

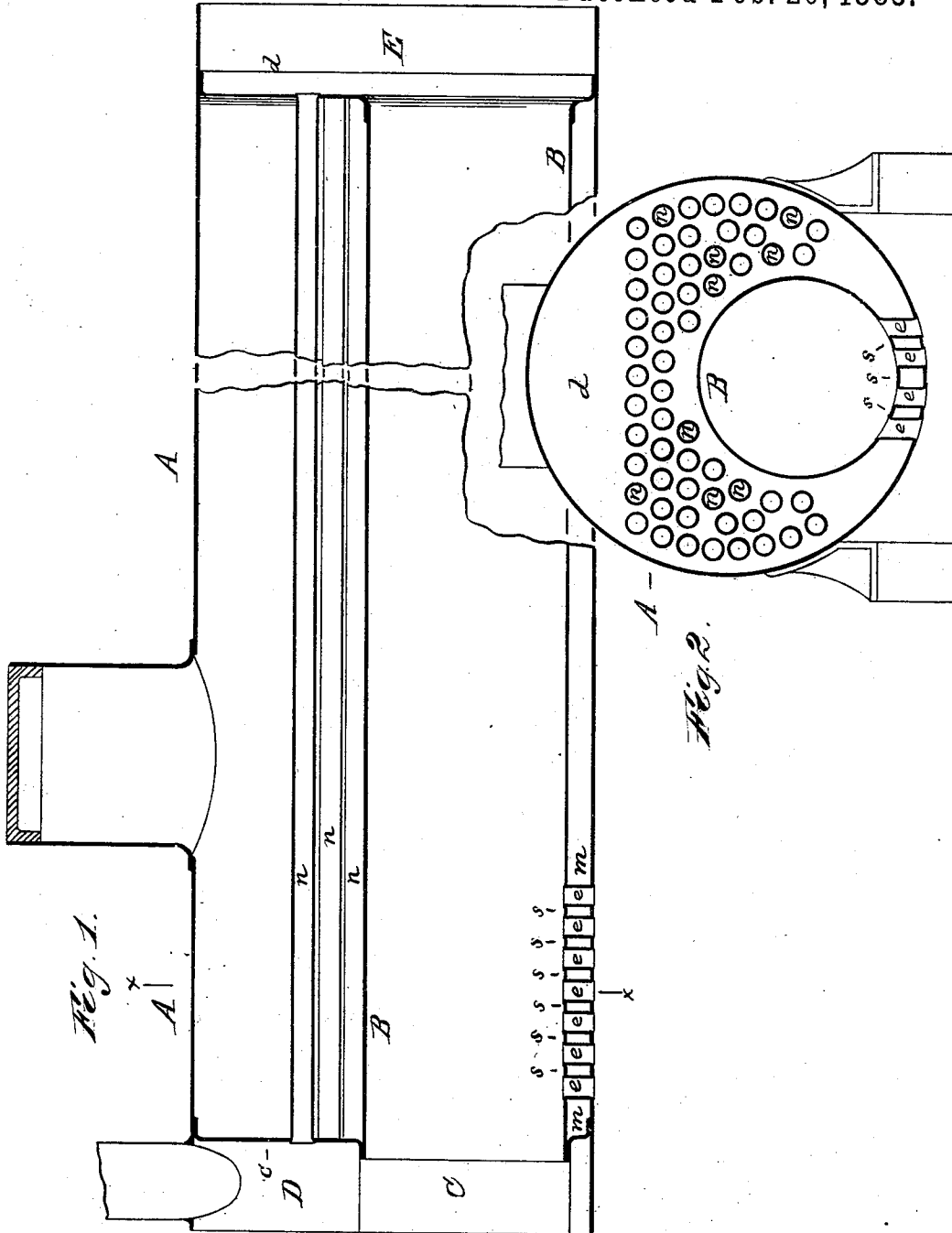
(No Model.)

J. OLDHAM & B. N. PAYNE.

STEAM BOILER.

No. 272,578.

Patented Feb. 20, 1883.



WITNESSES:

W. L. Bennett.  
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# UNITED STATES PATENT OFFICE.

JOHN OLDHAM AND BENJAMIN N. PAYNE, OF CORNING, NEW YORK, AS-  
SIGNORS TO B. W. PAYNE & SONS, OF SAME PLACE.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 272,578, dated February 20, 1883.

Application filed June 13, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN OLDHAM and BENJAMIN N. PAYNE, both of Corning, in the county of Steuben and State of New York, have made an invention of certain new and useful Improvements in Steam-Boilers; and we do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and exact description and specification of the same.

The principal object of the invention set forth in this specification is to provide a steam-boiler with an internal fire-box of large capacity relatively to the size of the external shell of the boiler, so that straw or other fuel which occupies a large space in proportion to its weight may be burned with advantage.

To this end the invention consists of certain combinations of devices, which are set forth in detail in the claims at the close of this specification.

In order that the invention may be fully understood, we have represented in the accompanying drawings, and will proceed to describe, a cylindrical steam-boiler embodying the invention in one of the modes devised by us.

Figure 1 of said drawings represents a central longitudinal vertical section of the steam-boiler, (with certain parts removed,) and Fig. 2 represents a transverse section of the same at the line *x x* of Fig. 1.

The steam-boiler represented in the said drawings has a plain cylindrical shell, A, and an internal cylindrical fire-box, B, which is secured at its ends to the heads *c d* of the cylindrical shell. Thus far the boiler corresponds with many previously known; but in such boilers it has been customary to divide the internal cylinder horizontally for a portion or the whole of its length and at about its greatest diameter by means of a series of grate-bars, so that the upper semi-cylindrical half of the internal cylinder above the grate-bars constitutes the fire-box for fuel, while the lower semi-cylindrical portion of the internal cylinder beneath the fire-box constitutes the ash-pit. It has also been proposed to adapt a boiler of this description for the burning of bulky fuel—such as straw—by placing a low-

down grate in the internal cylinder at one end; but in practice we found that the use of such low-down grate was objectionable for various reasons, chief among which are these, namely: that portions of unburned straw would pass below the grate and gradually choke up the space beneath it, so as to prevent free access of air to the fuel on the grate, that the grate so applied diminished the fuel capacity of the internal cylinder, and that the grate would rapidly burn out and require to be replaced. All these objections are overcome by our invention.

In order that the present invention may be embodied in the cylindrical boiler represented in the drawings, the internal cylinder B of the boiler is not divided by grate-bars, but is connected at its under side with the external shell, A, of the boiler by means of one or more air-passages, *e e e*, whose walls are formed in this example of short tubes, so that the draft to the fuel may pass from the exterior of the boiler transversely across the water-space *m* beneath the internal cylinder. The parts *s* of the boiler between these passages constitute in substance the grate of the boiler, supporting the fuel and permitting the access of air to it through the openings *e e e* between them. Hence the whole internal area of the internal cylinder is made available as a fire-box of greater capacity, adapted to the use of straw or similar fuel which is of large bulk in proportion to its weight.

In order that the heat developed by the burning fuel may be taken up, the boiler is fitted with return-flues, formed in this example by tubes *n n*, which are secured in the heads *c d* of the boiler, and extend throughout its length. There are also the customary flue-connections, D E, at the ends of the boiler, to permit the products of combustion to pass from the internal cylinder to the return-flues, and from the latter to the chimney, which connections are closed by doors when the boiler is in use, while the passage C to the front end of the fire-box is also closed by doors and door-casing.

The extent of the openings between the internal fire-box and the shell of the boiler may

be varied, as found expedient, according to the quantity of fuel to be burned in a given time, and its character. The air passing through the tubular passages to the fire-box is heated by the surrounding hot water, so that it meets the incandescent fuel in a warm condition, and, if deemed expedient, the heating of the air can be furthered by making the tubes connecting the fire-box and external shell of the boiler of larger diameter than is necessary for the admission of air, and by choking their internal orifices by ferrules or rings, so that while the orifices are sufficient for the delivery of air a larger heating-surface is presented.

The invention claimed in this patent is restricted to a boiler in which the fire-box extends through the shell from end to end thereof, so as to present a large space for the combustion of a bulky fuel—such as straw. With such a fire-box no opportunity is afforded for the application of flues at its end. Hence the flues must necessarily consist of return-flues such as are represented in the drawings, arranged at the sides or top of the fire-box. The form of the cross-section of the boiler may be changed, provided the fire-box extends from end to end of the boiler; and, if deemed best, the products of combustion, after passing from the fire-box through the boiler, may be returned outside of the shell toward the position of the fire-box, an external casing of brick or iron being applied to form a return-flue, extending from the rear end of the boiler as far as the tubular passages for air, and the products of combustion being thence conducted off laterally.

Having thus described our invention, we declare that we are aware that air-passages have been made through the water-spaces of steam-boilers to supply air to the combustible gases, either in the sides of the fire-box above the fuel therein, or in the main flue leading from the fire-box, the bottoms of the fire-boxes being in such cases formed of grates. We therefore do not claim, broadly, air-passages extended transversely of the fire-box of a steam-boiler.

We are also aware that the comparatively short fire-boxes of locomotive-boilers have had their bottoms formed by a water-space which is traversed by transverse air-passages; but in such case the fire-box occupies only a part

of the length of the boiler, and, its internal capacity being comparatively small, is unfitted for the use of a bulky fuel—such as straw. Moreover, the flues in such case were extended directly forward from the end of the fire-box to the distant boiler end, thus taking up the space which in our boiler is occupied by the long fire-box, and the flues become choked very soon by the flying cinders or particles of straw, and require such frequent cleaning as to render the boiler practically inoperative when it is attempted to burn straw or other light bulky fuel in its fire-box, because the burning straw fuel is so near the ends of the flues. We therefore do not claim, broadly, the combination of a fire-box of every kind with an external shell by transverse air-passages; nor do we claim the same in this patent in combination with direct flues extended from one end of the fire-box to the distant boiler end; but reserve the right to claim such combination in a separate patent to be applied for hereafter.

We claim as our invention—

1. The combination, substantially as before set forth, of the external shell of the boiler, the fire-box extended through said shell from end to end of said boiler, and the transverse air-passages extended from said external shell through the bottom of the fire-box, whereby a box of large capacity is obtained for burning a bulky fuel, and the grate is formed by the perforated water-space at the bottom of said fire-box.

2. The combination, substantially as before set forth, of the shell of the boiler, the fire-box extended through from end to end of said boiler, the transverse air-passages extended from the external shell through the bottom of the fire-box, and the return-flues, whereby a fire-box of large capacity is obtained for burning a bulky fuel upon the perforated water-space which closes its bottom and supports said fuel, and the heat is effectually taken up.

In witness we have hereto set our hands this 31st day of May, A. D. 1882.

JOHN OLDHAM.  
BENJAMIN N. PAYNE.

Witnesses:

W. H. WESTBROOK,  
GEORGE HITCHCOCK.