June 10, 1930. D. H. SHANNON 1,762,246

STEAM BOILER

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Fig. 1

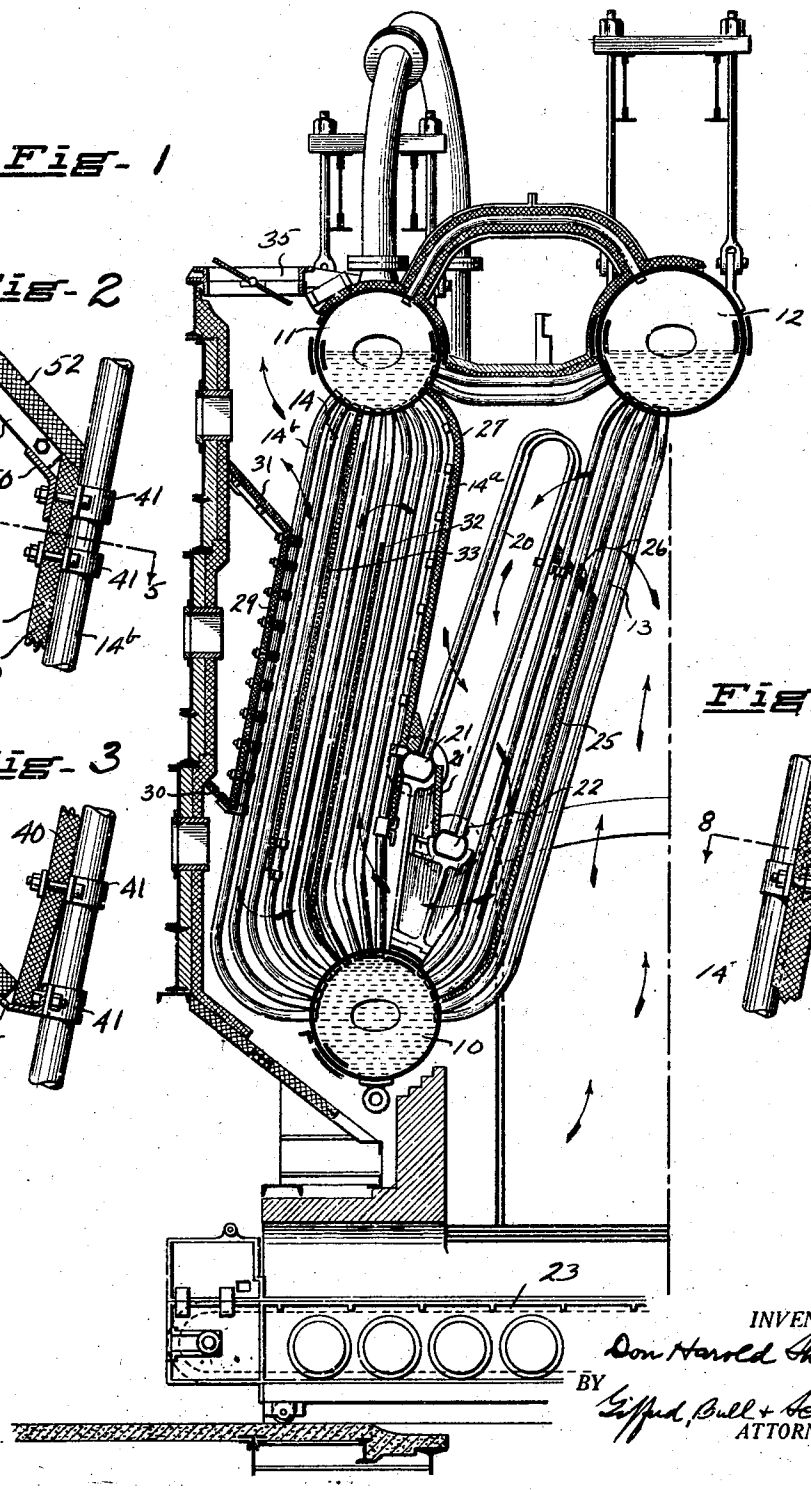


Fig. 2

Fig. 3

Fig. 4

INVENTOR.
Don Harold Shannon
BY
Gifford, Bull & Beall
ATTORNEYS.

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Fig-5

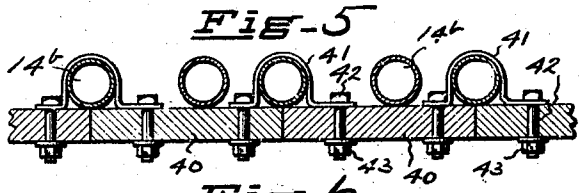


Fig-6

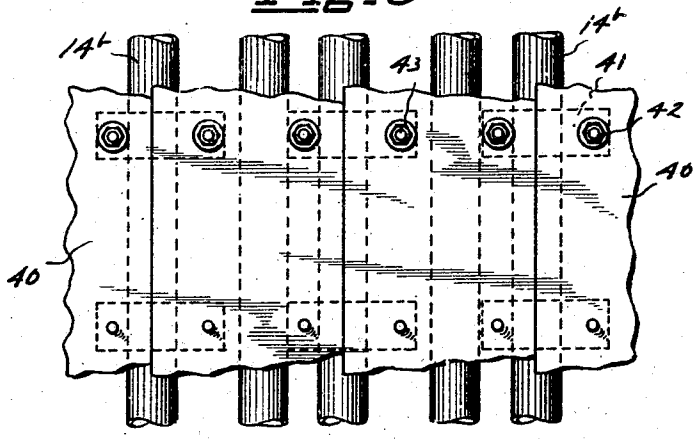


Fig-7

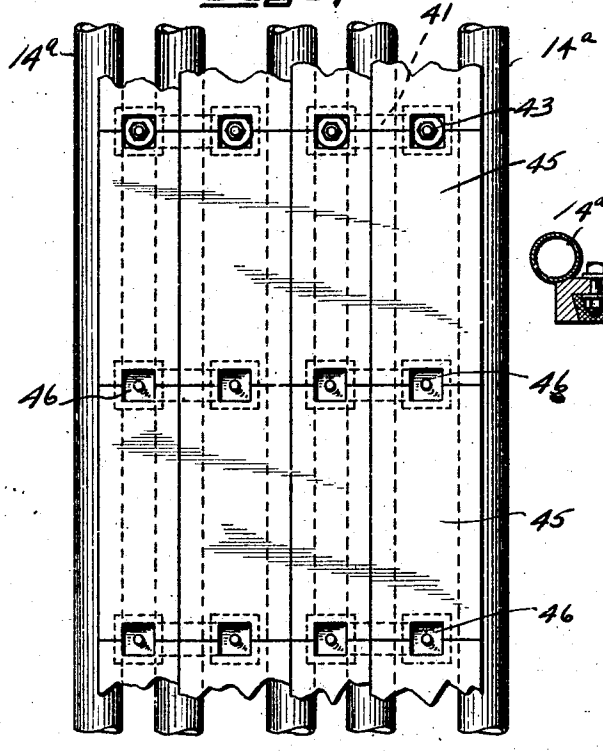
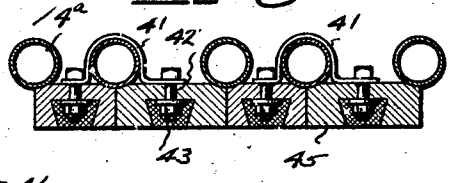


Fig-8



INVENTOR.
Don Harold Shannon
BY
Griffin, Ball & Rauch
ATTORNEYS.

Patented June 10, 1930 1,762,246

UNITED STATES PATENT OFFICE

DON HAROLD SHANNON, OF DETROIT, MICHIGAN, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY

STEAM BOILER

Application filed August 16, 1923. Serial No. 657,669.

My invention relates to steam boilers and has particular reference to improvements in baffles therefor and in the manner of their arrangement and location.

My invention will best be understood from the following specification taken with the annexed drawings, in which Fig. 1 is a sectional view, in elevation, of a half of a boiler of a well-known type containing an illustrative embodiment of my invention; Fig. 2 is an enlarged view of a portion of one of the baffles and adjoining baffle shelf; Fig. 3 is an enlarged view of the lower end portion of the same baffle; Fig. 4 is a sectional view in detail of a portion of another baffle; Fig. 5 is a view in section taken along the line 5—5 of Fig. 2; Fig. 6 is a front view showing a portion of one of the baffles in place; Fig. 7 is a view corresponding to Fig. 6, of the baffle shown in Fig. 4, and Fig. 8 is a view in section taken along line 8—8 of Fig. 4.

Like reference characters indicate like parts in the different views.

In the installation shown in Fig. 1, 10 denotes the mud drum of a boiler of the Stirling "W" type, also having steam and water drums 11 and 12. A bank of tubes 13 connects mud drum 10 to steam and water drum 12 and a bank 14 connects mud drum 10 with steam and water drum 11. A superheater having tubes 20 and headers 21 and 22 is located between banks of tubes 13 and 14. A baffle member 21′ extends from header 21 to header 22 in order to direct the flow of the gases beneath said headers. As here illustrated, the furnace comprises a mechanical stoker 23.

The tubes 13 are provided with the customary baffle 25 having a shelf portion 26, thereby affording a pass of the gases over shelf 26 and across the tubes 20 of the superheater. In the illustrative embodiment, a baffle 27 of special construction extends from the drum 11 in front of the first row 14^a of the bank of tubes 14 throughout the greater portion of their length and terminates preferably below the upper superheater header 21. On the outermost row 14^b of the bank of tubes 14 and preferably on the outside thereof, I provide a baffle 29 having lower and upper shelf portions 30 and 31, respectively. Baffles 27 and 29 are secured to the tubes in a manner to be presently described. Intermediate baffles 32 and 33 serve to cause the gases to make a plurality of passes over the tubes 14. The gases leave the boiler through exit opening 35.

Figs. 2 to 8 illustrate the manner of construction of the baffles 27 and 29 and the means for securing them to the boiler tubes. Figs. 2, 3, 5 and 6 show in detail the construction I have employed for baffle 29 which is placed in a relatively cool position in the setting, in which longitudinal title sections 40 are secured to the tubes 14^b by means of strap members 41 which pass around a tube 14^b and are secured at the ends thereof to the tile sections by means of bolts 42 and nuts 43. By having the line of contact of successive tile sections 40 contiguous with the boiler tube, I am able to secure two tile sections by means of a single strap 41.

As shown in Fig. 7, I employ a somewhat similar construction for securing together tile sections 45 of baffle 27 which is placed in a relatively hot position in the setting where the face of the baffle on the side farthest from the supporting tubes is swept by the hotter gases. In this instance it is advantageous to provide each tile section with recesses 46 preferably at the ends thereof and arranged so that a recess 46 is formed partly in each of the adjacent ends of two tile sections 45. By locating the ends of the bolts 42′ and the nuts 43 within these recesses and thereafter filling the remaining space therein with sealing means such as fire clay or other refractory, I provide a smooth surface for the baffle 27 which is suitable for resisting the gases. The bolts 42 and nuts 43 are maintained at a temperature below that at which the metal will be burned, the cooling being effected by conducting the heat to the straps 41 which are in contact with the boiler tubes. It will be seen that the joints between the longitudinal edges of the sections are closed and substantially sealed against leakage of gases by the fact that a

tube is disposed behind each joint, while the transverse joints are substantially sealed either by contact with the tubes or by the refractory material which is used to also protect the fastening means in the recesses 46. In this arrangement the leakage of gas through a baffle is materially reduced, and a much tighter baffle is provided.

Fig. 2 illustrates the manner I have employed for securing the shelf member 31 to the upper end of baffle 29. In this construction, angle members 50 secure the supporting members or stringers 51 upon which tiling 52 is placed. The members 51 are likewise secured to the boiler casing 54 by means of angle members 50. A shelf member 30 is secured at the lower end of baffle 29 by means of angle members 55 which are attached to the tubes by means of strap members 41.

From the foregoing, it will be seen that I have provided a simple and effective form of baffle construction which is adapted to be placed on the under side of a row of inclined water tubes. When so located, an appreciably greater flow area for the gases is afforded than would otherwise be the case. Furthermore, in the type of boiler illustrated, by locating a baffle immediately adjacent the superheater, the major portion of the heating surface of the latter is shielded from the cooling effect of the water tubes which would otherwise tend to absorb radiated heat from the superheater, thereby causing the superheater to be more effective and to give a higher degree of superheat for a given superheating surface than when the superheater tubes are not so shielded from the cooling effect of the water tubes.

It will be understood that the foregoing construction is illustrative merely and that various changes may be made both in the form of the baffles described and their location without departing from the spirit of my invention.

I claim:

1. A baffle for a water tube boiler comprising blocks of refractory material, means for securing said blocks to the boiler tubes comprising strap members each adapted to extend around a boiler tube, means securing said strap members to said blocks, the arrangement of straps and blocks being such that the sides of said blocks are contiguous along the boiler tubes and a strap is secured to contiguous blocks.

2. In combination, a boiler having a bank of water tubes and a flat tile baffle extending along and in front of an outermost row of tubes of said bank and having metallic straps disposed around the tubes and in extended thermal engagement therewith to attach the tiles thereto, the outer surface of the tiles being smooth and the attaching means for said straps being below the outer surface of the tiles.

3. In combination, a boiler comprising a bank of water tubes, a flat tile baffle extending along and in front of an outermost row of tubes of said bank, metallic strap means for attaching said baffle to said tubes, said metallic means having extensive thermal engagement with said boiler tubes and exposed to contact by hot gases only on the cooler side of said baffle, whereby they are cooled.

4. A boiler baffle made up of tiles laid in courses and supported on boiler tubes, pockets in the tiles at the joints between the courses, clamping means surrounding and having extended thermal engagement with the boiler tubes, and having their ends located in pockets of adjacent tiles, said pockets being filled with hardened plastic material, said plastic material serving to seal the joints between adjacent tiles to reduce gas leakage.

5. A boiler baffle made up of tiles laid in courses, and attached to boiler tubes by means which come between the courses, pockets in the tiles opposite said means so arranged that plastic material introduced into the pockets and afterwards hardened will be held securely in place, said means having portions lying in said pockets and said plastic material covering the portions of said means so lying in said pockets and also lying over the joints between adjacent tiles to reduce gas leakage.

6. A water tube steam boiler having water tubes arranged in rows and a baffle extending across the boiler adjacent to one of said rows, said baffle comprising a plurality of separate sections with their adjacent edges positioned opposite a tube in said row, and members embracing said tube and securing adjacent sections thereto.

7. In a boiler, a row of tubes and a baffle disposed on one side thereof, said baffle comprising a plurality of sections arranged with longitudinal edges opposite a tube in said row and adjacent thereto and with transverse edges adjacent each other, means disposed between said transverse edges and engaging the adjacent sections and a tube, to hold said sections in position, said means including a member terminating in a recess formed partly in each of said adjacent sections, and means filling said recess and covering the end of the member therein.

DON HAROLD SHANNON.