(No Model.) 2 Sheets—Sheet 1.

O. S. RHODES.

APPARATUS FOR GENERATING AND APPLYING VAPORS.

No. 551,233. Patented Dec. 10, 1895.

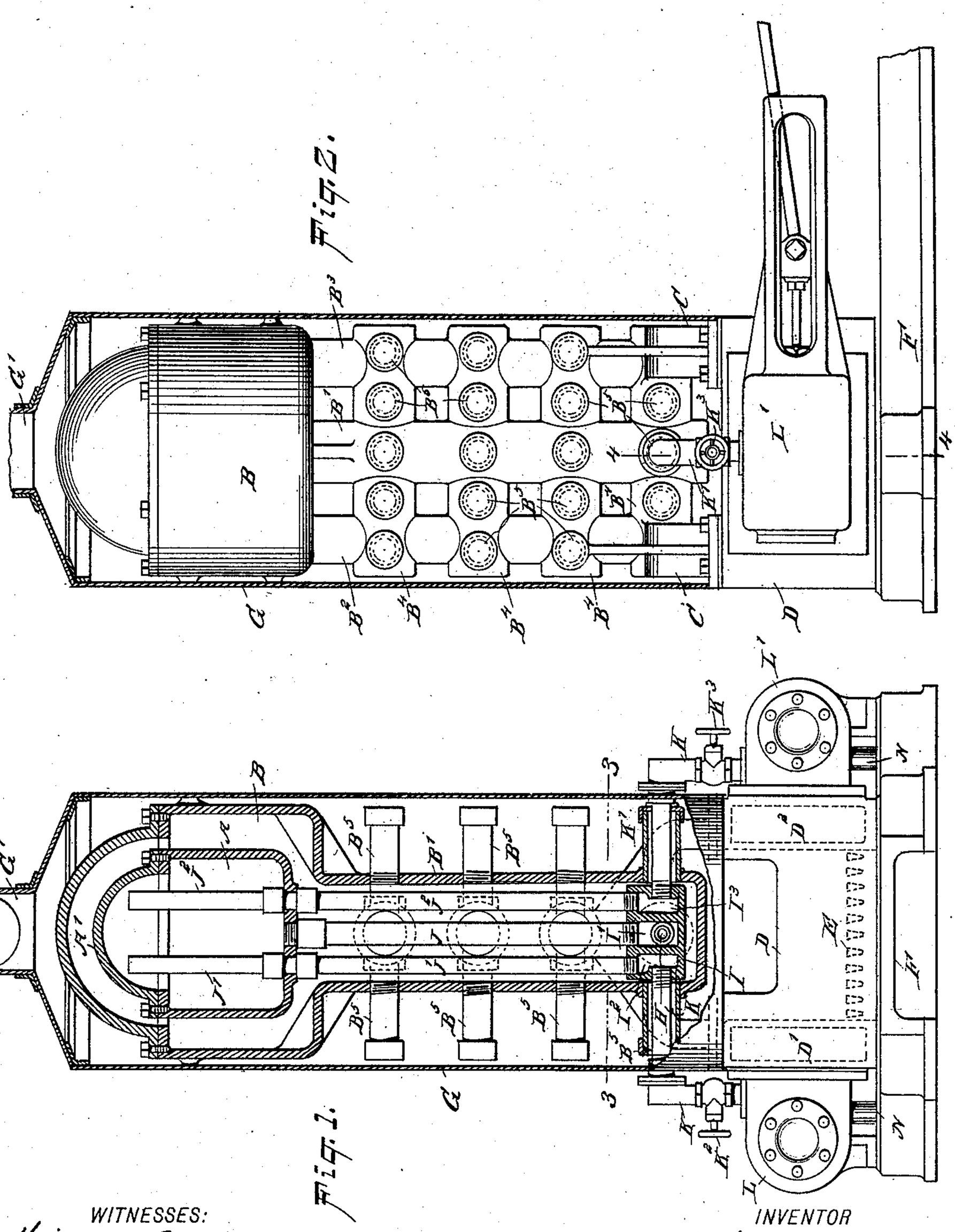


Fig. 2.

Fig. 1.

WITNESSES:

William Goebel

Rev. J. Houston, Jr.

INVENTOR

O. S. Rhodes

BY Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

O. S. RHODES.

APPARATUS FOR GENERATING AND APPLYING VAPORS.

No. 551,233. Patented Dec. 10, 1895.

Fig. 3.

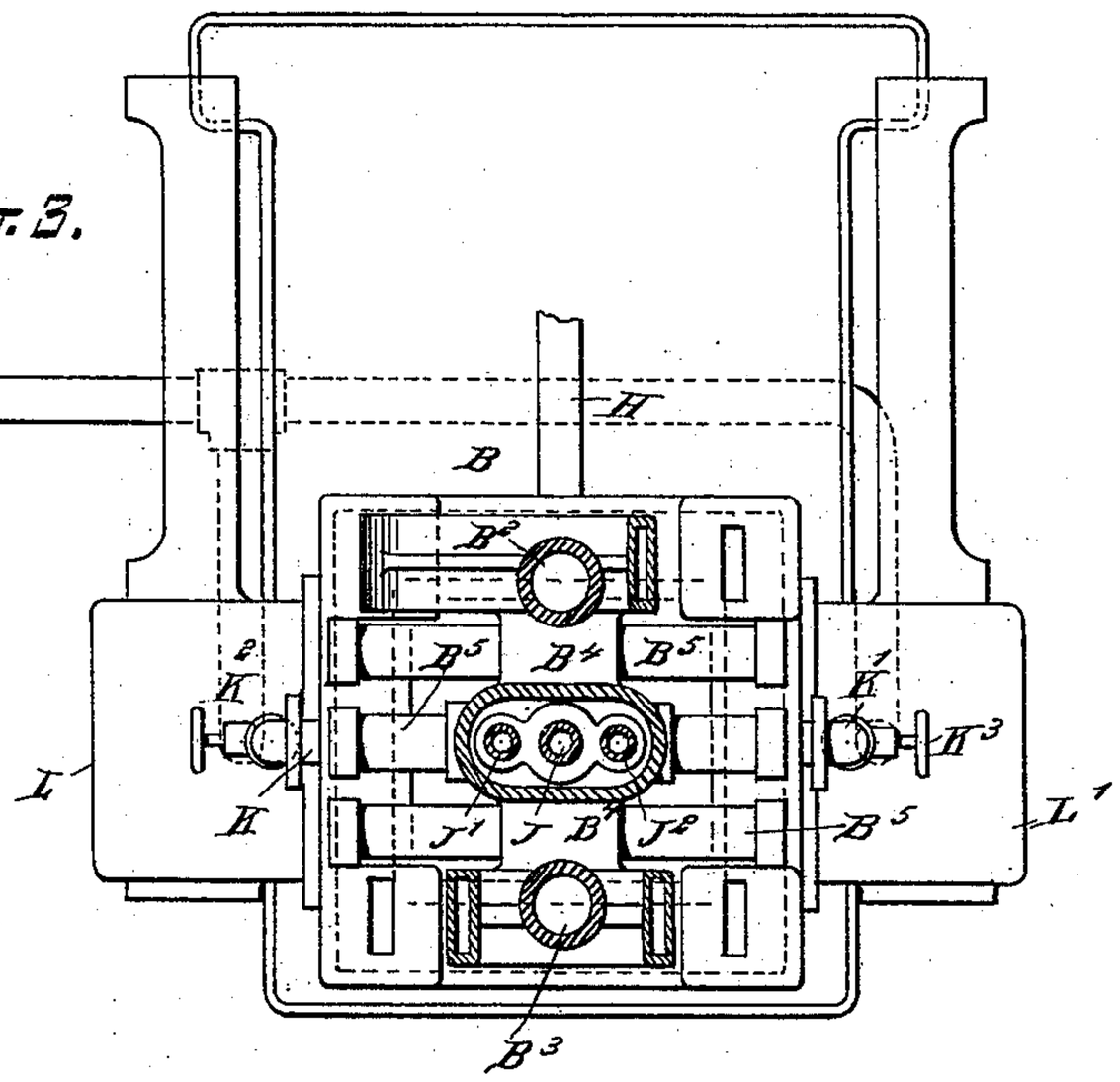
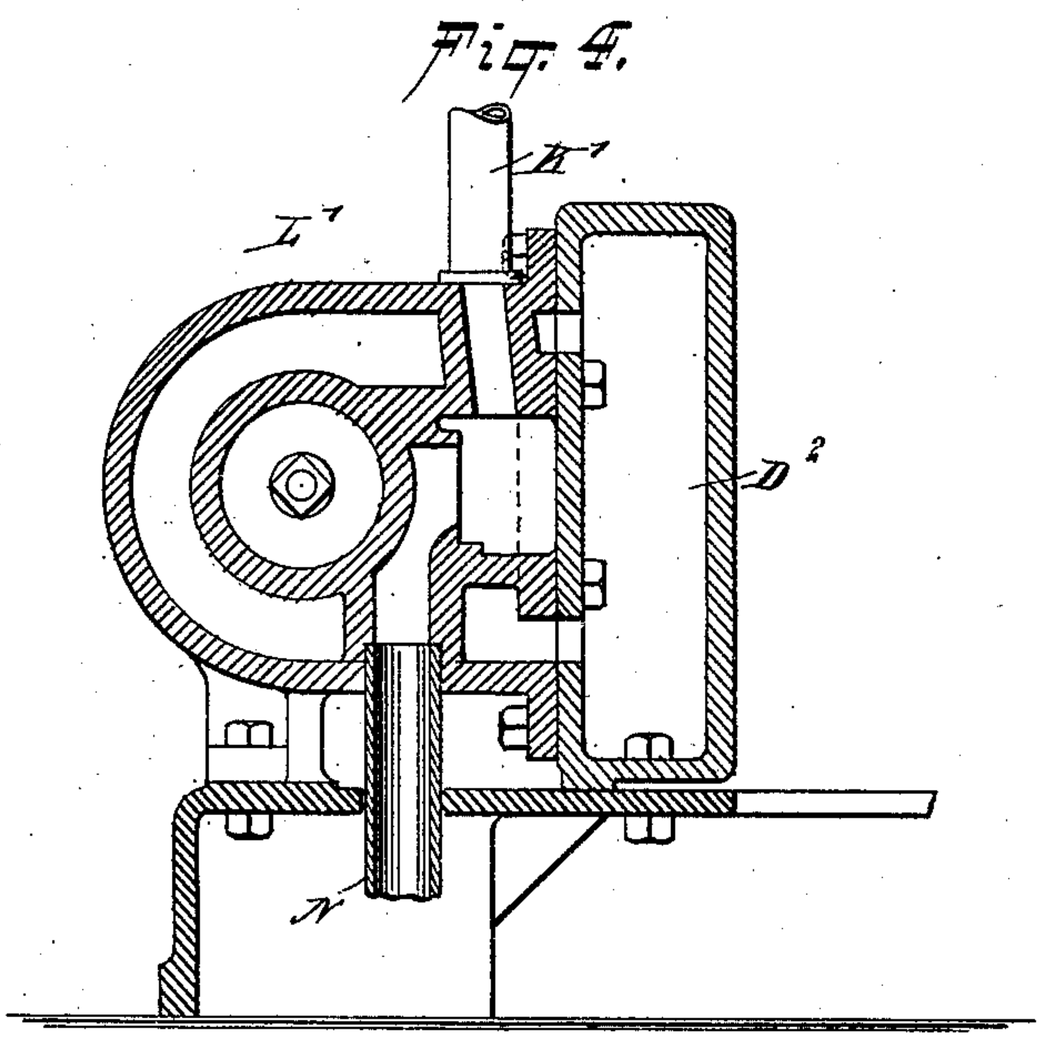


Fig. 4.



WITNESSES:

William Gaebel.

Thos. J. Hooker, Jr.

INVENTOR

O. S. Rhodes

BY

Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

OREON S. RHODES, OF EAST STROUDSBURG, PENNSYLVANIA.

APPARATUS FOR GENERATING AND APPLYING VAPORS.

SPECIFICATION forming part of Letters Patent No. 551,233, dated December 10, 1895.

Application filed April 2, 1895. Serial No. 544,191. (No model.)

To all whom it may concern:

Be it known that I, OREON STAPLES RHODES, of East Stroudsburg, in the county of Monroe and State of Pennsylvania, have invented a new and Improved Apparatus for Generating and Applying Vapors, of which the following is a full, clear, and exact description.

The invention relates to the generation of vapors of volatile liquids and to motors driven by such vapors.

The object of the invention is to provide a new and improved apparatus for generating and applying vapors, whereby the fuel is utilized to the greatest advantage and the danger from explosions is reduced to a minimum.

The apparatus consists of a generator comprising a closed receptacle adapted to contain the chemical to be vaporized to form the motive agent, and a boiler surrounding the said receptacle and adapted to contain the heating medium for heating the receptacle and the chemical contained therein.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a cross-section of the improvement. Fig. 2 is a side elevation of the same with the shell in section. Fig. 3 is a sectional plan view of the same on the line 3 3 of Fig. 1, and Fig. 4 is an enlarged transverse section of the engine on the line 4 4 of Fig. 2.

In order to carry the above-described method into effect, I prefer the construction of an apparatus as shown in the drawings, the said apparatus being provided with a closed receptacle A, adapted to contain a chemical, such as ether, to be volatilized to form the motive agent, as hereinafter more fully described. This receptacle A is completely surrounded by or inclosed in a boiler B, made tubular in its lower portion, and having for this construction the vertically-disposed legs B′, B² and B³, connected with each other by a series of horizontally-disposed arms B⁴, from which, as well as from the leg B′, extend the short boiler-tubes B⁵, capped at their outer ends, as plainly indicated in the drawings.

The lowermost horizontal arm B⁴ of the tubular portion of the boiler B is supported in bearings C, attached to the top of a furnace D, containing a fire-box E, and mounted on a suitable base F. A shell G, likewise set on the furnace D, surrounds the boiler B; and through this shell pass the smoke and gases of the fuel burning in the fire-box, so as to heat the boiler fluid contained in the boiler B and the tubular extensions thereof before passing to the smoke-stack G′ extending from the top of the shell G.

The chemical employed is preferably in fluid form, and is passed by a pump or other similar device into a pipe H discharging into a central chamber I′ formed in a box I held in the lower end of the central leg B′, as plainly shown in Figs. 1 and 3. From the top of this chamber I′ in the box I leads a pipe J which extends vertically in the leg B′ and which discharges into the bottom of the receptacle A, so that the chemical passes from the pump through the pipe H into the chamber I′, and then through the pipe J into the receptacle A in which it is volatilized by the heated boiler fluid surrounding the said receptacle A and the pipe J as well as the box I.

Into the receptacle A and near to the cap A′ thereof extend the vertically-disposed outlet-pipes J′ and J² passing through the bottom of the receptacle A down the leg B′, to connect at their lower ends with the chambers I² and I³ formed in the box I on the opposite sides of the central chamber I′. The side chambers I² and I³ are connected by pipes K and K′ with the chests of the engines L and L′ respectively, secured on opposite sides of the furnace D, as is plainly shown in Figs. 1, 2 and 3. Thus the vapors generated in the receptacle A can pass through the pipes J J′, chambers I² I³ and pipes K K′ to the engines L L′ to drive the same in the usual manner. The pipes K K′ have the usual valves K² K³ to regulate the passage of the vapors from the receptacle A to the cylinders.

The cylinders are provided with jackets through which circulates the boiler fluid, it being understood that the sides of the furnace D are formed with compartments D′ and D² opening into the said jackets, and connected with the legs of the boiler, so that the

boiler fluid can circulate through the jackets surrounding the cylinders, to prevent loss of heat while the vapors are doing their work as the motive agent in the cylinders of the engines L and L'. The exhausted vapors pass from the engines through pipes N to a condenser of suitable construction, to be condensed and forced by the pump back into the pipe H to be used over again by being volatilized in the receptacle A as previously explained.

It will be seen that by the construction described the generator is very simple and compact in construction and the boiler and engine form but one machine and both make use of the same boiler fluid. The construction is such that the fire from the furnace D is directly beneath and in contact with the lower end of the boiler, and the heat in passing to the chimney must necessarily pass over a great surface of the boiler containing the boiler fluid, so that the latter is raised to a high temperature and is kept there at a comparatively less expense for fuel than by the methods heretofore employed.

The boiler fluid is preferably a fixed oil having a boiling-point at a high temperature, so that the fluid gives a great heat without corresponding pressure, and hence reduces the danger of explosion to a minimum.

The vapor-generator in the form of the receptacle and the pipes connected therewith is such as to withstand any pressure of the vapor generated. The vapor is generated from a volatile liquid combined with a soluble gas, a volatile liquid, or a liquefied gas.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for the generation of vapors, consisting of a closed receptacle containing the chemical to be vaporized, a closed boiler surrounding said receptacle for containing the heating medium, a shell surrounding the boiler for directing the products of combustion thereto, a furnace located beneath all of said parts and having compartments in its side walls, engines attached to said side walls and having jackets communicating with the compartments, and ducts leading from the boiler into said compartments and wholly within the heating surface of the furnace, substantially as shown and described.

2. An apparatus for generating vapors, comprising a closed receptacle adapted to contain the chemical to be vaporized to form the motive agent, a boiler surrounding the said receptacle, and adapted to contain the heating medium for heating the receptacle and the chemical contained therein, a furnace supporting the said boiler and heating the same, an engine cylinder located at each side of and against the wall of the furnace, and the vapor pipes leading through the boiler, substantially as shown and described.

3. An apparatus for generating vapors, comprising a closed receptacle adapted to contain the chemical to be vaporized to form the motive agent, a boiler surrounding the said receptacle, and adapted to contain the heating medium for heating the receptacle and the chemical contained therein, and comprising vertical legs united by horizontal tubular arms, a furnace supporting the said boiler and heating the same, and engines formed with jackets in communication with the said boiler, to circulate the heating medium around the cylinders and the engines, substantially as shown and described.

4. An apparatus for generating vapors, comprising a closed receptacle adapted to contain the chemical to be vaporized to form the motive agent, a boiler surrounding the said receptacle, and adapted to contain the heating medium for heating the receptacle and the chemical contained therein, a feed pipe leading through a portion of the boiler, and discharging into the lower portion of the receptacle for the motive agent material, engines formed with jackets, and adapted to be driven by the vapor generated in the said receptacle, vapor pipes extended through the lower wall of the vapor receptacle from a point near its top, and chambers forming the walls for the furnace and in communication with the cylinder jackets and with the said boiler, substantially as shown and described.

5. An apparatus for generating vapors, comprising a boiler having legs connected with each other by horizontal arms having tubes closed at their outer ends, a receptacle set in the said boiler, an inlet pipe connected with the said receptacle and extending into one of the said legs, a box contained in the said leg and formed with compartments or chambers into one of which leads the said supply pipe, and outlet pipes leading from the said receptacle into the other chambers in the box, substantially as shown and described.

6. An apparatus for generating vapors, comprising a boiler having legs connected with each other by horizontal arms having tubes closed at their outer ends, a receptacle set in the said boiler, an inlet pipe connected with the said receptacle and extending into one of the said legs, a box contained in the said leg and formed with compartments or chambers into one of which leads the said supply pipe, outlet pipes leading from the said receptacle into the other chambers in the box, and engine supply pipes leading from the last mentioned chambers, to carry the vapors to the engine cylinders, substantially as shown and described.

7. An apparatus for generating vapors, comprising a boiler having legs connected with each other by horizontal arms having tubes closed at their outer ends, a receptacle set in the said boiler, an inlet pipe connected with the said receptacle and extending into one of the said legs, a box contained in the said leg and formed with compartments or chambers,

into one of which leads the said supply pipe, outlet pipes leading from the said receptacle into the other chambers in the box, and engine supply pipes leading from the last mentioned chambers, to carry the vapors to the engine cylinders, the said cylinder supply pipes extending through some of the tubes at the lower end of the boiler, substantially as shown and described.

OREON S. RHODES.

Witnesses:
W. B. EILEMBERGER,
F. W. EILEMBERGER.