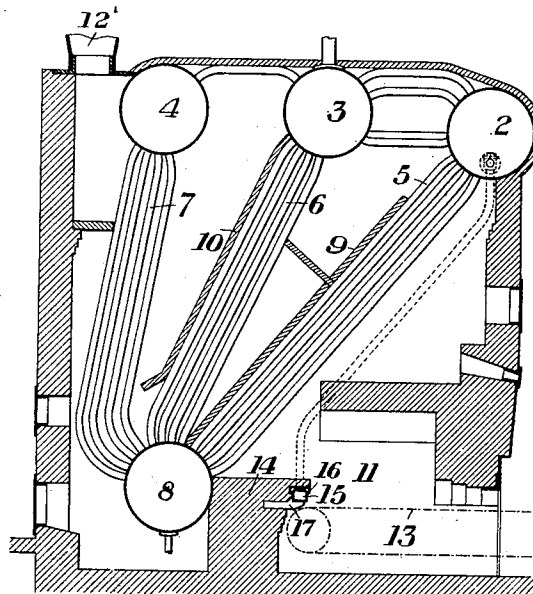


J. E. BELL.
BOILER STOKER.
APPLICATION FILED SEPT. 11, 1906.

932,369.

Patented Aug. 24, 1909.
4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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W. W. Swartz

INVENTOR

J. E. Bell
By Robert B. Byrnes,
his Atty.

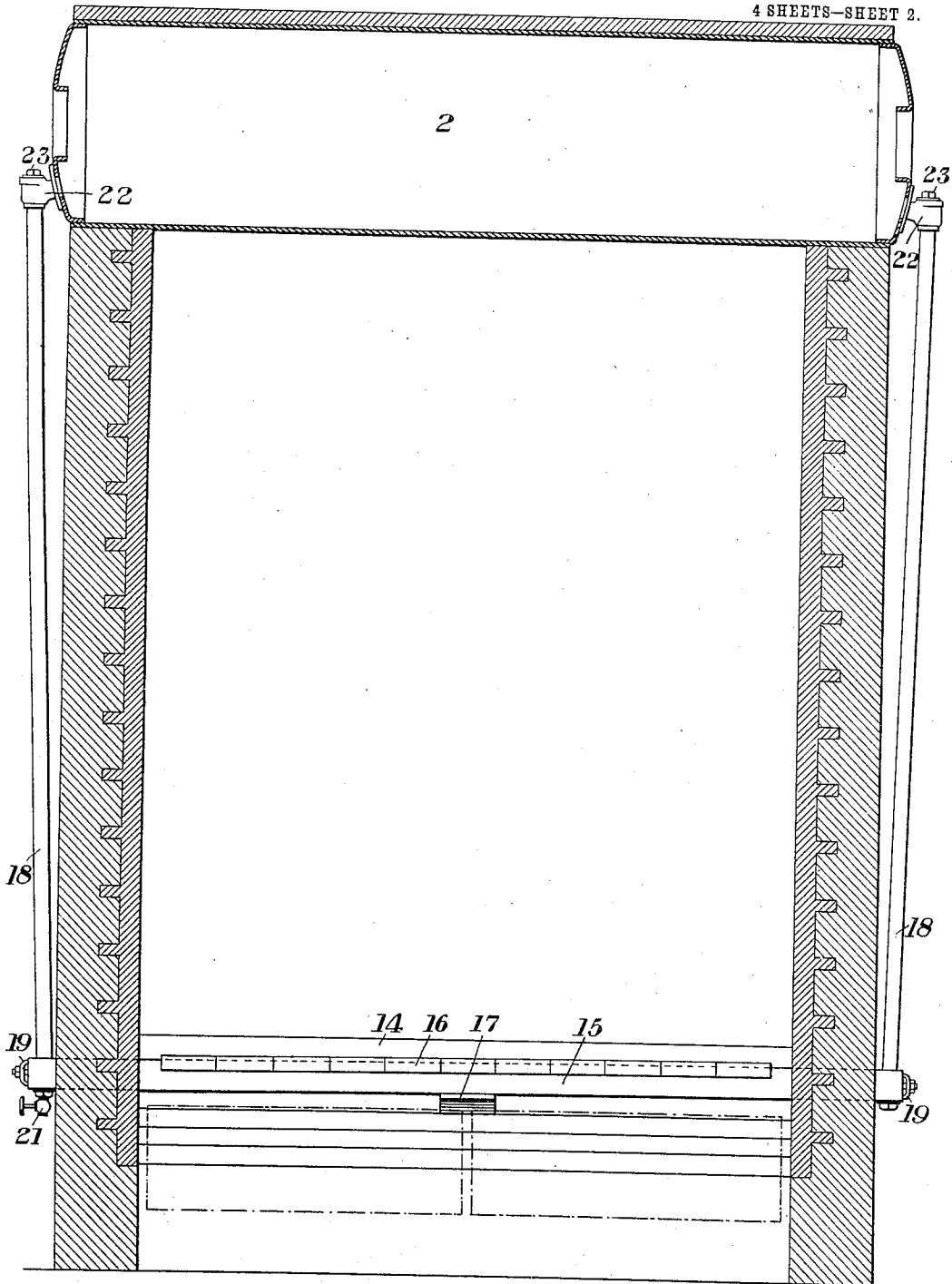
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4 SHEETS—SHEET 2.



WITNESSES

Fig. 2.

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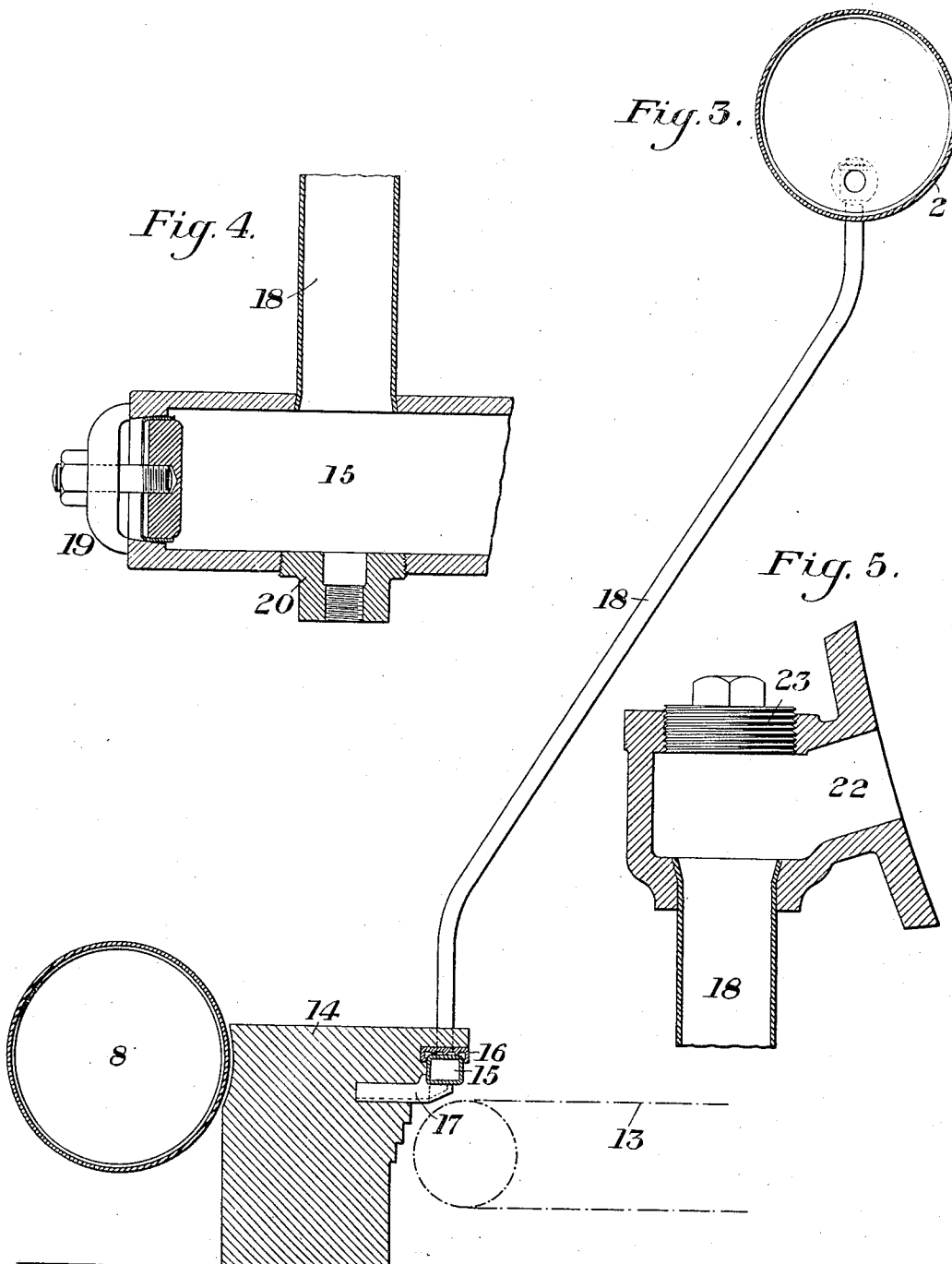
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4 SHEETS—SHEET 3.



WITNESSES

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4 SHEETS—SHEET 4.

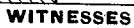


Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN E. BELL, OF NEW YORK, N. Y., ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

BOILER-STOKER.

932,369.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed September 11, 1906. Serial No. 334,089.

To all whom it may concern:

Be it known that I, JOHN E. BELL, of New York, county and State of New York, have invented a new and Improved Boiler-Stoker, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a sectional side elevation, showing one form of a Stirling boiler provided with my improved stoker structure; Fig. 2 is a partial front elevation; Fig. 3 is an enlarged detail view, showing the connection with the water back; Figs. 4 and 5 are detail views hereinafter referred to; and Fig. 6 is a view similar to Fig. 2, showing a modified form.

My invention relates to the class of boiler stokers wherein a chain grate is employed, and the object of the invention is to provide an improved water back for such furnace structures.

My invention provides for reducing the liability of deposits in the water back, for circulation therethrough, and to prevent over-heating or burning of the same.

In the drawing, 2, 3 and 4 represent upper transverse steam and water drums of a Stirling boiler, each connected by a bank of tubes 5, 6 and 7 with a lower transverse mud-drum 8.

9 and 10 represent the usual baffling to direct the gases rising from the furnace 11, so that these gases flow up and down in serial passes over the three banks to the outlet flue 12.

13 is a conventional illustration of a chain grate, which extends back to near the bridge wall 14. This bridge wall is transverse of the setting, and in its front face I provide a water back 15, which consists, preferably, of a heavy steel tube, substantially square or rectangular in cross section and extending through the side walls, as shown in Fig. 2. Over this box I preferably provide a series of ribbed cast plates 16, which act to protect the box from the intense heat of the furnace, air spaces being preferably provided between these plates and the masonry or brick work extending over them.

17 represent supports built into the masonry for the water box which overhangs the inner end of the chain grate.

Each end of the water box is connected

outside of the setting by one or more pipes or tubes 18 with the heads of the front upper drum 2. In Fig. 4 I show the preferred detail of the connection to the water box, the end of the box 15 having a hand-hole closure 19 with the pipe 18 leading through its upper side. I also preferably provide a hole on the under side in line with the pipe 18, provided with a fitting 20 for a hand valve 21, as shown in Fig. 2.

The end of the upper drum 2 is preferably provided with a fitting 22 having a plug closure 23 in line with the tube 18.

The box is preferably inclined slightly from one end toward the other, so that the steam generated therein will rise toward the higher end and cause an up circulation through the tube 18 at such end. This will cause a rapid circulation through the box, such circulation being down through the tube 18 at the lower end and up through the tube 18 at the higher end, thus keeping the box filled with water and preventing over-heating or burning. The box may, however, be arranged without any inclination, or its upper wall may have an inclination in either or both directions. Any steam formed will start a circulation by entering the tube or tubes 18, and once started, the circulation will persist, on account of the difference in density between the fluid in the two connecting tubes 18.

On account of connecting the water box to the water space of a steam and water drum which is other than the feed drum into which the feed water enters, I reduce or avoid the precipitation of sediment in the water box, since the water is thus taken from a source where it contains the least amount of scale or sediment-forming matter, and thus in a four drum Stirling boiler I preferably connect the box to the front upper drum, as shown.

Where the device is applied to wide boilers, I may employ two or more of the water boxes arranged end to end. Thus in Fig. 6 I show the box as consisting of two parts, 15^a and 15^b, in line with each other, with their inner ends preferably closed by welding in heads or using any other desirable closures. In such case of a wide boiler I may also use further circulating tubes 24, which may connect the inner ends of these two boxes to the front upper steam and water drum at the center of its length, these entering tube holes

which would otherwise be occupied by two tubes of the front row of the front bank of tubes. In this manner each box may have its own circulation independent of the other circulation, being up through the tubes 24 and down through the cooler tubes 18.

The advantages of my invention result particularly from the connecting of the water back to the water space of a steam and water drum which is not the feed drum, and is preferably the front drum where a boiler of the transverse drum serial up and down pass type is used. It also results from the use of external connecting tubes at opposite ends which provide for a circulation through the water back to carry off steam and prevent burning. The water back prevents abrasion of the bridge wall by the ashes which pass over the rearend of the stoker and reduces the amount of air admitted at this point, by giving a channel of uniform size for the passage of the ashes.

Added circulating tubes may be used in any form of the invention; the device may be used with other types of boilers, though it is especially adapted to boilers having a series of cross drums with a baffling to give the gases serial up and down passes over the banks, and many other variations may be made without departing from my invention.

I claim:

1. In a tubular boiler furnace having upper and lower water drums, an upwardly projecting bridge wall having above it an outlet port for flame and gases, a transversely extending water-back in said bridge wall, and direct connections between opposite ends of the said water back and an upper drum arranged to produce a down circulation in one connection and an up circulation in the other connection; substantially as described.

2. In a boiler furnace, an upwardly projecting bridge wall, having above it an outlet port for flame and gases from the furnace, and a hollow water back member for said bridge wall, said water back having its ends connected with an upper water space of the boiler, and being closed except for such connections, whereby there is a circulation downward through one of said connections, thence through the water back and upwardly through the other connection, substantially as described.

3. In a boiler, an upper transverse steam and water drum, a lower mud drum, a bridge

wall extending parallel to the said drums and abutting against the lower mud drum at its rear side, and a water back having connections at its ends with said drum arranged to cause a down circulation through one of said connections and an up circulation through the other connection; substantially as described.

4. In a boiler furnace, an upwardly projecting bridge wall having a water back thereon with an outlet port for flame and gases above it, said water back having an endwise inclination, and water tubes at each end connecting said ends to an upper water space of the boiler; substantially as described.

5. In a boiler furnace, a water back comprising a box, connections for circulating water therethrough, and iron plates extending over the box and arranged to protect it from the heat of the furnace substantially as described.

6. In a boiler furnace, an upwardly-projecting bridge wall, over which the flame and gases pass, a water-back in the front face of said wall, metal plates extending over the box to protect it from the heat of the furnace, and circulating connections between the said back and a steam and water space of the boiler; substantially as described.

7. In a water tube boiler a plurality of upper transverse steam and water drums, a bridge wall which extends parallel to the said drums, a water back member for said bridge wall and water pipes forming a direct connection between the water back member and one of the upper drums, said drum being remote from the drum to which the feed water supply pipe leads, and the member being closed except for said connections; substantially as described.

8. In a boiler, an upper transverse steam and water drum, a bridge wall extending parallel to the said drum, and a water back having connections at its ends with said drum arranged to cause a down circulation through one of said connections, and an up circulation through the other connection, substantially as described.

In testimony whereof, I have hereunto set my hand.

JOHN E. BELL.

Witnesses:

ESTHER V. BUNELL.

G. K. WANNEMACHER.