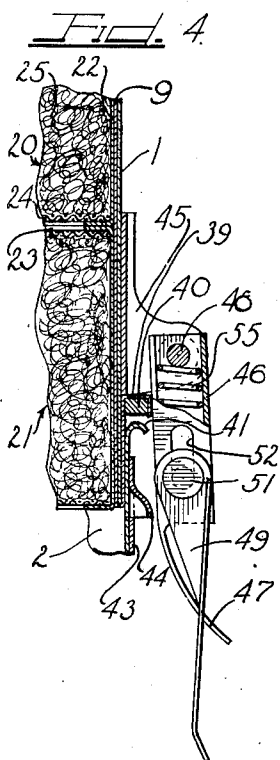
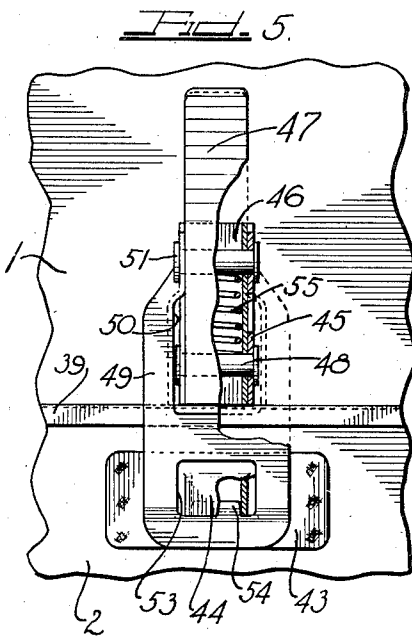
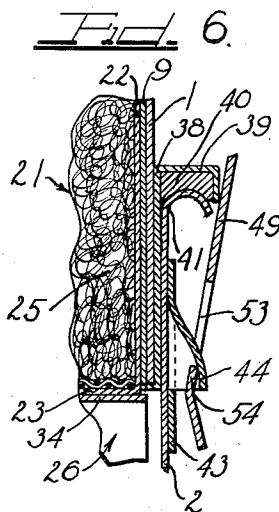
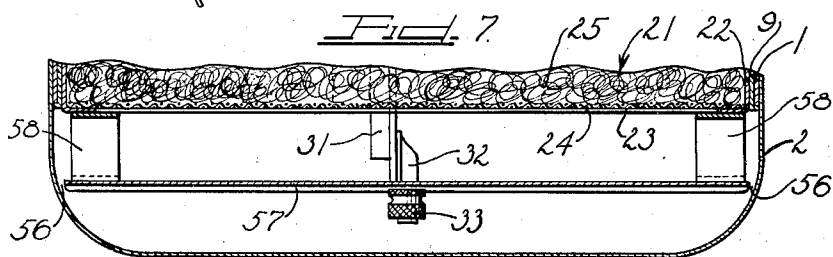
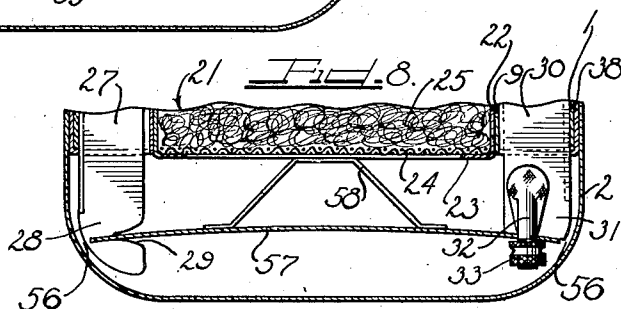
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AIR CLEANER

Filed Jan. 30, 1942

3 Sheets-Sheet 3



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2,393,660

AIR CLEANER

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Application January 30, 1942, Serial No. 428,815

12 Claims. (Cl. 183—15)

This invention relates to improvements in a liquid bath air cleaner for use in connection with an air intake to an internal combustion engine, air compressor, or other forms of apparatus to which it is desirable to supply clean air. More specifically, the air cleaner is highly advantageous for use in connection with motorcycles, although the invention may be used with other and various types of vehicles as well as other and various types of devices such as internal combustion engines needing a supply of clean air, as will be apparent to one skilled in the art.

By way of example and not by way of limitation, the instant invention will be in the main described herein in connection with its use on a motorcycle, so as to better set forth all of the advantages of the invention.

It has been proven that air cleaners are essential to motorcycles if continued satisfactory operation is expected, and this is especially true when the motorcycle is used over rough terrain in cross country work. Difficulty has been experienced heretofore in the satisfactory use of an air cleaner, especially a liquid bath air cleaner, with a motorcycle because, as frequently happens in cross country work, the motorcycle falls to one side or the other with the engine still running. When that happens with air cleaners heretofore known, the cleaner is tipped and the cleansing liquid usually contained in a sump or cup at the lower part of the cleaner would readily flow into the filter mass and consequently be carried over into the engine or carburetor through the clean air outlet. Further, cleaners heretofore known were frequently plugged by dirt thrown from the wheels of a motorcycle, and were not sufficiently rugged to withstand the rough usage to which a motorcycle and all of its parts are frequently subjected.

With the foregoing in mind, it is an important object of the instant invention to provide a liquid bath air cleaner which may be tipped sidewise from the vertical at least as far as a horizontal position in either direction without spilling the cleansing liquid contained in the sump of the cleaner and without any danger of this liquid being carried over into the carburetor or internal combustion engine while the air cleaner is tipped.

Another object of the instant invention is the provision of an air cleaner having a liquid trap on opposite sides thereof, each trap being of sufficient capacity to hold all of the liquid normally supplied to the sump of the cleaner and prevent that liquid from entering the filter mass or reaching the clean air outlet of the device in the event the cleaner is tipped over sidewise.

Also an object of this invention is the provision of an air cleaner provided with a plurality of liquid traps to prevent spilling or pull over of sump liquid in the event the cleaner is tipped sidewise, which liquid traps during normal operation and position of the cleaner function as a portion of the dirty air inlet, thus affording an inlet so arranged and distributed as to area that restriction is reduced to substantially a minimum.

It is a further object of this invention to provide an air cleaner constructed to withstand extremely hard usage and at the same time reduce restriction to air passage through the cleaner below that heretofore available for cleaners of the same capacity.

It is also a feature of this invention to provide a liquid bath air cleaner in which a plurality of inlet openings are provided located in semi-protective regions where such inlet openings will not become plugged by dirt thrown or spilled thereagainst during operation of the vehicle with which the cleaner is associated.

Still a further feature of the instant invention resides in the provision of a liquid bath air cleaner having a casing of separable sections embodying an arrangement for fastening the two sections together to effectively provide an air tight seal therebetween which is unaffected by abnormally rough usage or treatment of the cleaner.

It is also an object of this invention to provide a liquid bath air cleaner constructed to permit a variance in capacity of the cleaner by a simple interchange of certain parts of the cleaner.

Still another object of this invention is the provision of a liquid bath air cleaner equipped with a novel backfire trap.

While some of the more salient features, characteristics and advantages of the instant invention have been above set forth, 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 the present invention;

Figure 2 is a reduced fragmentary vertical sectional view at right angles to the showing of Figure 1, taken substantially as indicated by the line II—II of Figure 1;

Figure 3 is a reduced bottom plan sectional view taken substantially as indicated by the staggered section line III—III of Figure 1, looking in the direction of the arrows;

Figure 4 is an enlarged fragmentary vertical sectional view on the same plane as Figure 1, but

illustrating the clamping device in open position;

Figure 5 is a fragmentary elevational view taken from the right hand side of Figure 1, illustrating the clamping member in closed position;

Figure 6 is a fragmentary enlargement of the lower right hand portion of Figure 1, illustrating the joining of the separable casing sections;

Figure 7 is a fragmentary central vertical sectional view on the same plane as Figure 1, but illustrating the use of a different type of baffle within the cleaner; and

Figure 8 is a fragmentary vertical sectional view on the same plane as Figure 2, illustrating the baffle means of Figure 7.

As shown on the drawings:

In the illustrated embodiment of this invention there is shown a liquid bath air cleaner embodying a casing including an upper section 1 which houses the filter mass or element as well as the traps for sump liquid in the event the casing is tipped sidewise; and a lower section or liquid cup 2 removably connected to the upper section 1. This lower section 2 is shaped to define internally a sump for cleansing liquid which is usually engine oil. In the illustrated instance, the casing is as nearly rectangular in shape as is feasible with facile manufacture; in other words, the corner portions are rounded for manufacturing expediency and to insure an airtight joining of the separable casing sections as well as enable the cleaner to withstand rough handling and usage.

Adjacent the upper end thereof, the upper casing section 1 is provided with an outwardly extending bead 3 against which the lower edge of a depending skirt 4 of a cover member 5 may seat. Preferably, the skirt 4 is spot welded, brazed, or otherwise secured to the upper margin of the casing section 1 above the bead 3 to firmly unite these parts and provide an airtight seal between them. Dirty air inlet ports are provided through the skirt of the cover member 5, preferably in a plurality of locations so as to provide a more even flow of incoming air through the cleaner and lessen the likelihood of turbulence interfering with the capacity of the cleaner. In this instance, a series of louvered inlet ports 6 are provided in one end of the casing, and a second series of louvered inlet ports 7 are provided along one side of the casing cover. The opposite side of the casing cover is imperforate and the other end of the casing is provided with a clean air outlet conduit 8 which, in the illustrated instance, extends through both a portion of the cover 5 and the casing section 1. The conduit 8, of course, is connected with the air intake of whatever device the cleaner is associated with, such for example as the carburetor air intake for an internal combustion engine.

Assuming, for purposes of example, that the illustrated cleaner is associated with a motorcycle, the cleaner will be so mounted on the motorcycle that the outlet conduit 8 is forward, namely, towards the front wheel of the motorcycle. This positioning results, of course, in the louvered inlets 6 being disposed towards the rear, while the louvered inlets 7 are preferably disposed on the inside next to the frame of the motorcycle. Thus, the imperforate side of the cleaner is to the outside of the motorcycle. Therefore, if the motorcycle tips to the right, the inlets 7 are kept away from the ground by the frame of the machine, and if it tips to the left, only the imperforate side of the cleaner may contact the ground. By providing louvered in-

lets, mud and dirt thrown by the wheels of the motorcycle is prevented from clogging the inlets so that there is always a free passage of air through the cleaner and it is impossible for the inlet openings to become jammed into the ground if the motorcycle falls.

Turbulence which might result from air entering the ports 6 at the back of the cleaner tending to rush immediately to the forward part of the cleaner is offset by the air entering through the side inlet ports 7, and likewise turbulence which might result from the air entering the side inlet ports 7 is offset by the air entering the rear inlet ports 6, so that a relatively even flow of air throughout the cleaner is obtained.

Within the casing the clean air outlet conduit 8 communicates with the interior of a filtering chamber defined by a tubular partition 9 over the upper end of which is attached a housing 10. With reference to Figure 2 it will be seen that the sidewalls of the housing 10 are flanged on each side as indicated at 11-11 just above the juncture with the partition 9 to provide a seat for a filter cartridge to be later described. With reference to Figure 1 it will be seen that the housing slopes rearwardly from a point at the forward end of the cleaner above the outlet conduit 8 to a point at the rear end of the cleaner below the lowermost one of the louvered inlets 6. At the rear end of the cleaner the housing 10 is provided with an end wall 12 which also has a flanged lower margin 13 to function as a seat for the filter cartridge. Likewise, the housing is provided with a front wall 14 having a lower flanged margin 15, this wall being apertured to accommodate the clean air outlet conduit 8.

With reference more particularly to Figure 3, it will be seen that the partition 9 is of the same general shape as the casing, but is narrower than the inside width of the casing so that the partition contacts the casing wall 1 at each end of the casing, and is preferably secured thereto, but is spaced from the sidewalls of the casing leaving open spaces or traps 15 and 16 respectively on each side of the filter partition. These traps 15 and 16 are in open communication with the inside of the liquid cup 2 at their bottom ends, and in open communication with the space 18 above the housing 10 at the top of the casing. Now, assuming that the air cleaner is mounted on a motor cycle in the manner above described, if the motorcycle falls over to the right, the liquid contained in the sump defined by the cup 2 will move over into the trap 16 and a side portion of a novel backfire trap in the nature of a baffle plate 19 (Figure 2) prevents the liquid from running out the inlet openings 7. Likewise, if the motorcycle falls over to the left, the sump liquid will be caught in the trap 15. In either instance, the sump liquid is prevented from ever reaching the outlet conduit 8 and passing over into the engine with which the air cleaner is associated. Each trap 15 and 16 is preferably so sized as to accommodate substantially all of the free liquid in the sump, usually not taking into account the sump liquid impregnating the lower portion of the filter mass, of which liquid only a negligible amount could reach the engine regardless of the tipping.

With reference to Figures 1 and 2 it will be seen that the backfire baffle 19 extends from the casing wall 1, slopes inwardly and upwardly in the space 18 over the traps 15 and 16, as well as the rear portion of the housing 10. The upper

inner margin of the baffle is curved downwardly as shown at 19a. Perimetrically this baffle extends from opposite sides of the outlet conduit 8 at the point of juncture with the housing 10 entirely around the casing. Thus, the construction of the baffle 19 not only prevents cleansing liquid from running out the inlet openings 6 and 7 in the event the cleaner is tipped, but also prevents loss of cleansing liquid in the event of backfire through the carburetor of the internal combustion engine with which the cleaner is associated. A backfire will cause a sudden blast of pressure through the cleaner in a reverse direction, through the outlet conduit 8, downwardly through the filter mass to be later described toward the liquid sump and upwardly through the inlet passages formed by the traps 15 and 16 toward the inlet openings 6 and 7. Any cleansing liquid carried toward the inlet openings by the backfire is caught and retained in the cleaner by the trap provided by the baffle 19.

Within the tubular partition 9 a filter mass is disposed. This mass or filtering medium may be made up of any suitable material such as wavy wire, curled cattle tail hair, cactus fiber, or any other suitable material deemed most feasible under particular manufacturing circumstances. In this instance the filter medium is in the nature of a pair of removable cartridges of substantially identical construction. These cartridges are generally indicated by numeral 20 for the upper or innermost cartridge, and numeral 21 for the outer or lowermost cartridge.

Each filter cartridge embodies an imperforate outer wall 22 sized to slidingly fit within the tubular partition 9. At each end thereof, the wall 22 is provided with an inwardly extending flange 23 which extends entirely around the cartridge and with the aid of a sheet of hardware cloth 24 or the equivalent retains the filter mass 25 within the confines of the wall 22 and flanges 23. The cartridges are slipped within the partition 9 so that the innermost cartridge seats against the aforesaid shoulders or flanges 11, 13 and 15, and the lowermost or outer cartridge 21 seats against the inner cartridge.

The filter cartridges are held in position, in the illustrated instance, by a baffle member generally indicated by numeral 26. The baffle is supported in position by one or more channel supports 27 (two being illustrated) located in the trap 15 and preferably secured both to the casing wall 1 and the tubular partition 9. Each such channel support has a depending leg 28 notched as indicated at 29 in Figure 2 for the reception of a margin of the baffle. In the opposite trap 16 is another channel support 30 having a depending leg 31 provided with a suitable bolt holding bracket 32 which carries a bolt that extends through an aperture of the baffle and is engaged below the baffle by a suitable thumb nut 33 or the equivalent.

The baffle itself is preferably made of a single piece of material and includes a centrally upstanding flat portion 34 which bears against the lowermost filter cartridge 21 lengthwise of the air cleaner, as seen clearly in Figures 1 and 2. From this central portion two similarly shaped wings curve downwardly and outwardly in opposite directions, a wing 35 curving toward the channel supports 28—28 and a wing 36 curving towards the channel support 30 on the opposite side. The wing 35 is provided with a suitable notch 37 for engagement with each of the channel supports 28, the notch in the baffle wing en-

tering the notch 29 in the leg 28 of the support 27. On the opposite side, the wing 36 is provided with a suitable aperture to receive the bolt carried by the holder 32 on the support 30. When in this position, with the wing 35 engaged as above described with the support legs 28—28, and the thumb nut 33 tightened beneath the opposite wing 36, the baffle is firmly held in position and preferably under some tension which results from the tendency to somewhat bend the wings 35 and 36 when the thumb nut 33 is tightened in position. Such tension eliminates likelihood of rattle or slippage in connection with the baffle and associated parts. Thus mounted in position, the baffle tightly and effectively maintains the filter cartridges within the tubular partition 9.

Novel and highly effective means are provided for joining the liquid cup 2 to the upper casing section 1 so as to provide an air tight seal therebetween and yet facilitate the ready removal of the liquid cup when desired. These means are in the nature of a pair of oppositely disposed over center clamping members designed to provide more drawing or clamping pressure than is given merely by the overcenter construction.

With reference more particularly to Figures 1, 4, 5 and 6, it will be seen that the upper casing section 1 is provided with a circumscribing sleeve 38 shaped at its upper end to form an outwardly extending gasket holding channel 39 which carries a suitable gasket 40 made of cork, rubber, felt, composition, or other feasible sealing material. The cup section 2 has an outwardly turned upper margin as indicated at 41, and the bend of this turned margin seats against the gasket as indicated at 42 in Figure 6 when the casing sections are joined together. Immediately below the turned margin 41 at each end of the air cleaner the upstanding skirt of the cup portion is provided with a plate 43 provided with a centrally outstanding portion 44 open at the bottom to function as an anchor or keeper for the hasp or latching member of the clamping mechanism.

This clamping mechanism embodies a channel bracket 45 attached at each end to the upper casing section 1. An actuating lever comprising a tubular or channel portion 46 and an integral outwardly extending curvate thumb piece 47 is pivoted to the bracket 45 by pivot pin 48. A hasp or latching member 49 having an opening 50 through which the channel lever 46 extends is pivoted to the channel lever by a pivot pin 51 which pivot pin is free to move longitudinally of the member 46 within opposed elongated slots 52. At its lower end the hasp or latch 49 is provided with a second opening 53 to receive the outstanding keeper 44, and is also provided with an upstanding tongue or locking element 54 engageable inside the keeper 44 as seen best in Figures 5 and 6.

With reference to Figure 4, it will be seen that the locking device is in open position, and the cup section 2 is telescoped over the lower portion of the upper casing section 1, but the flare 41 on the cup is not in contact with the gasket 40. It is now a simple expedient to swing the latch member 49 into engagement with the keeper 44 so that the tongue 54 is locked within the keeper, while elevating the thumb lever 47. When the thumb lever 47 together with the tubular portion 46 is forced over center into upright position as seen in Figure 5, the hasp or latch 49 tightly clamps the cup section 2 and pulls it up further along

the upper section 1 so that the turned margin 41 of the cup section seats firmly against the gasket as indicated at 42 in Figure 6. As stated before, to positively insure an air tight seal between the casing sections and to eliminate rattle, etc., a relatively heavy spring 55 is disposed freely within the tubular lever portion 46 between the pivot pins 48 and 51, so that the spring tends to force the pivot pins apart. When the clamping lever 47 is moved into the upright position seen in Figures 1, 5 and 6, the pivot pin 51 is naturally brought downward within the elongated slots 52, thereby compressing the spring 55 as seen best in Figure 1. Thus the over center action of the clamping element is augmented and materially strengthened by the action of the spring, and one such clamping device including the spring at each end of the air cleaner is amply sufficient to insure a positive air tight seal between the separable casing sections.

In operation, the cleaner above described is extremely efficient. Assuming that the cleaner is in condition for operation, with the casing sections joined together, and the outlet conduit 8 connected to the carburetor of an internal combustion engine, for example, due to the suction of the engine incoming dirty air enters through the louvered inlet openings 6 and 7 which, as stated above, are located in semi-protected areas, namely, at the back of the air cleaner and along the side of the air cleaner adjacent the frame of a motorcycle for example. The disposition of the inlet openings so that the path of incoming air crosses at right angles avoids any loss of capacity due to turbulence within the cleaner. The entering air through both sets of openings arrives in the space 18 above the housing 10 at the top of the cleaner, that air entering the openings 7 passing over the baffle 19. The entering air then descends on opposite sides of the casing through the traps 15 and 16 and strikes the sump liquid on top of the baffle wings 35 and 36. The normal level of sump liquid is substantially even with the lower end of the tubular partition 9, which is preferably just sufficient to seal off the traps 15 and 16. All of the sump liquid resting on top of the baffle wings 35 and 36 is immediately carried up into the lower filter cartridge 21 by the rush of incoming air. Such liquid circulates within the filter mass and foreign particles are effectively removed from the air. The upper portion of the filter mass, including all or a part of the upper cartridge 20, not only removes finer foreign particles from the traveling air but also cleanses the air of any entrained sump liquid so that clean air free from sump liquid passes out the conduit 8. During the cleansing operation there will be a circulation of air through the lower portion of the filter medium and heavy dirt laden liquid will gravitate over the wings 35 and 36 back into the sump and other cleansing liquid will be aspirated from the sump through the openings 56—56 between the side edges of the baffle wings and the adjacent wall of the liquid cup 2. With the liquid lying in this trap, no liquid can flow through the filter mass into the engine, nor can any of the liquid flow out the inlet openings 6 or 7, the inlet openings 6 being disposed out of line of the liquid, and the baffle 19 preventing any flow of liquid out of the openings 7. Likewise,

if the motorcycle is tipped to the left, sump liquid will be caught in the trap 15 and so prevented from leaving the cleaner either through the inlet openings or the clean air outlet conduit 8. When the motorcycle has again been righted, the liquid will return to the sump and the cleaner will again operate as above described. It will be especially noted that it makes no difference whatever whether or not the motorcycle engine is running and continues to run at the time the motorcycle falls either to the left or right. It will further be noted that in the event the motorcycle falls, it is impossible for either set of inlet openings to be jammed into the ground, because one set is disposed towards the rear of the machine, and the other set is protected by the frame of the machine. If the motorcycle falls to the left and the casing comes in contact with the ground, that side of the casing is imperforate and the rugged construction of the cleaner should protect it against all reasonable fallings or accidents, without in any manner affecting its efficiency or operation.

Likewise, due to the baffle plate 19 there can be no loss of cleansing liquid by way of backfire through the carburetor of the internal combustion engine with which the cleaner is associated.

In addition, it is apparent that the cleaner is designed to provide a thorough and effective circulation of sump liquid over the baffle and through the lower portion of the filter insuring a very high cleaning efficiency, and the ample inlet path for incoming air defined by the space 18 and the traps 15 and 16 reduces restriction to the travel of air to a point below that of any other cleaner of equal capacity with which I am familiar. It is further apparent that a positive and quickly adaptable air seal occurs between the lower casing section 2 and the upper casing section 1, effected by my novel clamping arrangement with the pulling power of the over center clamping element augmented by the action of the springs 55—55.

When it is desired to cleanse the air cleaner parts or replace sump liquid, it is a simple expedient to release the clamping elements and pull off the liquid cup, dumping out the old liquid together with the accumulated dirt, and replenishing the cup with new cleansing liquid to the desired level. When the cup is removed, it is a simple expedient to remove the thumb nut 33, take out the baffle 26, thus permitting both filter cartridges 20 and 21 to drop out of the tubular partition 9. These filter cartridges may then be washed in kerosene, gasoline, or other equivalent cleansing medium, readily replaced in the tubular partition 9, the baffle placed again in position, and anchored under tension by the thumb nut 33. Then the oil cup with the new liquid supply may be replaced, the clamping elements again locked in the position seen in Figure 1, and the cleaner is ready for operation. Thus, the cleaner can be serviced simply, and very quickly, without the aid of any tools or mechanical implements whatever.

Assuming it is desired to increase the capacity of the cleaner without detracting to any but a most negligible degree from the efficiency, and of course without causing a likelihood of pull over of cleansing liquid to the carburetor of the internal combustion engine through ordinary operation, this may be accomplished with the instant invention in a simple and quickly accomplished operation of substituting a different form of baffle.

With reference to Figures 7 and 8, it will be seen that I have illustrated a substitute form

of baffle designed to increase the capacity of the air cleaner. All of the other portions of the air cleaner construction, including the baffle supporting means, remain the same as above described, the only difference in structure being the baffle itself. To effect this increase in the capacity of the cleaner, it is a simple expedient to remove the baffle 26 as above described. Another baffle 57 is then inserted and held in position in identically the same manner as was the baffle 26. The baffle 57, however, does not have the curvate wings 35 and 36 of the baffle 26, but on the other hand is substantially a sheet of material bowed upwardly slightly from one side to the other. On the top of the baffle is a pair of yoke members 58—58 one at each end of the baffle which bear against the flange 23 of the lowermost filter cartridge 21 and thus retains the filter cartridges in position. The tightening of the thumb nut 33 will also provide some inherent tension in the baffle 57 so that the filter cartridges will positively be held in position and rattling and other noises will be eliminated.

Using a baffle of the character of the baffle 57, also provides a circulatory action of cleansing liquid over the upper surface of the baffle and the aspiration of cleansing liquid through the openings 56—56 between the edges of the baffle and the adjacent wall of the casing section 2, but all of the liquid initially on top of the baffle will not at once be carried up into the filter mass by incoming air, since the baffle is not so shaped as to guide all of this liquid into the filter mass as are the wings 35 and 36 on the baffle 26. Consequently, during operation there will be a somewhat less quantity of cleansing liquid within the filter mass and the liquid will be mostly concentrated in the lower portion of the filter mass, thereby permitting a greater amount of air to pass through the cleaner, which air will not only be efficiently cleaned, but there will be no danger of sump liquid being carried over by the traveling air into the carburetor of the internal combustion engine with which the cleaner is associated.

In view of the foregoing, it will be apparent that the capacity of the cleaner may be altered at will by a simple substitution of baffle elements.

By virtue of the disclosure herein and in the appended drawings, it is apparent that I have provided a novel form of air cleaner highly desirable for use in connection with motorcycles and similar vehicles, although the air cleaner may be used with many and various types of equipment needing a supply of clean air as will be apparent to one skilled in the art. It will further be apparent that the air cleaner is highly efficient and operates with low restriction, is rugged in construction, and designed to prevent the passage of liquid through the dirty air inlet openings or the clean air outlet opening in the event the cleaner is tipped to either side. It is also apparent that I have provided simple and efficient yet highly positive clamping means for joining the separable parts of the casing section together which means provide a highly positive air tight seal between the separable sections when joined, and which permit a ready and facile separation of the sections when desired.

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 other-

wise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In an air cleaner, a casing having an inlet opening in each of an end wall and a sidewall, said casing having a liquid sump in the bottom thereof, a partition inside said casing spaced from the opposed casing sidewalls and defining a filter compartment, filter means inside said compartment, imperforate means spaced above said filter means and sealing off the filter compartment, an outlet conduit communicating with the filter compartment above the filter means and extending to the outside casing wall, a baffle beneath said filter means and extending beyond the sides thereof but not to the casing wall, and the spaces between said partition and the casing sidewalls functioning both as passages for incoming air and as traps for sump liquid in the event the cleaner is tipped sidewise in either direction, said baffle preventing free sump liquid from entering said filter means when the cleaner is tipped.

2. In an air cleaner, a casing having an inlet opening near the top and a liquid sump at the bottom, covered partition means in said casing defining a filter compartment open only at the bottom towards said sump, removable filter cartridges in said compartment, a baffle below said partition means and extending therebeyond having a raised portion supporting said cartridges in position, said partition means being spaced from opposed walls of the casing to define incoming air passages and traps for sump liquid if the cleaner is tipped sidewise, and outlet conduit means communicating with the filter compartment.

3. In an air cleaner, a casing having an inlet opening, said casing having a liquid sump at the bottom thereof, a tubular partition in said casing above said sump and spaced from the casing wall to provide a passage for incoming air, filter means within said partition, an outlet conduit communicating with the interior of said partition above the filter means, baffle supporting means in said passage for incoming air, and a baffle held under tension by said supporting means with a part of the baffle contacting said filter means to maintain the latter in position.

4. In an air cleaner, a casing having an inlet opening, said casing having a liquid sump at the bottom thereof, a tubular partition in said casing above said sump and spaced from the casing wall to provide a passage for incoming air, filter means within said partition, an outlet conduit communicating with the interior of said partition above the filter means, a notched baffle support in said passage for incoming air, a baffle shaped for complemental engagement in the notch of said support and having a part arranged to contact and support said filter means, and a second baffle support in said passage spaced from the first support and arranged to engage said baffle and hold the same under tension.

5. In a liquid bath air cleaner, a casing having spaced inlet and outlet openings and a liquid sump therein adjacent the path of air traveling through the casing, filter means in said casing, an imperforate wall around said filter means spaced from opposite parts of said casing to provide traps communicating with said sump, and a baffle below said filter means and extending outwardly beyond the filter means and over a part of the traps in position to prevent sump liquid from entering the filter means instead of

all entering a trap in the event the cleaner is tipped.

6. In an air cleaner, a casing having spaced inlet and outlet openings near the top thereof and a sump for cleansing liquid in the lower part thereof, means in said casing containing a filter mass, a housing over said means and mass and opening through said outlet opening, said means being disposed to define on a plurality of sides thereof an air inlet passage leading toward said sump, said passages communicating with each other above said housing, and a baffle member extending slantwise over the upper portions of said inlet passages in spaced relationship to said housing and having a downwardly turned inner margin, said baffle member preventing escape of liquid through said inlet opening in the event of reverse pressure through the cleaner.

7. An air cleaner for association with an internal combustion engine, including a closed-top casing substantially rectangular in cross-section to be mounted with one of the longer sides nearer the engine, said side nearer the engine having an inlet opening near the top of the casing and extending substantially the full length of the side, the other and outer side being imperforate, partition means having a housing thereover spaced from the side walls of said casing to provide liquid traps as well as inlet passages, said traps communicating with the inlet and with each other above the partition housing, an outlet conduit leading from said housing through the casing wall, filter means in said partition means, and said casing having a liquid sump below said filter means.

8. An air cleaner for association with an internal combustion engine, including a closed-top casing substantially rectangular in cross-section to be mounted with one of the longer sides nearer the engine, said side nearer the engine having an inlet opening near the top of the casing and extending substantially the full length of the side, the other and outer side being imperforate, partition means having a housing thereover spaced from the side walls of said casing to provide liquid traps as well as inlet passages, said traps communicating with the inlet and with each other above the partition housing, an outlet conduit leading from said housing through the casing wall, filter means in said partition means, said casing having a liquid sump below said filter means, baffle means extending inwardly from the casing wall below the inlet opening and over the upper parts of said traps and terminating short of the partition housing.

9. In a liquid bath air cleaner, a casing longer than it is wide and having an inlet opening along one of its longer sides, the opposite longer side being imperforate, said casing having a liquid sump therein, means in said casing defining liquid traps to receive sump liquid in the event the cleaner is tipped, said traps communicating with each other and with said inlet above said means to function as air inlet passages, filter means in said trap defining means, an outlet conduit leading from said trap defining means above said filter means, and baffle means extending inwardly from the casing wall over the upper portions of said traps, entering air being forced to pass over the

upper surface of said baffle means and then between said baffle means and said housing to enter said air inlet passages.

10. In an air cleaner, a casing having separated inlet and outlet openings, said casing having a liquid sump in the bottom thereof, an open bottomed partition housing in said casing spaced from the casing wall to define a path for entering air leading towards said sump, filter means in said housing, means establishing communication between the outlet opening and the interior of said housing above the filter means, said path also functioning as a trap for sump liquid in the event the cleaner is tipped, and a baffle member extending inwardly over said path to a point spaced above said partition housing and around which entering air must travel to enter said path, said baffle serving the double function of completing said trap to prevent liquid running out the inlet opening when the cleaner is tipped and to retain liquid in the cleaner in the event of reverse pressure through the cleaner.

11. In an air cleaner, a casing having a liquid sump in the bottom thereof and an inlet opening well above said sump, a partition housing in said casing of less cross-sectional size than said casing and having an opening in the bottom thereof above said liquid sump, said partition housing having a closed top, filter means in said housing, and outlet means for clean air communicating with the interior of said housing above said filter means, said partition housing being spaced from the wall of said casing to define therebetween a passage for incoming air leading downwardly toward said sump, said passage being in direct communication with said inlet opening, and a baffle member so arranged as to block a direct flow of air from the inlet opening to said passage and extending over said passage to hold sump liquid in the casing in event of reverse pressure through the cleaner.

12. In an air cleaner, a casing having a liquid sump in the bottom thereof and an inlet opening well above said sump, a partition housing in said casing of less cross-sectional size than said casing and having an opening in the bottom thereof above said liquid sump, said partition housing having a closed top, filter means in said housing, and outlet means for clean air communicating with the interior of said housing above said filter means, said partition housing being spaced from the wall of said casing to define therebetween a passage for incoming air leading downwardly toward said sump, said passage being in direct communication with said inlet opening, and a baffle member extending inwardly over the upper part of said passage to a point spaced above said housing and over which incoming air must travel to reach said passage, said baffle retaining sump liquid in said passage in the event the cleaner is tipped and also retaining sump liquid in the cleaner in event of reverse pressure through the cleaner, and the inner marginal portion of said baffle member being curved inwardly and downwardly to afford a smooth path of travel for the air and thus lessen restriction to the flow of air through the cleaner.

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