

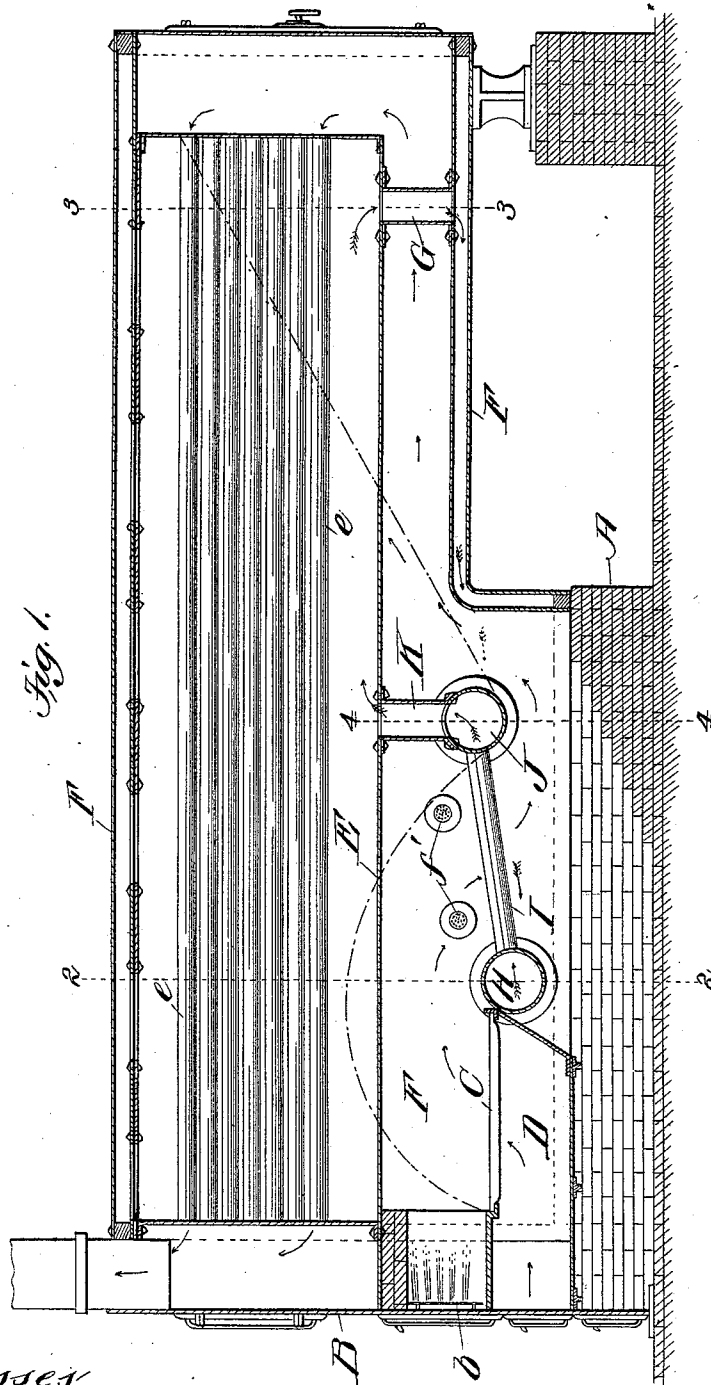
(No Model.)

2 Sheets—Sheet 1.

E. M. BOSLEY.
STEAM BOILER.

No. 540,945.

Patented June 11, 1895.



Witnesses
F. R. Cornwall
Hugh K. Wagner.

Inventor
Elizabeth M. Bosbey
By Paul Bakewell
his atty

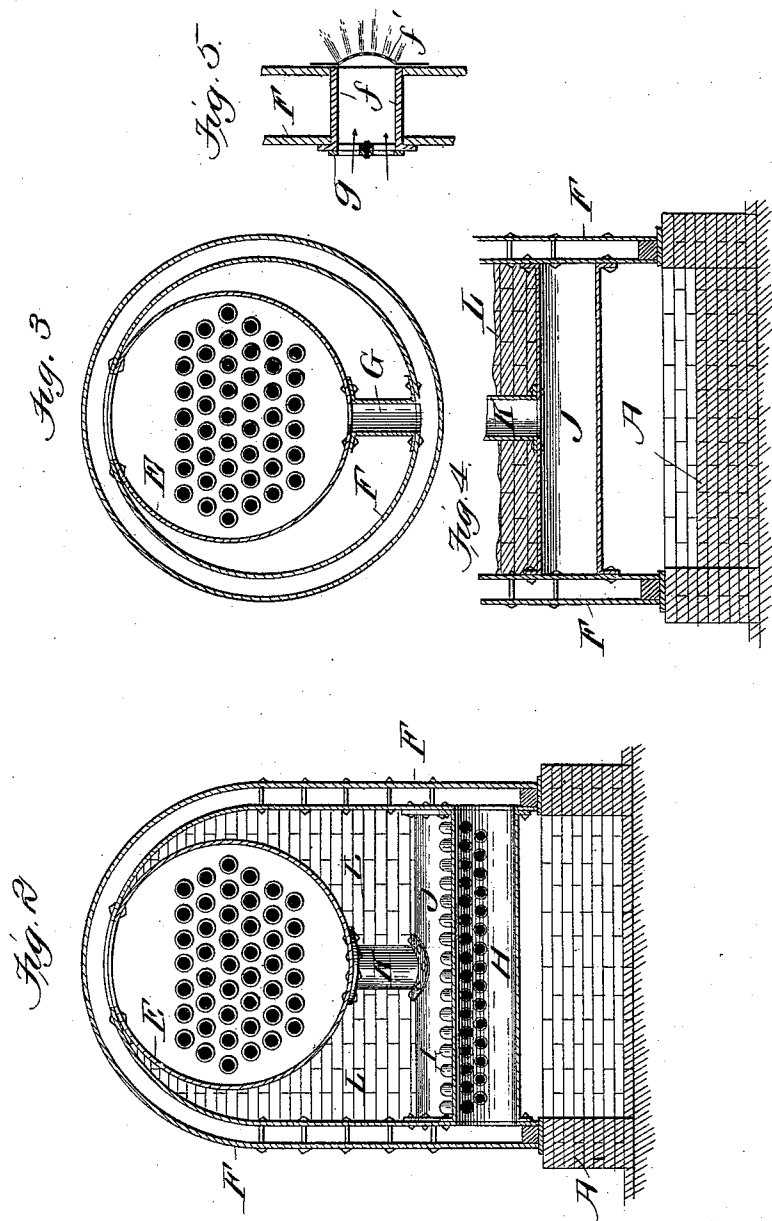
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UNITED STATES PATENT OFFICE.

ELIJAH M. BOSLEY, OF ST. LOUIS, MISSOURI.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 540,945, dated June 11, 1895.

Application filed May 5, 1894. Serial No. 510,159. (No model.)

To all whom it may concern:

Be it known that I, ELIJAH M. BOSLEY, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, wherein—
10 Figure 1 is a longitudinal section. Fig. 2 is a cross-section on line 2 2 of Fig. 1. Fig. 3 is a cross-section on line 3 3 in Fig. 1. Fig. 4 is a cross-section on line 4 4 of Fig. 1. Fig. 5 is a cross-section through one of the side draft-
15 openings.

My invention relates to a new and useful improvement in steam boilers, and consists, generally stated, in combining with a tubular boiler, a water-jacket, and in connecting the water-jacket and tubular boiler in such manner that the water may circulate freely, which connecting means forms a water-grate.

Another feature of invention resides in so arranging the tubular boiler relative to the arch of the water-jacket that the two are substantially uninterruptedly connected.

Another feature resides in locating beneath the tubular boiler a depending water-leg, which acts as a collector for the water-grate and is connected to the bottom of the tubular boiler, said water leg or chamber also supporting a bridge-wall, as shown in Fig. 2.

Other minor features of invention reside in the construction, arrangement, and combination of the several parts, all as will hereinafter be more fully described, and afterward pointed out in the claims.

In the drawings, A indicates the masonry upon which the forward part of the boiler is supported, said masonry also forming an ash-pit for the water-grate, as shown in Fig. 2.

B indicates the face-plate of the boiler, which is formed with suitable openings to the several ash-pits, fire-boxes, and smoke-chambers, which openings are covered by suitable doors, as is common.

C indicates the ordinary grate-bars, whose rear ends are preferably supported upon a transversely-disposed water-chamber, and D, the ash-pit therefor, which ash-pit is independent of the ash-pit for the water-grate. The line of draft through the grate-bars C

and the water-grate bars is substantially the same as that described in United States Letters Patent No. 498,378, dated May 30, 1893, granted to me, save in certain particulars, which will be hereinafter mentioned. The line of draft is indicated in the drawings in Fig. 1 by the small spears.

E indicates a tubular boiler, which is provided with the draft-tubes *e*, as is common. The upper side of this boiler is preferably formed with perforations, which open portions communicate with the chamber in the arch of the jacket F, substantially the entire length of the boiler E, at the same time preserving the continuity of the top of boiler E and water jacket F.

The water-jacket F, at its rear end, is preferably circular in form, of greater diameter and eccentrically-disposed to the boiler E, whose rear end is connected to the chamber of the water jacket F by pipe G, as shown in Figs. 1 and 3. The forward end of the water-jacket extends down, preferably in vertical lines, and is supported on the masonry A, as shown in Figs. 1 and 2. This water-jacket chamber near its front end and at the junction of the two sets of grate-bars, is cross-connected by chamber H, which I shall term the distributing chamber. From this chamber H lead the water-grate bars I, which are preferably staggered and arranged at an incline, as shown in Figs. 2 and 1. These grate-bars lead into a collecting chamber J, which is connected to the bottom of the boiler E, preferably at about its center, by a pipe K. This collecting chamber J is not connected directly to the water-jacket chamber, but its ends are closed, as shown in Fig. 4.

L indicates a partition or bridge-wall, which is supported above the collecting chamber, and extends upwardly filling the space between the boiler E and the inside wall of the water-jacket F, so as to direct the draft downwardly through the water-grate bars and under the collecting chamber.

The operation of the boiler is as follows: The fire being upon the two grate-bars C and I, the draft will be in the line as indicated by the small spears in Fig. 1. By the presence of the bridge-wall L above the collecting chamber, the lines of active draft will be confined beneath the dot-and-dash lines shown in Fig.

1, while above said dot and dash lines, all the heat which is transmitted to the boiler E is by reflection. The draft is generally opened, so as to pass through the ash-pit D, but it is often desirable that air be admitted to the fire-box, so as to feed the fire on grate C. In order to do this, I provide the door to grate C with draft-openings and means for regulating the same, and arrange on the inside of the door a baffle plate *b*, which not only diffuses the air upon its introduction, but, also, heats the same, so as to prevent it chilling the boiler E. It may also be found desirable to arrange draft openings through the jacket F, just above the water-grate bars I. I have illustrated a section in Fig. 5, whereby this may be accomplished, in which *f* is the ferrule, *f'* the baffle-plate, and *g* the draft-regulator. The object of arranging these draft-openings above and near the fire on the water-grate bars, is to enable the operator to admit oxygen to the incandescent fire on said water grate bars, in order to support combustion. This may be found necessary in some instances, as the green fire is generally upon the grate bars C, and this incandescent fire pushed back on the water grate bars. When the green fire consumes the gases from the ash-pit D, the products of combustion, heavily charged with solid carbon, are thrown upon the incandescent fire, and if the heat thereof is not great enough to separate the gases, the products of combustion will pass beyond, unconsumed. It may, therefore, be found necessary to arrange the draft openings *f* in the sides of the furnace, so as to support combustion of the incandescent coals, at the same time permitting consumption of the gases generated by the green fire on grate C.

The lines of active draft up through the grate-bar C, down through the grate-bars I, and to the rear of the tubes E will be confined beneath the dot-and-dash line, as above referred to. The advantage of thus directing the active draft to the lower portion of the boiler E, will be appreciated by those conversant with steam boilers, as such active draft is not directed against that part of the boiler or water-jacket which may be termed the steam-space. Therefore, the portion of the boiler above the water-line is never exposed to a direct active heat, but only to reflected heat, which will tend to lengthen the life of the boiler.

It will be noticed that the water-line, which is just above the return draft-flues *e*, is below the communicating openings between the boiler E and the water-jacket, thus making said communication one for steam only, which is subjected to the reflected (not active) heat, thereby forming a connected steam-dome in the boiler E and water-jacket. Boiler E is virtually complete in itself, and might be said to be a boiler within a boiler.

The water circulation is indicated by the arrows in Fig. 1, and may be described as follows: From the water-jacket, it is drawn in

from the distributing chamber H and distributed through the water-grate bars I, whence it is collected by the collecting chamber J and discharged into the bottom part of the boiler E, about midway its length, whence it circulates rearwardly to pipe G and down into the water-jacket, whence it either ascends upwardly, or, if it has lost its heat, will return downwardly and forwardly to the distributing chamber, whence it will be again circulated. The forward part of the boiler E is subjected to a direct active heat, as generated by the fire on two sets of grate-bars. Therefore, it would be of no special advantage to include that portion of the boiler in the circulation excited by the water-grate bars.

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

1. In a steam boiler, the combination with a water-jacket which is circular in cross-section at its rear portion, and of an inverted U-shape at its forward portion, the inner wall, at its top, being formed with openings, of a tubular boiler which is eccentrically arranged to the arch of said water-jacket, said tubular boiler being formed with openings at its upper portion which register with the openings in the inner wall of the water-jacket, two sets of grate-bars arranged under the forward end of the tubular boiler, in the inverted U-shaped portion of the water-jacket, one set of which is formed hollow for the passage of water, a water-leg for receiving the water from said grate-bars, which water-leg opens into the bottom of the tubular boiler, and a bridge wall which is supported by said water-leg, whereby the draft from the first set of grate-bars is directed downwardly through the water grate-bars, substantially as described.

2. In a steam boiler, the combination with a water-jacket, of a tubular boiler opening into said water-jacket at the arch thereof, a cross-connecting chamber located at the lower forward portion of the water-jacket, water-grate bars leading from said chamber, a collecting chamber into which said water-grate bars lead, and a connection between the collecting chamber and the tubular boiler, substantially as described.

3. In a steam boiler, the combination with a water-jacket, of a tubular boiler opening thereinto, a distributing chamber located at the lower forward portion of the water-jacket, water-grate bars leading from said distributing chamber, a collecting chamber into which said water-grate bars lead, a connection between the collecting chamber and the tubular boiler, and a connection between the rear end of the tubular boiler, and the rear lower portion of the water-jacket, substantially as described.

4. In a steam boiler, the combination with a water-jacket, of a tubular boiler opening thereinto along its top, a chamber H connecting the water-jacket at its lower forward portion, grate-bars located in front of said cham-

ber, and grate-bars leading from the rear of
said chamber, which conduct water therefrom
into a receiving pipe and thence into the bot-
tom of the tubular boiler, a bridge-wall sup-
ported by said receiving pipe so as to direct
the draft from the first set of grate-bars down
through the water-grate bars and beneath the
receiving chamber, and ferrules located in the
water-jacket above the water-grate bars, said
ferrules being opened or closed by draft regu-

lators whereby combustion may be supported
on the water-grate bars, substantially as de-
scribed.

In testimony whereof I hereunto affix my
signature, in presence of two witnesses, this 15
2d day of May, 1894.

ELIJAH M. BOSLEY.

Witnesses:

F. R. CORNWALL,
HUGH K. WAGNER.