

No. 780,304.

PATENTED JAN. 17, 1905.

W. H. RICHMOND.
WATER HEATER FOR LOCOMOTIVES.

APPLICATION FILED FEB. 18, 1904.

2 SHEETS—SHEET 1.

Fig 1

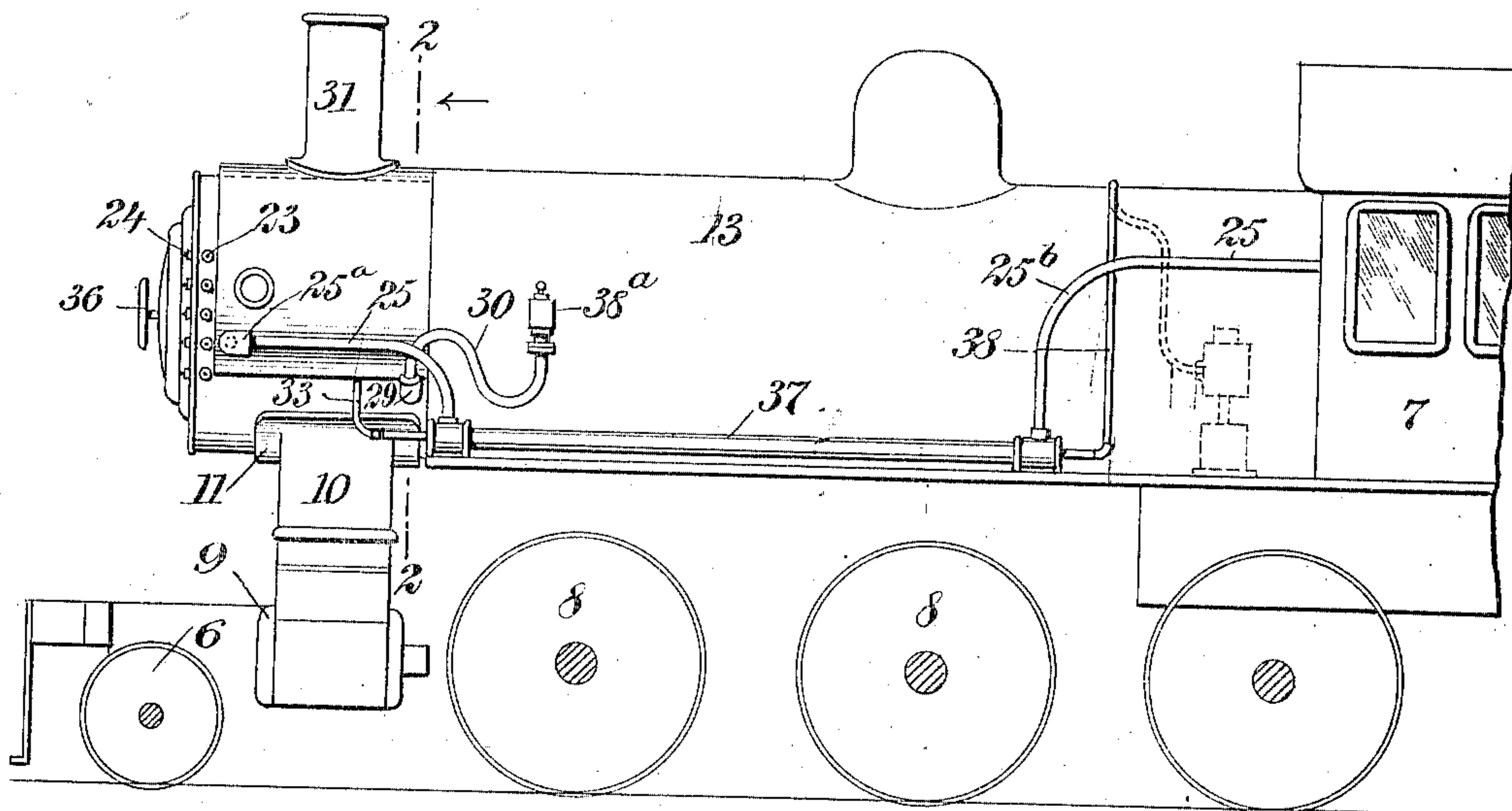
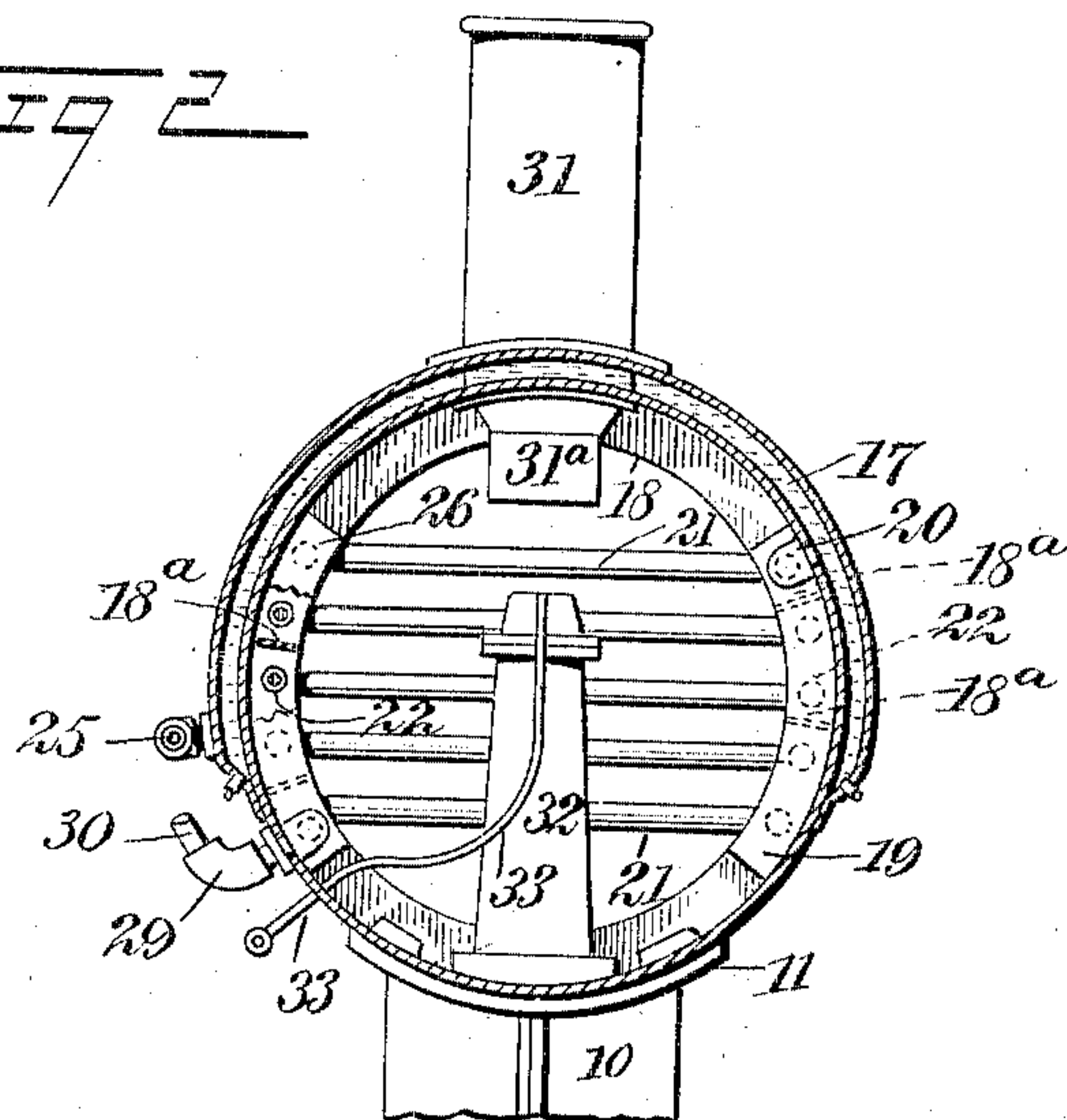


Fig 2



WITNESSES:

H. Walker
W. Harrison

INVENTOR

Wesley H. Richmond

BY

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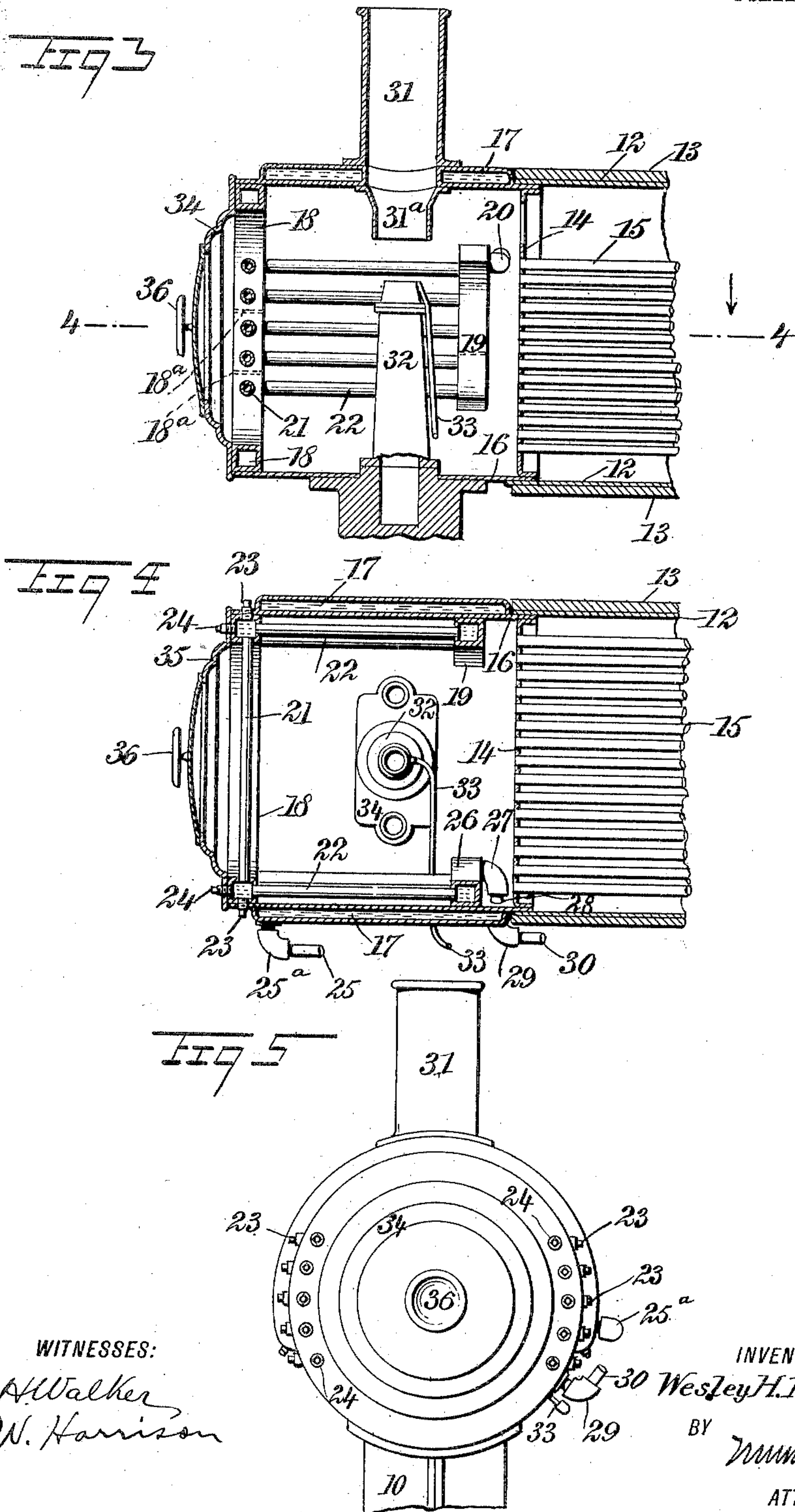
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UNITED STATES PATENT OFFICE.

WESLEY H. RICHMOND, OF MARQUETTE, MICHIGAN, ASSIGNOR OF ONE-HALF TO HENRY R. HARRIS, OF MARQUETTE, MICHIGAN.

WATER-HEATER FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 780,304, dated January 17, 1905.

Application filed February 18, 1904. Serial No. 194,128.

To all whom it may concern:

Be it known that I, WESLEY H. RICHMOND, a citizen of the United States, and a resident of Marquette, in the county of Marquette and State of Michigan, have invented a new and Improved Water-Heater for Locomotives and the Like, of which the following is a full, clear, and exact description.

My invention relates to water-heaters and admits of general use, but is particularly applicable to locomotives and when used in locomotives may be operated largely by means of heat otherwise wasted.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a locomotive equipped with my invention. Fig. 2 is an enlarged section upon the line 2 2 of Fig. 1 looking in the direction of the arrow. Fig. 3 is a fragmentary vertical longitudinal section through the same. Fig. 4 is a horizontal section upon the line 4 4 of Fig. 3 looking in the direction of the arrow, and Fig. 5 is a fragmentary front elevation of the locomotive.

The locomotive is equipped with most of the usual apparatus, such as the truck 6, the cab 7, wheels 8, cylinders 9, steam-conduits 10, and cylinder-saddles 11, these parts being of the usual construction. The boiler is shown at 12 and is provided with the usual jacketing 13, a flue-sheet 14, and flues 15. A heater 37 surrounds the feed-pipe 38, through which the exhaust-steam from the air-pump passes. The smoke-box 16, comprising the usual front end of the locomotive, is provided with a water-jacket 17 of substantially cylindrical form and with a water-ring 18, disposed adjacent thereto and connected therewith, as herein-after described. A pair of arc-shaped hollow members 19 and 20 are also provided, these members being disposed within the smoke-box 16. The member 19 is connected by a pipe 20 directly with the interior of the water-jacket 17, as indicated in Fig. 3. A number of water-tubes 21 extend directly across the water-ring 18, and a number of somewhat

similar tubes 22 are each disposed at right angles to the tubes 21 and connected with the ring 18 and with the hollow members 19 and 26. Opposite the respective ends of the tubes 21 are the removable plugs 23, screwed into the ring 18, as shown in Fig. 4. Similarly, opposite the front ends of the water-tubes 22 are the removable screw-plugs 24. The purpose of having the plugs 23 and 24 disposed opposite the ends of the water-tubes 22 is to enable the tubes to be readily cleaned or inspected. By removing any single one of the plugs 23 or 24 the corresponding end of either of the tubes 22 or 21 is brought into view, so that a workman can readily inspect or clean the same. The ring 18 is provided with partitions 18^a, whereby it is divided off. The tubes are preferably expanded into position after the manner of securing the flues into the flue-sheet. A pipe 25, provided with a bend 25^a, is connected with the water-jacket 17 and also with the heater 37. The arc-shaped hollow member 26 is provided with a bend 27 and with a pipe 28, which passes through the smoke-box 16 at a point below the water-jacket, and is connected by a bend 29 with a pipe 30, which extends to a check-valve 38^a, connected directly with the boiler.

The smoke-stack is shown at 31 and is provided with the contracted portion 31^a. The blast-nozzle is shown at 32, and the pipe 33 of the air-pump is located in the usual manner. The end plate is shown at 34, and mounted upon it is the number-plate 36. Connected with the heater 37 is a feeder-pipe 25^b, running back to the cab, whereby the feeder is maintained under the control of the engineer.

The operation of my device is as follows: The flames and gases of combustion pass through the flues 15 into the smoke-box in the usual manner. The water-ring 18, the hollow members 19 and 26 connected therewith, and the tubes 21 and 22 are thus heated by the flames and gases. The blast-nozzle 32 and the pipe 33 perform their usual functions. The water contained within the ring 18, the members 19 and 26, and the water-tubes thereby becomes heated to a high temperature within the water-jacket 17, from which the

water, still hot, passes through the pipe 30 and check-valve 38^a into the boiler. From the heater 37 the water flows into the water-jacket 17, thence through pipe 20, thence sinus-
 5 ously throughout the entire system of tubes 21 22, leaving by the pipe 30 and entering the boiler through the check-valve 38^a.

It will be observed that the water mechanism in the front end of the locomotive is
 10 heated in three distinct ways, to wit—first, by the exhaust from the air-pipe into the heater; second, by the flames and waste gases, and, third, by the waste heat radiating from the flue-sheet 14. In fact, in the ordinary loco-
 15 motive there is a considerable waste of heat at this point, and the principal purpose of my invention is to prevent this waste of heat, thereby economizing fuel. Another object
 20 attained by my invention, however, is to enable the boiler to raise steam more quickly and also to slightly enlarge the capacity of the boiler.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

25 1. In a water-heater for locomotives and the like, the combination of a substantially saddle-shaped water-jacket, a hollow member of substantially annular conformity disposed concentric to said water-jacket, a plurality of
 30 substantially arc-shaped hollow members disposed within said water-jacket, and concentric thereto, tubes connecting said substantially arc-shaped members and said annular member together, tubes extending across said an-
 35 nular member, and mechanism connecting said water-jacket with the boiler of a locomotive.

2. The combination of a water-ring provided with partitions separating the same into com-
 40 partments, a hollow member disposed adjacent to said water-ring and likewise provided with partitions separating the same into compartments, a plurality of water-tubes connected with said ring and with said hollow
 45 member, the arrangement being such that said water-ring, said hollow member and said tubes together form a sinuous circulatory system, and means for connecting said system with a boiler.

50 3. The combination of a water-ring provided with partitions dividing the same into separate compartments, said compartments being adapted to hold water, a tubular member ex-
 55 tending across the path of the flame from one of said compartments to another thereof, and

connections between said water-ring and the boiler.

4. The combination of a hollow ring dis- posed in a vertical plane provided with parti-
 60 tions separating the same into compartments, and a plurality of water-tubes disposed across said ring and communicating with oppositely-
 65 disposed compartments thereof, said water-tubes crossing the path of the gases of com- bustion.

5. The combination of a water-ring provided with partitions separating the same into com-
 70 partments, a plurality of tubular members tapped into said water-ring, divers of said tubular members connecting one compartment
 75 of the ring with another compartment thereof, and being disposed across the path of the flames and gases, a plurality of screw-plugs tapped into said water-ring and disposed op-
 80 posite the respective ends of said tubular mem- bers for the purpose of rendering said tubu-
 85 lar members readily accessible, and connec- tions extending from certain of said tubular members to the boiler.

6. The combination of a water-ring provided
 80 with an angular portion disposed adjacent to the path of the flames and gases, a plurality of tubular members connected with said an-
 85 gular portion, means for connecting divers of said tubular members with the boiler, and re- movable plugs connected with said water-ring
 90 and disposed opposite the adjoining ends of said tubular members for the purpose of ren- dering the interior of said tubular members
 95 readily accessible.

7. The combination of a water-ring provided with an angular portion so disposed as to en-
 circle the path of the flames and gases, a plu-
 95 rality of tubular members connected with said angular portion, divers of said tubular mem- bers crossing said ring and connecting one
 100 part with another part thereof, removable plugs connected with said water-ring and dis- posed opposite the respective ends of said tu-
 105 bular members for the purpose of rendering the interior of said tubular members readily accessible, and means for connecting divers of said tubular members with a boiler.

In testimony whereof I have signed my name to this specification in the presence of two sub-
 scribing witnesses.

WESLEY H. RICHMOND.

Witnesses:

WALTON HARRISON,
 EVERARD BOLTON MARSHALL.