W. S. REYNOLDS.

CIRCULATING HEATERS FOR FIRE-ENGINES.

No. 181,799. Patented Sept. 5, 1876.

Fig. 1.

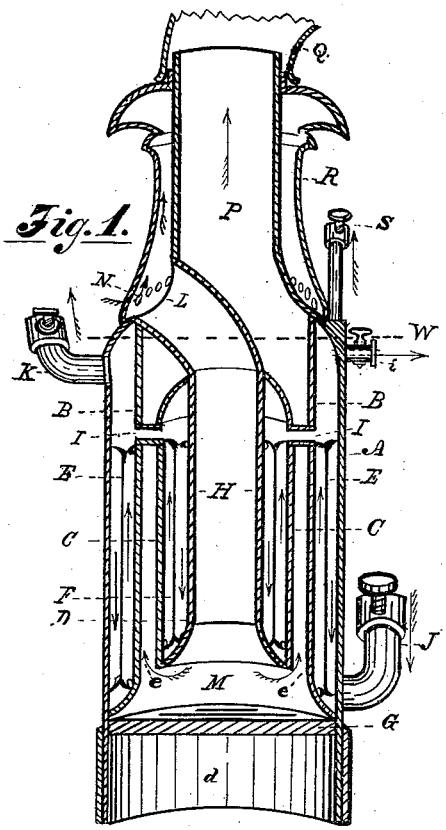


Fig. 2.

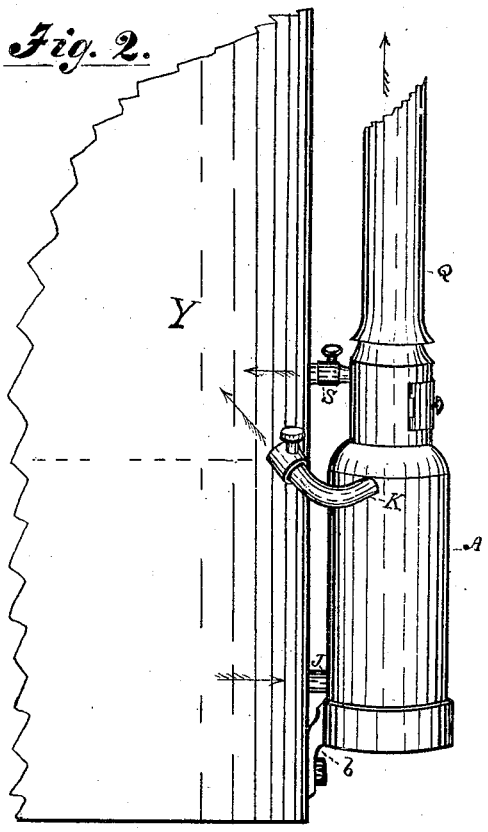
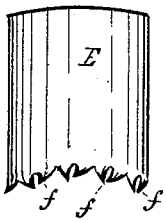


Fig. 3.



Witnesses:

Latta Bussell

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Inventor:

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UNITED STATES PATENT OFFICE.

WILLIAM S. REYNOLDS, OF LA FAYETTE, INDIANA, ASSIGNOR TO HIMSELF AND HELEN M. SEMPILL, OF SAME PLACE.

IMPROVEMENT IN CIRCULATING-HEATERS FOR FIRE-ENGINES.

Specification forming part of Letters Patent No. **181,799**, dated September 5, 1876; application filed September 13, 1875.

To all whom it may concern:

Be it known that I, WILLIAM S. REYNOLDS, of the city of La Fayette, State of Indiana, have invented a Circulating-Heater for Steam Fire-Engines, of which the following is a specification:

The object of my invention is to keep the water in a fire-engine boiler always hot by means of the small heater A, which is permanently attached to the side of the boiler Y, and also to keep the water in constant circulation, both in the heater and boiler, and thereby facilitate the generation of steam in emergencies, and prevent the deposit of lime or other sediment.

Figure 1 is an elevated section of my circulating-heater. Fig. 2 is a side elevation of same, showing the manner of its attachment to the boiler. Only a small section of the boiler is shown in this figure. Fig. 3 shows a sheet-iron septum, used for dividing the cold from the hot water in my heater, and forcing the cold water to descend while the heated water is ascending within the body of the heater.

A is the outside shell of my heater, made of sheet metal, cylindrical in shape, and of sufficient strength to bear the maximum steam-pressure of the boiler Y, to which it is attached as a permanent fixture by bracket *b* and pipes S, K, and J. B is the inside shell of the outer water-chamber, there being two of these water-chambers within this device. C is the outside shell of the inner water-chamber, and D the inside shell of same. Each of these annular water-chambers is divided into two separate water-compartments by the cylindrical sheet-metal septums E and F; but at the same time the water in each compartment can freely pass from one to the other through the serrations *f* at the lower ends of the septums. The serrations *f* are cut deep enough to form a guide for holding E and F exactly in the middle of their respective water-spaces when the projections *f* are bent in and out alternately. The water-conduits I connect the inner and outer water-chambers, and permit a free flow of water from one to the other. The septums E and F must terminate just below these conduits. G is the fire-grate in my heater. M is the fire-space, and H is the magazine for fuel, which is introduced at L. The annular space for fire-draft lies between B and C, and terminates in egress-flue P at the top.

It will be seen by this arrangement that my heater is a base-burner, consuming its fuel as it descends through the magazine H.

The entire heat resulting from this slow combustion is forced upward through the narrow annular space that lies between the two water-chambers, heating the water on each side. Each of these two water-chambers being divided annularly into two water-compartments, it follows that the compartment in each that lies next the fire must be heated, so that the water is constantly ascending in it, while the water in the compartment farthest away from the fire must descend in a corresponding ratio. In this way a constant circulation of the water is maintained within the heater itself, and this circulation, in contact with such a large area of heating-surface, must sustain a very high temperature with the expenditure of a very small amount of fuel. J is the cold-water-pipe, which connects the lower end of my heater with the boiler Y. K is the hot-water pipe, connecting the upper end of the heater with the boiler; and S is a steam-escape pipe, through which any steam that may be generated within the heater may freely pass into boiler Y. Without this steam-pipe S my heater is irregular in performance; but with it its circulation of water through boiler Y is regular and exact. The cause of this is found in the fact that when steam is generated within the heater it forces the water back from egress-pipe K, and itself escapes into the boiler Y, preventing also the further ingress of cold water through pipe J until some steam-pressure is established in boiler Y, when cool water will again flow, condensing the steam in the heater until a circulation is again established through hot-water pipe K. With S tapped into the top of heater A, to permit the discharge of steam into the boiler above water-line W, cool water will constantly flow from the boiler through J, and out again as it is heated through K, and this, too, with a minimum of fuel, keeping the water in boiler Y almost at the steam point day and night. When a fire-alarm is given, the match is ap-

plied to fuel under boiler Y, and in three minutes there is ample steam to do execution in throwing water through the fire hose.

This invention is attached to the boiler by a bracket and pipe, J, at its lower end, and by pipes S and K at the upper end. Supplemental smoke-pipe Q can be swung clear of the device when the engine is to be moved to a fire. While in the house it serves to carry the smoke away to any suitable outlet. The hood R fits loosely over smoke-flue P, and is perforated near the lower edge N to admit cold air, which passes upward around P until it reaches the inside of Q, Fig. 1. R serves as an ornament, and also to prevent the radiation of heat from P, and the consequent heating of the engine-house in warm weather. The arrows show the direction of the water and air currents in this device. *d* is the space for an ash-pan to catch falling ashes from fire-space M. *i* is a vent-valve or try-cock for testing the height of water in A.

It will be seen that while my invention establishes a circulation of water from the boiler into the heater, and thence back into the boiler, it also maintains another and independent circulation within its various water-compartments, thus keeping up a ceaseless round of exposures of the water to the large area of heating-surface within.

I am aware that circulating-heaters for steam fire-engines have been used before to establish a water-circulation between boiler and heater, but with no provision for the escape of steam which may be generated within the heater. To such I lay no claim; but

What I claim is—

The combination of circulating-heater A, boiler Y, connecting-pipes S K J, and bracket *b*, substantially as shown, and for the purposes described.

WILLIAM S. REYNOLDS.

Witnesses:
JOHN D. MILLER,
THOS. JONES.