

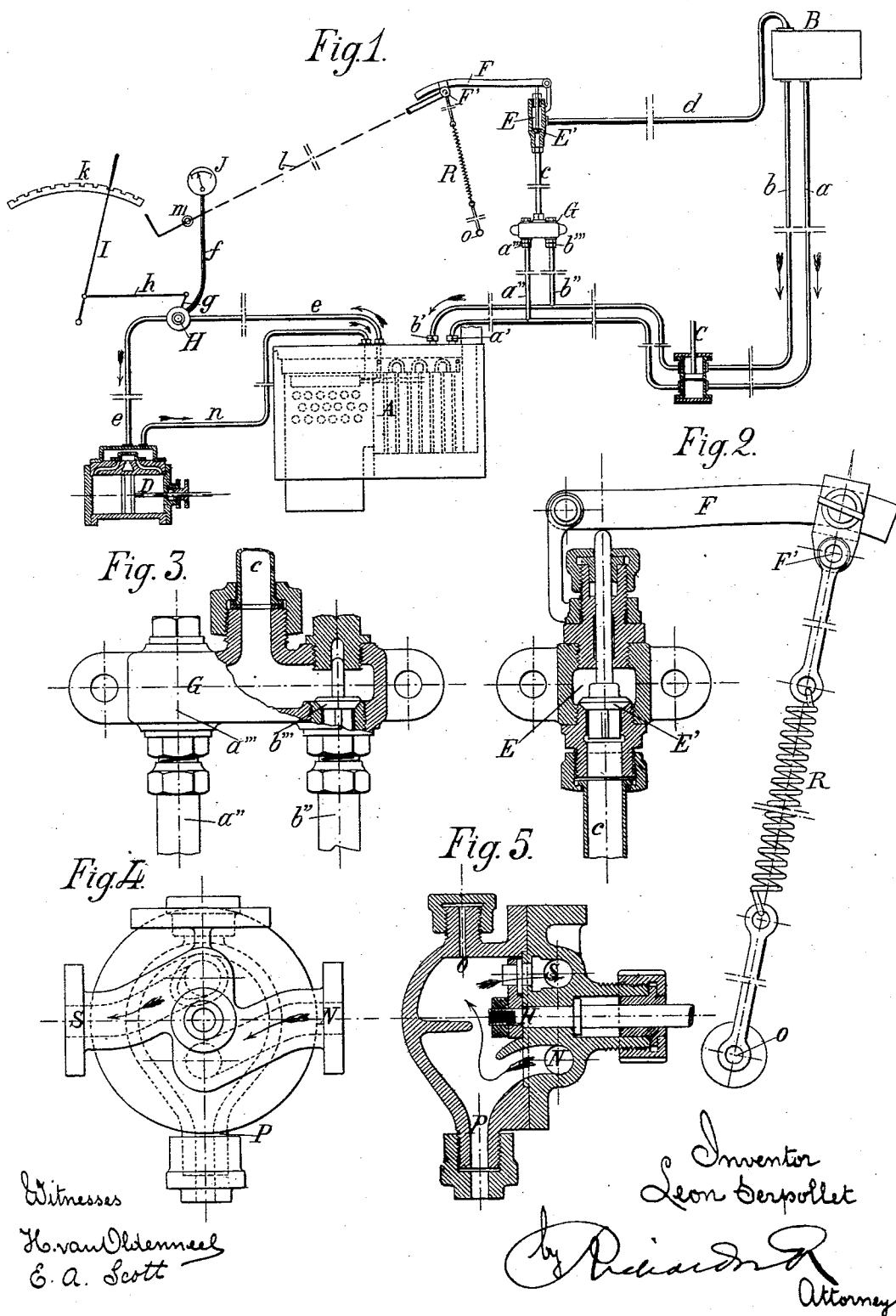
(No Model.)

3 Sheets—Sheet 1.

L. SERPOLLET.
STEAM ENGINE.

No. 587,760.

Patented Aug. 10, 1897.



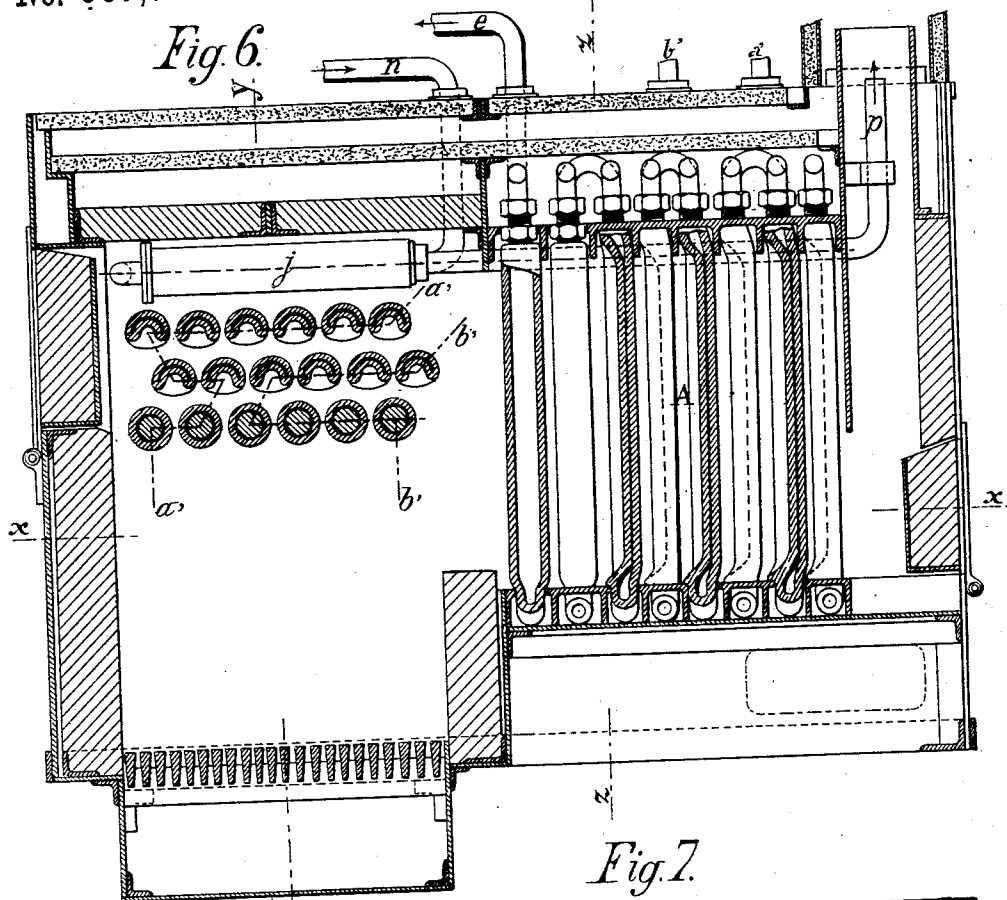
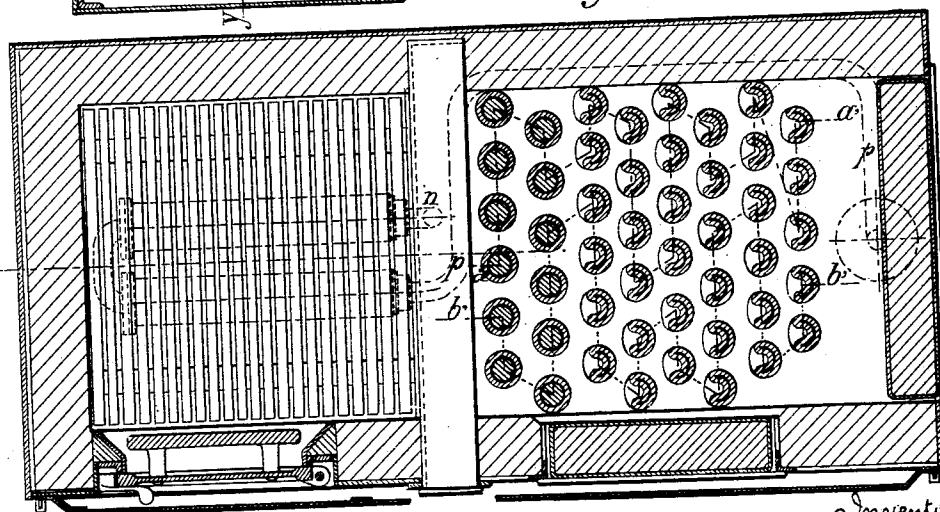
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L. SERPOLLET.
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No. 587,760.

Patented Aug. 10, 1897.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 9.

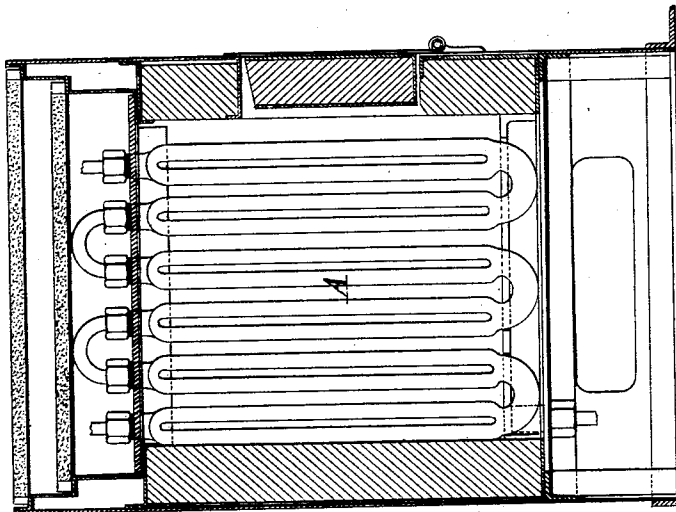
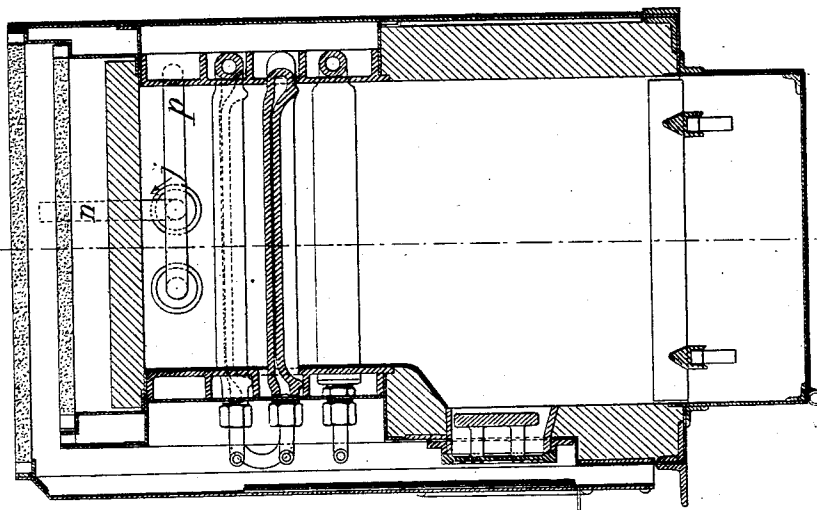


Fig. 8.



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UNITED STATES PATENT OFFICE.

LEON SERPOLLET, OF PARIS, FRANCE, ASSIGNOR TO LA SOCIÉTÉ DES GÉNÉRATEURS À VAPORISATION INSTANTANÉE, (SYSTÈME LEON SERPOLLET,) OF SAME PLACE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 587,760, dated August 10, 1897.

Application filed June 4, 1896. Serial No. 594,322. (No model.) Patented in France November 8, 1895, No. 251,540.

To all whom it may concern.

Be it known that I, LEON SERPOLLET, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Steam-Engines, (for which I have obtained a patent in France, No. 251,540, dated November 8, 1895,) of which the following is a specification.

My invention consists in a combination of organs connected by pipes and by transmission and stopping devices applied to steam-carriages provided with the instantaneous-vaporizing boilers of my United States patent and running on tramways. The object of the aforesaid combinations is to render the working and the management of the automobile carriage or of the locomotive quick, easy, sure, and economical whatever may be the momentary resistance of the road and the mechanical working corresponding to these resistances.

Figure 1 shows a diagram of the whole of the combination of all the organs concerned. Fig. 2 is a section through the axle of the box E and of the valve E', which it contains inside. Fig. 3 is a section and side view of the box G. The detail of the distributing-regulator H is given by Figs. 4 and 5. Fig. 6 shows a vertical section of the general arrangement of a boiler, shown simply in the diagram Fig. 1 by the letter A. Fig. 7 is the horizontal section following the horizontal line X X of Fig. 6. Fig. 8 shows an upright view of the section of the boiler following the vertical line y y of Fig. 6, and Fig. 9 shows an upright view of the section of the boiler following the vertical line z z of Fig. 6.

The boiler A is here supposed to be formed by two rows or distinct batteries of vaporizing-tubes, as is the case with most multitubular boilers or so-called "serpentine" boilers—as, for instance, the Belleville boilers—as soon as the heating-surface has to be increased, but here each series is fed by an equally-distinct water-pipe.

B is the feeding-tank, which contains and furnishes the feeding-water. It receives at the same time the return water, which has been taken from it by the pump and which is driven back in excess toward the boiler.

C is the double-action feeding, sucking,

and forcing pump, and D the motive cylinder of the machine.

E is the box, which contains in its interior forming-chamber the valve E', charged or held down by a lever F, at the extremity of which, bent concentrically with regard to the center o, the slide F', attached to the upper extremity of the spring R, slides. An eduction or return pipe d connects the interior of the box E with the feeding-tank B, allowing the return into this tank of the water driven back in excess toward the boiler.

The box G contains as many valves a''' b''' (in this case two) as there are series or groups of vaporizing-tubes in order to constitute the whole or the ensemble of the boiler A. The box G is only necessary in case the boiler be formed of more than one series of vaporizing-tubes, for where a boiler is formed by a single series the valve-box E with the valve E' and the return-pipe d suffice.

The valves of the box G rise under the afflux of the water driven back in excess by the pump or under the afflux of the water returning from the boiler under the pressure of the steam when the pressure in the boiler becomes stronger than the pressure acting on the valve E' and inside the box E, which communicates with the box G by the pipe c. The valves a''' b''' prevent any return of the water toward the boiler, while if the boiler were formed by a single series of tubes this return would be prevented by the valve E'. Moreover, these same valves insure an equal pressure in all the series of vaporizing-tubes of the boilers when this boiler is composed of more than one series.

The steam-distributor H is worked by the handle g, the switch-rod h, the lever I, which can be stopped in one of the notches of the arc K. The mechanism can act also (by means of the switch-rod l shown by the dotted line) on the slide F' of the spring R. This switch-rod is guided in a horizontal cylindrical bearer m. This bearer can be loosely fixed (with sufficient loose working or play to allow the switch-rod to slide easily) or can oscillate slightly as trunnions.

The pump C sucks the water of the tank B by the pipes a b and drives it back into the series of vaporizing-tubes of the boiler by the

corresponding continuing tubes $a' b'$, each of which is provided with a corresponding education-pipe $a'' b''$.

The steam formed in each of the groups of which the boiler A is composed escapes toward the cylinder by the pipe e , penetrates into the steam-distributor H by the opening N, following the course shown by the arrows 1 2, and leaves the steam-distributor by the aperture S, Figs. 4 and 5. The steam in striking against the opposite sides of the opening by which it enters loses some of its *vis viva* and abandons the fixed pulverulent matters which it carries along and which fall into the opening P, from where they can be extracted from time to time. The joint or flushing-opening O is for the purpose of cleaning the lower pipe P. The pressure of the steam is registered by the steam-gage J, and this pressure, according to the position one gives to the index F' on the lever F, varies with every movement in the way one wishes, according to the requirement of the service of the machine—i. e., according to the nature and the state of the road and the stoppages required by the passengers.

The steam which works in the cylinder escapes by the pipe n and is led into a superheater j , provided with movable bottoms to enable the superheater to be cleaned. The steam thus overheated to the required degree escapes through the chimney or flue and remains invisible even in damp weather.

One will readily conceive that the box G with several valves would be superfluous if the boiler A, instead of being formed by several series of groups of vaporizing-tubes, were formed by a single series of these tubes, which would then be fed by a single pipe a and a' , of which the derived branch a' would then communicate directly with the interior of the box E by the intermediary on the under part of the valve E'.

From the above it will be seen that the boiler, which, as before stated, is of my patented form, is an important element in the combination, and the whole system of return valves and connections belongs thereto.

My invention is thus not a safety-valve for the relief of the steam-pressure in the boiler, as ordinarily, but a valve arrangement for use with my peculiar form of boiler, in which the water fed thereto is vaporized instantaneously and wholly upon its introduction into the boiler, there being no reserve quantity of water in the boiler, that which is fed in excess from the tank being returned automatically thereto.

I claim—

1. In combination in a steam-engine with a boiler of the instantaneous-vaporization type, a tank for supplying the water, the pipe leading therefrom to the boiler, the return-tube to the tank for the escape of the surplus water from those parts of the boiler where the instantaneous vaporization takes place, and the valve inserted in the said return-pipe

for instantaneously controlling the pressure in the boiler and the return to the tank of the water not vaporized, substantially as described.

2. In combination in a steam-engine with a boiler of the instantaneous-vaporization type, a tank for supplying the water, a pipe leading therefrom to the boiler, the return-pipe to the tank for the escape of the surplus water from those parts of the boiler where the instantaneous vaporization takes place, the valve inserted in said return-pipe for instantaneously controlling the pressure in the boiler and the return to the tank of the not vaporized water, means for placing a variable tension on said valve and connections extending from said means to the hand of the operator whereby the steam-pressure may be regulated, together with the surplus water, substantially as described.

3. In combination in a steam-engine, the boiler having a plurality of nests of tubes, the feed-water tank connected to said tubes in the boiler, the return-pipe $c d$ the return branches $a'' b''$ and the chamber G connected with the return-pipes $a'' b''$ and $c d$ and having valves controlling the pipes a'' and b'' , said valves and chamber G serving to equalize the pressure in the tube-nests, substantially as described.

4. In combination in a steam-engine, the boiler, the cylinder and the distributor-valve H having a casing with passages N and S and the rotary spindle controlling the valve, substantially as described.

5. In combination in a steam-engine, the boiler, the cylinder, the oscillating valve, the casing having the passages N and S, and means for operating the valve consisting of the lever I, the segment K, the link h and the arm g , substantially as described.

6. In a steam-engine, the combination of a boiler of the instantaneous-vaporization type, a feed-water tank connected therewith, a pump for forcing the water from the feed-water tank to the boiler, a return-pipe connection c, d , between the boiler and the feed-water tank, a valve E' in said pipe, and a device for regulating the tension on said valve to control the return of the water to the feed-water tank, substantially as described.

7. In combination in a steam-engine, the boiler having a plurality of nests of tubes adapted for instantaneous vaporization, the feed-water tank connected to said tubes in the boiler, the return-pipe c, d , the return branches $a'' b''$, and the chamber G connected with the return-pipes $a'' b''$ and c, d , and having valves controlling the pipes $a'' b''$, said valves and chamber G serving to equalize the pressure in the tube-nests, substantially as described.

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Witnesses:

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