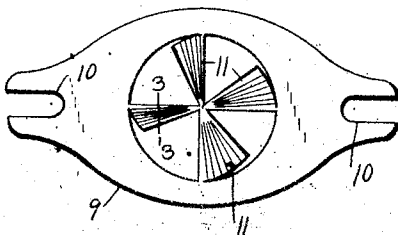
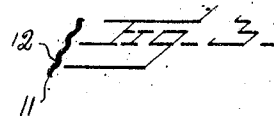
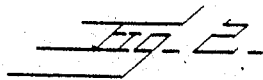
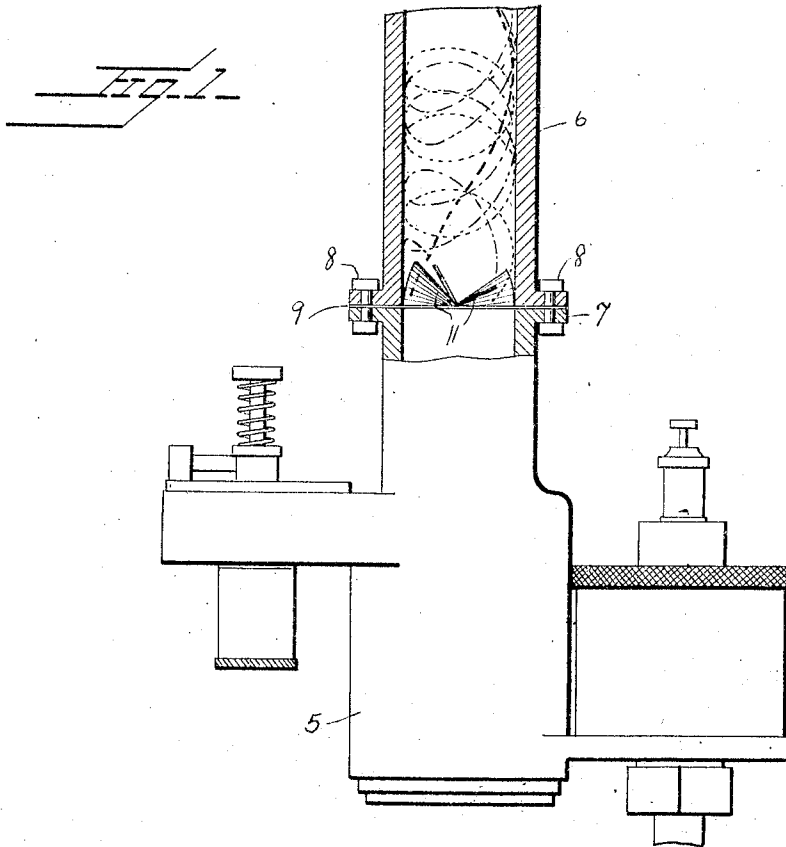


E. CAMP.
MIXER FOR GASEOUS FUEL.
APPLICATION FILED JUNE 26, 1918.

1,327,699.

Patented Jan. 13, 1920.



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ERNEST CAMP, OF SAN DIEGO, CALIFORNIA.

MIXER FOR GASEOUS FUEL.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ERNEST CAMP, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented certain new and useful Improvements in Mixers for Gaseous Fuel, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to mixers for gaseous fuel, and has for its primary object to provide a simple and efficient device adapted to be interposed between the intake manifold and the carbureter of a gas engine for the purpose of producing a more thorough vaporization of the liquid fuel and the carburetion of the air which is mixed therewith.

20 It is another object of the invention to provide a device for the above purpose which is so constructed as to cause the gaseous fuel and air to be divided into a multiplicity of currents each moving in an individual spiral or tortuous path through the intake manifold and the said currents intersecting each other, whereby a more thorough admixture of the fuel and air is produced.

30 It is a further general object of the invention to provide a device as above characterized for producing a more thorough intermingling or association of the air and fuel which will result in a more rapid and complete combustion of the mixture, the development of a maximum of power with a minimum of consumption of fuel, and which will also largely obviate the formation of carbon deposits in the engine cylinders which frequently occasions preignition and backfiring.

40 And it is a further general object of the invention to provide a mixer for gaseous fuel which may be employed in connection with the ordinary internal combustion engine as used upon motor vehicles without necessitating any alterations whatever therein, the device itself being efficient and reliable for the purpose in view, durable in its construction, and capable of manufacture at relatively small cost.

50 With the above and other objects in view, the invention consists in the improved construction, combination and arrangement of the several parts as will be hereinafter more fully described, subsequently claimed and

illustrated in the accompanying drawing in which similar reference characters designate corresponding parts throughout the several views, and wherein:—

Figure 1 is an elevation of a carbureter and intake manifold connection, with parts thereof in section;

Fig. 2 is an enlarged plan view of the mixer; and

Fig. 3 is a section taken on the line 3—3 of Fig. 2.

Referring in detail to the drawing, 5 designates a carbureter of any conventional type, such as is commonly used upon motor vehicle engines, and 6 an intake manifold pipe connection. The outlet neck of the carbureter and end of the intake pipe are flanged in the usual manner, as shown at 7, and connected by bolts 8.

The device constituting the subject matter of the present application is formed from a single plate of metal 9 of requisite thickness, which is attenuated at its opposite ends and slotted, as shown at 10, to receive the fastening bolts 8, said ends of the plate being interposed between the flanges 7. The medial portion of this plate 9 is of substantially the same diameter as the external diameter of the pipe or conduit 6. This conduit, beyond the plate 9, is entirely free and unobstructed.

Baffle wings or vanes 11 are stamped or cut out from the intermediate portion of the plate 9. These vanes are integrally connected to each other at the center of the plate and at their outer ends remain integrally connected to the body of said plate. The baffle vanes are obliquely inclined with respect to the horizontal plane of the plate 9 and project entirely from one side of said plate and upwardly into the intake pipe 6. It is to be particularly noted that the degree of inclination of these blades differs. In other words, one blade is disposed almost at a right angle with respect to the plane of the plate 9, while the angle of inclination of the remaining blades with respect to the plane of said plate gradually decreases. Thus, it will be apparent that the blade first referred to being positioned almost in the plane of the longitudinal axis of the intake pipe 6 will cause a long spiral or swirling movement of the gaseous fuel mixture striking against the lower face of said vane. The next vane will cause the fuel mixture strik-

110

ing the face thereof to travel in a shorter spiral, while the mixture impinging against the next vane will have a still shorter spiral movement and the other vane will further
 5 reduce the length of the spiral path of the current striking against the same. Thus, the baffle wings or vanes 11 will direct the spiral current of the fuel mixture upwardly through the intake pipe 6. There is no im-
 10 pediment or obstruction to the free and unrestricted travel of these currents and they will therefore in their upward passage to the intake ports of the engine cylinders intersect each other at different points
 15 throughout the length of the intake pipe. By thus dividing the mixture of gaseous fuel and air into separate currents and passing these currents through each other, a very thorough admixture of the air and fuel is
 20 attained, resulting in the complete carburetion of the air. More perfect combustion in the engine cylinders is thus assured, as well as the complete consumption of the gas upon the explosion thereof with a re-
 25 sulting increase in the power developed. It will further be appreciated that my invention thus obviates the formation of carbon in the engine cylinders as no unconsumed gases remain therein, and thus, also, over-
 30 heating of the cylinders is obviated.

When the engine is being operated at a low speed, the amount of air drawn into the manifold is relatively small and the multi-
 35 plicity of spiral currents above referred to will swirl upwardly through the pipe 6 very slowly. As the speed of the engine is gradually increased, the velocity of these spiral currents likewise increases. Thus, uni-
 40 formity is obtained in the relative proportions of air and gas drawn into the cylinders of the engine, irrespective of the speed of operation.

It is, of course, manifest that the nearer approach of the liquid fuel to its molecular
 45 size, the more closely will the fuel become associated with the oxygen, which is essential to its combustion. Therefore, I preferably, though not necessarily, form the blades or vanes 11 with longitudinally extending
 50 corrugations as shown at 12, so as to more thoroughly break up and atomize the fuel particles which may not be sufficiently reduced in size in the carbureter. The im-
 55 pact of the fuel and air mixture against these corrugated surfaces of the baffle vanes will assure the disintegration or breaking up of any solid particles of fuel which may remain in the mixture. It is also to be ob-
 60 served that as there are no screens or other impediments in the intake pipe 6 to the free upward passage of the spirally ascending currents, the possibility of a separation of the fuel from the air is precluded.

I have herein referred to the invention as
 65 being primarily designed for use in the

mixing of gaseous fuel for use in an internal combustion engine, with a proportionate volume of air. It is to be understood, however, that the device may also be utilized by resorting to obvious modifica-
 70 tions in its size and the relative proportions of its several parts for mixing together granular or other fluent materials as well as vapors or liquids, and it is to be understood that the word "fluid" as em-
 75 ployed in the appended claims is used in its generic sense and is intended to apply to either dry or wet fluent materials.

From the foregoing description, taken in connection with the accompanying draw-
 80 ing, the construction, manner of operation and several advantages of the device will be clearly and fully understood. My improved fuel mixer may be advantageously utilized in connection with various types of motor
 85 vehicle gas engines without necessitating any alterations whatever in their construction. The device can be easily and quickly applied in its operative position and securely clamped between the intake pipe and the
 90 carbureter. As my improved mixer may be readily stamped from a single sheet metal plate, it is also apparent that the device can be produced at small manufacturing cost. I have indicated four of the baffle vanes or
 95 wings in the accompanying drawing, but it is of course manifest that a greater or less number of these blades may be provided if desired. The device is likewise susceptible of many other modifications in the form and
 100 proportion of its several parts and I, therefore, reserve the privilege of adopting all such legitimate changes as may be fairly embodied within the spirit and scope of the invention as claimed. 105

I claim:—

1. A fluid mixing device adapted to be arranged in a fluid conduit and comprising a member having a single series of radially
 110 disposed baffles in fixed relation to each other, said baffles being disposed in relatively different inclined planes to divide the fluid into separate spiral currents traveling in the same direction through the conduit.

2. A mixing device for use in connection
 115 with the intake pipe of an internal combustion engine comprising a member provided with a plurality of corrugated baffles disposed at relatively different oblique angles with respect to each other and with respect
 120 to the plane of said member.

3. A mixing device for use in the intake pipe of an internal combustion engine comprising a plate provided with a plurality of
 125 baffle vanes projecting from one side of the plate and adapted to extend into the intake pipe, said vanes being disposed in relatively different, obliquely inclined planes with relation to the direction of flow of the gaseous fuel as and for the purpose set forth. 130

4. The method of mixing fluent materials, which consists in directing the materials through a conduit in a plurality of streams and in spirals which are of relatively different lengths so that the said streams will intersect each other at spaced points during their passage through the conduit.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ERNEST CAMP.

Witnesses:

ROCHELLE L. BOEHM,
FLORENCE WHEELER.