R. S. HELVIE.

CARBURETER AND RELIEF VALVE FOR EXPLOSIVE ENGINES.

APPLICATION FILED OCT. 28, 1909.

996,018.

Patented June 20, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

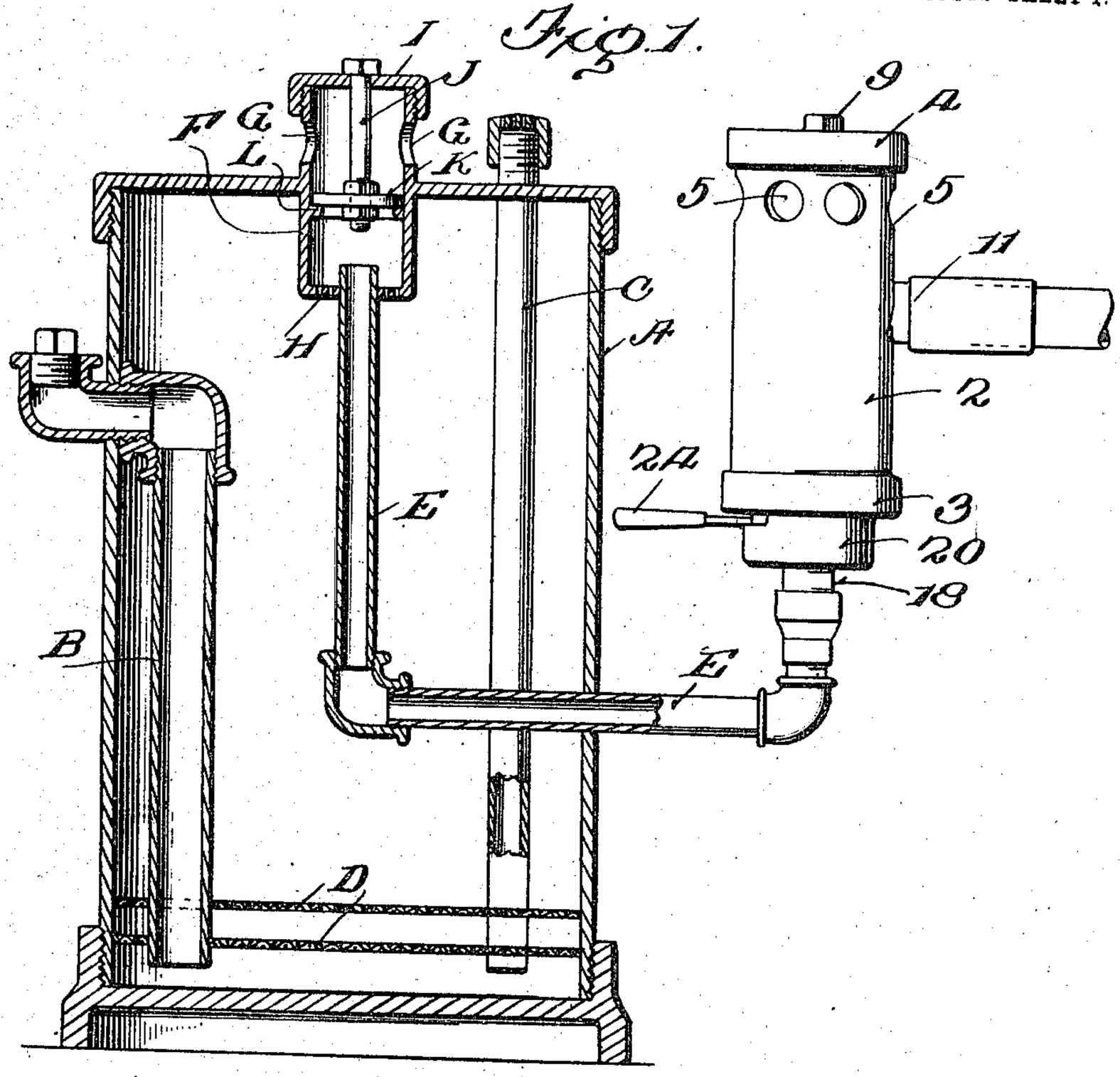

Fig. 3.

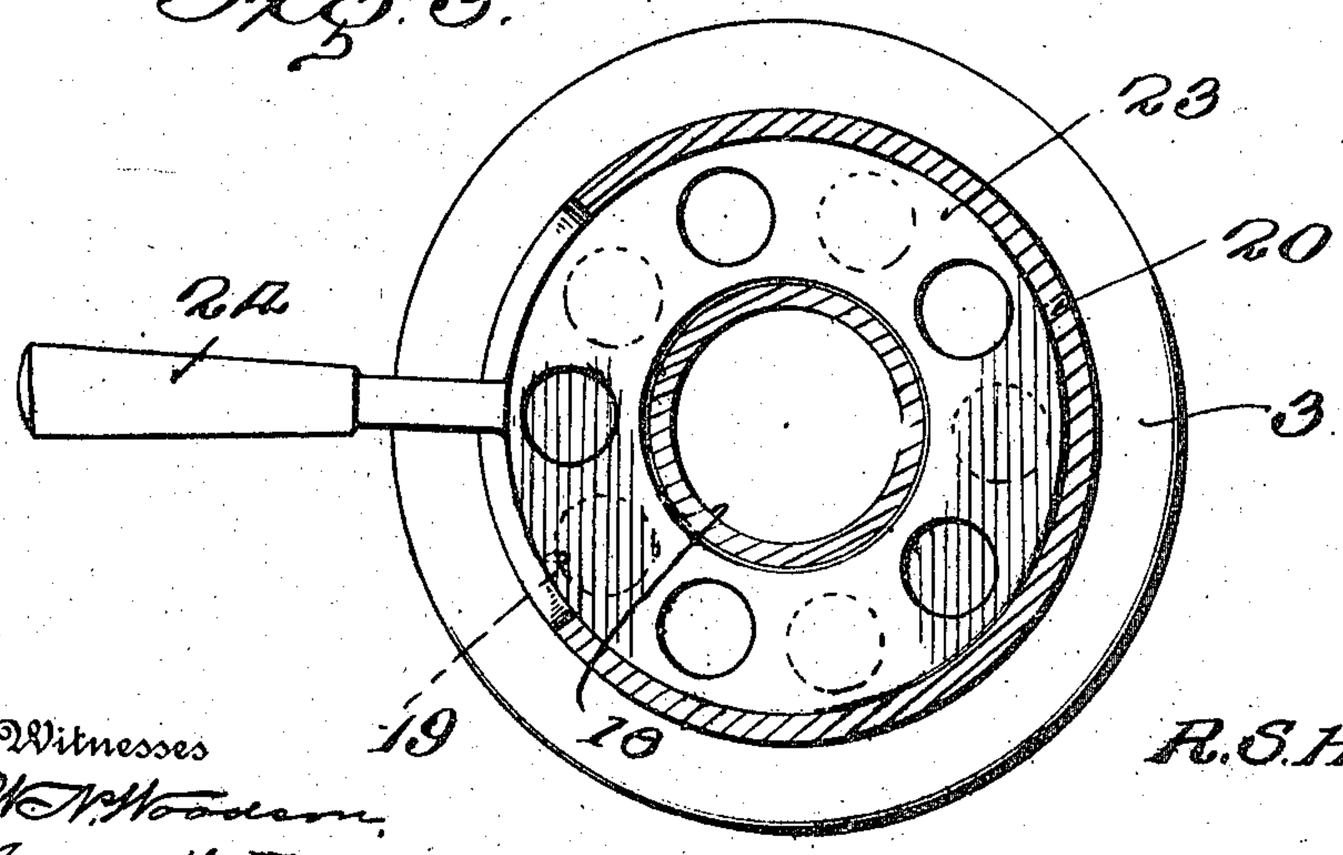

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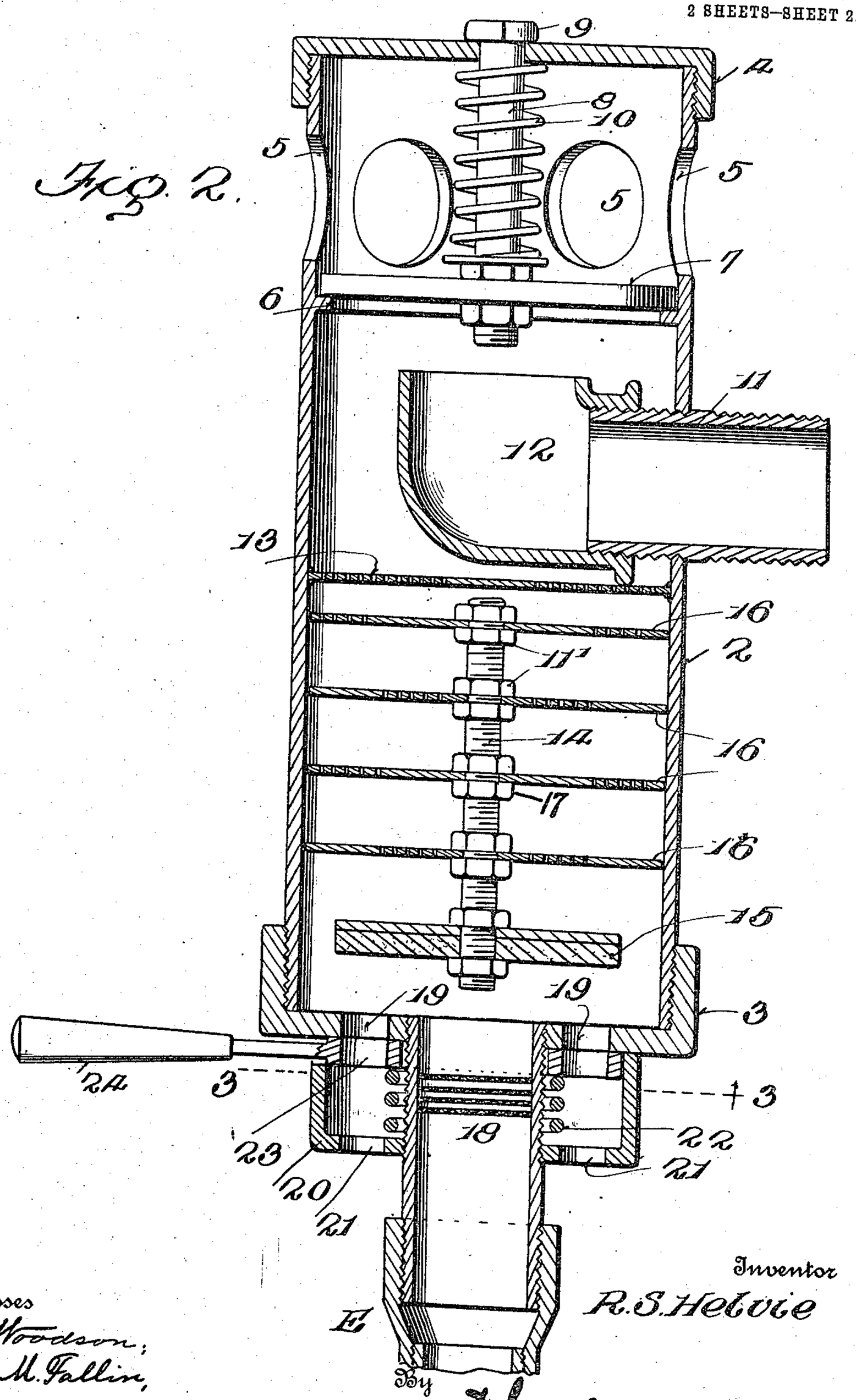
Fig. 2.



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UNITED STATES PATENT OFFICE.

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CARBURETER AND RELIEF-VALVE FOR EXPLOSIVE-ENGINES.

996,018. Specification of Letters Patent. Patented June 20, 1911.

Application filed October 28, 1909. Serial No. 525,072.

To all whom it may concern:

Be it known that I, ROSCOE S. HELVIE, a citizen of the United States, residing at Oshuskey, in the county of Cimarron and State of Oklahoma, have invented certain new and useful Improvements in Carbureters and Relief-Valves for Explosive-Engines of which the following is a specification.

My invention relates to internal combustion engines, and particularly to means for mixing air and hydro-carbon vapor before passing it to the engine, one object of the invention being to provide a means for mixing the vapor and air very thoroughly and for regulating the mixture so as to get the best proportions of each for use in any especial type of engine.

A further object is to prevent a backward movement of the gas in the pipe line from the generator to the engine, due to low pressure in the generator, and to prevent any dangerous or disastrous results from back firing.

To these ends, I provide a chamber located intermediate of the vapor generator and the engine and forming an enlargement of the pipe line leading between these two points, this chamber being provided with means for the graduated inlet of air, and also being provided with a relief valve so located that if back firing occurs in the engine or in the pipes leading from said chamber to the engine, the force of the explosion will be delivered against the inside face of the relief valve and in a position to most effectually force it open and permit the force of the explosion to pass out of the chamber. The chamber above described also contains between the relief valve and the pipe line leading to the generator, baffles which prevent, upon an explosion in the said chamber, any ignition of the vapor between the chamber and the generator. Further, the provision of a series of perforated plates or screens located within the chamber, prevents, after each suction stroke, the backward movement of the gas in the line due to low pressure in the generator.

For a full understanding of the invention and the merits thereof, and to acquire a knowledge of the details of construction, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a side elevation of my device applied to a vapor generator, the generator being shown in section; Fig. 2 is an enlarged longitudinal diametrical section of my mixing chamber, showing the relief valve in one end thereof in section; and, Fig. 3 is a transverse section on the line 3—3 of Fig. 2.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Referring to these drawings, A designates a generating chamber of any desired construction and having a hydro-carbon inlet pipe B whereby the lowest portion of the chamber is filled with gasolene or other suitable hydro-carbon.

C designates an air inlet pipe which enters the upper end of the chamber and passes down to the lower end thereof.

D designates opposed screens also located at the lower end of the chamber A and forming between them a compartment which may be filled with fibrous material such as asbestos, for the purpose of finely dividing and thereby carbureting the air and gasolene vapor.

E designates an outlet pipe which extends downward from the upper end of the chamber A and then outward, and connects to the mixing chamber 2.

F designates a valve chamber which is located in the head of the chamber A and which surrounds the upper end of the pipe E. This valve chamber, as will be seen, extends above the cap or head of the cylinder A and is formed with a plurality of outlet openings G.

H designates a screen traversing the lower portion of the chamber F.

I designates a cap screw-threaded on the upper end of the valve chamber, through which passes the stem J of a valve K, this valve resting upon a seat L in the chamber F. The valve K is a relief valve so that in case of any explosion in the pipe E, the valve K will be forced upward, and the force of the explosion will be carried out through the openings G.

While I have described and shown a particular kind of generator, I do not wish to be limited to this, as the particular kind of generator forms no part of my present invention.

My present invention consists in the pro-

vision of a cylindrical chamber 2 closed at both ends by the caps 3 and 4. The upper end of the chamber is formed with a series of outlet openings 5, and below these openings is formed a circular seat 6 for a puppet valve 7 whose stem 8 passes loosely through the cap 4 and is provided with the head 9. A coil spring 10 surrounds the stem 9 and forces the valve 7 firmly down upon its seat 6. It will be seen that when the valve 7 is forced upward, the openings 5 are disclosed, permitting the escape of explosive gases to the outside air.

11 designates an outlet nipple, screw-threaded on its exterior and adapted to be connected to the inlet port of the engine. This nipple passes through the wall of the chamber 2 and carries on its inner end the ell 12 which opens upward immediately beneath the end face of the valve 7. Beneath the outlet nipple 11 and the ell 12 is the transverse perforated plate or screen 13 which is fixed in place within the cylinder 2.

16 designates a plurality of perforated screens or plates fitting the interior of the cylinder 2 fairly snugly but adapted to move within the cylinder. These plates are supported by nuts 17 upon a screw-threaded valve stem 14 whose lower end carries the valve 15. This valve is adapted to seat against the upper end of a nipple 18 which is screw-threaded into the cap 3 and also closes the ports 19 when the valve is in the lowest position. This nipple 18 is screw-threaded on its exterior and is connected at its end to the pipe E from the generator. Surrounding the end of the nipple 18, the cap 3 is provided with a plurality of air inlet openings 19. Supported upon the nipple 18 is a pipe cap 20 whose upper end fits up tightly against the under face of the cap 3, thus forming a chamber into which the openings 19 open. The under face of the cap 20 is provided with a plurality of air inlet openings 21. Surrounding the nipple 18 is the coil spring 22 which bears upward against a rotatable valve plate 23 having a series of ports in it adapted, when the valve is turned in one position, to register with the ports 19 through the cap 3, but when the plate is turned in the other position, to close the ports 19. This plate has projecting from it a handle 24 which extends out through a slot in the cap 20.

The purpose of these several elements above described is as follows: The valve 7 rests lightly upon the seat 6 and is adapted to be raised by the force of an explosion such as caused by back firing. This force will be directed against the under face of the valve 7 by reason of the angular turn in the pipe 11 caused by the use of the ell 12. Thus, the burning gases of the back firing will be allowed a ready passage to the atmosphere, and the relief to the pressure will be so immediate (because of the size of the valve 7 relatively to the chamber 2, and because of the direction of the exploding gases) that no damage can possibly occur to the chamber or the parts contained therein. The plate 13 and the plates 16 act as baffle screens or plates to entirely prevent the passage of flame downward to the gas supply. It will be noted that the perforations through the plates 16 have a staggered relation to each other, so that there is no direct communication from the upper portion of the chamber 2 to the lower portion thereof, but that any flame which might pass the screens, would have to take a devious course. Not only do these plates act as baffle plates and screens, but because of the movement of the plates 16, the air and gas entering through the pipe E and the air openings 19, will be more thoroughly mixed, thus securing a better explosive mixture. The valve 15, through the suction stroke, is raised by atmospheric pressure and because of pressure in the generator and pipe E. Air is admitted through the ports 19 and 21, and the proportion of air to vapor is regulated by adjusting the valve 23. It is to be understood that the quantity of mixture passing through the chamber 2 is governed by the capacity of the cylinder of the engine, but the proportions of the mixture are regulated by the valve 23 in relation to the ports 19. If the ports 19 are opened wide, the air meeting with less resistance to its entrance than in its entrance to the generator, will enter through the ports 19, but if the ports 19 are partly closed, or closed to such extent that the resistance to the entrance of the air at 19 will be equal to that of the resistance of the air to the generator, then an equal amount of gas and air will enter the mixture. Less friction at the ports 19 means more air and less gas.

My construction is extremely simple; may be made of ordinary pipe fittings, and in practice has been found to thoroughly mix the air and gas in proper proportions, and provides in addition thereto thoroughly reliable protection against back firing, and eliminates all chance of the hot gases from the explosion igniting the contents of the generator.

Having thus described the invention, what I claim is:—

1. As a means for reducing the effects of back firing explosions in explosive engines, the combination with a source of explosive vapor and an engine, of a pipe line connecting the source of vapor with the engine, and a chamber located in said pipe line, said chamber having outlet relief ports at one end, and a spring-held relief valve normally closing said ports but opening to an increase of pressure within the chamber, the inner end of the pipe to the engine opening adjacent to and against the inner face of the

valve and being directed away from the inlet from said pipe line.

2. A mixing chamber for internal combustion engines having a vapor inlet pipe at one end, relief ports at the opposite end, a puppet valve yieldingly held against its seat to close said relief ports, but opening upon an increase of pressure within the chamber, and an outlet pipe passing through the side of the chamber, the end of said pipe within the chamber being angled and directed against the inner face of the valve.

3. A mixing chamber for internal combustion engines, having a vapor inlet pipe at one end, and relief ports at the opposite end, a valve yieldingly held against its seat and normally closing the said relief ports, but opening upon an increase of pressure within the chamber, an outlet pipe extending through the wall of the chamber, the end of said pipe within the chamber being disposed adjacent to the relief valve directed against the inner face of the valve and away from the vapor inlet pipe, and a screen located below the outlet pipe and extending entirely across the chamber.

4. The combination with a mixing chamber of an internal combustion engine, having a vapor inlet pipe at one end and relief ports at the opposite end, of a puppet valve yieldingly held against its seat and normally closing said relief ports, but opening upon an increase of pressure in the chamber, an outlet pipe extending through the wall of the chamber, the end of said pipe within the chamber being directed against the inner face of the puppet valve, and a plurality of screens located below the outlet pipe and extending entirely across the chamber, the perforations of said screens having a staggered relation with regard to each other.

5. A mixing chamber for internal combustion engines having an explosive vapor inlet at one end, the other end of said chamber being formed with relief ports, a valve-seat located adjacent to the relief ports and between the relief ports and the inlet end of the chamber, an outlet pipe extending into the chamber between the said seat and the inlet, a perforated screen located between the inlet opening and the outlet pipe preventing the ignition of vapor entering the mixing chamber below the outlet pipe, and a valve normally closing said relief ports and normally resting upon said seat, said valve being adapted to be forced beyond the relief ports to uncover the same upon an explosion in the chamber.

6. The combination with the mixing chamber of an internal combustion engine, of an inlet pipe at one end, an outlet pipe leading from the other end of the chamber, said chamber having relief ports at its end opposite to the inlet pipe, a spring-held valve normally closing said relief ports but opening to an increase of pressure within the chamber, a puppet valve closing the inlet pipe and having a stem projecting into the chamber, and a series of perforated screens carried upon said stem and extending transversely across the chamber.

7. The combination with the mixing chamber of an internal combustion engine, said chamber having an inlet pipe leading into it at one end, and a series of air inlet openings surrounding the inlet pipe, the other end of the chamber having a series of relief ports, of a puppet valve closing said relief ports but adapted to open said ports upon an increase of pressure within the chamber, an outlet pipe leading into the chamber below the relief valve and having its end directed against the inner face of the relief valve, a spring-held puppet valve closing the inlet pipe and the air inlet openings, a screen crossing the chamber between the puppet valve and the outlet pipe, a stem on the puppet valve, and a plurality of perforated screens carried upon said stem and movable therewith.

8. A mixing chamber for internal combustion engines having a series of relief ports at one end and at the other a vapor inlet port and a series of air inlet ports, a vapor outlet pipe leading from said chamber adjacent to the relief ports, a puppet valve interposed between the outlet pipe and the relief ports, a seat located below the relief ports against which the puppet valve normally rests, the said outlet valve having its inner end directed against the under face of said puppet valve, a valve normally closing the air inlet openings and the vapor inlet port, said valve having a stem projecting into the chamber, a series of perforated screens carried upon the valve stem, and a valve located below the air inlet openings and having openings adapted to register with the air inlet openings, said valves being movable to control said openings.

9. A mixing chamber for internal combustion engines, comprising a cylinder having at one end a series of relief ports, and having a cap at each end, one of said caps being formed with air inlet openings oppositely disposed at the other end of the chamber from the relief ports, a vapor inlet pipe entering said last named cap, a chamber attached to the inlet pipe exterior to said cap and having air inlet openings, a valve disposed within said chamber and having perforations adapted to register with the air inlet openings in the cap, said valve being movable to carry its perforations out of registration with said air inlet openings, a valve seat formed at the other end of the chamber inward of the relief ports, a spring pressed puppet valve closing against said seat and thereby preventing the passage of vapor out of said relief ports, an outlet pipe

the inner end of which is directed against the inner face of said puppet valve, a fixed perforated partition located between the outlet pipe and the inlet end of the cylinder, a valve closing against the inlet pipe and also closing the air inlet openings, said valve having a stem projecting into the chamber, and a series of perforated plates carried upon said stem and extending transversely of the chamber.

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

ROSCOE S. HELVIE. [L. S.]

Witnesses:

JOHN W. HELVIE,

W. GORHOM JACKSON.