

(No Model.)

2 Sheets—Sheet 1.

E. J. & A. B. DUFF.  
BOILER FURNACE.

No. 573,265.

Patented Dec. 15, 1896.

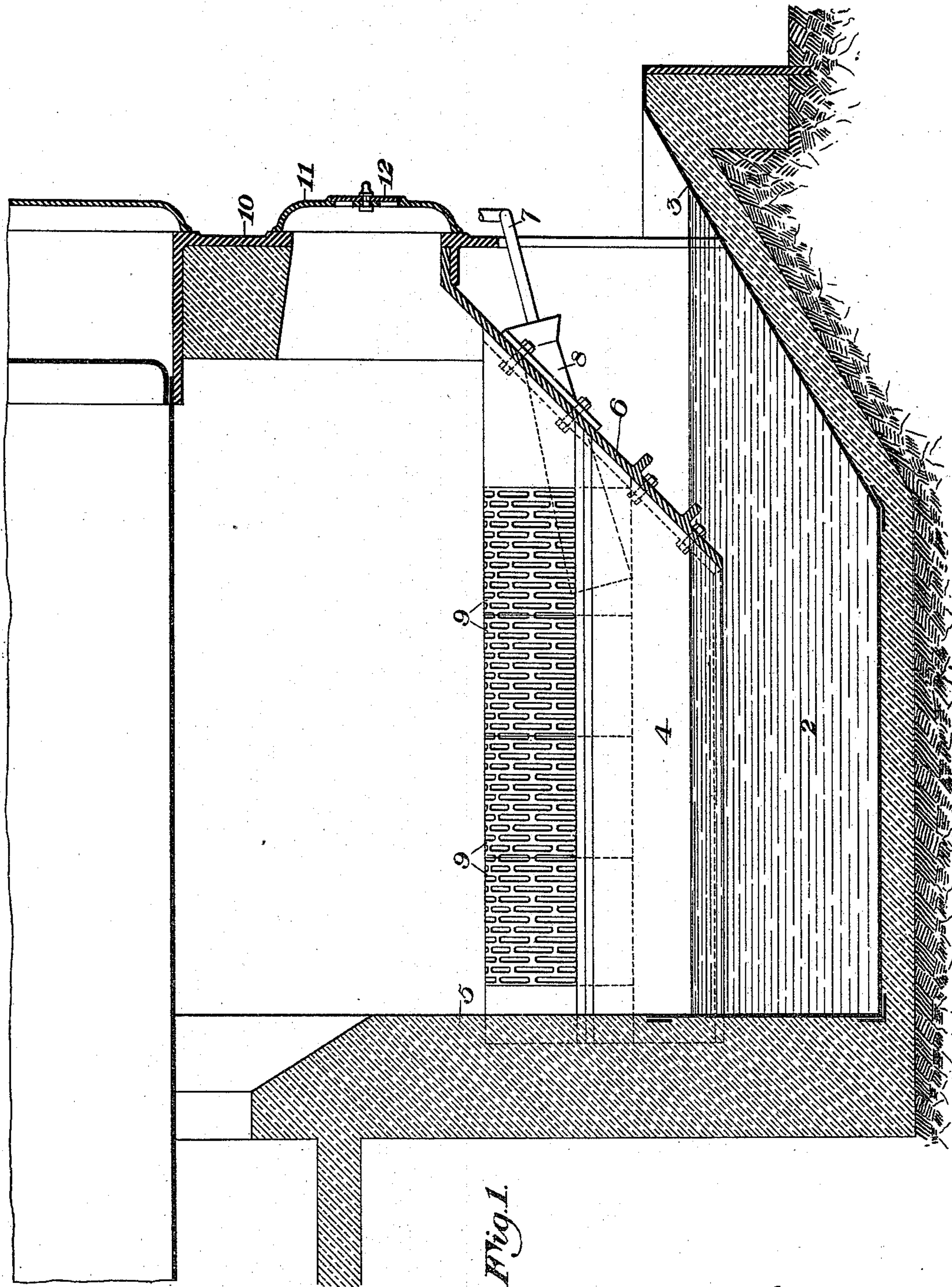


Fig. 1.

WITNESSES

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C. E. MacKown

INVENTORS

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their attys.



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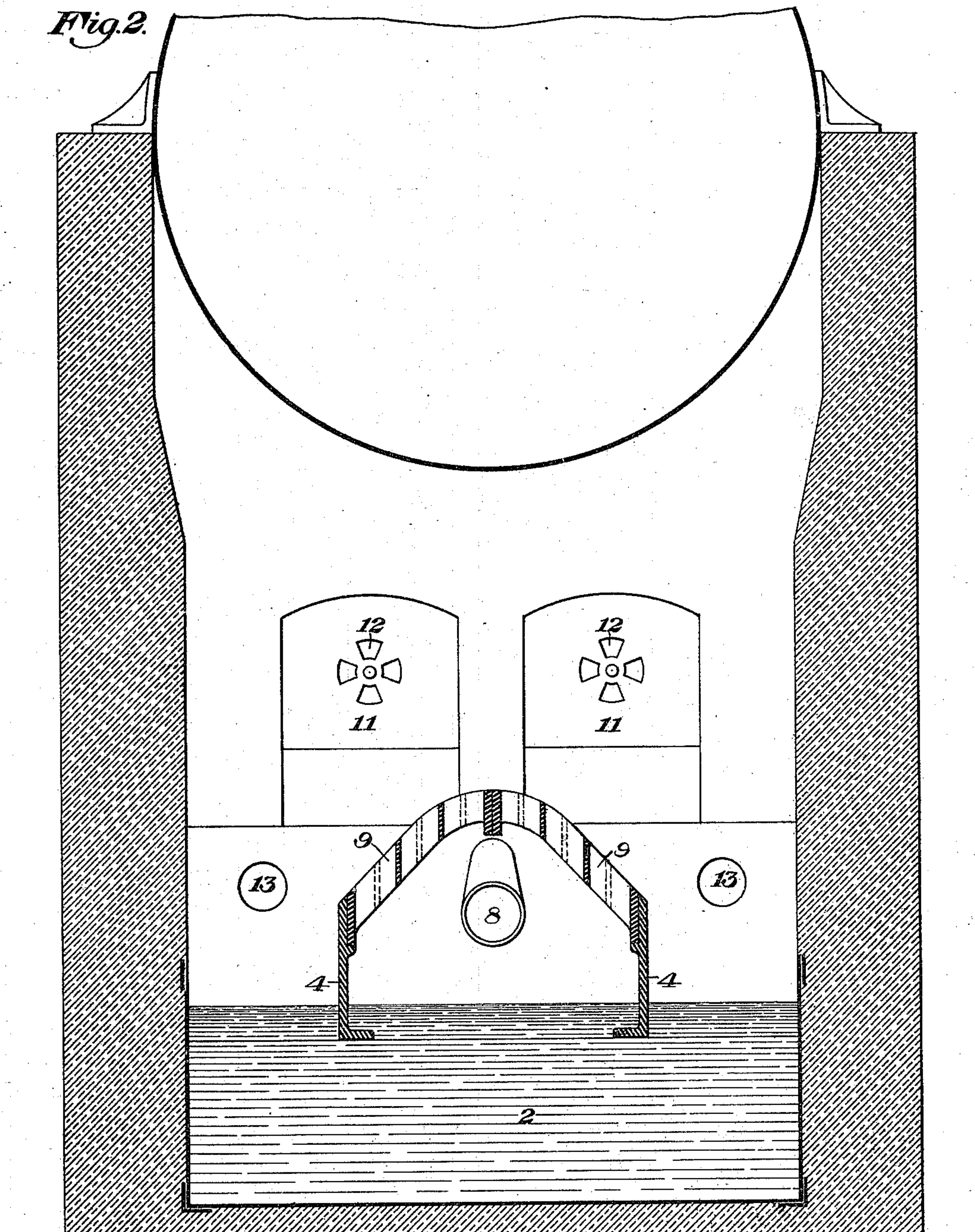
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Fig. 2.



WITNESSES

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# UNITED STATES PATENT OFFICE.

EDWARD JAMES DUFF, OF GLENGARRIFF, NEAR LIVERPOOL, ENGLAND,  
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## BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 573,265, dated December 15, 1896.

Application filed June 30, 1896. Serial No. 597,514. (No model.)

*To all whom it may concern:*

Be it known that we, EDWARD JAMES DUFF, of Glengarriff, Cressington Park, near Liverpool, England, and ALFRED B. DUFF, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Boiler-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal vertical section of the forward portion of a horizontal tubular boiler provided with our improved furnace; and Fig. 2 is a vertical cross-section of the same, looking toward the furnace-front.

Our invention relates to the class of boiler-furnaces, and is designed to provide an inclosed water-sealed grate which will give continuous contact of the hot ashes and the water, will furnish a large amount of gas of uniform quality for combustion, and will prevent the formation of clinkers.

In the drawings, in which similar numerals indicate corresponding parts, 2 represents the ash-pit of the furnace, this consisting of an open pan or trough having an inclined front 3, along which the ashes may be raked out as desired. Extending below the water-level in this trough are two longitudinal side plates 4 4, which at their rear ends extend into and are supported by the bridge-wall 5 and at their front ends are secured to the side flanges of an inclined plate 6. This plate 6, which also extends below the water-level, rests upon a ledge on the front plate of the furnace, and through it projects the air-pipe 7, having the usual steam-injector 8. Upon the side plates 4 4 rest the longitudinal grates 9 9, each consisting of an inclined perforated plate or grating, thus forming a double incline upon which the fuel rests.

It will be observed that the side plates 4 4 are set inwardly some distance from the side walls of the furnace, thus leaving a free space upon each side for the passage of the ashes or residues to the ash-pit, thereby preventing

the formation of clinkers by removing the ashes from the blast.

Above the level of the grates the front plate 10 is provided with two doors 11 11, each having a suitable damper 12 to regulate the amount of air which enters and unites with the gas rising from the fuel upon the grate. The plate 6 and the front plate are provided with suitable registering poker-holes 13 to give access to the fuel upon the grates.

The operation of the furnace is as follows: The air-blast entering through the pipe 7 passes up through the inclined gratings, and, being uniformly distributed throughout the coal, forms the gas, which, rising, unites with the air entering through the doors 11 and burns in the chamber above the grates and beneath the boiler. The ashes descending along the inclined grates fall into the water in the trough 2 and are raked out as desired.

The advantages of our invention result from the regular and automatic removal of the ashes from the grates on account of the inclined position of the grate and the free spaces at its lower end. The water seal prevents escape of gas, while the ashes are easily removed and the operation of the furnace is simple and demands little attention, giving an intense heat. The furnace gives great economy of fuel, and inferior qualities of fuel may be advantageously used therein.

The grate may be inclined in one direction only, if desired, and may slope in another plane, and many other changes may be made in the form and arrangement of parts without departing from our invention, since

We claim—

1. In a boiler-furnace, the combination with a longitudinal water-trough having an inclined front portion, of a shell dipping thereinto, and having an inclined grating, said grating being arranged so as to give a free space at its lower edge for the passage of the residues into the water-trough, an air-pipe leading into the shell below the grating, and air-inlets above the grates; substantially as described.

2. In a boiler-furnace, the combination with  
a longitudinal water-trough having an in-  
clined front portion for the raking out of ashes,  
of a shell dipping thereinto and having a  
5 double inclined grating, a free space being  
formed between the side edges of the grating  
and the walls of the furnace, an air-pipe lead-  
ing into the shell below the grating, and air-  
inlets above the level of the grating; substan-  
10 tially as described.

In testimony whereof we have hereunto set  
our hands.

EDWARD JAMES DUFF.  
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C. BYRNES.