

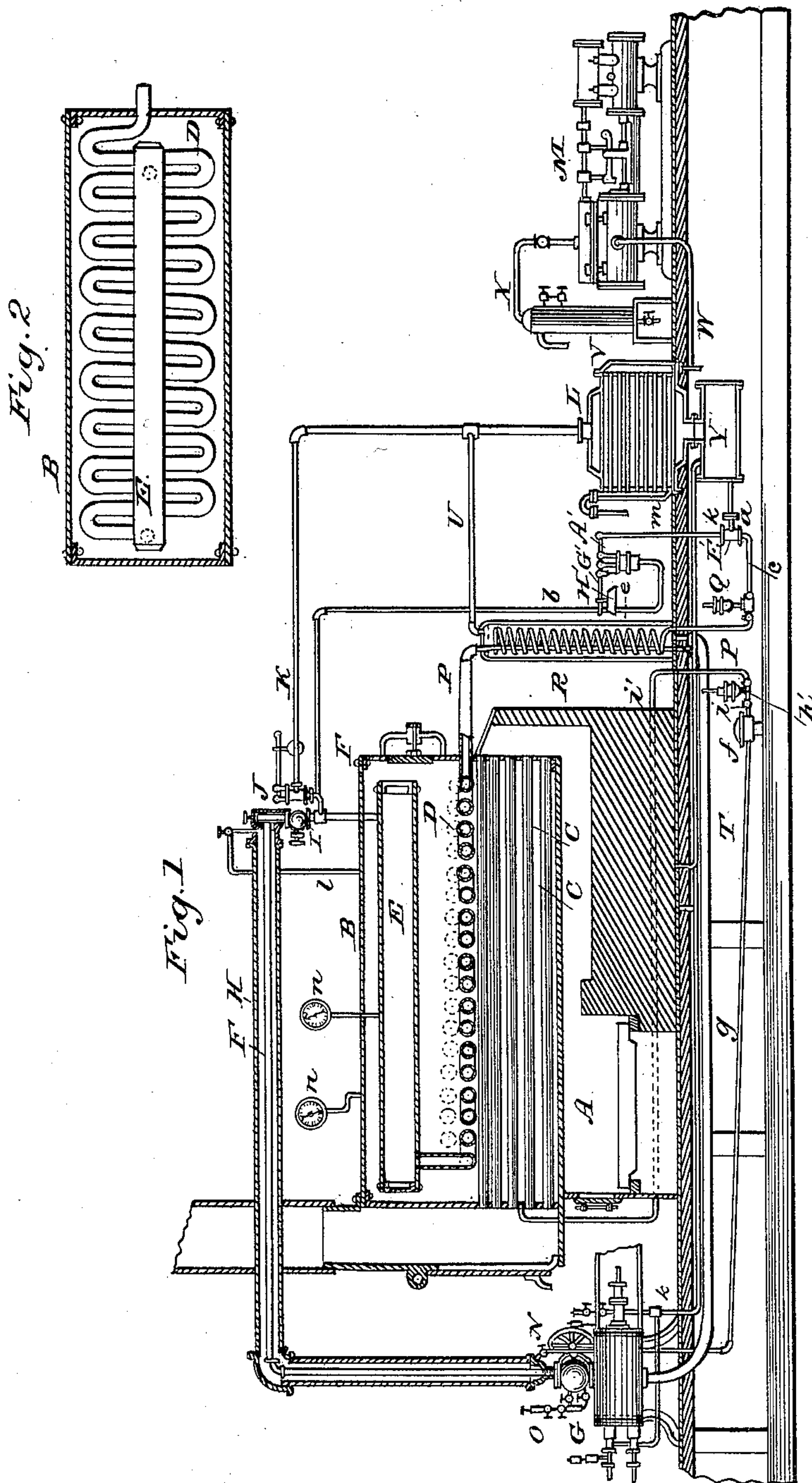
(No Model.)

2 Sheets—Sheet 1.

W. S. COLWELL.
TRIPLE THERMIC MOTOR.

No. 432,510.

Patented July 22, 1890.



WITNESSES:

Ad. S. Dietrich.
Wm. W. P. Dyre.

INVENTOR.

William S. Colwell.

By J. Johnston his ATTORNEY

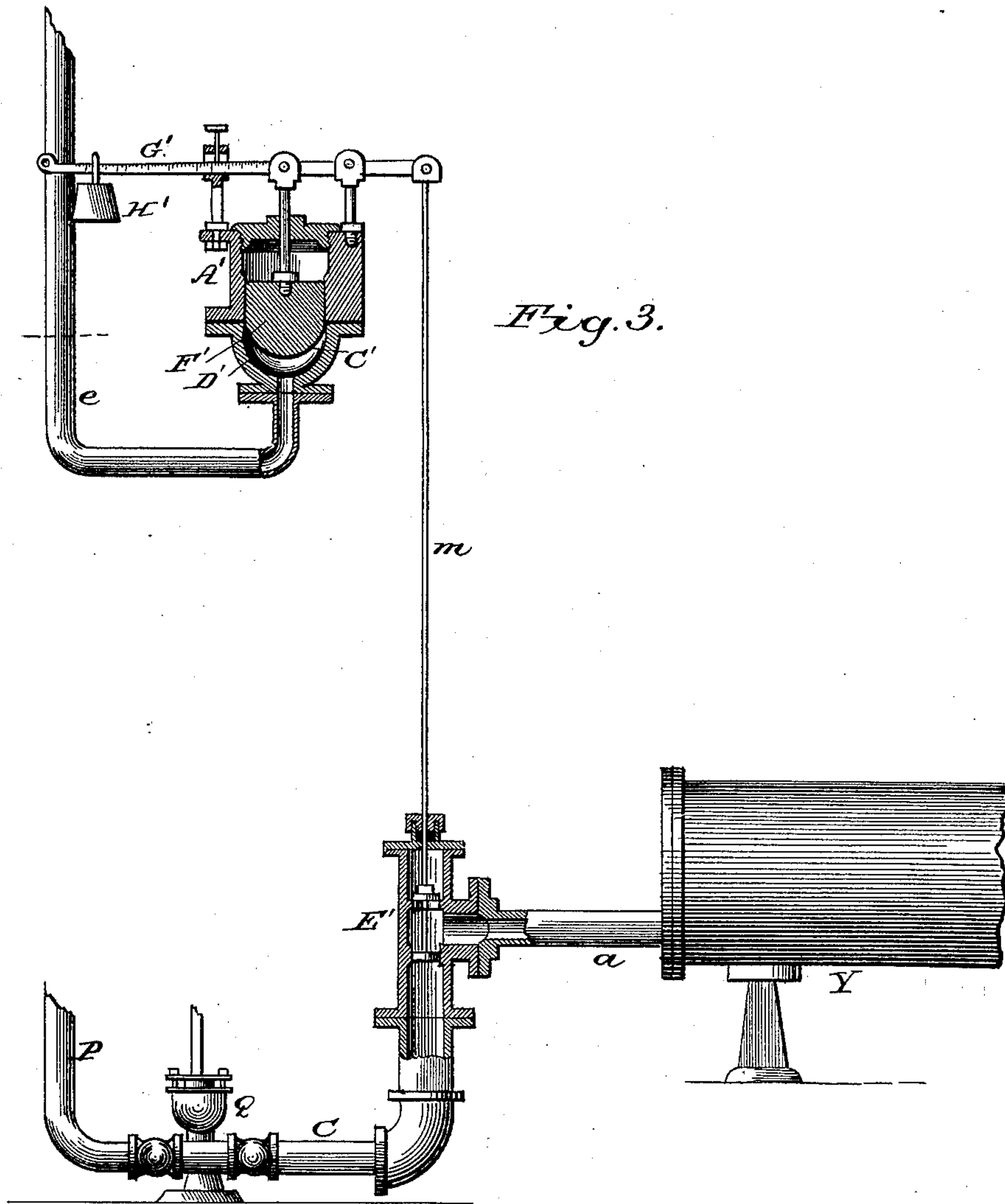
(No Model.)

2 Sheets—Sheet 2.

W. S. COLWELL.
TRIPLE THERMIC MOTOR.

No. 432,510.

Patented July 22, 1890.



WITNESSES:

Ad. S. Dieterich.
Wm. W. S. Dyre.

INVENTOR.

William S. Colwell.

By J. Johnston his ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM S. COLWELL, OF PITTSBURG, PENNSYLVANIA.

TRIPLE THERMIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 432,510, dated July 22, 1890.

Application filed January 13, 1885. Serial No. 152,713. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. COLWELL, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Triple Thermic Motor; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists in the method hereinafter described and specially claimed, whereby a motor is generated by the induction of liquid bisulphide of carbon into a vapor-generator and circulating it therein, said generator being contained within a steam-boiler, and subjecting said liquid to heat contained within said steam-boiler to evolve vapor, and also superheating and expanding said vapor in a chamber or reservoir contained in said steam-boiler, thereby increasing its tension and maintaining the heat and expansion of said vapor until it has performed its office on the piston of the engine, and also automatically controlling the induction of said liquid into said generator, and also automatically controlling the pressure of said vapor, and also conveying the vapor exhausted from the engine, by gravity, to the condenser, and also returning the liquid bisulphide of carbon to said generator heated to about the boiling-point.

To enable others skilled in the art with which my invention is most nearly connected to make and use the same, I will proceed to describe its construction and operation.

In the accompanying drawings, which form part of this specification, Figure 1 is a vertical section of an apparatus for carrying out the invention stated and hereinafter more fully described. Fig. 2 is a horizontal section of the steam-boiler, representing a plan of the bisulphide-of-carbon-vapor generator and expanding chamber contained within said steam-boiler. Fig. 3 is an enlarged view of the regulating-valve for controlling the flow of liquid bisulphide of carbon to the pump shown in side elevation.

Reference being had to the accompanying drawings, A represents an ordinary furnace for the tubular steam-boiler B, which is also

of ordinary construction and furnished with the usual appendages of such boilers. Above the tubes C is arranged within the boiler B a generator D, which is of uniform diameter from the rear end of the boiler toward the front end, running zigzag, as shown in Fig. 2, and communicates with a vapor superheating and expanding chamber E, having conduit F for conducting the vapor to the cylinder G of the engine, having a casing around it, which communicates with the casing H around the conduit F, supplied with steam from the boiler. This incasing of the cylinder G and conduit F is clearly and fully described and shown in Letters Patent No. 219,622, granted to me September 16, 1879, in which patent is also described and shown a steam-boiler having within it a generator for evolving liquid bisulphide of carbon into a vapor for a motor.

The conduit F is provided with a valve I and safety-valve J, to which is attached a pipe K, which communicates with the condenser L, which communicates with a vacuum-pump M. Substantially this arrangement of safety-valve, condenser, and a vacuum-producing mechanism and the purpose and operation of the same are also described and shown in said cited patent. The throttle-valve N and lubricating device O, connected to and communicating with the cylinder G, are also described in said cited patent and in Letters Patent No. 266,952, granted to me October 31, 1882.

The generator D is arranged on a horizontal plane, but part of it may be arranged at an angle to said plane, as indicated by dotted lines shown in Fig. 1. The rear end of the generator D communicates with a pipe P, which enters and is arranged in a heater R and communicates with a pump Q. This arrangement of pipe P, heater R, and pump Q and the purpose and operation of said parts are fully and clearly described in cited Letters Patent No. 266,952. The lower end of the heater R communicates with the exhaust of the cylinder G, through the medium of pipe T, and its upper end communicates with a pipe U, which communicates with the condenser L, which communicates by pipe W with the vacuum-pump M, which communicates by pipe X with a washer V. The con-

denser L also communicates with a well Y, which communicates by a pipe *a* with a balance-valve E', which by a pipe *c* communicates with the pump Q. The balance-valve E' is opened and closed by the regulating-valve A', having chambers B' C', diaphragm D', plunger F', lever G', and weight II', said valve communicating with the conduit F by means of a pipe *b*, which is charged with water to about the dotted line *e*.

The vacuum-pump, washer, condenser, well, pump Q, balance-valve, and regulating-valve are all substantially shown, described, and claimed, and their operation and purpose fully set forth in my application for Letters Patent filed July 26, 1884, Serial No. 138,819, and therefore not herein claimed, and need not be further described in this specification.

The casing surrounding the cylinder G communicates with a steam-trap *f* through the medium of pipe *g*, and said trap communicates with the pump *h* by means of pipe *i*, and said pump *h* communicates with the steam-boiler B by means of pipe *j*. The packing mechanism for the valve-rod and piston of the cylinder communicates with the well Y by means of the pipes *k k*, as described in said cited application.

The water in the boiler B may cover or partially cover the generator D, or the water may be below the said generator, and the chamber E will be surrounded with steam.

The construction of the apparatus shown in the accompanying drawings, and hereinbefore described, will readily be understood from the foregoing description and by reference to the said cited patents and application. I will therefore proceed to describe the operation, which is as follows:

The boiler B being filled to the desired point with water and the generator D charged with a sufficient quantity of liquid bisulphide of carbon for evolving vapor enough for starting the engine, and the well Y charged with the desired quantity of liquid bisulphide of carbon, fire is then started in the furnace A, which heats the water in the boiler B and evolves steam therefrom, which heated water or steam acts on the walls of the generator D and the steam surrounds the superheating and expanding chamber E, so that the liquid bisulphide of carbon is evolved into a vapor in the tubes constituting the generator, and superheated and expanded in the chamber E and its tension increased. The operator opens the valve I and throttle N, and the engine is thereby put in motion. The vacuum-pump being put in motion, the exhaust-vapor from the engine passes through the pipes T, U, and K to the condenser L, and is condensed into a liquid, which flows into the well Y and from it through valve E' to pump Q, which forces it through pipe P in the heater R, where the liquid bisulphide of carbon is heated by the exhaust-vapor from the engine to about the boiling-point in its passage to the generator D, through which it circulates, and is evolved

into a vapor and superheated, and consequently has its tension increased, in the chamber E, and passing from said chamber enters the conduit F and passes to the cylinder G, where performing its office is exhausted into pipe T and makes the circuit, as before described. The casing II and casing around the cylinder receive steam from the boiler B through the medium of the pipe *l*, thereby maintaining the expansion and tension of the vapor until it has performed its office on the piston of the engine. In case the pressure of the vapor in the chamber E should be greater than determined upon it will, through the pipe *b*, act against the water in the said pipe, which, acting against the diaphragm D' and it against the plunger F, will move the lever G', which will force down the stem *m*, and thereby close down the balance-valve E' in accordance with the overpressure of the vapor, thereby correspondingly cutting off the supply of liquid bisulphide of carbon from the pump Q and generator D until the pressure of vapor in the chamber E has decreased to that pressure fixed upon by the operator. The weight II' will then open the balance-valve E' and allow the desired quantity of liquid to flow to the pump Q and generator D. The hot water produced by the condensation of steam in the casing of the cylinder G and casing II of the conduit F will flow into the trap *f* through the pipe *g*, and from said trap to the pump *h*, which forces it through the pipe *i* into the boiler B at about the boiling-point. The condensable and incondensable gases which are drawn by the vacuum-pump through the pipe W are forced through pipe X into water in the washer V, as and for the purpose described in said cited application.

The safety-valve J, which by pipe K communicates with the condenser L, is for the purpose of allowing the surplus vapor in the case of overpressure to escape to the condenser L. The pressure of steam in the boiler B and the pressure of the vapor in the chamber E are shown by gages *n*.

In another application filed this day, Serial No. 152,714, I have claimed the means employed to generate a motor from liquid bisulphide of carbon, the claims in both applications having been originally presented in my application, Serial No. 140,969, filed August 19, 1884, and in which division was required by the Patent Office.

Having thus fully described my improvement, what I claim as of my invention is—

1. The method of generating a motor, which consists in conducting liquid bisulphide of carbon to a generator contained in a steam-boiler, subjecting it to the heat of the water or steam to evolve vapor, superheating the vapor in a chamber surrounded by the steam of the boiler, and finally conducting the vapor to the engine through a conduit surrounded by live steam from the boiler, substantially as described.

2. The method of generating a motor, which consists in circulating liquid bisulphide of carbon in a generator contained in a steam-boiler and applying thereto the heat of the water or steam in said boiler, substantially as described.

3. The method of generating a motor, which consists in circulating liquid bisulphide of carbon in a generator contained in a steam-boiler and applying thereto the heat of the water or steam to evolve vapor, and superheating the vapor in a chamber connected to the generator and also contained in the boiler, substantially as described.

4. The method of generating a motor, which consists in circulating liquid bisulphide of carbon in a generator contained in a steam-boiler, applying thereto the heat of the water or steam to evolve vapor, superheating the vapor in a chamber surrounded by steam, and maintaining the expansion of the vapor until the power thereof has been applied to an engine, substantially as described.

5. The method of operating a bisulphide-of-carbon engine, which consists in conducting liquid bisulphide of carbon into a generator contained in a steam-boiler, evolving vapor by the heat of water or steam surrounding the generator, superheating the vapor in a separate chamber within the steam-boiler, maintaining the heat or tension to the engine, condensing the vapor, and returning the liquid to the generator, substantially as described.

6. The method of operating a bisulphide-of-carbon engine, which consists in evolving vapor in a generator contained in a steam-boiler

and surrounded by water or steam, superheating the vapor in a chamber in the boiler surrounded by steam, and conducting the vapor to the engine and any excess from the supply-conduit to the condenser, substantially as described.

7. The method of generating a motor, which consists in heating liquid bisulphide of carbon, conducting it to a generator contained in a steam-boiler and subjecting it to the heat of the water or steam to evolve vapor, superheating the vapor in a chamber also contained in the boiler and surrounded by steam, and finally conducting the vapor to an engine, substantially as described.

8. In a bisulphide-of-carbon generator, the method of controlling the supply of liquid, which consists in automatically operating a valve in the supply-pipe by the vapor from the generator, closing the valve when the pressure becomes too great, and restoring the valve to its normal condition by the gravity of a weight when the pressure is reduced, substantially as described.

9. The method of generating a motor, which consists in conducting liquid bisulphide of carbon into a generator, in which it is evolved into vapor and expanded by the heat of boiling water or steam and conducting the vapor into a reservoir separated from the generator, but in communication therewith, where the vapor is superheated by steam, substantially as described.

WILLIAM S. COLWELL.

Witnesses:

JAMES J. JOHNSTON,
F. W. HAAS.