R. D. JEFFREYS.

CIRCULATING MEANS FOR BOILERS.

APPLICATION FILED MAR. 22, 1911.

1,083,281.

Patented Jan. 6, 1914.

3 SHEETS—SHEET 1.

Fig. 1.

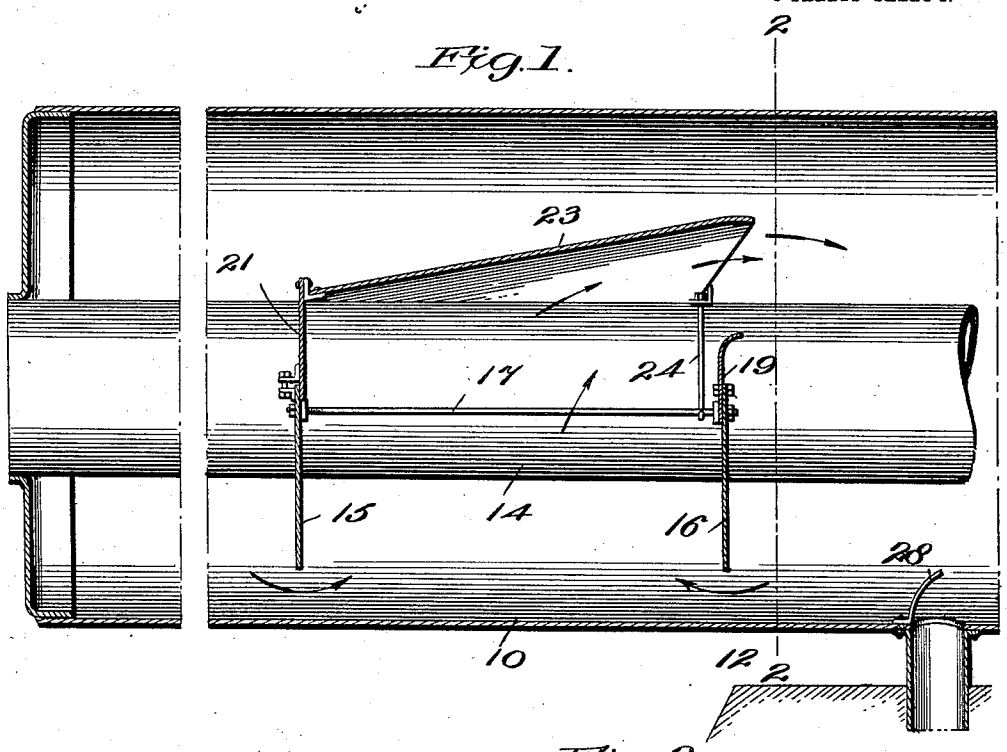

Fig. 3.

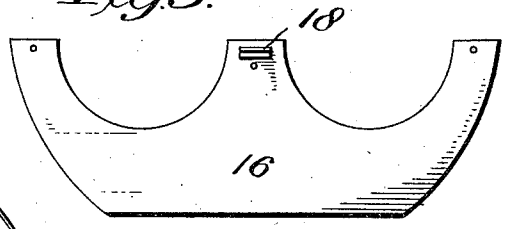

Fig. 2.

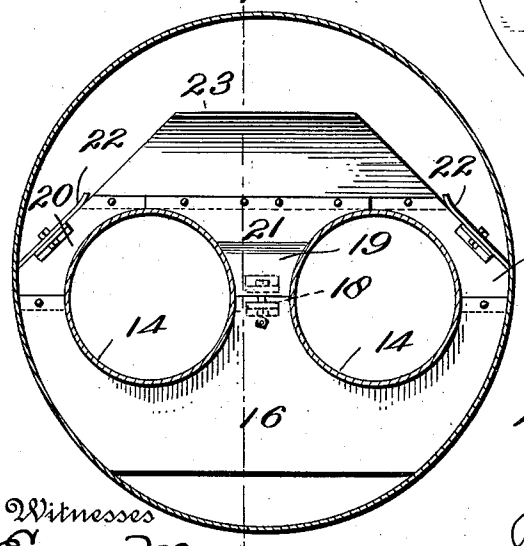

Fig. 4.

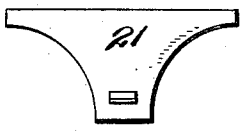

Fig. 5.

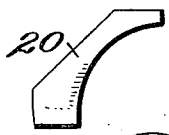

Fig. 6.

Witnesses

Edwin Bell.

Geo. A. Byrne.

Inventor

Robert D. Jeffreys,

by Wilkinson, Fisher & Witherspoon,

Attorneys.

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3 SHEETS—SHEET 2.

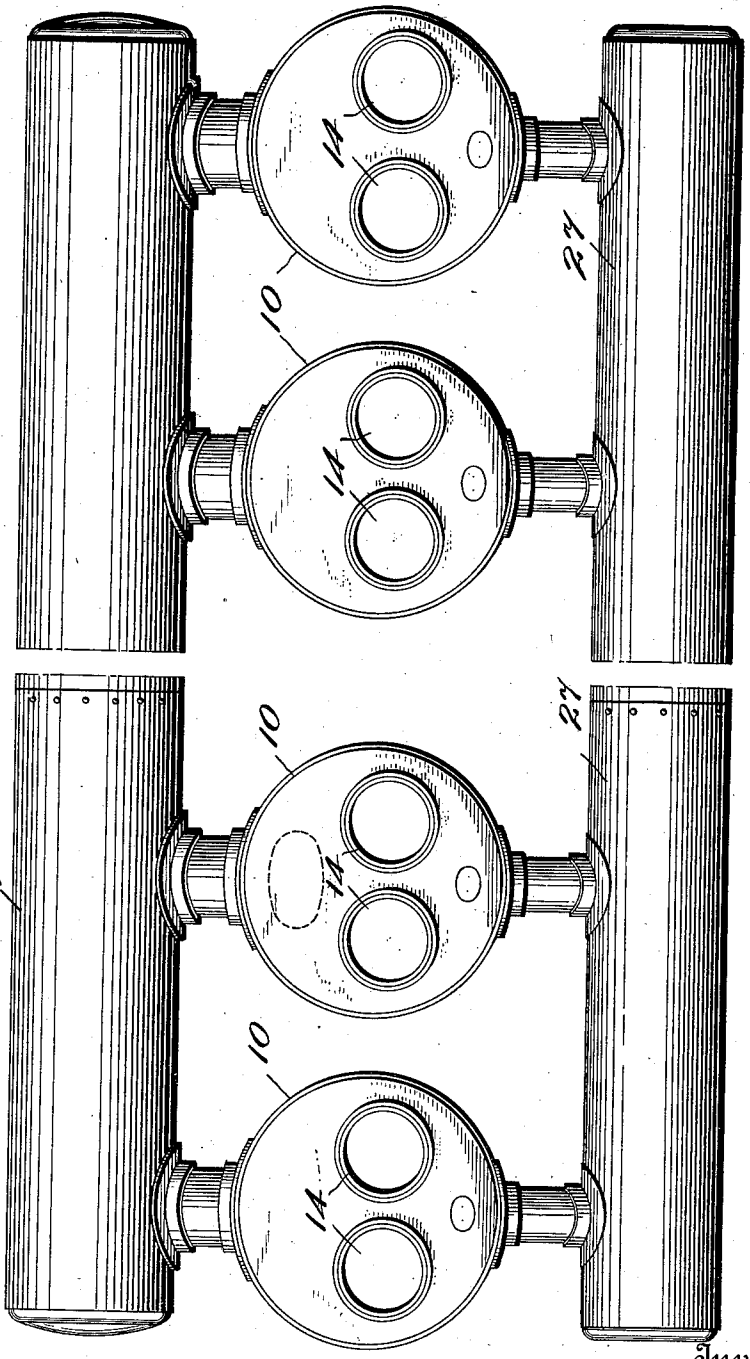

Fig. 1.

Witnesses

Edwin J. Beller.

Geo. A. Bryce.

Inventor

Robert D. Jeffreys,

by Williamson, Fisher & Witherspoon,

Attorneys.

R. D. JEFFREYS.

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3 SHEETS—SHEET 3.

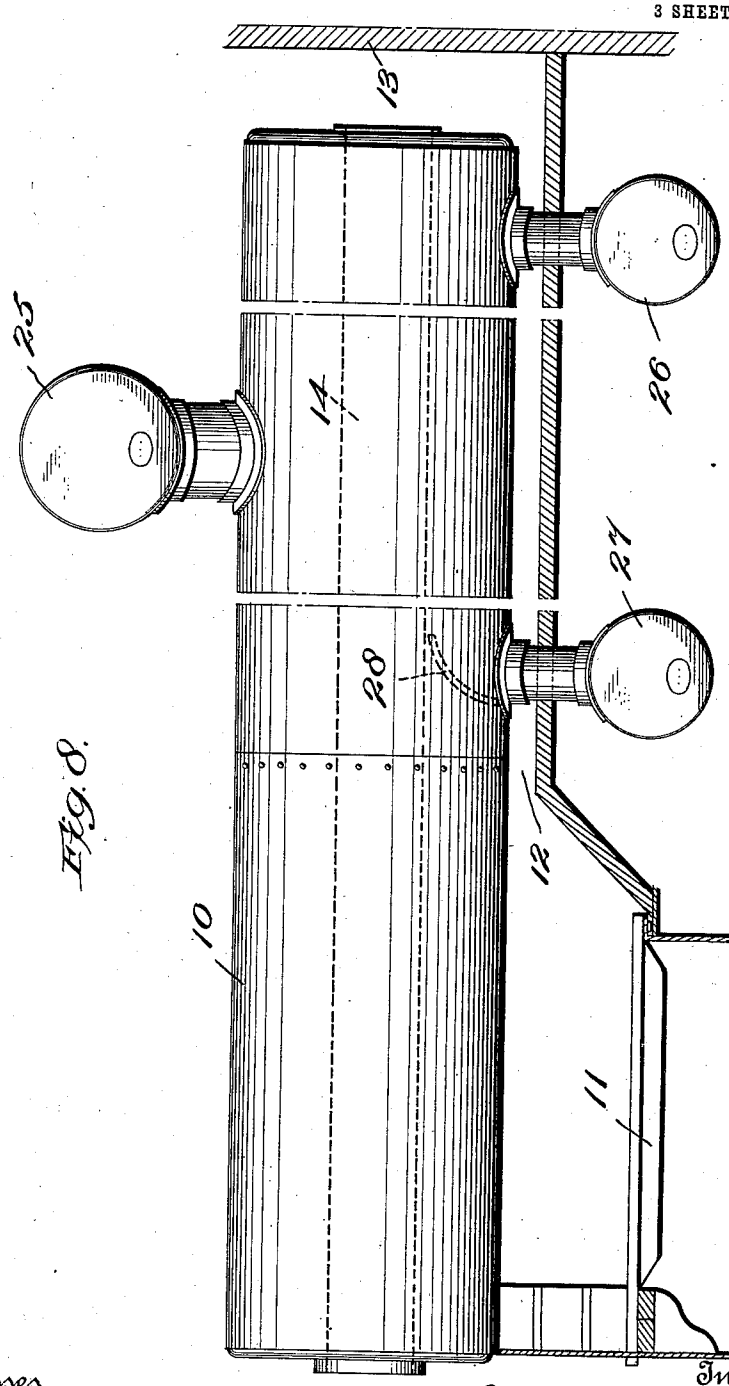

Fig. 8.

Witnesses

Edwin Weller.

Geo. A. Bepne.

Inventor

Robert D. Jeffreys,

by Wilkinson, Fisher & Witherspoon,

Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT D. JEFFREYS, OF NEW WINDSOR, NEW YORK, ASSIGNOR TO HARRY SCHOFIELD, SIDNEY J. ROSS, AND OLIVER PRESCOTT MacFARLANE, ALL OF LONDON, ENGLAND.

CIRCULATING MEANS FOR BOILERS.

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Application filed March 22, 1911. Serial No. 616,149.

To all whom it may concern:

Be it known that I, ROBERT D. JEFFREYS, a subject of the King of England, residing at New Windsor, in the State of New York, have invented certain new and useful Improvements in Circulating Means for Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention has relation to an improvement in means for promoting and directing the circulation of the water in steam boilers and thereby increasing the rate of making steam and preventing the deposit of sediment in such parts of the boiler as would probably be injuriously affected by its presence.

The invention is especially applicable to boilers having internal tubes for hot gases, and is useful in those plants wherein a considerable number of such boilers are connected in a "battery."

It is one advantage of my invention that it permits the circulating device to be made independently of the boiler and to be applied at any particular portion of the interior thereof which may be indicated by the specific conditions of use.

My invention is shown in one illustrative embodiment in the accompanying drawings, wherein—

Figure 1 is a longitudinal section of the device in place, taken on the plane 1—1 in Fig. 2; Fig. 2 is a transverse section of the same taken on the plane 2—2 of Fig. 1; Figs. 3, 4, 5 and 6 are detail views of the housing plates; Fig. 7 is a battery of boilers of the type for which this device is particularly useful, and Fig. 8 is a side view of one boiler of said battery.

While my invention is intended for application to fire-tube boilers in general, it is particularly adapted to use in connection with the form of boiler shown in the drawings herewith. It is to be understood that the boiler bodies as illustrated in the drawings are longer in proportion to their diameter than is shown and this has been indicated by cutting out cross sections of these bodies or shells, whereby indefinite length is suggested.

In Fig. 1 the boiler shell 10 is supposed to be a portion of that shown in elevation in Fig. 8, the same being properly inclosed and supported over the grate bars 11 and combustion space 12. The hot gases, passing first backward, are intercepted by the wall 13 and return through the fire flues 14, to find their way from the front of the boiler to the chimney (not shown). This is the arrangement of the well known "return flue" boiler to which my invention is particularly adapted.

The principal object of my invention is to supply means whereby the natural convective movement set up within the boiler shell may be made to produce a circulation of the heated water so directed as to prevent accumulation of sediment in the hotter parts of the boiler, where such accumulation would tend to cause burning of the shell. In my preferred form this is so arranged as to cause actual removal of the sediment into a properly placed mud drum. To carry out these ends I construct a housing directly over the hottest portion of the combustion space, as for instance the rear of the fire-box as shown in Fig. 1, whereby the convective action of the rising steam generated in this quarter is concentrated and directed in the proper manner. The housing in question is preferably constructed substantially as shown in Figs. 1 and 2, wherein there are employed two transverse partitions 15, and 16, extending entirely across the boiler shell, and so disposed as to leave a clear space above them and a clear space beneath them. The tension rods 17 serve to unite these partitions.

Figs. 3 to 6 show the forms of unit plates which are preferably employed to compose the partitions. The front partition 16 comprises a lower member shaped, as shown in Fig. 3, to accommodate the flues and provided with a suitable lug 18, whereby it may be bolted to the favorably curved lip-plate 19 shown in Figs. 1 and 6. At the outer sides of the flues 14 and extending partly over each, are the side plates shown at 20 in Figs. 2 and 5, which are suitably secured to the lower member. The rear partition 15 is composed of parts similar to those composing the front member, save that the center piece 21, shown in Fig. 4 takes the place of the lip-plate 19 used in the forward partition. Inclined roofing plates 22 are bolted or otherwise made fast to the side pieces 20 of the two partitions.

The hood 23 is fixed to these side roofing plates and to the rear partition, and is also preferably braced in front by the rod 24 extending downward to engage the middle bracing rod 17. There is thus composed an adjustable knockdown housing which can be put together within the boiler and may be located at any point where the individual local conditions are best suited for it. The operation of this housing depends upon the energy imparted by convection to the water over the hottest part of the fire. The upward current produced by convection beneath the housing draws the water from front and back under the partitions 15 and 16, as indicated by the arrows, and causes it to impinge upon the inclined hood 23 whereby a strong current is produced in a forward direction over the lip-plate as shown by the arrows. The current along the bottom of the boiler prevents any accumulation of sediment in the hotter parts of the boiler. I prefer to provide in this connection special means adapted to cooperate with the circulating means shown for gathering the sediment, and I have illustrated this in Figs. 1, 7 and 8 in connection with long return flue boilers arranged in a group or battery. In this arrangement the associated boiler shells 10 are placed parallel over the fire box and combustion space, and are united by a transverse shell 25 constituting the steam drum. Extending transversely under the boiler shells 10 are two mud drums 26 and 27, connected with said shells by appropriate passages.

The natural tendency of much of the sediment is to collect at the rear end of each boiler shell, where it will settle into the rear mud drum 26. I prefer, however, to supply the supplemental drum 27 nearer the front of the boiler shells, and to employ a mud diverter 28 at the entrance of said supplemental mud drum, which diverter stands directly in the main current approaching the circulator-housing. Any mud, carried along by this main current is thus caught by the diverter and turned into the supplemental drum.

It will be seen that my improvement supplies a simple and inexpensive means, applicable to a variety of boiler types, and adjustable within boilers already erected, whereby efficient circulation is promoted; thereby increasing the rapidity of steam output and controlling the means for removal of sediment.

Various changes may be made in this device without departing from the scope of my invention, and I do not limit myself to the details shown and described.

What I claim is—

1. In a boiler having internal flues, a knockdown circulator-housing comprising in combination a pair of suitably shaped plates (15 and 21) extending substantially across the boiler and embracing the flues at one end of the housing, said plates extending to a point well below said flues, suitably shaped plates (16 and 19) embracing said flues at the opposite end of the housing, suitable stays uniting the two sets of plates, a top plate attached to the upper portion of said first named set of plates, and extending across said flues and inclining upward therefrom over the top of the housing in a longitudinal direction, substantially as described.

2. In a boiler having internal flues, a circulator-housing embracing the flue or flues near the hottest part of the boiler and extending below said flue or flues and forming a passage so directed as to drive the water in one direction longitudinally along the top over the flues and toward a cooler portion of the boiler, a mud drum below the main boiler and situated in a cooler portion of the furnace, a passage leading down from the main boiler to said mud drum, said passage being between the cooler end of the boiler and the bottom of said housing and out of the line of circulation of the water, and a diverter at the opening of said mud drum and on that side of the same nearest the housing, said diverter being substantially in line of travel of the circulating water toward the underside of the housing, substantially as described.

In testimony whereof, I have affixed my signature, in presence of two witnesses.

ROBERT D. JEFFREYS.

Witnesses:
H. S. MacKaye,
L. F. Little.