Oct. 12, 1948. E. D. MARQUETTE 2,451,398

HEAT EXCHANGER

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Fig. 1.

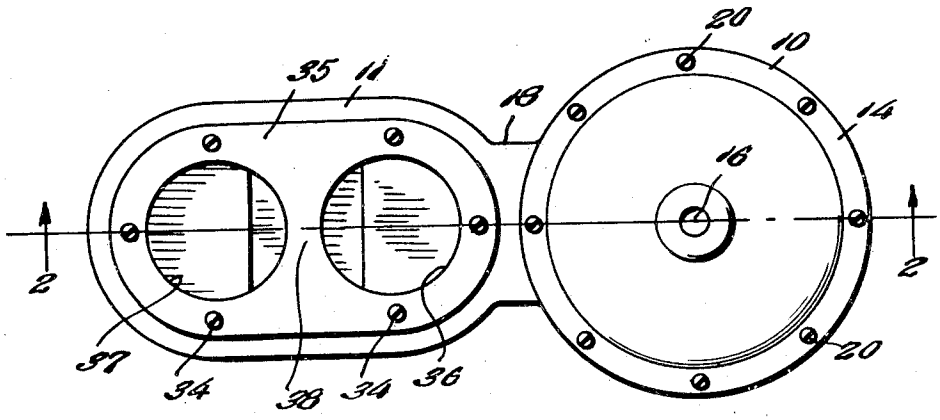
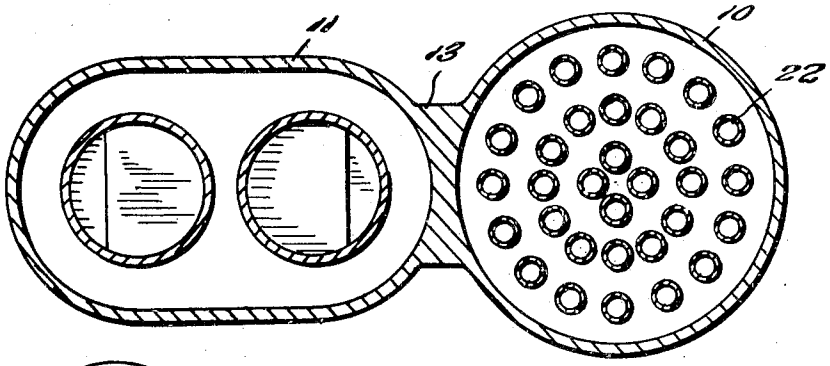



Fig. 3.



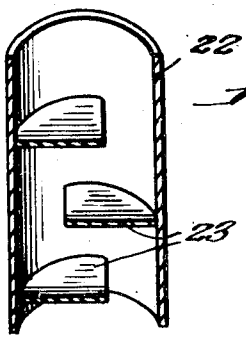




Fig. 4.

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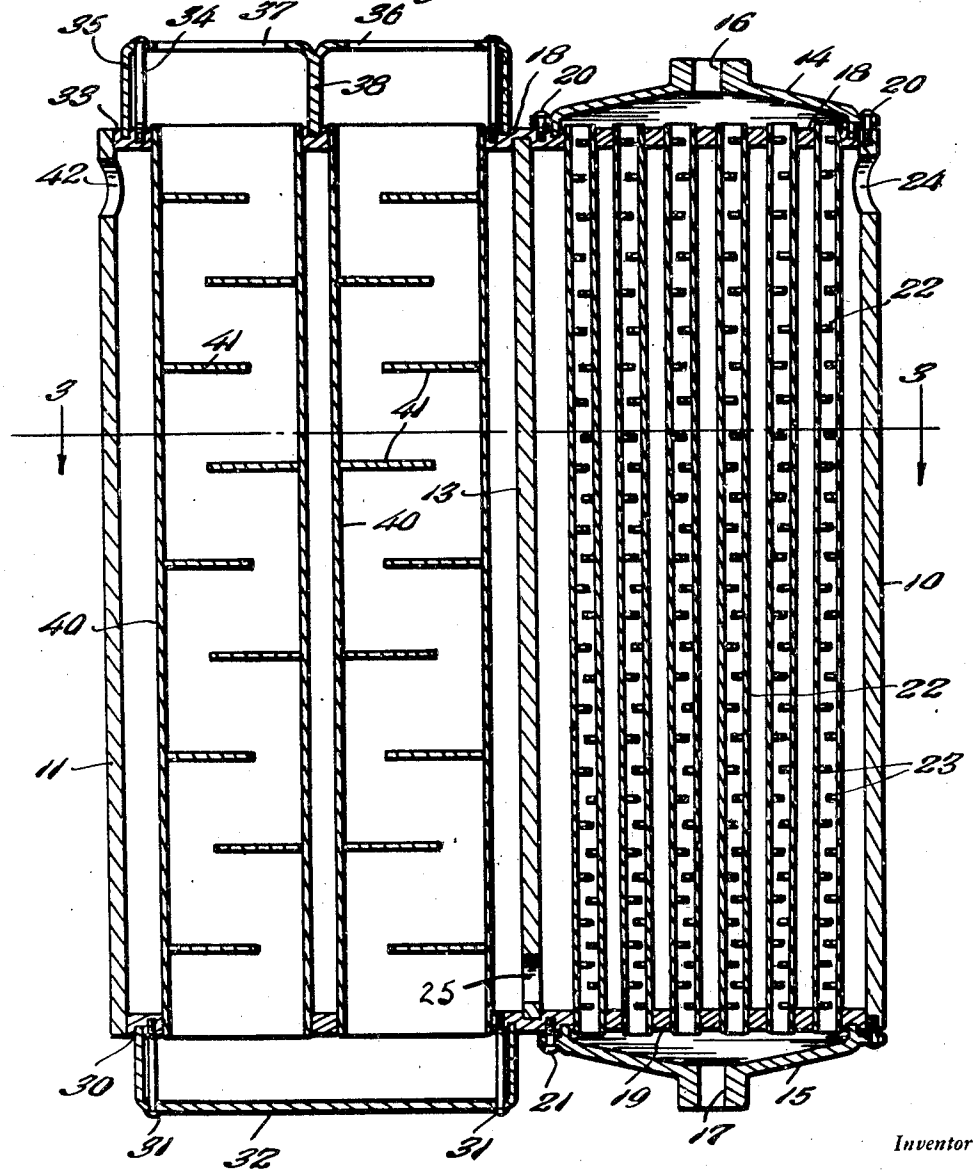
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Fig. 2.




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2,451,398

## HEAT EXCHANGER

Ernest D. Marquette, St. Albans, Vt.

Application November 9, 1944, Serial No. 562,687

1 Claim. (Cl. 257—220)

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This invention relates to a heat exchanger, and more particularly to such a device adapted to preheat the fuel and air utilized in an internal combustion engine prior to their introduction into a carburetor.

A primary object of this invention is the provision of such a device adapted thoroughly to preheat the fuel, such as gasoline, and the air, utilizing the hot water employed in cooling the engine.

An additional object of the invention is the provision of such a device adapted both by the use of such heat, and by its mechanical construction, to expand and partially vaporize the gasoline prior to its introduction to the carburetor, thus creating a greater volume per unit of weight, as contrasted to the normally cold gasoline introduced directly from the fuel storage tank.

Still another object of the invention is the provision of a device accomplishing the foregoing objects which will accordingly provide greater power for an internal combustion engine per unit of fuel, and consequent saving of fuel per mile.

Still other objects reside in the combinations of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawings, wherein there is shown a preferred embodiment of this inventive concept.

In the drawings:

Figure 1 is a top plan view of one form of device embodying the instant inventive concept.

Figure 2 is a sectional view taken substantially along the line 2—2 of Figure 1, as viewed in the direction indicated by the arrows.

Figure 3 is a sectional view taken substantially along the line 3—3 of Figure 2, as viewed in the direction indicated by the arrows, and

Figure 4 is an enlarged fragmentary detail sectional view illustrating a constructional detail.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Having reference now to the drawings, the device is comprised of a cylindrical shell 10, and a second shell 11, oval in cross section, secured together, as by a connection 13, forming a partition therebetween. Having reference first to shell 10, the same is provided with a top head 14 and a bottom head 15, each provided with an aperture 16 and 17, respectively. Heads 14 and 15 are secured to end plates 18 and 19, as by screws 20 and 21, respectively, which end plates also serve as fluid-tight sealing gaskets. Each of end plates

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18 and 19 is provided with a plurality of aligned perforations, between which extend a plurality of metal tubes 22, which may be comprised of cold rolled brass, or the like. The interior of each of tubes 22 is provided with a plurality of oppositely disposed, semi-circular baffles 23. The shell 10 is likewise provided with an inlet 24 and an outlet 25 extending through the partition 13 into cylinder 11.

The portion of the apparatus just described is adapted to the pre-heating of the fuel, such as gasoline, adapted to be utilized in conjunction with the engine, and the operation is as follows: Water enters sleeve 10 through inlet 24 from a suitable connection with the radiator or engine block (not shown), and circulating around tubes 22 flows downwardly and eventually out through outlet 25. Simultaneously therewith gasoline enters aperture 17 from the fuel pump (not shown), and passes upwardly through the tubes 22 being thoroughly mixed and partially volatilized by the combined action of the hot water and the baffles 23, and finally passes out through aperture 16 to the carburetor of the vehicle (not shown). Thus, it will be seen that the gasoline is thoroughly preheated, and rendered partially volatile in a state of turbulence, prior to its introduction to the carburetor.

Having reference now to the shell 11, the same is provided with a plate 30 to which is secured, as by screws 31, a lower head 32, completely closing the end of the shell. The upper end of shell 11 is likewise provided with a plate 33, which may comprise an integral portion of or a continuation of the plate 18, and to which is secured, as by screws 34, an upper head 35 provided with two relatively large apertures 36 and 37 comprising air inlet and outlet means, respectively. As best shown in Figure 1, the head 35 is comprised of two substantially cylindrical portions, separated by a baffle or partition 38, serving to preclude the admixture of inflowing and outflowing air.

End plates 30 and 33 are each provided with a pair of aligned circular apertures, between which opposite apertures extend a pair of relatively large metal air tubes, each provided with a plurality of interiorly positioned, oppositely disposed spaced baffles 41. The shell 11 is correspondingly provided with an outlet 42.

As the heated water leaves shell 10 through outlet 25 and enters shell 11, it circulates upwardly about tubes 40, and finally leaves through outlet 42 and passes through a suitable conduit (not shown) back to the engine block or radiator.

Simultaneously, air enters inlet 36 from a suitable air filter and intake (not shown), passes downwardly through the associated pipes 40 into the head 32, and thence upwardly through the other of pipes 40 exiting from outlet 37, through a suitable conduit (not shown) to the carburetor.

Thus, it will be seen that the air admitted to the carburetor is also thoroughly mixed by its passage over baffles 41 and heated by the water from the radiator or engine block simultaneously with the heating and mixing of the gasoline previously described.

From the foregoing it will now be seen that there is herein provided a construction accomplishing all the objects of this invention and others including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

A heat exchange unit for simultaneously preheating air and fuel carried to the carburetor of an internal combustion engine by the water heated in cooling the engine, comprising two juxtaposed shells having a common wall formed with a port extending through the lower end thereof, one of said shells having an inlet port at its upper end for receiving heated water from the engine-cooling system and the other shell having an outlet port at its upper end for discharging the water back to said engine-cooling system, common upper and lower apertured cover plates for said shells, a plurality of pipes having internally formed, alternately arranged baffles circumferentially and concentrically disposed in one shell between said closure plates therefor, a



pair of enlarged pipes having internally formed alternately arranged baffles disposed in said other shell between the portions of the closure plates at the opposite ends thereof, upper and lower centrally ported outlet and inlet caps secured to said plates at the ends of said first-mentioned shell adapted for connection with the fuel supply line leading to the engine carburetor, combined inlet and outlet caps removably secured on the plate overlying said second-mentioned shell for connection with the air inlet supply to the engine carburetor and a single cap removably secured on the plate at the lower end of said last-mentioned shell forming a return or bypass for the air passing through the enlarged pipes in said shell.

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