

No. 694,681.

Patented Mar. 4, 1902.

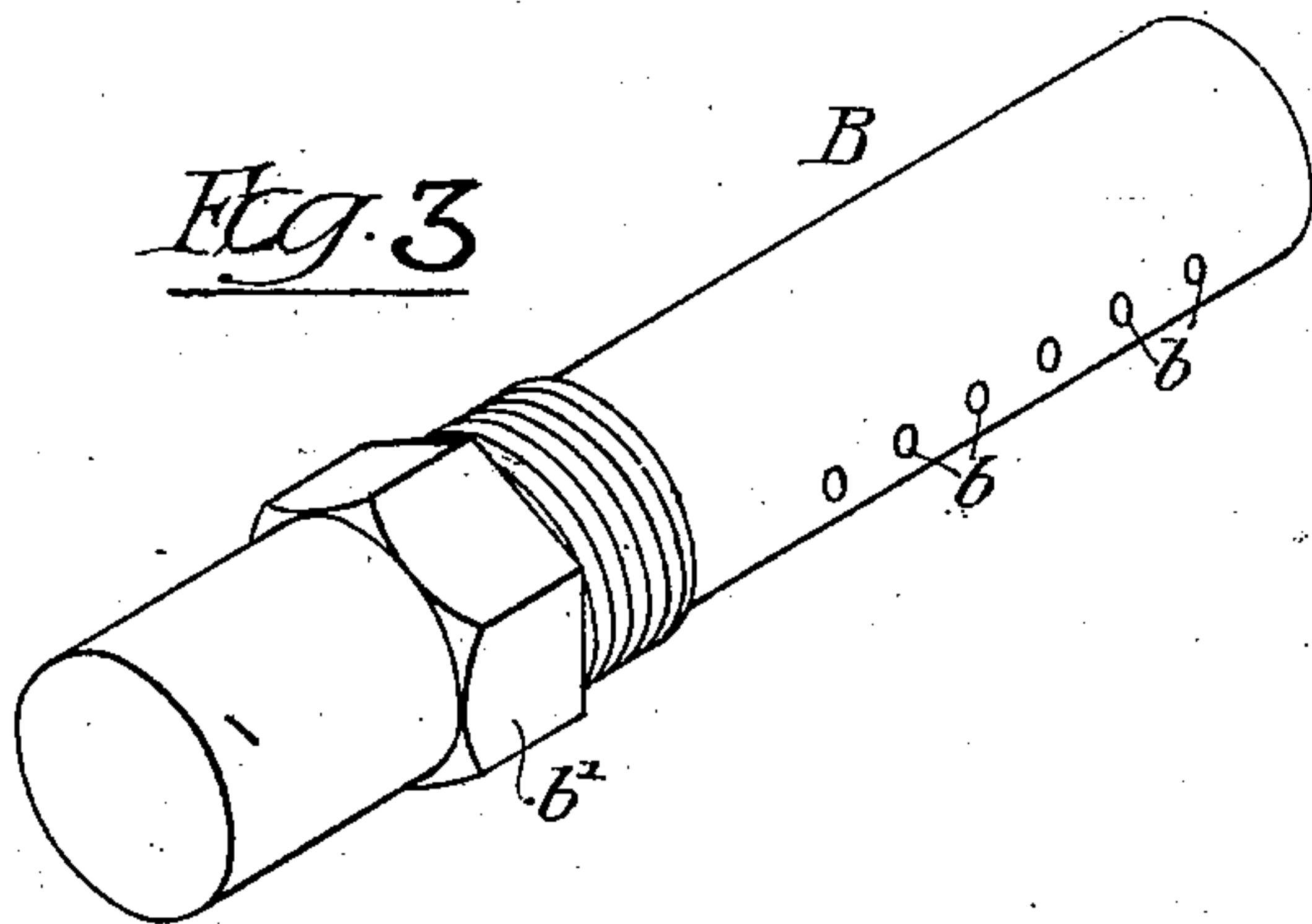
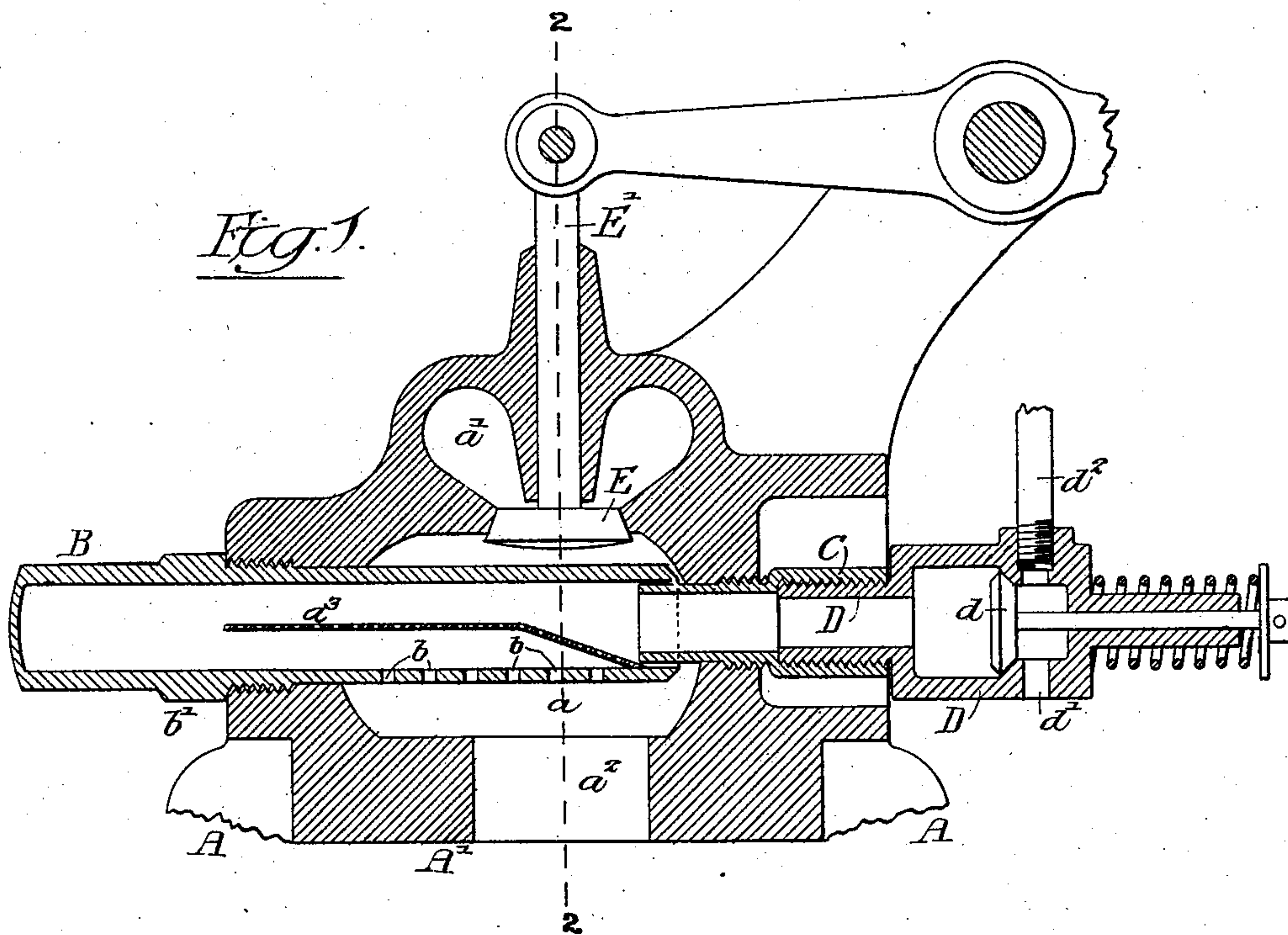
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VAPORIZING AND IGNITING DEVICE FOR GAS OR EXPLOSION MOTORS.

(Application filed Jan. 17, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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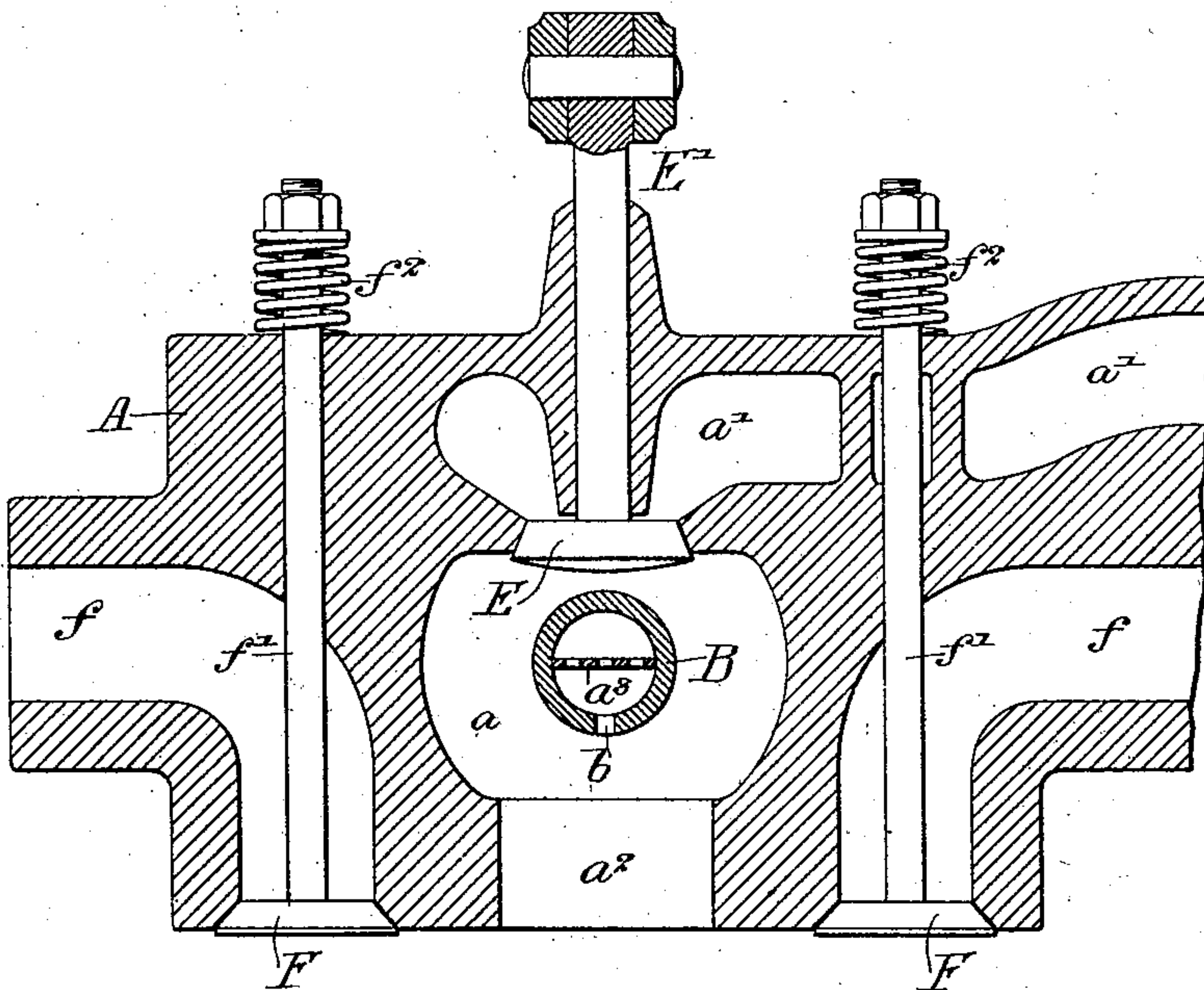
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(No Model.)

2 Sheets—Sheet 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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VAPORIZING AND IGNITING DEVICE FOR GAS OR EXPLOSION MOTORS.

SPECIFICATION forming part of Letters Patent No. 694,681, dated March 4, 1902.

Application filed January 17, 1901. Serial No. 43,646. (No model.)

To all whom it may concern:

Be it known that I, HOWARD R. SHEPPARD, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Vaporizing and Igniting Devices for Gas or Explosion Motors, of which the following is a specification.

My invention relates to certain improvements in means for vaporizing and igniting the fuel employed for operating gas or explosion engines. It has for its object the simplification of the parts of an explosion-engine which are concerned in gasifying, mixing, and firing the operating charge and at the same time the provision of means for performing the above operations in a reliable and economical manner. This object I attain as hereinafter described, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view taken across the upper part of a gas-engine cylinder to which my invention is applied. Fig. 2 is a vertical sectional view of the cylinder-head, taken on the line 2 2, Fig. 1; and Fig. 3 is a perspective view of the vaporizing and igniting tube.

Heretofore in that class of gas or explosion engines in which the combustion or firing of the operating charge is accomplished by means of a hot tube or other heated surface it has been customary to provide a tube or equivalent device projecting from and in communication with the interior of the cylinder, which could be heated by a lamp or torch when the engine was to be started. It was usually kept permanently hot from some external source of heat, there being a separate device for vaporizing the fuel and mixing it with the necessary proportions of air, although in some types of engine heat was supplied from the outside only when starting.

In my improved device a single tube projecting from the cylinder-head and into it serves the double purpose of igniter when starting by the use of external heat and of vaporizer and igniter after the machine is in regular operation, it also assisting in distributing and mixing the gasified fuel with the air drawn in by the piston.

In the drawings, A is a part of the cylinder-casting of a gas-engine, having a head or cover A', which is cast with a combustion-

chamber *a* in it. This chamber communicates with the engine-cylinder through an opening *a*², which thus forms a neck or portion narrower than the said chamber. Extending into the chamber *a* at one side is a tube B, open at its inner end and having small holes or perforations *b* through it. The opening through the wall of the chamber is tapped to receive corresponding threads on the tube, which is made with a preferably hexagonal or squared section *b'*, constructed to receive a wrench by which the tube may be taken out or put in place. It will be seen that the end of the tube B, extends beyond the cylinder, and, if desired, this may be made with a screw-plug for cleaning purposes. Extending through a tapped opening in the chamber opposite to that for the tube B is a second tube C, which may be constructed either to enter or to envelop the end of the tube B. In the present instance it enters the tube B. Screwing into the tube C is a valve-casing D, in which is the spring-controlled admission-valve *d*. In this casing, beyond the valve, are the two openings *d'* and *d*², one being open to the air and the other connected to a source of fuel-supply, respectively. An exhaust-valve E for governing the flow of the gases of combustion from the cylinder is controlled and actuated by valve-gearing in a manner common in mechanisms of this class and is constructed to fit a seat in the upper part of the combustion-chamber *a*, there being a space *a'* above this valve which communicates with the atmosphere. In addition to this there are one or more air-admission or puppet valves F, placed in passages *f*, opening into the combustion-chamber, which automatically operate to admit air on the suction-stroke of the piston. These valves are carried on stems or rods *f'*, which extend through the cylinder-head and are provided with springs *f*², normally keeping the valves in their closed position. In operation the action of my improved device is as follows:

It being desired to start the engine, it is turned over several times by hand, thus drawing a small quantity of air with a charge of fuel into the tubes C and B and causing a comparatively large volume of air to flow into the combustion-chamber through the automatic admission-valves F. A blow-torch

or other form of heating-lamp is applied to the outer end of the tube B, and it soon is heated sufficiently to vaporize the liquid within it. As this takes place the gas formed escapes with the air drawn in through the opening d' and the admission-valves into the combustion-chamber a , where it is shortly ignited or fired by the heat from the tube aided by the heat derived from its compression by the piston, the explosion taking place just after the end of the compression-stroke and driving the piston downward. During the return stroke of said piston mechanism of any of the types ordinarily used for the purpose operates the valve-rod E' and opens the valve E , allowing the products of combustion to escape through a suitable exhaust-pipe. On its second downward stroke air and oil are again drawn by the piston in through the valve d , the tubes or casings D and C , and the air-admission valves, and the vaporizing and ignition take place as before. In a short time the heat generated by the repeated explosions heats the body of the tube B to a bright red, and the external source of heat applied to the end of the tube may be removed. As soon as the fuel-oil enters the tube it is immediately gasified, and being compelled to issue therefrom through small holes b and around the tube C it is very thoroughly mixed with the air admitted.

Should it be desired to remove the tube B for cleaning or renewal, this is very simply done by applying a wrench to the nut-like section b' . If desired, the outer end of the tube B may be made with a plug, which can be removed for cleaning or inspecting the tube. Similarly when for any reason the tube C needs replacing the valve-casing D may be unscrewed from it and the said tube removed without loss of time.

In order to more perfectly distribute and mix the gasified hydrocarbon with the air present, a diaphragm a^3 , preferably perforated, may be inserted in the tube B , preferably in the position shown in Fig. 1, and this may extend across a part of the length of said tube, as is found advisable. When the diaphragm is used, the holes b are made in the bottom of the tube B ; otherwise they are in its sides, as shown in Fig. 3.

From the above description it will be seen that the construction and number of the parts employed in gasifying and exploding the operating charge of an engine of the type described are very materially simplified, there being but comparatively few parts, and these are of a construction not likely to get out of order. In addition to these features by the device shown I am enabled to obtain a more perfect mixture of the liquid fuel with the air necessary for combustion than has hitherto been possible with a consequent very material increase in the economy of operation of the engine.

I claim as my invention—

1. The combination of a cylinder-head for gas or explosion engines, with an igniting-tube, said tube extending through said cylinder-head into a chamber therein in communication with the engine, and a removable tube connected thereto, said tube extending into one end of the igniting-tube, substantially as described.

2. In a cylinder-head for a gas or explosion engine, the combination of an igniting-tube extending through one side of and supported by said cylinder-head, a valve-casing connected to sources of air and fuel supply, said casing having a connection extending loosely into one end of the igniting-tube, perforations through the sides of said tubes between the point at which said connection enters and the point at which the tube passes through the side of the cylinder-head, substantially as described.

3. The combination in an igniting and vaporizing device for a gas or explosion engine, of a cylinder-head, a tube projecting through said head, a second tube connected to a source of fuel-supply, the inner section of the first tube having a series of holes through it and being open at the end, the fuel-supply tube entering said end and the outer section of the first tube extending outside the cylinder-head and being closed at the end, substantially as described.

4. The combination of a hollow cylinder-head, a tube having perforations through its sides projecting into the hollow of said head, a perforated diaphragm extending within said tube, a second tube extending into the said hollow opposite to the first tube a valve-casing connected to the said second tube, a valve in said casing and inlets for liquid fuel and air beyond said valve, substantially as described.

5. The combination in a cylinder-head for an explosion-engine, of a combustion-chamber, a perforated tube entering through an opening in said chamber, said tube being closed at its outer end and extended outside of the cylinder-head, a perforated diaphragm extending within said tube, a second tube extending into an opening in the combustion-chamber opposite to the first tube, and extending into the end of said tube, said diaphragm being placed to finely divide a fluid entering the first tube through the second tube, and a valve-casing connected to the second tube, a valve in said casing and air and fuel connections, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOWARD R. SHEPPARD.

Witnesses:

H. M. SHIPE,
ROBERT A. DAVIES.