Feb. 27, 1940. A. G. BUSH 2,191,440

WATER CLARIFIER FOR AUTOMOBILES

Filed July 29, 1937

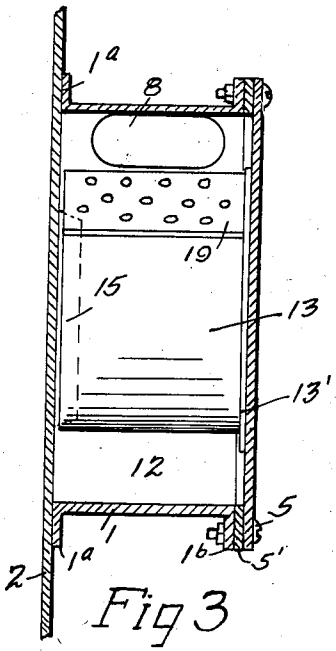


Fig 3

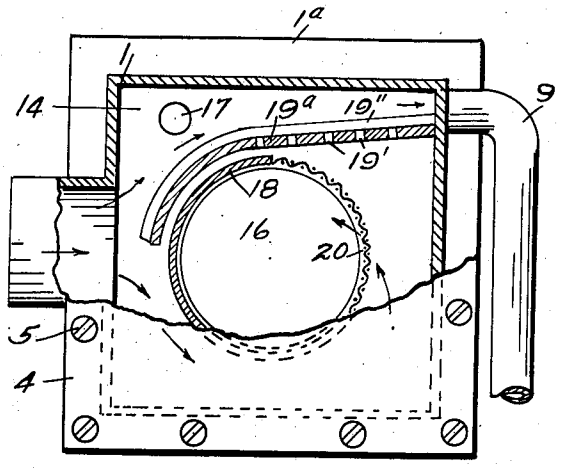


Fig 2

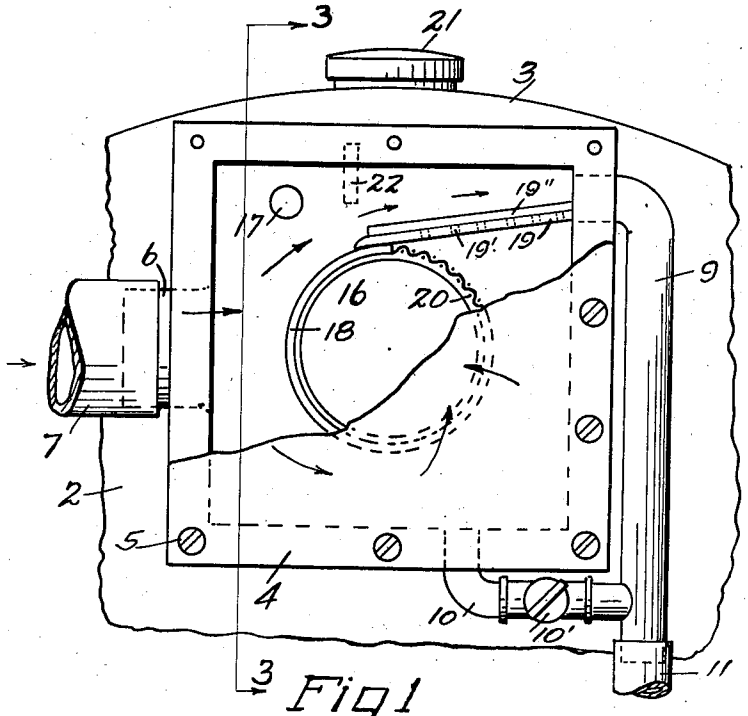


Fig 1

Arthur G. Bush, INVENTOR.

BY Bush & Bush,

ATTORNEYS.

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WATER CLARIFIER FOR AUTOMOBILES

Arthur G. Bush, Davenport, Iowa

Application July 29, 1937, Serial No. 156,364

10 Claims. (Cl. 210—165)

My invention relates to a new and useful improvement for water clarifiers for automobiles.

The objects of my invention are to provide a small, compact, easily manufactured clarifier to be mounted in the cooling system of a water-cooled automobile which will not only separate out a large portion of the sedimentary material heavier than water, but will also separate out the oily, foamy sludge and other lighter than water materials which accumulate in the circulating system; and will provide means for drawing into the radiator the vapors arising from the water, alcohol, etc., used in the cooling system so as to condense and save the alcohol, etc.

I accomplish these objects by the means illustrated in the accompanying drawing, in which—

Figure 1 is a rear elevation of my apparatus attached to the rear wall of the upper water chamber of a radiator, but with a part of the rear plate of the clarifier broken away to show the interior construction.

Figure 2 is a similar rear elevation of an alternate form of my device, with the rear plate broken away to show the interior.

Figure 3 is a sectional elevation on the line 3—3 of Figure 1.

My apparatus comprises a rectangular housing 1, which comprises the top, bottom and right and left side walls of the body of my clarifier. The housing 1 is provided with a flange 1*a* at its front edge, which is attached by welding or other suitable means, to the rear wall 2 of the upper chamber or part of the radiator of the automobile, the top of which appears in Figure 1 as 3.

The rear edge of the housing 1 is likewise provided with a similar flange 1*b*, which extends all around the housing and to which the rear plate 4 is attached by bolts 5, or other suitable means, which render it readily detachable from the flange 1*b*.

The left side plate of the housing 1 is formed with an annular flange 6 protruding to the left thereof as shown in Figure 1, to which the hose 7 may be connected, the other end of the hose 7 forming a part of the water line from the pump or from the engine block, as the case may be to the radiator.

The right side plate of the housing 1 has an elliptical opening 8 formed therein around which a waste pipe 9 is secured by welding, brazing, or other suitable means.

To the bottom plate of the housing 1, I attach a drain pipe 10 which is provided with a stop-cock 10' and leads into the waste pipe 9, to which it may be connected in any suitable manner.

A rubber hose 11 may be attached to the lower end of the waste pipe 9, to conduct the sludge, sediment and water when drained off, to any desired position below the engine and prevent soiling and wetting the engine when the clarifier is flushed or drained.

Upon the inner face of the rear plate 4 I attach a cylinder 13 which is provided with flanges 13' united to the wall 4 by welding, soldering or other suitable means.

The inner end of the cylinder 13 is formed to fit snugly upon an annular flange 15, which is pressed outwardly from the rear wall 2 of the radiator. The flange 15 is preferably formed in the shape of a short cone frustum so as to fit snugly within the opening end of the cylinder 13, and to leave an opening 16 in the rear wall of the upper chamber of the radiator so that the water may pass freely from the cylinder 13 into the radiator.

Near the top plate of the housing 1 I form in the rear wall 2 of the radiator, an opening or bore 17 which serves to allow the vapors or water, alcohol, etc., to pass into the upper chamber of the radiator where they may condense, and thus prevent waste of either alcohol or water. The action of the pump in the circulating system, will normally aid in drawing such vapors into the radiator chamber as the pump draws the water out of the bottom of the radiator.

In the case of excess steam accumulating in the radiator, the opening 17 will also permit such steam to pass into the clarifier and out to the atmosphere through the pipe 9, thus avoiding the blowing of steam and sludge out around the radiator cap.

It is well known among automobile drivers that at times the oil from around the bearing of the pump shaft or from other sources, works into the water circulation in the cooling system. When this occurs, the oil readily picks up particles of rust from inside the engine, block; also particles of lime in the radiator, or other sediment that may be in the water, and forms a sort of emulsion or sludge.

This sludge becomes thick enough to clog up the radiator tubes and smaller water passages, and greatly impairs the cooling capacity of a radiator. It is not easily soluble. It frequently cannot be removed by flushing. In many cases, the radiator must be unsoldered and the tubes or water passages scraped out with steel rods or other scraper. Until thus cleaned out, the radiator will heat and often the steam escaping from around the radiator cap will carry oily sludge

which will be blown all over the hood and all over the windshield and even on top of the car.

In order to separate this sludge from the water in my clarifier, I form the left one-third or one-half of the cylinder out of a small plate of sheet metal 18, at the top of which I mount a sheet metal apron 19 provided with a plurality of small holes or bores 19', which will permit water to pass through them but are too small to permit the passage of the oily sludge.

The apron 19 may be formed with a flange 19'', by which it may be united to the rear plate 4 by welding or other suitable means.

The remainder of the cylinder 20 is made of fine screen wire, fibre, cloth or other suitable material having a fine encugh mesh to prevent the passage of sediment, particles of lime, rust, etc., but open enough and having sufficient size and capacity to permit the flow of the water going from the pump to the upper radiator chamber.

The radiator may be provided with the usual cap, 21, for filling it. The filling cap may be mounted upon the body of the clarifier if desired, or in any other desired part of the water circulating system instead of upon the radiator and will perform the same function.

An overflow pipe 22 may be mounted in the throat or neck of the radiator under the filling cap, if desired, but with my apparatus, this is not necessary as the pipe 9 will act as an overflow pipe.

Figure 2 shows an alternate form of my device in which the apron 19*a* is mounted above the cylinder 13, as by the flange 19'', it extends downwardly to the left of the cylinder 13 to about the middle line of the cylinder. When a separate apron 19*a* is used, the entire cylinder 13 may be formed of wire, gauze or other suitable screening, as the apron so formed will keep the sludge away from the cylinder and prevent the screen being clogged up by it.

In the operation of my apparatus, the water is forced by the pump from the engine block into the pipe 7, from which it passes into the housing 1, the inner part of which might conveniently be considered as forming an upper or sludge chamber 14 and a lower or sediment chamber 12. As the water passes through the pipe 7 the oily sludge, being lighter than the water, will rise to the top of the pipe, while the heavier sediment will be carried near the bottom of the pipe.

As the water passes into the clarifier, the sludge will accordingly pass upwardly into the sludge chamber 14, sliding along the apron until it reaches the aperture 8 in the right side wall and passes down into the drain pipe 9, being separated from the water by the apron 19 and the small openings 19' which permit the water to pass through the apron, but prevent the passage of the sludge.

The sediment bearing portion of the water will pass downwardly into the sediment chamber 12, as most of the water will pass in that direction. From the sediment chamber 12 the water will pass through the screen 20, which will screen out the sediment, and into the cylinder 13, and thence passing into the upper radiator chamber from which is continues downwardly through the radiator where it is cooled. After being cooled in the radiator, it passes back to the pump or to the engine block. The pump may be either ahead or behind the engine block in the direction of circulation as desired.

The entire circuit is closed except for the aperture 8 opening into the sludge pipe 9 and the overflow pipe 22, if an overflow pipe is used.

It will thus be seen that my apparatus carries out four functions simultaneously. It strains out the sediment and collects it in a chamber from which it can be removed by opening the cock 10'. It separates the sludge from the water. It carries the sludge away from and out of the circulating system so that it cannot get into the radiator and it provides means for drawing off the vaporized alcohol, water, etc., so as to prevent waste thereof. It also provides an outlet in case the radiator is overflowed.

I have shown the rear plate 4 secured to the rear flange 1*b* of the housing 1 by small bolts 5, with a rubber gasket 5' inserted between the plate 4 and the flange 1*b*, but I do not limit my claims to this particular form of fastening, for it is obvious that any suitable form of fastening may be used which will be secure against leakage, and fastenings may be utilized which will permit a much speedier removal of the plate 4 than the bolts.

The form of my apparatus, with the rear plate 4 removable, makes it possible to easily and readily take out the cylinder 13 and apron 19 for cleaning, as well as for the purpose of cleaning out any sediment which may accumulate in the sediment chamber 12. However, with this form of apparatus, it will seldom be necessary to remove the plate 4, because the pipe 10 is preferably made large enough to freely drain off the sediment from the sediment chamber 12, and the aperture 8 is made large enough to readily carry off the sludge which may accumulate in the sludge chamber 14.

The opening or aperture 17 is preferably placed above the level of the bottom of the aperture 8 so that the water system may be flushed out and the sludge carried out through the drain pipe 9 without passing into the radiator chamber through the opening 17.

It is common practice in connection with the cooling system for internal combustion engines, to provide radiators which comprise upper and lower chambers united by a large number of small tubes or conduits of various shapes and designs.

In the manufacture of my invention, I prefer to mount my housing approximately at the level of the upper radiator chamber so that the water passing through the screen and the vapors passing through the vapor opening, will enter directly into the upper chamber of the radiator and it is obvious that my clarifying chamber may be made integral with the upper radiator chamber without departing from the spirit of my invention.

It is likewise obvious that my clarifier may be inserted in the conduit which passes from the lower chamber of the radiator to the pump or to the engine block if desired, and in such cases a bend may be formed in the sludge pipe the top of which will be at the normal upper water level of the system, but I prefer to mount it in the conduit leading from the engine block to the radiator, because in that position, it will tend to separate light particles of rust, lime, oily sludge, etc., coming from the radiator block, before it passes into the radiator and thus prevent it from getting into the tubes or small conduits connecting the upper and lower chambers of the radiator.

In the claims I use the term "water" to in-

clude either water, water mixed with alcohol, glycerine or other substances, or other cooling fluids, including those designed to prevent freezing or to improve the heat conductivity of the fluid or to restrain the evaporation.

I do not limit my claims to the precise forms shown in the drawing for it is obvious that many modifications thereof may be made without departing from the spirit of my invention.

I claim:

1. In a cooling system for internal combustion engines, the combination with a radiator suitably connected to the engine block, of a housing united to the radiator wall near the top thereof and in circuit with the radiator and engine block, said housing forming a chamber the lower portion of which, by gravimetric separation, can receive and retain the heavier materials contained in the cooling liquid and the upper portion of which can receive the vapors rising from the heated liquid and the foam, oily sludge and other buoyant substances and an opening from the upper part of the housing into the upper part of the radiator and said housing being provided with an overflow outlet at the height of the desired liquid level, means mounted within the housing for skimming the foam, oily sludge and other lighter materials from the fluid, comprising an oblique plate having its lower edge extending into the incoming stream of liquid and its upper end adjacent and leading to the overflow outlet, and means comprising a cylindrical screen extending at right angles to the incoming stream of cooling fluid for separating the heavier substances from the fluid.

2. In a cooling system for internal combustion engines, the combination with a radiator suitably connected to the engine block, of a housing united to the radiator wall near the top thereof and in circuit with the radiator and engine block, said housing forming a chamber the lower portion of which, by gravimetric separation, can receive and retain the heavier materials contained in the cooling liquid and the upper portion of which can receive the foam, oily sludge and other buoyant substances, and being provided with an overflow outlet at the height of the desired liquid level, means mounted within the housing for skimming the foam, oily sludge and other lighter materials from the fluid, comprising an oblique plate having its lower edge extending into the incoming stream of liquid and its upper end adjacent and leading to the overflow outlet, and means comprising a cylindrical screen extending at right angles to the incoming stream of cooling fluid for separating the heavier substances from the fluid.

3. In a cooling system for internal combustion engines, the combination with a radiator suitably connected to the engine block, of a housing united to the radiator wall near the top thereof and in circuit with the radiator and engine block, said housing forming a chamber the lower portion of which can receive and retain the heavier materials contained in such fluid and the upper portion of which can receive the foam, oily sludge and other lighter substances, and being provided with an overflow outlet at the top of the normal water level, and means within the housing for skimming the foam, oily sludge and other lighter materials from the fluid, comprising an oblique plate having its lower edge extending into the incoming stream of water and its upper end adjacent and leading to the overflow outlet.

4. In a circulating cooling system for internal combustion engines employing a radiator, a skimming chamber through which the cooling liquid is conducted in circuit with the engine block and radiator, a waste outlet in the skimming chamber approximately at the normal filled liquid level of the system, an oblique skimming plate mounted in the skimming chamber with its lower edge extending into the incoming current of liquid and its upper edge adjacent the waste outlet to skim the foam, oily sludge and other lighter materials from the liquid and conduct it to the waste outlet for discharge.

5. The combination with a chamber mounted in series in a radiator cooling system for gas engines, having a port for sludge and overflow, of a port leading to the upper portion of the radiator above the normal water level adapted to permit alcoholic or other vapors to pass from the chamber into the radiator.

6. The combination with a chamber mounted in series in a radiator cooling system for gas engines, of a port leading to the upper portion of the radiator above the normal water level adapted to permit alcoholic or other vapors to pass from the chamber into the radiator.

7. A cooling system for internal combustion engines as described in claim 4, and having a vapor outlet from the upper portion of the skimming chamber into the upper portion of the radiator at or above the normal water level.

8. A cooling system for internal combustion engines as described in claim 4, in combination with a conduit to conduct vapors from the upper part of the skimming chamber to the upper part of the radiator.

9. A cooling system for internal combustion engines as described in claim 4, having a transverse screen mounted in the skimming chamber below the skimmer plate to separate the heavier waste matters from the circulating fluid.

10. A cooling system for internal combustion engines as described in claim 4, in combination with a transverse screen mounted in the skimming chamber below the skimmer plate to separate the heavier waste matters from the circulating fluid.

ARTHUR G. BUSH.