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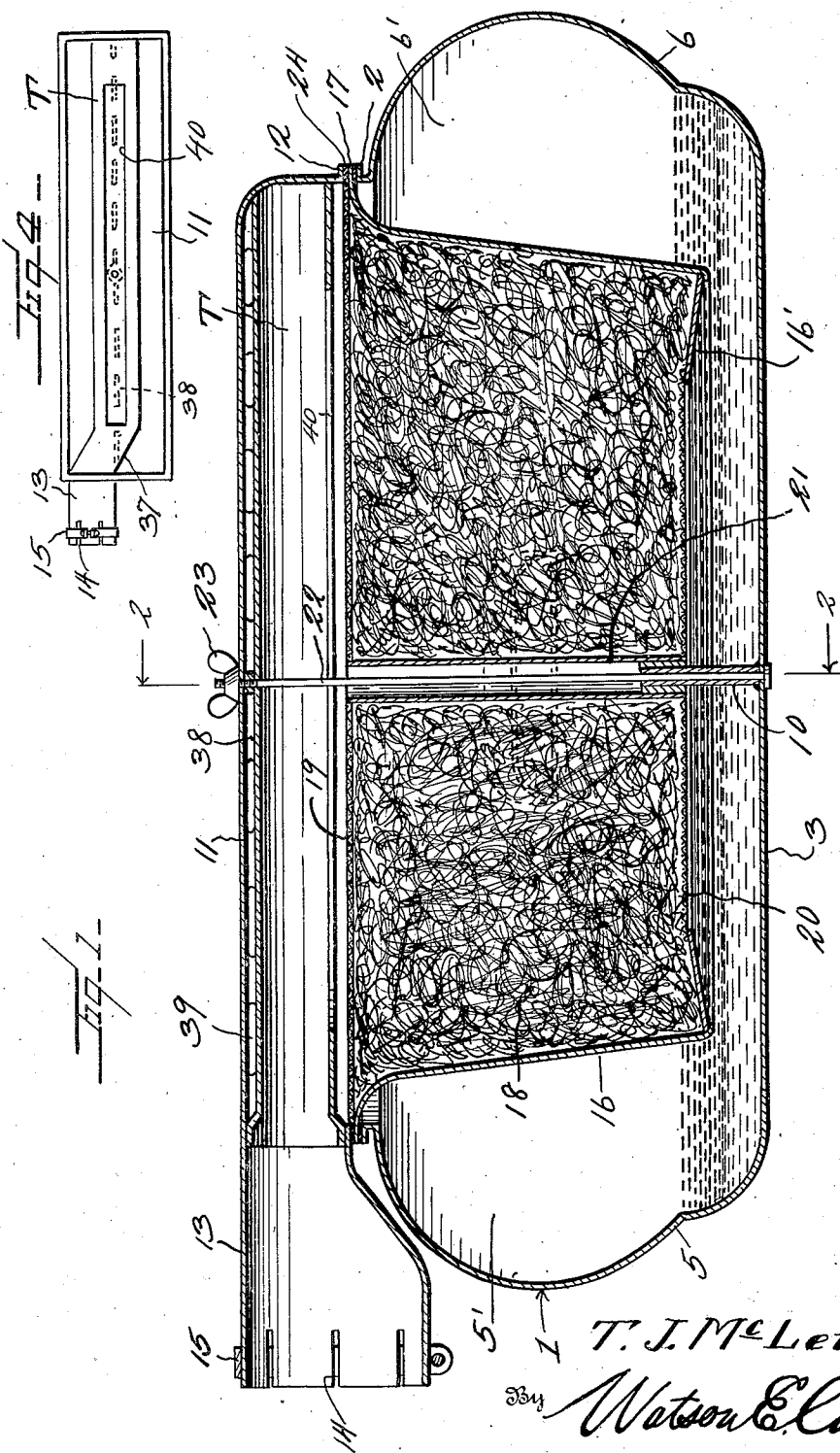
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2,259,938

FILTER DEVICE

Filed July 18, 1940

2 Sheets-Sheet 1



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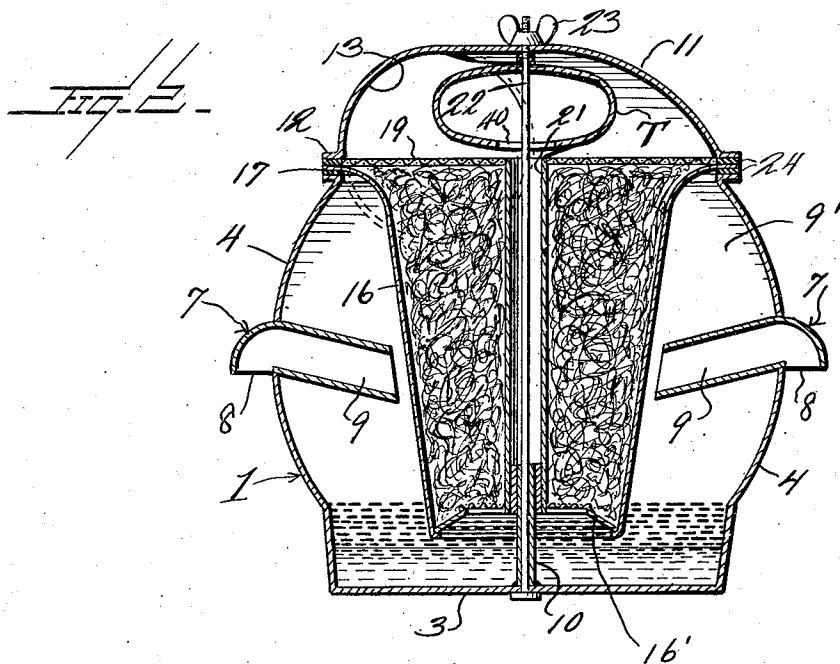
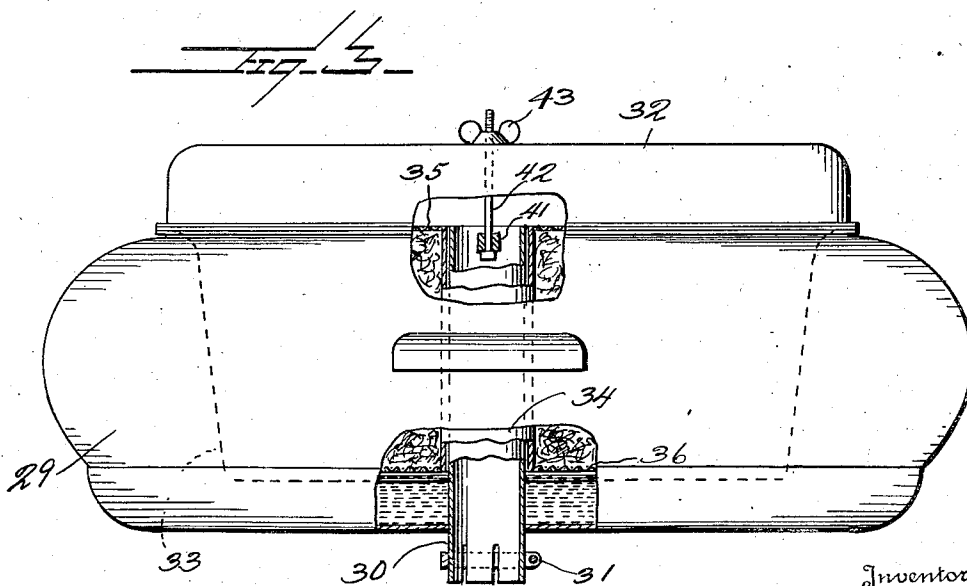
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UNITED STATES PATENT OFFICE

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FILTER DEVICE

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5 Claims. (Cl. 183—15)

This invention relates to improvements in air strainers or air filters of the type designed for use in connection with the carbureters of internal combustion engines, the present device being primarily designed for use upon motorcycles, motor scooters or similar types of machines.

In the operation of motorcycles, scooters and like vehicles, the engines are frequently tilted at very sharp angles and where air cleaners are employed in association with the engine carbureter, which have a cleaning fluid therein such as oil or the like, such fluid frequently spills out when the engine is tilted to an extreme angle. The present invention has for its primary object to provide an air cleaner in which the air flowing therethrough is subjected to an oil bath, which is so designed that the oil will not be spilled out even though the machine upon which the cleaner is mounted is laid on its side or stood on end, thus insuring at all times the presence in the cleaner of the necessary oil through which the air flowing to the engine carbureter must pass.

Another object of the invention is to provide an oil bath air cleaner which while primarily designed for use upon motorcycles and like vehicles in the manner stated, may be readily converted to use upon automobile engines in connection with down-draft carbureters.

A still further object of the invention is to provide an oil bath air cleaner in which the construction and arrangement of the parts is such that a minimum of dust-laden air will be drawn into the cleaner, thereby insuring a longer life for the cleaner.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not to be confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Fig. 1 is a vertical longitudinal section through the air filter embodying the present invention.

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1.

Fig. 3 is a view partly in side elevation and partly in section of a modified form of the invention.

Fig. 4 is a view in bottom plan of the cleaner cover showing the air conductor tube therein.

Referring now more particularly to the drawings, it will be seen that the air cleaner embodying the present invention comprises an elongated pressed metal body 1 having a longitudinally extending open top, the edge of which is outwardly flanged, as indicated at 2, and opposite the open top, a downwardly pressed longitudinally extending oil pan or sump 3 having substantially straight side walls, this pan being filled with oil as shown. The longitudinal side walls of the body 1 bulge or curve outwardly, as indicated at 4, so that the body suggests a horizontally disposed cylinder having a flat open top side and a downwardly pressed bottom side. The front and rear ends of the body are bowed or pressed outwardly in the substantially semi-spherical form shown and indicated respectively by the numerals 5 and 6.

At substantially the transverse center of the body 1, each side wall 4 is provided with an air inlet tube or conduit 7 which at its outer end is shaped to provide the downwardly opening hood 8 and which extends inwardly and downwardly into the receptacle body, as clearly illustrated in Fig. 2, the inner end portion of each tube being indicated by the numeral 9.

At the transverse center of the body 1 there extends upwardly through the central portion of the oil sump 3, a sleeve 10 which is secured to the bottom of the oil sump in a fluid-tight manner and opens through such bottom to receive a tie bolt hereinafter referred to.

The numeral 11 designates the top or cover for the body 1, this cover having an open under side outlined by a flange 12 which conforms in its dimensions with the flange 2 and is adapted to rest thereon so as to close the top opening of the body. At one end and preferably adjacent one side, the cover merges into the air outlet sleeve 13 which has its end edge slit, as indicated at 14, so that it may be compressed or reduced in diameter by the encircling clamping band 15. This sleeve is provided to receive the air inlet tube of a carbureter, not shown, about which it is secured by the clamping band.

Disposed within the cover 11 and preferably upon the longitudinal center thereof is a tube T which at one end is secured to the end wall of the cover remote from the sleeve 13. At its opposite end this tube has a portion extended laterally, as indicated at 17, so that it may join the sleeve 13 which is offset from the longitudinal center of the cover, as shown in Fig. 2. The tube

T is spaced from the top of the cover 11 and is attached thereto by the longitudinally extending web 38 which at intervals has openings 39 cut therethrough. Upon its under side, the tube T is provided with the single longitudinally extending slot 40 which terminates at each end a substantial distance inwardly from the end wall of the cover.

The numeral 16 designates a filter material container which is of elongated rectangular design and which is open at its top and bottom, the top part of the container being provided with the outwardly flaring encircling flange 17. The container 16 is slightly tapered from the top to the bottom thereof and it is of a maximum width and length which is slightly less than the width and length of the opening for the body 1, so that the container may be readily dropped into the body with the flange 17 resting upon the flange 2 between this flange and the flange 12 of the cover. The height of the container 16 is such that when it is suspended within the body in the manner stated, the bottom level will be slightly below the level of the oil in the sump 3.

The lower edge of the container 16 is bordered by the inwardly and upwardly extending flange 16', this flange being provided to prevent oil from entering the container from the sump 3 when the body is tipped either to one side or onto an end.

As previously stated, the walls of the container 16 taper toward the bottom and when the container is in position in the body, the inner ends of the air inlet conduits 7 are in relatively closely spaced relation with the side walls of the container so that air entering the body 1 through these conduits strikes the side walls of the container 16 and is deflected downwardly toward the sump into which it must pass before it can flow into the lower end of the container and upwardly through the same.

The container 16 is filled with a suitable filter material preferably copper mesh 18, and the top and bottom of the container are each covered by a screen to maintain the filter mesh in place, the top screen being indicated by the numeral 19 and the bottom screen by the numeral 20. These screens are soldered or otherwise permanently secured to the filter container. In the assembling of the filter unit comprising the container 16, the filter mesh 18 and the screens 19 and 20, the bottom screen may be secured in position before the filter material is put in and there may be secured vertically upon the bottom screen the bolt sleeve 21 alining with a suitable opening in the bottom screen and adapted for alinement with a similar opening in the top screen so that after the container 16 has been placed in position preparatory to applying the cover 11, there may be extended upwardly through the sleeve 10 and through the sleeve 21 into which the sleeve 10 extends, the tie bolt 22 which passes through the top wall of the cover to receive a securing nut 23. By this means, the parts of the filter are securely coupled together. Gaskets 24 are preferably inserted between the flanges of the device to prevent leakage.

By the provision of the outwardly bulging ends 5 and 6 for the body and the bowed sides 4, it will be apparent that should the air cleaner be tipped in either direction sideways, oil in the sump 3 will merely flow into the chamber 9' between the wall 4 and the adjacent side wall of the container 16 and cannot escape through

the air inlet conduits nor can it enter the top 11 to pass into the engine carbureter. Should the cleaner be tipped onto its rear end or onto its forward end, the oil will flow either into the area 6' between the outwardly bowed rear wall 6 and the adjacent rear wall of the receptacle 16 or into the area 5' between the forwardly bowed wall 5 and the forward wall of the container 16. In either case, it will be retained against passage into the top 11 where it might flow into the engine carbureter. By the provision of the inwardly and upwardly extending flange 16' at the lower end of the container 16, the possibility of any oil splashing across the lower edge of a side or end wall of the container 16 and flowing into the filtering material is avoided. If, however, a sudden inversion of the filter device should occur which would cause the oil in the sump to be thrown into the area defined by the flange 16' and thus pass through the straining or filtering material 18 into the top 11 of the device, this oil cannot even then pass into the carbureter through the connection 13' because of the provision of the tube T. The apertures 39 in the web which connects the tube with the top of the cover permit the oil to pass between the tube and the top wall so that when the device is again placed in upright position, the oil will flow down and back through the filtering material into the sump but cannot be drawn into the opening 40 with the air.

From the foregoing description, it will be apparent that when the cleaner device is mounted in horizontal position and attached at its forward end to the air inlet of a carbureter, air entering through the air conduits 7 will flow downwardly along the side walls of the filter container 16 to the under side of such container where it will be forced, due to the fact that the bottom of the filter container lies just below the level of the oil in the sump 3, to pass through the oil before it can flow upwardly through the filter container 16. In passing upwardly through this container, any oil which may be picked up will be scrubbed out of the air by the copper mesh filter and the air will then flow in clean condition into the cover 11 and into the engine carbureter.

In Fig. 3, a slightly modified construction of the air cleaner is shown for adapting the same to a downdraft carbureter such as is used with automobile engines. In this construction, the main body portion of the cleaner will be the same as the body illustrated and described in connection with the preferred form, this body being here designated generally by the numeral 29, with the exception that the bottom of the oil sump will have an air outlet tube 30 extended therethrough which at its lower end is slitted and provided with a clamping ring 31 to facilitate its attachment to the air intake of the carbureter while its upper end extends to the top of the body 29. The cover for the open top of the body 29 is indicated by the numeral 32 and forms an air hood into which the air rises from the filter container 33 to pass downwardly through the tube 30.

The cover or top 32 for the modified form of the invention is held in place by providing the tube 30 in its upper part with a spider 41 to which is connected an end of a tie bolt 42 which extends upwardly through the top 32 and receives upon its upper end the wing nut 43 which bears upon the top side of the top 32 to draw the same firmly into position upon the body 29. The connection between the top 32 and the body 29 may be the same as that shown and described particularly in

connection with the structure of Fig. 1, suitable leak-preventing gaskets being inserted between the several parts. In this modified form, the filter container would be provided with a central vertical sleeve 34 which surrounds the tube 30, the top and bottom screens 35 and 36 respectively, for the filter material container being suitably centrally apertured for the extension therethrough of the upper or inner part of the tube 30 or, if preferred, the top filter retaining screen may be in a single piece to extend over and cover the inner or top end of the tube 30. With this modified construction, it will be readily seen that the air cleaner can be mounted directly over the carbureter in the customary manner of mounting air cleaners for downdraft carbureters.

What is claimed is:

1. An air cleaner, comprising an elongated horizontally disposed housing body having a top opening and having a pan-like bottom forming a sump extending throughout the length of the body, a receptacle having downwardly converging imperforate side and end walls suspended within the body from the edge of said top opening, the receptacle being open at its top and bottom and having its bottom opening disposed with respect to said sump to be immersed in fluid in the sump, a filter material filling the receptacle, said receptacle walls having at their lower edges inwardly and upwardly directed bordering rims, screens covering the open top and bottom of the receptacle, a hood-like cover overlying the open top of the body and of the receptacle, an air outlet conduit leading from said cover, and an air introducing conduit passing through a wall of the housing body and extending inwardly toward and terminating in close proximity to the adjacent side of the filter material receptacle for conducting the air downwardly into the fluid containing sump to pass through the fluid therein and into the said receptacle through the open bottom thereof.

2. An air cleaner, comprising an elongated horizontally disposed housing of substantially cylindrical cross-section and having a top opening and a longitudinally extending pan-like bottom sump to be filled with fluid, an elongated container disposed within the housing and having an open top and an open bottom, said container being secured around its top to the edge of said housing opening and having its open bottom in a plane to be submerged in said sump, a hood covering said housing opening and said container, an air outlet in communication with said hood, a filtering material filling the container, said container having its walls of imperforate form, and an air admitting conduit extending through a side wall of the housing and discharging therein in close proximity to a side of said container, the air passing downwardly into the fluid in said sump and into the filter material container through the open bottom of the latter, said filter material container having an upwardly and inwardly extending flange bordering the open bottom thereof.

3. A fluid bath air cleaner, comprising an elongated body having an open top and a bottom formed to provide a fluid containing sump, the length of the body being horizontal when the body is in use, a hood-like cover for and extending lengthwise of said open top, a tube suspended within and extending lengthwise of and through said cover, an outlet sleeve connected with an end of the cover and having connection with said tube, the sleeve being designed for attachment to the air inlet of a carbureter, said tube having a lengthwise downwardly directed air inlet opening therein, a filtering medium carrying receptacle suspended within the body and having an open top and bottom, the open top of the receptacle opening into the cover toward the opening of the tube and the open bottom of the receptacle being disposed with respect to said sump to be immersed within fluid in the sump, the body having side walls spaced from the receptacle, and air inlet means leading through said side walls toward the adjacent sides of the receptacle.

4. An air cleaner, comprising a housing having a bottom portion designed to receive a fluid, a removable top for the housing forming an air hood, a receptacle suspended in the housing from the lower part of the hood, the receptacle having an open top directed into the hood and an open bottom arranged for immersion in fluid in the bottom of the housing, a filter material filling the receptacle, an air outlet conduit leading from the hood, said housing having side walls spaced from the walls of the receptacle to an extent sufficient to provide a space therebetween in which all of the fluid may be received when the housing is turned on one side, and air admission conduits extending through the side walls of the housing toward and terminating in relatively close proximity to the adjacent walls of the receptacle whereby the fluid is held against escape from the housing upon its entrance into said space.

5. An air cleaner, comprising a housing formed to contain a fluid in its bottom portion, a filter containing receptacle suspended in the housing and secured thereto adjacent its top to the upper part of the housing, the portion of the housing above the receptacle forming an air chamber, the receptacle forming an air passageway between the lower part of the housing and the air chamber, a filter material within the receptacle, the said receptacle and the housing having side walls spaced apart a distance sufficient to provide a space into which fluid may enter from the lower part of the housing when the housing is turned on its side, an air conduit in communication with said air chamber for conducting air therefrom, and air admission conduits carried by the side walls of the housing and extending inwardly therefrom toward the adjacent walls of the receptacle across the said space between the receptacle wall and the adjacent housing wall, said last conduits functioning to admit air into the housing and to prevent the escape of fluid when the housing is turned on its side.

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