2 Sheets—Sheet 1.

G. H. HOAGLAND.

Fire-Box for Steam-Boilers.

No. 202,819. Patented April 23, 1878.

Fig. 1.

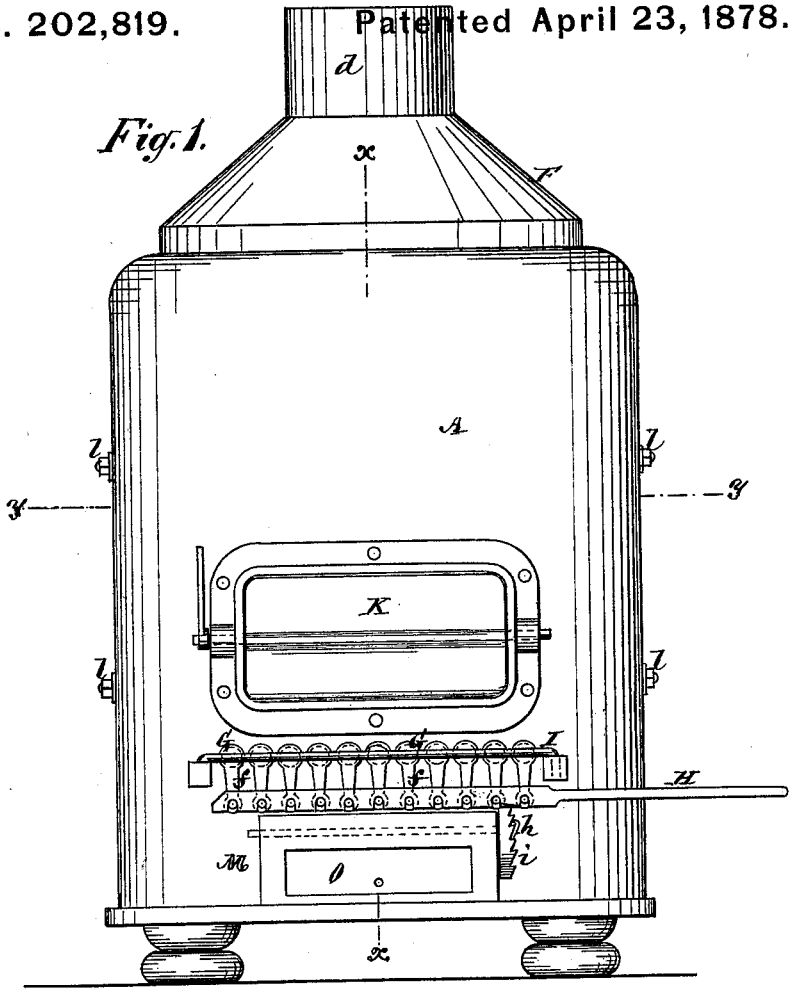


Fig. 4.

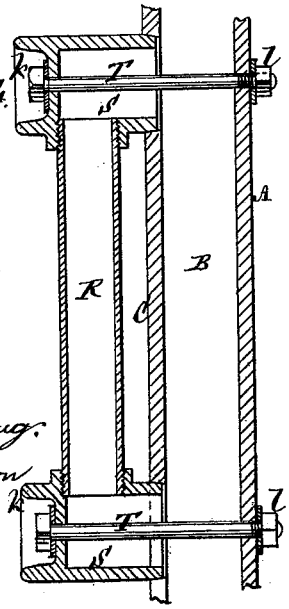


Fig. 5

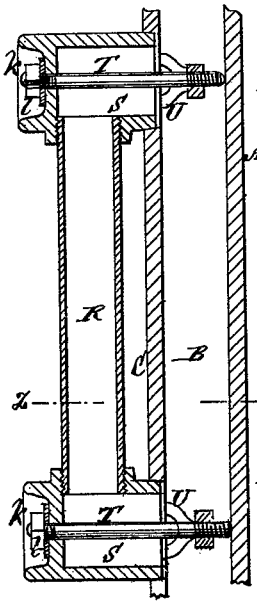
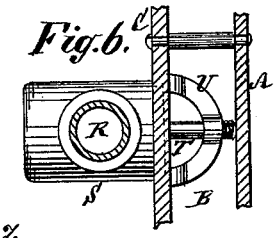


Fig. 6.



Witnesses:
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Henry T. Brown

Inventor:
Geo. H. Hoagland
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Brown & Allen

G. H. HOAGLAND.

Fire-Box for Steam-Boilers.

No. 202,819. Patented April 23, 1878.

Fig. 2.

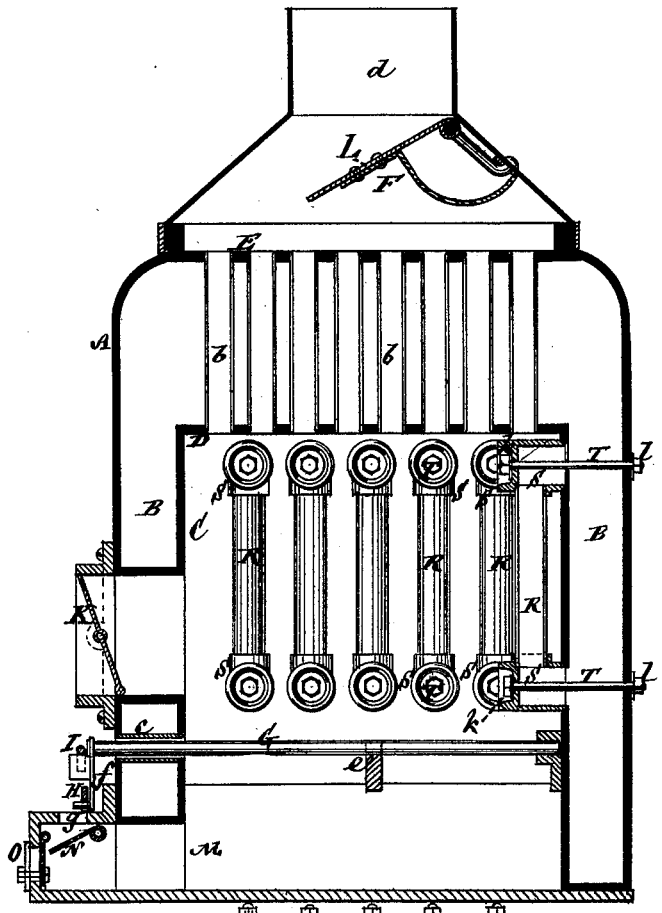
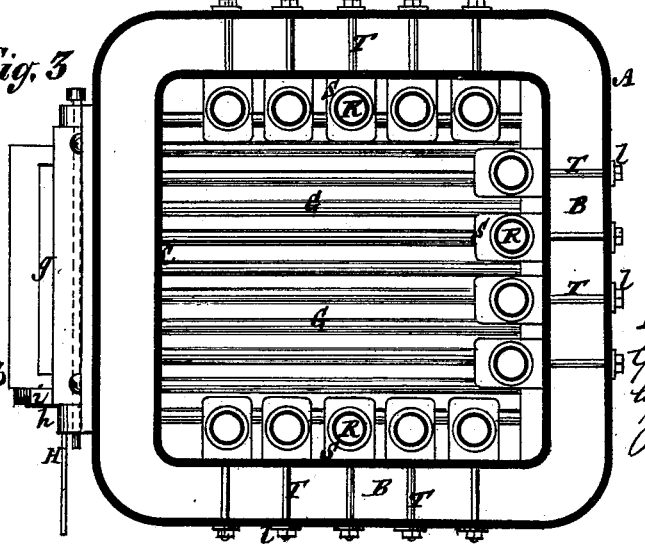


Fig. 3



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UNITED STATES PATENT OFFICE.

GEORGE H. HOAGLAND, OF PORT JERVIS, NEW YORK.

IMPROVEMENT IN FIRE-BOXES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **202,819**, dated April 23, 1878; application filed January 10, 1878.

To all whom it may concern:

Be it known that I, GEORGE H. HOAGLAND, of Port Jervis, in the county of Orange and State of New York, have invented a new and useful Improvement in the Fire-Boxes of Steam-Boilers, of which the following is a description, reference being had to the accompanying drawing, forming part of this specification.

This invention is designed to be applied to boilers of various kinds, including boilers for both locomotive and stationary engines, and boilers for heating cars, buildings, and other purposes.

The invention generally consists in a novel construction and mode of attaching lining-tubes to the fire-boxes of boilers, whereby not only an increased amount of heating-surface is obtained, and, in the application of said tubes to the fire-boxes of locomotive-engine boilers, the sheets of said boxes are protected from burning out, but enlarged facilities are afforded for attaching and securing the lining-tubes to their places, free from leakage, and for separately removing said tubes to replace them by others, when necessary, also whereby the fastenings themselves are protected from exposure to the fire, and, by the water circulating within the tubes, from excessive or injurious heat.

The drawing, from Figure 1 to Fig. 4, inclusive, illustrates the invention as applied to a boiler for heating railway-cars; and Figs. 5 and 6 show the invention as applied to the one side, in part, of a fire-box for locomotive-engine boilers.

Fig. 1 is a front view of a car-heater having the invention applied. Fig. 2 is a vertical section thereof on the line *x x;* Fig. 3, a horizontal section of the same on the line *y y;* and Fig. 4, a longitudinal sectional view, upon a larger scale, of one of the lining-tubes of the fire-box detached. Fig. 5 is a vertical section through one side of the fire-box of a boiler for locomotive-engines with the invention applied, and Fig. 6 a horizontal section thereof on the line *z z.*

Referring, in the first instance, to the several figures from 1 to 4, inclusive, A is the outer case or shell of the boiler or heater, constructed to leave a water-space, B, around the fire-box C, and extending both above and below said fire-box. D is the perforated crown-sheet of the fire-box, connected by smoke tubes or flues *b* with a correspondingly-perforated upper sheet, E, at the base of the smoke box or chamber F, with the outlet *d* of which the chimney or draft-pipe connects.

G G are the grate-bars, which are independently fitted to their places, and capable of independent removal when necessary. These bars are entered through tubes *c* in the front water-space of the boiler, and, passing over or through a guide-bridge, *e*, rest at their inner ends within cavities in the back of the fire-box. Said bars may be independently drawn out, either as far as the bridge *e* or beyond it, to relieve the fire of clinkers, and may be rocked collectively to free the fire by means of a reciprocating bar, H, constructed to engage with cranks *f* on the forward ends of the grate-bars, which latter are kept in their places, or restrained from being accidentally or improperly drawn out, by a removable locking-bar, I.

K is the fire-door, which is made self-closing either by weight or spring, so that, in case of the upsetting of the car in which the heater is arranged, the burning fuel will be prevented from scattering about the car. The smoke-box F is also provided with a damper or valve, L, that, in case of the car being inverted, will close the outlet *d;* and the draft-inlet *g* to the fire-box through the ash-pit M is similarly provided with a valve or damper, N, capable of adjustment by means of a spring-lever, *h*, and fixed toothed catch *i*, to hold said damper in any desired open position, but rendered self-closing in case of the upsetting of the car. The ash-pit M is also provided with a lid or door, O, in front, which is permanently closed except when it is required to remove the ashes.

One or more steam-pipes may be attached to the boiler or heater, for conducting the steam to and through the car or several cars in the train.

The interior of the fire-box C is lined with a series of upright tubes, R, which are formed with elbows S, of a T shape or construction at their opposite ends. The outer end of each of these elbows is constructed to form a cone-joint with the fire-box sheet; and the opposite or inner end of said elbows is constructed with a countersink or recess, *k*, for the head of the bolt T, and a packing-ring or washer used to secure the tubes R to their places, said bolts T passing through said elbows S, and, through

the water-space B of the heater, to and through the outer shell or case A, where they are secured on the outer side by nuts *l*. The insertion of the heads of the bolts T in the countersink *k* of the inner ends of the elbows protects said heads, by the filling of the countersinks with dust or ashes, from injury by the fire, while the bolts themselves are protected by the circulation of the water in the elbows, and by their passage through the water-space of the boiler. Furthermore, the T form of the elbows provides for the gases of combustion playing wholly around the tubes, thus very materially adding to the heating-surface of the boiler; and said tubes, which do not require to be screwed to their places, may readily and independently be attached or detached, as required.

To apply the invention to boilers of locomotive-engines in which it is not convenient or practicable to run the fastening-bolts T through the water shell or case of the fire-box, (see Figs. 5 and 6,) the elbow-shaped lining-tubes are secured by screwing or securing said bolts at their outer ends within or to bridges U in the water-space B or jacket of the fire-box, and applying the tightening-nuts *l* to said bolts within the countersinks or cavities *k* of the elbows of the tubes.

I claim—

1. The combination, with the fire-box of a steam boiler or heater having a surrounding or inclosing water space or chambers, of lining-tubes, constructed with elbows at their opposite ends, for establishing communication with said water-space, and bolts or fastenings for said tubes, arranged to pass through said elbows, and protected by the water circulating through the elbows and water-space with which said elbows connect, substantially as specified.

2. The lining-tubes R, having T-shaped elbows S at their opposite ends, and constructed with countersinks *k* on the inner ends of said elbows, in combination with the fastening-bolts T, for application to fire-boxes having water-jackets, essentially as described.

In testimony whereof I hereunto sign my name in the presence of two subscribing witnesses.

GEO. H. HOAGLAND.

Witnesses:
HENRY T. BROWN,
VERNON H. HARRIS.