

H. ETHERIDGE.
FEED WATER HEATER.
APPLICATION FILED MAY 13, 1909.

938,134.

Patented Oct. 26, 1909.

FIG. I.

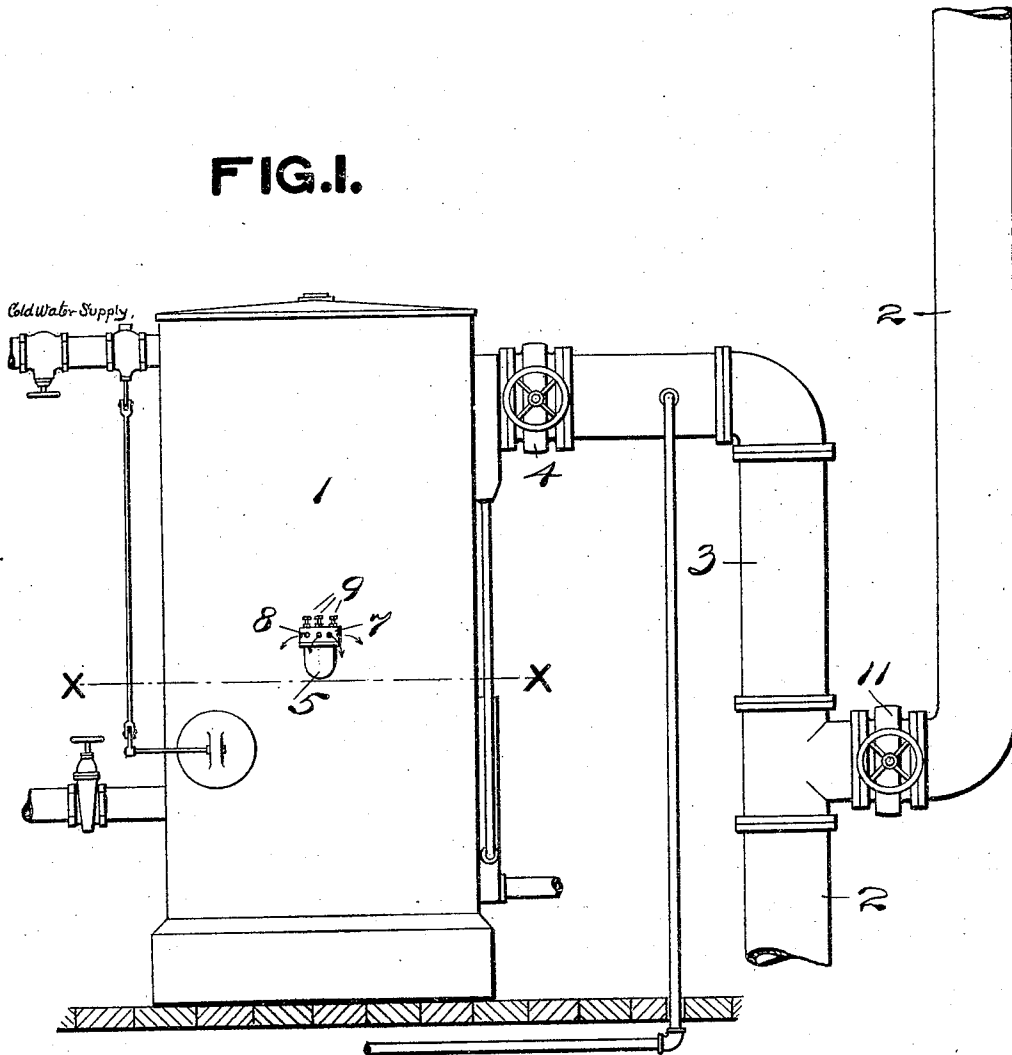
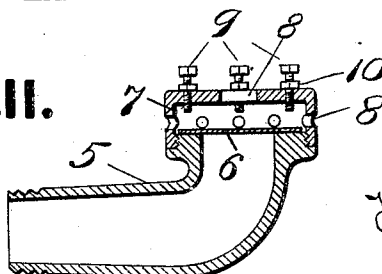


FIG. II.



Witnesses
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UNITED STATES PATENT OFFICE.

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FEED-WATER HEATER.

938,134.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed May 13, 1909. Serial No. 495,791.

To all whom it may concern:

Be it known that I, HARRY ETHERIDGE, a citizen of the United States, residing at Zeli-
enople, in the county of Butler and State
5 of Pennsylvania, have invented certain new
and useful Improvements in Feed-Water
Heaters, and do declare the following to be
a full, clear, and exact description of the in-
vention, such as will enable others skilled in
10 the art to which it appertains to make and
use the same, reference being had to the ac-
companying drawings, and to the letters and
figures of reference marked thereon, which
form a part of this specification.

15 In all open-feed water heaters, having a
by-pass for the exhaust steam service, there
is an accumulation of heavy gases which is
given off by the water and occupies the space
in the heater above the water line, which
20 gases being of greater specific gravity than
the incoming steam gradually becomes so
dense as to offer a back-pressure to the en-
trance of the steam. When this condition
prevails the exhaust steam naturally follows
25 the path of least resistance and escapes
through the main line to the atmosphere,
with a consequent fall in the temperature of
the feed-water in the heater.

To overcome the above objection various
30 means have been employed, the most notable
being that of placing a butterfly valve in
the exhaust line, the attending weight car-
ried by the valve lever at the pivotal thereof
being adjusted by hand to suit different
35 quantities of steam emitted from the exhaust
line. Aside from the necessity of constant
change of adjustment of the weight to ac-
commodate different quantities of steam
from the exhaust line, and the consequent
40 back-pressure to the engine, it has been
found that the constant hammering of the
valve occasioned thereby, wears the valve
parts, occasioning repairs and renewals
thereof.

45 The object of my invention is to provide a
simple and effective means of eliminating
the difficulties referred to and which shall be
entirely automatic in operation regardless
of the amount of steam employed, as well as
50 maintain the water at a temperature con-
sistent with that of the exhaust steam, the
means employed to effect these results being
that of a valve actuated automatically by the
exhaust pulsations, the relative location of
55 the valve to the heater being found to be

most essential to attainment of results, as
will be later pointed out.

In the accompanying drawings, forming a
part of this specification, I have illustrated
the application of my invention to a feed- 60
water heater, in which drawings,

Figure I, is a side elevation of a heater
and attending exhaust steam line, with my
improvements added thereto, and Fig. II, is
a longitudinal sectional view through the 65
automatic valve, similar detail parts of the
structure in said views being designated by
numerals of like character.

In the structure disclosed, the numeral 1
designates one of the many forms of heaters 70
at present in use, but the particular form
shown is not essential as the invention is
applicable to any other form of open heater.
Associated with the heater is shown the
usual exhaust steam line 2 having a branch 75
3 connecting the same with the heater, in
which branch is placed the usual gate-
valve 4.

To the heater proper, and as close to the
water line X. X. as circumstance will per- 80
mit, I secure my automatic valve, comprising
an elbow 5 communicating with the interior
of the heater the outer end of which carries
a loosely disposed disk 6 which is the valve 85
proper. The valve end of this elbow has a
cage 7 threadably secured thereto and has
the exhaust openings 8 formed therein, said
cage being in the form of a cap and is pro-
vided in the top with vertically disposed
90 screw-bolts 9 extending therethrough to limit
and regulate the lift of the valve, said screws
being provided with jam-nuts 10. I also
place within the main exhaust line a gate-
valve 11 to regulate the supply of steam to
95 the heater.

In practice, with each impulse of the ex-
haust steam as it enters the heater the disk
valve will be lifted from its seat on the end
of the elbow, since as before stated the gases
are of greater specific gravity than the air 100
or incoming steam and dispose themselves
upon the surface of the water, said incom-
ing steam pulsations act upon the gases and
force them out through the elbow as fast
as they accumulate, the disk valve resuming 105
its seat instantly as soon as the exhaust
pulsation is spent, thereby disposing of the
said gases externally and preventing their
return as well as the entrance of cold air
from the surrounding atmosphere, the oper- 110

ation of opening and closing the valve being continued automatically by and between the pulsations of the steam.

5 The location of the vacuum valve is, as before stated, essential to obtaining the best results, it being determined by experiment that it should be as near the water or overflow line as possible, the temperature of the water being increased to a greater extent
10 at such location than at any other point thereabove with the same amount of steam, said gases being of greater specific gravity than the air or steam it is evident that the outlet for same should be at the water line
15 and in the absence of any outlet the gases are merely disturbed and absorb the heat which should pass into the water.

Having thus shown and described my invention, what I claim and desire to secure
20 by Letters Patent, is:

1. The combination with a feed-water heater, of a valve located at the water line thereof and adapted to be automatically operated by the exhaust pulsations, as and for
25 the purpose set forth.

2. The combination with a feed-water heater, of an outlet member located at the water line thereof, and a valve carried by said member which is adapted to be automatically operated by the exhaust pulsations, as and for the purpose set forth. 30

3. The combination with a feed-water heater, of an outlet member located at the water line thereof, a valve seated on said member adapted to be operated by the exhaust pulsations, and means to limit the movement of said valve. 35

4. The combination with a feed-water heater, of an outlet member located at the water line thereof, a disk valve seated on said member, a cage carried by the end of said member over the valve, and means to regulate the movement of said valve. 40

In testimony whereof, I affix my signature, in presence of two witnesses.

HARRY ETHERIDGE.

Witnesses:

JEAN WILSON,
E. GOETTMAN.