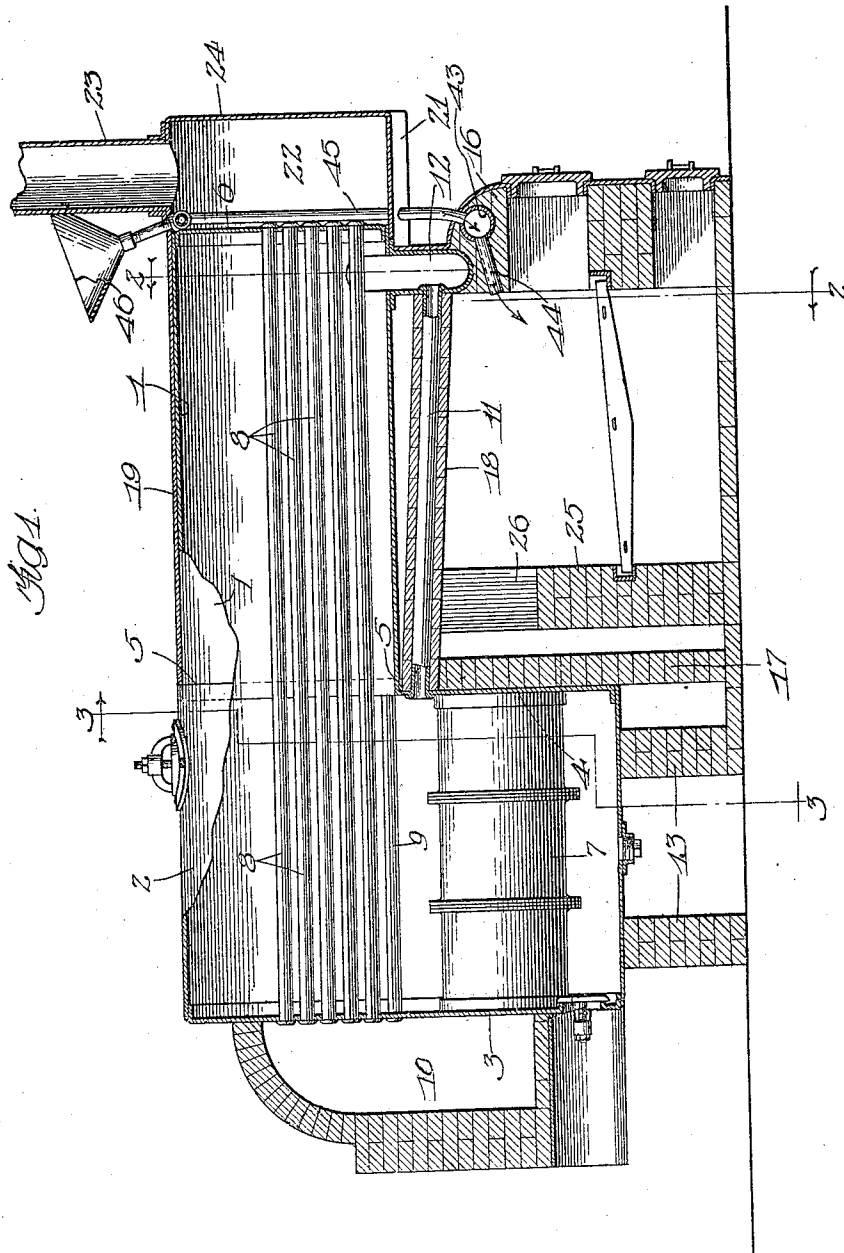


T. F. DOWNEY.
STEAM ROILER.
APPLICATION FILED FEB. 27, 1909.

949,956.

Patented Feb. 22, 1910.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

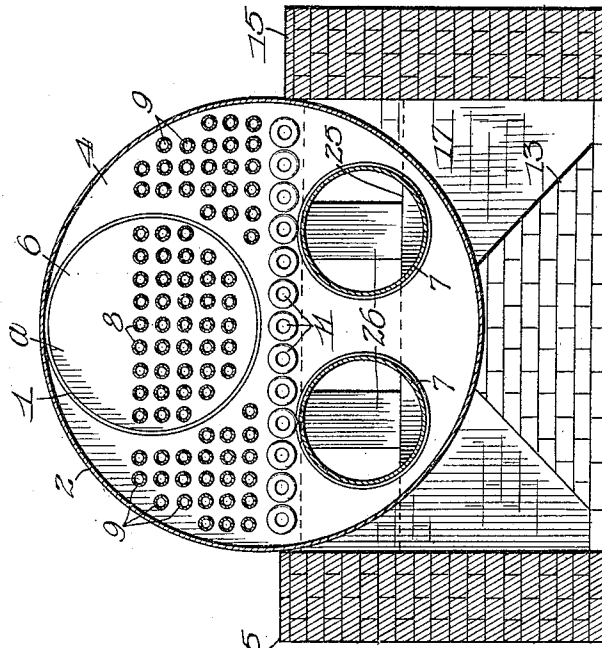
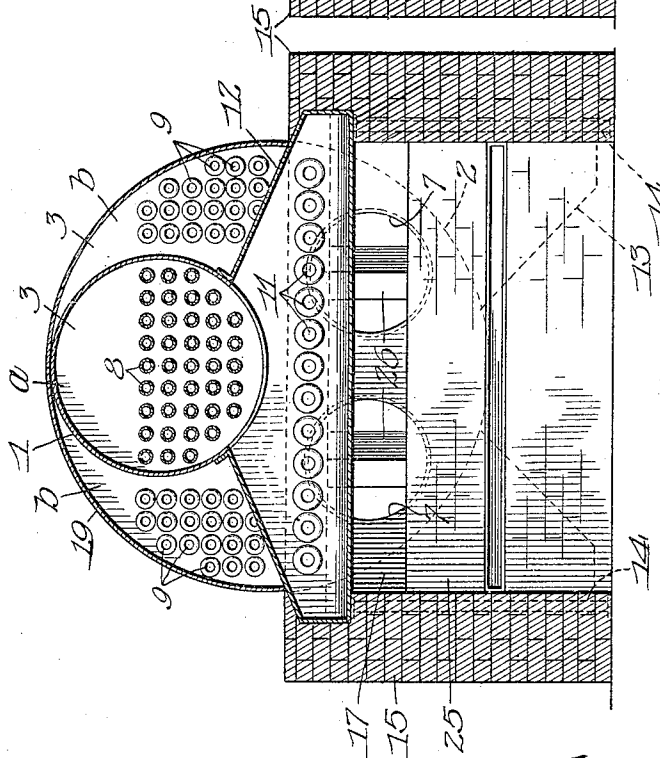


Fig. 2.



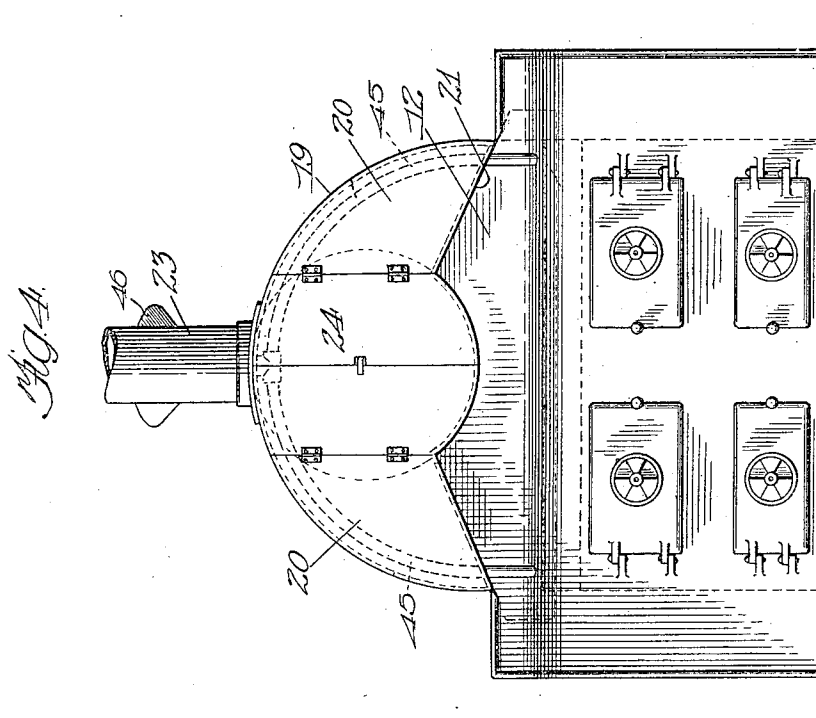
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UNITED STATES PATENT OFFICE.

THOMAS F. DOWNEY, OF CHICAGO, ILLINOIS.

STEAM-BOILER.

949,956.

Specification of Letters Patent.

Patented Feb. 22, 1910.

Application filed February 27, 1909. Serial No. 480,427.

To all whom it may concern:

Be it known that I, THOMAS F. DOWNEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

Certain features of this invention are especially applicable to Scotch or marine boilers. It has been common to place the grates within the large flues of boilers of this type, but with such an arrangement of the furnace, the water in the bottom of the boiler is not sufficiently heated and the circulation is poor. Furthermore, the grate surface available in the flues is limited. My invention contemplates placing the furnace in front of the boiler and in communication with the large flues where the required amount of grate surface can be had and the water in the boiler below the large flues can be more efficiently heated, thereby improving the circulation. Where a construction of this kind has been attempted in the past, there has been a serious loss of heat through the top of the furnace.

It is one of the objects of this invention to provide such an arrangement of the boiler and the furnace as to avoid such loss of heat, or rather, to utilize the heat from the arch or top wall of the furnace.

As heretofore constructed, the arch has been made heavy enough to support itself, and consequently has restricted the space available for tubes or flues.

One of the objects of this invention is to utilize boiler tubes for supporting the arch, whereby the latter can be made relatively light.

Another object of the invention is to make the side walls and the arch independent of one another, whereby the side walls may be removed or renewed without disturbing the arch, and vice versa.

Another object of the invention is to improve the circulation in a Scotch or marine boiler by combining water tubes therewith.

Another object of the invention is to provide simple and efficient means for superheating the steam.

A further object of the invention is to provide such an arrangement of the furnace as shall promote the complete combustion of the fuel.

A further object is to provide means for

warming the air admitted to the combustion chamber.

In the accompanying drawings, Figure 1 is a longitudinal central section through a steam boiler and furnace embodying the features of my invention. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 1. Fig. 4 is a front elevation.

The embodiment of my invention which has been selected for illustration comprises a cylindrical forward section or shell 1 and a rear cylindrical section or shell 2. The section 2 is provided with a rear tube sheet 3 and the forward tube sheet 4, the forward tube sheet having therein a circular opening surrounded by an annular flange 5 to which flange the rear end of the shell 1 is secured. The upper portions of the shells or sections 1 and 2 are substantially alined. At the forward end of the shell 1 is a tube sheet 6. In the lower portion of the rear shell 2 are two flues 7 of relatively large diameter. Extending from the tube sheet 6 of the forward shell 1 to the tube sheet 3 of the rear shell 2 is a set of flues 8, said flues filling substantially the lower half of the shell 1 and providing a steam and water space *a* above them. Flues 9 extend from the tube sheet 3 to the tube sheet 4 of the rear shell 2 at each side of the flues 8, the uppermost flues 9 being preferably in the same plane as the uppermost flues 8. The rear ends of the flues 7, 8 and 9 open into a chamber 10 of suitable construction affording an opportunity for the products of combustion to pass from the flues 7 into flues 8 and 9. A plurality of water tubes 11, preferably arranged in a plane, extend from the forward tube sheet 4 of the rear shell 2 to a water leg 12 attached to the shell 1 near the forward end thereof and communicating with the interior of said shell 1. It will be understood that the tubes 11 may be level or may pitch to the front or the rear.

The boiler is supported, in this instance, upon two piers 13 beneath the rear shell 2 and two metal pillars 14 below the water leg 12. Brick walls 15 extend from a point near the forward end of the shell 1 to the forward end of the shell 2, being connected at their forward ends by the boiler front 16 and at their rear ends by a wall 17. Said wall 17 covers the lower portion of the tube sheet 4 and has openings therein alined with

and of the same diameter as the flues 7. The water tubes 11 are preferably inclosed within and support a tile arch 18 extending from one of the side walls to the other. The wall

5 17 extends up to the arch 18.

The space at each side of the forward shell 1 is inclosed by a semicylindrical plate or casing 19 extending from one of the side walls to the other, and from the tube sheet 4 to a point forward of the front end of the shell 1. The forward end of the casing 19 is closed by walls 20 and 21 to form a smoke box 22.

23 is a smoke flue communicating with the smoke box 22. Doors 24 may be provided for the smoke box 22, if desired.

Any suitable form of grate may be employed. The bridge wall 25 extends from one side wall 15 to the other at a suitable distance from the front of the rear shell 2. Upon said bridge wall are two pillars 26 each located in front of one of the flues 7 and serving to prevent the products of combustion from passing directly through the flues 7, said pillars causing the smoke and hot gases to strike the wall 17. The pillars 26 may be of triangular cross-section.

Suitable means may be employed for warming the air admitted to the combustion chamber. I have herein shown a header 43 within the boiler front, a suitable number of air-discharge tubes 44 communicating between the header and the interior of the combustion chamber. Pipes 45 extend upward from the header 43, through the breeching 22, and merge into an inlet pipe or funnel 46.

In operation, the products of combustion pass over the bridge wall 25, through the flues 7 and the chamber 10 and through the flues 8 into the smoke box 22 and out through the smoke flue 23. The products of combustion also pass through the flues 9 into the spaces *b* (Fig. 2) within the casing 19 at each side of the shell 1 and thence into the smoke box 22. The hot gases in said spaces *b* serve to superheat the steam in the steam space *a*. The longer the section 1, the greater the degree of superheat that may be obtained. The heat passing into the arch 18 is utilized to heat the water in the tubes 11, the heat passing through the arch being radiated into the casing 19, where it serves to heat the water in the section 1 and to superheat the steam. As will be understood, the pillars 26 and the facing 17 for the forward hood 4 become highly heated and promote the combustion of the smoke.

When it becomes desirable to repair or

replace the side walls 15, they may be removed without disturbing the arch 18, since the latter is supported independently of the side walls.

Manholes and handholes of suitable construction may be provided at any desired points in the boiler.

I would have it understood that I desire not to be limited to the precise details of construction herein shown and described, for various modifications will occur to persons skilled in the art.

I claim as my invention:

1. The combination, with a Scotch boiler having a large flue in the lower part thereof and a plurality of small flues in the upper part thereof, of a furnace located in front of the lower part of the boiler and communicating with the large flue, a cylindrical shell extending from the upper part of the boiler to a position over said furnace, certain of the small flues being extended through said shell, a water leg at the front end of said shell, a flat series of water tubes connected at their rear ends with the front tube sheet of the Scotch boiler above said large flue, said water tubes being connected at their front ends with said water leg, said tubes supporting the top wall of the furnace, means establishing communication between the rear ends of said flues, and a smoke outlet for the forward ends of said small flues.

2. The combination with a Scotch boiler having a large flue in the lower part thereof, of a furnace located in front of the lower part of the boiler and communicating with the large flue, a cylindrical shell extending from the upper part of the boiler to a position over said furnace, a water leg at the front end of said extension shell, a series of water tubes connected at their rear ends with the front tube sheet of the Scotch boiler above said large flue, said water tubes being connected at their front ends with said water leg, said tubes supporting the top wall of the furnace, a plurality of small flues in said Scotch boiler located above said water tubes and arranged within said extension shell and at each side of said shell, the flues within the shell being extended to the forward end of the shell, means establishing communication between the rear ends of all of said flues, and a smoke outlet for the forward ends of the small flues.

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