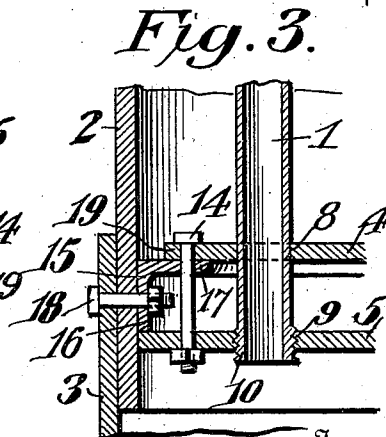
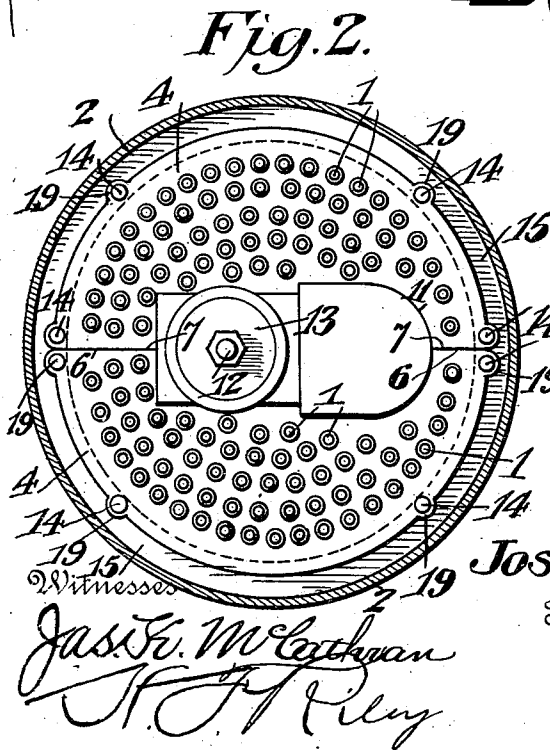
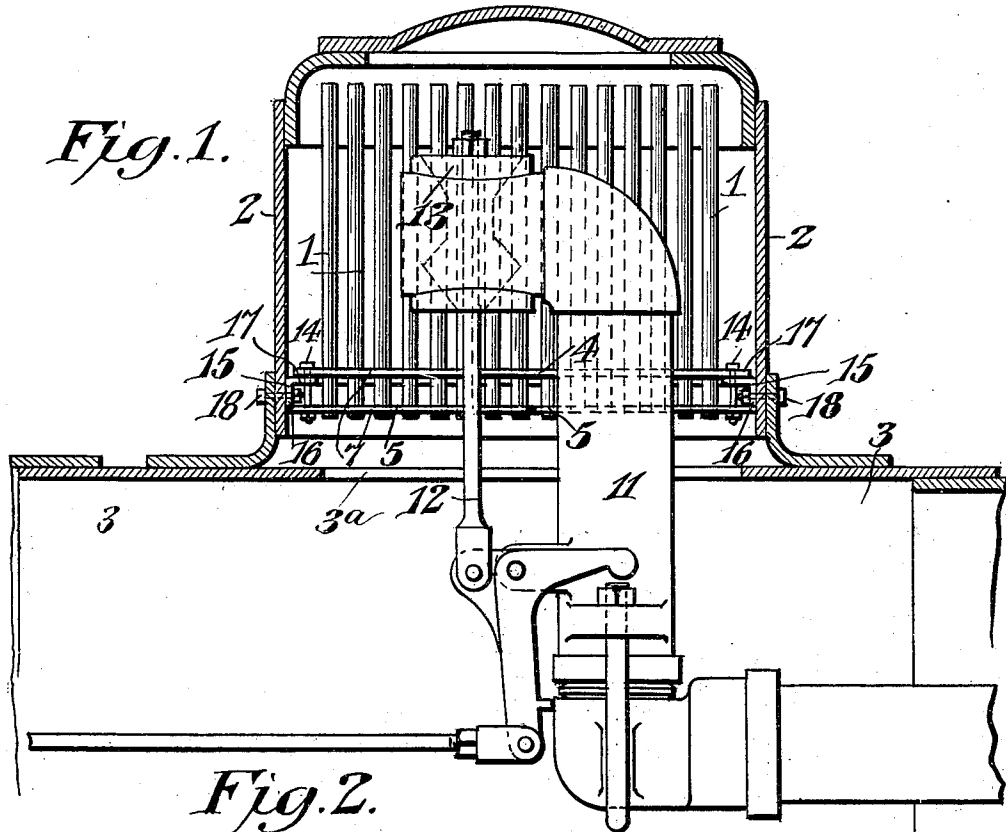


J. E. HARRISON.  
SEPARATOR FOR BOILERS.  
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988,264.

Patented Mar. 28, 1911.



Inventor  
**Joseph E. Harrison.**  
By *E. J. Siggers*  
Attorney

Witnesses  
*James F. McLaughlin*  
*J. F. Riley*

# UNITED STATES PATENT OFFICE.

JOSEPH E. HARRISON, OF HARVEY, NORTH DAKOTA.

## SEPARATOR FOR BOILERS.

988,264.

Specification of Letters Patent.

Patented Mar. 28, 1911.

Application filed March 14, 1910. Serial No. 549,367.

### *To all whom it may concern:*

Be it known that I, JOSEPH E. HARRISON, a citizen of the United States, residing at Harvey, in the county of Wells and State of North Dakota, have invented a new and useful Separator for Boilers, of which the following is a specification.

The invention relates to improvements in boilers for locomotives and other engines.

The object of the present invention is to improve the construction of boilers, and to provide a simple, inexpensive and efficient attachment, adapted to be placed within the steam dome of a boiler without necessitating any alteration in the arrangement of the throttle valve or steam pipe, and adapted to eliminate the effect of a direct draw of steam from the water within the boiler, and capable of insuring a uniform distribution or consumption of the steam, and of supplying dry steam to the throttle valve and thereby preventing water from entering the cylinders and valve casings.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawing, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing:—Figure 1 is a vertical sectional view of a portion of a boiler equipped with an attachment, constructed in accordance with this invention. Fig. 2 is a horizontal sectional view of the steam dome, the attachment being shown in plan view. Fig. 3 is an enlarged detail sectional view of the attachment and a portion of the steam dome.

Like numerals of reference designate corresponding parts in all the figures of the drawing.

In the embodiment of the invention illustrated in the accompanying drawing, the attachment includes a series of vertically arranged tubes 1, located within the steam dome 2 of a locomotive boiler 3 and mounted at their lower ends in a support, consisting of upper and lower horizontal plates or diaphragms 4 and 5, forming a closure at the bottom of the steam dome to prevent a direct passage of water or steam into the

steam dome and to permit the steam to enter the space above such closure only through the vertical tubes. The vertical steam tubes are open at each end and are of a sufficient number to supply the desired quantity of steam, and to conduct the same uniformly from the lower portion of the steam dome to the top thereof, the steam tubes terminating preferably to within about an inch and a half of the top of the steam dome. This has the effect of raising the throttle valve or steam pipe to the top of the steam dome and insures a supply of dry steam to the cylinders.

The upper and lower horizontal plates or diaphragms are preferably composed of two sections, being provided at the center and having diametrically arranged transverse abutting edges 6 and 7. The vertical tubes extend through openings 8 and 9 in the upper and lower plates or diaphragms; the upper openings 8 are smooth, as clearly shown in Fig. 3 of the drawing, and the lower openings are threaded and engaged by the lower ends 10 of the steam tubes, which are exteriorly threaded. The plates or diaphragms, which are spaced apart and which maintain the steam tubes in a vertical position, are provided with suitable openings for the steam pipe 11 and for the stem 12 of a throttle valve 13. The steam pipe and the throttle valve are arranged centrally of the steam dome and are surrounded by the vertical steam tubes, and no steam enters the steam pipe 11 except that which has passed through the vertical steam tubes.

The upper and lower diaphragms are secured by vertical bolts 14 to a flanged ring 15, approximately L-shaped in horizontal section and composed of a vertical annular portion 16 and an inwardly extending horizontal annular flange or portion 17. The vertical flange or portion is secured by horizontal bolts 18 to the inner faces of the walls of the steam dome, and the upper plate or diaphragm rests upon the horizontal flange 17, while the lower plate or diaphragm fits against the lower edge of the vertical flange 16. The vertical bolts 14 pierce the upper and lower diaphragms and the horizontal flange of the ring 15, as clearly shown in Fig. 3 of the drawing, and the upper diaphragm is provided at its periphery with projections or ears 19, which are perforated for the bolts 14. Instead, however, of mounting the closure, formed by the upper and lower diaphragms, on the walls of the

steam dome, it may be secured directly upon the boiler at the opening 3<sup>a</sup> over which the steam dome is mounted. With this arrangement the upper and lower diaphragms will form a closure for the lower portion or bottom of the steam dome, and the arrangement will not in any manner affect the construction of the said dome.

The attachment eliminates the direct draw of steam from the water, and thereby prevents the water from foaming especially when locomotives are running in bad water districts. It enables the steam to be drawn in a uniform manner throughout the entire area of the steam dome, so that the water is less subject to rise, or be disturbed and cause the boiler to foam. It lessens the liability of the water entering the cylinders and causing breakage of the valves and cylinder packing, or the springing of the valve gear and affecting the efficiency of the service, and it also enables the boiler to carry more water without priming, so that locomotives will make better fuel and oil records, and locomotives will also be enabled to work nearer their full capacity without disturbing the water within the boiler, and the efficiency of a locomotive or other steam engine will be correspondingly increased. Also when the engine is running in alkali, or other bad water districts, it will enable the boiler to carry at least enough water to have the crown sheet covered at all times, thereby insuring safety of the boiler and largely eliminating engine failures.

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

1. An attachment for boilers including a support designed to be arranged at the lower portion of a steam dome and forming a closure for the same, and a plurality of independent steam tubes of relatively small diameter piercing the support and extending therefrom to the upper portion of the steam dome and forming entrance passages for the steam.

2. An attachment for boilers comprising a support including a horizontal diaphragm designed to be located at the lower portion of the steam dome of a boiler and forming a closure for the same, and a plurality of vertical steam tubes open at each end and each piercing the diaphragm and extend-

ing to the upper portion of the steam dome and forming independent steam passages.

3. An attachment for boilers including a support composed of spaced horizontal diaphragms designed to extend across the lower portion of a steam dome and forming a closure for the same, and a plurality of vertical steam tubes piercing the diaphragms and open at each end and forming independent steam passages.

4. An attachment for boilers including spaced upper and lower horizontal diaphragms designed to extend across the bottom of a steam dome and provided with aligned openings, the openings of the lower diaphragm being threaded, and vertical steam tubes extending through the openings of the diaphragms to the upper portion of the steam dome and having lower threaded ends engaging the threaded openings of the lower diaphragm.

5. An attachment for boilers including a horizontal flanged ring provided with means for securing it to the lower portion of a steam dome, upper and lower horizontal diaphragms spaced apart to receive the flanged ring, fastening devices piercing the diaphragms and securing the same to the ring, and a plurality of vertical steam tubes piercing the diaphragm and supporting the same and extending to the upper portion of the steam dome and forming independent steam passages.

6. The combination of a steam dome, a diaphragm extending across the lower portion of the steam dome and forming a closure for the same, a steam pipe piercing the diaphragm and extending into the space above the same and provided above the said diaphragm with a throttle valve, and a plurality of vertical tubes piercing the diaphragm and supported at their lower portions by the same and extending above the plane of the throttle valve, said tubes being of relatively small diameter and arranged around the steam pipe and forming independent steam passages.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOSEPH E. HARRISON.

Witnesses:

F. O. BREWSTER,  
F. J. LECBA.