

No. 612,098.

Patented Oct. 11, 1898.

P. D. DE LA GRÉE.
STEAM GENERATOR.

(Application filed Dec. 27, 1897.)

(No Model.)

Fig: 1.

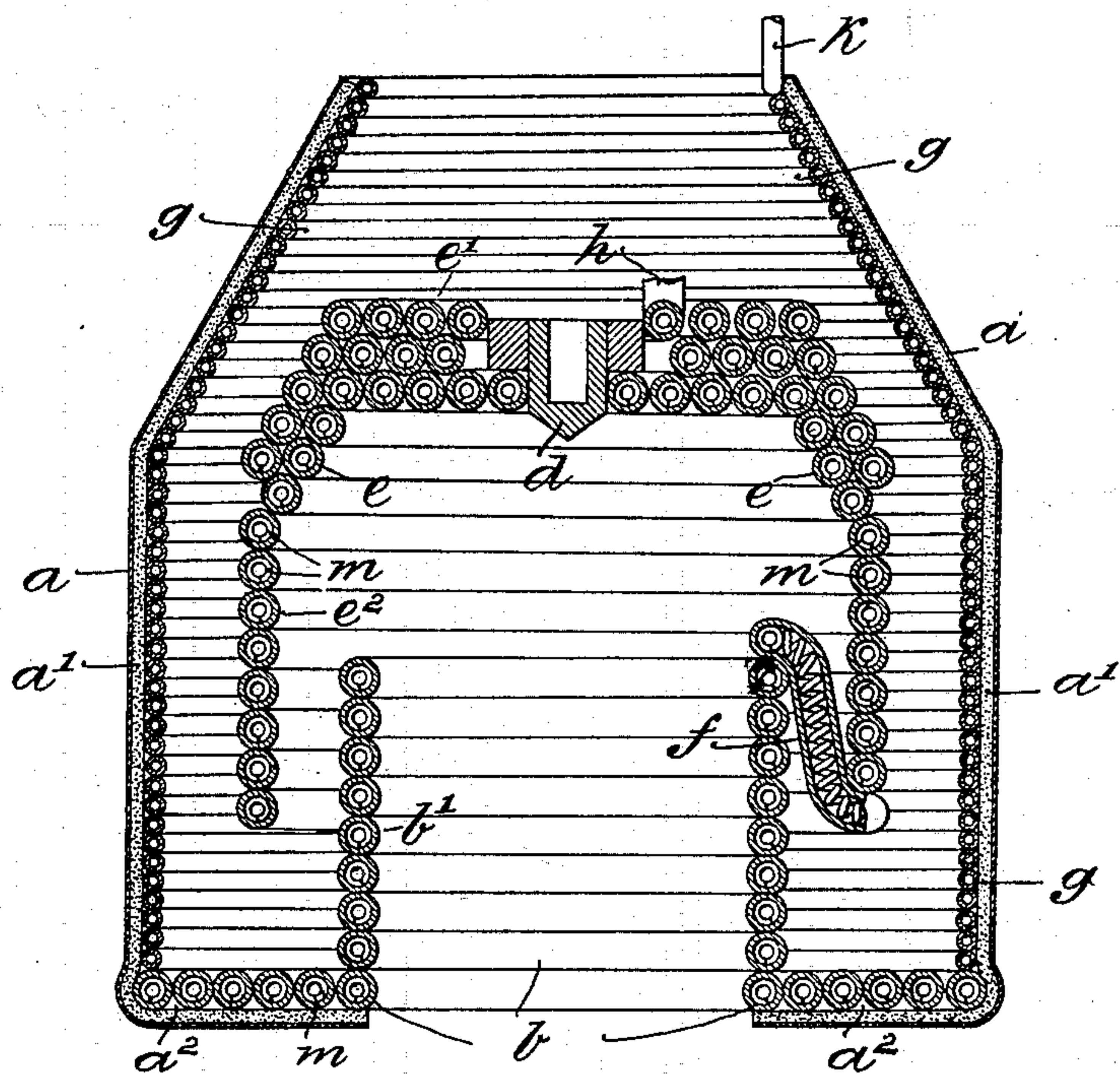


Fig: 2.

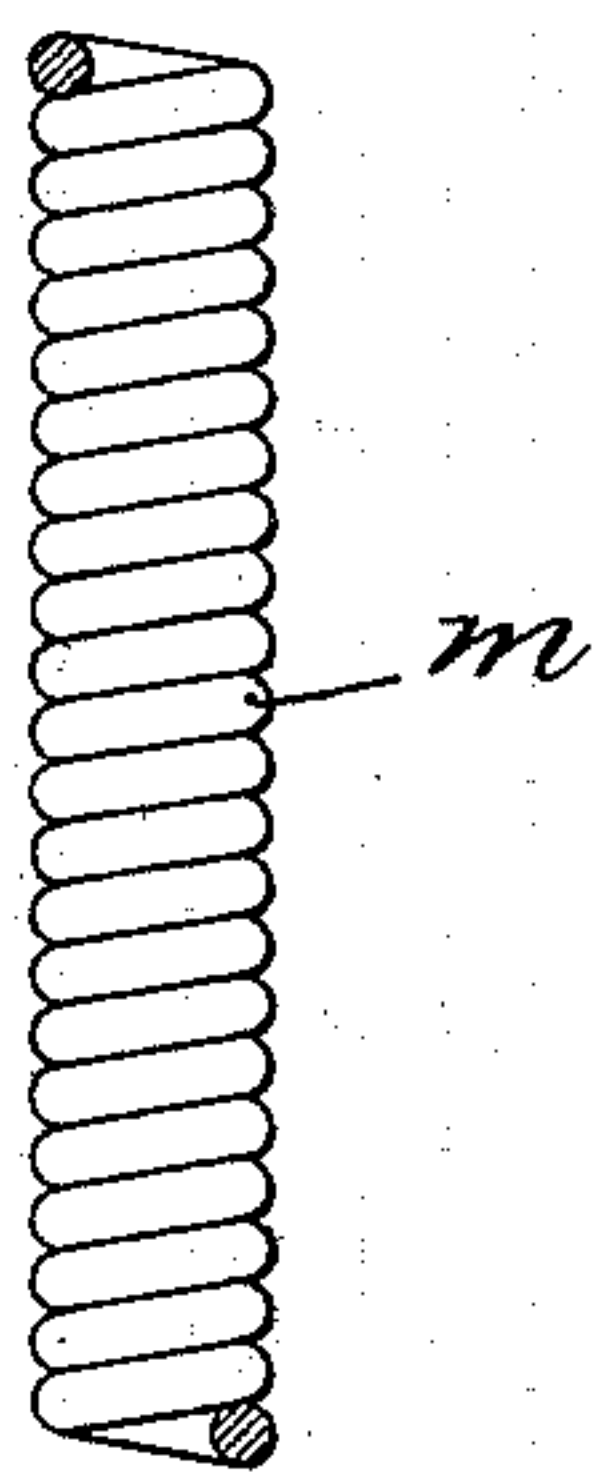


Fig. 3.

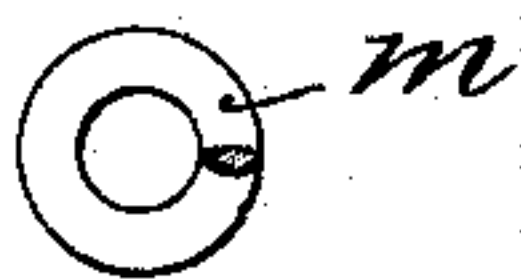


Fig: 4.

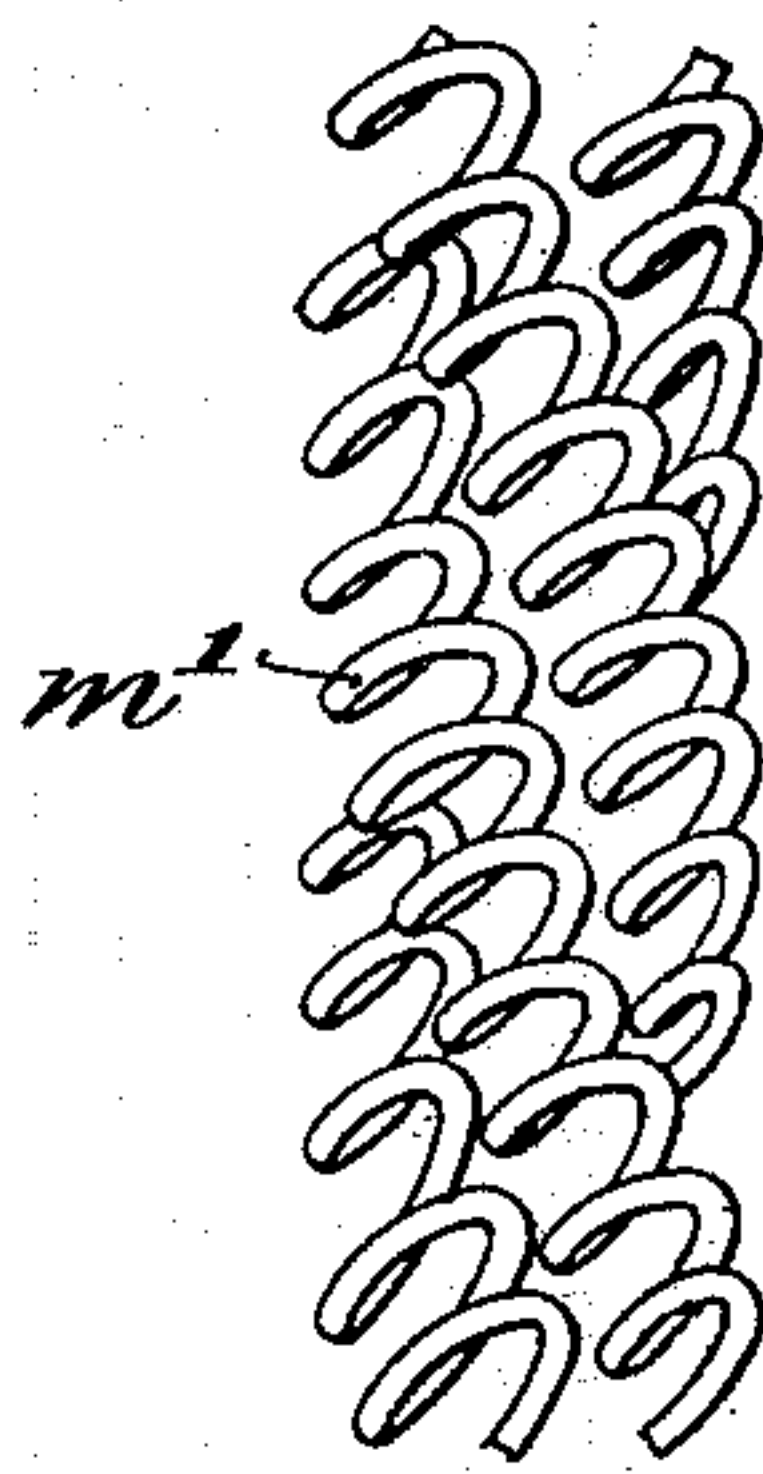
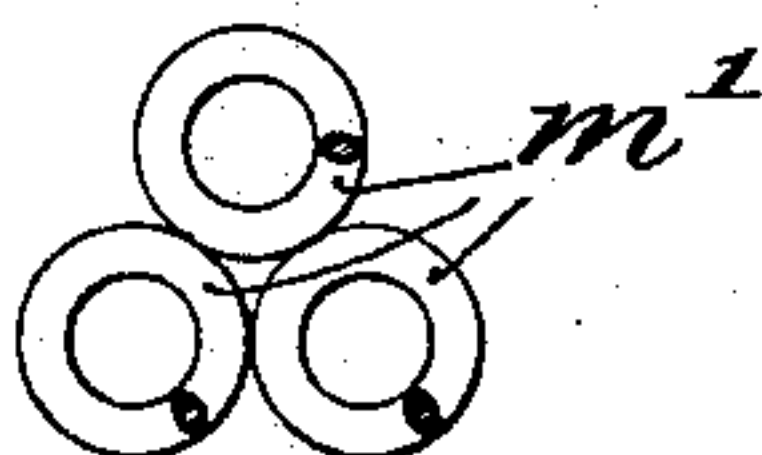


Fig: 5.



2 Witnesses:
Thomas M. Smith.
Richard C. Maxwell.

Inventor:
Paul Bonduant de la Grè,
By J. Walter Douglass,
Attorneys.

UNITED STATES PATENT OFFICE.

PAUL DOUDART DE LA GRÉE, OF ALGIERS, ALGERIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 612,098, dated October 11, 1898.

Application filed December 27, 1897. Serial No. 663,656. (No model.) Patented in France November 6, 1894, No. 243,138.

To all whom it may concern:

Be it known that I, PAUL DOUDART DE LA GRÉE, a citizen of France, residing at Algiers, Algeria, have invented certain new and useful Improvements in Steam-Generators, (for which I have obtained French Letters Patent No. 243,138, dated November 6, 1894,) of which the following is a specification.

My invention has relation to a steam-generator wherein an intense and instantaneous vaporization may be obtained; and in such connection it relates to the construction and arrangement of such a generator.

The principal object of my invention is to provide a steam-generator wherein an intense and instantaneous vaporization may be obtained by contact of the water with the heated metal walls of a coil of pipe.

My invention consists of two worms or coils of pipes or tubes connected together, one coil surrounding the flame from a suitable source of heat and the other surmounting the first coil in the form of a cap, and said coils supported within a hood or casing of heat-retaining material; and my invention further consists of a steam-generator constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a vertical central sectional view of a steam-generator embodying main features of my invention. Fig. 2 is a side elevational view of a coiled rod adapted to be inserted in the tubes of the generator. Fig. 3 is an end elevation of Fig. 2. Fig. 4 is a side elevational view of a modified form of filling for the tubes, consisting of several disconnected rods arranged spirally with respect to each other; and Fig. 5 is an end elevational view of Fig. 4.

Referring to the drawings, *a* represents a hood or casing preferably conical in shape and having its interior lined with refractory and heat-retaining material *a'*. On the floor *a²* of this hood is coiled the worm *b* in the shape of an open cylinder. Above the worm *b* and supported by a suitable block or bracket *d* is coiled the worm *e* in the form of a cap,

the horizontal portion *e'* of which is arranged some distance above the top of the worm *b* and the walls *e²* of which are concentric with and inclose the walls *b'* of the worm *b*. The lowermost coil of the worm *e* extends some distance below the uppermost coil of the worm *b* and is connected thereto by a branch pipe *f*. Along the interior of the hood *a* is coiled a worm *g*, forming a feed-water heater, and this worm *g* is connected to the base of the worm *b*. An offtake-pipe *h* leads from the upper horizontal portion *e'* of the worm *e* to the steam-dome or other suitable reservoir. Water enters the feed-water worm *g* by means of the pipe *k* at the upper portion of the casing *a* and worm *g*.

The tubes of the worms *b* and *e* are preferably provided in their interior with a spirally-wound rod or bar *m*, as illustrated in Figs. 2 and 3, or the series of spirally-wound rods or bars *m'*, as illustrated in Figs. 4 and 5. In either case the rod *m* or rods *m'* preferably rest against the interior walls of the tubes and receive heat therefrom, and the water is forced through the spiral rod *m* or rods *m'* and in contact not alone with the heated tubes themselves, but with the spiral rod or rods. A special advantage of this construction is that the water in the tubes is subjected at many points to the heat arising from combustion, and hence is more quickly and intensely heated to the vaporizing-point. A second advantage in the use of the spiral rod *m* or rods *m'* resides in the fact that being so coiled or spirally formed they are flexible and readily adapt themselves to the bends in the tubes, so that they can be inserted or removed from the worms with little labor.

The casing or hood *a* is to be located over a suitable source of heat—such, for instance, as the flame from a hydrocarbon-burner—and the worm *b* acts as a flue to conduct and direct the heated gases toward the horizontal portion of the worm *e*. This horizontal portion deflects the gases downward through the space between the concentric portions of the two worms and into the interior of the hood or casing *a*, all as clearly indicated by the arrows in Fig. 1 of the drawings.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-generator, a hood or casing having its interior lined with refractory and heat-retaining material, a worm in open cylindric form supported on the floor of said casing, a second worm coiled in the form of a cap, the horizontal or top portion of which is arranged directly above the upper edge of the cylindric worm, said cap-shaped worm having walls concentric with and inclosing the upper portion of the walls of the cylindric worm, and a branch pipe connecting the upper coil of the cylindric worm with the lower coil of the cap-shaped worm, substantially as and for the purposes described.

2. In a steam-generator, a hood or casing having its interior lined with refractory heat-containing material, a feed-water coil arranged on said lining, a worm in open cylindric form supported on the floor of said casing, a second worm coiled in the form of a

cap, the horizontal or top portion of which is arranged directly above the upper edge of the cylindric worm, said cap-shaped worm having walls concentric with and inclosing the upper portion of the walls of the cylindric worm, a branch pipe connecting the upper coil of the cylindric worm with the lower coil of the cap-shaped worm, a pipe leading from the horizontal portion of the cap-shaped worm to a steam-reservoir and a connection between the lower portion of the feed-water coil and the lower coil of the cylindric worm, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

PAUL DOUDART DE LA GRÉE.

Witnesses:

A. FABRE,
T. ABOURD.