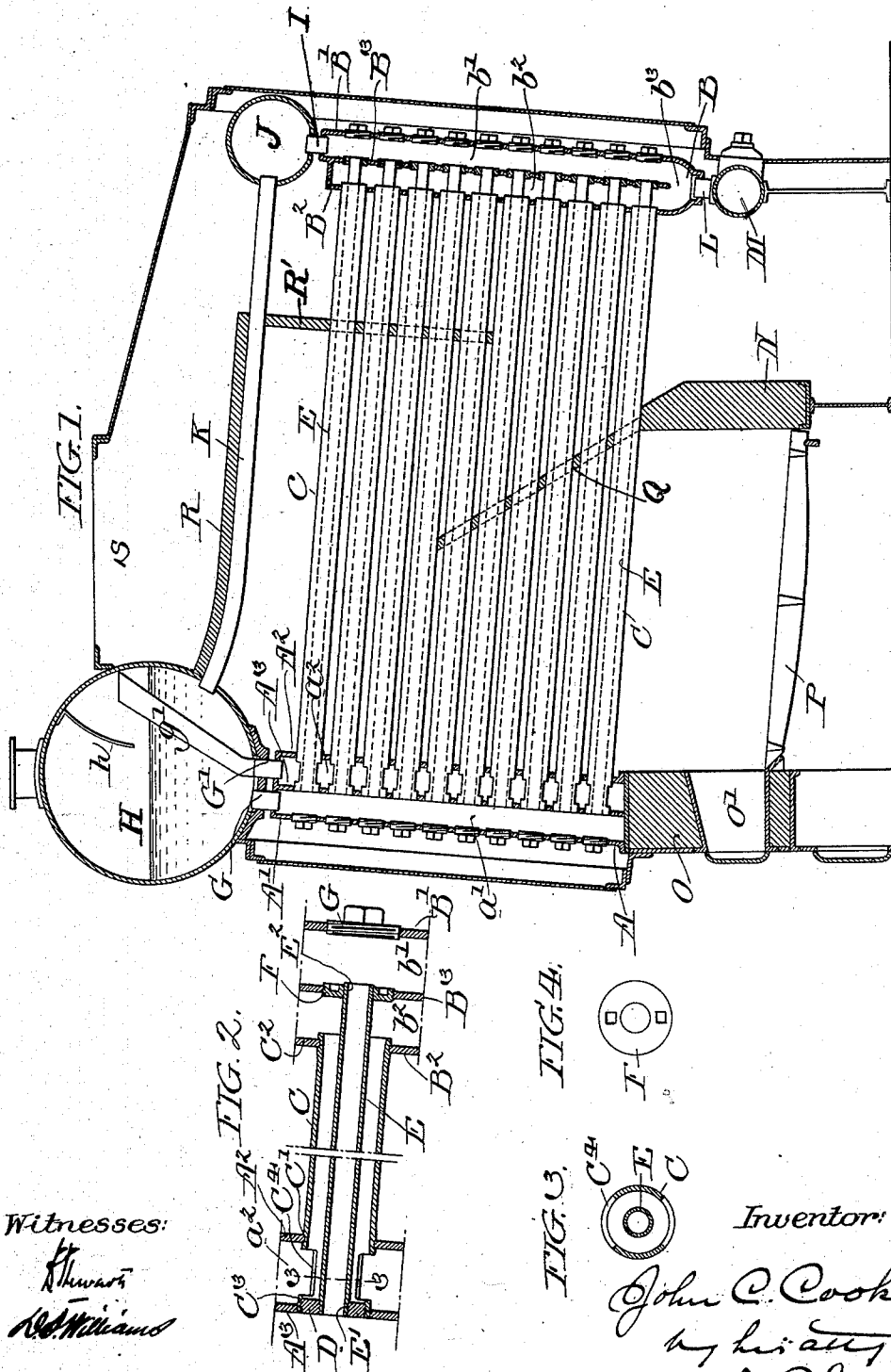


J. C. COOKE.
WATER TUBE BOILER.
(Application filed Oct. 4, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 714,782, dated December 2, 1902.

Application filed October 4, 1901. Serial No. 77,516. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. COOKE, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Water-Tube Boilers, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to water-tube boilers, and has for its object to provide a boiler of this class of high efficiency and one in which provision is made for the energetic circulation of the water and for arresting in any convenient position for removal any sedimentary deposit.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a vertical sectional elevation of my boiler, taken through opposite headers. Fig. 2 is a view, on an enlarged scale, showing the manner in which the duplex tubes are preferably secured in position. Fig. 3 is a cross-section on the line 3 3 of Fig. 2, and Fig. 4 a plan view of one of the nuts used to engage the ends of the threaded tubes.

A indicates the front header, of which there are generally a group making up the front end of the boiler, A' being the front and A² the rear walls of the headers, while A³ indicates an intermediate partition separating the header longitudinally into front and rear chambers, (indicated at a' and a².)

B is the rear header, also in usual construction one of a group, B' being the rear and B² the front wall, while B³ represents a longitudinal partition extending near but not quite to the bottom of the header and separating it into two chambers b' and b², connected at bottom, as indicated at b³.

C and E represent duplex tubes connecting the headers. The outer tubes C are shown as forming swaged joints with the header-walls A² and B² at C' and C². The front end of the tube C extends into and fills a perforation in the partition-wall A³ and has screwed into it the annular nut D, into the threaded central perforation of which screws the end of

the internal pipe E, as indicated at E', the rear end E² of this internal pipe extending through the annular nut F in the partition B³ of the rear header, said nut screwing into said partition, as indicated. The front end of the outer pipe C is partly cut away, as indicated at C⁴, so that it will open into the chamber a² of the front header. The chambers a' a² of the front header open through nozzles G G' into the steam and water drum H. The nozzle G' is shown as connected with the steam-space in the boiler through an open-ended pipe g', h indicating a baffle-plate in the boiler. The chamber b' of the rear header connects through a nozzle I with a water-drum J, situated above it, and this water-drum connects with the drum H through a circulating-pipe, (indicated at K.) The bottom of the rear header further connects through a nozzle L with a mud-drum, (indicated at M.)

N indicates the bridge-wall of the furnace, situated between said bridge-wall and the front wall O of the furnace, O' being the charging-door, and P the grate.

Q indicates a baffle-wall extending upwardly and forwardly from the top of the bridge-wall to direct the products of combustion against the bottom of the drum H.

R is a partition separating the chamber in which the boiler is situated from the flue S and having a depending baffle R', which forces the gases downward over the middle of the tubes and permits them to move upward over the rear of the tubes to the flue S.

The baffle-wall construction indicated forms in part the subject-matter of my application filed October 4, 1901, Serial No. 77,514.

In operation the water in the drum H moves partly downward through the nozzle G into the chamber a' and thence through the internal pipes E into the chamber b' of the rear header. Partly, also, the water from the drum H moves backwardly and downwardly through the circulating-pipes into drum J and thence through the nozzle I into the chamber b'. The water moves to the bottom of the rear header through the chamber b' and thence upwardly through the chamber b² of the rear header and forwardly and upwardly through the outer pipe C to the chamber a²

of the front header, from which the water and steam generated in it emerge through the nozzle *G'* into the drum *H*, the upwardly-extending pipe *g'* not being essential or in all circumstances desirable. Where it is used, the water of course escapes from the top of it and is by the baffle *h* thrown down on the surface of the water in the drum *H*.

It will be observed that the construction of the rear header and its connection with the mud-drum *M* is such as to practically insure all sedimentary matter being deposited in said drum, and this feature of construction is of value apart from its combination with the circulating-pipe *K*, leading into the rear header either directly or through a water-drum *J*. It will also be obvious that my construction is one which insures a very thorough circulation and supply of water to all the tubes of the boiler.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A water-tube boiler having in combination a front header *A* having a longitudinal partition *A*³ dividing it into chambers *a'* and *a*², a rear header *B* also divided by a partial longitudinal partition *B*³ into chambers *b'* *b*² connected only at the bottom of the header, a series of duplex tubes *C, E* the outer ones connecting two chambers of the front and rear headers and the inner ones connecting the other two chambers of the headers, a steam and water drum *H* connecting with both chambers of the front header and a mud-receptacle at the bottom of the rear header.

2. A water-tube boiler having in combination a front header *A* having a longitudinal partition *A*³ dividing it into chambers *a'* and *a*², a rear header *B* also divided by a partial longitudinal partition *B*³ into chambers *b'* *b*² connected at bottom, a series of duplex tubes *C, E*, the outer ones connecting two chambers of the front and rear headers and the inner ones connecting the other two chambers of the headers, a steam and water drum *H* connecting with both chambers of the front header and a circulating-conduit connecting the drum with the chamber in the rear header to which the inner tubes *E* lead.

3. A water-tube boiler having in combination a front header *A* having a longitudinal partition *A*³ dividing it into chambers *a'* and *a*², a rear header *B* also divided by a partial longitudinal partition *B*³ into chambers *b'* *b*²

connected at bottom, a series of duplex tubes *C, E*, the outer ones connecting two chambers of the front and rear headers, and the inner ones connecting the other two chambers of the headers, a steam and water drum *H* connecting with both chambers of the front header, a water-drum *J* connecting with the chamber of the rear header to which the inner tubes *E* connect and a conduit *K* connecting the drums *H* and *J*.

4. A water-tube boiler having in combination a front header *A* having a longitudinal partition *A*³ dividing it into chambers *a'* and *a*², a rear header *B* also divided by a partial longitudinal partition *B*³ into chambers *b'* *b*² connected at bottom, a series of duplex tubes *C, E*, the outer ones connecting two chambers of the front and rear headers, and the inner ones connecting the other two chambers of the headers, a steam and water drum *H* connecting with chambers of the front header, a circulating-conduit connecting the drum with the chamber in the rear header to which the inner tubes *E* lead and a mud-drum *M* connected to the bottom of the rear header.

5. A water-tube boiler having in combination a front header *A* having a longitudinal partition *A*³ dividing it into chambers *a'* and *a*², a rear header *B* also divided by a partial longitudinal partition *B*³ into chambers *b'* *b*² connected at bottom, a series of duplex tubes *C, E*, the outer ones connecting the chambers *a*² and *b*² and the inner ones connecting the chambers *a'* and *b'*, a steam and water drum *H* connected to the tops of both chambers *a'* and *a*² and a circulating-conduit leading from drum *H* to the top of chamber *b'*.

6. A water-tube boiler having in combination a front header *A* having a longitudinal partition *A*³ dividing it into chambers *a'* and *a*², a rear header *B* also divided by a partial longitudinal partition *B*³ into chambers *b'* *b*² connected at bottom, a series of duplex tubes *C, E*, the outer ones connecting the chambers *a*² and *b*² and the inner ones connecting the chambers *a'* and *b'*, a steam and water drum *H* connected to the tops of both chambers *a'* and *a*², a water-drum *J* connected to the top of chamber *b'* and conduits *R* connecting drums *H* and *J*.

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Witnesses:

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