(No Model.)

H. M. YOUNG.

STEAM BOILER HEATER.

No. 285,453. Patented Sept. 25, 1883.

Fig. 1.

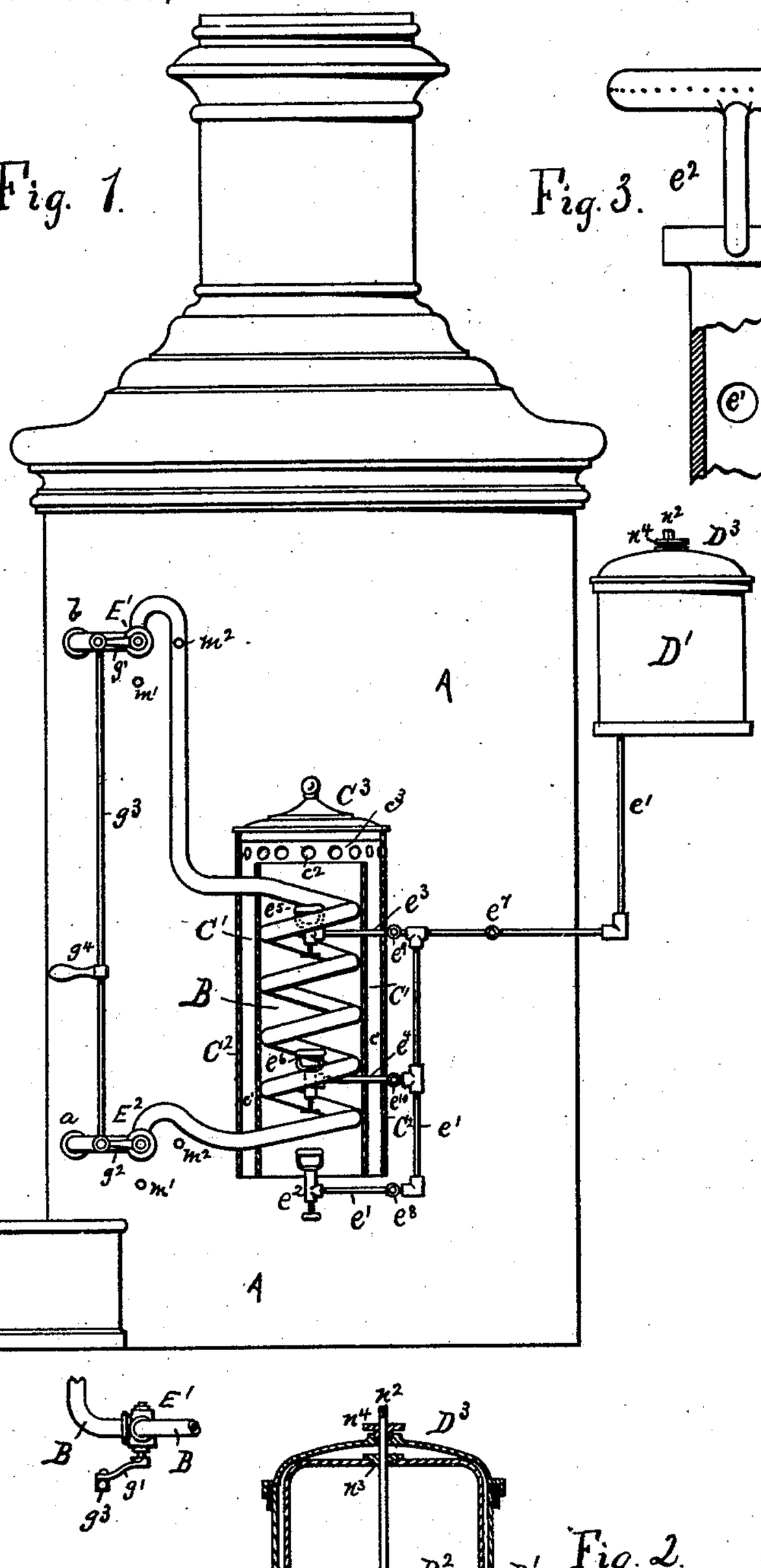

Fig. 3.

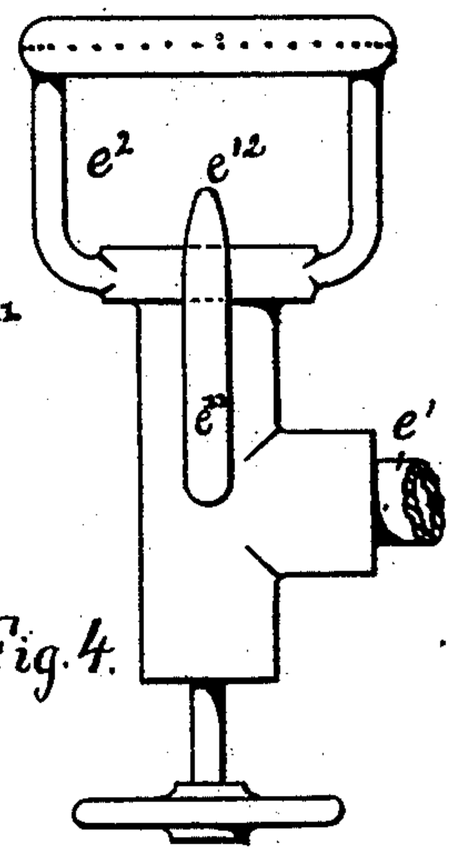

Fig. 4.

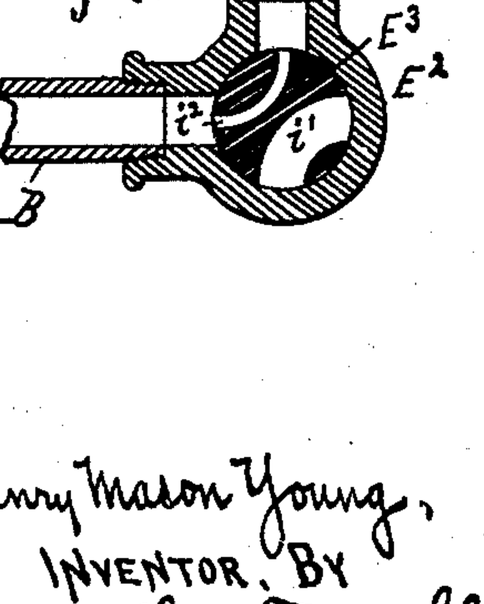

Fig. 5.

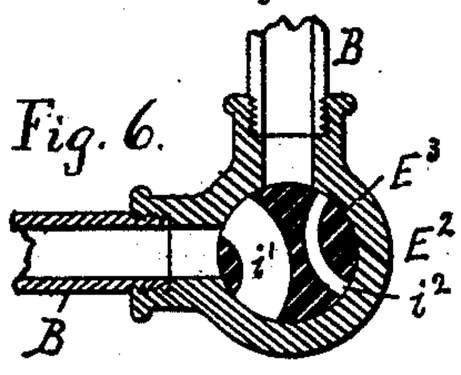

Fig. 6.

Fig. 7.

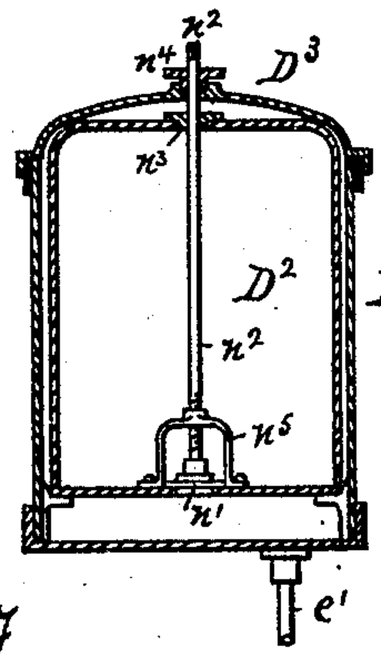

Fig. 2.

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STEAM-BOILER HEATER.

SPECIFICATION forming part of Letters Patent No. 285,453, dated September 25, 1883.

Application filed July 26, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY MASON YOUNG, a citizen of the United States, residing at Minneapolis, county of Hennepin, and State of Minnesota, have invented certain new and useful Improvements in Steam-Boiler-Heater Attachments, of which the following specification is a full, clear, and exact description, reference being also had to the accompanying drawings, in which—

Figure 1 is a side view of a portion of the boiler of a steam fire-engine, showing my improvement attached thereto. Fig. 2 is an enlarged sectional view of the gasoline-tank; Figs. 3 and 4, enlarged detail views of one of the burners. Figs. 5, 6, and 7 are enlarged sectional views of the two-way cocks by which the water is fed from the boiler to the heating-coil.

This improvement may be attached to any kind of boiler, but is more especially applicable to the boilers of steam fire-engines, upon one of which it is shown arranged.

A is the boiler, and B a coil of steam-pipe connected to it by one end, *a*, below the water-line, and by the other end, *b*, above the water-line.

C′ is a sheet-metal jacket encircling the coil of pipe, and C^2 is another similar jacket encircling the first jacket, leaving an air-space, *c*′, between them. The outer jacket is provided with perforations c^2 near its top, and a cover, C^3, as shown, leaving an air-space, c^3, between the cover and the upper edge of the inner jacket. By this arrangement a non-conducting jacket is formed to confine the heat radiated from the coil and prevent its waste, or from injuring the polished jacket of the boiler or other parts of the steamer.

D′ is a gasoline-tank, from which a pipe, *e*′, leads beneath the lower part of the coil B, and is provided with a burner, e^2.

e^3 e^4 are two branch pipes leading from the main pipe *e*′ to points inside the coil B, and provided with burners e^5 e^6. The pipe *e*′ is provided with stop-cocks e^7 e^8, and each of the branches e^3 e^4 is provided with a stop-cock, e^9 e^{10}, by which the flow of gasoline may be shut off entirely, or fed to one or more of the burners, as required.

E′ is a "two-way" cock inserted into the pipe B between the coil and the end *b*, and E^2 is another two-way cock inserted into the pipe between the coil and the end *a*. The plugs of each of these cocks E′ E^2 is provided with a crank-arm lever, *g*′ g^2, and the crank-arms connected to each other by a rod, g^3, having an operating-handle, g^4, so that both valves may be operated at once by moving the rod g^3 up and down.

As before stated, the cocks E′ E^2 are two-way cocks, the construction of the lower cock, E^2, being shown in Figs. 5, 6, and 7, in which E^2 represents the casing, and E^3 the plug. The plug is provided with two curved ports, *i*′ i^2, the former as large or nearly as large as the interiors of the pipe leading into them, while the latter port is much smaller, as shown.

The solid portions of the plug between the ports is large enough to cover the outlets or inlets to the pipe B when turned, as shown in Fig. 6, so that the passage of water through the cock may be shut off entirely. In Fig. 5 the plug is shown turned so as to permit the water to flow through the large port *i*′. In Fig. 6 the plug is turned so as to shut the water off entirely, while in Fig. 7 the plug is shown turned so as to admit water through the small port i^2 only.

The upper cock, E′, will be constructed just like the cock E^2, except that both its ports will be large, like the port *i*′ in the plug of the cock E^2.

In Fig. 1 the connecting-bar g^3 of the cocks is shown placed so as to hold the cocks wide open, and then when the bar is forced one-fourth a revolution downward, or when the outer ends of the crank-arms are at *m*′, the cocks will be closed; and then when the bar is forced one-fourth a revolution upward on the other side, or when the crank-arms are at m^2, the small port i^2 of the lower cock will be open, as in Fig. 7, and the upper cock wide open. By this means the engineer can at will admit a large or small quantity of water to the coil B, or shut it off altogether.

The burners e^2 e^5 e^6, as before stated, are of the ordinary construction, except that a small auxiliary feed-pipe, e^{11}, is arranged to run from the body of the burner below the valve

and opening at e^{12}, beneath the perforated ring, so as to provide a constant supply of gasoline to the burner, so that if the flame of the burner becomes blown out or otherwise extinguished the gasoline flowing from the small tube e^{11} will at once relight it. By this simple device the burner is rendered non-extinguishable as long as the supply of gasoline exists. The main burner can only be extinguished by a draft of air, which drives the gas back into the supply-pipe, and any such draft will tend to force the gas through the auxiliary pipe e^{11} more rapidly, and the gas from said auxiliary pipe coming in contact with the heated burner will be ignited and keep the burner lighted until the supply from the main pipe is restored.

The gasoline-tank consists of an outer tank, D′, and an inner tank, D^2. The latter is provided with a valve, n', in its bottom, having a stem, n^2, passing up through a stuffing-box, n^3, in the top of the tank D^2, and thence out through a similar stuffing-box, n^4, in the cover D^3 of the outer tank, D′. The feed-pipe e' leads from the outer tank, D′, to the burners, as shown. The cover D^3 is made removable and adapted to be fitted gas-tight to the tank D′, and the stem n^2 is provided with a screw-thread where it passes through the valve-cage n^5, and the latter formed with a screw-thread, so that it forms a nut to the screw-thread on the stem n^2. A spring may be used to hold the valve n' closed; but a screw-thread is preferable, as it is less liable to become displaced. By this arrangement the inner tank, D^2, may be filled with gasoline and the valve n^2 screwed down tight, so that no leakage can occur, no matter in what position the can may be placed. Then by removing the cover D^3, placing the tank D^2 in position inside the tank D′, as shown in Fig. 2, and replacing and securing the cover D^3, with the stem n^2 projecting out through the stuffing-box in the cover, the valve n' may be opened by turning the stem n^2 with a wrench from the outside and the gasoline allowed to escape into the space between the two tanks, and thence through the pipe e' to the burners. By this means the tank D^2 may be filled at any safe distance from the burners or other fire, and then placed in the tank D′, thereby preventing the exposure to heat or flame of the gasoline, except through the valve n' to the burners in the proper manner. Several of these tanks D^2 already filled will be provided with each boiler, so that when one becomes empty another can be placed in position very quickly and without danger of explosions. By this means a perfectly safe method is provided for replenishing the supply of gasoline to the burners and heater.

When used upon steam fire-engines, the lower burner is kept burning all the time, which keeps the water in the boiler hot enough to circulate constantly through the coil, thereby heating all the water in the boiler up to near the boiling-point. The heat from the lower burner is also sufficient to keep the other burners hot enough, so that when the gasoline is admitted to them by opening the cocks e^5 e^6 gas will be at once created and the burners flash at once into flame, so that no necessity exists of heating the burners before igniting them. The heat from the three burners is sufficient to raise steam in the boiler to a pressure of from thirty to forty pounds, which is sufficient to start the "blower" in the smoke-stack and keep up the supply of steam after the fire in the boiler is lighted and the pumps started. To secure the generation of this thirty or forty pound pressure in a very short time is the object of forming the plug of the valve E^2 with the small port i^2, so that a small supply of water may be admitted to the coil B′. The heat from the three burners is sufficient to heat the coil nearly, if not quite, red hot; hence when the water is admitted through the small port i^2 it is very rapidly converted into steam, and rushes into the boiler and raises the pressure much more rapidly than if a larger supply of water were admitted. When an alarm of fire is sounded, the engineer turns on the burners e^5 e^6 and turns the valve E^2, as shown in Fig. 7, and in two or three minutes a pressure of thirty or forty pounds of steam is generated. When the scene of the fire is reached, if the engine is needed, then the fire in the boiler is lighted and the pumps at once started, the steam already generated being sufficient to keep up the supply by means of the blower. If the alarm is a false one, or the fire so small as not to require the services of the steamer, then it is only necessary to shut off the two upper burners and return to the engine-house without lighting the fire in the boiler at all.

A large percentage of fire-alarms are given by mistake, or for small insignificant fires that are extinguished before the steamers arrive, and by my apparatus in all such cases the fuel in the boiler is saved, as no necessity thereby exists of lighting it. This device also saves a very large percentage of wear and tear caused by the action of the fire upon the boiler when lighted for false alarms. Another great advantage is, that after answering one alarm the engine returns to the house in just as good or better condition to answer another alarm as it was to answer the first, whereas if the fire had been lighted in the boiler, and then the grates dumped when the conflagration was extinguished preparatory to cleaning the boiler and rearranging the kindling and other fuel, much valuable time would necessarily be lost by rebuilding the fire and getting up steam again in event of another alarm being sounded before the steamer was in condition to answer it. By my device, however, all such danger is avoided, as the steamer is always in condition to answer any number of alarms, no matter how short a time may elapse between them.

The ends of the coil B may be arranged to be led into a bath-tub or other body of water

it is desired to heat, as the heated air in the pipes will cause the water to circulate through them and heat the water into which the pipes lead.

Having described my invention and set forth its merits, what I claim is—

1. A steam-boiler, a coil of pipe communicating with said boiler both above and below the water-level, a tank or reservoir containing gasoline or similar fluid, and two or more burners arranged, as shown, beneath or within said coil, and connected to said tank, whereby the heat generated by one of said burners will keep the remaining burners in condition to at once ignite when supplied with gasoline, as and for the purpose set forth.

2. The combination of the coil B, communicating by its ends with a steam-boiler both above and below the water-level, two-way cocks E′ E², inserted in the circuit of said coil, means, substantially as shown, for admitting a small quantity of water to said coil, and means for heating said coil, substantially as described.

3. The combination, with a steam-boiler, of a coil, B, two-way cocks E′ E², a gasoline-reservoir, and two or more burners arranged as shown, and supplied with gasoline from said tank, whereby the heat radiated from one of said burners will keep the remaining burners in condition to be lighted by supplying them with gasoline, substantially as and for the purpose herein specified.

4. The combination, with a steam-boiler, a coil, B, and burners for heating said coil, of outer and inner supplying-tanks, D′ D², the outer tank being provided with a gas-tight cover, D³, stuffing-box n^4, and feed-pipe e^4, communicating with said burners, the inner tank being provided with a valve, n', at its bottom, and a stuffing-box, n^3, and a valve-stem, n^4, connected with the valve n' and passing through the stuffing-boxes n^3 n^4, and adapted to be raised and lowered, whereby the valve n' is opened and shut, substantially as set forth.

5. The combination of the coil B, arranged as shown and described, a gasoline-tank, and one or more burners, arranged as shown, and provided with auxiliary tubes e^{11}, substantially as described.

6. The heating-coil B, communicating at both ends with the steam-boiler, and one or more burners, arranged as shown, in combination with an inner jacket, C², surrounding said coil, and an outer jacket, C′, surrounding said inner jacket, whereby an air-space is provided between said jackets, substantially as and for the purpose herein specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY MASON YOUNG.

Witnesses:
C. N. WOODWARD,
LOUIS FEESER, Sr.