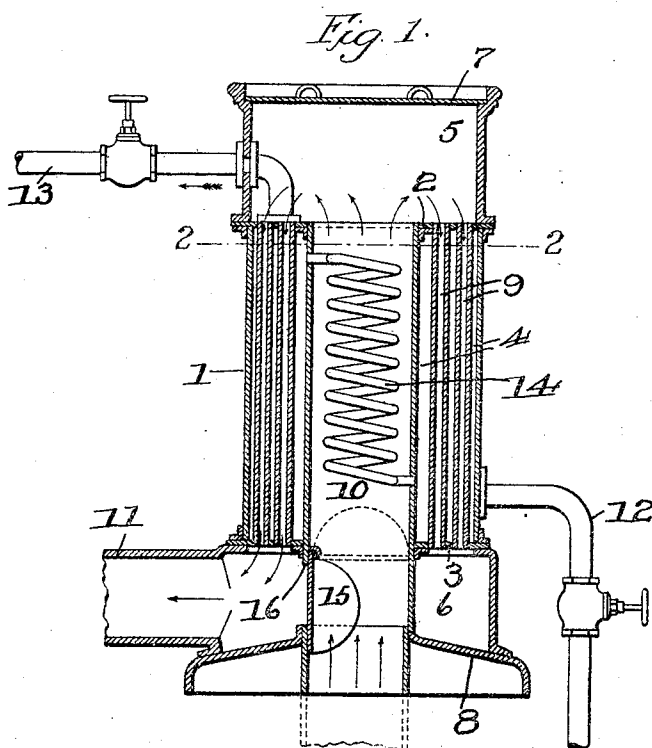
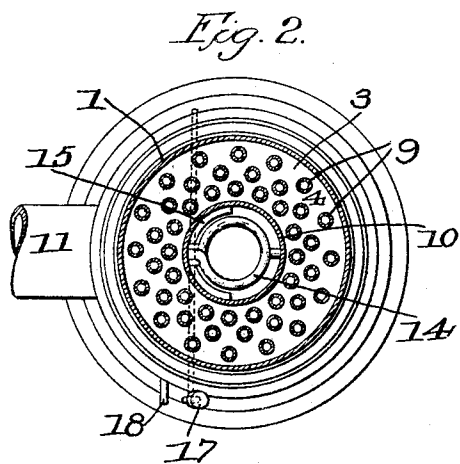
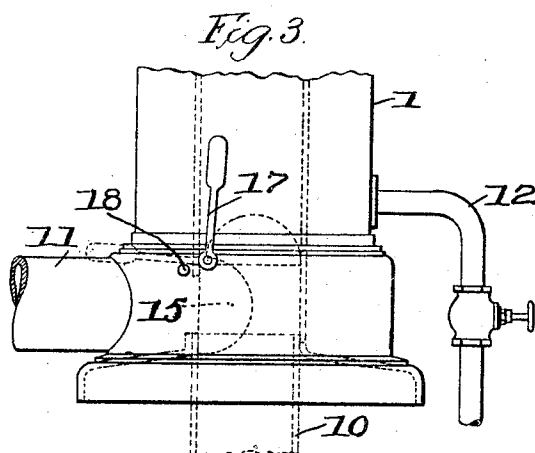


T. SUZUKI.
FEED WATER HEATER.
APPLICATION FILED MAR. 3, 1905.



Witnesses:
C. H. Crawford
M. S. Reeder

Inventor:
Tozaburo Suzuki,
By B. Suzuki
Att'y

UNITED STATES PATENT OFFICE.

TOZABURO SUZUKI, OF SUNAMURA, JAPAN.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 794,821, dated July 18, 1905.

Application filed March 3, 1905. Serial No. 248,321.

To all whom it may concern:

Be it known that I, TOZABURO SUZUKI, a subject of the Emperor of Japan, residing at No. 401 Jibeishinden, Sunamura, in the county of Minami Katsushika and prefecture of Tokyo, in the Empire of Japan, have invented certain new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

My invention relates to improvements in feed-water heaters for boilers and the like, and has for one of its objects the provision of a heater whereby the products of combustion utilized for heating the water are caused to travel and be brought in contact with the largest possible area of heating-surface, whereby full and complete utilization of the heat unit of the products of combustion will be effected.

My invention also includes improved means whereby the products of combustion may be quickly deflected from their normal course and caused to pass directly to an outlet in a manner to completely cut out the heater for purposes of repair and the like.

My invention will be more fully described in connection with the accompanying drawings and will be more particularly pointed out in the appended claims.

In the drawings, Figure 1 represents a sectional view of a feed-water heater embodying the main features of my invention, the same being provided with a suitable inlet and outlet for the products of combustion. Fig. 2 is a horizontal sectional view on line 2-2 of Fig. 1. Fig. 3 is a view in elevation of the lower portion of the heater.

Like parts are designated by similar characters of reference throughout the different figures of the drawings.

My invention consists generally of an outer shell or casing 1, divided by partitions 2, 3 into a centrally-disposed water-chamber 4 and communicating smoke and draft chambers 5 and 6. The outer end of the smoke-chamber 5 is provided with a removable lid or cover 7, permitting access to the feed-water heater for cleaning purposes and purposes of repair. The lower or draft chamber 6 is provided with an imperforate base-wall 8, which is normally

closed. The water-chamber 4 is provided with a plurality of combustion-tubes 9, terminating at the partitions 2 and 3 and serving to bring the smoke and draft chambers into communication. The heater is provided with a flame-trunk 10, preferably centrally disposed and desirably extending through the draft and water chambers up to and abreast of the partition 2. Said flame-trunk 10 at its lower end is desirably broken away, so that the same may communicate in any desired manner to receive the products of combustion from a furnace or other source of supply. The flame-trunk 10 delivers into the smoke-chamber 5, and the products of combustion are thence directed downwardly through the tubes 9 into the smoke-chamber 6, wherefrom egress is provided through an outlet 11. Supply and delivery water pipes 12 and 13 are shown communicating with the water-chamber. By reference to Fig. 1 it will be noted that the flame-trunk 10 is relatively large in diameter, and in order that the products of combustion which do not come directly in contact with the wall of the same may be utilized I desirably provide an auxiliary heating-coil 14. Said heating-coil, as shown, is located within the flame-trunk and is desirably not of sufficient diameter to engage the wall thereof, but is formed in a manner to come in contact with products of combustion which do not contact directly with the wall of said trunk. Said auxiliary coil 14 communicates at its opposite ends with the water-chamber 4 and preferably extends substantially throughout the height of said chamber.

When it is desired to throw the water-heater out of gear in order that the same may be cleaned, I have provided a damper 15 in the flame-trunk adjacent the draft-chamber, the said flame-trunk being provided with an aperture 16, whereby the flame-trunk is enabled to deliver direct to the draft-chamber. I desirably so construct the damper 15 as to enable the operator not only to provide a direct path for the products of combustion from the flame-trunk into the outlet, but also to effectively prevent any of the products of combustion from passing upwardly into the heater. To this end the damper 15 is of a

generally concave formation in order to seat tightly against the margin of the aperture 16 and is also of a diameter equal to the internal diameter of the flame-trunk, thereby serving when in a retracted or horizontal position to engage the internal periphery of the latter. As shown in dotted lines in Fig. 1, the damper is turned in a manner to cut off the passage of any of the products of combustion to the smoke-chamber and serves to deflect the same outwardly through the outlet 11. An operating-handle 17 (shown in Fig. 3) serves as a means whereby the damper may be thrown in the different operating positions. The said handle is provided with a weighted outer end and is connected with the pivotal mounting of the damper in a manner to occupy a position slightly off from the vertical when said damper is in a position to close the aperture 16, the weighted end serving when in a horizontal position to maintain the damper in such a position by gravity, the said weighted end slightly exceeding the weight of the damper. A suitable stop 18 serves to limit the movement of the damper in a downward direction.

A great advantage is obtained in providing the products of combustion with a circuitous or double path of travel and bringing the same throughout its travel in contact with all of the heating area of the water-chamber. By this improved means the heating properties of the products of combustion are fully expended and the greatest economy and the highest efficiency is obtained.

A further advantage consists in the peculiar construction whereby the upward and downward travel of the products of combustion are fed through the flame-trunk and the combustion-tubes, respectively. It will be noted that the central portion, at which point the water would ordinarily be least benefited, is in my improved flame-trunk provided with a greatly-increased heating-surface because of the relatively large diameter of the flame-trunk.

In order that the open space in the flame-trunk resulting from the large diameter thereof may be fully utilized, the products of combustion passing into the interior and which do not come in contact with the wall of the trunk are fully utilized and expended upon the auxiliary heating-coil. Thus it will be seen that while the products of combustion are passing upwardly through the flame-trunk and thence downwardly through the combustion-tubes I not only utilize the heat units of the same to the greatest possible extent; but the construction of the flame-trunk

and combustion-tubes is such that the progress of the products of combustion throughout their travel is at no point impeded or restricted, but is, on the other hand, provided with an open and free passage.

While I have herein shown and described a single embodiment of my invention, it will be understood that the same may be materially altered without departing from the spirit of the invention.

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

1. The combination with a feed-water heater, of a central flame-trunk receiving products of combustion, an overhead chamber to which it delivers, heat-flues leading downwardly from said chamber, an annular draft-chamber to which the flues deliver, a draft-pipe, an outer shell or casing forming between said overhead and draft chambers a water-chamber, inlet and outlet pipes, and a damper in said flame-trunk closing an aperture leading therefrom to said draft-chamber, said damper also serving to close said flame-trunk to the overhead chamber.

2. The combination with a feed-water heater, of a central flame-trunk receiving products of combustion, an overhead chamber to which said trunk delivers, flues leading downwardly from said chamber, an annular draft-chamber to which the flues deliver, a draft-pipe, an outer shell or casing forming between said overhead and draft chambers a water-chamber, and a damper in said flame-trunk closing the aperture leading therefrom to said draft-chamber.

3. The combination with a feed-water heater, of a central flame-trunk receiving products of combustion, an overhead chamber to which said trunk delivers, flues leading downwardly from said chamber, an annular draft-chamber to which said flues deliver, an outer shell or casing forming between said overhead and draft chambers a water-chamber, an outlet for said draft-chamber, and means permitting the products of combustion to pass directly to said outlet and preventing passage through said flame-trunk, said means serving also to close the passage to said outlet and open said flame-trunk to the products of combustion.

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

TOZABURO SUZUKI.

Witnesses:

UHACHI TSHIWARAZ,
GENJI KURIBARA.