H. H. VAUGHAN.

FEED WATER HEATER.

APPLICATION FILED JUNE 7, 1911.

1,069,360.

Patented Aug. 5, 1913.

4 SHEETS—SHEET 1.

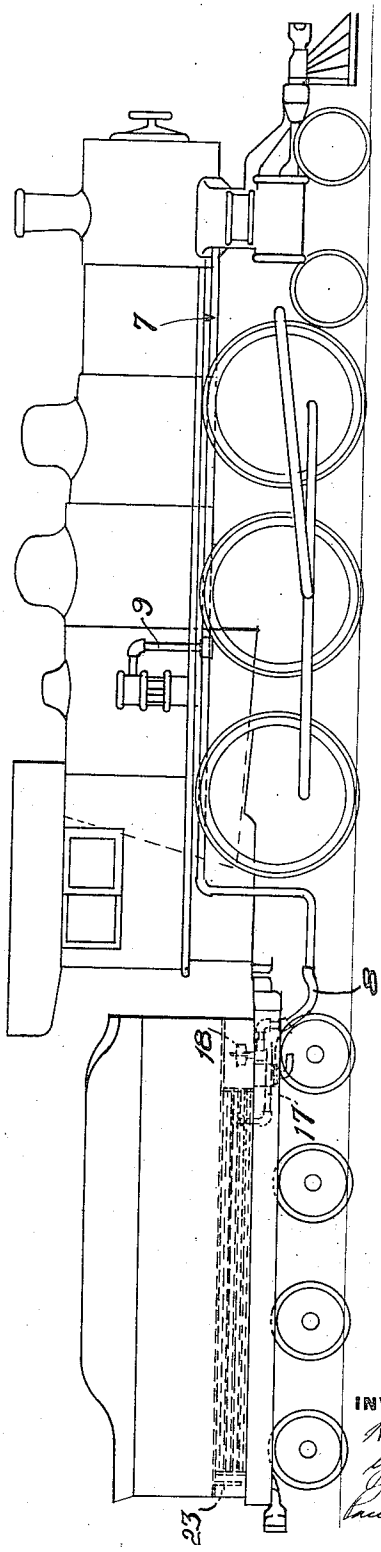

Fig. 1

WITNESSES

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4 SHEETS—SHEET 2.

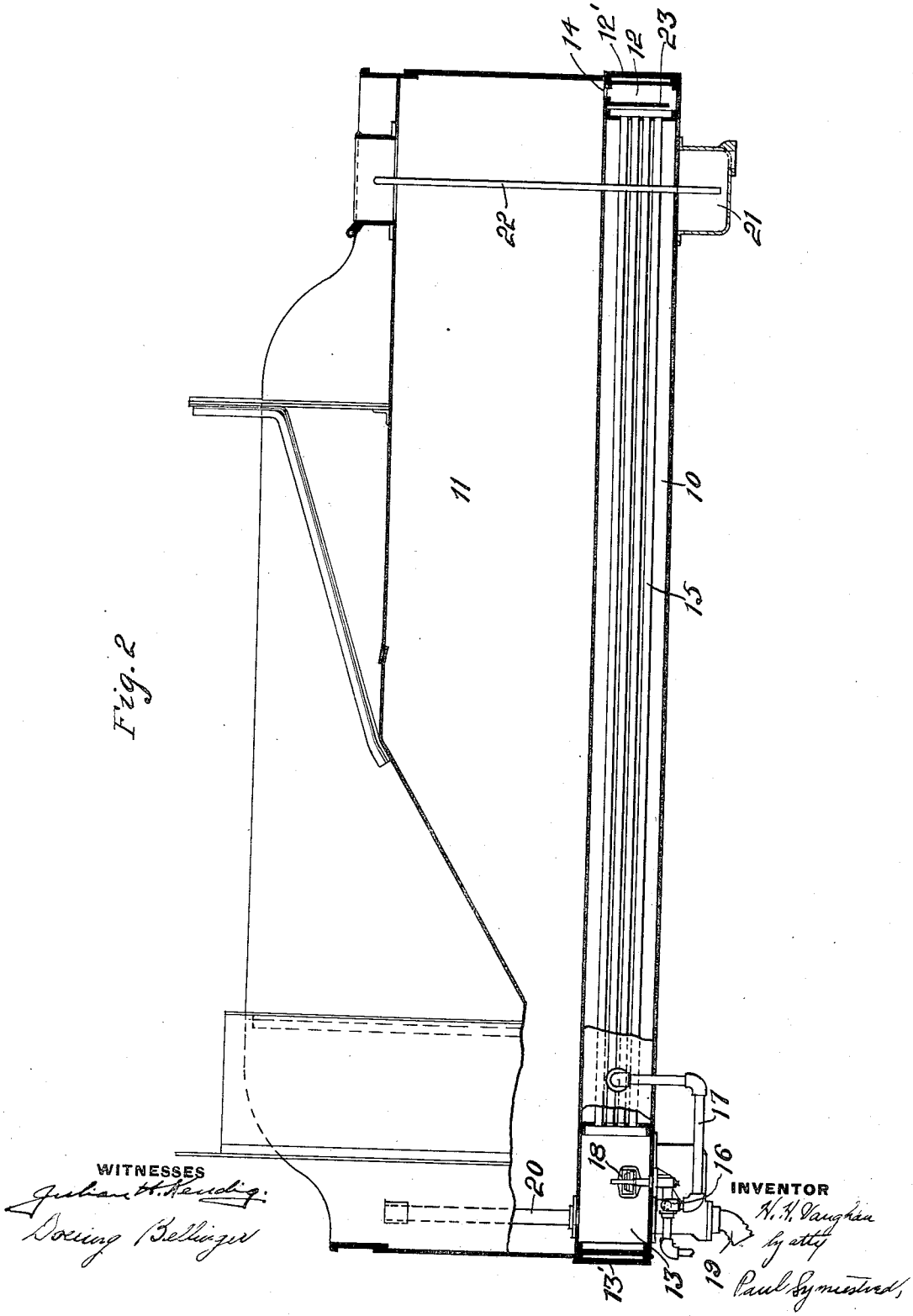

Fig. 2

WITNESSES

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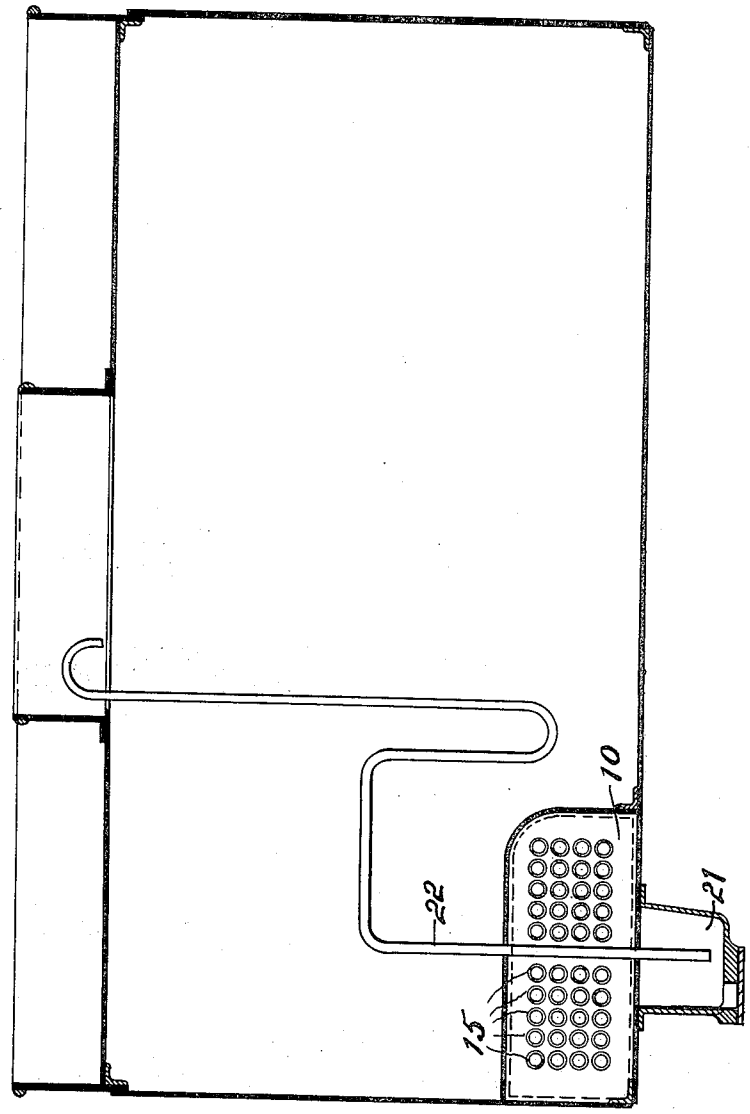
4 SHEETS—SHEET 3.

Fig. 3



WITNESSES

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4 SHEETS—SHEET 4.

Fig. 5

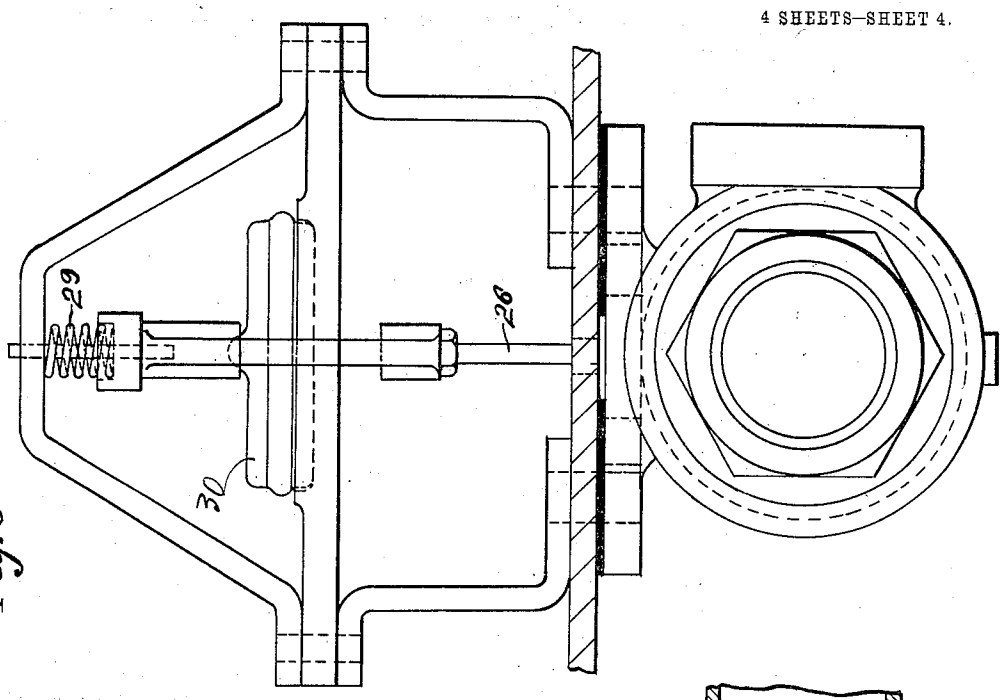
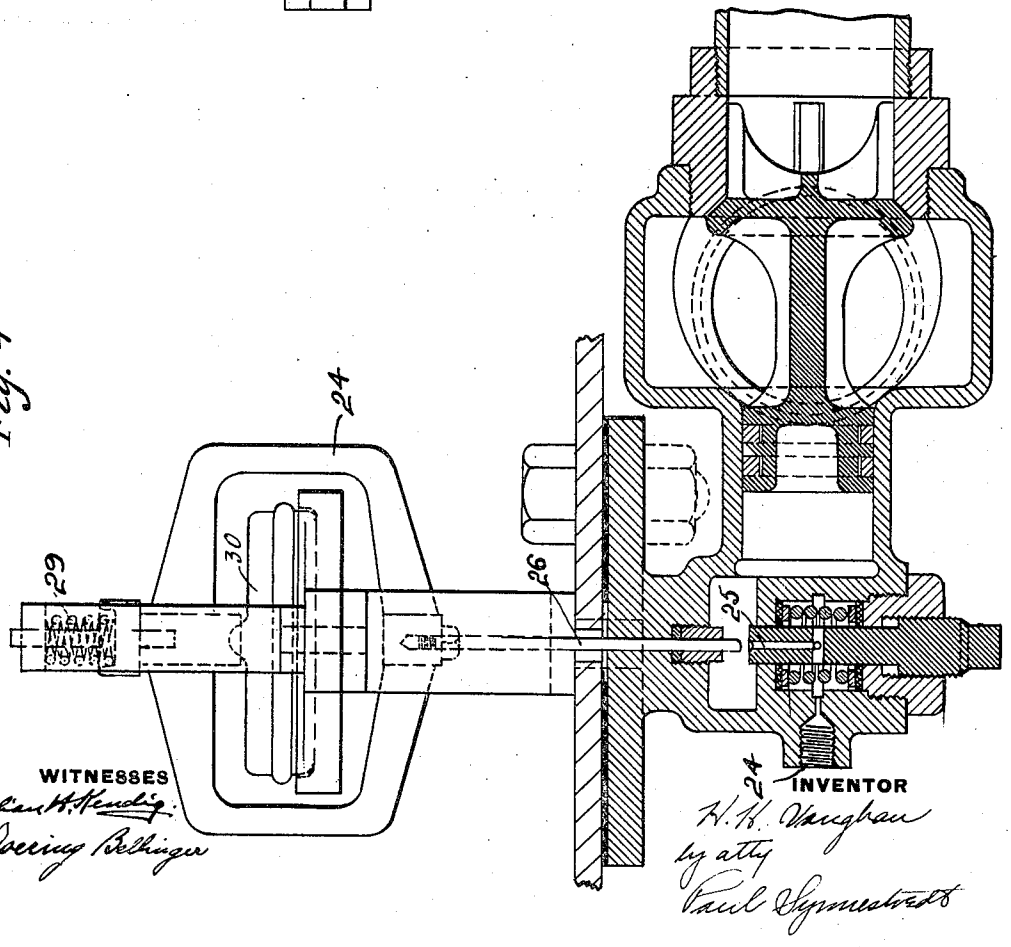


Fig. 4



WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY H. VAUGHAN, OF MONTREAL, CANADA.

FEED-WATER HEATER.

1,069,360. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed June 7, 1911. Serial No. 631,783.

To all whom it may concern:

Be it known that I, HENRY H. VAUGHAN, a citizen of the United States, residing at Montreal, Canada, (his post-office address being 8 Weredale Park, Westmount P. O.,) have invented certain new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

The invention relates to feed water heaters and particularly to feed water heaters for locomotives. One of the objects of my invention is the provision of improved means for quickly and economically heating a small portion of water in the tender-tank by passing the water through tubes in a heating chamber whereby the area of heating surface is greatly increased. Another of the objects of my invention is the provision of an improved means for preventing circulation between the heated and the cool portions of the water in the heater and tank. Another object is the provision of a feed water heater of the character specified having improved means for collecting the condensate in the heating chamber and returning the same to the tender-tank proper. In general, my invention is designed to provide an improved arrangement of tender and feed water heater which is simple in construction and effective in operation. These, together with such other objects as may hereinafter appear or are incidental to my invention I attain by means of a construction illustrated in preferred form in the accompanying drawings wherein:

Figure 1 is a diagrammatic illustration of a locomotive and tender having my improved heater applied; Figure 2 is a partial longitudinal section through the tender; Figure 3 is a transverse section on the line III—III of Figure 2 on an enlarged scale; and Figures 4 and 5 are detail views of the thermostat and valve mechanism employed in my improved heater.

My heater is preferably designed to use exhaust steam either from the locomotive cylinders or from the air compressor or both, and on inspection of Figure 1, it will be seen that the pipe 7 leads from the exhaust chamber of the cylinders and is connected to the heater by a flexible connection 8, and to the air compressor by a pipe, 9.

Referring now to Figure 2, it will be seen that I have provided a heating chamber, 10, in the bottom of one of the legs of the main water tank, 11, of the tender. Adjacent to either end of the heating chamber—which is shut off from communication with the main tank—are water chambers 12 and 13. The chamber, 12, has communication at the top with the main tank, 10, by means of a port or opening 14. A series of tubes, 15, extend through the heating chamber and open into the water chambers. Steam is admitted to the heating chamber from the pipe 7 through the valve 16 and the pipe 17, said valve being controlled by a thermostat, 18, the operation of which will hereinafter appear. The water chamber, 13, is provided with a connection 19 for the usual steam injector, not shown, and with a vent pipe, 20, extending to a point substantially at the normal level of the water in the main tank, and adapted to exhaust the heater from air and permit water to flow therein when filling the tender tank. The end plates 12′ and 13′ of the heating chamber are preferably made detachable in order to give free access to the tubes 15. At the rear end of the heating chamber is a condensate tank, 21, from which extends a pipe, 22, leading to the top of the main tank. The water chamber, 12, is divided into two compartments by means of the wall, 23, the said compartments having communication with each other at a point substantially below the level of the tubes 15. (See Figure 2). By this arrangement, a circulation between the portion of water which is heated in the tubes and the cool water in the tank is prevented, although the water in the tank can flow freely into the heater whenever hot water is being drawn therefrom.

In order that the temperature of the water may be regulated and maintained at a degree at which the steam injector will be most effective in its operation, I have provided a thermostatic valve control for the admission of steam. Referring to Figures 4 and 5, it will be seen that the steam admission valve, 16, is normally held in closed position by means of air pressure admitted to the valve casing from the main reservoir or other source of supply, by means of the pipe 24 and the port 25, which port is controlled by the thermostat, 18. The thermostat is mounted in the water chamber, 13. and is provided with a stem, 26, which seats on the port 25 when in closed position. The stem 26 is normally held in closed position by means of the spring, 29, until the water in the heater reaches the predetermined de-

gree, at which time the action of the heat expands the thermostat proper, 30, and raises the stem 26 from off its seat and thereby permits air pressure to enter the casing and close the steam valve. When the temperature of the water in the heater falls below the required degree, the thermostat will contract and the spring 29 will seat the stem 26 and close the port 25, thereby permitting the steam valve to open.

The condensate in the heating chamber will collect in the receptacle 21 and upon the admission of steam into the heating chamber, such condensate will be blown up through the pipe 22 and discharged into the top of the tender tank. It will be noted that the pipe 22 is provided with a looped portion 22′, which retains a small amount of condensate after exhaust steam has been admitted to the heater and the steam valve has been closed. The condensate that will collect in this loop portion is sufficient to prevent the steam from escaping from the heating chamber during the periods when the steam valve is closed.

It will be apparent that my construction is simple and effective in operation and that it is particularly adapted to the requirements of standard structure in tenders. It will also be seen that my improved arrangement is very economical in its operation.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is the following:—

1. In combination in a feed water heater, a main tank, a heating chamber therein but having no communication therewith, a water chamber at each end of said heating chamber, one of which communicates with the main tank, a series of tubes extending through the heating chamber and opening into the water chambers, a steam inlet to the heating chamber and a discharge outlet from one of the water chambers.

2. In combination in a feed water heater, a main tank, an elongated heating chamber mounted therein at a point below the level of the water line, said chamber having no communication with the tank, a water chamber adjacent the forward end of the heating chamber, a water chamber adjacent the rearward end of the heating chamber opening into the main tank, and a series of tubes extending through the heating chamber and opening into the water chambers, the said rear water chamber being composed of two communicating compartments opening into each other at their lower portions.

3. A feed water heater for locomotive tenders comprising a heating chamber located in the bottom of the tender tank, a water chamber at the forward end of the heating chamber, a water chamber at the rearward end thereof communicating with the main tender tank, a plurality of tubes extending through the heating chamber and opening into the water chambers, an outlet from the forward water chamber, a wall dividing the rear water chamber into two compartments communicating with each other at a point below the level of the tubes, and means for admitting steam to the heating chamber.

4. In combination in a feed water heater, a main tank, a heating chamber therein, a water chamber at each end of said heating chamber, one of which communicates with the main tank, a series of tubes extending through the heating chamber and opening into the water chambers, a removable plate for one of the water chambers opposite the ends of the tubes arranged to give access to the tubes when the plate is removed, a steam inlet to the heating chamber, and a discharge outlet from one of the water chambers.

5. In combination in a feed water heater, a main tank, a heating chamber therein, a water chamber at each end of said heating chamber, one of which communicates with the main tank, a series of tubes extending through the heating chamber and opening into the water chambers, a removable plate for each of the water chambers opposite the ends of the tubes in such chambers, and arranged to give access to the end of the tubes when the plates are removed, a steam inlet to the heating chamber, and a discharge outlet from one of the water chambers.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

HENRY H. VAUGHAN.

Witnesses:
L. A. Myers,
Julian H. Kendig.