(No Model.) 2 Sheets—Sheet 1.

W. W. SUTCLIFFE.

STEAM BOILER.

No. 401,603. Patented Apr. 16, 1889.

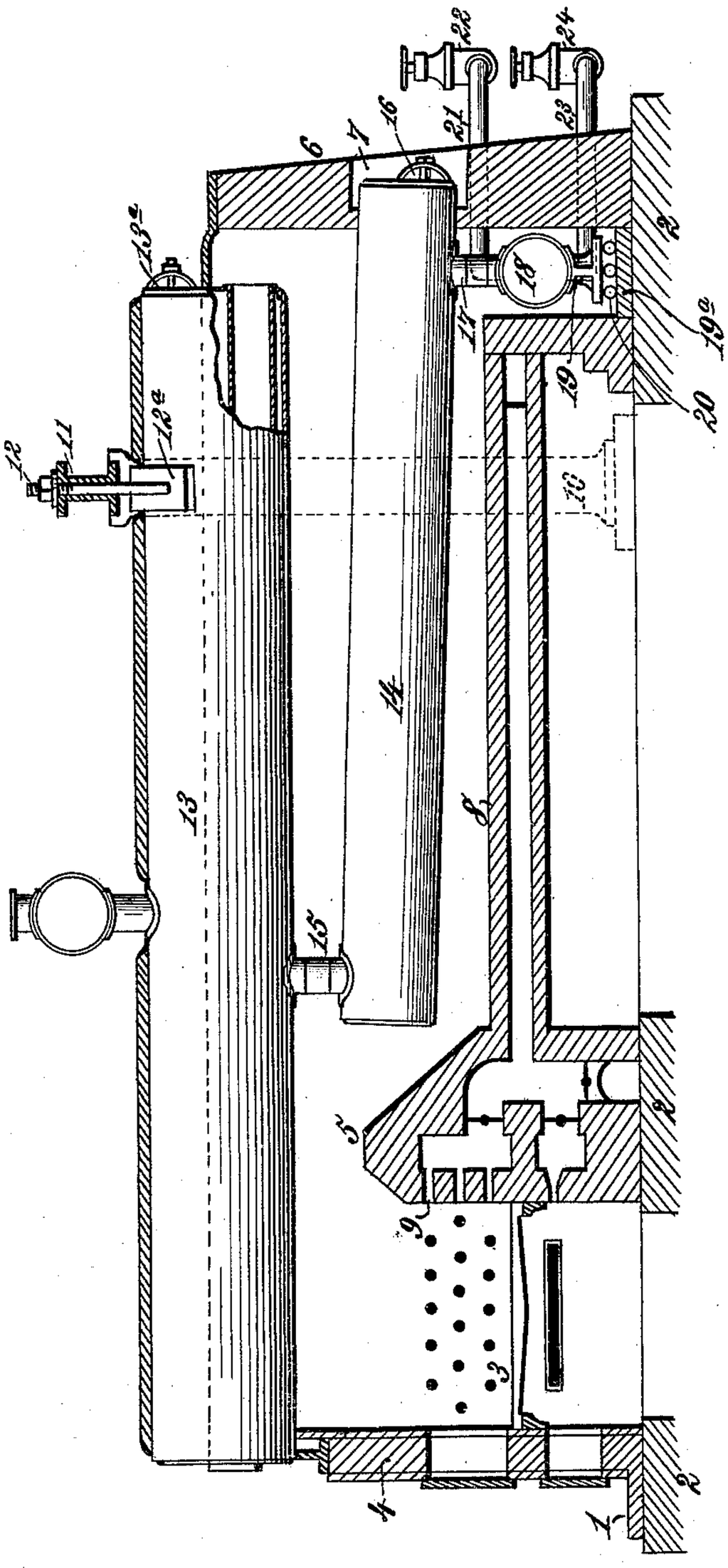

Fig. 1.

Witnesses.
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Inventor:
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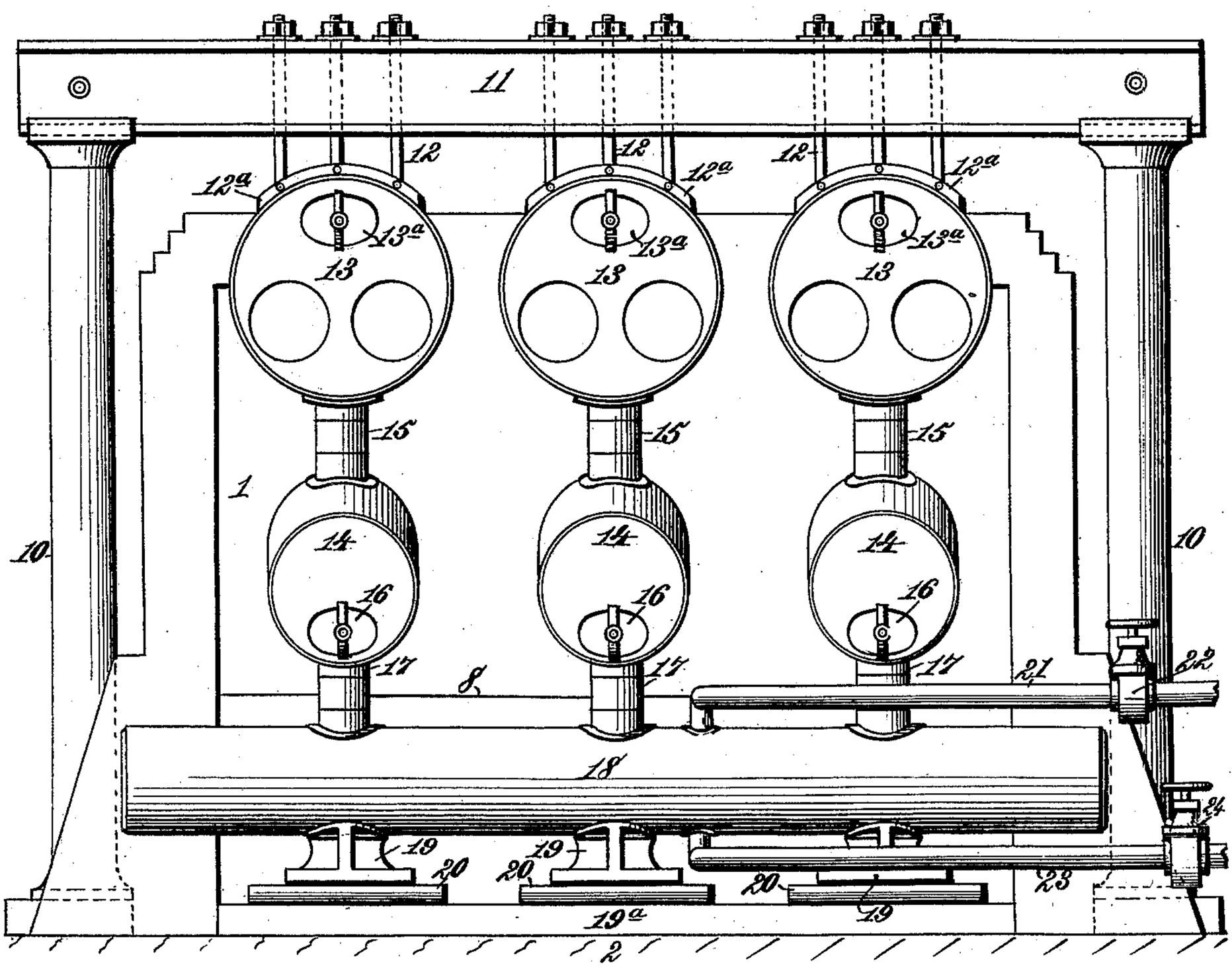
Fig. 2.



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Robt Ewett,
J. C. Sutherford.

Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM W. SUTCLIFFE, OF NEW ORLEANS, LOUISIANA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 401,603, dated April 16, 1889.

Application filed December 27, 1888. Serial No. 294,739. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. SUTCLIFFE, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented new and useful Improvements in Underhanging Steam-Boilers, of which the following is a specification.

This invention relates to steam-boilers of the type having underhanging supplementary or auxiliary boilers; and the objects of my invention are to improve the construction of parts whereby the heating-surface and boiler-power are increased, to provide novel means for raising the temperature of the feed-water before it enters the main boiler and avoid the formation of scales and mud deposits in the main boiler, to provide for the free expansion and contraction of the underhanging boilers and thereby guard against ruptures and explosions, to provide novel means for sustaining the main boiler and sustaining or supporting the rear extremities of the underhanging boilers, to provide novel means for cleaning out the underhanging boilers, to provide novel means for supplying the feed-water through the mud-drum of the underhanging boilers and cleaning said mud-drum of scales and mud deposits, and to provide underhanging boilers having communication only at their forward ends with the main boiler, and which are exposed on all sides substantially throughout their length to the direct action of the flame and heat from the fire-box of the furnace without obstructing the draft.

The objects of my invention I accomplish in the manner and by the features of construction and combination of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a steam-boiler and furnace structure illustrating my invention, and Fig. 2 a rear end elevation omitting the rear of the furnace structure to more clearly illustrate the invention.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, reference being made to the drawings, wherein—

The numeral 1 indicates an inclosing furnace structure of brick-work or similar material ordinarily used for steam-boilers, and of any form suitable for the conditions required, it being erected on a foundation or base, 2, and having a fire-box, 3, a front wall, 4, a bridge-wall, 5, and a rear wall, 6, having through-orifices 7, and a bottom, 8, preferably containing an air-supply flue in communication with a chamber in the bridge-wall to supply air through tuyeres 9 above and below the grate. At the sides of the rear end of the furnace structure rise columns 10, supporting at their upper ends a beam or girder, 11, of channel-iron, having suspended bolts 12, secured at their lower ends to saddles 12^a, from which are suspended the rear ends of a series of boilers, 13, having man-holes 13^a, the front ends of said flue-boilers seating on and being sustained by the front furnace-wall, 4. An auxiliary or underhanging boiler, 14, is located under each flue-boiler, and each auxiliary boiler connects at its forward end only with its main boiler, this connection being at a point behind the bridge-wall 5 through the medium of a single tubular leg, 15.

The underhanging boilers occupy the fire-space back of the bridge-wall. They incline downward toward the rear of the furnace, and their rear ends are extended considerably back of the rear ends of the flue-boilers, each of such extended ends projecting into and being exposed through one of the orifices 7 in the rear furnace-wall, 6, and provided with a man-hole, 16, whereby access can be had to the interior of each underhanging boiler through the rear furnace-wall for the purpose of removing scales and mud deposits. The rear end of each underhanging boiler is provided on its under side with a pendent tubular leg, 17, communicating with a transverse mud-drum, 18, located immediately inside the rear furnace-wall. The mud-drum has secured to its under side a pendent solid leg or shank, 19, which serves to sustain the drum, and through the latter support the rear ends of the underhanging boilers in such manner that such boilers are free to expand and contract lengthwise to guard against ruptures and explosions. This is effected by ar-

ranging the rear extremities of the underhanging boilers loosely in the openings 7 in the rear furnace-wall, 6, and locating between the foundation or base 2 and the lower end of the leg or shank 19 a metallic or other slab, 19ª, on which is placed a rolling bearing composed of rollers 20, which I term "expansion-rollers," in that they permit the leg or shank 19 to slide to and fro when the mud-drum is correspondingly moved by the expansion and contraction of the underhanging boilers.

I have shown a series of the legs or shanks, 19, on the under side of the mud-drum; but I do not confine myself to any special number, though more than one is desirable in order to properly support the mud-drum at different points and thereby sustain and support the rear ends of the underhanging boilers.

The feed-water for the boilers is supplied by a feed-water pipe, 21, having a suitable stop-valve, 22, and opening into the mud-drum on its upper side, whereby the deposit of scales within the boilers is nearly, if not entirely, avoided, since the feed-water is introduced into the mud-drum and there deposits mud and then circulates upward through the legs 17 and underhanging boilers into the flue-boilers. The feed-water in its passage upward through the underhanging boilers is raised in temperature, and the foreign matter held in suspension will naturally gravitate and remain in the mud-drum. The feed-water thus enters the flue-boilers in a properly-heated state and comparatively pure condition. The arrangement of the underhanging boilers and the front connecting-legs within the fire-space between the bridge-wall and under the main boilers enables me to utilize the heat of the products of combustion passing from the fire-box over the bridge-wall, thereby economizing fuel in the generation of steam, the underhanging boilers being also exposed on all sides substantially throughout their length to the direct action of the heat without affecting the furnace-draft, thus increasing the heating-surface and the boiler-power.

The mud-drum is provided on its under side with a blow-off pipe, 23, having a stop-valve, 24, whereby the mud-drum can be blown out and thereby cleaned. The construction and arrangement described provide perfect means for the expansion and contraction of the underhanging boilers, and afford ample facilities for removing scales and mud deposits, in which particulars my invention is especially useful and recommends itself.

The connection of the underhanging boiler at its front end only with the flue-boiler at the under side of the latter, and the extension of the underhanging boiler beyond the rear end of the flue-boiler and through the rear furnace-wall, and the provision of a man-hole at the rear of the underhanging boiler, and the support of the rear end of the underhanging boiler and mud-drum by a rolling expansion support are features that, with others herein described, contribute in producing a safe, desirable, and efficient steam-boiler of the type specified.

The support of the forward ends of the main boilers on the front furnace-wall and the suspension of their rearward ends through the medium of the pendent bolts, saddles, beam or girder, and columns provide for the expansion and contraction of the main boilers without danger of rupture or explosion.

The products of combustion passing in direct contact with all sides of the auxiliary boilers are directed upward by the rear furnace-wall, 6, into the rear ends of the flues or tubes 25, extending longitudinally through the main or flue boilers.

I do not herein claim the inclosing furnace structure having the separate air-flues and tuyeres or blast-openings above and below the grate-bars, the independent dampers, and the air-conduit shown in the drawings, as such features, with others not definitely specified herein, constitute the subject-matter of Letters Patent issued to me September 18, 1888, No. 389,773.

Having thus described my invention, what I claim is—

1. The combination, with an inclosing furnace structure having a rear wall provided with a through-orifice, of a flue-boiler, an underhanging boiler connected at its forward end only with the flue-boiler, inclined downward in a rearward direction, and having its rear extremity extended back of the flue-boiler into the orifice in the rear furnace-wall and there provided with a man-hole accessible through said orifice, and a mud-drum located under and connected with the rear end of the underhanging boiler and adapted to slide or move on a supporting-base, substantially as described.

2. The combination, with an inclosing furnace structure having a fire-box, a bridge-wall, and a rear wall provided with a through-orifice, of a flue-boiler, an overhanging boiler connected at its forward end only with the flue-boiler behind the bridge-wall and having its rear extremity extended beyond the rear end of the flue-boiler into the orifice in the rear furnace-wall, and a mud-drum located under and connected with the rear end of the underhanging boiler and provided with a leg or shank loosely sustained by a supporting-base to permit the mud-drum to slide, substantially as described.

3. The combination, with an inclosing furnace structure having a rear wall provided with a through-orifice, of a flue-boiler supported at its front end by the front furnace-wall, supporting-columns having a beam or girder provided with pendent bolts by which the rear end of the flue-boiler is suspended, an underhanging boiler connected at its front end with the flue-boiler, and having its rear end extended beyond the rear end of the flue-boiler, and provided with a man-hole accessible through the orifice in the rear end of the

underhanging boiler, and having a leg or shank resting on a supporting-base, and a feed-water pipe connected to the mud-drum, substantially as described.

4. The combination, with an inclosing furnace structure having a rear wall provided with through-orifices, of a series of flue-boilers resting at their front ends on the front furnace-wall and suspended at their rear ends, a series of underhanging boilers connected at their front ends only with the flue-boilers and having their rear ends extended beyond the rear ends of the flue-boilers, and each provided with a man-hole accessible through one of the orifices in the rear furnace-wall, a mud-drum located transversely under the rear ends of the underhanging boilers and having connections therewith and provided with legs or shanks loosely sustained by a supporting-base, and a feed-water pipe connected to the mud-drum, substantially as described.

5. The combination, with an inclosing furnace structure having a rear wall provided with through-orifices, of flue-boilers, underhanging boilers connected, respectively, at their front ends only with the flue-boilers, inclining downward in a rearward direction, and having their rear ends extended back of the rear ends of the flue-boilers and provided with man-holes accessible through the orifices in the rear furnace-wall, a mud-drum located tranversely under and connected with the rear ends of the underhanging boilers and provided with a leg or shank loosely sustained by a supporting-base, a feed-water pipe communicating with the upper portion of the mud-drum, and a blow-off pipe communicating with the lower portion of the mud-drum, substantially as described.

6. The combination, with a furnace structure, of a main boiler, an underhanging boiler connected at its front end to the main boiler and having its rear extremity extended beyond the rear end of the main boiler and provided with a man-hole, a mud-drum located under and connected with the rear end of the underhanging boiler, a rolling expansion support for the mud-drum, and a feed-water pipe communicating with the upper portion of the mud-drum, substantially as described.

7. The combination of a furnace structure, a main boiler resting on the front furnace-wall, the columns having a girder provided with pendent bolts by which the rear end of the main boiler is suspended, an underhanging boiler connected at its front end with the main boiler, a mud-drum located under and connected with the rear end of the underhanging boiler, and a rolling expansion support for the mud-drum, substantially as described.

8. The combination of a furnace structure, a main boiler, the columns having a girder provided with pendent bolts by which the rear end of the main boiler is suspended, an underhanging boiler connected at its front end with the main boiler, a mud-drum located under and connected with the rear end of the underhanging boiler, a rolling expansion support for the mud-drum, and a feed-water pipe communicating with the lower portion of the mud-drum, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WM. W. SUTCLIFFE.

Witnesses:
JNO. S. MOORE,
CHAS. G. JOHNSON.