No. 676,722. Patented June 18, 1901.

F. J. MANNEY & D. W. WATKINS.

STEAM BOILER.

(Application filed Oct. 20, 1900.)

(No Model.) 2 Sheets—Sheet 1.

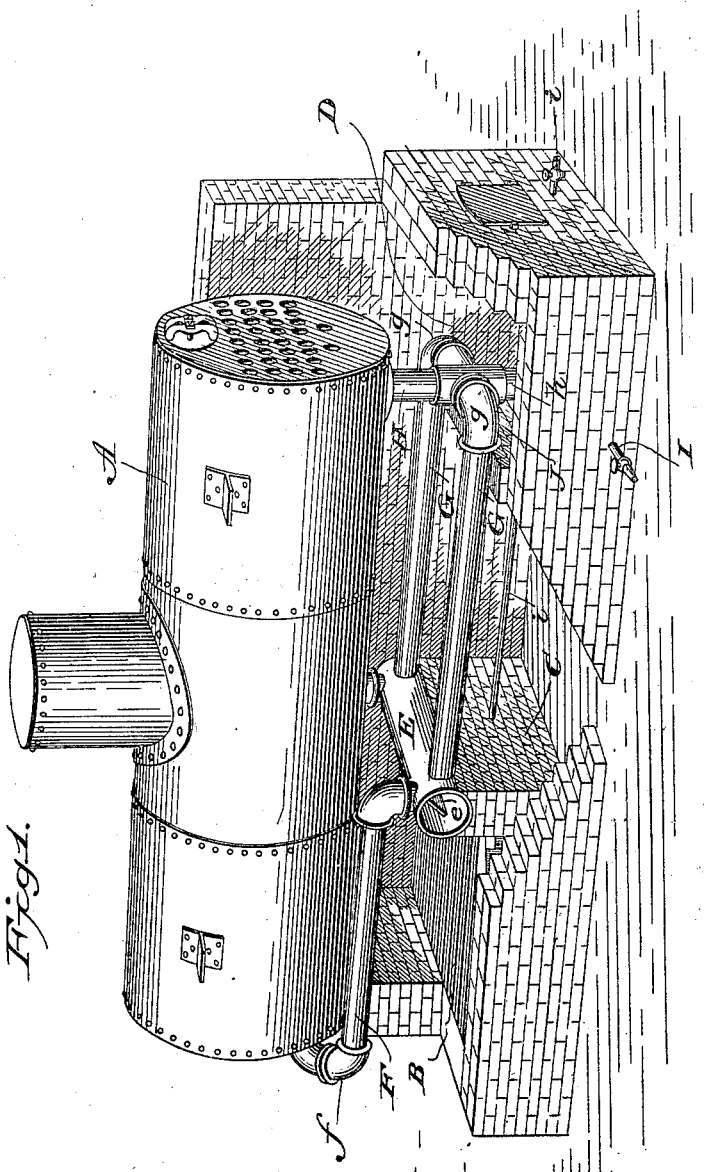

Fig. 1.

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Fig. 2.

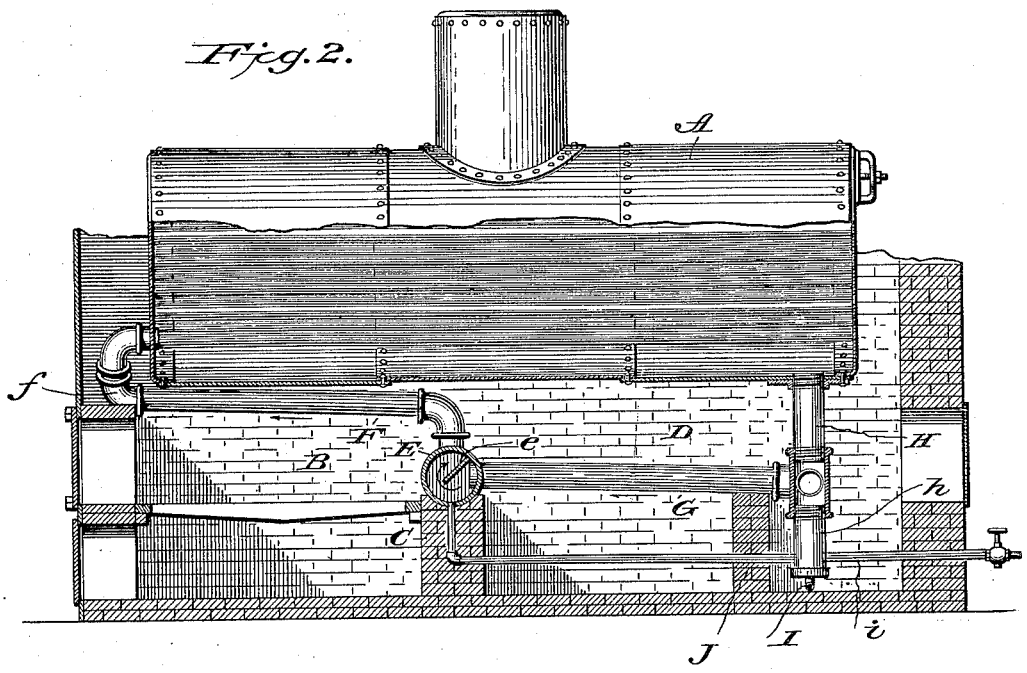
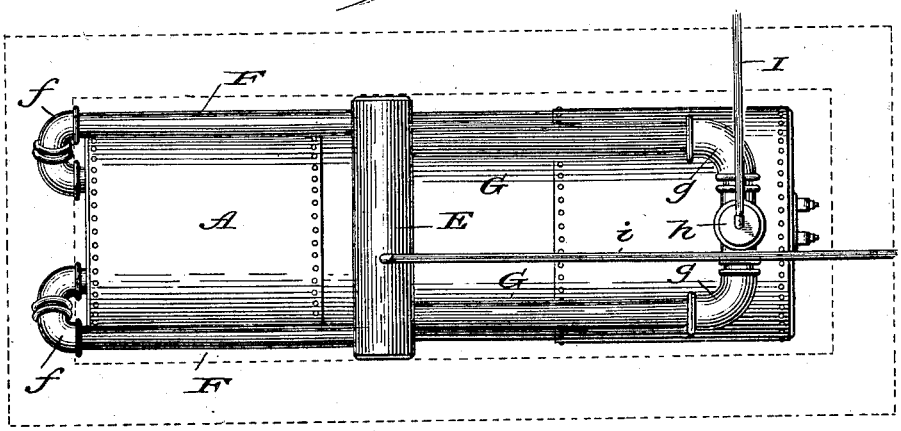


Fig. 3.



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UNITED STATES PATENT OFFICE.

FLORANCE J. MANNEY AND DANIEL WEBSTER WATKINS, OF DAVENPORT, IOWA, ASSIGNORS OF ONE-THIRD TO A. B. FRENIER, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 676,722, dated June 18, 1901.

Application filed October 20, 1900. Serial No. 33,766. (No model.)

To all whom it may concern:

Be it known that we, FLORANCE J. MANNEY and DANIEL WEBSTER WATKINS, of Davenport, Scott county, Iowa, have invented certain new and useful Improvements in Steam-Boilers; and we hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in steam-boiler furnaces, and has particular reference to the means for producing rapid circulation of water through the lower part of the boiler, where ordinarily the water is most quiet, and thus in a large measure preventing the deposit or accumulation of scale; and a further object is to provide the exterior water-circulating portion of the apparatus with a scale-trap located at the lowest point of the apparatus and exterior to the boiler and drum, so that scale and mud deposits can be ejected by opening the blow-off cocks.

The invention therefore consists in the novel construction of that portion of the water circulating and heating apparatus exterior to the boiler proper, as will be hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view, partly in section, of the complete apparatus. Fig. 2 is a longitudinal section through the same. Fig. 3 is a bottom plan view.

Referring to the drawings, A designates a tubular or flue steam-boiler of any suitable construction, a brick-set boiler being illustrated in the drawings.

B represents the fire-chamber, C the bridge-wall, and D the outlet-flue, extending from the bridge-wall beneath the boiler to and communicating with the uptake, all as in the usual construction of boilers of this type. On top of the bridge-wall C and forming part thereof is a drum E, to the upper side of which and near its opposite ends are connected forwardly-extending water-circulating pipes F, which pass through the fire-chamber B and are connected by suitable bends *f* to the front end of the boiler at a point near the bottom of the boiler and preferably below the majority of the water-tubes therein, so that water will enter the boiler from the pipes F at a point near the bottom of the boiler and where the water is ordinarily the most quiet, and usually in ordinary boilers at these points the greatest deposit of scale takes place, increasing the liability of burning out and explosion of the boiler.

To the rear side of the drum E, at a point below the connection of the pipes F thereto, but also near the opposite ends thereof, are attached pipes G, which extend rearwardly to the end of the boiler and then are connected by inwardly-directed bends *g* to a vertical pipe H, attached to the lower side and rear end of the boiler, said pipe H preferably having a cross-sectional area equal to or greater than the combined sectional area of the pipes G, and in practice the pipes F are of preferably equal or greater area than pipes G, so as to facilitate a circulation of water from the boiler through pipes H and G to drum E and thence through pipes F back into the front end of the boiler.

The pipes G and F are both slightly inclined upwardly from rear to front, so as to facilitate the circulation of the water. A deflector-plate *e* is placed in drum E intermediate the connections of pipes G and F thereto to prevent short-circuiting of water through the drum, this partition causing the water entering from pipes G to circulate around in the drum and thence up into pipes F and preventing deposits in the drum.

The pipe H extends below the connections of pipes G thereto, and the lower part of the pipe H forms a trap *h*, into which the scale, mud, &c., collected in the boiler is deposited by the circulation of the water. A transverse wall J is built across the boiler-setting immediately in front of the pendent trap-pipe *h* at the rear end of the boiler, its object being to lower the temperature of the trap, thereby inducing a settlement of solid particles, owing to the fact that water at this point will have little or no motion. The temperature is lowered by preventing the heat from the furnace directly striking the trap, owing to the presence of this wall. The trap *h* may be connected with a blow-off pipe I, suitably

valved, and the lower side of the drum E may be connected with a blow-off pipe *i*.

It will be observed that the pipes F are located in the hottest part of the fire-chamber and the drum E on the bridge-wall is subjected to great heat, while the pipes G are not quite so highly heated and are furthermore connected to the coldest part of the boiler by the pipes H. This arrangement of pipes, drum, and connections causes a natural circulation of the water, which is increased as the temperature rises, and as the heating-pipes connect only with the water-space of the boiler and near the bottom thereof a natural circulation of water from front to rear of the boiler is produced, by which scale, sediment, &c., in the boiler will be swept back to the pipe H and caught in the trap *h*, from which it can be conveniently blown off.

Having thus described our invention, what we therefore claim as new, and desire to secure by Letters Patent thereon, is—

1. The combination with a tubular steam-boiler, of a water-heating drum or inclosed receptacle arranged transversely to and beneath said boiler, in proximity to the bridge-wall, pipes located above the drum and extending through the upper part of the fire-chamber and directly connecting the upper part of the drum with the front end of the boiler, and pipes connecting the drum with the rear end of the boiler, said pipes being connected to the drum at points below the connection of the first-mentioned pipes therewith, for the purpose of inducing a rapid and continuous circulation of water in and through the pipes, drum and boiler, all substantially as described.

2. The combination of a boiler, the water-heating drum under the boiler, pipes directly connecting said drum with the front part of the boiler, said pipes opening into the water-space of the boiler below the tubes, a vertical pipe connected with the rear end of the boiler and opening into the bottom thereof, and the pipes communicating with said vertical pipe above its lower end by their rear ends and with the drum at their forward ends at a point below the connection of the first-mentioned pipes therewith, substantially as described.

3. In a boiler-furnace the combination of a boiler, a drum under the boiler forming part of the bridge-wall, pipes connecting the upper part of said drum with the front water-space of the boiler below the tubes, and a vertical pipe connected with the rear end of the boiler and opening into the bottom thereof, with the pipes communicating with said vertical pipe by their rear ends and with said drum at their forward ends, and a deflector in said drum located intermediate the connections of the front and rear pipes therewith, substantially as and for the purpose described.

4. The combination of a boiler, a drum located upon and forming the upper part of the bridge-wall, the opposite pipes connected at their rear ends to the top of the drum and extending forwardly and connected at their front ends to the front end of the boiler, a pipe attached to the rear end and bottom of the boiler and depending therefrom, the lower portion of said pipe forming a scale-trap, opposite pipes connected to said trap-pipe at a point above the lower end thereof and extending forwardly to and communicating with the drum, and the draw-off pipe connected with the lower end of the trap-pipe, for the purpose and substantially as described.

5. In a boiler-furnace, the combination of a boiler, a fire-chamber and bridge-wall, and a drum located upon and forming the upper part of the bridge-wall, and opposite pipes connected at their rear ends to the top of the drum and extending forwardly through the fire-chamber and connected at their front ends to the front end of the boiler; with a pipe attached to the rear end and bottom of the boiler and depending therefrom, the lower portion of said pipe forming a scale-trap, opposite pipes connected to said trap-pipe at a point above the lower end thereof and extending forwardly to and communicating with the drum at a point below the connections of the first-mentioned pipes thereto, a deflecting-plate in said drum to prevent direct flow of water from the rear to the front pipes, and the draw-off pipe connected with the lower end of the trap-pipe, for the purpose and substantially as described.

6. In a boiler-furnace the combination of a boiler, a drum under the boiler forming part of the bridge-wall, pipes connecting the upper part of said drum with the front water-space of the boiler below the tubes, and a vertical pipe connected with the rear end of the boiler and opening into the bottom thereof, with the pipes communicating with said vertical pipe by their rear ends and with said drum at their forward ends at a point below the connection of the first-mentioned pipes therewith and a deflector in said drum located intermediate the connections of the front and rear pipes therewith, and a suitable blow-off pipe connected to the under side of said drum for the purpose of blowing out of drum any deposit of mud or other substance which may find lodgment therein, substantially as and for the purpose described.

7. The combination of a boiler, a drum located upon and forming the upper part of the bridge-wall, the opposite pipes connected at their rear ends to the top of the drum and extending forwardly and connected at their front ends to the front end of the boiler, a pipe attached to the rear end and bottom of the boiler and depending therefrom, the lower portion of said pipe forming a scale-trap, opposite pipes connected to said trap-pipe at a point above the lower end thereof and extending forwardly to and communicating with the drum at a point below the con-

nections of the first-mentioned pipes thereto, and the draw-off pipe connected with the lower end of the trap-pipe, and a transverse protecting-wall constructed immediately in front of said trap-pipe, for the purpose and substantially as described.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

FLORANCE J. MANNEY.
DANIEL WEBSTER WATKINS.

Witnesses:
FRED W. REIMERS,
GEO. MINEHAN.