Dec. 19, 1933. M. I. KEARNS 1,940,132

STEAM BOILER

Filed Nov. 13, 1930 2 Sheets-Sheet 1

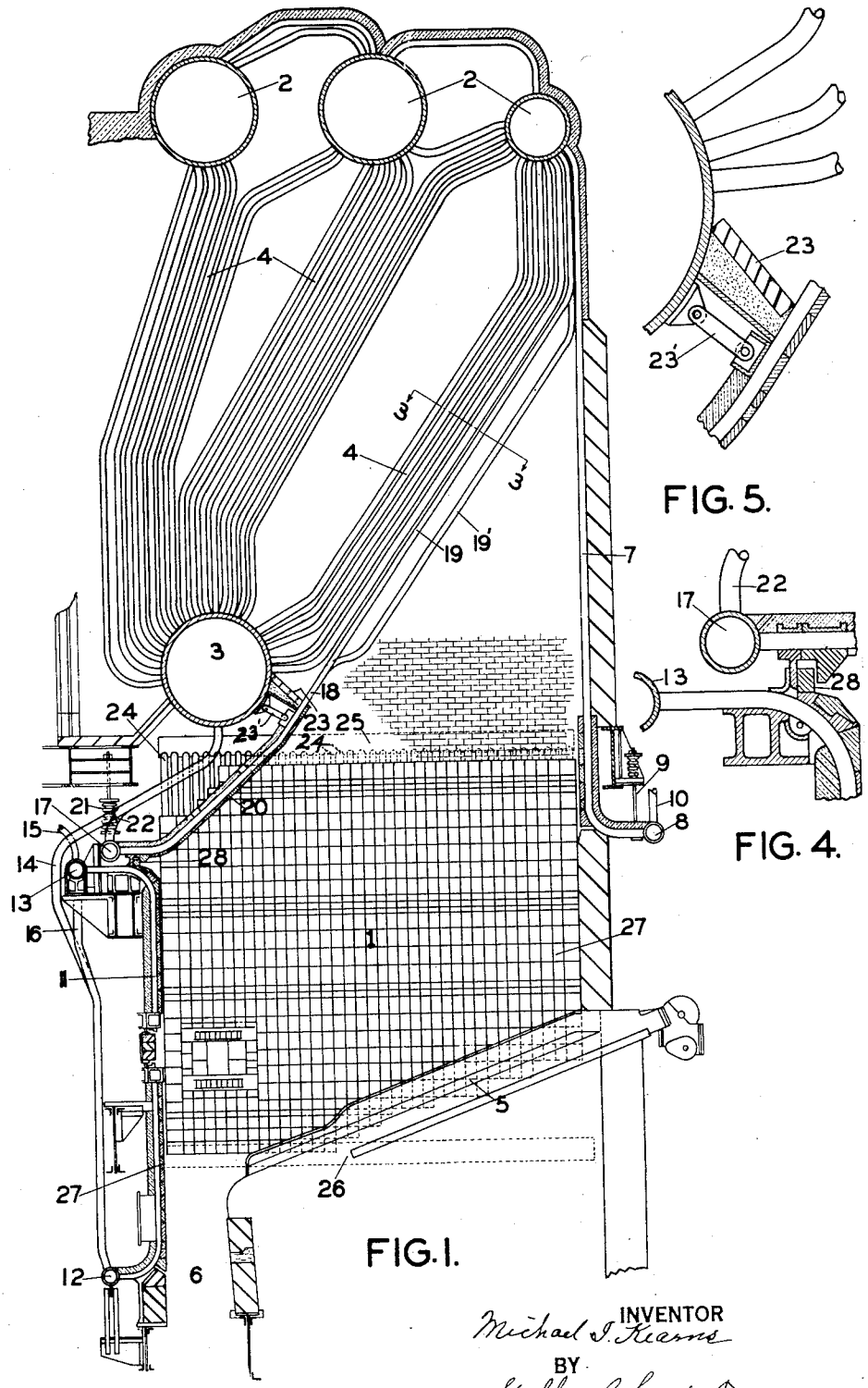


FIG. 1.

FIG. 5.

FIG. 4.

INVENTOR
Michael I. Kearns
BY
Gifford, Scull & Burgess
ATTORNEYS

Dec. 19, 1933. M. I. KEARNS 1,940,132

STEAM BOILER

Filed Nov. 13, 1930 2 Sheets-Sheet 2

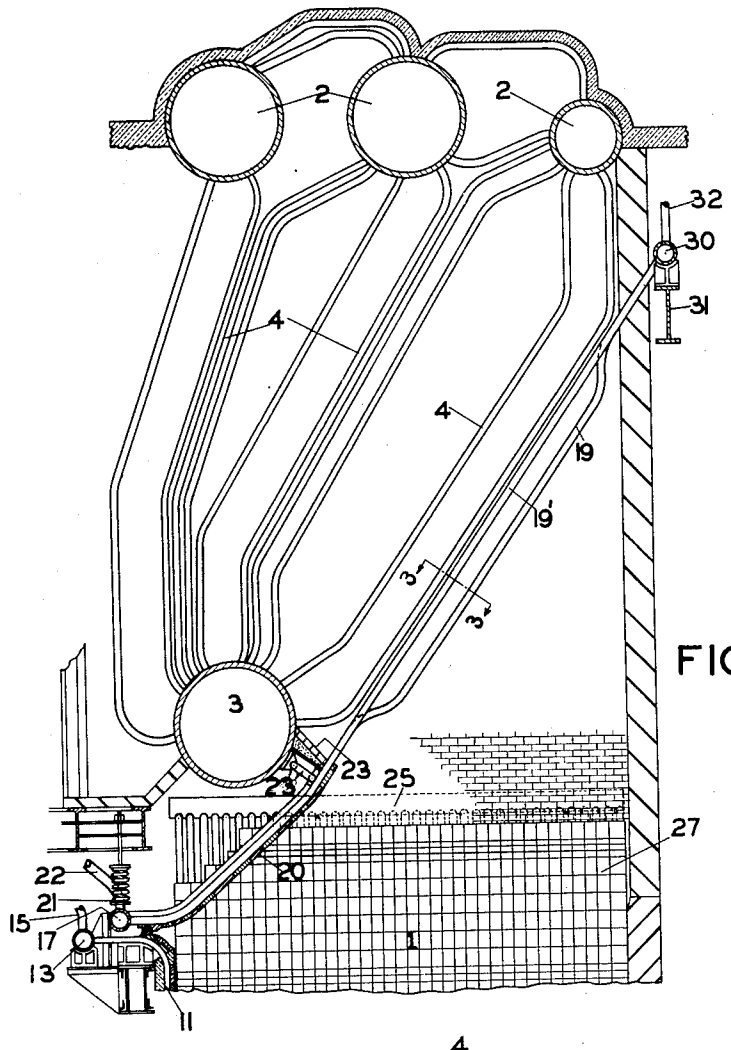


FIG. 2.

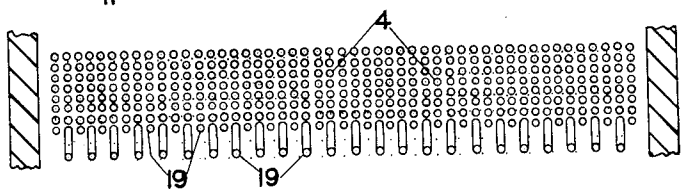


FIG. 3.

INVENTOR
Michael I. Kearns
BY
Gifford, Scull & Burgess
ATTORNEYS

Patented Dec. 19, 1933

1,940,132

UNITED STATES PATENT OFFICE

1,940,132

STEAM BOILER

Michael I. Kearns, Allentown, Pa., assignor to Fuller Lehigh Company, Fullerton, Pa., a corporation of Delaware

Application November 13, 1930
Serial No. 495,319

9 Claims. (Cl. 122—235)

This invention relates to a steam boiler of the Stirling type in which a row of inclined tubes is provided in front of the front bank of boiler tubes to serve as a slag screen for the boiler tubes. These tubes extend into a header located at the upper rear portion of the boiler furnace with the lower portions of these tubes lined with tile to serve as a portion of the roof of the furnace and to serve to protect the mud drum of the boiler from the hot gases from the furnace.

The invention will be understood from the description in connection with the accompanying drawings, in which Fig. 1 is a vertical section through an illustrative embodiment of the invention; Fig. 2 is a similar section, partly broken away, showing a modification; Fig. 3 is a section along the line 3—3 of Fig. 1; and Figs. 4 and 5 are sections on a larger scale showing some of the details.

In the drawings, reference character 1 indicates a furnace above which a Stirling boiler is located having upper drums 2 and a lower or mud drum 3 connected by banks of tubes 4 in the well-known manner.

The furnace 1 may be fired by means of a stoker 5 and an ashpit 6 may be located at the rear end of the stoker.

The front wall of the furnace is shown as extending straight downwardly from the front upper drum 2 and this wall is provided with a row of tubes 7 extending from a horizontally disposed header 8 spring supported by means of the supports 9 into the front drum 2.

The header 8 may be connected to the water space of the boiler by means of one or more pipes 10.

The rear wall of the furnace is provided with a row of upwardly extending tubes 11, the lower and upper ends of which extend outwardly into a lower header 12 and an upper header 13, respectively. The lower header 12 may be connected to the mud drum 3 by one or more pipes 14 and the upper header 13 may be connected to the steam space of the boiler by means of the pipe 15. Recirculating tubes 16 located outside of the furnace may connect the headers 12 and 13 for local circulation of water.

A horizontally disposed header 17 is located outside of the rear upper portion of the furnace 1 and a row of tubes 18 extends in an upwardly inclined direction from this header along the upper rear portion of the furnace and thence upwardly in front of the front bank 4 of boiler tubes to the front drum 2. Alternate tubes 18 have portions 19′ in front of the tube bank 4 bent forwardly away from the portions 19 of the tube row 18 to provide a slag screen for the tube bank 4. The lower portion of the tubes 18 along the rear upper portion of the furnace 1 is lined with tile or the well-known Bailey blocks 20 to provide a roof or wall to protect the mud drum 3 from the heat of the furnace. The lower header 17 may be spring supported, as indicated at 21, to permit expansion of the tubes 18 in a downward direction, and the header 17 may be connected to the water space of the boiler by one or more pipes 22. A baffle 23 extends from the upper portion of the tile 20 that form a furnace arch, to the drum 3 to prevent short-circuiting of hot gases beneath this drum, and a link mechanism 23′ below the baffle 23 connects the tubes 18 to the drum 3 to support the intermediate portions of these tubes and still permit expansion so that the arch is flexibly supported by the boiler.

The side walls of the furnace may be provided with upwardly extending water wall tubes 24 connected to upper and lower headers 25 and 26 and these tubes, as well as the tubes 11, may be lined with tile or the well-known Bailey blocks 27. The headers 25 and 26 are connected to the water circulation system of the boiler in the well-known manner. A gas seal 28 is provided between the lower portions of the tubes 18 that are lined with tile 20 and the upper end of the rear wall of the furnace that is made up of the tubes 11 and blocks 27.

In the modification shown in Fig. 2, an upper horizontally disposed header 30 is located outside of the boiler setting a short distance from the front drum 2 and is supported upon a support 31. This header 30 may be connected to the steam space of the boiler by means of the pipe 32, the remainder of this modification being quite similar to that already described.

By this invention, a vertical front wall can be used from the front upper drum of the boiler so that a furnace can be made of greater depth than ordinary, thus making a more compact setting than is the case when the front wall extends forwardly from the front drum of the boiler. Also the mud drum of the boiler is protected from the heat of the furnace and hot gases from the furnace are not permitted to impinge directly upon this drum. The tubes 18 not only provide a slag screen for protecting the boiler tubes, but these tubes provide additional evaporating surface for generating steam for the boiler.

I claim:

1. In a boiler having an upper drum, a lower

mud drum, and a bank of bent tubes connecting said drums, a furnace, a horizontally disposed spring supported header located outside of the upper rear portion of said furnace, a row of upwardly and forwardly inclined tubes extending from said header to the front drum of said boiler, and means to support an intermediate portion of said tubes from said mud drum.

2. In a boiler having an upper drum, a lower mud drum, and a bank of bent tubes connecting said drums, a furnace, a horizontally disposed header located outside of the upper rear portion of said furnace, a row of upwardly and forwardly inclined tubes extending from said header to the front drum of said boiler, a gas seal extending from said row of tubes to the mud drum of said boiler, and suspension members connected from said mud drum to said tubes.

3. In a boiler having an upper drum, a lower mud drum, and a bank of bent tubes connecting said drums, a furnace, a lower header at the rear of said furnace, an upper header at the front of said furnace, a row of tubes connecting said headers and extending substantially parallel to the front bank of tubes of said boiler, a gas seal from said row of tubes to the mud drum of said boiler, and a support for an intermediate part of said tubes behind said gas seal.

4. In a boiler having an upper drum, a lower mud drum, and a bank of bent tubes connecting said drums, a furnace, a row of inclined tubes extending across said furnace, the upper portions of said tubes being staggered and the lower portions being lined with tile to form a wall, and a baffle extending from the upper edge of said wall to said mud drum.

5. In a boiler having an upper drum, a lower mud drum, and a bank of bent tubes connecting said drums, a furnace, a row of tubes extending across the upper portion of said furnace, a portion of said tubes being provided with refractory material to form a furnace arch, and a support extending from the mud drum of said boiler to said tubes and connected to said mud drum and tubes.

6. In a boiler having an upper drum, a lower mud drum, and a bank of bent tubes connecting said drums, a furnace, a row of tubes extending across the upper portion of said furnace, a portion of said tubes being provided with refractory material to form a furnace arch, and a flexible support between the mud drum of said boiler and said tubes and connected to said mud drum and tubes.

7. In a boiler having an upper drum, a lower mud drum, and a bank of bent tubes connecting said drums, a furnace, a row of tubes extending across the upper portion of said furnace a portion of said tubes being provided with refractory material to form a furnace arch, a support extending from the mud drum of said boiler to said tubes and connected to said mud drum and tubes, and a gas seal between said drum and arch.

8. In a boiler having an upper drum, a lower mud drum, and a bank of inclined tubes connecting said drums, a furnace, a row of tubes having their upper portions extending across the upper portion of said furnace in front of said tube bank and arranged to form a slag screen therefor, the lower portions of said row of tubes being provided with refractory material to form a furnace arch, and a support extending from the mud drum of said boiler to said row of tubes and connected to said mud drum and tubes.

9. In a boiler having an upper drum, a lower mud drum, and a bank of inclined tubes connecting said drums, a furnace, a row of tubes having their upper portions extending across the upper portion of said furnace in front of said tube bank and arranged to form a slag screen therefor, the lower portions of said row of tubes being provided with refractory material to form a furnace arch, and a pivoted link support extending from the mud drum of said boiler to an intermediate portion of said row of tubes and connected to said mud drum and tubes.

MICHAEL I. KEARNS.