

A. G. SHERMAN.
BOILER.

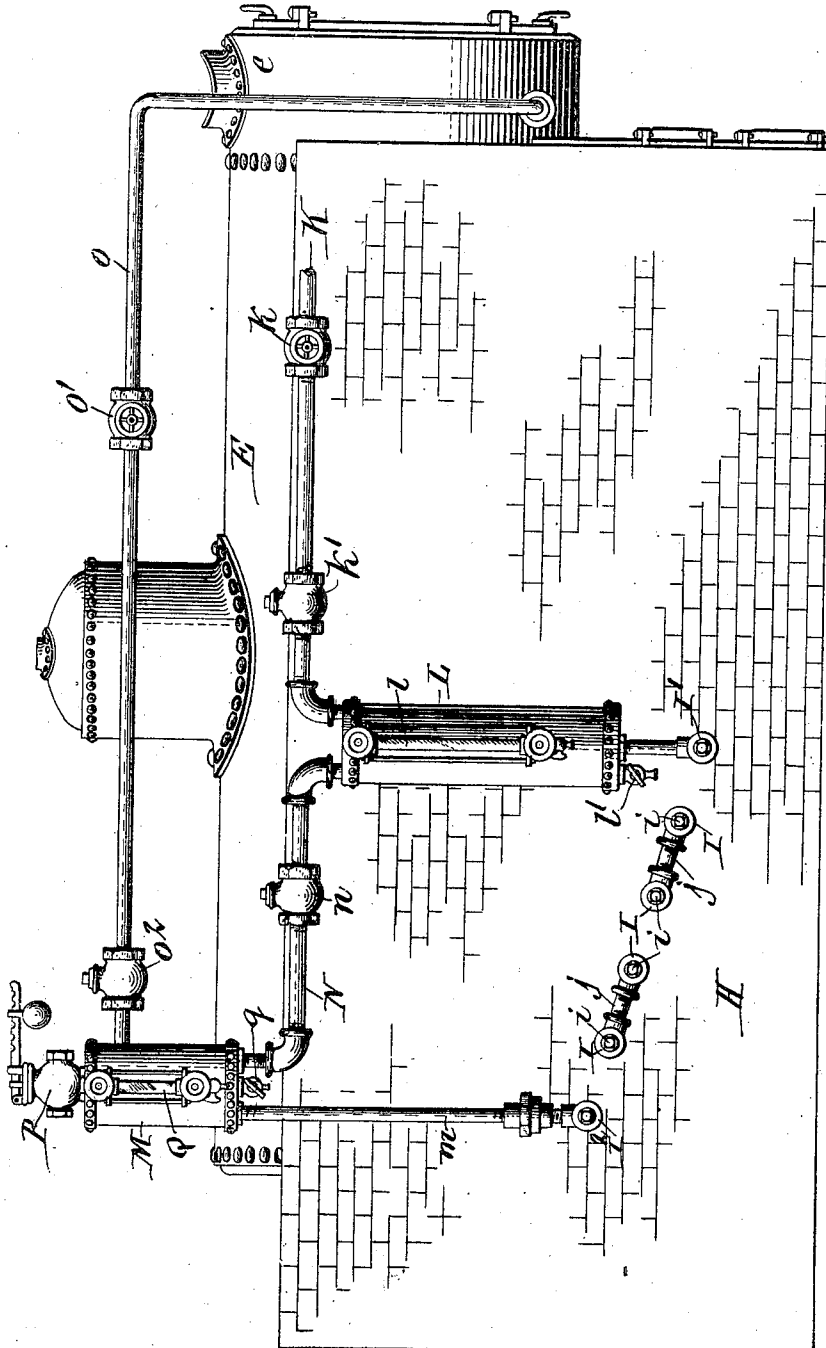
APPLICATION FILED FEB. 19, 1910.

972,580.

Patented Oct. 11, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

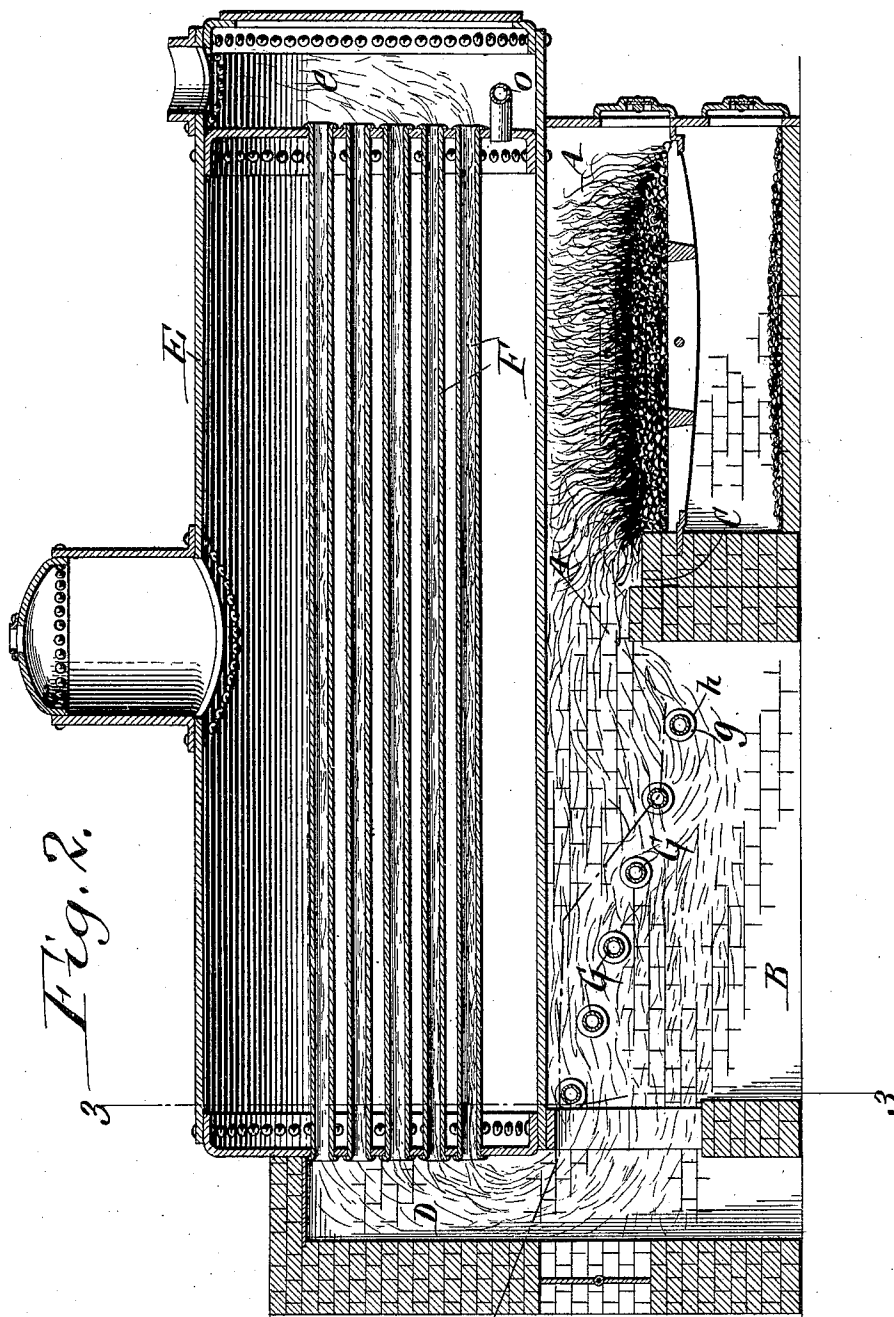


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

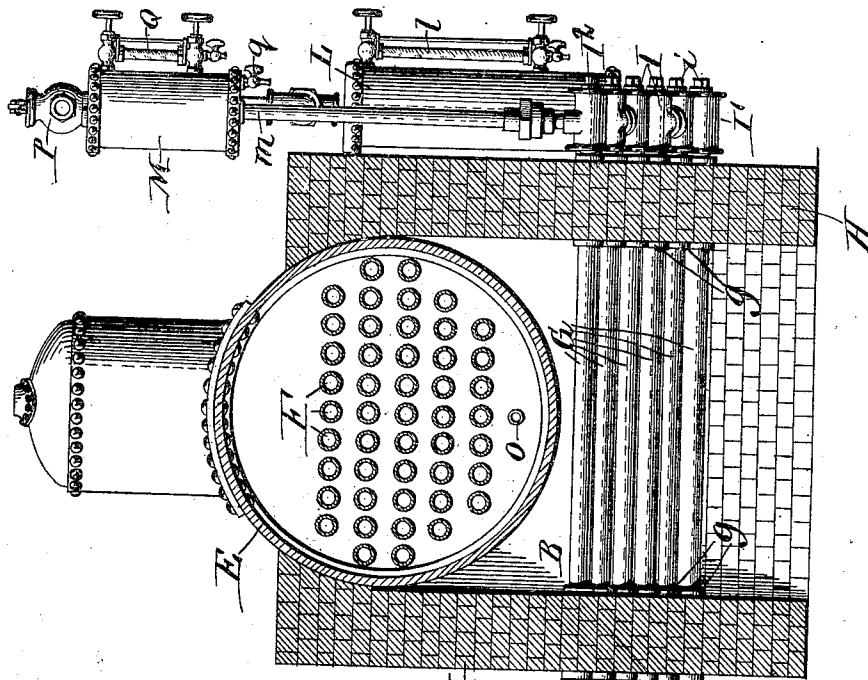
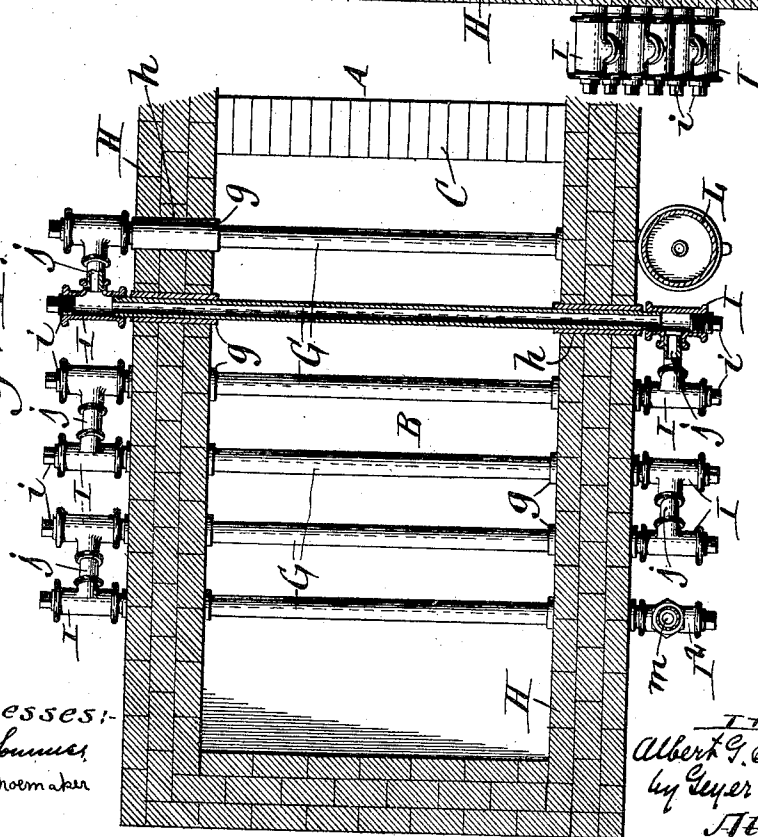


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALBERT G. SHERMAN, OF BUFFALO, NEW YORK.

BOILER.

972,580.

Specification of Letters Patent.

Patented Oct. 11, 1910.

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To all whom it may concern:

Be it known that I, ALBERT G. SHERMAN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Boilers, of which the following is a specification.

This invention relates to a preliminary water heater for boilers whereby the heat of the furnace is utilized to better advantage and caused to heat the feed water before the same reaches the boiler proper.

The object of this invention is to produce a steam boiler having a preliminary water heater of this character which is very simple and inexpensive in construction, which can be readily installed in new boilers as well as boilers already built, and which has its parts so arranged that they are all accessible from the exterior of the boiler setting for inspection, cleaning, and repairs.

In the accompanying drawings consisting of 3 sheets: Figure 1 is a side elevation of a steam boiler equipped with my improvements. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a vertical transverse section of the same in line 3—3, Fig. 2. Fig. 4 is a fragmentary horizontal section in line 4—4, Fig. 2.

Similar letters of reference indicate corresponding parts throughout the several views.

A represents the furnace, B the horizontal front combustion chamber arranged in rear of the furnace, C the bridge arranged transversely between the furnace and the front combustion chamber, D the vertical rear combustion chamber or smoke box extending upwardly from the rear end of the front combustion chamber, E the shell of the boiler arranged horizontally and lengthwise over the furnace and front combustion chamber and having an uptake *e* at its front end, and F a plurality of horizontal main flues or tubes arranged within the shell and connecting the rear combustion chamber and said uptake.

The parts just described may be of any suitable or approved construction.

G represents a plurality of preliminary water heating tubes through which the feed water of the boiler passes before entering the shell. These tubes are arranged trans-

versely one behind the other in a longitudinal row within the front combustion chamber, so that the gases of the furnace immediately after passing over the bridge strike these water tubes and heat the water in the same. Inasmuch as the gases at this time are in the hottest condition and the temperature of the same lowers materially by the time they enter the main longitudinal boiler tubes F, the same operate most effectively on the water in the transverse tubes and utilize the intense heat of the gases which is greatest at this time, thereby causing preliminary heating of the water for subsequent use in the boiler shell without any additional expense for fuel.

The water tubes G are preferably so arranged that each tube is successively higher from the front toward the rear end of the front combustion chamber, as shown in Fig. 2, thereby effectually intercepting the hot furnace gases and compelling the same to act upon the water in the tubes before the same reach the rear end of the boiler shell. Each of the water tubes extends at its opposite ends through openings *h* in the side walls H of the boiler setting so that this pipe is accessible from the exterior of the boiler for inspection, cleaning and repairs. To permit of freely withdrawing the pipes G laterally from the front combustion chamber and replacing the same by a new one without disturbing the setting of the boiler, each of the openings *h* is provided with a lining sleeve *g* and which receives the adjacent part of the respective tube G, as shown in Figs. 2 and 4. The several water pipes are also connected with each other outside of the boiler setting so that the feed water passes successively through said pipes in serpentine or zig-zag fashion before the same reaches the boiler shell. For this purpose a plurality of T-shaped fittings I, I¹, I² are provided each of which has an inner nipple connected with the outer end of one of the water tubes G, an outer nipple which is normally closed by a screw plug *i* and a side nipple for connection with other parts to be presently described. Each fitting I has a side nipple connected by a short coupling pipe *j* with the side nipple of the T-fitting I of an adjacent water pipe, each pipe

G being connected at one end with the adjacent end of the pipe in front of the same and at its opposite end with the adjacent end of the pipe in rear of the same.

- 5 The feed water to be heated preparatory to being delivered to the boiler shell is supplied by a pipe K arranged outside of the boiler setting and containing a hand valve k and a forwardly opening check valve k^1 .
 10 This pipe connects with the upper end of a front lower receiving tank or reservoir L which is also arranged outside of the boiler setting and connected at its lower end with the side nipple of the T-fitting I^1 at one
 15 end of the foremost one of the transverse water pipes. This tank is provided with a gage l at its side for determining the height of the water in the same and at its bottom the same is provided with a drain cock l^1
 20 whereby the water may be drawn from this tank.

- M represents an elevated rear water delivery tank or reservoir which is arranged higher than the receiving tank and which
 25 has its lower end connected by a rising pipe m with the side nipple of the T-fitting I^2 on the adjacent end of the upper or rearmost transverse water pipe G. The lower end of the upper or delivery tank M is also connected by a return or circulating pipe N
 30 with the upper end of the lower tank L, said circulating pipe containing a check valve n which opens toward the lower tank and closes toward the upper tank. The upper
 35 part of the upper tank is connected by a delivery pipe o with the shell of the boiler, said pipe containing a hand valve o^1 and a check valve o^2 which opens forwardly or toward the boiler shell. On its upper side the
 40 upper tank is provided with a safety blow-off valve P, at its side with a gage Q, and at its lower end with a drain cock q^1 .

- When the supply and delivery valves k , o^1 are both open the feed water passes successively through the supply pipe K, lower
 45 tank L, preliminary water heating tubes G, rising pipe m , upper tank M, and delivery pipe o to the boiler shell, whereby the water is heated by the flames in the front combustion chamber before the same enters the
 50 boiler proper. Upon closing the valve o^1 when sufficient water has been fed to the boiler shell the water passes from the upper tank M through the circulating pipe N to
 55 the lower tank, thence returns again through the transverse water pipes G and rising pipe m , thereby constantly circulating the water through the water pipes in the front combustion chamber and preventing the same from
 60 burning out.

By providing the upper and lower tanks in the water supply system a large volume of surplus water is provided which permits

of keeping the heated water tubes well supplied with water for a considerable time if 65 the same are cut off from other sources of water, thereby preventing the water heating pipes from becoming dry and burning out.

When the delivery pipe o^1 is closed the stopper, plug or gate of the check valve n of 70 the circulating pipe N opens under the pressure of the water and permits the latter to circulate but when the delivery valve o^1 is open the check valve n also remains closed, thereby compelling the water after passing 75 through the preliminary heating pipes to pass on to the boiler shell.

It will be noted that in these means for effecting a preliminary heating of the water, no joints are employed on those parts of the 80 water conductors or pipes which are arranged in the combustion chamber, whereby leakage in the latter is positively avoided. All the joints in the preliminary heating system are arranged outside of the furnace 85 and boiler setting where any leakage can be easily detected and readily repaired without disturbing the boiler setting.

My improvements can be applied to either a new boiler about to be set up or to a boiler 90 already erected and can be installed by using standard fittings and materials which are usually kept in stock by supply houses, thereby avoiding the use of special fittings and reducing the cost of installation accord- 95 ingly.

Upon removing the plugs i from the T-fittings I, I^1 , I^2 at opposite ends of the water tubes G a swab or cleaning implement may be pushed through the same from side to 100 side for thoroughly removing any sediment which has accumulated thereon and it also permits of a complete and careful inspection of the interior of the water pipes G without dismembering the boiler setting. 105

I claim as my invention:

1. A boiler comprising a furnace, a combustion chamber arranged in rear of the furnace, a shell arranged over the furnace and combustion chamber, a plurality of communicating heating tubes arranged in said 110 combustion chamber, a lower tank connected at its lower end with the inlet of the heating tubes, a water supply pipe connected with the upper end of the lower tank, and an elevated tank connected at its lower end 115 with the outlet of said heating tubes and with the upper end of said lower tank and also connected at its upper end with said shell. 120

2. A boiler comprising a furnace, a combustion chamber arranged in rear of the furnace, a shell arranged over the furnace and combustion chamber, a plurality of communicating heating tubes arranged in said 125 combustion chamber, a lower tank connected

at its lower end with the inlet of the heating
tubes, a water supply pipe connected with
the upper end of the lower tank, an elevated
tank connected at its lower end with the out-
5 let of said heating tubes and with the upper
end of said lower tank and also connected
at its upper end with said shell and a check
valve which is arranged in the connection

between the upper and lower tanks and
which opens toward the latter. 10

Witness my hand this 16th day of Febru-
ary, 1910.

ALBERT G. SHERMAN.

Witnesses:

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ANNA HEIGIS.