No. 667,910. Patented Feb. 12, 1901.

W. A. HATCHER & J. W. PACKARD.

MIXER AND VAPORIZER FOR EXPLOSIVE ENGINES.

(Application filed June 26, 1900.)

(No Model.) 3 Sheets—Sheet 1.

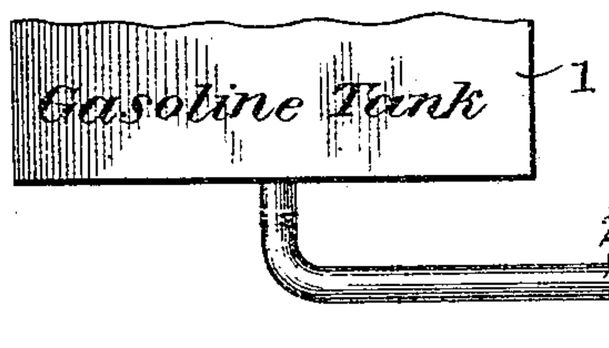
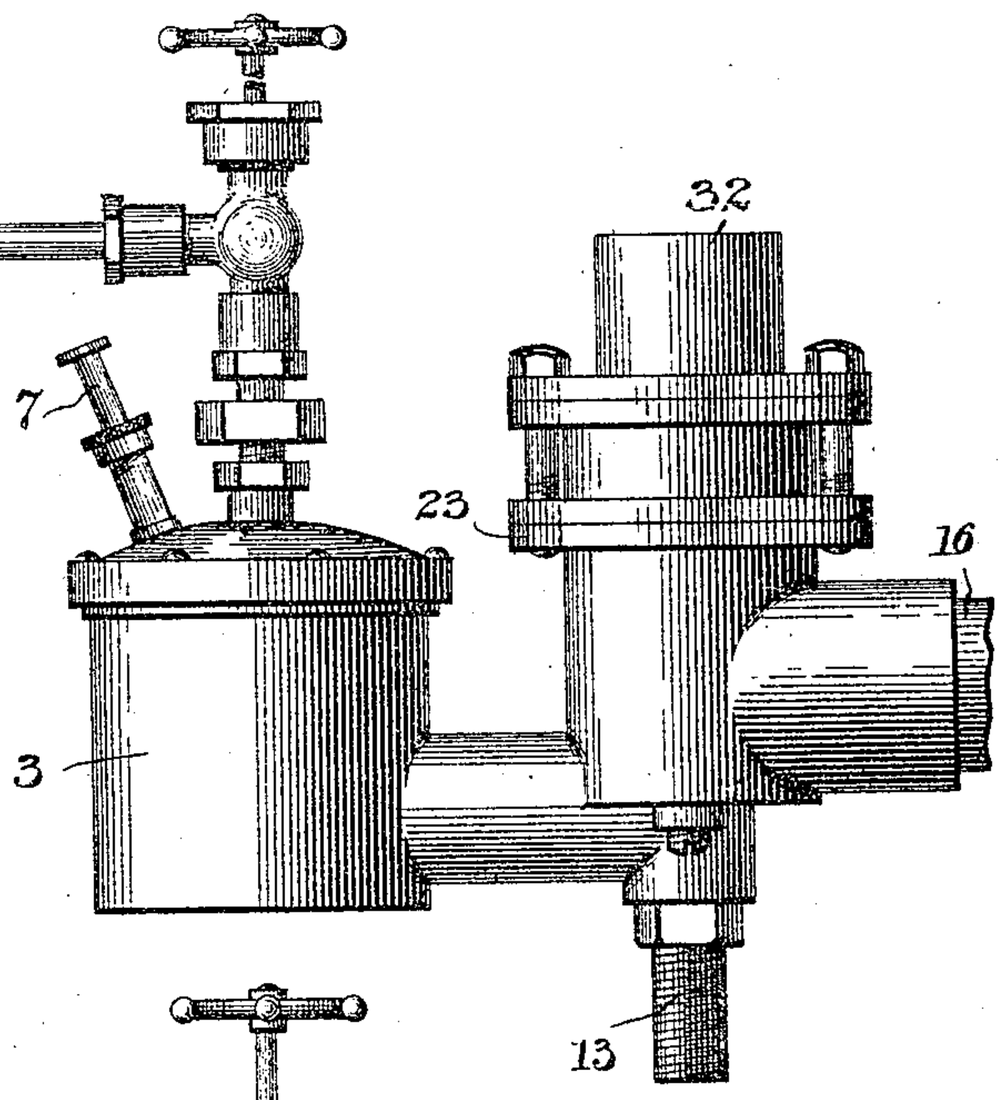


Fig. 1.



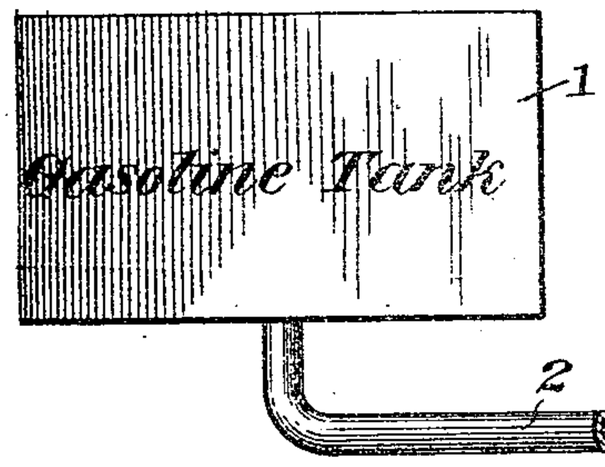


Fig. 2.

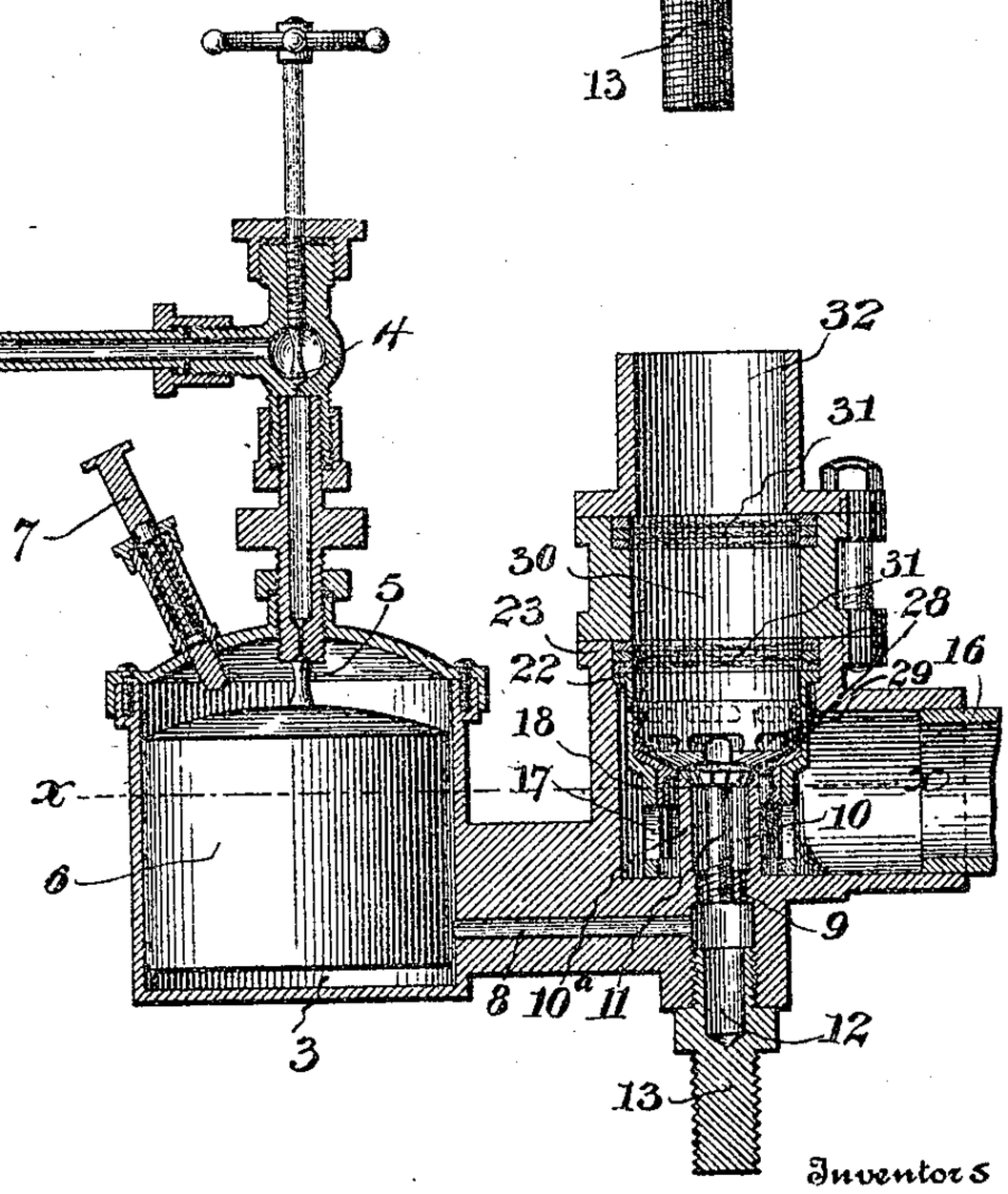


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Fig. 3.

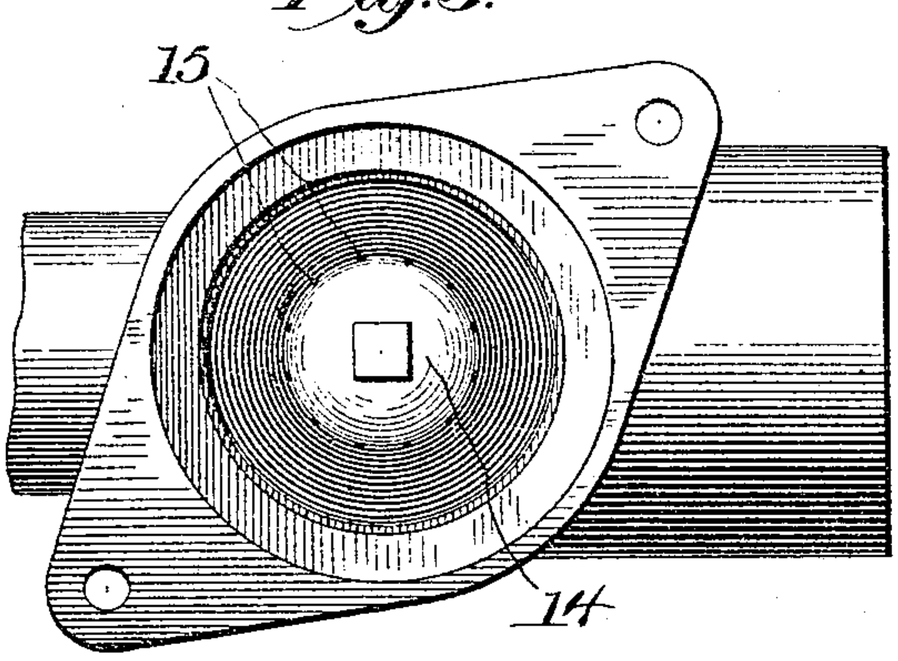

Fig. 4.

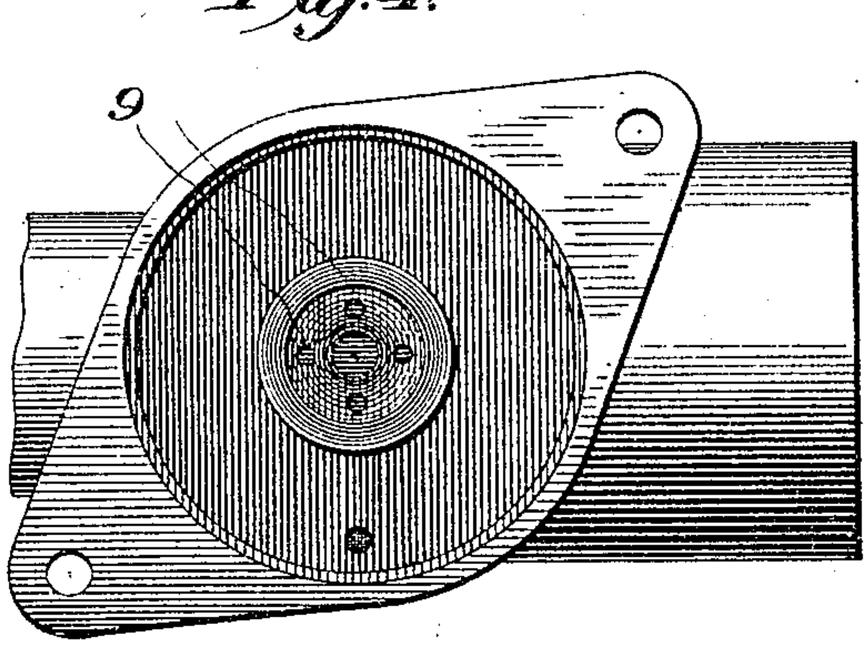

Fig. 5.

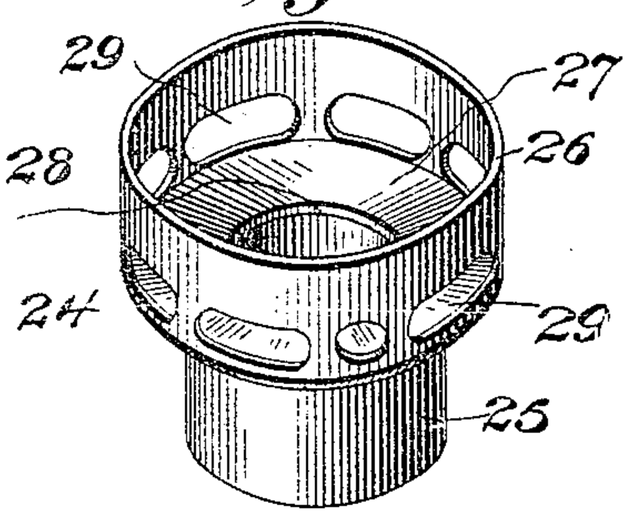

Fig. 6.

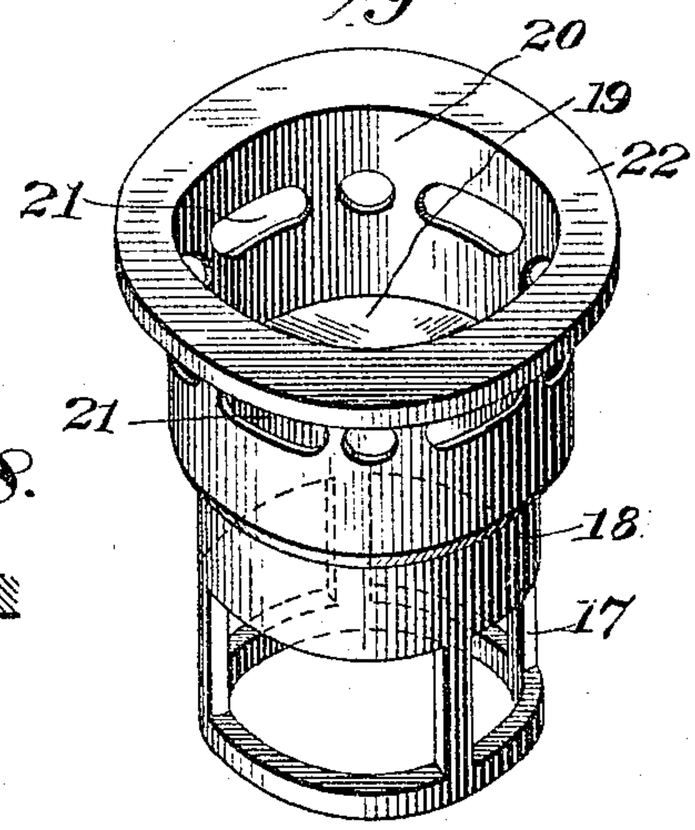

Fig. 8.

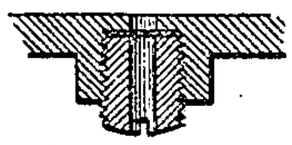

Fig. 7.

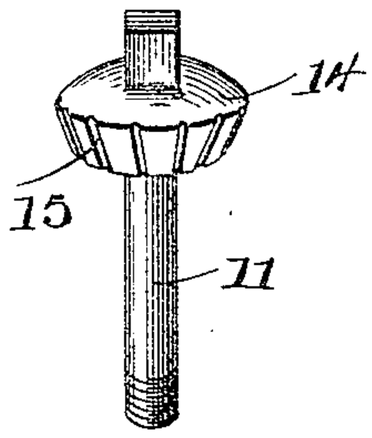

Fig. 9.

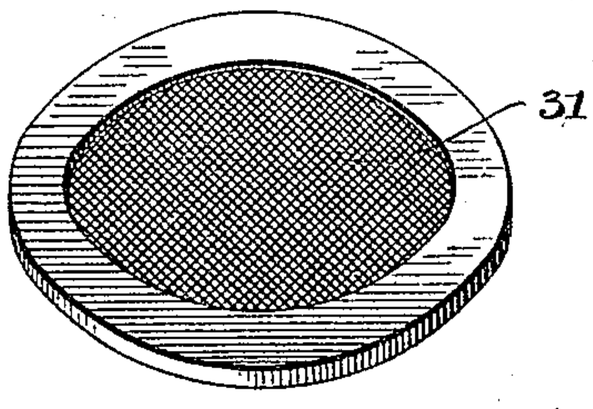

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Fig. 10.

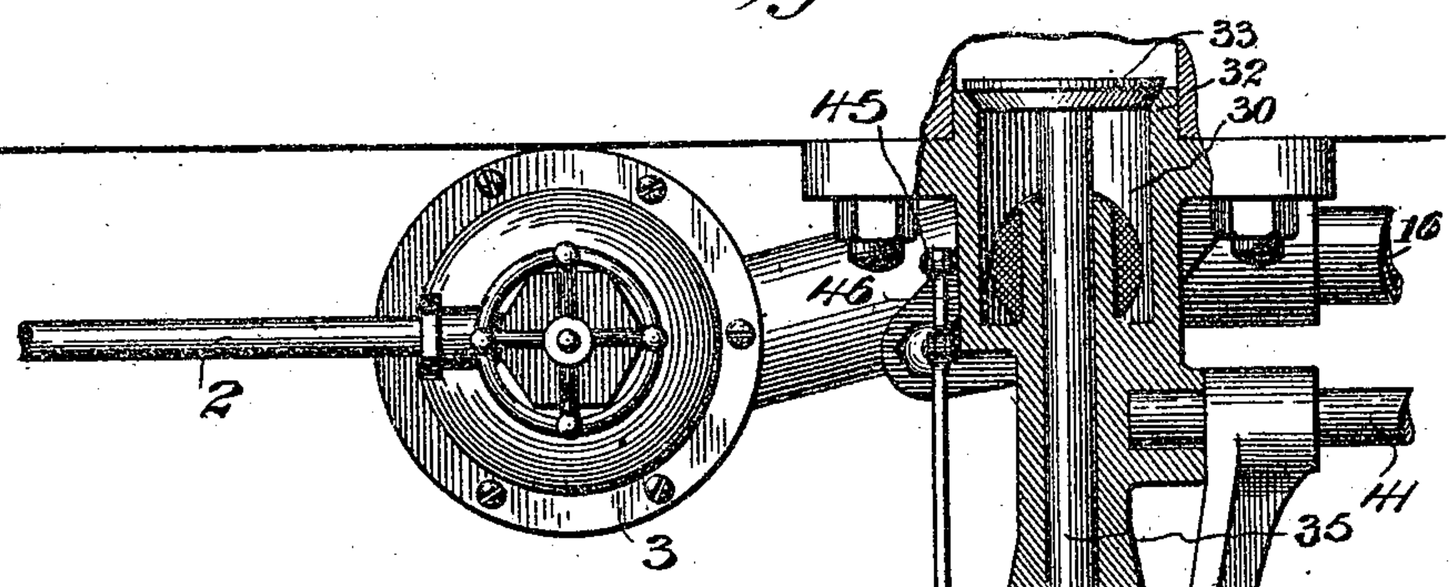


Fig. 12.

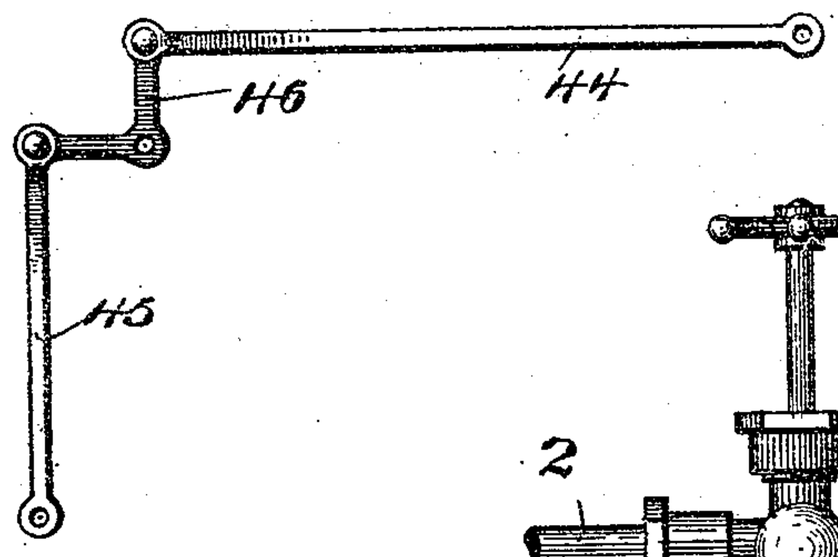


Fig. 11.

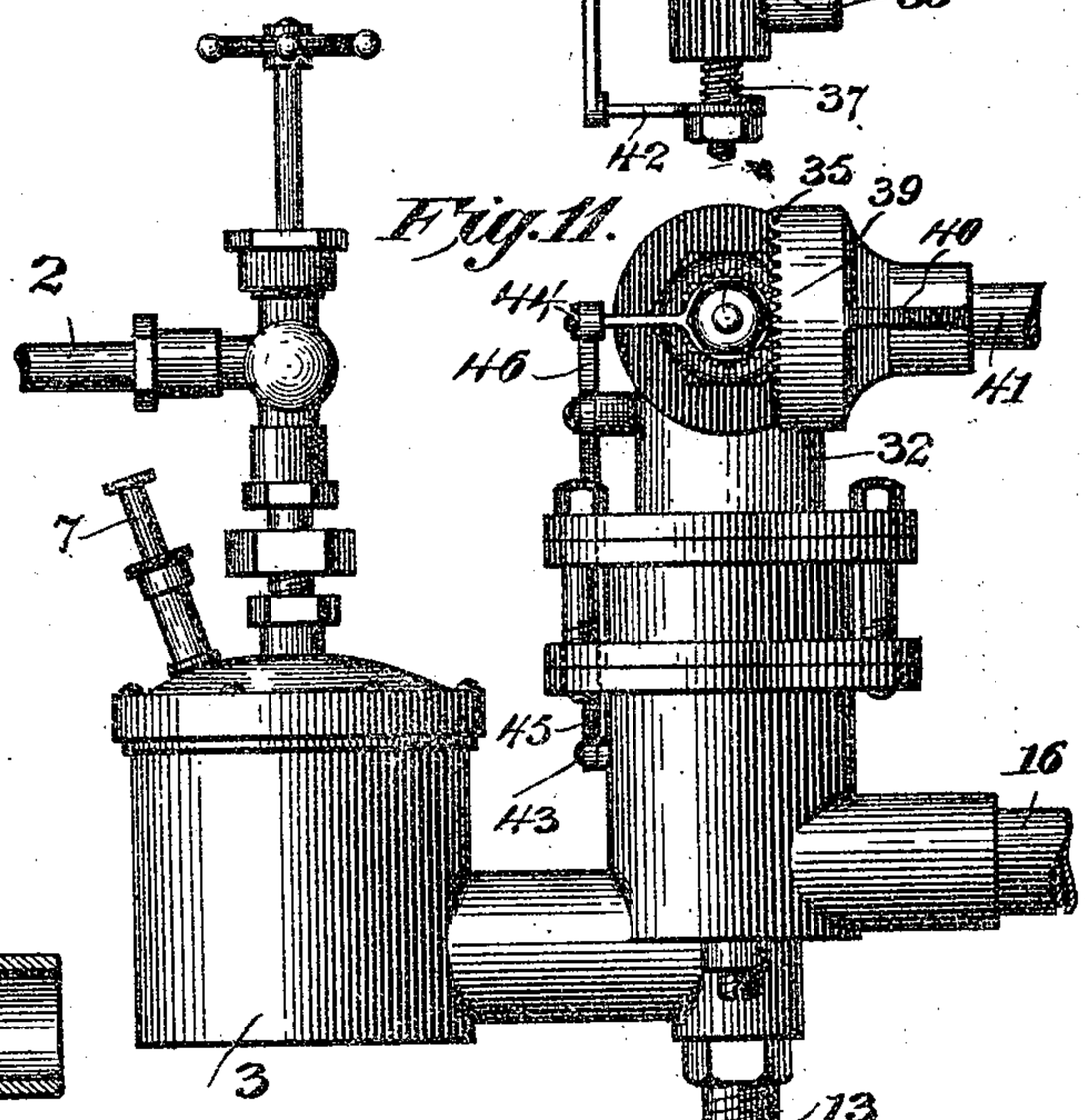
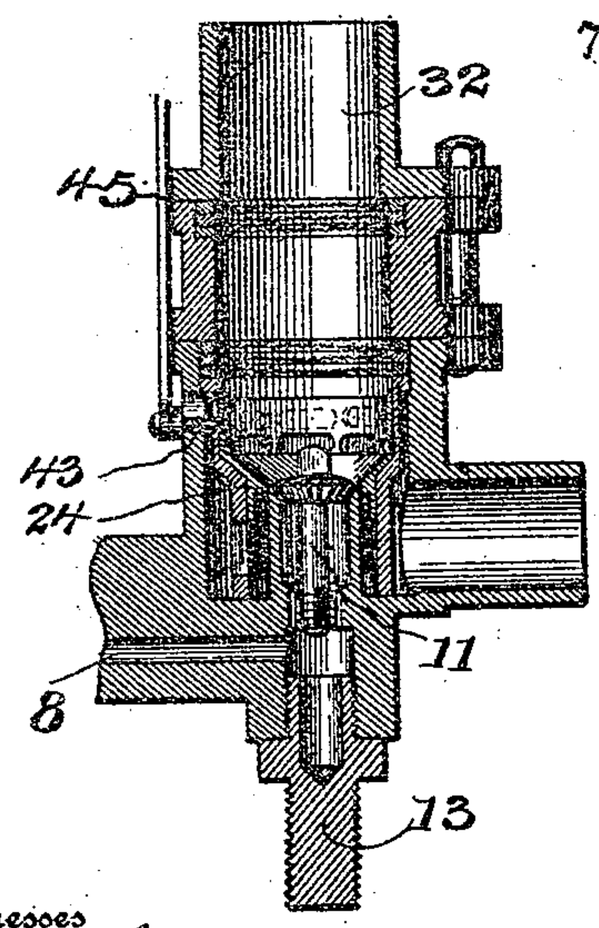


Fig. 13.



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UNITED STATES PATENT OFFICE.

WILLIAM A. HATCHER AND JAMES W. PACKARD, OF WARREN, OHIO; SAID HATCHER ASSIGNOR TO SAID PACKARD.

MIXER AND VAPORIZER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 667,910, dated February 12, 1901.

Application filed June 26, 1900. Serial No. 21,648. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM A. HATCHER and JAMES W. PACKARD, citizens of the United States, residing at Warren, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Mixers and Vaporizers, of which the following is a specification.

This invention relates to hydrocarbon-motors, and more particularly to mixers and vaporizers for this class of motors.

The object of the invention is to provide a simple apparatus for effectively regulating the admission of gas and air to the mixing-chamber.

The invention will be described in detail in connection with the accompanying drawings, in which—

Figure 1 is a side view of so much of the apparatus as is necessary to illustrate the invention. Fig. 2 is a central sectional view of the same. Figs. 3 to 9, inclusive, are details of the apparatus shown in Figs. 1 and 2. Figs. 10 to 13, inclusive, illustrate a modified form of the invention.

Referring first to Figs. 1 to 9, inclusive, 1 indicates the storage-reservoir, from which the gasolene passes through a tube 2 into the tank or vessel 3. The supply of hydrocarbon to the tank 3 may be positively shut off or regulated by a valve 4. It is also automatically controlled by a valve 5, carried by a float 6 in tank 3. In the top of the tank 3 is a plunger 7, by means of which the float may be positively depressed when it is desired to fill the tank with fluid. The hydrocarbon flows from the tank 3 through a passage 8 and upward through small passages 9, Figs. 2 and 4, into a cylindrical chamber 10. In the lower part of this chamber is a threaded opening into which is screwed a stem 11, Figs. 2 and 7. Beneath the stem 11 is a cavity or well 12, in which dirt may accumulate, the bottom of said well being in a removable cap 13. The upper end of the wall of chamber 10 is beveled, forming a conical seat for a conical head 14 upon the stem 11. This head is provided with a series of small peripheral grooves 15, Figs. 3 and 7. The float is so proportioned that it permits the gasolene in the tank and in the chamber 10 to rise approximately to a level with the under side of the head 14, as indicated by the line $x\,x$, Fig. 2. The air enters through a pipe 16 and through openings 17 in the side of a cylindrical jacket 18, which surrounds the chamber 10 at some little distance from its wall, Figs. 2 and 6. The jacket 18 is provided with an offset portion 19, forming a seat, for a purpose to be referred to hereinafter, and a cylindrical extension 20 above said seat. In the extension 20 are openings 21. The jacket or pot 18 is also provided with a flange 22, which fits the inner wall of the casing 23, in which the jacket is located. Within the jacket 18 and resting upon the seat 19 is an air-valve 24, comprising a cylindrical portion 25, which has a working fit in the lower part of the jacket, a cylindrical part 26, which has a working fit in the upper part of the jacket, and an offset 27 between said parts adapted to rest on the seat 19 of the jacket. The air-valve also has an inwardly-projecting flange 28, which fits close up to the wall 10^a of the chamber 10. In the upper cylindrical portion of the air-valve are a series of openings 29. When the valve is in its lowest position, as shown in Fig. 2, the openings 29 do not register with the openings 21 in the jacket; but when the air-valve is sufficiently raised communication is opened between the air-chamber surrounding the jacket through the openings 21 and 29 and the mixer-chamber 30. The mixer may be provided with any suitable number of screens 31 or other devices to thoroughly commingle the air and oil.

The operation of the invention above described is as follows: The gasolene stands at the level of the line x just at the base of the openings 15, and the air-valve normally stands in its closed position, cutting off all communication with the air-inlet pipe, as shown in Fig. 2. At stated intervals suction is created in the pipe 32 in the usual manner, the effect of which is to draw into the mixing-chamber a charge of gasolene, which is sprayed in through the openings 15, and to simultaneously raise the air-valve and permit a charge of air to enter at the inner edge of the flange 28, the air and oil coming into intimate contact and being carried up into the mixer together. When the engine is taking light

charges of the mixture, the air-valve is raised but slightly and the openings 21 are not uncovered. When, however, the draft upon the mixture is stronger, the air-valve is raised sufficiently to uncover more or less of the openings 21, so that air may enter through said openings, as well as through the central opening of the flange 28. The air-valve falls back to its seat and closes all of the air-inlets after each charge of mixture is drawn into the cylinder. We have found an apparatus constructed as above to regulate automatically the charges of air and hydrocarbon in a very satisfactory manner.

In Figs. 10 to 13, inclusive, we have shown the same devices as in Figs. 1 to 9, inclusive, and in addition we have shown means for positively moving the air-valve as follows: A pipe 32, leading from the mixing-chamber 30 to the cylinder, is normally closed by a valve 33, said valve being drawn to its seat by a spring 34, surrounding its stem 35. The maximum opening of the valve 33 is regulated by a threaded pinion or nut 36, which is adjustable upon a threaded extension 37 of stem 35. At each opening of the valve the nut 36 abuts against a fixed seat 38 on the valve-casing, and the position of the nut regulates the opening of the valve, as will be readily understood. The nut or pinion 36 is adjusted by means of a sector-gear 39 on an arm 40 of a rock-shaft 41, the said rock-shaft being controlled in any suitable manner, either automatically or by hand-lever. The devices for controlling the rock-shaft form no part of the present invention.

Connected to the stem 35 is an arm 42, and connected to the air-valve is an arm 43, which arms are operatively connected together by means of links 44 and 45 and an intermediate right-angled elbow-lever 46.

It will be seen that the devices shown in Figs. 10 to 13, inclusive, effect the opening of the air-valve 24 positively and in proportion to the opening of the mixer-valve 33, the opening of both of said valves being under the control of a sector-gear 40.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a hydrocarbon-motor, the combination of the chamber 10 in communication with the gasolene-supply, the series of openings in the top of said chamber, and the freely-moving air-valve having an inner flange located close to said openings when the valve is closed.

2. In a hydrocarbon-engine, the combination of the chamber 10 communicating with the gasolene-supply, and provided with a series of small openings at its upper end, a jacket surrounding said chamber and separated therefrom, the air-valve sliding in said jacket and normally closing the space between the jacket and the chamber, and the mixer above said air-valve, for the purpose set forth.

3. In a hydrocarbon-engine, the combination with the gasolene-chamber 10 having a series of perforations in its upper portion, the jacket surrounding and separated from said chamber, means for admitting air to the lower portion of said jacket, a series of openings in said jacket communicating directly with the mixer, and an air-valve sliding within the jacket and arranged to normally close said openings, said air-valve being provided with openings to register with the openings in the jacket when the air-valve is raised.

4. In a hydrocarbon-engine, the combination of the gasolene-chamber 10, the tank in communication therewith, and a float for maintaining a constant level in said tank, of a head in said chamber provided with a series of peripheral grooves, an air-valve surrounding the chamber and having a flange fitting close to the outlets of said grooves, a jacket in which said air-valve works, a series of openings in said jacket, and a corresponding series of openings in said air-valve adapted to register with the aforesaid openings when the air-valve is raised.

5. In a hydrocarbon-engine, the combination of an oil-inlet pipe, a circular series of openings through which the oil is sprayed, and an air-inlet valve immediately surrounding and coöperating with said oil-openings to admit air adjacent thereto, with a valve for admitting mixture to the cylinder, and connections between said mixture-valve and said inlet-valve, for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM A. HATCHER.
JAMES W. PACKARD.

Witnesses:
M. S. ANDREWS,
ROBT. E. GORTON.