

No. 790,251.

PATENTED MAY 16, 1905.

F. BURGER.
WATER TUBE BOILER.
APPLICATION FILED AUG. 24, 1901.

2 SHEETS—SHEET 1.

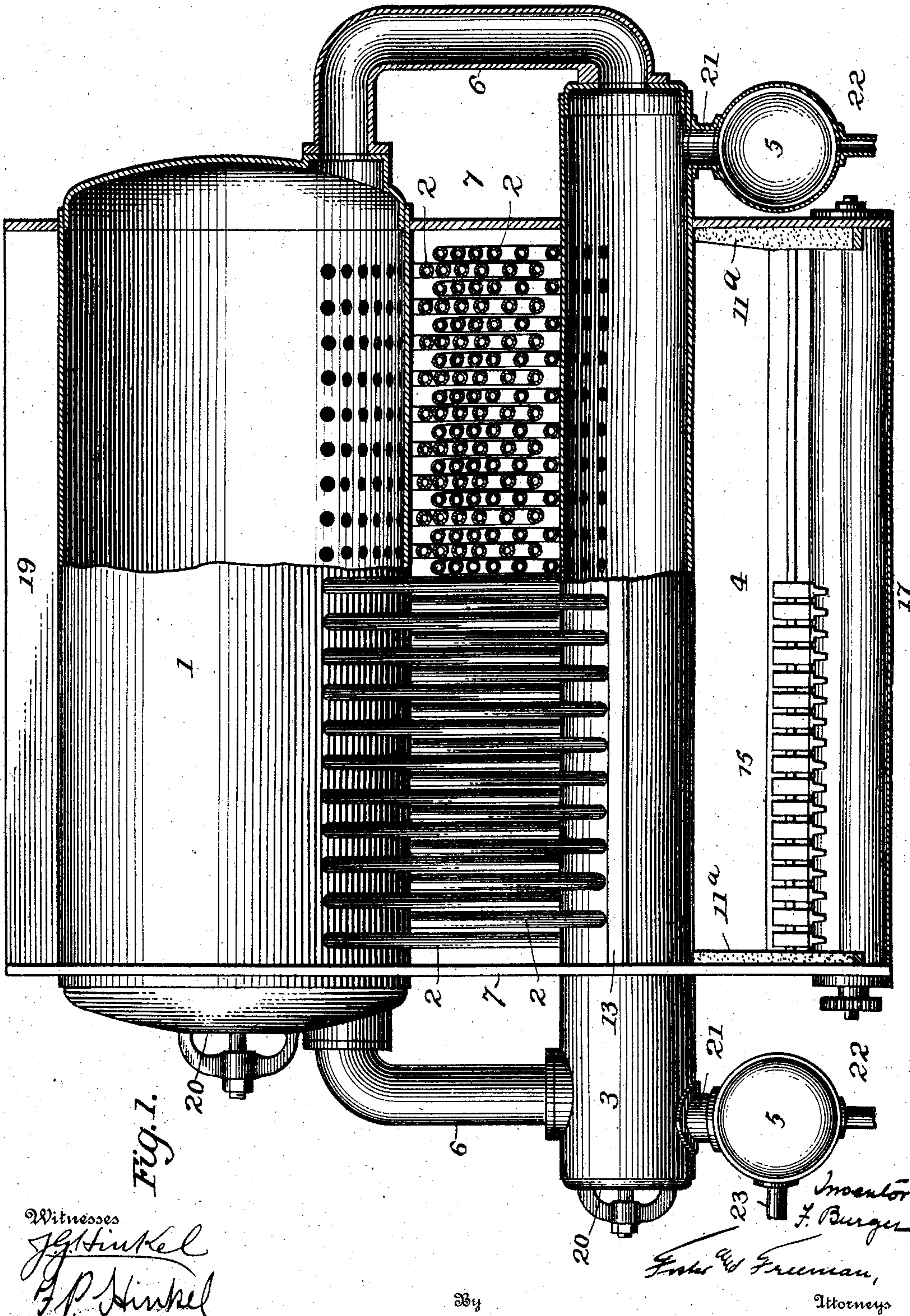


Fig. 1.

Witnesses

J. P. Hinkel
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By

Inventor
F. Burger
Foster & Freeman,
Attorneys

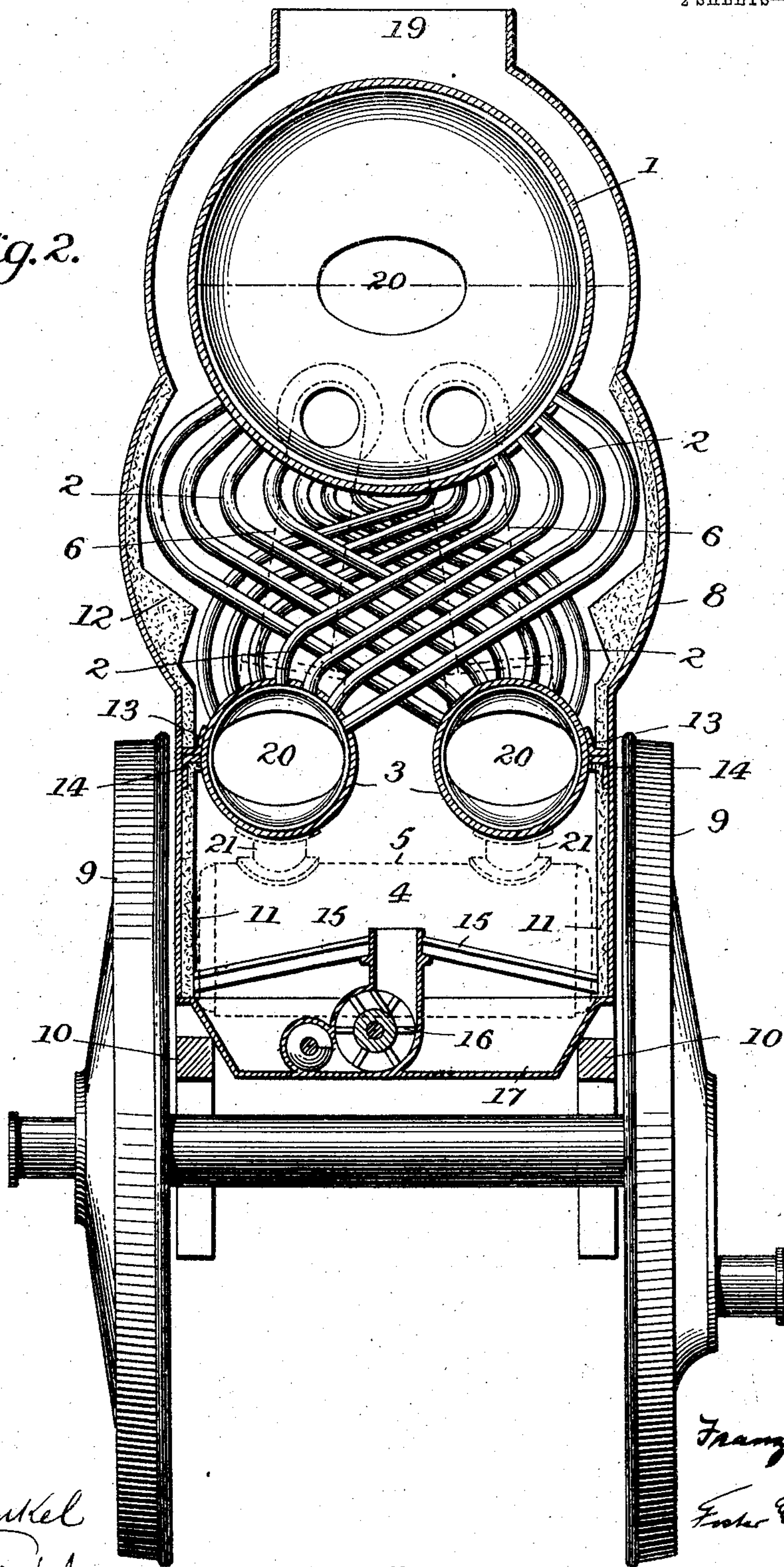
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2 SHEETS—SHEET 2.

Fig. 2.



Witnesses
J. Hinkel
H. P. Hinkel

By

Inventor
Franz Burger
Foster & Freeman
Attorneys

UNITED STATES PATENT OFFICE.

FRANZ BURGER, OF FORT WAYNE, INDIANA, ASSIGNOR OF THREE-FOURTHS TO HENRY M. WILLIAMS, OF FORT WAYNE, INDIANA.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 790,251, dated May 16, 1905.

Application filed August 24, 1901. Serial No. 73,186.

To all whom it may concern:

Be it known that I, FRANZ BURGER, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Water-Tube Boilers for Locomotives, of which the following is a specification.

This invention relates to water-tube boilers; and its object is to improve the construction of such boilers.

The invention will be fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a side view, partly in section, of a boiler and furnace embodying my invention. Fig. 2 is a vertical transverse section of the same, also showing a fuel-feeding apparatus and a pair of locomotive driving-wheels.

The boiler illustrated and to be hereinafter described is especially intended for use on locomotive-engines; but it may be used with equal advantage for marine or stationary engines.

The boiler consists of three cylindrical shells, a number of bent water-tubes, four large circulating-pipes, and two mud-drums.

The main cylindrical shell 1 is supported above and connected by bent tubes 2 to two smaller cylindrical shells 3, supported in the furnace 4, one on each side thereof. The mud-drums are indicated by 5, and there are two of them extending transversely of the furnace exterior thereof and one near each end. Both cylinders 3 are connected to the drums 5 by short pipes 21.

The large circulating-pipes are indicated by 6, and there are four of them, two leading from each end of the shell 1 near the bottom thereof to the ends of the shells 3.

To securely support the shells 1 and 3, I prefer to employ two heavy plates 7, provided with openings through which the ends of the respective shells project. These plates also form the front and rear walls of the furnace, and preferably they will be provided with fire-resisting material (indicated by 11^a) at their lower portions. The parts of the

boiler between the plates 7 are inclosed by a jacket 8, which extends down between the driving-wheels 9 to the bar-frame 10. The jacket is secured to the edges of the plates 7, and its lower portion forms the side walls of the furnace. To the inside of the jacket is secured fire-resisting material, (indicated by 11,) and a longitudinally-extending deflecting portion 12 is formed in said fire-resisting material between the shells 1 and 3. The shells 3 are additionally supported by angle-bars 13, fastened to the said shells and resting upon angle-bars 14, which are fastened to the sides of the jacket 8. These angle-bars extend the whole length of the jacket between the plates 7 and not only serve to support the shells 3, but also to close the space between the respective shells and the jacket, so that no products of combustion can pass above the shells 3 except through the central space between said shells.

The jacket 8 is contracted at its upper end to cause the hot gases to contact with the upper part of the shell 1 before they escape through the opening 19.

The furnace 4 is provided with grate-bars 15 and with a fuel-feeding device 16 and an ash-pan 17.

The general practice in water-tube boilers is to place the smaller cylinders, such as 3, below or out of reach of the fire in order to form settling-drums for the mud, the heating-surface being only the tubes which are exposed to the fire. The upper drum is also usually out of reach of the hot gases. Also the circulation of water through the tubes in most cases is dependent on the tubes themselves or on a small pipe only. Nevertheless, these boilers are of great efficiency, and to accommodate this class of boilers for locomotive use has been the aim of many engineers on account of their steaming qualities. In my boiler I have greatly increased the heating-surface by adding the two shells 3, which are subjected to the direct heat of the furnace. It will also be observed that the bent tubes 2 are crossed or interlaced and that the products of combustion must pass up through the space between the shells 3 and thence out

through the space between the jacket 8 and shell 1, and the consequence is that the tubes are subjected to intense heat throughout their length. The tubes 2 will be placed as close 5 to each other as practicable, thereby obstructing the free escape of the products of combustion and enabling them to absorb most of the heat from the gases. By directing the products of combustion over the upper portion 10 of the shell 1 the steam therein will to some extent be superheated. A free circulation of water is also insured from the shell 1 through the pipes 6 to the shells 3 and through the tubes 2 to the shell 1. By locating the 15 mud-drums 5 outside the furnace and below the shells 3 there will be no circulation within the drums and the temperature of the water will be lowered therein, which will facilitate the settling of the mud in them. Pipes 22 20 lead from the mud-drums, through which the mud may be blown out when desired.

The feed-water pipe is indicated by 23, leading into one of the drums 5; but obviously the water might be fed into one or both of the 25 shells 3.

Each of the shells 1 and 3 will preferably be provided with a manhole 20 at one end thereof to permit access to the interior thereof.

Without limiting myself to the precise details of construction illustrated and described, 30 I claim—

1. The combination with the furnace, of a

pair of shells supported within the fire-box directly above the grate-bars near the opposite sides thereof and spaced apart, a larger 35 shell supported above them, water-tubes connecting the upper and lower shells, a jacket inclosing said shells and tubes, obstructing-plates between the jacket and the opposing sides of the lower shells, circulating-pipes exterior 40 of the furnace connecting the upper and lower shells, and mud-drums exterior of the furnace connected to the lower shells, substantially as set forth.

2. The combination with the furnace, of a 45 pair of shells supported within the fire-box directly above the grate-bars near the opposite sides thereof and spaced apart, a larger shell supported above them, crossed water-tubes connecting the upper and lower shells, 50 an inclosing jacket, obstructing-plates between the jacket and the lower shells, circulating-pipes exterior of the jacket connecting the ends of the upper and lower shells, and mud-drums exterior of the jacket connected 55 to the lower shells, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANZ BURGER.

Witnesses:

GEO. K. TORRENCE,
C. B. WATERS.