

No. 879,362.

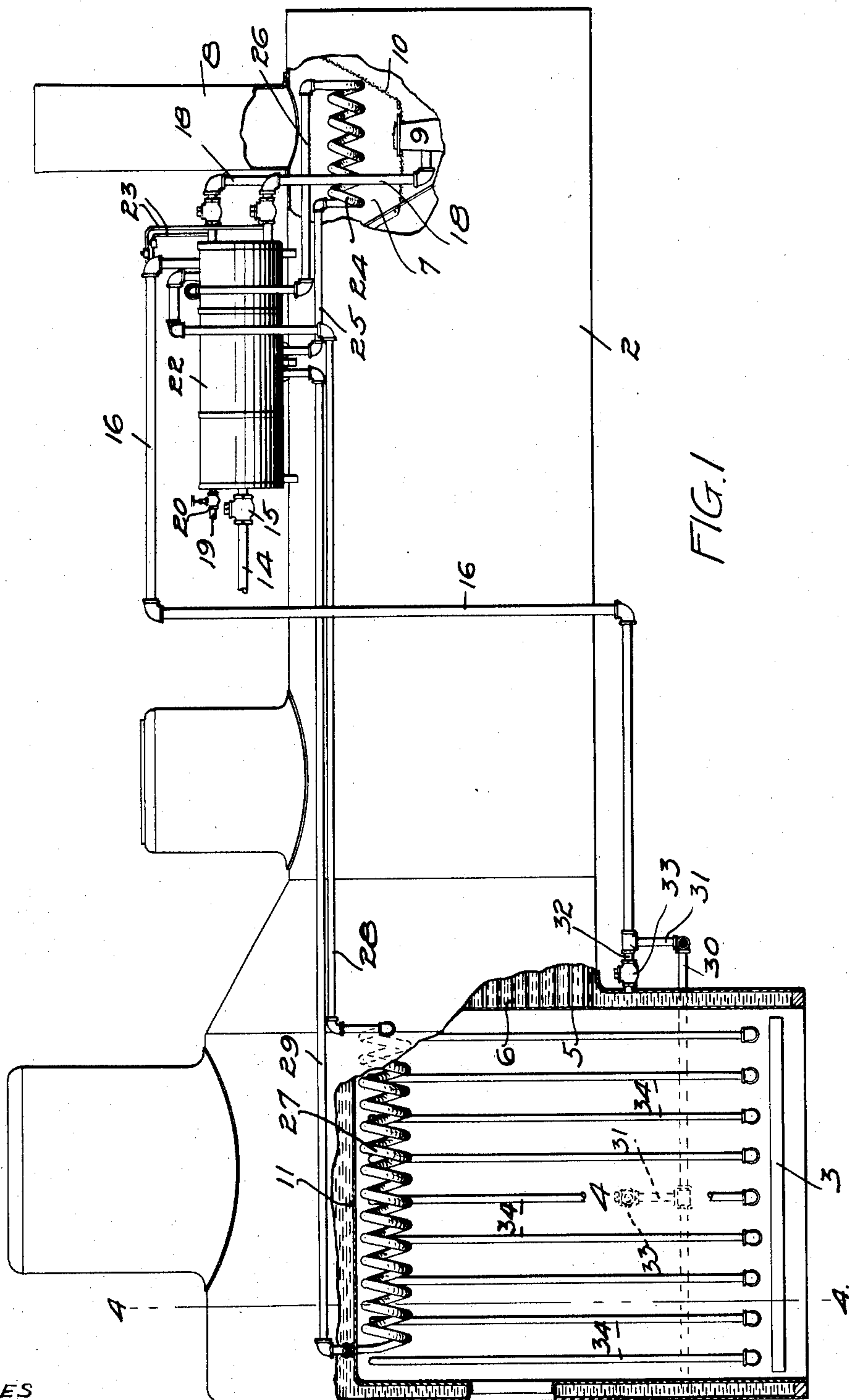
PATENTED FEB. 18, 1908.

W. H. BROWN.

FEED WATER HEATER.

APPLICATION FILED MAR. 17, 1906.

2 SHEETS—SHEET 1.



WITNESSES
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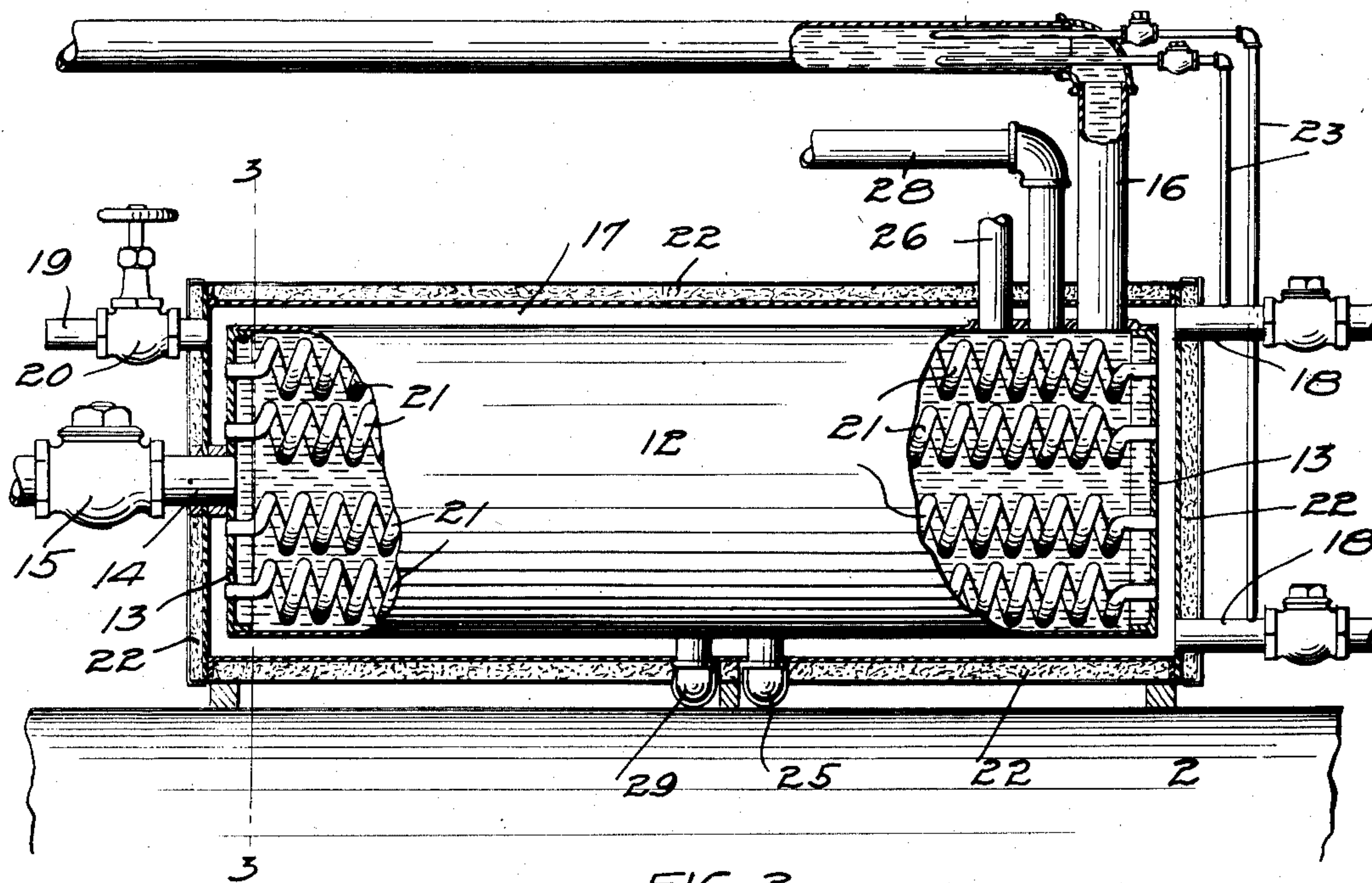


FIG. 2.

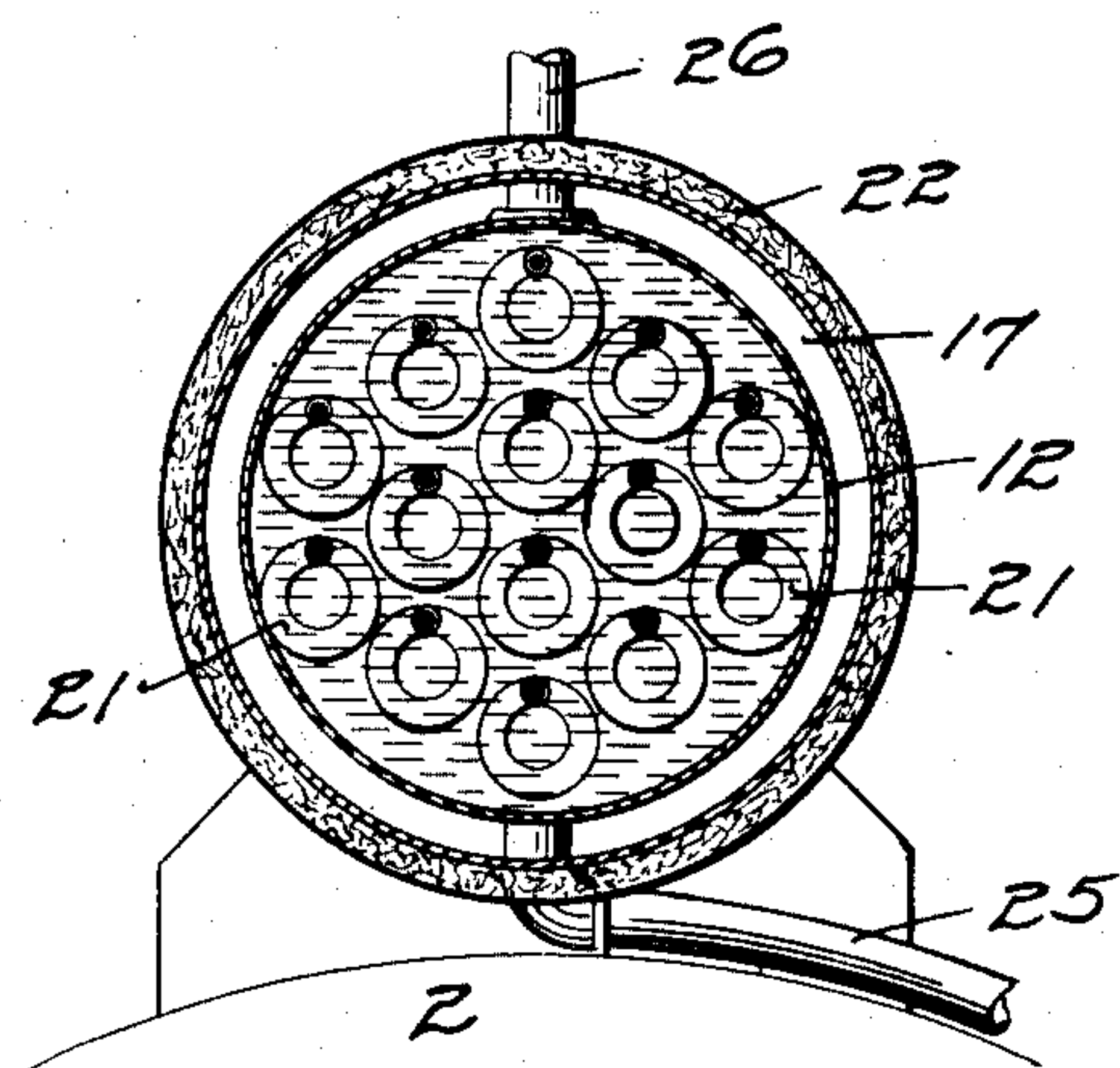


FIG. 3.

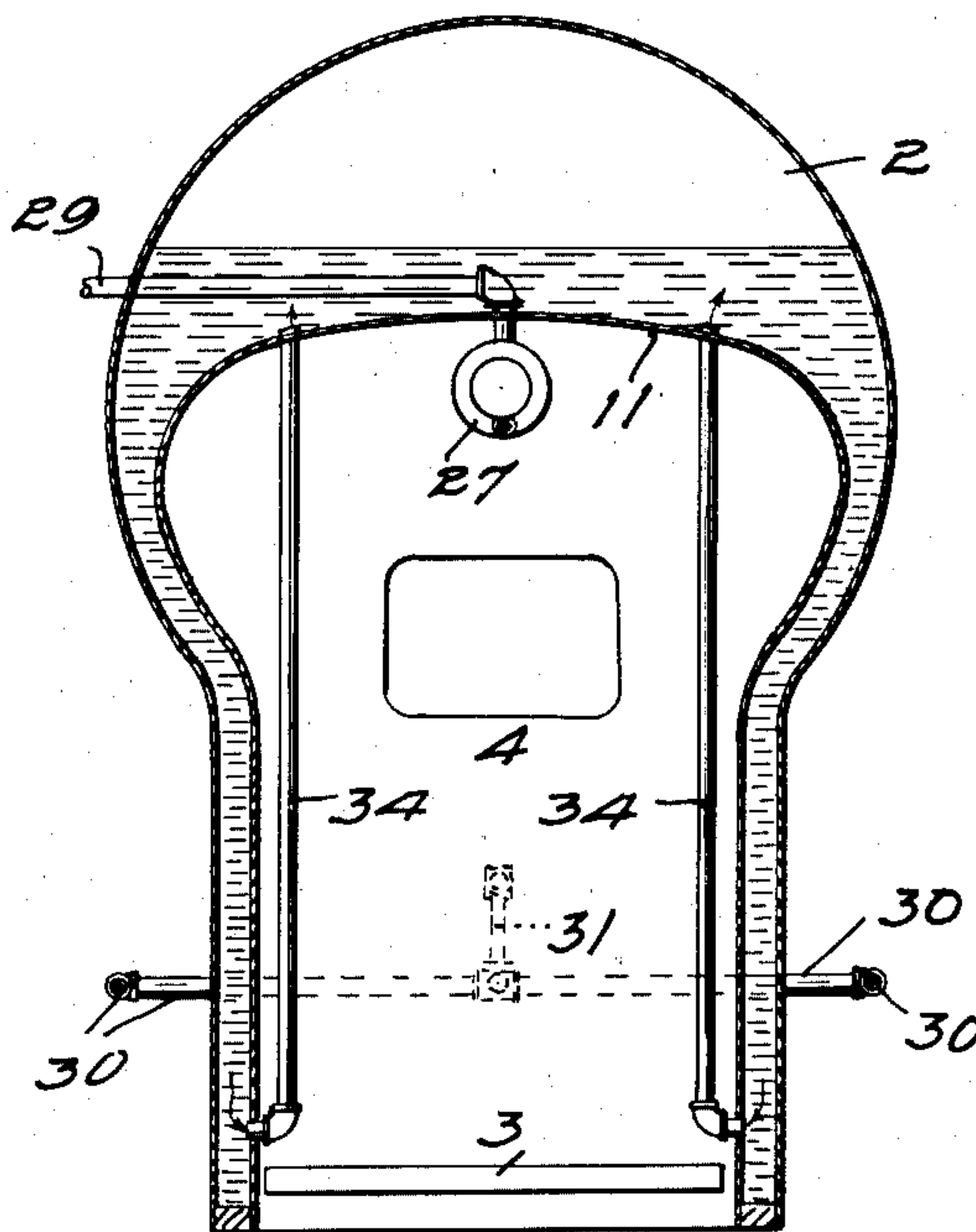


FIG. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM H. BROWN, OF MINNEAPOLIS, MINNESOTA.

FEED-WATER HEATER.

No. 879,362.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed March 17, 1906. Serial No. 306,620.

To all whom it may concern:

Be it known that I, WILLIAM H. BROWN, of Minneapolis, Hennepin county, Minnesota, have invented certain Improvements in Feed-
5 Water Heaters, of which the following is a specification.

This invention relates to improvements in feed-water-heaters for boilers, and the invention is particularly adapted for application
10 to the boilers of locomotives.

The object of the invention is to provide a feed-water-heater by means of which the water may be raised to a high temperature before entering the boiler.

15 Other objects of the invention will appear from the following detailed description, taken in connection with the accompanying drawings, in which,

Figure 1 is a side elevation of a locomotive
20 boiler, partly broken away, and showing my improved feed-water-heater applied thereto. Fig. 2 is a partial side elevation of the receptacle or drum of the feed-water-heater, showing the inclosing drum in longitudinal section.
25 Fig. 3 is a vertical section on line 3—3 of Fig. 2. Fig. 4 is a vertical section on line 4—4 of Fig. 1.

The locomotive-boiler 2 herein shown may be of any ordinary or preferred construction.
30 It is provided with the usual grate 3, fire-box 4, tube-sheet 5, tubes 6, smoke-box 7; smoke-stack 8, exhaust-nozzle 9 and netting 10. Above the fire-box 4 is the usual crown-sheet 11.

35 A water-heating drum or chamber 12 is provided, preferably of cylindrical form, and having preferably the heads or end sheets 13—13. This chamber has connected to it a water supply or inlet pipe 14, provided with
40 a suitable check-valve 15. The injector pipe connects with the pipe 14, and by this means the water to be heated is fed into the heating chamber or drum 12. A pipe 16 leads from the chamber 12 to the boiler, as hereinafter
45 described.

The heating chamber 12 is arranged within a steam drum 17, provided with the inlet pipes 18, one of which is connected to the exhaust from each engine cylinder. At the
50 opposite end of the drum 17 is the exit pipe 19 having a suitable regulating valve 20. The exhaust steam from the engine cylinders enters the drum through the pipes 18, passes

along and around the chamber 12, and also passes through the tubes 21, a series of which
55 are arranged in said heating chamber with their ends mounted in its end-plates. The tubes 21 are preferably spirally coiled and any desired part thereof may be arranged in said chamber (see Figs. 2 and 3). The drum
60 17 is provided with a suitable covering 22, formed of asbestos, or other non-conductor of heat. I prefer also to provide the small steam pipes 23 which extend from the pipes
65 18 and project into the water pipe 16. Each of these pipes is provided with a suitable check-valve; and by means of said pipes small jets of steam are injected into the water
70 pipe 16 (see Fig. 2), for the purpose of further heating the water after it leaves the chamber 12 and while on its way to the boiler.

For the purpose of additionally heating the water in the chamber 12, I provide a
75 heating coil 24 arranged in the smoke-box 7 above the exhaust pipe 9. This coil is connected to the chamber 12 by the pipes 25 and 26, one connected with the upper part and one with the lower part of said chamber, so that a circulation of water through said
80 coil is constantly maintained. A steam-coil 27 is preferably located in the upper part of the fire-box, and this coil is connected to the chamber 12 by the pipes 28 and 29 so that a circulation of water is constantly
85 maintained through the coil 27.

The heated water from the chamber 12 is conducted to the boiler through the pipe 16, and I prefer to make four connections between this pipe and the water-leg of the
90 boiler, or the portion of the boiler that surrounds the lower part of the fire-box (see Figs. 1 and 4). For this purpose I provide pipes 30 and 31 extending around the outer wall of the fire-box, and having the branch
95 pipes 32 that extend through the outer shell of the boiler, and that are provided with check-valves 33. With this arrangement it will be seen that the feed-water enters the water-leg of the boiler near the lower end
100 thereof. I also prefer to provide a series of pipes 34, 34, at each side of the fire-box, that are connected at their lower ends to the water-leg of the boiler, and at their upper ends to the crown-sheet. These pipes fur-
105 nish means for rapidly heating the water

which, entering the water-leg from the feed pipe, will move downward and will flow into said pipes, and pass upward through said pipes into the boiler above the crown-sheet.

5 By this means there will be a rapid heating of the water soon after it enters the boiler.

It will be seen that the feed-water-heater herein described insures raising the water to a high temperature by means of the exhaust steam from the engine cylinders, and thereby utilizes the heat from this steam that would otherwise be wasted. The heating coil that is located in the upper part of the fire-box also aids materially in raising the temperature of the feed-water. By having the water enter the boiler in the narrow space around the lower part of the fire-box and then pass upward through the pipes 34, additional heating is secured, and the production of steam is greatly facilitated.

The details of the construction may be varied in many particulars without departing from my invention.

I claim as my invention:

25 1. The combination, with a locomotive boiler, of a drum mounted thereon near the smoke stack and having double walls with a non-heat-conducting material between them, a chamber arranged within said drum and spaced from the walls thereof, a water supply pipe connected with said chamber, a series of pipes arranged within said chamber having their ends opening through the ends of said chamber into the space between it and the walls of said drum, pipes leading from the exhaust cylinders of the locomotive and opening into the space between said chamber and drum and whereby the exhaust steam will be admitted to said space and to said spirally coiled pipes in said chamber, and a pipe leading from said chamber to the boiler, substantially as described.

2. The combination, with a boiler, of a drum mounted thereon, a chamber provided within said drum and spaced from the walls thereof, a series of pipes provided within said chamber and having their ends projecting through the heads of said chamber and communicating with the space between said chamber and the walls of said drum, a water inlet pipe communicating with the interior of said chamber, an outlet pipe leading from said chamber to the boiler, and exhaust steam pipes leading from the engine cylinders and through the walls of said drum into the space between it and said chamber, substantially as described.

3. The combination, with a boiler, of a drum mounted thereon, a chamber provided within said drum and spaced from the wall thereof, a water inlet pipe for said chamber, an outlet pipe leading upward from the top of said chamber, exhaust steam pipes leading from the engine cylinder and communicating with the space between said drum and

chamber, and steam pipes having suitable valves leading from said exhaust pipes and projecting into said water outlet pipe.

4. The combination, with a locomotive boiler having a stack and an exhaust nozzle arranged below the stack, of a drum mounted on said boiler, a chamber arranged within said drum and spaced from the walls thereof, pipes leading from said exhaust and communicating with the space between said drum and chamber, a water supply pipe leading into said chamber, an outlet pipe leading from said chamber to the boiler, a coil located between said stack and said exhaust nozzle, and pipes leading from the ends of said coil, and one pipe extending through the lower wall of said chamber and the other pipe through the upper wall thereof, substantially as described.

5. The combination, with a boiler having a fire box, of a chamber located on said boiler, a water supply pipe for said chamber, a pipe leading from the top of said chamber to said boiler, a drum inclosing said chamber, pipes leading from the exhaust into the space between said drum and chamber, a coil arranged in the upper part of said fire box, and pipes leading from said coil to said chamber, one of said pipes entering the lower walls of said chamber and the other pipe entering the upper wall of said chamber whereby the circulation of water from said chamber will be established through the coil in said fire box.

6. The combination, with a locomotive boiler, of a chamber mounted thereon, a series of pipes provided within said chamber, a water inlet pipe communicating with the interior of said chamber, an outlet pipe leading from said chamber to the boiler, drum heads provided at each end of said chamber and spaced therefrom, and exhaust steam pipes leading from the engine cylinder and communicating with the spaces between said chamber and drum heads and through said spaces with the pipes extending through said chamber, substantially as described.

7. The combination, with a locomotive boiler having a stack and an exhaust nozzle arranged below said stack, a chamber mounted on said boiler, a series of pipes provided in said chamber, and extending through the heads thereof, drum heads provided at each end of said chamber and spaced from the heads thereof, pipes leading from said exhaust nozzle and communicating with the pipes in said chamber through the spaces between said heads, a water supply pipe leading into said chamber, an outlet pipe leading from said chamber to the boiler, a coil located between said stack and said exhaust nozzle, pipes leading from said coil and one pipe extending through the lower wall of said chamber and the other pipe through the upper wall thereof.

8. The combination, with a locomotive

boiler having a stack, and an exhaust nozzle
arranged below said stack, of a chamber
mounted on said boiler, a drum inclosing said
chamber and spaced from the walls thereof,
5 pipes leading from said nozzle into said drum,
a water supply pipe leading into said cham-
ber, an outlet pipe leading from said chamber
to the boiler, a coil located between said
stack and said exhaust nozzle, and pipes

leading from said coil and extending through 10
the walls of said drum into said chamber,
substantially as described.

In witness whereof, I have hereunto set
my hand this 14th day of March 1906.

WILLIAM H. BROWN.

Witnesses:

C. G. HANSON,
A. C. PAUL.