No. 869,369. PATENTED OCT. 29, 1907.

F. G. HOBART & W. W. GORE.

COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAR. 26, 1907.

3 SHEETS—SHEET 1.

Fig. 2

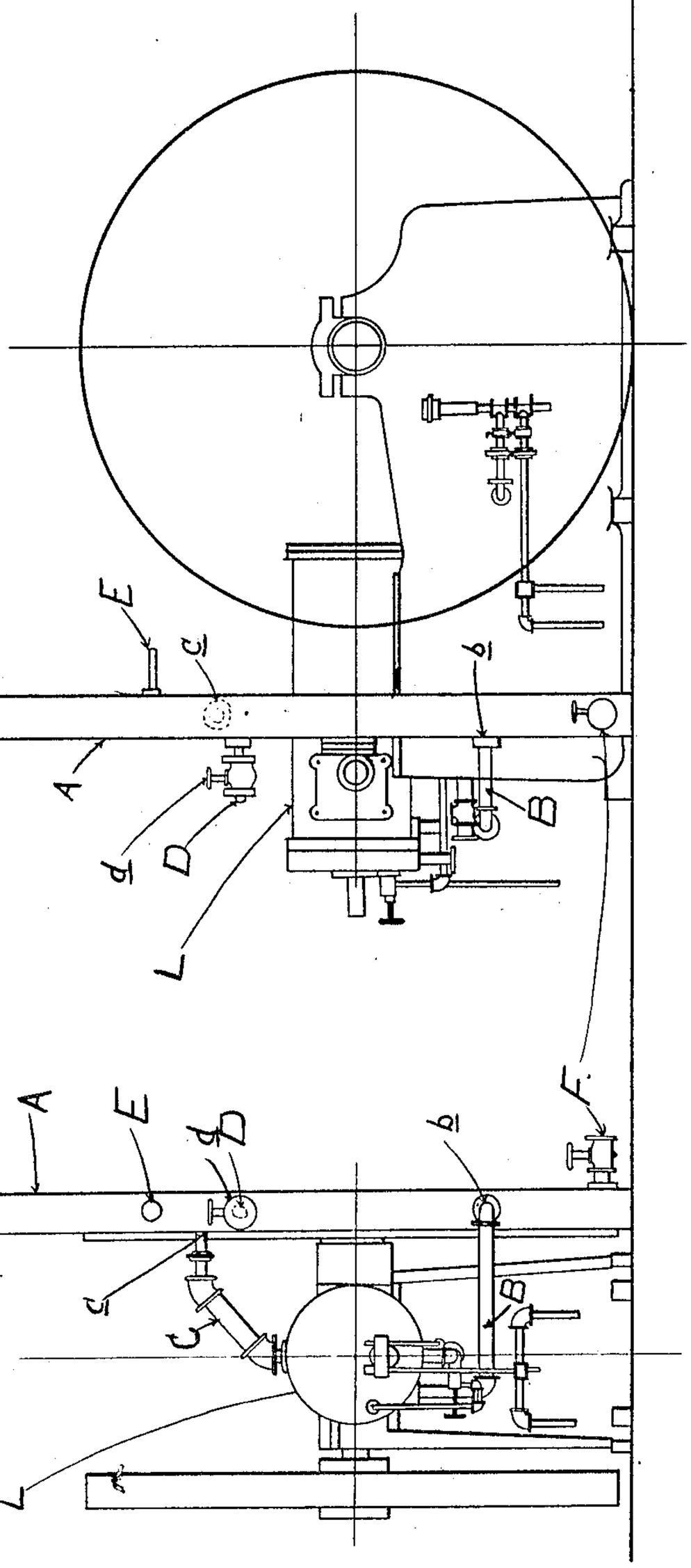

Fig. 1.

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Fig 3.

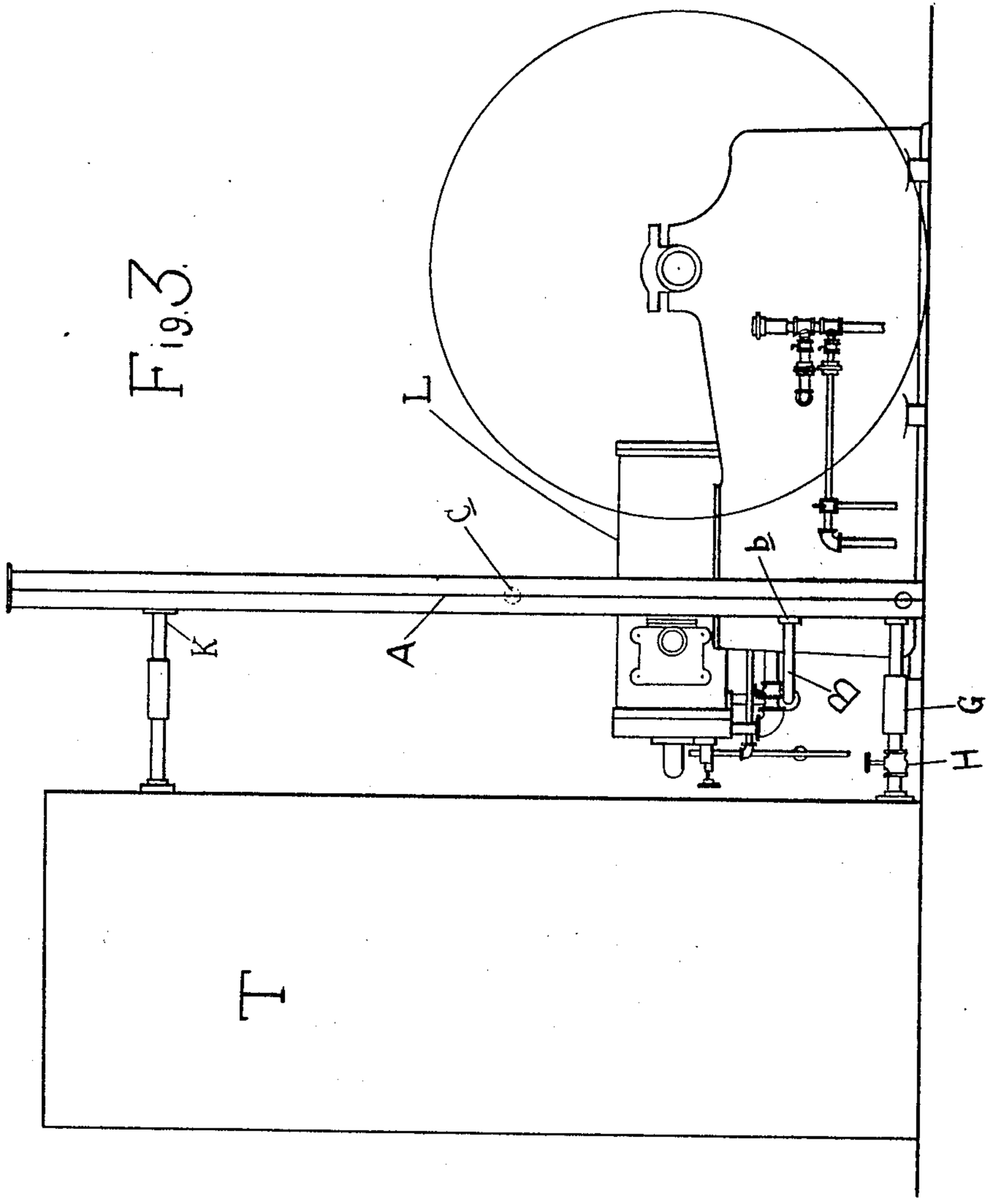

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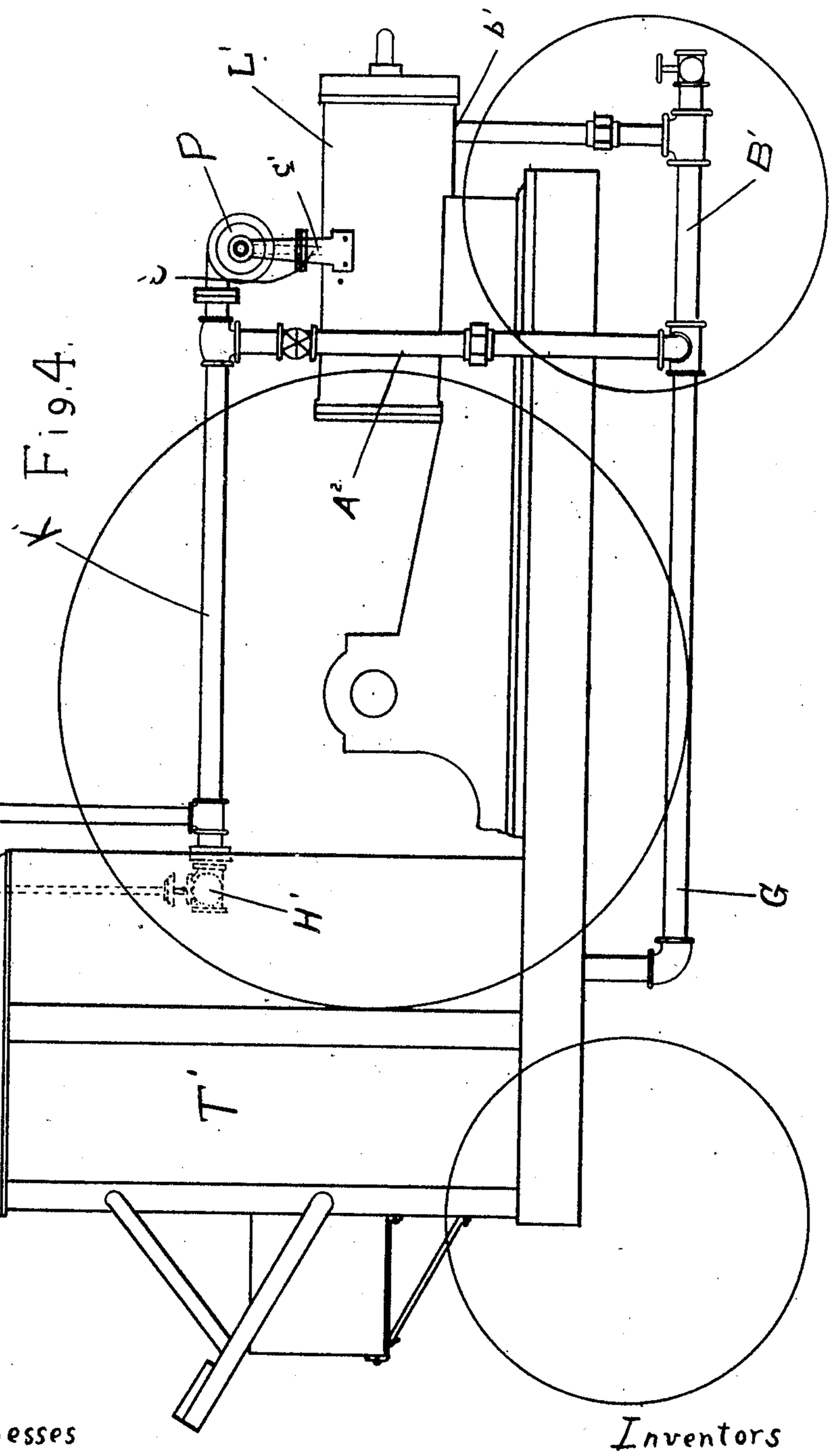
Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANKLIN G. HOBART AND WARREN W. GORE, OF BELOIT, WISCONSIN, ASSIGNORS TO FAIRBANKS, MORSE & COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COOLING SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

No. 869,369. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed March 26, 1907. Serial No. 364,712.

To all whom it may concern:

Be it known that we, FRANKLIN G. HOBART and WARREN W. GORE, citizens of the United States of America, residing at Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Cooling Systems for Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to new and useful improvements in cooling devices for internal combustion engines, and is particularly adapted for engines using kerosene and other comparatively high fire test oils.

Our cooling device may be employed with the ordinary gas or gasolene engine, which has been adapted to use kerosene.

For satisfactory operation, all parts of the cylinder of an engine using kerosene for fuel must be kept at a comparatively high temperature, and this cannot be done where cold water is taken directly into the jacket.

It is therefore the purpose of our invention to pass warm water into the jacket, and to that end we mix the hot water taken from the outlet of the jacket with the cold water which would ordinarily enter the inlet thereof at a low temperature.

The preferred means by which we accomplish the desired result will be more particularly hereinafter described and set forth in the claims.

In the drawings, Figures 1 and 2 are respectively end and side elevations of a stationary kerosene engine arranged to be cooled by running water; Fig. 3 is a side elevation of a stationary kerosene engine with which a cooling tank is employed with thermo-siphon circulation; and Fig. 4 is a side elevation of a portable kerosene engine provided with a cooling tank and a circulating pump.

The engine cylinder L is provided with a water inlet pipe B leading to the lower side of the water jacket, and the outlet pipe C leading from the top of the water jacket. These pipes connect at separated points *b* and *c* respectively with a circulating or mixing chamber, or conduit A, as shown in Figs. 1 and 2.

Where connection is to be made for the use of running water for cooling, the inlet connection is made at D, and the outlet, or overflow, connection at E in the circulating chamber A, and these connections are preferably below and above respectively and on opposite sides of the outlet connection from the jacket. A connection F is provided at the bottom of the circulating chamber for draining the system when desired.

The operation of this system of piping is as follows: The circulating chamber A, being of large volume relative to the volume of cold water entering at D, the hot water from the jacket entering at *c* will be mixed with this cold water in a proportion determined by the volume of cold water entering at D. The pipe D is preferably relatively small and the flow therethrough is regulated by a valve *d* whereby a predetermined temperature may be maintained in the circulating chamber A. Thus, water at a comparatively high temperature can be taken into the jacket from the chamber A through the pipe B.

In the arrangement shown in Fig. 3, the connections from the water jacket are made with a circulating chamber A′ and are identical with those shown in Figs. 1 and 2. The chamber or conduit A′, however, is preferably made slightly longer than the cooling tank T, with which it is connected by the pipes K and G near the top and bottom, respectively. A valve H is provided in the pipe G by the manipulation of which a greater or less flow of water may be permitted between the cooling tank and the circulating chamber.

In the arrangement shown in Fig. 4, the cylinder L′ of the portable engine is provided with a suitable circulating pump, such as the rotary pump P, arranged to take water from the jacket through the pipe C′ at the point *c*′ at the top of the cylinder. B′ is the inlet pipe connecting with the jacket at the point *b*′ and pipes B′ and C′ are connected with the cooling tank T′ through the medium of pipes G′ and K′, respectively. A by-pass conduit A^2 connects pipes C′ and B′, and by regulating the valve H′ in the pipe K′ by means of the handle or stem *h* a greater or less volume of water taken from the jacket may be made to flow through the by-pass A^2 and reënter the jacket after mixing with and raising the temperature of the cold water flowing from the cooling tank and the pipe G′ into the pipe B′.

What we claim as our invention is:

1. In a cooling system, the combination with a cylinder water jacket and inlet and outlet connections therefor, of a water supply connection and means communicating therewith for mixing a portion of the water from said jacket outlet with water from said supply connection and passing said mixture into said inlet, for the purpose described.

2. In a cooling system, the combination with a cylinder water jacket having inlet and outlet, of a mixing conduit having connections communicating with said inlet and outlet, a water supply connection communicating with said conduit, and means for regulating the amount of water from said outlet returned to said inlet, for the purpose described.

3. In a cooling system, the combination with a cylinder water jacket, of a mixing conduit, a water supply connection communicating therewith, and inlet and outlet conduits for said jacket connecting with said mixing conduit.

4. In a cooling system, the combination with a cylinder water jacket, of a mixing conduit, a water supply connection communicating therewith, and inlet and outlet conduits for said jacket connecting with said mixing conduit at spaced points.

5. In a cooling system, the combination with a cylinder

water jacket, of a mixing chamber or conduit, a water supply connection communicating therewith, and inlet and outlet conduits for said jacket connecting with said mixing chamber or conduit on opposite sides of said supply connection.

6. In a cooling system, a cylinder water jacket provided with an inlet and an outlet, a water supply, pipes connecting the water supply with the inlet and outlet of the cylinder water jacket, and a by pass connecting said inlet and outlet pipes.

7. In a cooling system, a cylinder water jacket provided with an inlet and outlet, a mixing conduit, a water supply communicating with said mixing conduit, and pipes connecting said mixing conduit with the inlet and outlet of the cylinder water jacket.

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

FRANKLIN G. HOBART.
WARREN W. GORE.

Witnesses:
E. J. MITCHELL,
W. A. GOSS.