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APPARATUS FOR VAPORIZING A HYDROCARBON MIXTURE

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Fig. 1.

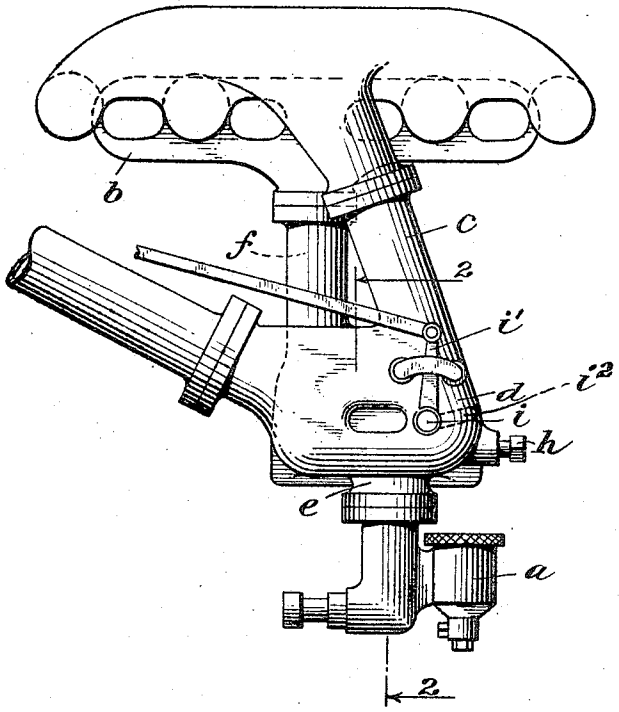
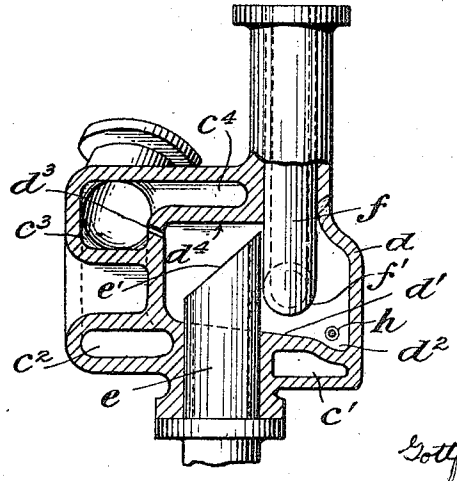


Fig. 2.



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APPARATUS FOR VAPORIZING A HYDROCARBON MIXTURE.

Application filed January 26, 1924. Serial No. 688,691.

This invention relates to apparatus for the practice of the method of vaporizing fuel described and claimed broadly in the co-pending application filed by the present applicant on April 21, 1922, Serial No. 555,845 in accordance with which it is proposed to separate out from the explosive mixture the heavy ends of liquid fuel, subject such liquid fuel to a vaporizing heat and re-introduce such vaporized fuel back into the mixture for introduction at a predetermined temperature into an internal combustion motor. The apparatus includes a construction described in the co-pending application filed by the present applicant on June 29, 1923, Serial No. 648,470 wherein the inlet riser is broken and the open ends of the broken section are so formed and disposed within the separating chamber as to cause the mixture to take such a course as will best insure the collection of the unevaporated ends without impairing seriously the flow of the mixture. The apparatus also includes a construction described in the co-pending application filed by the present applicant on July 27, 1923, Serial No. 654,099 wherein the evaporating chamber, instead of being separate and remote from the separating chamber, so that the separating chamber is not subjected to the heat of the exhaust gases, is coincident therewith and the exhaust gases heat the gaseous mixture as well as the unevaporated fuel collected in the separating chamber by being conducted in heat interchanging relationship with the walls of the separating chamber by more or less separated passages through which the flow of the gases in certain of the passages is controlled to control the heating of the mixture. While the prior constructions are effective in withdrawing the unevaporated portions of the fuel to enable a mixture of a constant temperature and also to permit a variation in the temperature and density of the mixture according to the working conditions of the motor it is sometimes advantageous to effect great vaporization of the fuel ends immediately upon their projection at high velocity into the vaporizing chamber. The present improvements relate particularly to the disposition of the passages for the exhaust gases whereby a hot spot is provided in the chamber wall against which the gases are projected upon their entrance into the evaporating chamber and from whence they are dispersed over the side walls which are less highly heated to prevent over-heating of the air and low density of the mixture resultant from too high a temperature.

The improvements will be described with greater particularity hereinafter in connection with the embodiment illustrated in the accompanying drawings, wherein:

Figure 1 is a view in elevation of the inlet riser, combined separator and evaporating chamber and exhaust pipe showing the relation of parts.

Figure 2 is a view in vertical section of the combined separator and evaporating chamber taken on the planes indicated by the broken line 2—2 in Figure 1 and looking in the direction of the arrows.

In accordance with the improved method in said co-pending application Serial No. 555,845 the mixture after being formed in the usual manner is passed to the inlet manifold and devices are provided for separating out the unevaporated heavy liquid fuel ends. The apparatus used for separating the heavy ends from the mixture is similar in principle and design to that disclosed in the co-pending application Serial No. 654,099 but the passages for the exhaust gases are so disposed as to provide a highly heated wall against which the fuel is projected from the carburetor whereby great vaporization of the unevaporated fuel ends is immediately obtained. Metering devices of any suitable form are conventionally indicated at *a*, the inlet manifold at *b*, the exhaust pipe at *c* and the combined separator and vaporizer chamber at *d*. The mixture formed by the metering device *a* rises through the pipe section *e* which terminates within the chamber *d*. Adjacent the riser section *e* but with its lower end disposed generally below the level of the upper end of said section *e* is a second riser section *f* which communicates with the inlet manifold *b*. The general relationship between the sections *e* and *f* in the preferred embodiment is shown in Figure 2 where it appears that the upper edge of section *e* is inclined as indicated at *e'* and is so presented to the side wall of the chamber *d* as to direct the mixture toward the side wall and disperse it over a large superficial area. Similarly the lower edge of the other section *f* is inclined as indicated at *f'* so that the gaseous mixture within the chamber *d* before flowing into the section *f* must circulate

throughout the chamber *d*. This relationship of sections *e* and *f* insures the collection of the liquid fuel particles carried in suspension in the mixture along the walls of the chamber *d* and their constant separation out from the gaseous mixture which is free to flow without appreciable loss of pressure up through the section *f* to the inlet manifold *b*. By having the chamber *d* of greater volumetric capacity than the pipe *e* the velocity of the gas passing through the chamber is decreased thereby insuring the separation of the maximum quantity of unevaporated fuel ends. The relationship between the risers *e* and *f* and the method of separating the liquid fuel particles from the mixture is substantially similar to the relationship and method disclosed in co-pending application Serial No. 654,099. However, it will be observed upon inspection of Figure 2 that the inclined open end of the riser *e* is turned directly away from the riser *f* thereby providing a greater path for the fuel particles in their passage throughout the chamber *d* and affording greater opportunities for the liquid particles to collect upon the walls of the chamber. As in the latter application it is desirable to provide for the admission of the mixture to the manifold carrying a predetermined amount of fuel particles and to this end the temperature of the chamber in which the separation and vaporization are carried out is controlled. The bottom wall *d'* of the chamber *d* is inclined as indicated in Figure 2 and is formed at the lowermost point with a depression d^2 in which the liquid particles of fuel draining down the inclined bottom will collect. In order to supply heat to the chamber *d* the chamber is preferably cast integral with a section of the exhaust pipe *c*. The passage for the exhaust gases through this section is subdivided as at *c*, c^2 and c^3, Figure 2. The passage *c'* is disposed adjacent the depression d^2 for the purpose of furnishing a constant supply of heat to the liquid fuel contained therein to vaporize it. A supplementary heating device, such as an electric coil *h*, may be disposed in the depression d^2 whereby liquid fuel particles collected therein may be quickly vaporized to provide the motor with an initial rich starting mixture. The temperature of the separating chamber *d* is regulated by the flow of hot exhaust gases through passages c^2 and c^3. The flow of the heating medium through these two passages is controlled by a valve i^2, carried upon the shaft *i* and actuated by the lever *i'*. Passage c^3 is in contact over a considerable area with the inner wall of chamber *d* and hot gases passing through this passage will influence, to a great extent, the temperature of the chamber. Passage c^2, however, is practically not in contact with the inner wall of the chamber and will have comparatively little influence on the temperature therein. This passage may be considered as a bypass for the heated gases around the chamber. By means of the valve the flow of the exhaust gases through the passages c^2 and c^3 and consequently the temperature of the chamber *d* may be controlled as is more clearly described and illustrated in the co-pending application Serial No. 654,099. A passage d^3 is formed between passage c^3 and chamber *d* to permit hot exhaust gas to enter the separator to dilute the mixture to a certain extent whereby a higher compression pressure is obtained and vaporization is facilitated. The construction of the evaporating chamber and the disposition of the exhaust passages is substantially similar to the construction disclosed in the co-pending application Serial No. 654,099 but in order to provide a higher heated surface against which the fuel entering the chamber is projected to obtain an initial great vaporization of the unevaporated ends thereof the exhaust passage c^3 is broadened to overlie a material portion of the upper wall of the chamber *d* as indicated at c^4. The heated exhaust gases flowing through this portion of the passage will cause the wall of the chamber to be highly heated and will result in a hot spot at the point d^4 where the gases projected from the riser *e* impinge. These gases are projected at relatively high velocity with a result that great vaporization of the fuel ends is at once obtained. Thence the gases are dispersed over the side walls which, because of the structure of the chamber, are less highly heated. Thus the air included in the mixture is not over-heated and a high density of the mixture results. The remaining ends drain into the trough d^2 where they lie until evaporated by the heat from the passage *c'* or the coil *h*. It will be understood that the size and disposition of the passage *c'* is such that the trough is not, under normal circumstances, too highly heated as it is not desired to subject the gases and air to too high a temperature.

The scope of the invention will be apparent from the appended claims which are intended to cover all equivalent forms of the devices herein shown.

What I claim is:

1. In an apparatus for vaporizing hydrocarbon fuel, the combination with an inlet manifold, a metering device for hydrocarbon fuel and a collecting chamber, of a riser in the chamber communicating with the metering device, a riser independent of the first named riser communicating with the inlet manifold, a passage for exhaust gases formed in the bottom wall of the chamber, a second passage formed in and adjacent to a wall of the chamber remote from said first mentioned passage and having a portion thereof overlying the upper wall of the

chamber, a third passage substantially remote from a wall of said chamber and means to control the flow of exhaust gases in the second and third passage, the riser from the metering device directing the gaseous mixture against the portion of the upper wall of the chamber which the passage for exhaust gases overlies.

2. The combination with an inlet manifold, a metering device for hydrocarbon fuel and a vaporizing chamber having inlet and outlet risers and an inclined bottom wall, of a passage for exhaust gases formed in said wall proximate the extreme inclined portion thereof, a second passage formed in and adjacent to the wall of the chamber remote from said first mentioned passage and having a portion thereof overlying the top of the chamber to form a hot spot, a third passage cast integral with said chamber but substantially remote from a wall thereof, a valve to control the flow of exhaust gases in the second and third passages and a passage for exhaust gases from the second passage into the chamber, said inlet riser directing gaseous mixture against the hot spot.

This specification signed this 23d day of January, A. D. 1924.

GOTTFRIED WIRRER.