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**948,402.**



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# UNITED STATES PATENT OFFICE.

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VAPORIZING AND MIXING DEVICE.

948,402.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, CHARLES F. PRESTON, a citizen of the United States, residing at La Grange, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Vaporizing and Mixing Devices, of which the following is a specification.

My invention relates to a vaporizing and mixing device intended particularly to be used on an internal combustion engine for vaporizing the hydrocarbon element and mixing it with air; and the invention has for its object to provide a device of this character which can be used either as an auxiliary to the ordinary carbureter, where gasoline is used, for making the mixture from the carbureter more intimate and more thoroughly vaporizing the gasoline before the mixture goes to the cylinder; or which can be used in place of the carbureter to accomplish the ordinary functions of the carbureter; or which, when gas is used as a fuel, will thoroughly mix the gas with air before it is exploded.

The invention has for further objects such new and improved constructions in vaporizing and mixing devices as will be described in the following specification and particularly set forth in the claims appended thereto.

One embodiment of my invention is shown in the accompanying drawings, wherein—

Figure 1 is a longitudinal section through the device. Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1, looking in the direction of the arrows. Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 1, looking in the direction of the arrows; and Fig. 4 is a cross-section on line 4—4 of Fig. 1, looking in the direction of the arrows.

Like characters of reference indicate like parts in the several figures of the drawings.

Referring to the drawings, 10 represents a cylindrical casing provided with the cap pieces 11 and 12 at either end, in which are threaded, or otherwise secured, respectively the inlet pipe 13 and the outlet pipe 14. Where the device is used auxiliary to a carbureter, pipe 13 leads from the carbureter and pipe 14 to the cylinder of the engine. The interior of the casing 10 is divided into chambers 15, 16 and 17, although there may be any number of such chambers, by the partitions 18, 19, 20, and 21. These partitions are perforated, preferably concentrically,

and in the perforations are fixed sets of tubes or fluid conduits which conduct the mixture of air and spirit through the chambers successively. The arrangement of the sets of conduits is such that the mixture is forced to follow a circuitous path through the casing, so that by successive convolutions of the streams of the mixture the parts of such streams are forced to pass through each other in making the turns in opposite directions. I have shown a preferred way of accomplishing this, which is to arrange the different sets of tubes or conduits so that the entering and outgoing sets of each chamber overlap. For example, in the perforations of partition 18 are set tubes 22, which extend substantially to partition 19, their discharge ends being cut off on the diagonal, so that the tubes discharge toward the center of the casing. The next set of tubes 23 extend from points adjacent partition 18 through partition 19 to points adjacent partition 20, the inlets 24 of these conduits facing toward the circumference of the casing, their discharge openings 25 being oppositely disposed. Another set of tubes 26 is provided having inlets 27 adjacent partition 19 and facing the circumference of the casing, extending through partition 20 and terminating at partition 21, and with discharge openings 28 facing inwardly. To complete the structure shown, another set of tubes 29 is provided having outwardly facing inlets and set in the perforations in partition 21. When the inlet and outlet are in the center of the casing, I preferably form the tubes or conduits of graduated diameters, the outer tubes being larger to compensate for the decreased pressure around the wall of the device. I preferably also construct the device with means for admitting air to the interior of the casing in regulatable quantities. To this end, the cap 11 is provided with the perforations 30 and on the cap is seated a rotatable shutter 31, provided with a handle 32 and having perforations 33 which can be made to register with perforations 30.

34 is a spirit inlet, which leads through the top of the casing and is provided with the cup 35 and the stop cock 36. Where it is desirable, a pipe may be provided for conducting spirit directly from the spirit tank into the inlet 34. Such pipe is shown at 37. It may be provided with a stop cock 38.

The operation of the device when used as auxiliary to the carbureter is as follows:



The mixture is drawn from the carbureter through pipe 13 by the suction in the cylinder. It enters the first set of conduits 22 and from them passes into chamber 15. In order to escape from chamber 15, it must pass backward along the spaces between pipes 22 and pipe 23 and then turn upon itself in entering the latter pipes. The parts of the several streams of fluid are in this way caused to pass through each other in making these convolutions and this action is accentuated by the reversed position of corresponding outlets and inlets. The streams of the mixture pass over the relatively sharp edges of the tubes, which has the tendency to break up any globules of gasolene so as to make the volatilization more complete. The thorough mixing is also facilitated by the fact that the passage-ways through which the mixture passes in alternation are of different configuration. The vapor first enters through the confined passage-ways formed by the tubes and then has opportunity to spread out over the ends of the tubes in entering the chamber.

Where, through improper regulation, the engine is drawing too much mixture from the carbureter, this may be remedied by uncovering to a greater or less extent ports 30 in the end of the mixer casing.

The device as shown has another advantage. By introducing gasolene into the inlet 34, the apparatus may be conveniently primed in starting. The introduction of gasolene might be effected through the pipe 37, assumed to lead from the gasolene tank. Such an arrangement permits the device to be used as an auxiliary carbureter in case the regular carbureter becomes disabled. In fact, the invention might be applied to the construction of a carbureter to take the place of the regular carbureter on the machine.

The use of this device gives more perfect vaporization and a more perfect mixture between the spirit and the air. This results in greater power as, of course, the explosiveness of the mixture increases as perfect vaporization and mixture is approximated. The device is also designed to do away with the necessity of vaporization by the application of heat. This is always accompanied by a loss of power as the cooler the mixture is the greater will be its explosive power when ignited. My device accomplishes mechanically, by mechanically breaking up the globules of gasolene and by thoroughly mixing the gasolene with the air, the complete vaporization and mixing which is sought to be obtained by the application of heat. Moreover, with a cooler vapor the danger of premature explosion is decreased. The streams of the mixture as they issue from the several tubes into the chambers change their conformation, spreading around the edges of the tube. This ex-

pansion and spreading over the relatively sharp edges of the tubes aids in mixing the air and the spirit. When it is necessary to prime the engine in starting, my device is of considerable advantage, inasmuch as the gasolene may be poured into the single mixing device instead of having to be introduced into each one of the several cylinders of the engine.

I do not limit myself to the particular devices, arrangements and proportions shown and described, as modifications could be devised which would come within my invention as defined by the claims.

In certain of the claims I have described means whereby the fluid is conducted from one chamber to the next as "tubes" or "tubular members;" and these devices have been shown as ordinary cylindrical pipes. I do not, however, wish thereby to limit my invention to the specific structure shown, nor to making the fluid passage ways circular in cross section; but intend by the terms "tube" and "tubular member," any structure forming a conduit of considerable length, relative to its diameter or transverse dimension.

I claim:

1. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and interposed between the same a plurality of transversely arranged partitions and a plurality of tubular members which extend through and project from said partitions, the said tubular members between adjacent partitions being overlapped, whereby the fluid is forced to follow a circuitous course from one to the other.

2. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and interposed between the same, partitions dividing said casings into chambers and tubular members connecting one chamber with the next and projecting into said chambers so that fluid passage-ways of successively varying conformation are provided through which the fluid is forced to pass in going from the inlet to the outlet.

3. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, means interposed between the same constituting sets of fluid conduits, successive sets being out of line with each other, and means for deflecting the fluid successively from one set to the next set, the successive sets arranged to overlap.

4. A vaporizing and mixing device, comprising a casing having an inlet and an outlet and divided into chambers, and sets of conduits leading from one chamber into the next, the conduits of one set in each chamber being out of line with those of the other set and overlapping.

5. A vaporizing and mixing device, comprising a casing having an inlet and an out-



let and divided into chambers, and sets of concentrically arranged conduits leading successively from one chamber into the next succeeding chamber, the conduits of successive sets overlapping.

6. A vaporizing and mixing device, comprising a casing having an inlet and an outlet and divided into chambers, and sets of concentrically arranged conduits leading successively from one chamber into the next succeeding chamber, the conduits of successive sets overlapping, the conduits at the circumference of said casing being of larger diameter than those at the center.

7. A vaporizing and mixing device, comprising a cylindrical casing having an inlet at one end and an outlet at the other and divided into chambers, sets of concentrically arranged conduits leading successively from one chamber into the next and overlapping, the inlet end of said casing being perforated, and a rotatable shutter having perforations which can be made to register to a greater or less extent with the perforations in the casing.

8. A vaporizing and mixing device, comprising a cylindrical casing having an inlet at one end and an outlet at the other and divided into chambers, sets of conduits leading from one chamber into the next, the conduits of successive sets overlapping, and a spirit inlet through the side of said casing between said inlet and outlet.

9. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and means interposed between the same providing fluid passage-ways through which the fluid is forced to pass in opposite directions in going from the inlet to the outlet, the passage-ways near the circumference of said casing being of greater cross-sectional area than those near the center of the same.

10. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and means interposed between the same providing a series of sets of parallel conduits, the conduits of each set overlapping those of the next set, whereby the fluid is forced to pass back and forth in opposite directions in going from the inlet to the outlet, and a separate air inlet into said casing.

11. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and means interposed between the same providing a series of sets of parallel conduits, the conduits of each set overlapping those of the next set, whereby the fluid is forced to pass back and forth in opposite directions in going from the inlet to the outlet, a separate air inlet into said casing, and means for controlling the inflow of air through said air inlet.

12. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and means interposed between the same

providing a series of sets of parallel conduits, the conduits of each set overlapping those of the next set, whereby the fluid is forced to pass back and forth in opposite directions in going from the inlet to the outlet, said casing provided with a separate spirit inlet between said first mentioned inlet and the outlet.

13. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, means interposed between the same providing a series of sets of parallel conduits, the conduits of each set overlapping those of the next set whereby the fluid is forced to pass back and forth in opposite directions in going from the inlet to the outlet, said casing provided with a separate spirit inlet between said first mentioned inlet and the outlet, and a separate air inlet with means for controlling the inflow of air there- through.

14. A vaporizing and mixing device, comprising a cylindrical casing provided with an inlet at one end and an outlet at the other, a series of transverse partitions dividing the interior of said casing into chambers, a set of fluid conduits extending through the first partition into proximity to the second, a set of conduits in alternate arrangement with the first set extending through the second partition and so on through said casing, the casing being provided with air intakes at its inlet end, means for regulating the supply of air through said air intakes, and a spirit inlet in the side of said casing.

15. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and interposed between the same a plurality of tubular members and transverse partitions arranged so as to form circuitous passage-ways between the inlet and the outlet of such configuration that the streams of mixture going through the device are caused to spread and expand at intervals.

16. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and means interposed between the same providing a series of sets of parallel conduits, the conduits of each set overlapping those of the next set, whereby the fluid is forced to pass back and forth in opposite directions in going from the inlet to the outlet.

17. A vaporizing and mixing device, comprising a casing having an inlet and an outlet, and divided into chambers, and conduits which connect one chamber with the next and project into the chambers, so arranged as to cause said fluid to be reversed within each chamber.

18. A vaporizing and mixing device, comprising a casing in which is formed a chamber, and fluid conduits which extend into



and partly through said chamber from opposite ends.

5 19. A vaporizing and mixing device, comprising a casing in which is formed a chamber, fluid conduits which extend into and partly through said chamber from opposite ends, and which overlap.

10 20. A vaporizing and mixing device, comprising a casing in which is formed a plurality of adjacent chambers, and successively arranged sets of conduits which connect each chamber with the next succeeding chamber, and which extend part way through each of the chambers which they connect.

15 21. A vaporizing and mixing device, comprising a casing, partitions dividing said casing into chambers, and tubes extending through each of said partitions and projecting therefrom so as to connect one chamber with the next succeeding chamber.

20 22. A vaporizing and mixing device, comprising a casing, partitions dividing said casing into chambers, and tubes extending through each of said partitions so as to connect one chamber with the next succeeding

chamber, the tubes leading into the several chambers overlapping the tubes leading from said respective chambers.

23. A vaporizing and mixing device, comprising a casing, partitions dividing said casing into chambers, and tubes extending through each of said partitions so as to connect one chamber with the next succeeding chamber, the tubes leading into the several chambers overlapping the tubes leading from said respective chambers and being beveled.

24. A vaporizing and mixing device, comprising a casing, partitions dividing said casing into chambers, and tubes extending through each of said partitions so as to connect one chamber with the next succeeding chamber, the tubes leading into the several chambers overlapping the tubes leading from said respective chambers, the ends of said tubes being oppositely beveled.

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Witnesses:

P. H. TRUMAN,  
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