

No. 752,681.

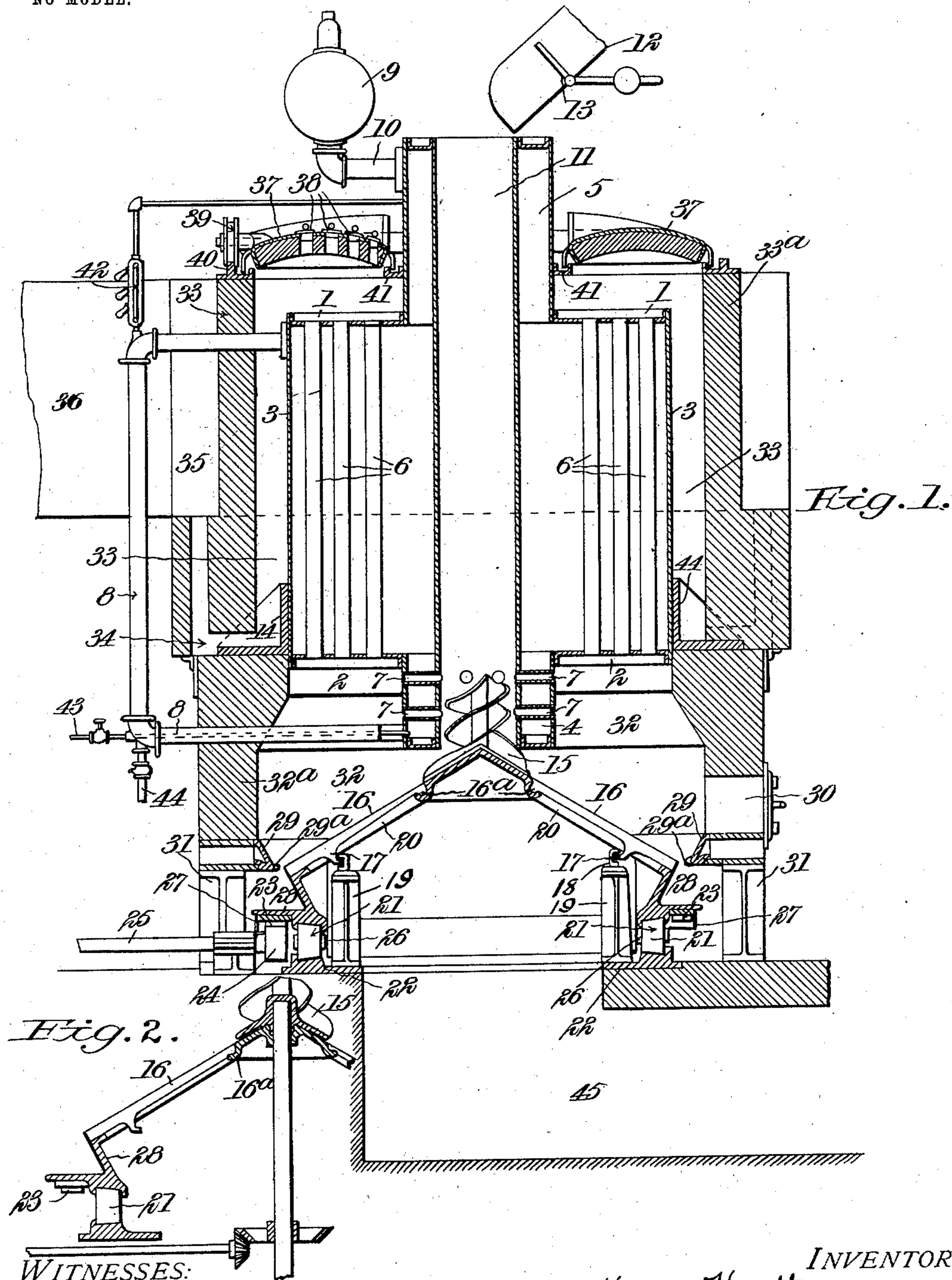
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STEAM BOILER FURNACE.

APPLICATION FILED JUNE 2, 1903.

NO MODEL.



WITNESSES:

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HARRY HYATT AND JAMES M. WIGHT, OF CLEVELAND, OHIO.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 752,681, dated February 23, 1904.

Application filed June 2, 1903. Serial No. 159,736. (No model.)

To all whom it may concern:

Be it known that we, HARRY HYATT and JAMES M. WIGHT, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

This invention relates particularly to that class of steam-boiler furnaces having an upright boiler with vertically-arranged fire-tubes and a rotatable grate thereunder. Its object is to provide an improved furnace of the kind stated characterized by novelty with respect to the means for feeding coal to the grate.

Other advantages will be apparent from the following description and claims in the construction and operation of the rotating grate, particularly with respect to a feeding-screw attached to the grate which takes the coal from a central vertical fuel-tube.

In the accompanying drawings, Figure 1 is a vertical section of the furnace and boiler. Fig. 2 is a fragmentary section illustrating a modification for rotating the feed-screw.

The boiler comprises a horizontal circular top head 1, a similar bottom head 2, connected by a vertical shell 3, a central coal-feeding tube 11, to which coal is fed from chute 12, regulated by gate 13. This tube is longer than the shell 3, extending above the top head and forming a steam-chest 5 and below the bottom head 2, forming an annular water-leg 4, and having a double wall in these extensions, with the space between these walls opening into the boiler, but closed externally. As many fire-tubes 6, extending from head to head, are placed as may be desired.

The upper extension or neck 5 is used as a steam-collector, and the steam-drum 9 is connected with it by the steam-pipe 10. The lower extension 4 serves to convey the coal through the combustion-chamber 32 to the grate 16 by means of the feed-screw 15 and is used also as a water-leg to collect the sediment formed in the boiler, which is blown off through the blow-off pipe 44. Said water-leg is provided with a number of short horizontal

tubes 7, running from the external to the internal wall of the leg to allow any gases formed in the tube to escape into the combustion-chamber. The water-leg is provided with a number of pipes 8, connected with its water-space and extending horizontally through the combustion-chamber 32 and furnace-wall 32^a and vertically outside the structure to other horizontal pipes to the upper part of the shell 3 to provide for the proper circulation of water in the boiler. One of these pipes 8 is used also as a blow-off, as above mentioned, at 44. Another or the same is used as an entrance for the feed-water pipe 43. Another or the same at its top is used to connect with the neck 5 in mounting the usual gages and water-column 42 necessary to maintain the proper level of water, which is above the top head 1, making what is known as a "submerged" flue-boiler.

The boiler is supported by means of a number of brackets 14, fastened to the shell 3 and resting on the circular wall 32^a around the furnace.

The furnace consists of a circular combustion-chamber 32 inside the furnace-wall 32^a, under the boiler, and over a series of grate-bars 16, arranged conically in a revolving grate-bar frame 20. The apex of the cone is directly under the lower end of coal-feeding tube 11 and is surmounted by a feed-screw 15, extending into the tube and adapted to force the coal out of the tube and over the grate-bars 16. This screw may be attached to the grate-bar frame, as shown in Fig. 1, and revolved by it or mounted on a central vertical shaft and driven independently, as shown in Fig. 2. The grate-bar frame 20 is mounted on a series of rollers 21, running in a circular track 22, and is revolved by means of ring-gear 23, pinion 24, and driving-shaft 25. The rollers are provided with a depending shield-ring 26 and the gear with a shield-ring 27 to keep out ashes.

The grate-bars have a depending projection 16^a at their upper end, which rests loosely in a groove in the grate-bar frame and permits the lower end of grate-bars to be raised and lowered to break up the fire and keep it open.

This movement is accomplished by means of the downward and inwardly projecting lug 17 on each grate-bar 16, which is engaged by one or more stationary cams 18, carried on a column 19, which sets on the roller-track 22. The cam 18 is so formed that when the lug 17 of the grate-bar 16 in its revolution enters the cam it is forced to follow the groove, which first raises and then lowers, causing the grate-bar to have the same motion and leaving it in the proper position to enter the next cam.

The furnace-wall 32^a is carried on a hollow ring 29, which rests on columns 31, standing on the floor. This ring is at the level of the outer end of the grate-bars and is provided with removable plates on the inside, leaving a narrow space between these plates and the end of the grate-bars for the ashes to fall through. These plates have inwardly-pointing projections 29^a at their inner edge to grind up any clinkers too large to fall through the opening. The ashes fall on the circular shelf 28, formed by the bottom of the grate-bar frame 20, from which they are removed by a stationary scraper. One or more firing-doors 30 are located in the furnace-wall 32^a, through which to observe the working of the fire.

From the combustion-chamber 32 the products of combustion pass through the fire-tubes 6 over the upper head 1 of the boiler and through the downtake-chamber 33, which is an annular space between the shell 3 and a fire-brick wall outside. From this chamber they pass through a series of ports 34, opening out of the bottom of this chamber and leading up through the wall into the smoke-box 35, which is an annular box outside the upper part of the downtake-chamber 33. From this smoke-box the gases are led to the stack through the connection 36.

An annular fire-brick cover 37 in a framework extends from the neck of the boiler to the downtake-chamber wall 33^a and is carried by three track-wheels 39, mounted on the framework and running on a circular track 40 on the wall. This cover has a flange dipping into a trough 41 on the neck 5 and another into a trough formed in part by the track 40, which troughs contain sand, which prevents the inlet of cold air and allows rotary motion of the cover to admit of the flues 6 being cleaned through the holes 38 in the cover 37.

The tunnel and pit 45 are to allow access to the mechanism under the grate and to remove ashes and cinders which may fall through the grate-bars. Coal is fed into the feeding-tube

11 through the chute 12 and regulated by the gate 13.

It will be seen that the course of the products of combustion from the combustion-chamber up through the flue 6 and down through the annular space 33 gives a large heating-surface to the boiler, with resulting advantages of economy and efficiency. The feed of the fuel is regulated by the speed at which the grate is rotated, and the grate is periodically shaken accordingly.

The construction of the top plate 37 permits the flues to be cleaned by rotation thereof to bring the holes 38 in alinement with the successive rows of flues. Thus the flues may be cleaned readily without removal of any of the parts. The water-leg 4 serves to prevent the lower end of the feeding-tube from rapidly burning out, and a generally highly efficient apparatus is produced. In the modification shown in Fig. 2 the feeding-screw can be rotated at any speed desired irrespective of the speed of the rotating grate. This may be advantageous under some conditions.

What we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a boiler having a vertical fuel-tube extending therethrough, of a conical rotary grate under the boiler, and a feed-screw carried at the apex of the grate in the lower end of the tube.

2. The combination with a vertical-flue boiler having a central fuel-tube extending therethrough, and a water-leg around the lower end of the tube projecting into the fire-box, of a conical rotary grate having a feeding-screw at its apex projecting into the lower end of the tube.

3. The combination with a boiler having a vertical fuel-tube extending therethrough, of a conical grate thereunder, and a rotary feeding-screw extending above the apex of the grate into the tube.

4. The combination with a boiler having a vertical fuel-tube extending therethrough, of a conical rotary grate, and a rotary feeding-screw extending above the apex of the grate into the tube.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HARRY HYATT.
JAMES M. WIGHT.

Witnesses:

JOHN A. BOMMhardt,
LOTTIE NEWBURN.