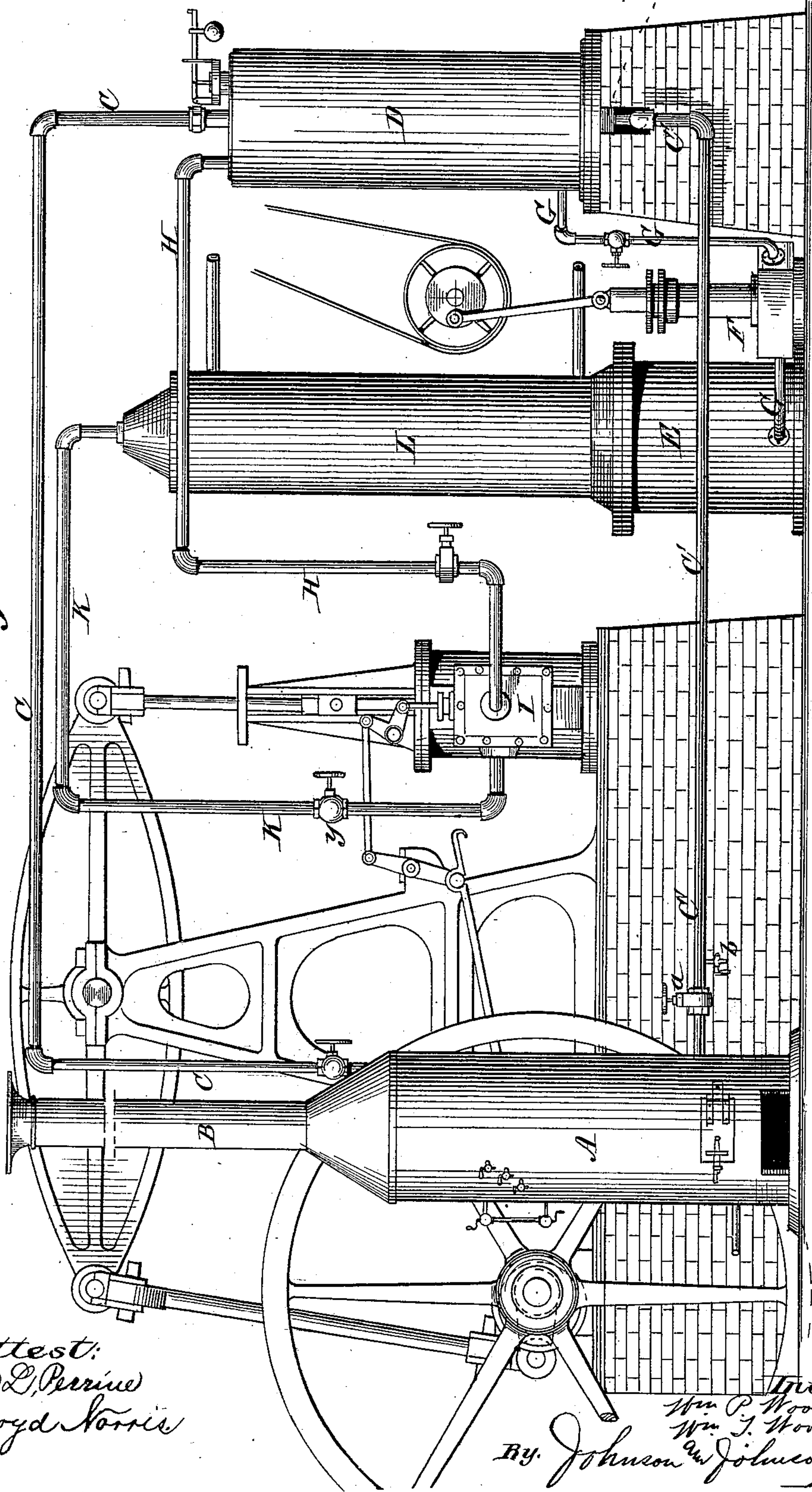


W. P. & W. T. WOOD.
Vapor-Engine.

No. 217,665.

Patented July 15, 1879.

Fig. 1.



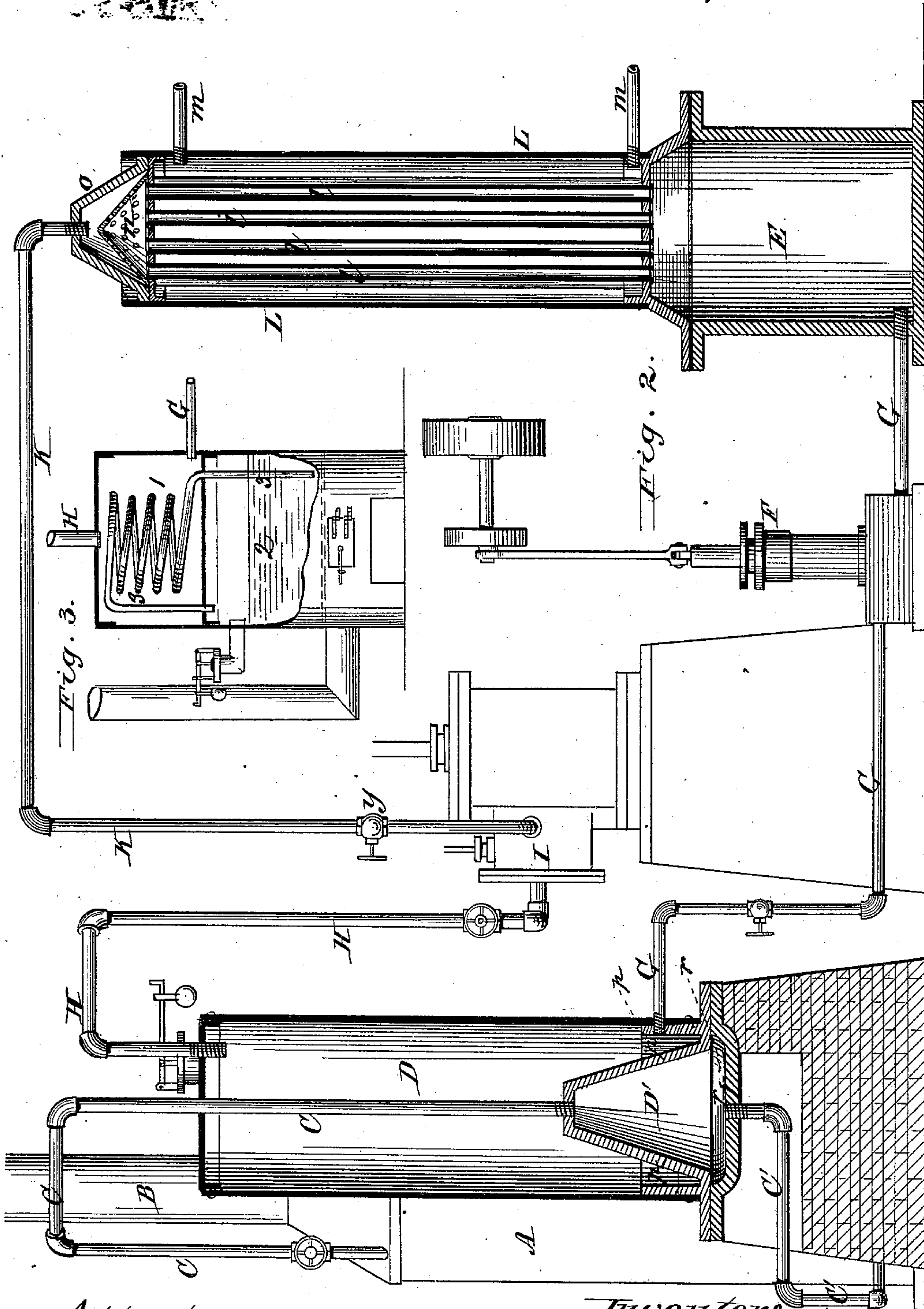
Attest:
H. L. Perrine
Floyd Norris

Inventors
Wm. P. Wood
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UNITED STATES PATENT OFFICE.

WILLIAM P. WOOD AND WILLIAM T. WOOD, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNORS OF ONE-THIRD THEIR RIGHT TO ISRAEL R. BLUMENBERG, OF SAME PLACE.

IMPROVEMENT IN VAPOR-ENGINES.

Specification forming part of Letters Patent No. **217,665**, dated July 15, 1879; application filed April 11, 1879.

To all whom it may concern:

Be it known that we, WILLIAM P. WOOD and WILLIAM T. WOOD, both of Washington, in the District of Columbia, have jointly invented certain new and useful Improvements in Vapor-Engines; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of our improvements is to economize fuel and gain power in engines; and we use bisulphide of carbon vaporized and employed in a manner to avoid all danger. Of course we may use any other vapor-producing agent—as ammonia, for instance; but the aims and purposes of our invention will appear more fully from the following description.

We take a steam-boiler of ordinary construction and of a capacity to generate merely sufficient steam to keep a retort heated to the proper temperature to vaporize volatile compounds, said boiler having such pipe-connections to and from the retort as to enable the return of the steam from the retort to the boiler without exhaust.

The retort is of a capacity sufficient to hold the volatile vapor necessary for the required force, and so constructed as to admit the steam from the boiler to such parts of the said retort as will enable the vaporizing of the compounds as the said volatile compound is pumped into said retort. It has suitable connections to convey the vapor to the engine for operating the same.

We do not limit ourselves to the specific construction of nor location of the steam-boiler and retort; but for the operation of larger engines we prefer a separation of the boiler from the retort for better security and facility for repairs; and for the successful operation of small engines the boiler and retort may be constructed together.

No particular construction of engine is required. Any ordinary engine that can be driven by steam may be used, and will receive

and be operated by the vapor the same as if it received steam. After the vapor has performed its office in the engine and is received in the exhaust-pipe it is then carried to a condenser, to be condensed and used over.

The condenser is upon the top of the reservoir for the compound, and has pipe-connections and is in connection with a pump to feed the volatile compound to the retort, and has devices to regulate the feed thereof.

By "retort" we mean an empty chamber heated in any manner by the extraneous application of steam or hot water, and which is merely to receive the injected compound and vaporize it.

Our invention contemplates a method of vaporizing the compound itself by heat in contradistinction to injecting the compound into steam, hot water, or other heated liquid, and looks to a continuous circuit of the steam to keep the vaporizing-chamber heated. Our method seeks to avoid heating the compound in its reservoir.

In the accompanying drawings, Figure 1 represents a view of our preferred apparatus for operating bisulphide-of-carbon engines; Fig. 2, an end view, showing the retort and reservoir and condenser in section, the positions being changed for the purpose of a clear illustration; and Fig. 3 is a modification.

The apparatus, as before stated, may be varied in some things not essential; but we prefer and shall describe the following construction as being the most convenient and entirely devoid of dangers accompanying the attempts hitherto made to use bisulphide of carbon as a motor.

The boiler A is an ordinary upright boiler, the smoke-stack B running through from the fire-box beneath. From the top of the boiler runs a pipe, C, which passes down through the retort D or vapor-generator, and terminates in a cone-shaped heating-cup, D', which it pierces. This cup D' is situated at the bottom of the retort, and is made of bronze, cast-iron, or other suitable material. It is heated from the inner side by direct impingement of the steam or hot water coming from said pipe C. It is against this cup that the volatile compound is driven and vaporized in the re-

tort, as will be presently described. The steam continues through a return-pipe, C', running from the bottom of cup D' back to the boiler A, which it pierces above the fire-box, but beneath the water-line, and thus a continuous circuit of the steam or hot water is kept up, and no open exhaust is used. There are, however, in the pipe C' the usual cocks *a b*, to let off the first cold water, in order to have the hot-water circuit, as is well understood.

We now come to our bisulphide-of-carbon reservoir, which we prefer to have at some distance from the boiler, especially for large engines. This reservoir E is of boiler-iron, and is so situated that it may have connection with the retort through a pump, F, whereby the volatile compound is forced into the retort against the heated cup D', where it vaporizes, as before stated. A pipe, G, passes from the reservoir through the pump and into the retort, for this purpose.

The heated vapor confined in the retort seeks vent through pipe H, which passes it to the steam-chest I of the engine, where it performs its office as a motive power the same as steam. The exhaust passes through a pipe, K, to a condenser, L, situated preferably on top the reservoir E, and thence the products of condensation drop into said reservoir, and are again used, as before stated.

At the first starting of the engine we use a hand-lever to operate the pump, for the reason that the engine works the pump by a connecting-band and pulley to force the bisulphide of carbon or other approved volatile compound into the retort, and thus works the engine. Consequently we must first pump the compound out of the reservoir against the heated cup by hand. However, after the first starting, there is no occasion to use the hand-lever of the pump, because sufficient of the compound (the product of the cooled vapor) will remain in the gutter surrounding the heating cup or cone to make sufficient vapor to work the engine, which then, in turn, works the pump to place more of the compound in the retort, and so on continuously, as before stated.

From a counter-shaft above, connected with the engine, as usual, a belt works the pump through pulley and crank-lever, as shown.

The condenser L has the usual tubes *l l l* and cold-water circuit *m m*. There is also a removable cap, *o*, and beneath this cap is a perforated conical hood, *n*, whereby the exhaust-vapor from the engine is properly distributed to the various condenser-tubes. This condenser L is preferably placed above the reservoir E, so that room may be economized, and so also that the percolations or products of condensation may drop directly into the reservoir, which is a matter of some moment, in view of saving the bisulphide of carbon or other compound used.

The condenser is bolted or otherwise fastened to its reservoir-base, and its top being

removable, as before stated, it may be readily cleaned when necessary.

The pump F may be of any make suitable to the purpose, such matters being well known to skilled mechanics.

The retort or vaporizing-chamber D is strongly made, of suitable material—boiler-iron or bronze-lined boiler-iron—and the pipe C from the boiler passes through the top of the retort and dives around through heating-cup D', which cup is preferably conical in shape, to receive against its sides the direct impingement of the compound to be vaporized. This cup or cone should be a single casting, with a guttered base, forming a receptacle, *p*, for whatever drip there may be, and also to receive the condensed vapor which remains after the fire has gone out and the retort has cooled. The receptacle sides are deep enough for this purpose, and also to receive the pipe G from the pump, so that there may be no leaking down of the compound. The pipe G should go through both the retort sides and the gutter-wall of the cup.

Beneath the cup in the retort-base is a basin, *r*, forming part of said cup as to office, but really part of the cap of the brick base, and made of iron, bronze, or other suitable material. In this basin hot water may collect and be transmitted, through pipe C', back to the boiler, as set forth.

In Fig. 3, Sheet 2, of the drawings, we have shown a modification of our apparatus, useful in running engines of small power. In this modification the retort 1 is within the boiler, above the hot-water chamber 2, the hot-water or steam circulation being by a coil, 3. Against this coil the pipe G injects the bisulphide of carbon, and the vapor passes out for service through pipe H, as before described.

The supply-reservoir E is filled with bisulphide of carbon or other compound in any suitable manner, preferably by a valved funnel-pipe. It also, as appears above, receives the drip from the condenser.

A sight-gage or other appliance may be used to determine the quantity of the compound in the reservoir.

Those parts of the engine which come in contact with the bisulphide-of-carbon vapor must be lubricated with glycerine or some compound of glycerine. If other vapors are used which might lick up ordinary lubricants, a lubricant should be provided specially for the purpose; but glycerine is not affected by the usual vapors used.

On the exhaust-pipe K, leading from vapor-chest I to the condenser, we provide a valve, *y*, to cut off the vapor-circuit, when any occasion happens to require examination of the vapor-chest.

We claim—

1. For utilizing volatile liquids as motors for engines, the method of producing the power-vapor, consisting in pumping the volatile com-

pound from a reservoir into and against parts of an empty retort, said retort being heated by a circuit of steam-pipes from boiler.

2. In apparatus for utilizing volatile liquids as motors, the combination, with a boiler, of a retort or vaporizing-chamber and a steam-circuit pipe leading from said boiler into and through said retort, whereby the vaporizing-surface is heated by a continuous circuit of steam direct from and returned to the boiler, substantially as herein set forth.

3. In apparatus for utilizing volatile liquids as motors, the retort or vaporizing-chamber D, provided with a heating cup or cone, D', in combination with the steam or hot-water conduit C, and the volatile-liquid conduit G, and the engine-connection H, substantially as and for the purpose described.

4. In apparatus for utilizing volatile liquids as motors, the boiler A, the steam-conduit C, the heating-cup D' of the retort D, and the return-pipe C', whereby to maintain the circuit

of the steam or hot water, substantially as described.

5. The cup or heating-cone D' of the retort D, provided with the receptacle *p*, for the purpose set forth.

6. A vapor-engine, consisting of a steam-boiler A, an independent retort or vaporizing-chamber, D, a heater therefor, a reservoir, E, for the volatile liquid, a steam-circuit pipe, C C', leading from said boiler into and through said retort to its extraneous heater, circuit-pipes H K G, connecting the boiler, condenser, reservoir, and a pump, for operation, substantially as herein set forth.

In testimony that we claim the foregoing we have affixed our signatures in the presence of two witnesses.

WILLIAM P. WOOD.
WILLIAM T. WOOD.

Witnesses:

A. E. H. JOHNSON,
J. W. HAMILTON JOHNSON.