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H. Fontaine,

Improved Engine and Generator.

PATENTED MAY 2 1871

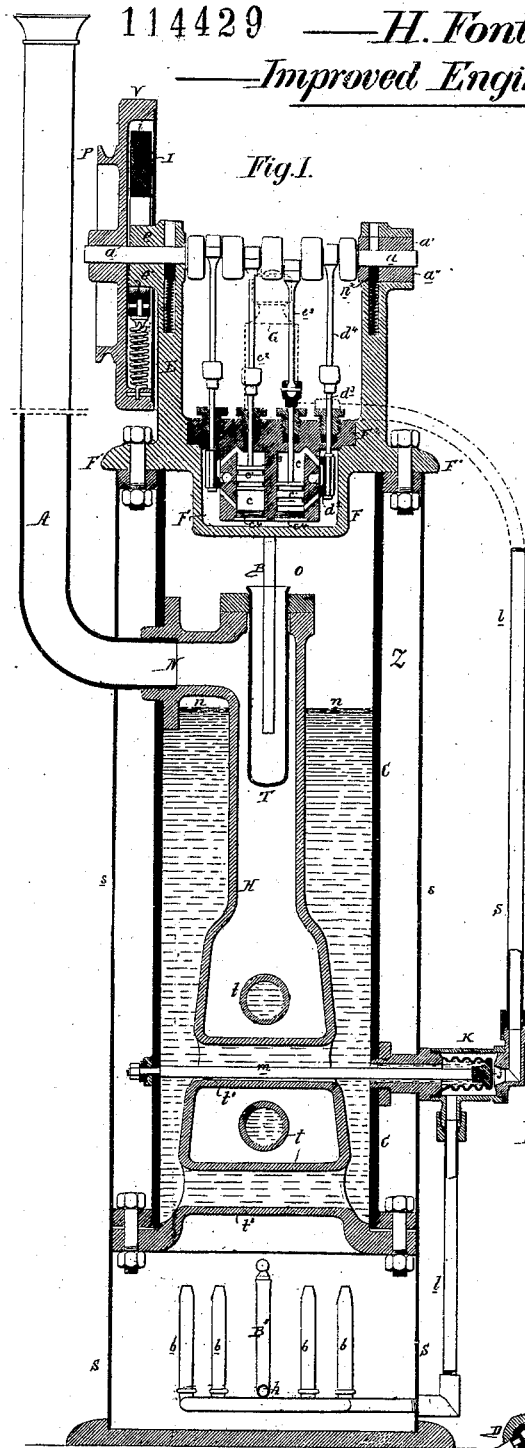


Fig. 1.

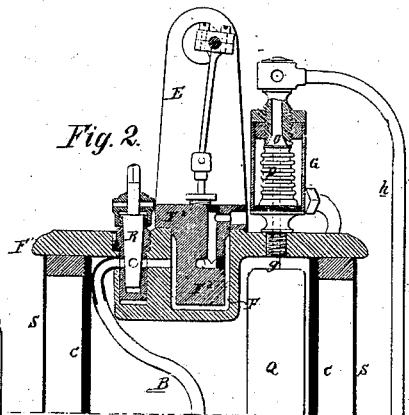


Fig. 2.

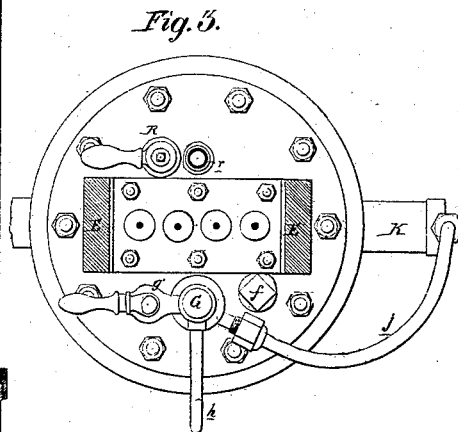


Fig. 3.

Fig. 4.

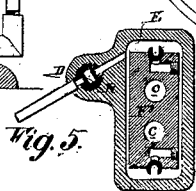
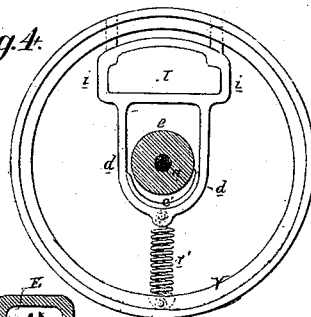


Fig. 5.

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Drawing No. 2.

Fig. 6.

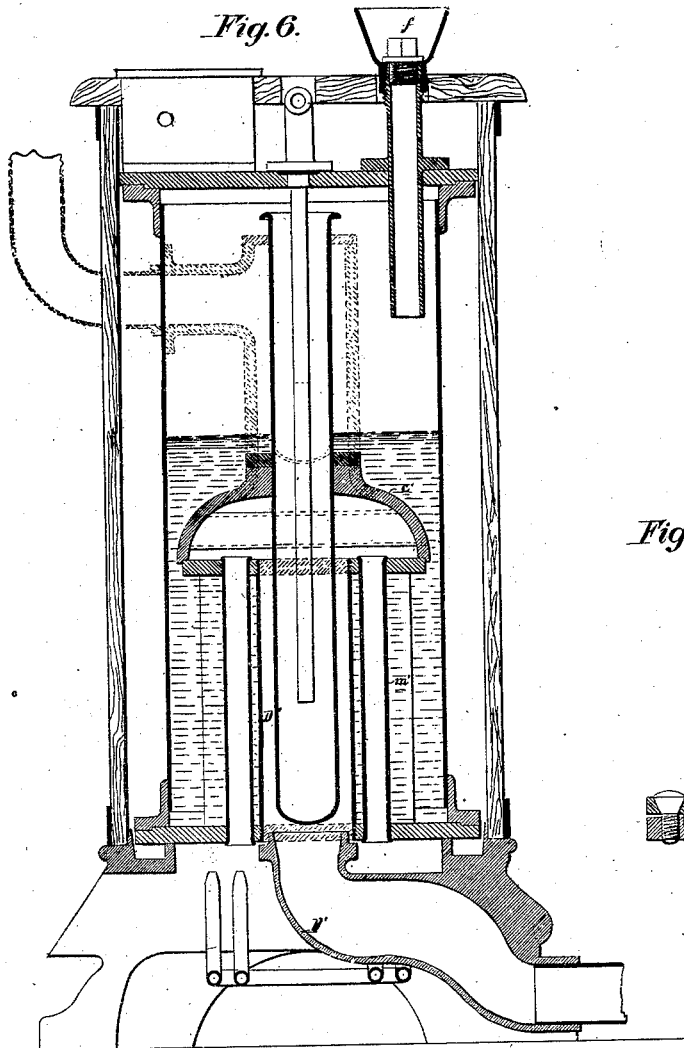


Fig. 10.

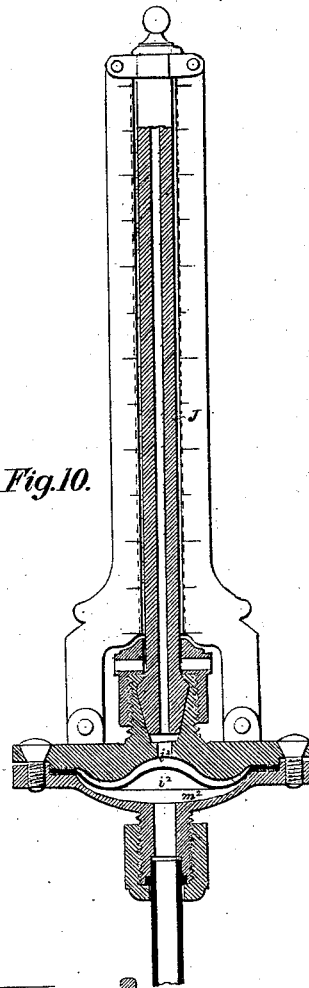


Fig. 7.

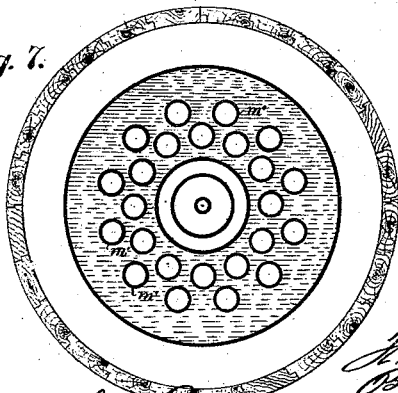
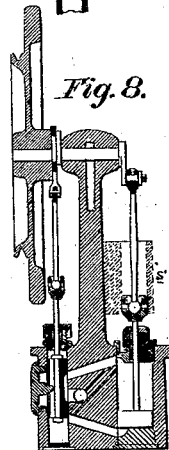


Fig. 9.



Fig. 8.



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United States Patent Office.

HIPPOLYTE FONTAINE, OF PARIS, FRANCE.

Letters Patent No. 114,429, dated May 2, 1871; antedated April 26, 1871.

IMPROVEMENT IN STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

I, HIPPOLYTE FONTAINE, engineer, in Paris, Empire of France, have invented an Improved Steam-Engine and Generator, of which the following is a specification:

Nature and Objects of the Invention.

My invention consists of a steam-generator and steam-engine, constructed and combined in a manner too fully described hereafter to need preliminary explanation, the whole forming a cheap, simple, safe, and easily-managed motive-power machine, for driving small lathes, sewing-machines, churns, and other objects which do not require much power to operate.

Description of the Accompanying Drawing.

Figure 1 (drawing No. 1) is a vertical section of my improved engine and generator;

Figure 2, a transverse sectional elevation on the line 1 2, fig. 1;

Figure 3, a sectional plan view of fig. 1;

Figures 4 and 5, detached sectional views of parts of the apparatus;

Figure 6, (drawing No. 2,) a sectional elevation of a modified form of generator;

Figure 7, a sectional plan on the line 3 4, fig. 6;

Figure 8, a sectional elevation of a modified form of engine;

Figure 9, a detached sectional view of part of fig. 8; and

Figure 10, a sectional elevation of an indicator which may be used.

General Description.

The body of the generator Z consists of a hollow cylinder, C, to the outside of which, at the upper and lower ends, are screwed rings forming flanges, and to the upper flange is bolted the cast-metal bed-plate F of the engine.

To the lower flange is bolted the flange of a detachable cast-metal flue, H, across the lower expanded end of which extend tubes *t t*, the tubes *t* alternating with and being at right angles to the tubes *t*; and near the upper end of the flue H is a lateral flanged branch, N, which extends through the cylinder C and communicates with a vertical smoke-pipe, A.

Into a cap at the upper end of the flue H is screwed a tubular case, T, open only at the upper end, and extending downward into the flue; and into this case extends a pipe, B, open at its lower end.

The cylinder C is surrounded by a casing, on the top of which the projecting edge of the bed-plate F bears, and within the lower portion of this casing, below the cylinder C, extend two pipes, *lh*, the latter being provided at its inner end with a gas-burner, B', and the

former being bent into a ring and provided with a series of burners, *b*.

To the bed-plate F is secured a case, G, which communicates with a pipe, *g*, leading to a suitable gas-reservoir, and having a seat to which is fitted a valve, *o*, the latter resting on a corrugated thin metal tube, *p*, which communicates with the steam-space O in the upper part of the generator.

A rod, *q*, extends from the valve *o* into the boiler, and is provided with a weight, Q, so proportioned that it will compress the corrugated tube *p* and withdraw the valve from its seat when the pressure of the steam is not sufficient to expand the tube and raise the valve.

The tube *h* communicates with the casing G above the valve so that a constant supply of gas is furnished to the burner B', while the tube *l* communicates with the casing below the valve so that when the pressure of steam within the generator becomes too great the valve will be closed and the supply of gas to the burners *b* will be cut off.

On the pressure being reduced the valve falls and the gas passing from the burners *b* is relit by the flame of the burner B'.

The continuity of the pipe *l* is interrupted by a casing, K, containing a corrugated tube, into which an expansion rod, *m*, secured to the generator, projects, as seen in fig. 1.

When the water becomes too low or the pressure and heat too great the rod *m* will expand and close the mouth of the lower portion of the pipe *h*, thereby cutting off the gas from the burners *b*, the rod contracting when water is introduced, and remaining in a contracted state as long as the boiler remains in a safe condition, and permitting the passage of gas to the said burners *b*.

On the bed-plate F' are two standards, EE', the latter having, near its upper end, an opening, *a'*, for the reception of the detachable bushing *a''* of a crank-shaft, *a*, the opposite end of the latter extending through the upright E and through a cylindrical projection on the same, and carrying at its outer end a fly-wheel, V, the latter being recessed at one side to receive the projection *e*, and having at the other side a grooved pulley, P.

The opening *a'* is of such a size as to permit the longitudinal insertion of the shaft *a* and the passage of its cranks, the bushing *a''* being then inserted, and in both uprights E E' are oil-recesses, springs *n* on which press lubricating-pads *n'* against the shaft.

The bed-plate F' is depressed at the center to form a chamber, with which communicates the steam-pipe B, a cock, R, serving to close the communication between the chamber and the boiler when required, (fig. 2;) and to the plate F' is fitted a plate F'', having at the

under side a projection, F''' , secured to, or as in the present instance cast with, and forming part of the plate F'' .

The projection F''' is of such a size that there is a steam-space between it and the walls of the chamber F , and is bored so as to form two vertical steam-cylinders, c , to which are fitted pistons c' , the rods of which project upward through suitable packing-boxes in the plate F'' , and are connected by rods c'' to the cranks on the driving-shaft.

The lower ends of the cylinders c are closed by screw-plugs c''' , and in the projection F''' are bored openings which extend to the sides of the projections and form the steam and exhaust-ports of the cylinder-valves d'' , connected to the rods d' , sliding on the faces of the projections F^3 over the said ports, and being suitably operated by cranks on the shaft a through connecting-rods d^4 .

Within the recessed side of the fly-wheel V is a yoke, d , attached at one end to a spiral spring, r' , which is secured at the other end to the rim of the wheel; and to the arms of the yoke is attached a weight, I , which, as the wheel revolves, moves toward the periphery by centrifugal force, overcoming the action of the spring, and if the wheel revolves too rapidly causes a pad, e , on the yoke d to bear on the hub e and retard the motion of the engine.

Operation.

Water is introduced into the generator to the height of the line n , fig. 1, through an opening in the plate F' , to which is fitted a steam-tight plug, f ; gas is passed to the pipe g' and ignited as it issues from the burners $B' b$, the heat from the flames and from the heated products of combustion as they pass upward through the flue H and in contact with the pipes t and T heating the water in the boiler, generating steam, which passes into the pipe T , where it is dried and superheated, and through the pipe B to the chamber F and to the cylinders, operating the pistons in the ordinary manner.

Should the pressure become too great the supply of gas will be reduced or cut off by the action of the expansion-tube p , as before described, while the descent of the water below the rod m will produce a like effect.

By constructing the engine and generator as above described many of the details and a large amount of nice fitting and adjusting of parts required in making an ordinary steam-motor are avoided; the apparatus is strong, substantial, easily and cheaply manufactured, not liable to get out of order, readily repaired if injured, and may be safely intrusted to the care of those not competent to take charge of the running of an ordinary engine.

Some of the features in the construction of the apparatus may be varied—for instance, ordinary tubular flues m' , communicating with a hollow cap, c' , to which a descending draught-pipe, D' , is connected, as shown

in figs. 6 and 7, may be substituted for the flue H , and a single cylinder may be used with a shaft extending through one upright only, as shown in fig. 8.

Where it is necessary, a hollow guide, s' , may be secured to the upright to guide the piston, as shown in fig. 8.

Claims.

1. A steam-boiler and steam-engine combined with devices, substantially as described, so that without replenishing the boiler the entire water in the latter may be consumed in supplying steam to the engine.
2. The generator, consisting of the cylinder C , flanges screwed onto the same, plate F' , and cast-metal flue H , constructed and arranged substantially as described.
3. The combination, with the generator Z and its flue or flues, of the tube T extending into the flues, and receiving the steam-pipe B , as set forth.
4. The cast-metal flue H , with its cross-tubes t and branch N , arranged as described.
5. A plate, F'' , having a projection, F''' , extending into a chamber, F , in the bed-plate, and recessed to receive pistons c' , as set forth.
6. The projection F''' , surrounded by a steam-chamber, F , having passages and ports, as described, and provided with valves arranged to slide on one or more of the exposed sides, as set forth.
7. The combination of the plate F' , its chamber F , and detachable plate F'' , its projection F^3 , chamber, passages, valves, and pistons, all substantially as set forth.
8. The upright E' , with its openings a' and detachable bearing a'' , in combination with the upright E and crank-shaft a , as described.
9. The recess in the uprights, containing springs n' and pads n'' , as set forth.
10. The wheel V , revolving adjacent to a stationary hub, e , and carrying a sliding weight, I , connected to a pad, e' , and operating the latter and operated by a spring, r' , substantially as set forth.
11. The burners b , communicating through a tube, l , with a casing, G , containing a valve, o , operated by the pressure of steam in the gasometer, substantially as set forth.
12. The said burners b , communicating with a regulating apparatus, in combination with a burner, B' , continuously supplied with gas, as specified.
13. The tube l , communicating with a casing, K , containing a valve operated on the descent of water in the boiler, as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FONTAINE.

Witnesses:

S. RIMAREL,
C. G. THIRION.