

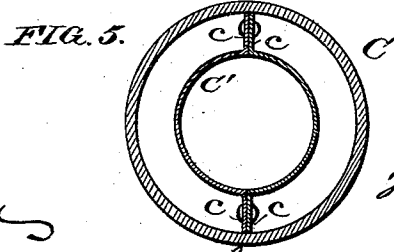
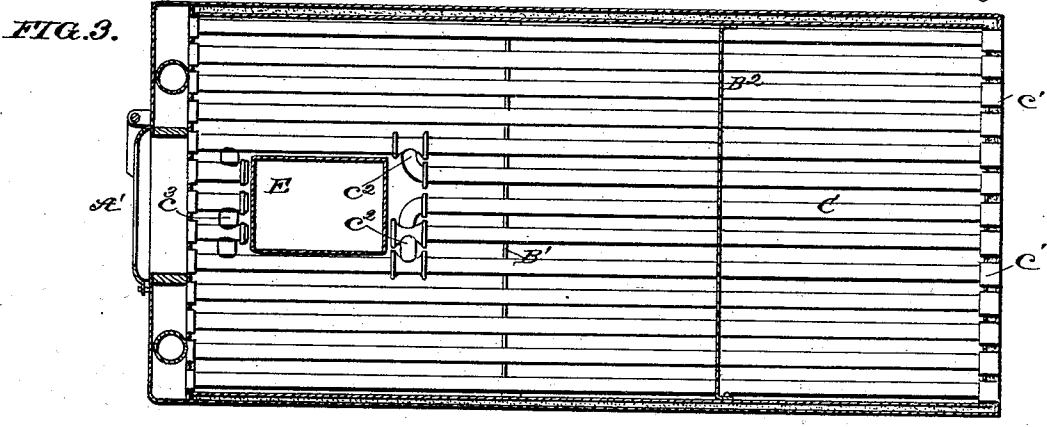
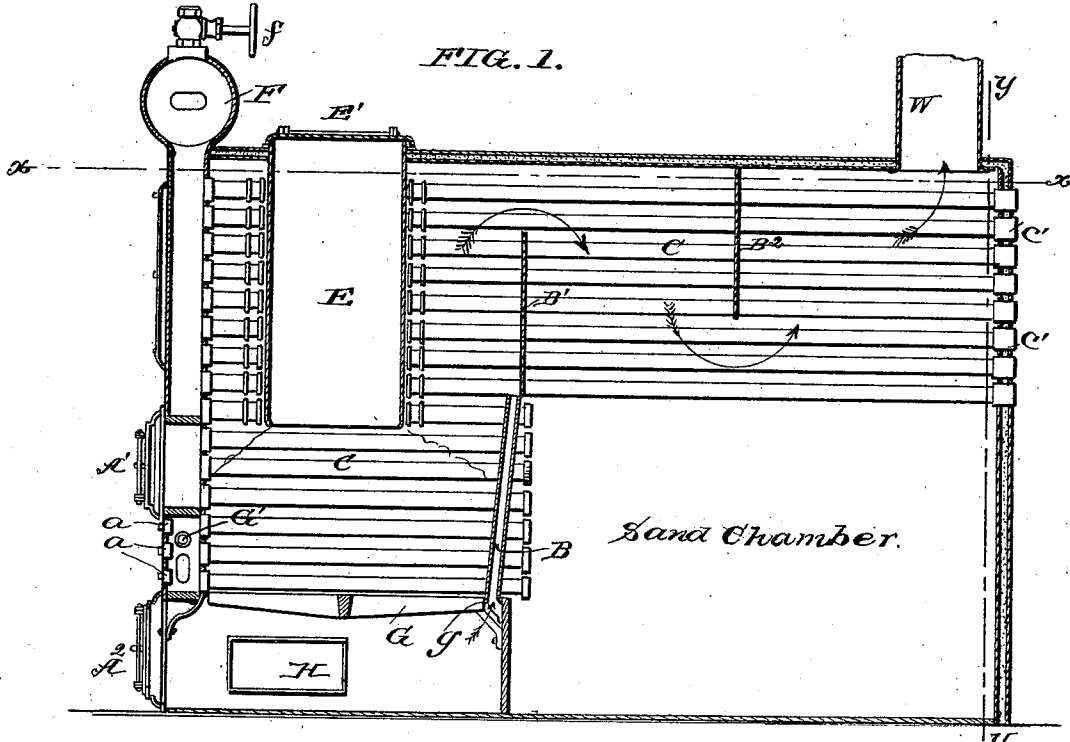
(No Model.)

2 Sheets—Sheet 1.

H. H. LINDEMUTH.
STEAM BOILER.

No. 373,836.

Patented Nov. 29, 1887.



Witnesses
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Inventor
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C. A. Snowden

(No Model.)

2 Sheets—Sheet 2.

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FIG. 2.

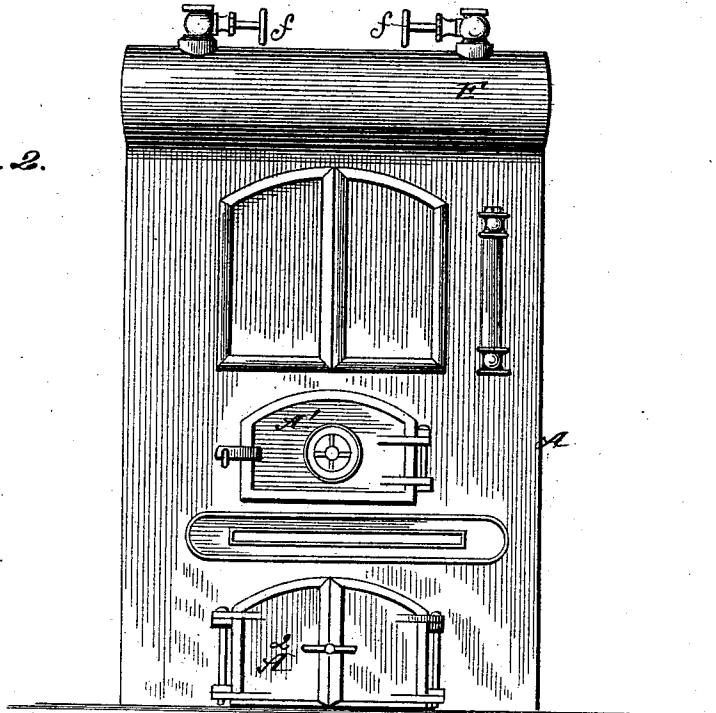
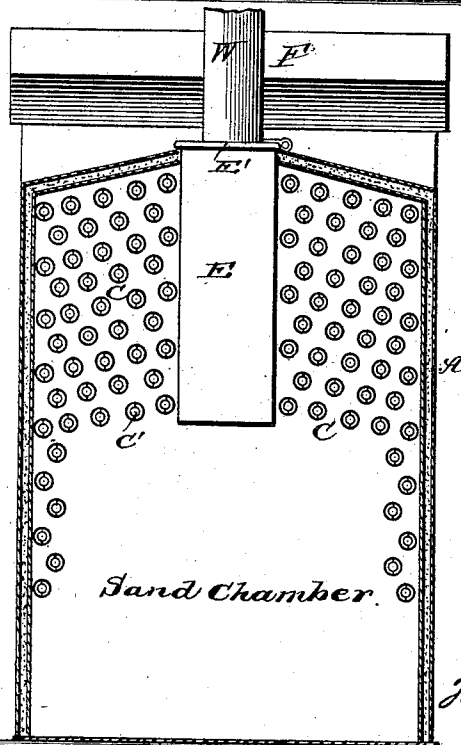


FIG. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

HARRY H. LINDEMUTH, OF MOUNT JOY, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 373,836, dated November 29, 1887.

Application filed April 18, 1887. Serial No. 235,251. (No model.)

To all whom it may concern:

Be it known that I, HARRY H. LINDEMUTH, a citizen of the United States, residing at Mount Joy, in the county of Lancaster and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification.

My invention relates to improvements in steam-boilers, and especially to that class of boilers known as "sectional water-tube boilers;" and it consists in the novel arrangement, construction, and combination of the several parts thereof, which will be more fully hereinafter described, and pointed out in the claims.

The object of my invention is to provide a sectional water-tube boiler wherein the parts are of simple and effective construction and combination, readily understood, strong and durable, easily cleaned, convenient and accessible at all points, and wherein means are provided to prevent the radiation of heat from the outer surface of the said boiler entire. I attain this object by the construction illustrated in the accompanying drawings, wherein like letters of reference indicate similar parts in the several views, and in which—

Figure 1 is a longitudinal vertical section of my improved boiler. Fig. 2 is a front elevation thereof. Fig. 3 is a horizontal section on the line *xx* of Fig. 1. Fig. 4 is a transverse vertical section on the line *yy* of Fig. 1. Fig. 5 is a cross-sectional view of one of the water-tubes.

A indicates the outer casing or shell of the boiler, which is constructed with a central open compartment which is adapted to be filled with sand for the purpose of preventing radiation of the heat from the outer surface of the boiler. This double wall or outer casing is provided at the top, sides, and rear of the boiler, being constructed, as will be readily understood, to provide for the various attachments of parts used in connection with the said boiler.

The forward part of the casing or front of the boiler may be constructed in any ornamental form, as shown in Fig. 2, and is provided with the usual fire-door, *A'*, ash-pit door *A²*, and with the water-gages and indicators, as in the ordinary form of boiler. The grate-bars *G* are also of the ordinary form of

construction, and have hot-air vents *g* formed in their rear portions, with which the hollow bridge-wall *B* is connected. This bridge-wall *B* is formed of two metallic plates having a compartment or chamber between them, which connects with the hot-air vents *g* in the rear of the grate-bars *G*, and are adapted to convey hot air upward in the rear of the fire of the furnace. The furnace-fire will be banked immediately against this bridge-wall *B*, and the air passing up through the vents *g* into the said bridge-wall will become superheated and pass out of the top or open end of the said bridge-wall and intermingle with the gases and smoke and form them into different compositions, which will be more readily burned by returning to the fire, thereby producing a perfect combustion and a smoke-consuming device. To the upper rear end of the bridge-wall *B* a break-plate, *B'*, is secured, against which the gases and that portion of the smoke which is not consumed strike and are elevated, passing over the top thereof, and strike against another break-plate, *B²*, secured to the top portion of the boiler, and are deflected downward, and, passing around the lower portion of this break-plate *B²*, thence pass upward into the smoke-stack *W* and escape.

The water-tubes are mounted in such a manner that they will readily permit of an expansion thereof, and a portion of which extends entirely through the boiler, as shown in Fig. 1, and a portion thereof to a point slightly in rear of the line of the bridge-wall. These water-tubes *C* are constructed in the form of sectional water-tubes having an inner core, to which the water passes in one direction, and an outer core or space formed between the inner core and outer wall of the tube, through which the said water returns. The inner core, *C'*, of said tube *C* is made in two parts, with flanges *c* securely bolted together and resting in the main tube *C*. This construction is adapted for a more ready circulation of the water therein, and also for convenience in cleaning the said tube when it becomes necessary. The ends of the tubes in the forward portions of the furnace are supported in the frame-work or front casing, as in the usual manner; but said casing is provided with a series of plugs, *a*, which may be removed from

the said casing to more readily gain admittance to the shorter series of tubes, which cannot conveniently be reached from the rear of the boiler entire.

5 At the rear portion of the boiler at the point where the longer tubes, C, pass therethrough and are supported thereby, a series of removable caps, c' , are provided, which are adapted to engage with the ends of the said tubes projecting through at said point by means of screw-threads, and may be removed when desired to clean the tubes, or for any other purpose found necessary.

10 Between the rear portion of the short tubes and the rear wall of the furnace and the lower portion of the longer tubes an open space is formed, which is adapted to be filled with sand, which rests against the said series of tubes. By this means the heat is retained in the boiler, which may be radiated from the fire-chamber by being absorbed by the sand, which is a well-known heat-absorbent, and again radiated from thence against the tubes, thereby producing a source of heat independent of the fire-chamber or furnace, and acting to more quickly heat the water in the tubes and cause it to remain in a heated condition, and consequently greatly facilitate the formation of steam.

15 In the forward part of the furnace a magazine, E, is formed and constructed by the insertion of metallic plates in an upright position in said part of the boiler, as shown in Figs. 1 and 2, and which is situated directly in the center of the boiler, near the forward end thereof, and produces a means for feeding coal to the fire, and which has a cap, E' , on the top portion of the boiler, by which access may be readily obtained to the internal portion thereof. The water-tubes C, it will be readily seen, cannot pass through this magazine E and still preserve the valuable operation thereof, and hence it becomes necessary to form a union with the tubes from one back to the other, as shown at $c^2 c^2$, Fig. 3, whereby the circulation may still be sustained and the desirable operation of the said tubes be unimpaired by the insertion of the magazine. The tubes C, which have been connected by unions to the tubes adjacent, as just described, will virtually be continued in front of the magazine by short pipes or tubes c^3 , so that no space is lost and a greater circulating-surface provided, and still retain the valuable acquisition of the magazine E.

20 On the top portion of the boiler a steam-dome, F, is formed, which may be circular in configuration, as shown in Fig. 1, or of an angular form, as shown in Fig. 4, and is provided with steam-valves $f f$, which connect with the radiators. The internal portion of this dome may be provided with a hand-hole for cleaning out the boiler-front, as may also the other portions of the front casing or wall of the boiler entire. On one side of the front casing a return-pipe, G' , is mounted, which is adapted to convey the water back to the boiler. In the

ash-pit a draft-door, H, is constructed which may be worked automatically, and is adapted to give ingress of the outer or atmospheric air to the said ash-pit, and to thereby cause a draft through the hollow bridge-wall B and to supply the necessary amount of air thereto, for the purposes hereinbefore stated.

It is understood that the necessary dampers, doors, and other parts of the furnace will be constructed as is necessary for the perfect operation of the boiler entire and of the furnace thereof, as is found necessary and desirable.

The utility, novelty, and advantage of my improved construction of furnace are obvious, and will be readily understood by those skilled in the art.

It is obvious that many minor changes in the construction and arrangement of parts may be made and substituted for those shown and described without departing from the nature and principle of my invention.

Having thus described my invention, I claim—

1. In a sectional water-tube boiler, the combination of the series of long tubes extending entirely through the furnace, the series of short tubes arranged on each side of the fire-chamber and extending to the rear line of the bridge-wall, and providing a sand-chamber between their rear ends and the rear ends of the furnace, and the fuel-magazine arranged in the forward part of the said tubes adjacent to the front of the furnace, substantially as described.

2. In a boiler-furnace, the sectional water-tube consisting of an inner and an outer core, through which the water circulates backward and forward, the said inner core being formed in two sections, the united flanges of which sections provide rests for the core, and the cap ends for said tubes, substantially as described.

3. In a boiler-furnace, the combination of a series of long tubes passing entirely therethrough from end to end, and a series of shorter tubes arranged below the long tubes and on each side of the fire-chamber and extending slightly in the rear of the line of the bridge-wall, removable cores arranged within said tubes, and the caps removably secured to the tubes at their ends, as set forth, for cleaning the same, substantially as described.

4. In a boiler-furnace, the combination of the series of long tubes arranged in the upper part of said furnace and passing therethrough from end to end, the series of short tubes arranged on each side of the fire-chamber below the series of long tubes and extending slightly to the rear of the line of the bridge-wall, and forming a chamber between the rear end thereof and the rear wall of the furnace, and adapted to receive sand, the fuel-magazine arranged in the forward part of the furnace of the boiler adjacent to the front wall thereof, having a cap or cover on the top portion thereof on the outside of the boiler-frame, the connections or unions in the rear of said magazine, and the short tubes in the forward portion thereof, substantially as described.

5. In a boiler-furnace, the combination, with the boiler portion thereof, having a series of sectional water-tubes, arranged as described and shown, of the grate-bars provided with hot-air vents at their rear portions, the hollow bridge-wall B, engaging with the hot-air vents, the break-wall B', connected to the upper portion of the said bridge-wall B, and the break-wall B², connected to and depending downward from the top of the frame of the boiler, all arranged as and for the purposes herein specified.

6. The combination, with the boiler-furnace having the sectional water-tubes, arranged and mounted as described and shown, of the grate-bars G, a draft-door opening into the ash-pit and allowing air to enter the same and pass through the vents *g* at the rear of the grate-bars G, the hollow bridge-wall B in connection with the said vents *g*, the break-wall B', connected to the upper portion of the bridge-wall B, and the break-wall B², connected to the top portion of the casing of the furnace and depending downward therefrom, all arranged and operating as herein specified.

7. In a boiler-furnace, the combination, with the series of long sectional water-tubes passing entirely through the furnace and connected around the fuel-magazine by unions, as described and shown, of the series of short tubes arranged below said series of long tubes and extending slightly to the rear of the line of the bridge-wall, thereby forming a chamber between their rear ends, the lower portion of the longer tubes, and the rear wall of the furnace

for the reception of sand, the caps on the rear ends of the series of long tubes, and the short plugs arranged in the forward portion of the casing of the boiler for convenience of access to the shorter tubes, substantially as described.

8. In a boiler and furnace, the combination, with the water-tubes, arranged therein as described and shown, of an outer casing or shell formed of plates of metal with a compartment between them for the reception of sand, and the sand-chamber in the rear of the series of short water-tubes and under the longer series thereof, substantially as described.

9. In a boiler and furnace, the combination of the outer hollow wall or casing adapted to receive sand, to prevent the radiation of heat therefrom, the series of long and short tubes, arranged as described and shown, the sand-chamber arranged in the rear of the short tubes and under the series of longer tubes, the hollow bridge-wall connecting with the vents in the rear portion of the grate-bars, the break-plate connected to the upper portion thereof, and the break-plate B², secured to the upper wall of the boiler and depending downwardly therefrom, all arranged and operating substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

H. H. LINDEMUTH.

Witnesses:

PETER BRUNNER,
BECKIE LINDEMUTH.