

W.E. Prall.
Steam Water-Elevator.

Nº 97220.

Patented Nov. 23. 1869.

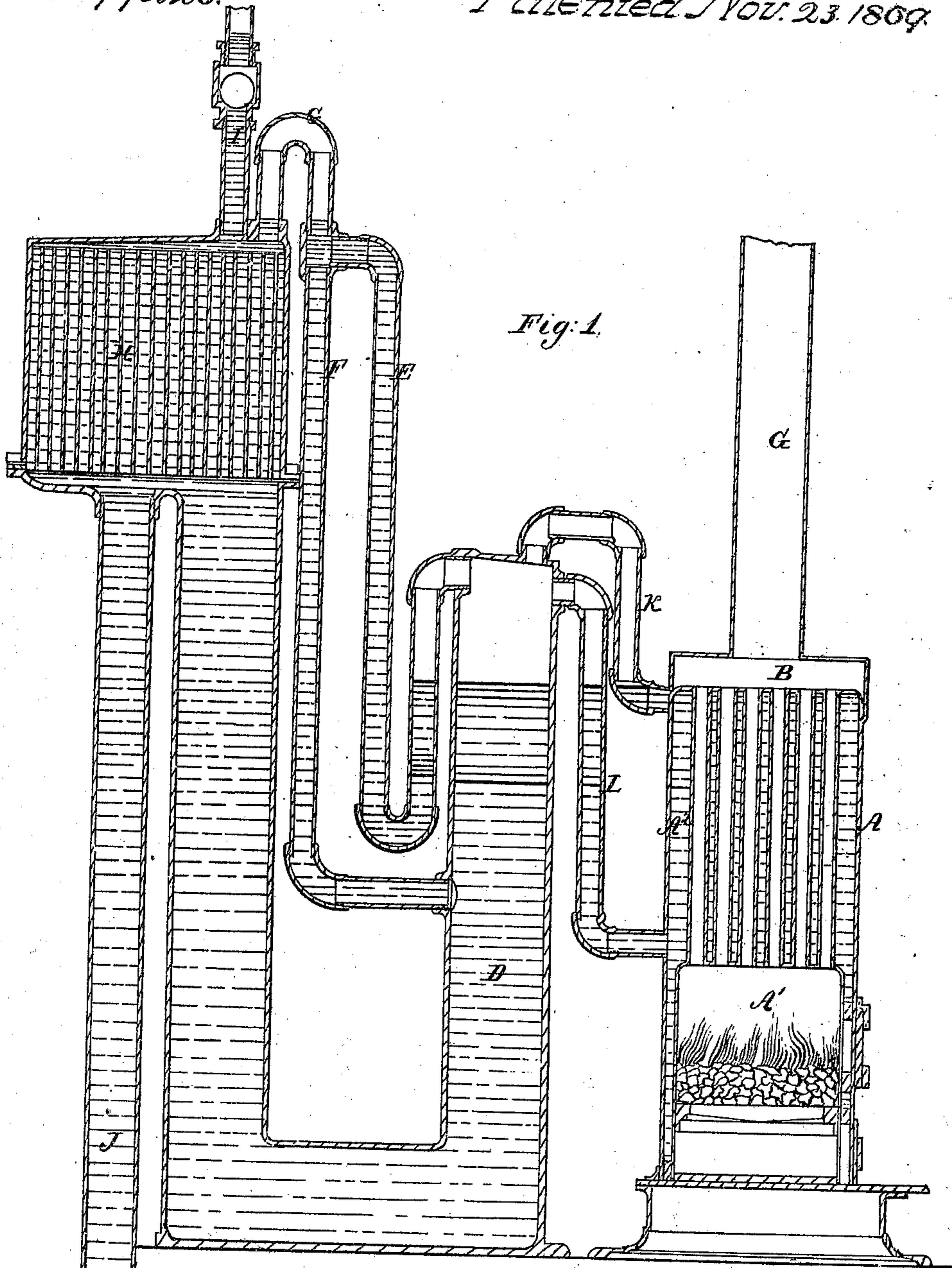


Fig. 1.

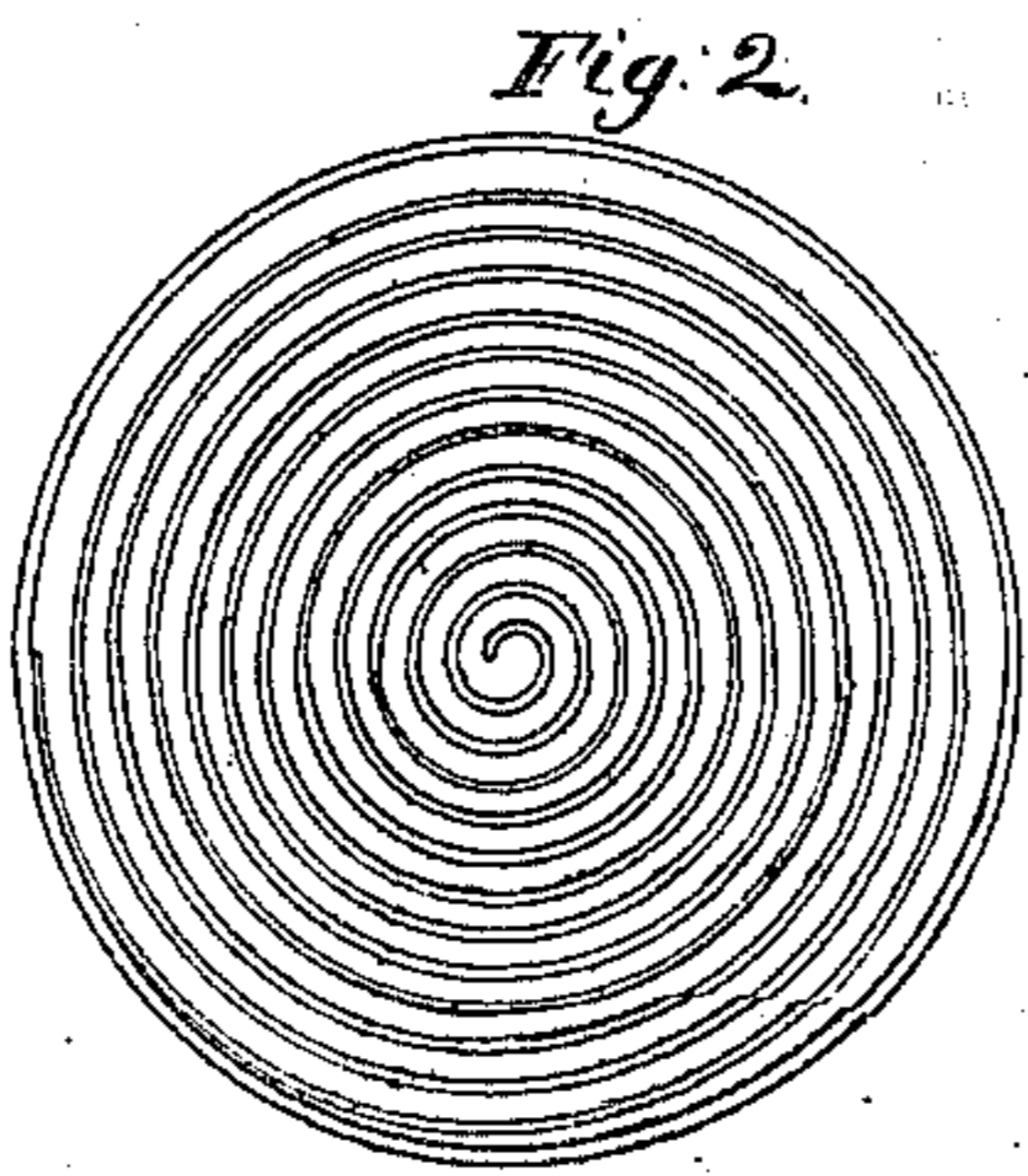


Fig. 2.

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

Letters Patent No. 97,226, 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 Machine; 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 sectional elevation of my improved device.

Figure 2 is a plan view of a worm or coil of pipe, which may be placed within the case of the condenser, and thus be made to perform the function of condensing the steam, it being, in such case, a substitute for the tubes shown in fig. 1.

Corresponding letters refer to corresponding parts in the figures.

This invention relates to that class of engines which is used for elevating water from wells or other sources of supply, to any point above such source, steam being the agent employed for that purpose; and

The invention consists in the arrangement of the pipes which conduct the water to the generator, and the steam therefrom, it being designed as an improvement on the one for which an application was filed by me in the United States Patent Office, on the 6th of August, 1869.

The object of this particular arrangement is to provide the means of adapting it to domestic purposes, so that the generator may be set in any position, either connected with a cooking-range or otherwise, and the elevating-mechanism in any other position, so that the generator may be supplied from the hot-water cylinder, as will be more fully described hereinafter.

A, in the drawings, represents the steam-generator, which, in this instance, consists of a vertical tubular boiler, having an upper tube-sheet, to which the upper ends of the tubes are secured, and through which they open into the smoke-chamber and the up-take. These tubes are surrounded with water, the spaces between the crown-sheet of the fire-box and upper tube-sheet being filled therewith.

A' represents the combustion-chamber of the generator, it being arranged within the shell thereof, in such a manner as to leave a water-space between the two. The upper or crown-sheet of this combustion-chamber is to be perforated, to receive and hold the lower ends of the tubes through which the products of combustion pass to the up-take. This generator is to be supplied with a door, for the admission of fuel, a grate, upon which to burn such fuel, and an ash-pit, for the reception of the ashes, all of which may be of the usual construction.

B represents the smoke-box or chamber, which is placed upon the top of the generator; and

C represents the up-take, which carries or conducts off the products of combustion from such smoke-box.

D represents the hot-water cylinder, which is to be of the form shown in fig. 1, of the drawings, or of a form equivalent to that, in order that its outer or highest end may communicate directly with the condenser, while its inner or short end is connected directly to the generator, by means of the pipes K and L.

E represents a bent pipe, which is to be attached to the upper portion of the steam-space, in the upper end of the hot-water cylinder, 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 hot-water cylinder D, at a point about midway of its length, 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, where it is supplied with a half-turn, and again carried downward, and attached to a boss formed upon the cap or cover of the 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 E, and thus open a steam-passageway between the generator and the condenser.

G represents the upper portion of the pipe F, it being enough higher than the condenser to be filled with air or vapor at all times, except when steam is passing through it, and thus prevent any circulation of water between the generator and condenser at this point.

H represents a condenser, which may 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 or flues 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 tubes, their upper ends are left free, and they can expand indefinitely, without causing any injury to themselves or to 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, it will be seen, is connected to the hot-water cylinder, so that at every discharge of water from such cylinder, the tubes of the condenser, and the condenser itself, are filled with water supplied thereto by the induction-pipe J.

I have described the condenser as being supplied

with tubes, for the purpose of increasing its cooling-surface, but it may be supplied with such a device as is shown in fig. 2, which consists of a plate or plates of metal, which are to be secured to the upper head of the condenser, and extend downward to near the bottom thereof, and thus present the necessary heat-absorbing surfaces. Another, and an equivalent form, would be to fill, or partially fill, the case of the condenser with rods or pieces of iron, with which the steam and water would come in contact, and thus the heat-absorbing surfaces would be presented.

I represents a water-discharge pipe, which may be attached to the upper portion of the condenser, and which is to be supplied with a check-valve, when the water which it conducts away 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:

All the parts having been previously filled with water, except the pipe G, a fire is to be kindled in the generator. As steam accumulates in the top thereof, it will be forced out through the pipe K, into the upper portion of the hot-water cylinder, where it presses upon the water therein, and as there is no obstructions in any of the connections with the condenser, the pressure is at once communicated to the water therein, and the discharge-pipe, which is attached to the top thereof, discharges an amount of water exactly equal to the quantity which was forced out of the hot-water cylinder.

The hot-water cylinder, which is connected with the generator by means of the pipes K and L, has a capacity much greater than that occupied by the quantity which is discharged at any one time, and, as a consequence, the water can never be drawn out of such cylinder, but is only forced downward therein, so that it is returned to the lower portion of the generator upon the refilling of the condenser, which causes the hottest portion of the water in such generator to be brought into contact with the heated portion of the tubes, thus insuring the rapid generation of steam for the next discharge into the cylinder.

The steam, as it accumulates in the hot-water cyl-

inder, presses the water downward, until the water therein is below the water in the short leg of the siphon or pipe E, when it becomes the lightest column, when the water in the long leg of the siphon takes the water from the short leg, and the passage-way connecting the hot-water cylinder with the condenser is opened, and the steam passes to the top of the condenser, through the air-chamber or pipe G.

The elevation of the condenser being greater than that of the generator or hot-water cylinder, the water, in consequence of the gravity, passes downward out of the condenser, and forces the water back into the upper end of the hot-water cylinder, and from thence into the generator, provided there is any space not already filled, by which the siphon-pipe becomes filled again. The space made vacant in the condenser by this recession of the water, becomes filled with the steam from the generator, that is, as the water passes downward through the water-cylinder, the steam passes therefrom into the condenser, and is brought into immediate contact with the cold surfaces then presented, which have just been made cool by the receding cold water, as a consequence of which the steam is condensed, and a vacuum is formed, when the induction-valve opens, and water from the source of supply rushes into the condenser.

While the above-described operation has been going on, steam has been generating in the generator, which now rushes into the hot-water cylinder, and again presses the water down, and thus the operation will be repeated as long as the fire is kept up in the generator.

Having thus fully described my invention,

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

The within-described arrangement of the pipes K and L, substantially as and for the purpose specified.

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

W. E. PRALL.

Witnesses:

WM. T. FARNHAM,
GEO. W. FARNHAM.