No. 756,834. PATENTED APR. 12, 1904.

J. F. DENISON.

VAPORIZER FOR EXPLOSIVE ENGINES.

APPLICATION FILED MAR. 20, 1902.

NO MODEL.

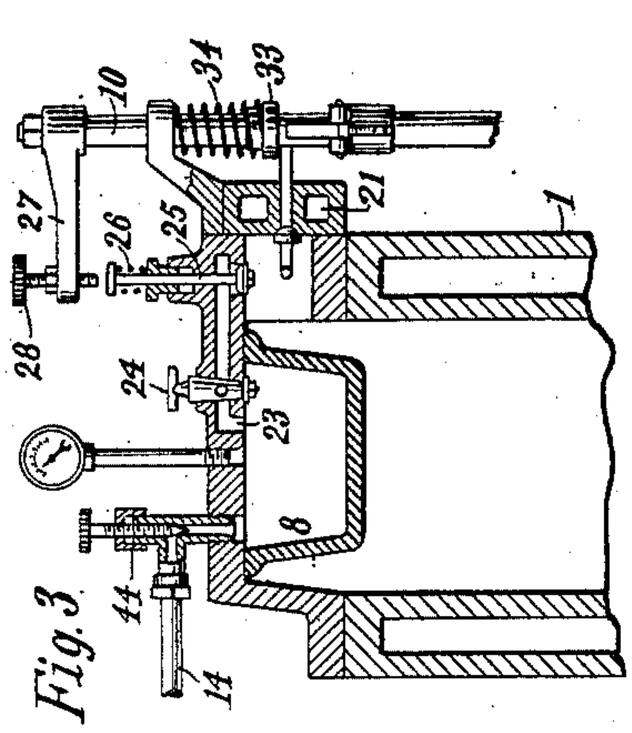

Fig. 3

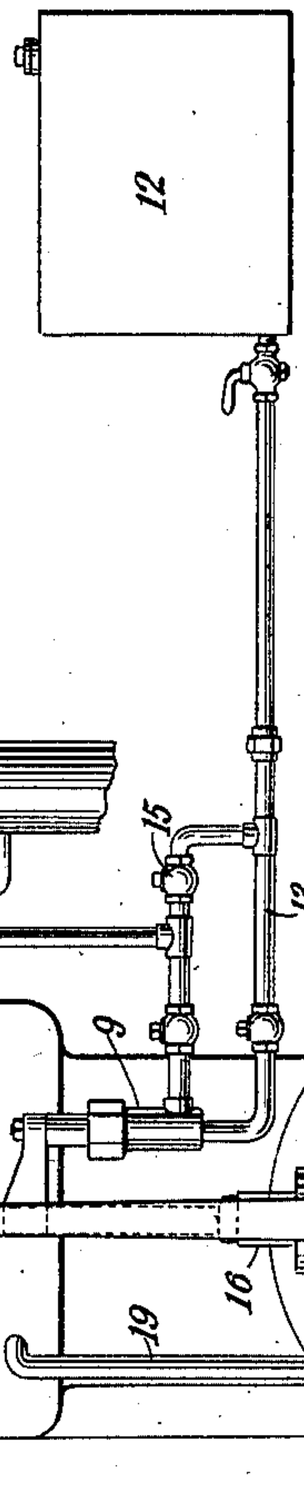

Fig. 1

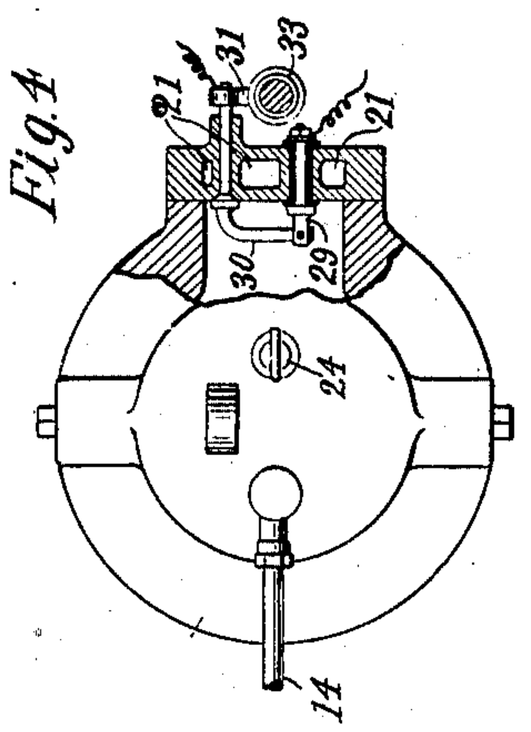

Fig. 4

Fig. 2

Witnesses:
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By
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No. 756,834. Patented April 12, 1904.

UNITED STATES PATENT OFFICE.

JULIAN F. DENISON, OF NEW HAVEN, CONNECTICUT.

VAPORIZER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 756,834, dated April 12, 1904.

Application filed March 20, 1902. Serial No. 99,058. (No model.)

To all whom it may concern:

Be it known that I, JULIAN F. DENISON, a citizen of the United States, residing at New Haven, county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Vaporizers for Explosive Engines, of which the following is a specification.

In operating explosive-engines with liquid hydrocarbon it is well known to persons familiar with such engines that the highest efficiency and economy cannot be obtained if the gas supplied to the explosion-chamber has mixed with it any unvaporized liquid. This is true even if the liquid be in very minute particles, and considerable difficulty has at times been experienced in avoiding this latter condition. Therefore I have invented a method and apparatus by which this difficulty may be easily overcome, so that the gas used in the charge is thoroughly dry and free from unvaporized particles.

My present invention, which consists in a method of providing fuel for use in explosive-engines, will be more clearly understood when described in connection with the apparatus shown in the accompanying drawings, wherein—

Figure 1 is a side view of my engine. Fig. 2 is a longitudinal central section in a plane parallel to that of Fig. 1. Fig. 3 is a longitudinal central section in a plane perpendicular to that of Fig. 1, showing the upper parts; and Fig. 4 is a top view with parts broken away to show details of the ignition mechanism.

The cylinder, cooled by water circulated through its walls, is designated by 1.

2 is the compression-chamber, in which air drawn in through the opening 3 is compressed by the forward stroke of the piston 4. The air is forced into the explosion-chamber through the passage 5 and striking the plate or projection 6 is diffused, driving out before it the burned gases of the exhaust through the passage 7.

The retort 8 is for the purpose of gasifying the liquid hydrocarbon and in the present instance is shown located on the cylinder-head. It may be of any desired form, shape, or configuration and made in any convenient way, as by casting. It may also be located elsewhere than on the cylinder-head, depending somewhat on the structure of the engine in which my method is to be employed. A convenient means for supplying liquid to the retort is a pump 9, Fig. 1, the plunger of which is actuated by the rod 10, reciprocated by the eccentric mechanism 11. Liquid is drawn from a reservoir, as 12, through the pipe 13 and forced into the retort through the pipe 14. If at any time the pressure in the retort rises above a predetermined point, the liquid will be driven back through 14 past a relief-valve 15 into the supply-pipe 13. This relief-valve is of course of any convenient or well-known form. Gas from the retort is supplied to the explosion-chamber 22 through the channel 23, which may be closed by the valve 24. The channel 23 is also controlled by a valve 25, normally held against its seat by a spring 26. Over the valve 25 is an arm 27 of the reciprocating rod 10, having the screw 28, so that when at the proper time the rod 10 is drawn down by the eccentric mechanism the screw 28, striking the valve 25, will open the same and allow gas from the retort to enter the explosion-chamber.

On the lower end of rod 10 is a plunger 16, working in a pump 17, by which water is drawn from a suitable source connected to a pipe 18. The water thus supplied is conducted to the cylinder by a pipe 19 and thence through the passages 20 and 21, Figs. 2, 3, and 4, to act as a cooling agent in the ordinary manner.

The charge in the explosion-chamber 22 is ignited by a suitable spark mechanism—such as shown, for example, in Figs. 2, 3, and 4. An electrode 29, insulated from the rest of the engine, is connected to one pole of a source of electricity and another electrode 30, which may or may not be insulated, to the other pole. The second electrode 30 is journaled in the wall of the explosion-chamber and has on its outer end a rocking lever 31, held raised by a spring 32, so that the electrode 30 may bear against the electrode 29, as shown. On the rod 10, arranged to slide freely thereon, is a hammer 33, held against the lever 31 by a spring 34, so that the electrode 30 is held out

of contact with the other. Fixed to the rod 10 below the hammer 33 is a pivoted trigger 35 of the form shown, held raised by a spring 36. When the rod 10 is raised, the upper part of the trigger engages the hammer and lifts it. As the rod continues its upward movement the electrode 30 approaches the other until a spark is produced by their contact, after which the trigger is tripped by the screw 37, releasing the hammer, which strikes the lever 31 a smart blow sufficient to separate the electrodes, as before.

Leading out of the retort is a pipe 38, controlled by a valve 39. In part of its length the pipe is coiled, as at 40, in a chamber 42, through which the exhaust escapes from explosion-chamber. Beyond the coil the pipe 38 is connected to a storage-tank 41, the purpose of which will be explained hereinafter.

From the foregoing description the operation of the engine will be readily understood. One of the caps 43 having been removed, the retort is heated in some convenient way, as by a paint-breamer. When the retort is sufficiently hot, the valve 24 is closed and the pump 9 worked a few strokes by turning the fly-wheel. Oil is thereby supplied to the retort, and when sufficient gas has been generated, determined by the gage, the cap is replaced and the valve 24 again opened. The engine is now ready to start in the ordinary manner by turning the fly-wheel. The retort 8 being surrounded by the explosive mixture will be highly heated by the explosions. It is of sufficient capacity to contain at moderate pressure a considerable quantity of gas—that is, enough for a number of explosions—so that it is not emptied every time the valve 25 is opened to supply fuel for the charge. The hydrocarbon is thus subjected to a high temperature for a much longer time than in the usual method of operation, with the result that the vaporization of the liquid is more complete. By increasing the supply of vapor maintained in the retort it will of course be heated still longer before withdrawn for the charge. This increase of the supply may be effected by adjusting the relief-valve 15 so that a higher pressure may be maintained and then increasing for a short time the supply of liquid hydrocarbon. In this way the gasifying may be carried so far that part or all of the vapor by the time it is admitted to the cylinder will have been transformed into a fixed dry gas which at ordinary temperatures will not all condense. By vaporizing the hydrocarbon in quantities in excess of that required for a single explosion I am able conveniently to store a part of the gas to be used thereafter in starting the engine. Thus by opening the valve 39 the tank 41 will be filled, the gas in its passage thereto through the coil 40 being still further heated by the exhaust. To start the engine by means of the stored supply, it is necessary to open the valve 39. The gas will thus be conducted to the retort and thence to the explosion-chamber. When the retort is filled, the supply from the tank 41 should be cut off.

It will be seen from the foregoing that by my method the fuel for the charge is supplied to the cylinder from a chamber of considerable capacity and in the form of a vapor entirely free from liquid, even in the minutest particles. This I regard as one of the most important advantages of my invention.

It is obvious, of course, that the engine shown and described is not the only one in which my invention may be embodied, and I therefore do not consider myself in any way limited thereto; but

What I claim is—

In a hydrocarbon explosion-engine, the combination of an explosion-chamber, a piston working therein, a retort at one end of the explosion-chamber directly exposed to the products of the explosions, means for maintaining in the retort a supply of vaporized hydrocarbon considerably in excess of the amount required for a single charge, means for delivering to the explosion-chamber fuel for the charge from the maintained supply, a storage-reservoir having a valved connection with the retort, and an exhaust-pipe extending from the explosion-chamber and inclosing a portion of the storage-reservoir connection, whereby the hydrocarbon vapor passing to the reservoir will be subjected to the heat of the exhaust, as set forth.

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Witnesses:
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