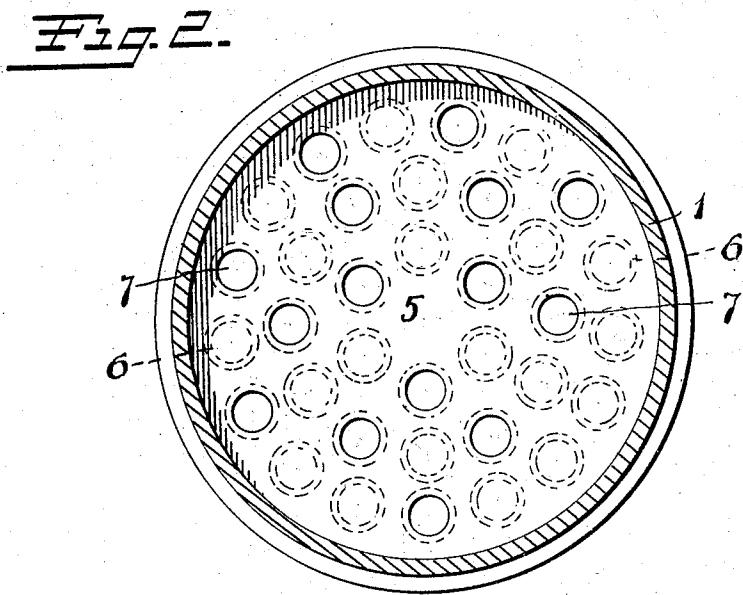
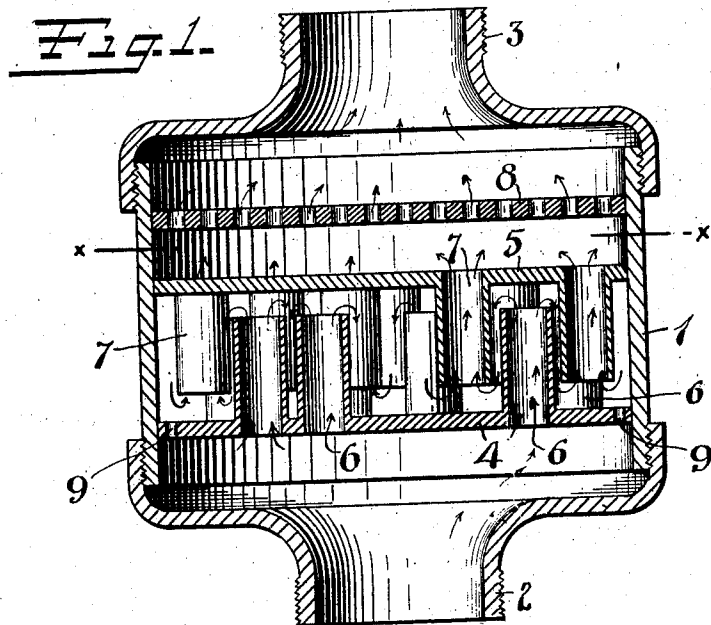


W. C. PAUL.
HYDROCARBON MIXER.
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937,854.



Witnesses:
Chas. A. Reed
Fred. M. Dummerfeldt

Inventor
W. C. PAUL
By *his Attorney*
Charles B. Brown & H. C. Hulse

UNITED STATES PATENT OFFICE.

WILLIAM C. PAUL, OF NEW YORK, N. Y., ASSIGNOR TO CHARLES H. CONNER, OF RYE, NEW YORK.

HYDROCARBON-MIXER.

937,854.

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To all whom it may concern:

Be it known that I, WILLIAM C. PAUL, a citizen of the United States, residing at New York, N. Y., have invented certain new and useful Improvements in Hydrocarbon-Mixers, of which the following is a full, clear, and exact description.

My invention relates to improved mixing devices.

My improved mixer may be very successfully employed wherever it is desired to effectively mix volatile liquids with air. For example, it may be used with great efficiency upon induction pipes for engines of the internal combustion type whereby from such use a perfect mixture of liquid hydrocarbon and air is guaranteed.

Although the aim of the present day vaporizers and carbureters, so-called, is to produce a mixture of gas and air and to measure the same so as to preserve the relative proportion of one to the other under varying demands, great difficulty is experienced in securing a complete mixture of the liquid fuel with the air. Now, by my invention this complete mixture is effected and that end is attained by a construction which is exceedingly simple, inexpensive and durable.

In the accompanying drawings, I have shown my invention in the preferred form, in which—

Figure 1 is a longitudinal sectional view. Fig. 2 is a cross section on the line X—X looking down.

1 is a casing preferably cylindrical in form, having an inlet 2 and an outlet 3 of relatively reduced diameter.

4 is a disk-like plate suitably secured within the casing 1 and extending transversely of the same. 5 is another similar plate located in said casing and spaced apart from the plate 4.

6—6 are tubes carried by the plate 4 and projecting toward the plate 5.

7—7 are tubes carried by the plate 5 and projecting toward the plate 4.

The tubes or nozzles 6—7 are so arranged relatively to each other that they do not interfere and the upper end of each tube 6 extends slightly above or overlaps the lower end of each tube 7. Each tube 6—6 directs its jet against a solid part of the plate standing above the same.

8 is what I may term a screen located above the plate 5. This screen may be made

in any desired manner and when employed it will perform the functions hereinafter attributed to the same.

The case may be made in sections, but the construction thereof is immaterial. The inlet 2 and outlet 3 may be provided with any suitable form of coupling devices whereby the mixer may be readily connected to an induction pipe or other conduit. In the drawings I have shown by arrows the direction of travel of gas through the mixer. As will be seen by these arrows, imperfectly mixed gas enters through the inlet 2 into the lower part of the chamber 1. It is then divided up and conducted through the several nozzles 6—6 in the form of a plurality of jets which impinge against a solid part of the overstanding plate 5, by which it is deflected and caused to pass down through the space between the overlapping ends of the tubes or nozzles 6—7. It then enters the tubes 7—7 and is passed through the same in the form of jets corresponding in number to the number of tubes 7—7. Where a screen 8 is used, the gas will then pass through said screen into the upper part of the chamber 1 and finally out through the outlet 3.

It will be seen from the foregoing that the course which the gas is obliged to follow is so tortuous and the several jets of gas have been so agitated by the deflecting walls that by the time said gas is passed through the reversely arranged gas passages 6—7 any previously unmixed fuel in the form of vapor will become thoroughly mixed with the air so that the gas as it proceeds from the outlet 3 is in the form of a perfect mixture. The function of the screen 8 when employed is two-fold. It first serves to supplement the action of the previously described parts in perfecting the mixture, and, second, it serves to prevent back-firing into the space to the rear of the screen. It will be observed that the gas is in a certain sense contracted as it enters each vortex at the entrance to each pipe 6. It is then permitted to expand as it is discharged from said pipes, and is again contracted where it enters the pipes 7—7, and is again permitted to expand where it emerges therefrom. This repeated contraction and expansion of the gas operates most effectively to secure the desired mixing effect. As will be seen in Fig. 2, a large number of pipes 6—6 are em-

ployed, it being desirable to provide in the sum of the cross-sectional areas of said pipes a cross-sectional area that will correspond to or be slightly greater than the cross-sectional area of the inlet 2, whereby no injurious choking effect will be produced.

While the best results are obtainable by substantially the means shown in the drawings and previously described, it should be understood that my invention is susceptible to modification. For example, I apprehend that very beneficial results may be obtained by a modified arrangement in which the jet principle is availed of even though the particular number, size and arrangement of pipes be very materially modified. Indeed, in some instances it might be possible to omit either one or the other of the sets of pipes 6—6 or 7—7.

9 are small drip ports arranged in the plate 4 and connecting the space above said plate with the space below the same whereby any condensation in said space may run back, and whereby also during use a sufficient quantity of air may pass into the space around the base of the pipe 6 to volatilize any fluid condensation that may occur. Similar drip ports may be provided in plate 5. Obviously the number of transverse

plates 4—5 may be increased if desired.

Obviously this principle and construction may be employed for mixing any fluid substances.

What I claim is:

1. In a mixer, an inclosed chamber, an inlet, an outlet, a mixing device arranged within said chamber and extending transversely thereof, including a plurality of pipes with deflecting means arranged at the base of said pipes, and with other deflecting means arranged in front of but spaced apart from the discharge end of said pipes, with passages through the last mentioned deflecting means and with tubes surrounding said mentioned passages and extending in a direction opposite to the first mentioned tubes and standing between the latter.

2. In a mixer, an inclosed chamber; an inlet and an outlet therefor, two transversely arranged perforated plates carried in said chamber, the perforations in one plate being out of line with the perforations in the other plate, and tubes carried by one plate around the perforations therein and arranged to direct jets toward an imperforate part of the other plate whereby gas passing through said tubes will be deflected.

3. In a mixer, an inclosed chamber having an inlet and an outlet, two transversely arranged perforated plates spaced apart and held within said chamber, the perforations in one plate being out of line with the perforations in the other plate, and tubes projecting from each plate toward the other

plate and surrounding the perforations in each of said plates respectively.

4. In a mixer, an inclosed chamber having an inlet and an outlet, two transversely arranged perforated plates spaced apart and held within said chamber, the perforations in one plate being out of line with the perforations in the other plate, and tubes projecting from each plate toward the other plate and surrounding the perforations in each of said plates respectively, the ends of each of said oppositely facing tubular projections overlapping each other but being spaced apart from one another to furnish gas passages.

5. In a mixer, an inclosed chamber having an inlet and an outlet, perforated plates fixed in said chamber and extending transversely across the same, the perforations in one plate being out of line with the perforations in the other plate, and tubes surrounding the perforations in each of said plates, the tubes carried by one plate being arranged to project jets against an imperforate portion of the other plate, the tubes in the last mentioned plate being arranged to receive and convey any gas in the space between said plates from said space into a space above or beyond the last mentioned plate.

6. In a mixer, an inclosed chamber having an inlet and an outlet, perforated plates fixed in said chamber and extending transversely across the same, the perforations in one plate being out of line with the perforations in the other plate, and tubes surrounding the perforations in each of said plates, the tubes carried by one plate being arranged to project jets against an imperforate portion of the other plate, the tubes in the last mentioned plate being arranged to receive and convey any gas in the space between said plates from said space into a space above or beyond the last mentioned plate, and a screen extending across said chamber in the space between said plates and the aforesaid outlet.

7. In a mixer, an inclosed chamber, an inlet, an outlet, a mixing device arranged within said chamber and extending across the same, including a perforated plate with means for forming a plurality of jets at said perforations, and deflecting means beyond the first mentioned plates to deflect such jets, with a plurality of passages from one side of said deflecting means to the other side thereof and toward the outlet of said casing said passages being out of line with the jet forming means.

WILLIAM C. PAUL.

Witnesses:

R. C. MITCHELL,
ALICE MORFORD.