No. 637,299. Patented Nov. 21, 1899.

G. S. STRONG.

OIL VAPORIZING DEVICE FOR GAS ENGINES.

(Application filed Dec. 24, 1898.)

(No Model.) 2 Sheets—Sheet 1.

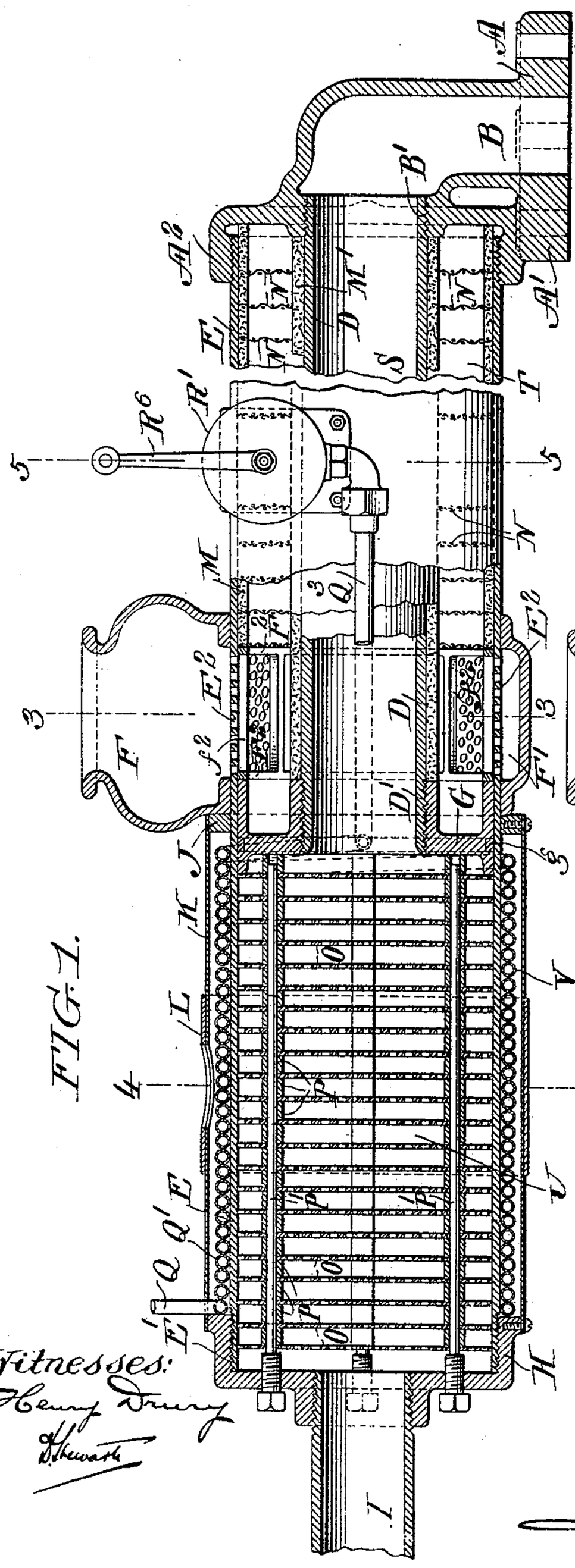

FIG. 1.

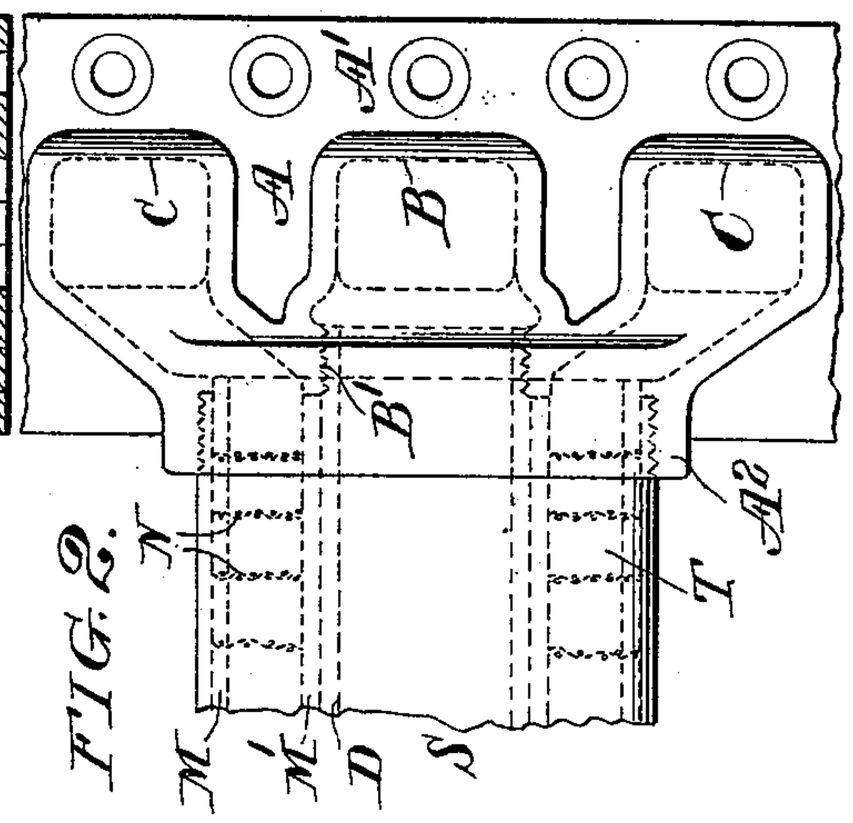

FIG. 2.

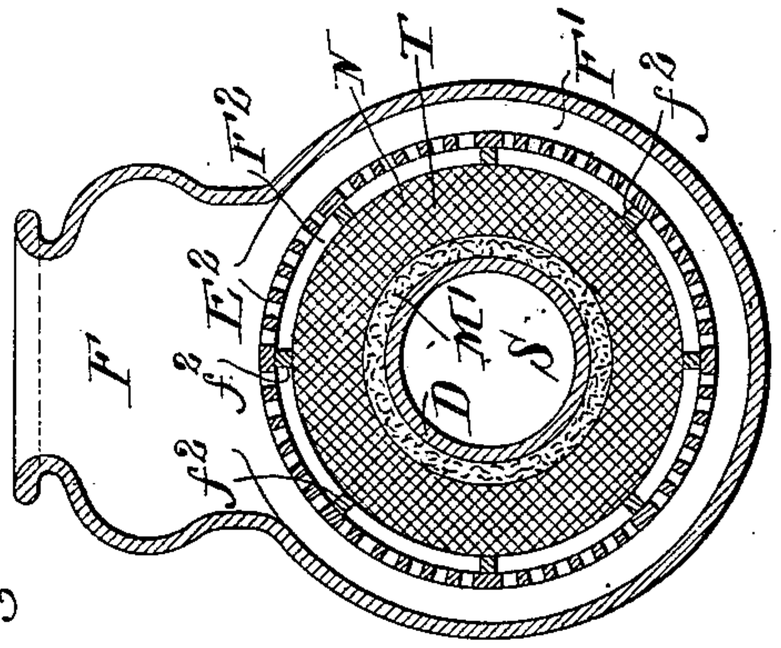

FIG. 3.

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FIG. 5.

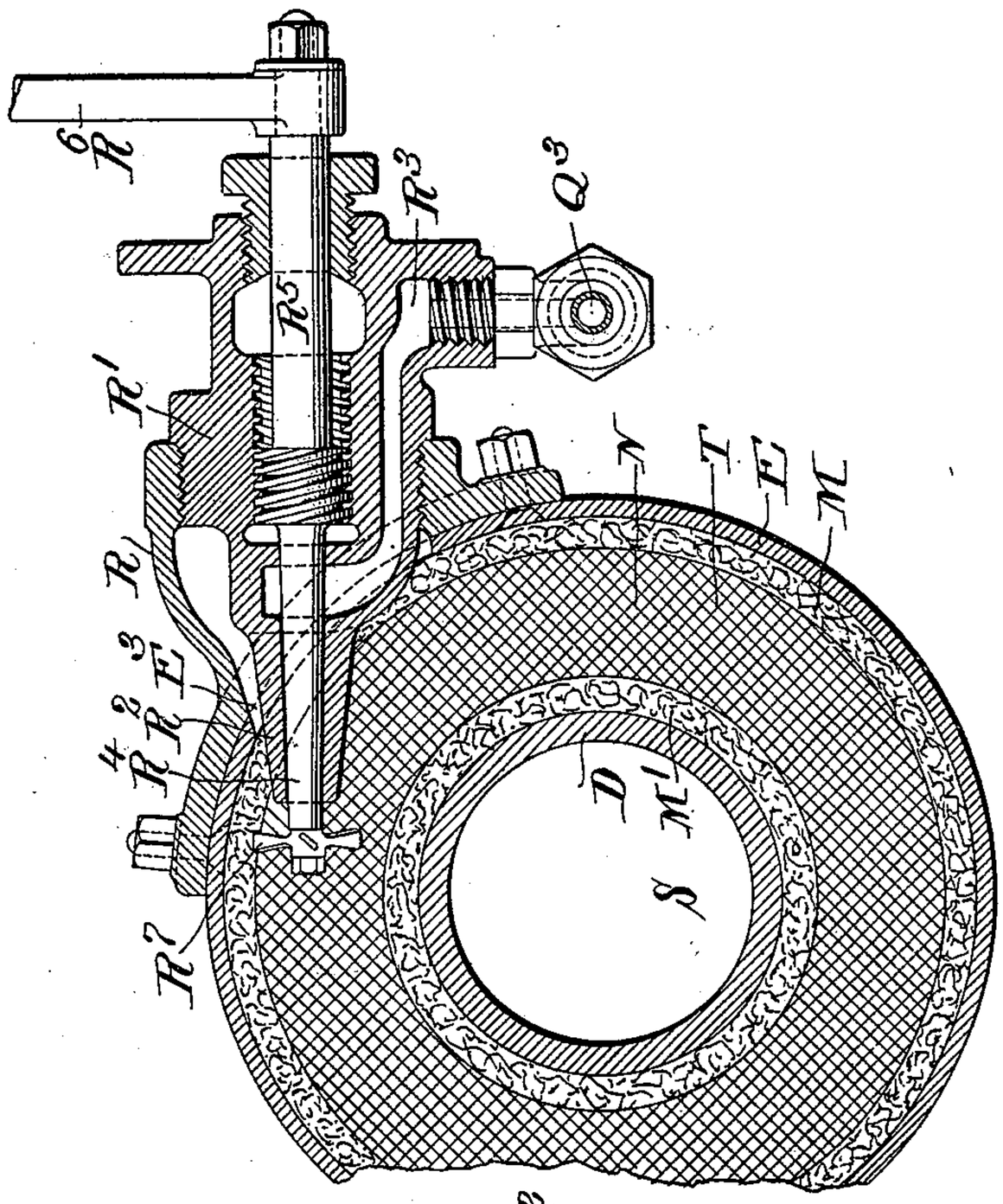
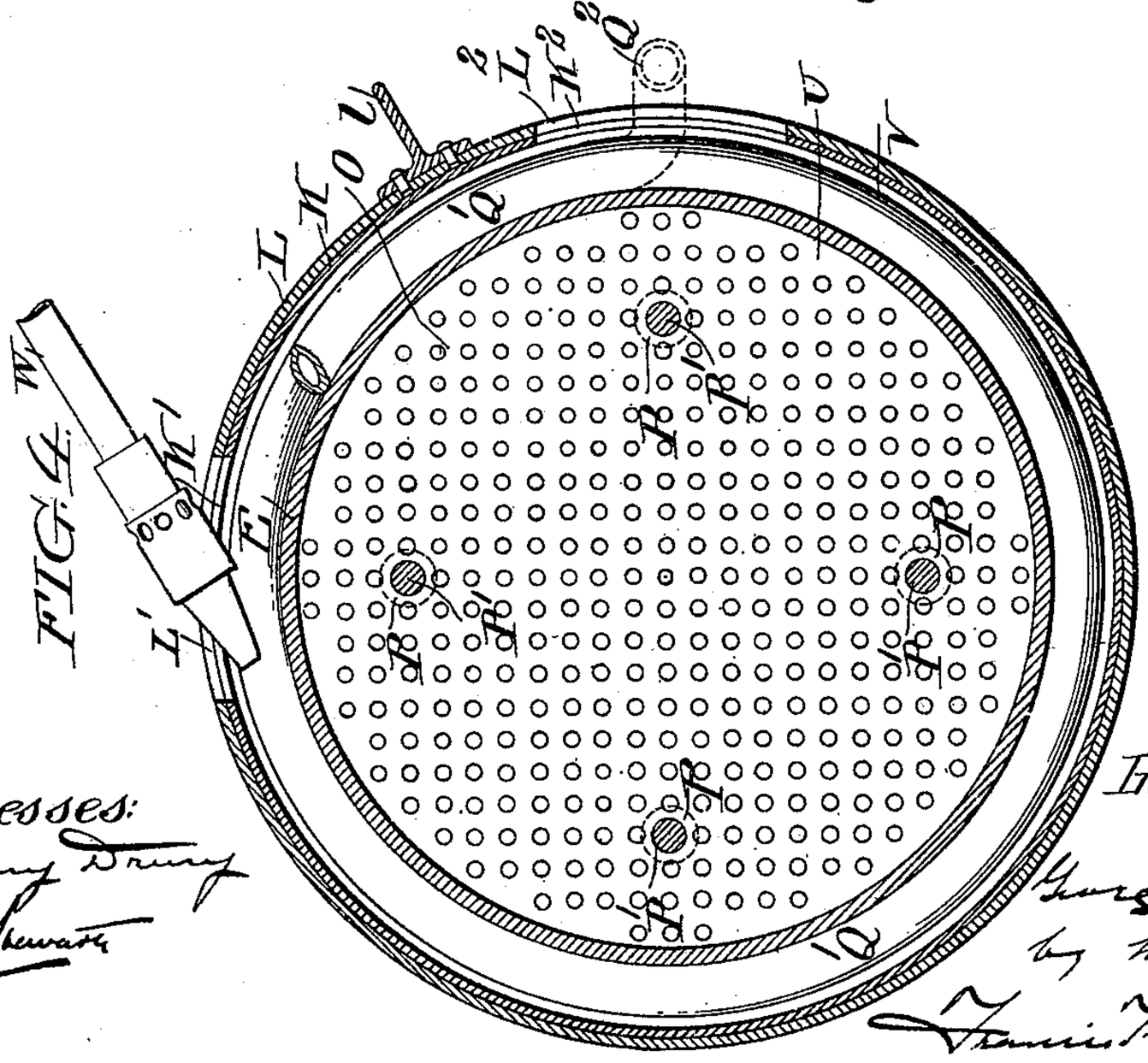


FIG. 6.



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UNITED STATES PATENT OFFICE.

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OIL-VAPORIZING DEVICE FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 637,299, dated November 21, 1899.

Application filed December 24, 1898. Serial No. 700,277. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. STRONG, a citizen of the United States of America, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Oil-Vaporizing Devices for Gas-Engines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to apparatus for preheating and entirely or practically vaporizing oil preparatory to its use in a gas-engine, the object of my invention being to avail myself in a convenient, practical, and efficient manner of the heat of the exhaust-gases of the engine for preheating and vaporizing the oil.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a side elevation of my improved apparatus in what I consider to be its best form, shown for the most part in central longitudinal section. Fig. 2 is a plan view of the casting forming the head of the apparatus and by which it is connected with the engine. (Not shown.) Fig. 3 is a cross-section on the line 3 3 of Fig. 1. Fig. 4 is a cross-section on the line 4 4 of Fig. 1, and Fig. 5 is a cross-section on the line 5 5 of Fig. 1.

A indicates the cast head of the apparatus, having, as shown, a flange A′, by which it is attached to the engine, and an internally-threaded cylindrical head A^2, the flanged and cylindrical heads being connected, as shown, by a central exhaust-passage B, which at its junction with the head A^2 is internally threaded, as indicated at B′, and two admission-passages C C.

D is a tube screwing into the threaded end B′ of the passage B and forming a continuation of the exhaust-passage. The chamber formed in this pipe is designated by the symbol S.

E is a pipe-section screwing into the threaded head A^2, as shown, and surrounding the pipe D, forming with it the annular chamber, which I have designated by the symbol T, while the portion of the pipe E which extends beyond the pipe-section D forms the metal wall of the cylindrical chamber, (designated by the symbol U.) The end of the pipe-section E is threaded, as indicated at E′, and upon it screws the head H, with which is connected the final exhaust-pipe section, (indicated at I.) The chamber T is separated from the chamber U by the U-shaped annular head G, which screws upon the end section D′ of the pipe D and fits tightly in the pipe E, as shown.

F is the inlet-casting for air. It is fitted around the pipe E, forming the annular chamber F′, and the portion of the pipe E lying within this chamber is made with multiple perforations, as indicated at E^2, so as to admit the air freely into the chamber T.

F^2 F^2 indicate two annular rings fitting against the pipe-section E on each side of the perforated portion E^2, said rings being connected by a cross-bar f^2, as shown.

J is a metal ring fitting on the outside of the pipe E and, as shown, close to the inlet-casting F, said ring forming one wall of an annular chamber V, formed by a cylindrical casing K, fitted, as shown, over the ring J and the end of the head H. In the cylindrical casing K, I form two openings, (indicated at K′ K^2, Fig. 4,) and around the portion of the casing in which these openings are formed I fit a ring-section L, having openings L′ and L^2, which in one position of the ring coincide with the openings K′ and K^2 and which as the ring is turned, as by its handle *l*, may be made to partly or wholly close the said openings.

M and M′ are jackets of non-conducting, preferably refractory, material fitted in the chamber T, inside of the pipe-section E and outside of the pipe-section D. These are employed because an explosive mixture is contained in a portion of the chamber T which it is necessary to keep below the point of ignition and because the heat of the gases of the chamber S is dangerously high from this opening.

N N, &c., are annular perforated diaphragms forming a multiple series of partitions in the chamber T. They may be formed of wire-gauze or perforated metal, as may be most convenient.

O O O, &c., are a multiple series of perforated metal plates forming partitions in the chamber U and with their edges fitted into

ontact with the metallic wall of the said mber formed by the pipe E. As shown, hese partition-plates are spaced by perforated thimbles P P, &c., secured on bolts P'.

Q is the oil-supply pipe, which is led into the annular chamber V and wound tightly in multiple convolutions on the metal pipe E, forming the inside wall of said chamber.

Q^2 and Q^3 indicate continuations of this oil-supply pipe, leading to an oil-spraying device. (Best indicated in Fig. 5.) As shown in said drawings, an opening E^3 is formed through the pipe E into the chamber T at a short distance from the air-passage leading into the said chamber. Around this opening E^3 is secured the casting R, into which screws the injector-body R', formed with a nozzle R^2, which projects into the chamber T between two of the diaphragms N N and connects through a passage R^3 with the oil-supply pipe-section, (indicated at Q^3.)

R^4 is a needle-valve working in the spraying-nozzle R^2, connected with threaded shaft R^5, working in a threaded portion R' and operated by a lever-handle R^6.

R^7 indicates a propeller-like wheel loosely journaled on the projecting end of the needle-valve R^4, so that it will turn freely and rapidly when an annular jet of oil is projected against its arms.

W, Fig. 4, indicates a burner in use to heat the oil on starting the engine.

The operation of the apparatus is readily followed. The exhaust-gases from the engine pass through the port B in the casting A into the chamber S, formed on the inside of the pipe D, and from said chamber they pass into the muffle-chamber U, the perforated diaphragms in said chamber performing their well-known function of deadening the noise of the exhaust, and also performing the additional function of conveying the heat of the exhaust-gases to the metal wall of the chamber U, formed by the pipe E, with which pipe the diaphragms are in close metallic connection. From the muffle-chamber U the gases escape through the pipe I. The air forming a portion of the explosive charge of the engine is drawn in through the casting F and through the perforation G^2 in the pipe E into the chamber T, passing through all of the perforated partitions N, and finally being drawn into the engine through the ports C C. The oil which it is desired to vaporize and mix with the air coming from the supply-pipe Q passes through the coils Q' situated in the chamber V, and which are in close metallic contact with the heated metallic wall of the chamber U. The oil in passing through the chamber V is therefore highly heated and delivered in this condition to the spraying device R', which admits the oil, of course under considerable pressure and in a fine spray, into the chamber T, the spraying device being arranged to throw the oil into the chamber in a direction substantially perpendicular to a radial line of the annular chamber. The sprayed oil is thoroughly mixed with the air by the action of the sprayer, and also of the multiple diaphragms N N, &c., through which the air and vaporized or sprayed oil pass before they reach the admission-ports C C.

The function of the gated openings K' K^2 in the chamber V is to provide a means for heating the oil when the engine is first started and before the exhaust-gases have had an opportunity of heating the muffle-chamber and through it the coils of oil-admission pipe. By moving the ring L so as to open the passages K' and K^2 the flame of a Bunsen burner W or similar lamp can be thrown into and substantially around the chamber V, so as to heat the coils of pipe U' and the oil passing through it. This need only continue until the exhaust-gases have had time to heat up the muffle-chamber to the proper point, when the lamp may be withdrawn and the gates closed.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of concentric tubes D E forming central and annular surrounding conduits, the inner arranged to serve as the exhaust-conduit of a gas-engine and the outer one as an air-intake passage, with a series of perforated diaphragm-partitions in the air-intake conduit and an oil-spraying nozzle arranged to throw oil between two partitions of the annular air-conduit and in a direction substantially at right angles to a radial line from the center of the annular chamber.

2. In combination with an exhaust-conduit of a gas-engine a cylindrical metal-walled chamber U, a multiple series of perforated metal plates O O, &c., having their edges in contact with the walls of chamber U, an oil-supply pipe Q' coiled on and in contact with the metal walls of chamber U and a tubular casing K inclosing said coiled pipe.

3. In combination with an exhaust-conduit of a gas-engine a cylindrical metal-walled chamber U, a multiple series of perforated metal plates O O, &c., having their edges in contact with the walls of chamber U, an oil-supply pipe Q' coiled on and in contact with the metal walls of chamber U, a tubular casing K inclosing said coiled pipe and having two openings as K' K^2 formed in it and means for closing said openings.

4. In combination with an exhaust-conduit of a gas-engine, a cylindrical metal-walled chamber U, a multiple series of perforated metal plates O O, &c., having their edges in contact with the walls of chamber U, an oil-supply pipe Q' coiled on and in contact with the metal walls of chamber U, a tubular casing K inclosing said coiled pipe and having two openings as K' K^2 formed in it and a sleeve-cover L having openings as L' L^2 for opening and closing said openings K' K^2.

5. The combination of concentric tubes D E forming a central and annular surrounding conduit, the inner one arranged to serve as the exhaust-conduit of a gas-engine and the

outer one as an air-intake passage, with a series of perforated diaphragm-partitions in the air-intake conduit, a cylindrical chamber U connected with the exhaust-conduit and having metal walls, a multiple series of peforated metallic-plate partitions situated in chamber U and having their edges in contact with its walls, a coiled oil-inlet pipe wound on the metal walls of the chamber U, a chamber inclosing said coiled pipe and a spraying-nozzle connected to the coiled inlet-pipe and arranged to throw the oil between two partitions of the air-inlet conduit.

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Witnesses:
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