

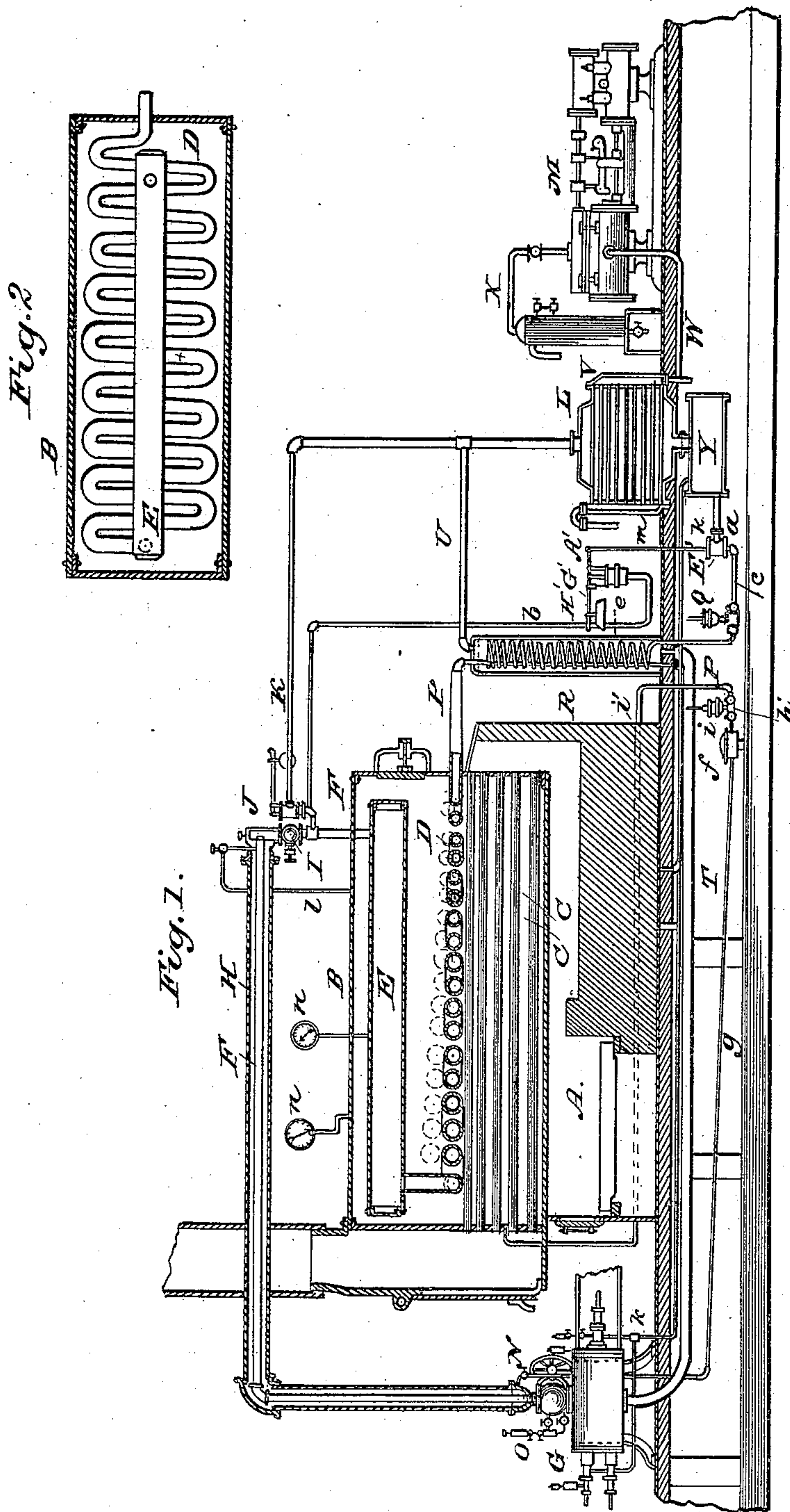
(No Model.)

2 Sheets—Sheet 1.

W. S. COLWELL.  
TRIPLE THERMIC MOTOR.

No. 313,182.

Patented Mar. 3, 1885.



WITNESSES:

*Fred. S. Dieterich*  
*Wm. W. S. Dyre*

INVENTOR.

*William S. Colwell*

*By J. L. Johnston his* ATTORNEY

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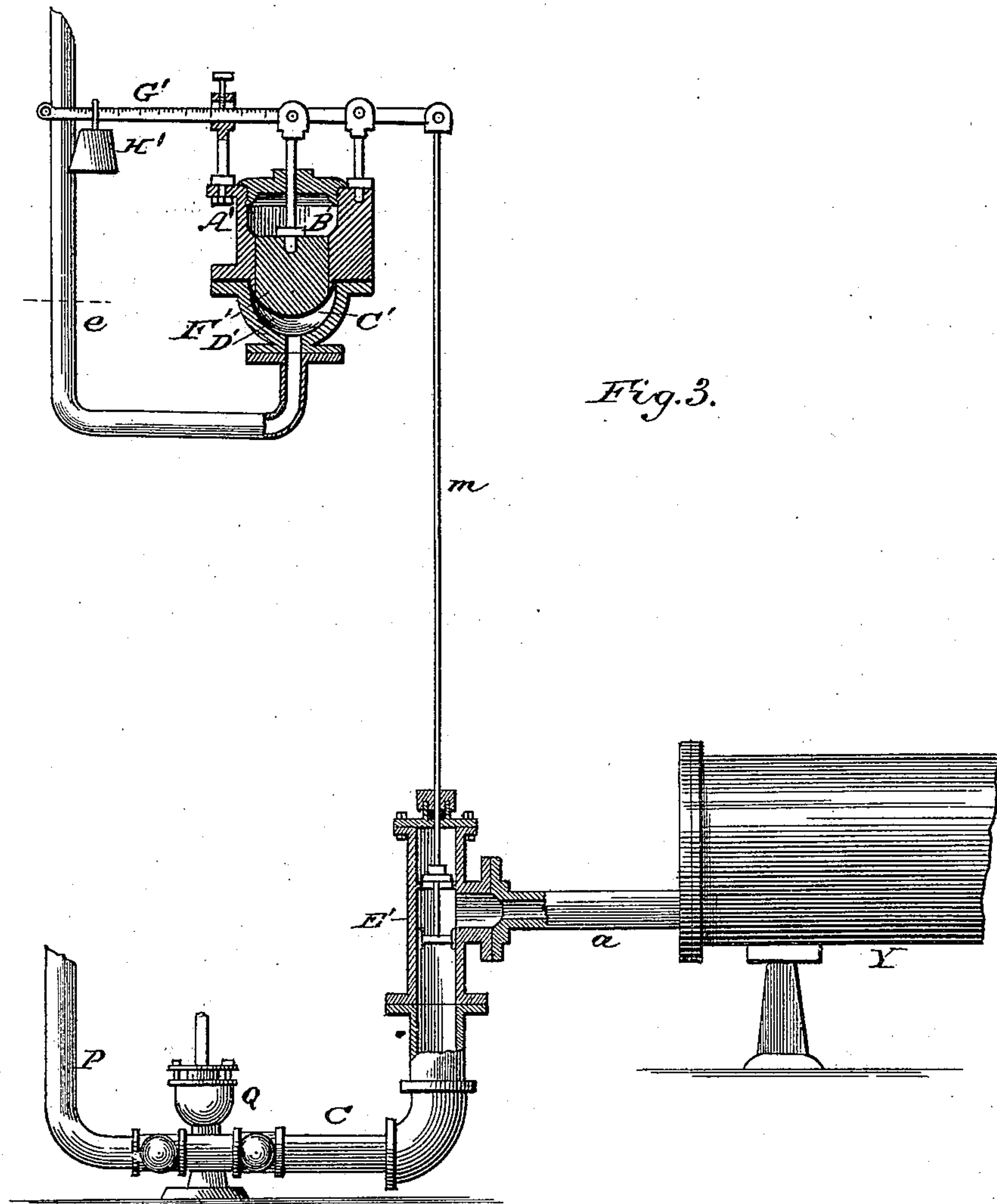


Fig. 3.

WITNESSES:

*Fred. L. Dätterich*  
*Wm. W. S. Pyre*

INVENTOR.

*William S. Colwell*

*By J. J. Johnston his* ATTORNEY



# UNITED STATES PATENT OFFICE.

WILLIAM S. COLWELL, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE  
TRIPLE THERMIC MOTOR COMPANY, OF NEW YORK, N. Y.

## TRIPLE THERMIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 313,182, dated March 3, 1885.

Application filed January 13, 1885. (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  
5 new and useful Improvement in Triple Thermic Motors; 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  
10 marked thereon.

My invention consists in the means, hereinafter described and specially claimed, whereby a motor is generated by the induction of liquid bisulphide of carbon into a vapor-generator of varying capacity and circulating it  
15 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  
20 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,  
25 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 con-  
30 denser, 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  
35 to make and use the same, I will proceed to describe its construction and operation.

In the accompanying drawings, which form a part of this specification, Figure 1 is a vertical section of an apparatus for carrying out  
40 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-  
45 boiler. Fig. 3 is an enlarged view of the regulating-valve for controlling the flow of the liquid bisulphide of carbon to the pump, shown in side elevation.

Reference being had to the accompanying  
50 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 increases in  
55 diameter from the rear end of the boiler toward the front end, running zigzag, as shown in Fig. 2, and at its largest diameter communicates with a vapor superheating and expanding chamber, E, having conduit F, for con-  
60 ducting 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  
55 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  
70 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 con-  
75 denser 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 is also described and shown in said  
80 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,  
85 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  
90 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  
95 is 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,  
100 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 condenser L also communicates with a well, Y, which communicates by a pipe, *a*, with a balance-valve, 5 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' and C', diaphragm D', plunger F', lever G', and weight H', said valve communicating with the conduit F by means of a 10 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 15 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 20 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*, 25 and said pump *h* communicates with the steam-boiler B by means of pipe *i'*.

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. 30

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.

35 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 40 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 45 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 50 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 vapor, and gradually expands from the 55 rear end of said generator toward the superheating and expanding chamber, and is further superheated and expanded in said chamber and its tension increased. The operator opens the valve I and throttle N, and the engine is 60 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 65 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 70 into a vapor, which is gradually increased in volume toward the superheating or expansion chamber E, in which it is further superheated or expanded, and consequently has its tension increased, and, passing from said chamber, enters the conduit F, and passes to the cylinder 75 G, where, performing its office, it is exhausted into pipe T, and makes the circuit, as before described.

The casing H and casing around the cylinder 80 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 85 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 90 will force down the stem *m*, and thereby close down the balance-valve E' in accordance with the over-pressure of the vapor, thereby correspondingly cutting off the supply of liquid 95 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 H' will then open the balance-valve E', and allow the 100 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 H of the conduit F will flow into the trap *f* through the pipe *g*, and from said 105 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 110 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 over pressure 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 120 shown by gages *n*.

The various methods of generating a motor involved in this invention form subject-matter of claims in my application No. 140,969, filed August 19, 1884, of which this is a division under requirements of the Office. 125

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

1. The combination of a steam-boiler, a vapor-generator of varying capacity heated by the water or steam of the boiler, and suitable 130 means for supplying volatile liquid to the vapor-generator, substantially as described.

2. The combination of a steam-boiler, a vapor-generator of varying capacity, and a su-



perheating-chamber, the former heated by water or steam and the latter by the steam of the boiler, substantially as described.

3. The combination of a steam-boiler, a vapor-generator of varying capacity heated by water or steam, a superheating-chamber, and a vapor-conduit surrounded by steam from the boiler, substantially as described.

4. The combination of a steam-boiler, a vapor-generator of varying capacity heated by water or steam, a superheating-chamber surrounded by steam, an engine, a condenser, a heater, and suitable means for returning the liquid to the generator, substantially as described.

5. The combination of a steam-boiler, a vapor-generator of varying capacity heated by water or steam, a superheating-chamber surrounded by steam, an engine, a condenser, a washer, and a well from which the liquid is returned to the vapor-generator, substantially as described.

6. The combination of a steam-boiler, a vapor-generator of varying capacity contained within the boiler, and heated by the water or steam to evolve vapor, and suitable means for supplying liquid to the vapor-generator, substantially as described.

7. The combination of a steam-boiler, a vapor-generator of continuously-increasing capacity contained within the boiler, and heated by the water or steam to evolve vapor and expand the same, and suitable means for supplying liquid to the vapor-generator, substantially as described.

8. The combination of a steam-boiler, a vapor-generator of varying capacity contained within the boiler, and heated by the water or steam, a superheating-chamber also contained in the boiler, and surrounded by steam, and suitable means for supplying liquid to the vapor-generator, substantially as described.

9. The combination of a steam-boiler, a vapor-generator of continuously-increasing capacity contained within the boiler, and heated by the water or steam to evolve vapor and expand the same, a superheating-chamber also contained within the boiler, and a vapor-conduit surrounded with steam, substantially as described.

10. The combination of a steam-boiler, a vapor-generator of varying capacity arranged transversely of the boiler, above the tubes thereof, and surrounded by the water or steam to evolve vapor and expand the same, substantially as described.

11. The combination of a steam-boiler, a vapor-generator of continuously-increasing capacity arranged transversely of the boiler, and surrounded with water or steam to evolve vapor and expand the same in continuously-increasing quantities, a superheating-chamber above the generator, surrounded by steam, and a vapor-conduit leading to an engine, provided with a steam-jacket supplied from the boiler, substantially as described.

12. The combination of a steam-boiler, a vapor-generator of varying capacity arranged transversely of the boiler, supported by the tubes thereof, and subjected to the heat of the water or steam to evolve vapor and expand the same in continuously-increasing volume, and suitable means for supplying liquid to the generator, substantially as described.

13. The combination of a steam-boiler, a vapor-generator of varying capacity arranged transversely of the boiler, supported by the tubes thereof, and subjected to the heat of water or steam to evolve vapor and expand it in continuously-increasing volume, a superheating-chamber above the vapor-generator, connected therewith, but separated therefrom by an interposed connection, and surrounded by the steam of the boiler, and a vapor-conduit also surrounded by steam from the boiler, substantially as described.

14. The combination of a steam-boiler, a vapor-generator of varying capacity, and a superheating-chamber contained within the boiler, an engine, a condenser, and a pipe provided with a safety-valve connecting the superheating vapor-chamber and the condenser, substantially as described.

WILLIAM S. COLWELL.

Witnesses:

JAMES J. JOHNSTON,  
F. W. HAAS.