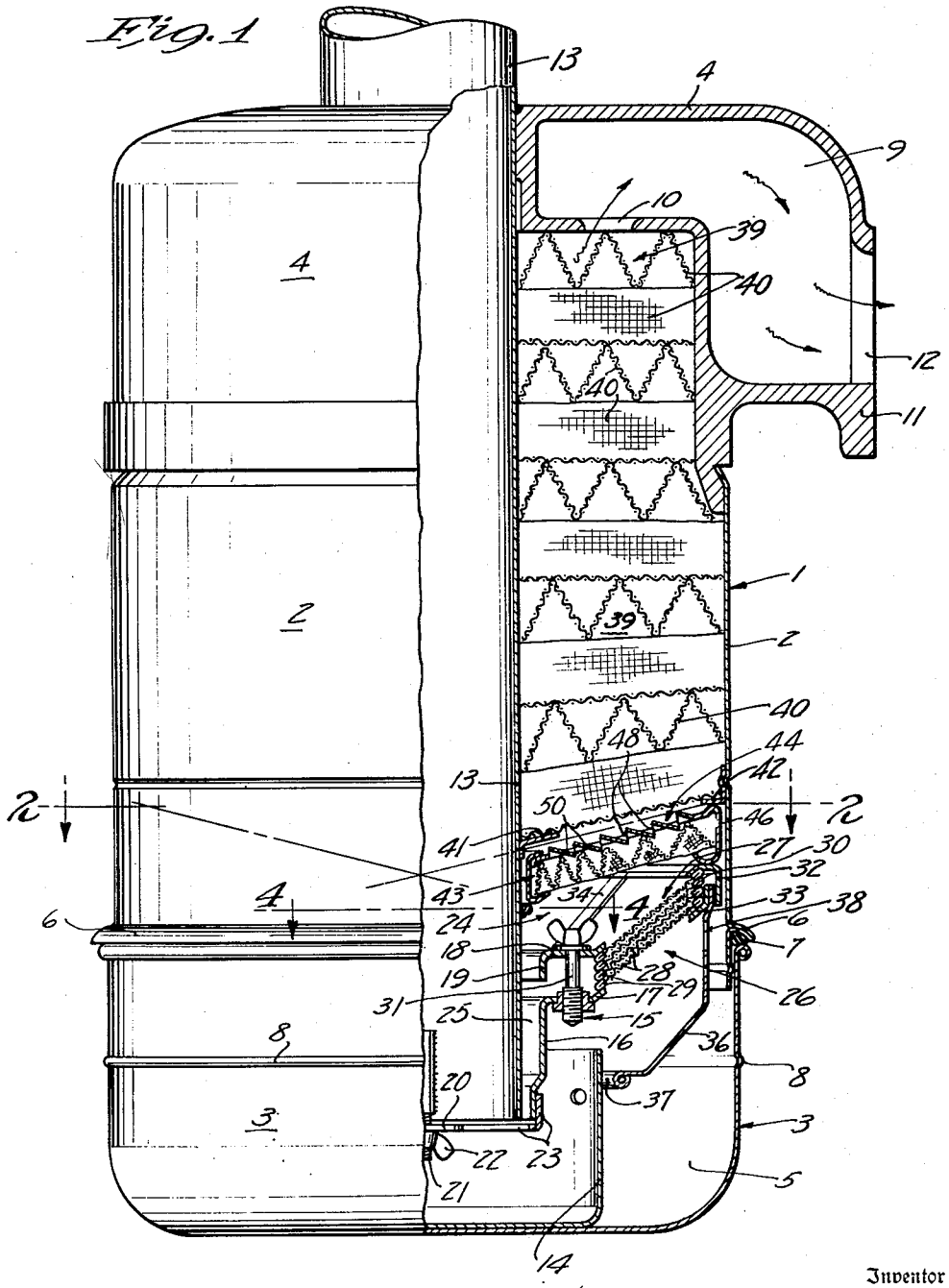
Feb. 10, 1953 S. H. BEACH 2,627,935

AIR CLEANER

Filed Feb. 7, 1951 2 SHEETS—SHEET 1

Fig. 1



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AIR CLEANER

Filed Feb. 7, 1951 2 SHEETS—SHEET 2

Fig. 2

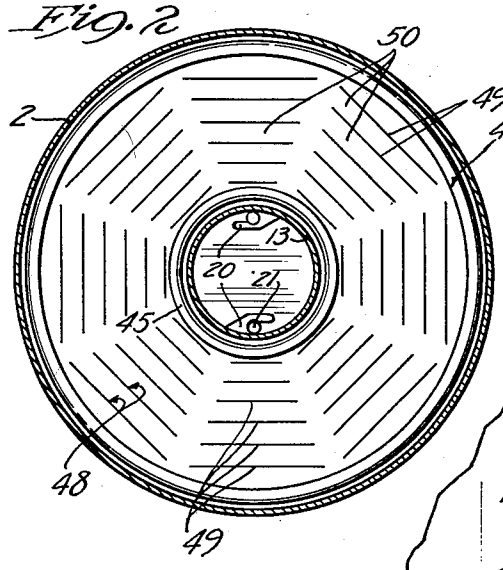


Fig. 3

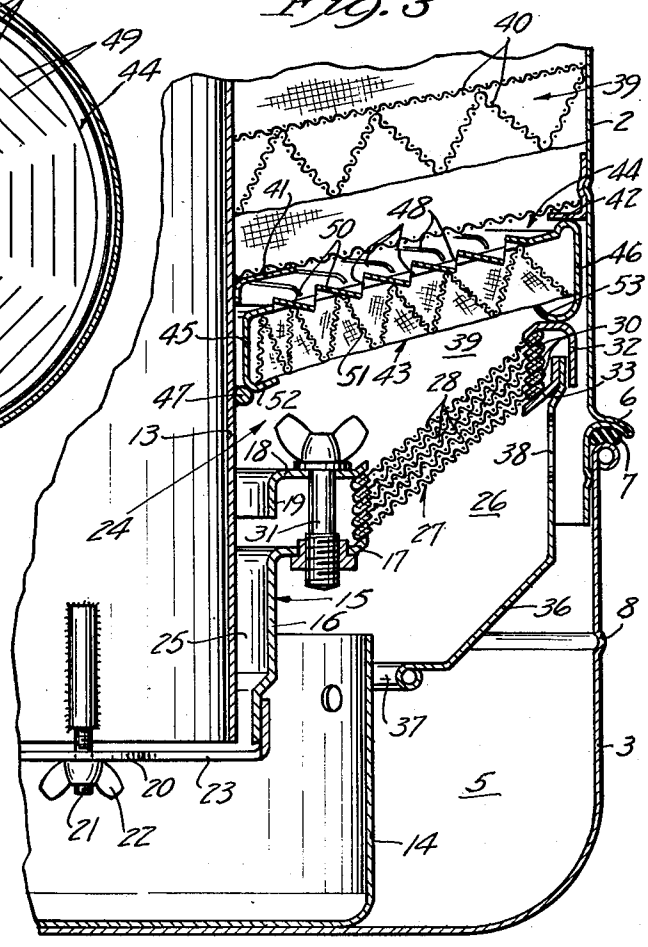
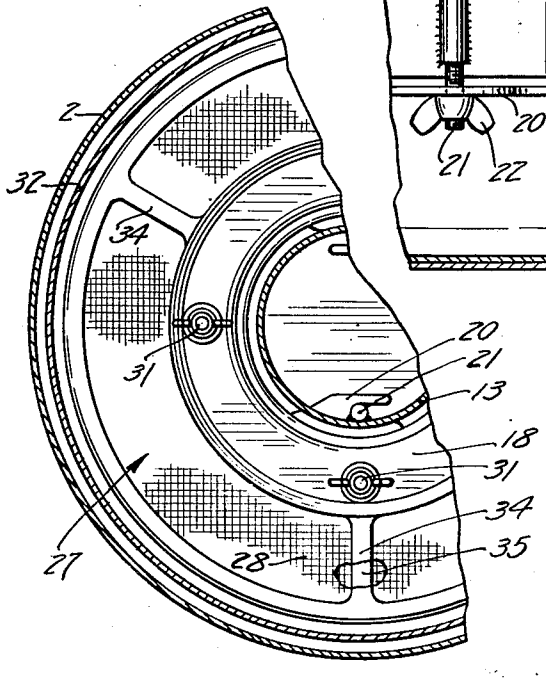


Fig. 4



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2,627,935

AIR CLEANER

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Application February 7, 1951, Serial No. 209,718

9 Claims. (Cl. 183—15)

1

Generally stated, my invention relates to improvements in air cleaners of the kind employing a body of free-flowing liquid, usually oil, to separate air-borne dust and similar foreign substance from a column of air, such cleaners being commonly used in connection with the air intake systems of internal combustion engines, compressors and analogous air-consuming devices, and being commonly referred to as "oil-washed" air cleaners or as "wet" air cleaners. In a more specific sense, it may be said that my invention relates to improvements in wet air cleaners of the general character disclosed and claimed in the Wilfred W. Lowther Patent No. 2,387,278 of October 23, 1945.

A particular object of the invention is the provision of an improved air cleaner of the general character described, whereby to prevent the carrying over of the cleaner's oil or other liquid into the air intake system of an associated internal combustion engine or corresponding air-consuming device, under certain abnormal conditions, when the normal air passageway leading upwardly from the bottom portion of the cleaner becomes partially or wholly plugged. This important objective will be elaborated upon and other objectives made apparent from the following specification, claims and appended drawings.

In the accompanying drawings, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view in side elevation, with some parts broken away and some parts shown in axial section, of a commercial air cleaner embodying a preferred form of the invention;

Fig. 2 is a transverse sectional view on a reduced scale, taken on the line 2—2 of Fig. 1 and looking downwardly;

Fig. 3 is a greatly enlarged fragmentary sectional view corresponding to the lower sectioned portion of Fig. 1; and

Fig. 4 is a fragmentary transverse sectional view taken on the line 4—4 of Fig. 1.

In the drawings hereof, a preferred embodiment of the invention is shown as being incorporated in a commercial form of air cleaner of the variety disclosed and claimed in the said Lowther Patent No. 2,387,278. The shell-like outer casing of the air cleaner illustrated is of generally cylindrical form and is indicated as an entirety by 1. This outer casing 1 comprises an intermediate cylindrical section 2, a cup-like bottom section 3 closing the lower end of intermediate section 2, and a head section 4 forming an extension of and closing the upper end of

2

cylindrical section 2. The cup-like lower section 3 of the casing provides a liquid reservoir 5 in the bottom portion of the casing 1 and is detachably telescopically applied over the lower end of cylindrical section 2 to the extent permitted by a flange 6 and sealing gasket 7. The cup-like bottom section 3 of the casing may be detachably secured in the position illustrated by any suitable means, such for example as the split clamping band of the Lowther et al. Patent No. 2,273,210, not shown. The liquid reservoir 5 is adapted to be filled with a suitable cleaning liquid, such as ordinary engine oil, not shown, to a static level indicated by bead 8 on the intermediate portion of the cup-like bottom section 3. The head section 4 is shown as being a cast structure cored out to provide a head chamber 9. This head chamber 9 is in communication with the interior of the upper end of the casing 1 through a series of circumferentially-spaced clean air outlet passages 10 and is formed to provide an anchoring flange 11 and a final clean air discharge passage 12, which latter is adapted to be connected to the air intake system of an internal combustion engine or other air-consuming device or apparatus.

Leading axially downwardly through the casing 1 and into the liquid reservoir 5 thereof is a central air intake conduit in the nature of a cylindrical tube 13. This central air intake conduit 13 is rigidly anchored in the cast head section 4 of the casing and has its lower discharge end disposed in spaced relation to the bottom of the casing section 3, but, nevertheless, below the normal static oil level in said section 3.

In the preferred arrangement illustrated, an upwardly opening inner oil cup 14 is mounted fast on the bottom of the cup-like lower casing section 3 in concentric relation thereto and the center inlet conduit 13. The cylindrical sides of this inner oil cup 14 extends above the plane of the lower discharge end of air intake conduit 13 and to, or slightly above, the plane of the normal static oil level in the reservoir 5. The cylindrical wall of this oil cup is of materially greater diameter than the air intake conduit 13 and of considerably less diameter than the cylindrical portion of the outer casing 1.

Concentrically disposed about the lower discharge end portion of the air intake conduit 13 is an annular baffle wall structure, indicated as an entirety by 15, and which, as shown, comprises a tubular portion 16 having an integrally-formed radially outwardly and upwardly directed annular flange 17, and a detachably applied out-

wardly and upwardly extending annular flange 18 located above and substantially identical to flange 17 and provided with a downturned tubular portion 19 that overlies and effectively forms a continuation of the tubular portion or element 16. The tubular portion 16 of the upwardly and outwardly-directed baffle wall structure 15 is concentrically spaced from the discharge end portion of intake conduit 13 and is rigidly but detachably anchored thereto by means of circumferentially-slotted anchoring flanges 20 and wing nut-equipped anchoring screws 21. As shown, there are two of these anchoring screws 21 and each thereof is welded or otherwise rigidly secured to the discharge end portion of intake conduit 13 and is provided below the discharge end of said conduit with a wing nut 22. The circumferentially-slotted anchoring flanges 20 are integrally formed with an anchoring ring 23 rigidly secured to the lower end of tubular portion 16. The upwardly and outwardly directed annular baffle wall structure 15 comprising portions 16, 17, 18 and 19, together with the lower portion of the air intake conduit 13, define a quiescent liquid-collecting zone or area 24 in the chamber space immediately overlying said baffle structure and further define a generally annular liquid return passage 25 leading downwardly from said quiescent liquid-collecting zone into the liquid reservoir 5 at a place immediately adjacent the discharge end of the intake conduit 13. The outer peripheral edges of the baffle wall flanges 17 and 18 define the inner margin of an annular air flow passage 26, which is spanned by a generally conical annular screen structure 27 through which all air passes under normal operating conditions.

As shown, the screen structure 27 comprises a superposed plurality of conical annular woven wire screens 28, each reinforced at its inner edge with a cross-sectionally U-shaped reinforcing ring 29 and at its outer peripheral edge with a similar reinforcing ring 30. The inner marginal edges of the several screens 28 of the screen element 27 are detachably clamped between flanges 17 and 18 of the baffle structure 15 by means of a circumferentially-spaced plurality of wing-headed clamping bolts 31. The outer marginal edges of the several screens of the screen element 27 are similarly clamped between upper and lower annular clamping flanges 32 and 33, respectively, the former of which is integrally formed with flange 18 and connected thereto by circumferentially-spaced spokes 34 and the latter of which is integrally formed with flange 17 and is connected thereto by circumferentially-spaced spokes 35. A skirt-like annular splash baffle 36 is rigidly and permanently anchored to the clamping flange 33 and freely receives the upper end of the inner oil cup 14 to provide therebetween an annular oil flow passage 37. In order to insure equalization of pressure on opposite sides of the splash guard 36, the said baffle is provided with circumferentially-spaced apertures 38 adjacent its upper end but below the screen element 27.

It should now be evident that when the liquid reservoir-forming bottom section 3 of the casing 1 is removed, that the entire baffle element 15 and screen structure 27 may be removed as a unit through the then-open bottom of the cleaner after first loosening wing nuts 22 and rotating the said unit to disengage the slotted anchoring flanges 20 from the bolts 21. Also, it should further be evident that when the baffle structure and screen structure 27 are thus removed as a unit, that the entire unit comprising baffle structure 15 and screen structure 27 can be disassembled for cleaning by merely unscrewing the clamping bolts 31.

The annular space within the casing 1 above the annular baffle wall structure 15 and screen structure 27 provides an expansion chamber 39; the aforesaid quiescent liquid-collecting zone being in the lower radially inner portion of this expansion chamber. Preferably, and in accordance with conventional practice, this expansion chamber 39 is provided with a filter element which, preferably and as illustrated, is of the loose-pack variety comprising a superposed plurality of corrugated annular woven wire screen element 40, which may be assumed to be of the kind disclosed in the Schulz Patent No. 2,011,303 of August 13, 1935. This stack of screen elements 40 is securely held in position by retaining flanges 41 and 42 respectively carried by the intake conduit 13 and cylindrical wall section 2 of the casing. Preferably and as illustrated, there is a considerable space between the lowermost annular screen element 40 and the top of the baffle structure 15 and uppermost portion of screen structure 27.

In accordance with the invention and for the purpose of preventing the cleaner's liquid from being carried entirely through and out of the cleaner under certain abnormal conditions, to be hereinafter fully explained, I provide an air diffusing baffle structure 43 located in and spanning the annular expansion chamber space below the lowermost screen element 40 and through which all air traversing the cleaner must pass. Preferably, and as shown, this baffle structure 43 is spaced considerably above the annular baffle wall structure 15 and the screen structure 27 of air flow passage 26. In its preferred form illustrated, this baffle structure 43 comprises an apertured annular baffle plate 44 having a depending collar-like flange 45 at its inner marginal edge and a depending collar-acting flange 46 at its outer marginal edge, the former telescopically receiving the air intake conduit 13 and the latter being telescopically received within the cylindrical wall of the outer casing. When the cleaner is completely assembled, the collar-acting flange 46 of the baffle plate 44 is securely clamped between the screen element retaining flange 42 of the outer casing and the flange 32 of the screen structure 27, and in this manner the entire air diffusing baffle structure 43 is securely but detachably anchored in position. For the sole purpose of preventing accidental downward displacement of the baffle structure 43 when the baffle wall structure 15 and screen structure 27 are removed, I preferably provide a split spring retaining ring 47 which is in sliding frictional engagement with the exterior of the air intake conduit 13 and is normally seated against the underside of collar-acting flange 45 of baffle plate 44. It should be understood that the liquid-collecting quiescent zone 24, which is created by and is located above, the baffle wall structure 15, extends upwardly into the chamber 39 to a level well above the apertured baffle plate 44.

The air diffusing baffle plate 44 is provided with a multiplicity of closely-spaced apertures 48 which, in the preferred embodiment of the invention illustrated, are closed to straight-through passage of air vertically of the cleaner and are each directed at an oblique angle to the vertical and generally toward the space in the expansion

chamber 39 overlying the quiescent liquid-collecting zone 24, the baffle wall structure 15 and the liquid return passage 25. In the preferred embodiment of the invention illustrated, these obliquely directed apertures 48 are each elongated in a direction generally circumferential of the annular baffle plate 44 or, otherwise stated, in a direction perpendicular to a plane radial to the axis of the cleaner and intersecting the intermediate portion of each such aperture. The elongated apertures 48 could be longitudinally arcuate and laid out concentric to the axis of the cleaner, but for the purpose of simplifying the manufacture, approximately the same result has been accomplished by elongating the apertures on a straight line. In the preferred embodiment of the invention illustrated, there are a plurality of circumferentially-spaced series of radially spaced apertures 48. As will be seen, particularly by reference to Fig. 2, the elongated apertures of each radially-spaced series thereof are of progressively greater length from the inside toward the outside of the baffle plate 44. In the structure illustrated, each radially-spaced series of elongated apertures 48 was formed by first cutting a radially-spaced series of slots 49 (see Fig. 2) in the baffle plate 44 to provide therebetween intervening louvers 50, which were then rotated on their transverse centers to open up and form the apertures 48. If the apertures 48 were thus formed in the plate disposed radially of the cleaner axis, the said apertures would be open to straight-through passage of air vertically of the cleaner. However, in connection with the structure illustrated, it is important to note that the baffle plate 44 is of generally conical shape and flares outwardly and upwardly at a sufficient angle to close the apertures 48 to such straight-through passage of air axially or vertically of the cleaner.

Preferably, but not essentially, the air diffusing baffle structure 43 further comprises a woven wire screen element 51, which preferably is of the corrugated variety disclosed and claimed in the aforesaid Lowther et al. Patent No. 2,273,210. This corrugated screen 51 is disposed against the underside of baffle plate 44 and is held in place by inturned portions 52 and 53 of annular collars 45 and 46 respectively.

Operation

Under normal conditions, the operation of the cleaner will be as follows: Dust-bearing air will pass down the central air intake conduit 13 into the inner oil cup 14, where it will impinge upon the oil therein, reverse its direction around the discharge end of the intake conduit 13 and the lower end of concentrically-disposed baffle tube 16 and pass upwardly into the air intake passage 26. Air thus discharged into and reversing its direction in passing through the inner oil cup 14 will displace most or all of the oil within the cup 14 and carry the same upwardly therewith through passage 26 and screen element 27 interposed therein. As the oil-laden air is discharged from the screen element 27, a rather rapid expansion of the air column will take place and some of the air-borne oil will be precipitated out of the air column into the quiescent liquid-collecting zone 24 overlying the baffle structure 15, from which it will be returned to the oil cup 14 of reservoir 5 through the annular oil-return passage 25, due to the suction or low-pressure effect produced adjacent the discharge end of passage 25 by the high velocity of the air stream past the discharge end thereof. The air thus discharged from the air flow passage 26, together with the balance of the oil borne thereby, is then carried upwardly through the baffle wall structure 43 into the screen-equipped expansion chamber 39. Although the annular air column expands considerably intermediate screen element 27 and the diffusing baffle wall structure 43, the main and highest velocity air flow through the apertured baffle plate 44 will, nevertheless, be through that portion thereof overlying the screen element 27, so that the air velocity through the radially innermost baffle apertures 48 overlying the baffle structure 15 will be relatively low. As the oil-laden column moves upwardly through the screen-equipped expansion chamber 39, the oil therein will be separated therefrom and collected in that portion of the relatively quiescent zone or area 24 of chamber 39 above baffle plate 44, wherefrom it will flow downwardly through the radially inner apertures or passages 48 of baffle plate 44 to that portion of the quiescent zone 24 underlying the baffle structure 43, and from thence downwardly through the annular oil return passage 25, wherefrom the oil is returned to the air stream or column for recirculation in the manner indicated.

The very fact that the baffle apertures 48 are directed obliquely with respect to the vertical, each in a direction inclined inwardly and upwardly toward the axis of the cleaner, aids materially in separating oil from the air column within the screened chamber 39. This is, of course, due to the fact that the jet of air directed from each of the baffle apertures 48 rapidly changes its direction within the lower portion of screened chamber 39 and in doing so tends to expel the oil therefrom by centrifugal action in the direction of the intake tube 13. Of course, it is also important to continuously return the collected oil from the space above the apertured baffle plate 44 to the space below the baffle plate 44. For this reason, it is important that the innermost apertures 48 of baffle plate 44 be shielded by the baffle structure 15, so that the velocity of the air flow therethrough is sufficiently low to allow a downflow of oil therethrough. In this connection, it is also important that the baffle apertures be of sufficient area so that the air velocity therethrough of each thereof is sufficiently low to prevent a high degree of liquid atomization. The screen element 51 of baffle wall structure 43 does, of course, aid in the diffusing of the rapidly moving column of air, but the main function thereof is to further aid in removing oil from the upwardly moving column of air and to direct collected oil radially inwardly to the quiescent liquid-collecting zone 24. In practice, it has been found that the air diffusing baffle structure 43 hereof, although primarily designed for the purpose of preventing carry-over of oil to the cleaner's outlet under certain abnormal conditions, also increases the efficiency of the cleaner materially, even under normal operating conditions, while at the same time not increasing the overall restriction of the cleaner objectionably.

As previously indicated, it is important, particularly under normal operating conditions, to maintain a continuous return of oil downwardly through the baffle structure 43. In practice, it has been found that the oblique directions of the baffle apertures 48 contribute greatly to the achievement of this desirable result, for the reason that the velocity of air through each individual oblique aperture or passage 48 is rela-

tively high near the top thereof, but is sufficiently low near the bottom thereof to allow return of oil downwardly thereagainst.

Under the usual operating conditions, the majority of the foreign matter carried into the air cleaner is ordinary earthen dust, which is readily trapped upon contact with the oil or other cleaning liquid and is deposited in the oil reservoir 5. This ordinary earthen dust has little tendency to plug the screen element 27. However, in some localities, and particularly at certain times of the year, the air passed through the cleaner contains, in addition to the usual earthen dust, a considerable volume of vegetable fibers that will not pass through the screens 28 of element 27 and, hence, rapidly choke up and plug the same. Under such abnormal conditions, the restriction of the screen element 27 builds up very rapidly to a point where the pressure below the oil return passage 25 becomes greater than the pressure thereabove and results in an abnormal upward movement of air upwardly through the oil return passage 25. Of course, after this action once commences, the volume and velocity of air passing upwardly through the liquid return passage 25 progressively increases as the screen element 27 becomes further plugged and restricted, until finally all of the air moving through the cleaner passes upwardly through the oil return passage 25. Under these abnormal conditions, the air moves upwardly through the oil return passage 25 at exceedingly high velocity, due to the relatively small and highly restricted cross-sectional area of passage 25, and discharges upwardly into the normally quiescent liquid-collecting zone overlying the baffle structure 15 and immediately adjacent the inlet conduit 13.

Before the advent of the baffle structure 43 of the instant invention, the high velocity jet of air thus upwardly discharged into the oil-collecting portion of the cleaner above baffle structure 15 produced abnormally high atomization of the encountered liquid and carried much of the same completely through the screened expansion chamber 39 and the cleaner's final outlet passage 12 to the intake system of the associated internal combustion engine or other air-consuming device.

It will, of course, be understood that this abnormal carry-over of oil was highly objectionable, first, because it soon deprived the cleaner of its liquid-cleaning agent; and, secondly, because of the essentially dirty character of the oil or other liquid-cleaning agent carried over into the intake system of the engine or other air-consuming device, which often produced disastrous results in the nature of very rapid wear, due to abrasive action.

With the baffle structure 43 of the instant invention incorporated in an air cleaner of the kind described, the rapidly moving column of air discharged upwardly from the liquid return passage 25, under abnormal conditions described, is diffused, spread out and greatly reduced in velocity by the interposed baffle structure 43, so that the velocity through the screened chamber 39 is relatively low and relatively uniform throughout the entire cross-sectional area thereof, with the result that the oil carried thereby is readily removed therefrom during its passage through the screened chamber 39. In this connection, it is further important to note that the baffle apertures 48 be directed obliquely to the vertical and in a direction inclined toward the axis of the cleaner, since this causes the jet of air moving through each individual aperture 48 to rapidly change its direction and expel therefrom much of its air-borne oil therefrom immediately above the baffle structure 43. When, as a result of plugging of the screens 28, air moves upwardly at high velocity through the oil return passage 25, a greatly increased volume of oil will be carried into the screened chamber 39, where a relatively large volume thereof will be retained in suspension. This large volume of oil thus suspended in the chamber 39 becomes thoroughly commingled with the air passing through said chamber, and very effectively removes the dust therefrom. However, due to the relatively even distribution of the air column resulting from the diffusing baffle structure 43, the air velocity through the said screen chamber 39 will not ordinarily be sufficient to carry the oil completely through the chamber into the cleaner's outlet.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the objectives set forth; and while I have shown and described a commercial embodiment of my novel device, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention as defined in the claims.

What I claim is:

1. In a wet-type air cleaner, structure defining a generally vertically disposed shell-like outer casing having a closed bottom providing a liquid reservoir, a chamber above the liquid reservoir, an air intake conduit discharging into the reservoir-forming bottom portion of the casing, and an air outlet passage leading from the upper portion of said chamber; wall structure located below said chamber and defining a quiescent liquid collecting zone in the lower portion of said chamber above the plane of the discharge end of said intake conduit and a liquid return passage from said zone to the reservoir at a place adjacent the discharge end of the intake conduit, one edge of said wall structure being spaced from the outer casing to define therewith an air passage from the liquid reservoir to said chamber; a screen spanning said air passage; and an apertured air diffusing baffle spanning the lower portion of said chamber and spaced above said screen element and said wall structure and through which all air entering said chamber must pass, said apertured air diffusing baffle serving under abnormal conditions when the said screen becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said chamber to the cleaner's air outlet passage under such abnormal conditions, said apertured air diffusing baffle comprising a plate having a multiplicity of spaced louvered apertures therethrough.

2. In a wet-type air cleaner, structure defining a generally vertically disposed shell-like outer casing having a closed bottom providing a liquid reservoir, a chamber above the liquid reservoir, an air intake conduit discharging into the reservoir-forming bottom portion of the casing, and an air outlet passage leading from the upper portion of said chamber; wall structure located below said chamber and defining a quiescent liquid collecting zone in the lower portion of said chamber above the plane of the discharge end of said intake conduit and a liquid return passage from said zone to the reservoir at a place adjacent the discharge end of the intake conduit, one edge of said wall structure being spaced from the outer casing to define therewith an air passage from the liquid reservoir

to said chamber; a screen spanning said air passage; and an apertured air diffusing baffle spanning the lower portion of said chamber and spaced above said screen element and said wall structure and through which all air entering said chamber must pass, said apertured air diffusing baffle serving under abnormal conditions when the said screen becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said chamber to the cleaner's air outlet passage under such abnormal conditions, said air diffusing baffle defining a multiplicity of air passages therethrough each of which is directed angularly upwardly and laterally toward the quiescent liquid-collecting zone of said chamber above the said liquid return passage and is substantially closed vertically of the cleaner.

3. In a wet-type air cleaner, structure defining a generally vertically disposed shell-like outer casing having a closed bottom providing a liquid reservoir, a chamber above the liquid reservoir, an air intake conduit discharging into the reservoir-forming bottom portion of the casing, and an air outlet passage leading from the upper portion of said chamber; wall structure located below said chamber and defining a quiescent liquid collecting zone in the lower portion of said chamber above the plane of the discharge end of said intake conduit and a liquid return passage from said zone to the reservoir at a place adjacent the discharge end of the intake conduit, one edge of said wall structure being spaced from the outer casing to define therewith an air passage from the liquid reservoir to said chamber; a screen spanning said air passage; and an apertured air diffusing baffle spanning the lower portion of said chamber and spaced above said screen element and said wall structure and through which all air entering said chamber must pass, said apertured air diffusing baffle serving under abnormal conditions when the said screen becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said chamber to the cleaner's air outlet passage under such abnormal conditions, said air diffusing baffle comprising a plate having a multiplicity of spaced louvered passages therethrough, the louvers of said passages substantially closing said passages to straight-through passage of air vertically of said cleaner, and said louvered passages being each directed angularly with respect to the vertical and toward a vertical plane passing through said liquid return passage.

4. In a wet-type air cleaner, structure defining a generally vertically disposed shell-like outer casing having a closed bottom providing a liquid reservoir, a chamber above the liquid reservoir, an air intake conduit discharging into the reservoir-forming bottom portion of the casing, and an air outlet passage leading from the upper portion of said chamber; wall structure located below said chamber and defining a quiescent liquid collecting zone in the lower portion of said chamber above the plane of the discharge end of said intake conduit and a liquid return passage from said zone to the reservoir at a place adjacent the discharge end of the intake conduit, one edge of said wall structure being spaced from the outer casing to define therewith an air passage from the liquid reservoir to said chamber; a screen spanning said air passage; and an apertured air diffusing baffle spanning the lower portion of said chamber and spaced above said screen element and said wall structure and through which all air entering said chamber must pass, said apertured air diffusing baffle serving under abnormal conditions when the said screen becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said chamber to the cleaner's air outlet passage under such abnormal conditions, said baffle being inclined in a direction away from the quiescent liquid-collecting zone and the space overlying said liquid-return passage therefrom, said baffle having a multiplicity of apertures therethrough each of which is directed at an angle that is oblique to the vertical and inclines toward the chamber space overlying the liquid-return passage, and said baffle apertures being substantially closed in a direction vertically of the cleaner.

5. In a wet type air cleaner, spaced generally cylindrical walls defining an outer casing with an air inlet passage leading downwardly into its lower portion and a concentrically-located chamber leading upwardly from the lower portion of the casing, a downwardly displaceable bottom section for the casing defining a liquid reservoir in the lower portion of the casing having its bottom spaced below the discharge end of the inlet passage and wherein air passing from the inlet passage to said air chamber reverses its direction around the discharge end of the inlet passage, an air outlet from the upper portion of the casing, a centrally apertured annular baffle wall disposed concentrically with respect to and adjacent the discharge end of the inlet passage and providing a relatively quiescent liquid-collecting zone thereabove, the lower marginal edge of the baffle wall structure being generally spaced from the marginal edge of a wall of the inlet passage to define therewith a generally annular liquid return passage from said quiescent liquid-collecting zone to the air stream at a place immediately adjacent to but posterior of said marginal edge of the inlet passage wall, an upper marginal portion of said generally annular baffle wall defining a generally circular side of an upwardly directed air passage from the liquid reservoir to said chamber, a filter element supported by said generally annular baffle wall and spanning said upwardly directed air passage, and an apertured air diffusing baffle spanning said upwardly directed air passage and spaced above said filter and said baffle wall structure, said apertured air diffusing baffle serving under abnormal conditions when said filter becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said cleaner to the cleaner's outlet passage under such abnormal conditions, said air diffusing baffle comprising a plate having a multiplicity of spaced louvered passages therethrough.

6. In a wet type air cleaner, spaced generally cylindrical walls defining an outer casing with an air inlet passage leading downwardly into its lower portion and a concentrically-located chamber leading upwardly from the lower portion of the casing, a downwardly displaceable bottom section for the casing defining a liquid reservoir in the lower portion of the casing having its bot-

tom spaced below the discharge end of the inlet passage and wherein air passing from the inlet passage to said air chamber reverses its direction around the discharge end of the inlet passage, an air outlet from the upper portion of the casing, a centrally apertured annular baffle wall disposed concentrically with respect to and adjacent the discharge end of the inlet passage and providing a relatively quiescent liquid-collecting zone thereabove, the lower marginal edge of the baffle wall structure being generally spaced from the marginal edge of a wall of the inlet passage to define therewith a generally annular liquid return passage from said quiescent liquid-collecting zone to the air stream at a place immediately adjacent to but posterior of said marginal edge of the inlet passage wall, an upper marginal portion of said generally annular baffle wall defining a generally circular side of an upwardly directed air passage from the liquid reservoir to said chamber, a filter element supported by said generally annular baffle wall and spanning said upwardly directed air passage, and an apertured air diffusing baffle spanning said upwardly directed air passage and spaced above said filter and said baffle wall structure, said apertured air diffusing baffle serving under abnormal conditions when said filter becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said cleaner to the cleaner's outlet passage under such abnormal conditions, said air diffusing baffle having a multiplicity of passages therethrough each of which is directed at an oblique angle to the vertical and is substantially closed vertically of the cleaner.

7. In a wet type air cleaner, spaced generally cylindrical walls defining an outer casing with an air inlet passage leading downwardly into its lower portion and a concentrically-located chamber leading upwardly from the lower portion of the casing, a downwardly displaceable bottom section for the casing defining a liquid reservoir in the lower portion of the casing having its bottom spaced below the discharge end of the inlet passage and wherein air passing from the inlet passage to said air chamber reverses its direction around the discharge end of the inlet passage, an air outlet from the upper portion of the casing, a centrally apertured annular baffle wall disposed concentrically with respect to and adjacent the discharge end of the inlet passage and providing a relatively quiescent liquid-collecting zone thereabove, the lower marginal edge of the baffle wall structure being generally spaced from the marginal edge of a wall of the inlet passage to define therewith a generally annular liquid return passage from said quiescent liquid-collecting zone to the air stream at a place immediately adjacent to but posterior of said marginal edge of the inlet passage wall, an upper marginal portion of said generally annular baffle wall defining a generally circular side of an upwardly directed air passage from the liquid reservoir to said chamber, a filter element supported by said generally annular baffle wall and spanning said upwardly directed air passage, and an apertured air diffusing baffle spanning said upwardly directed air passage and spaced above said filter and said baffle wall structure, said apertured air diffusing baffle serving under abnormal conditions when said filter becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said cleaner to the cleaner's outlet passage under such abnormal conditions, said air diffusing baffle defining a multiplicity of passages therethrough that are directed angularly upwardly and laterally toward the space in said chamber overlying the said oil return passage and which are substantially closed vertically of the cleaner.

8. In a wet type air cleaner, spaced generally cylindrical walls defining an outer casing with an air inlet passage leading downwardly into its lower portion and a concentrically-located chamber leading upwardly from the lower portion of the casing, a downwardly displaceable bottom section for the casing defining a liquid reservoir in the lower portion of the casing having its bottom spaced below the discharge end of the inlet passage and wherein air passing from the inlet passage to said air chamber reverses its direction around the discharge end of the inlet passage, an air outlet from the upper portion of the casing, a centrally apertured annular baffle wall disposed concentrically with respect to and adjacent the discharge end of the inlet passage and providing a relatively quiescent liquid-collecting zone thereabove, the lower marginal edge of the baffle wall structure being generally spaced from the marginal edge of a wall of the inlet passage to define therewith a generally annular liquid return passage from said quiescent liquid-collecting zone to the air stream at a place immediately adjacent to but posterior of said marginal edge of the inlet passage wall, an upper marginal portion of said generally annular baffle wall defining a generally circular side of an upwardly directed air passage from the liquid reservoir to said chamber, a filter element supported by said generally annular baffle wall and spanning said upwardly directed air passage, and an apertured air diffusing baffle spanning said upwardly directed air passage and spaced above said filter and said baffle wall structure, said apertured air diffusing baffle serving under abnormal conditions when said filter becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said cleaner to the cleaner's outlet passage under such abnormal conditions, said air diffusing baffle comprising a plate having a multiplicity of spaced louvered passages therethrough, the louvers of said passages substantially closing said passages to straight-through passage of air vertically of the cleaner, and said louvered passages being directed angularly with respect to the vertical.

9. In a wet type air cleaner, spaced generally cylindrical walls defining an outer casing with an air inlet passage leading downwardly into its lower portion and a concentrically-located chamber leading upwardly from the lower portion of the casing, a downwardly displaceable bottom section for the casing defining a liquid reservoir in the lower portion of the casing having its bottom spaced below the discharge end of the inlet passage and wherein air passing from the inlet passage to said air chamber reverses its direction around the discharge end of the inlet passage, an air outlet from the upper portion of the casing, a centrally apertured annular baffle wall disposed concentrically with respect to and adjacent the discharge end of the inlet passage and providing a relatively quiescent liquid-collecting zone thereabove, the lower marginal edge of the baffle

wall structure being generally spaced from the marginal edge of a wall of the inlet passage to define therewith a generally annular liquid return passage from said quiescent liquid-collecting zone to the air stream at a place immediately adjacent to but posterior of said marginal edge of the inlet passage wall, an upper marginal portion of said generally annular baffle wall defining a generally circular side of an upwardly directed air passage from the liquid reservoir to said chamber, a filter element supported by said generally annular baffle wall and spanning said upwardly directed air passage, and an apertured air diffusing baffle spanning said upwardly directed air passage and spaced above said filter and said baffle wall structure, said apertured air diffusing baffle serving under abnormal conditions when said filter becomes clogged to diffuse and reduce the velocity of air which then passes upwardly through said liquid return passage at high velocity, thereby greatly reducing the tendency to carry liquid through said cleaner to the cleaner's outlet passage under such abnormal conditions, said air diffusing baffle comprising a plate having a multiplicity of spaced louvered passages

therethrough, the louvers of said passages substantially closing said passages to straight-through passage of air vertically of the cleaner and said louvered passages being each directed angularly with respect to the vertical toward a vertical plane passing through said liquid return passage.

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