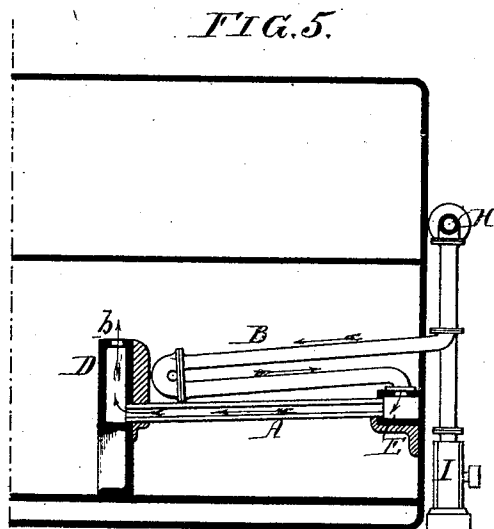
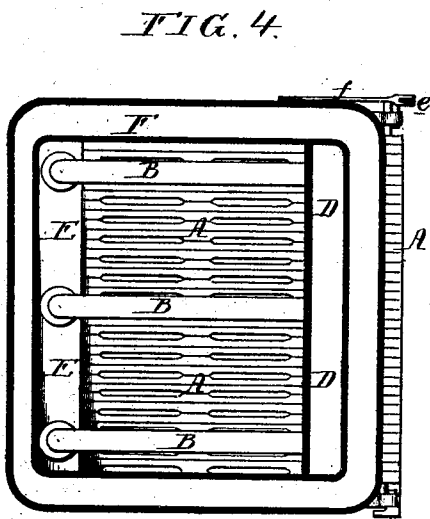
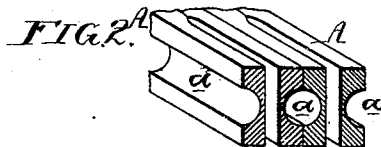
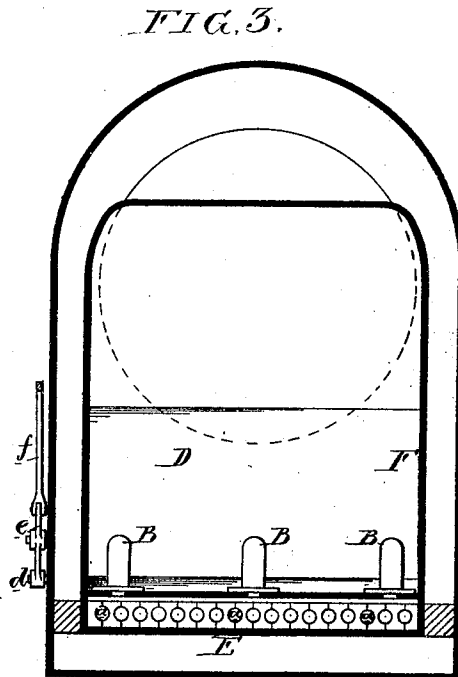
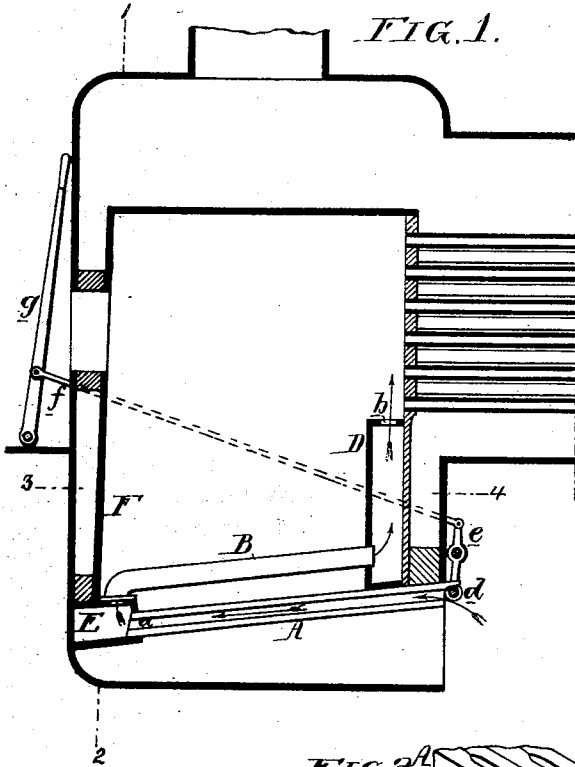


W. R. W. SMITH.
Smoke-Consuming Apparatus.

No. 145,022.

Patented Nov. 25, 1873.



Witnesses, Hubert Hovson,
Harry Smith

William R. W. Smith
By his Attys,
Hovson and Son.

UNITED STATES PATENT OFFICE.

WILLIAM RAE WILSON SMITH, OF GLASGOW, NORTH BRITAIN.

IMPROVEMENT IN SMOKE-CONSUMING APPARATUS.

Specification forming part of Letters Patent No. **145,022**, dated November 25, 1873; application filed November 7, 1873.

To all whom it may concern:

Be it known that I, WILLIAM RAE WILSON SMITH, of Glasgow, in the county of Lanark, North Britain, have invented an Improved Smoke-Consuming Apparatus, of which the following is a specification:

The object of my invention is to consume the smoke in locomotives, and other fire-boxes or furnaces, by mixing it with air or steam, or both, superheated by being passed through hollow grate-bars A, tubes B, and a hollow bridge, D, which are arranged within the fire-box or furnace, as fully described hereafter, and as illustrated in the sectional elevation, Figure 1, of the accompanying drawing.

Each of the grate-bars A is cast with longitudinal grooves in its opposite edges, so that when the said bars are grouped together there will be a series of channels or passage, *a*, between them, as best observed in the sectional perspective view, Fig. 2, and transverse section, Fig. 3, on the line 1 2, Fig. 1. These passages *a* are open to the external air at their rear ends, but communicate at their front ends with a chamber, E, which extends transversely across the fire-box F, as shown in Fig. 3, and in the sectional plan, Fig. 4, on the line 3 4, Fig. 1. Each of the tubes B, of which there are three in the present instance, communicates at its front end with the chamber E, and at its rear end with the hollow bridge H, which has outlet-openings *b* at the top. I prefer to construct this bridge of fire-brick, although metal may be used.

The tubes B may be either above the grate-bars, as shown, or in line with the same, and arranged in any suitable manner, either horizontally or inclined.

The air enters the rear open ends of the hollow grate-bars A, and passes through them, as indicated by the arrows, into the chamber E, whence it passes through the tubes B into the hollow bridge D, and, after circulating within the latter, emerges from the openings *b* in a highly-heated state, and by mingling with the smoke and other products of combustion effectually consumes the same.

The hollow grate-bars may have air forced

into and through them by a fan, or otherwise; or steam, to be superheated in its passage, or mixed air and steam, may be forced through the said hollow bars and tubes B.

In the present instance the grate-bars are supported at their rear ends by a transverse rod, *d*, secured at its opposite extremities to two levers, *e*, one of which is connected by a link, *f*, to a lever, *g*, having its fulcrum on the foot-plate of the engine, the object of which arrangement is to permit the hollow grate-bars to be easily and quickly "dropped" as under existing systems of carrying grate-bars.

My invention is not only applicable to locomotive fire-boxes, but may be used with advantage in fire-boxes and furnaces generally, for effecting a thorough consumption of the smoke and other products of combustion. In Fig. 5, for instance, my invention is illustrated as applied to an ordinary horizontal boiler, and the arrangement of the parts is somewhat modified, the hollow grate-bars, instead of the tubes B, forming the mediums of communication between the chamber E and hollow bridge D, while the said tubes B have a return bend within the furnace above the bars. The direction of the currents is also reversed, the air or steam, in this instance, first passing through the tubes B, into all of which it is forced by a connecting-tube, H, communicating with a fan, I.

I claim as my invention—

1. A smoke-consuming apparatus in which hollow grate-bars A, air or steam tubes B, and a hollow bridge, D, having outlet-openings *b*, are combined and applied to a fire-box or furnace, substantially as herein described.

2. The air or steam passages *a*, formed between adjoining grate-bars by longitudinal grooves in the edges of the same, as set forth.

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

WILLIAM RAE WILSON SMITH. [L. s.]

Witnesses:

EDWARD FISHER BAMBER,
JOHN CAMPBELL MACANDIE.