

W. E. Prall.
Steam Water-Elevator.
Nº 97225. Patented Nov. 23. 1869.

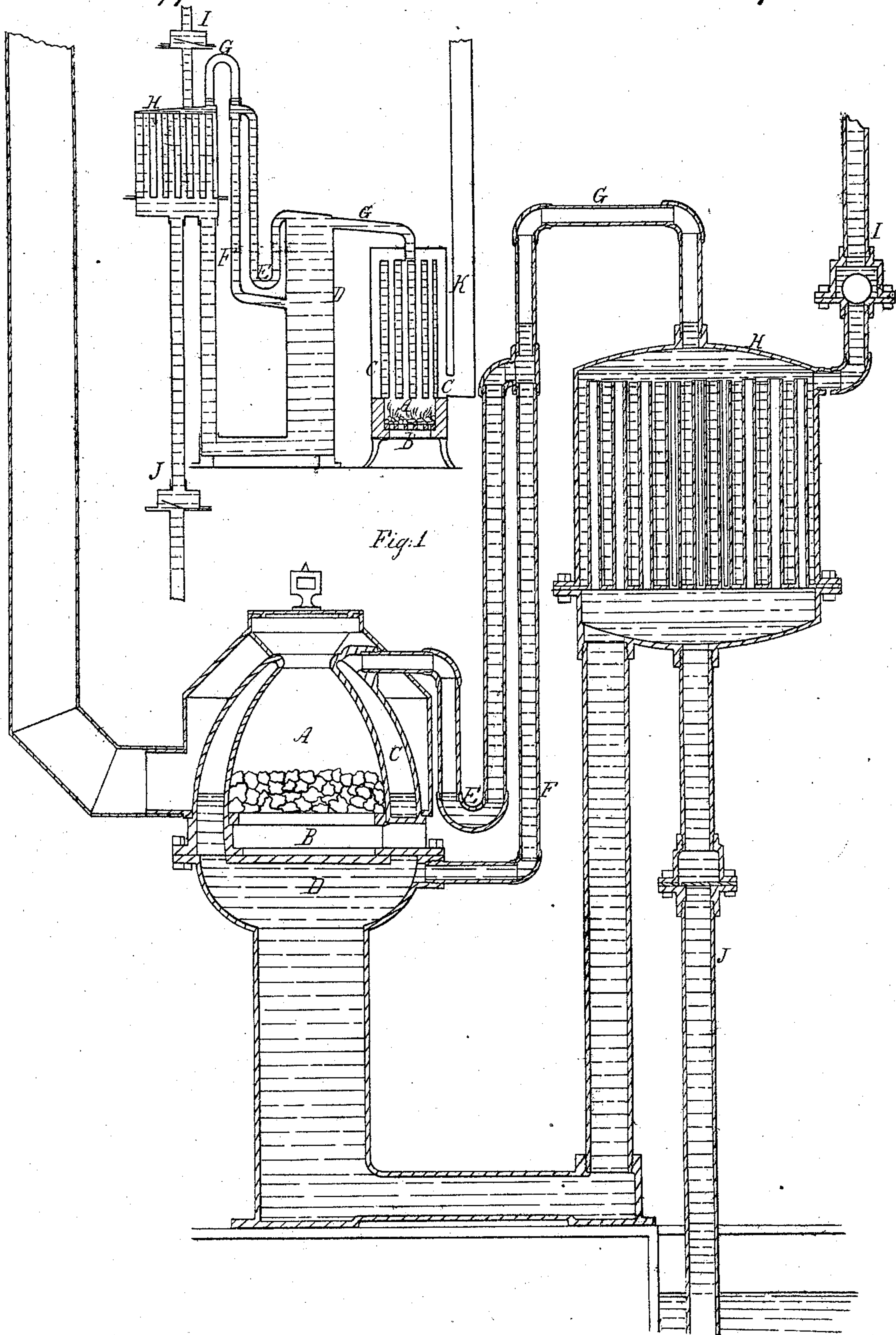


Fig. 1

Witnesses
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United States Patent Office.

W. E. PRALL, OF WASHINGTON, DISTRICT OF COLUMBIA.

Letters Patent No. 97,225, dated November 23, 1869.

IMPROVEMENT IN STEAM WATER-ELEVATORS.

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

To all whom it may concern:

Be it known that I, W. E. PRALL, of Washington, in the county of Washington, and District of Columbia, have invented a new and useful Improvement in Water-Elevating Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure 1 is a vertical central elevation of my improved engine, showing the generator, water-reservoirs, condenser, and connecting-pipes.

Figure 2 is a vertical central section of a modified form of the same devices, showing a different form of generator and water-reservoir.

This invention relates to that class of engines which are used for elevating water from a well or other reservoir, or from a stream, to any desired locality above the level of such source of supply, steam being the agent employed for the purpose of elevating the water.

The invention consists in the combination and arrangement of the parts of which the device is composed.

It has been found to be of great importance, in engines of this class, and especially in those of this peculiar construction, it being such that steam is generated and condensed in the same devices, that the means for condensing the steam should be such as to produce as near instantaneous condensation as possible, and it is the object of this invention to combine with the other portions of the engine such a condenser, in order that its pulsations may be more rapid, and thus insure the raising of a greater quantity of water in any given length of time.

A represents the combustion-chamber of a steam-generator, or rather of the steam-generating portion of the engine. This generator, or portion of the device may be constructed as shown in the drawing, or of any other convenient form that will leave a steam-space in its upper portion, so that, as steam is generated, it shall collect therein, and press upon the water in the hot-water cylinder below, and cause a portion thereof to be expelled through siphon-pipe F.

B represents the ash-pan of the generator, through which the air passes for the support of combustion in the fire-box, the fuel being supplied through the top of the generator, the aperture of which is covered with a removable plate, and the unburned products of combustion escaping from such chamber through any suitable pipe.

C represents the steam-space of the generator.

D represents the hot-water cylinder, which is to be placed below the generator, so that the water in the upper portion thereof is always kept heated, and so that, as a portion of its contents are expelled, by being forced down by the steam, and out through the pipes,

as above described, it shall still retain a considerable quantity of highly-heated water, to be carried back into contact with the surface of the generator, in order that another pressure may be generated within the generator, or the steam-space thereof, without the lapse of time which would be necessary if cold water were allowed to come in contact with such surface.

E represents a bent pipe, which is to be attached to the upper portion of the steam-space of the generator, from which point it extends outward and downward, and then up, as shown in fig. 1 of the drawings, having its upper end attached to the pipe F, so that it forms the short leg of a siphon, and performs an office very analogous to that of a cut-off valve in a steam-engine.

F represents another pipe, the lower end of which is to be secured to the generator at a point some distance below the ordinary water-line, from which point it extends outward and then upward, as seen in fig. 1, until it reaches an elevation somewhat above the upper surface of the condenser, when it is turned to a horizontal position, and extends in the direction of the condenser until it reaches a point directly above the centre of such condenser, when it is to be turned downward and attached to a boss formed upon the cap or cover of each condenser. This pipe forms the long leg of a siphon, its office being, at the proper time, to withdraw the water from the siphon or pipe F, and thus open a steam-passage between the generator and condenser.

G represents the upper horizontal portion of the pipe F, as above described, it being enough higher than the condenser to always be filled with air, and thus prevent an oscillation of water between the generator and condenser.

H represents a condenser, which is to be provided with a large number of tubes, it being desirable to have as many as possible, without making the condenser too large. It will be seen that this vessel is to be provided with a flue-sheet near its lower end, to which the tubes are to be secured in the usual manner, but so as to be water-tight therein. Outside of the ends of these tubes, a chamber is to be provided, as shown in fig. 1 of the drawings. As a consequence of this arrangement of the tubes, their upper ends are left free, and they can expand and contract indefinitely, without causing any injury to themselves, or the vessel with which they are connected, and at the same time they present both their outer and inner surfaces to the heating action of the steam and the cooling effects of the water. The condenser, as will be seen, is connected to the generator by means of pipes E F G, and cylinder D, so that at every discharge of water from the generator, the tubes are filled and surrounded with water supplied to the condenser by the induction-pipe J.

I represents a discharge-pipe, which may be attached to the upper portion of the condenser, and is to be supplied with a check-valve, when the water which it carries off is to be elevated above its own level.

J represents the induction-pipe for the water. It is to be secured to the lower portion of the condenser, and may extend downward into a well or other source of supply, so as to conduct the water to the condenser. The operation of this device will be as follows:

It is first to be filled with water, through an aperture in the top of the condenser, where all the pipes and parts are filled except the air-chamber, or continuation of the pipes E and F, which has such an elevation above the condenser that it can never become filled with water.

Fire is kindled in the chamber A. As the steam accumulates in the generator, the water is forced downward into the hot-water cylinder, and as there are no obstructions in any of the connections with the condenser H, the pressure is at once communicated to the water in the condenser, and the discharge-pipe I, attached to the top of the condenser, discharges an amount of cold water exactly equal in amount to the quantity of hot water that was forced into the hot-water cylinder by the steam in the generator.

The hot-water cylinder D, which is connected with the generator, and located beneath it, has a capacity much greater than the generator, therefore the hot water can never be discharged into the horizontal pipe connecting with the condenser. The steam, as it accumulates, presses the water downward, until the water in the generator is driven sufficiently below the bottom of the short leg of the siphon or pipe E to make it the lightest column; then the water in the long leg of the siphon takes the water from the short leg, and the passage-way connecting the generator with the condenser is opened, and the steam at once passes to the top of the condenser through the air-chamber pipe G.

The elevation of the condenser H being greater than that of the generator, the water, in consequence of its gravity, presses downward out of the condenser, and forces the hot water back into the generator, and the cut-off or siphon pipe becomes filled again. The space made vacant by this recession of the water in the condenser becomes filled with the steam from the generator; that is, as the water presses downward toward the generator, the steam goes upward into the condenser, and is brought into immediate contact with the cold tubes in the condenser, just made vacant by the receding cold water.

A vacuum is at once produced by the condensation of the steam, the induction-valve opens, water from the supply at once rises into the condenser, and the steam immediately begins to again generate; the water never having entirely left the heated plates which surround the fire, is at the boiling-point; and the operation is quickly repeated, and continues as long as the fire is kept up in the generator.

At fig. 2 is shown a modification of the devices, where it will be seen that the generator is of different construction, and the hot-water cylinder is placed in a different position.

Having thus fully described my invention,

What I claim, and desire to secure by Letters Patent, is—

The combination of a steam-generator, A, a hot-water cylinder, D, siphon-pipes E and F, and a tubular condenser, when constructed and arranged substantially as set forth.

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

W. E. PRALL.

Witnesses:

A. RUPPERT,

B. EDW. J. EILS.