(No Model.)

G. S. STRONG.

LOCOMOTIVE BOILER.

No. 261,783. Patented July 25, 1882.

FIG. 1.

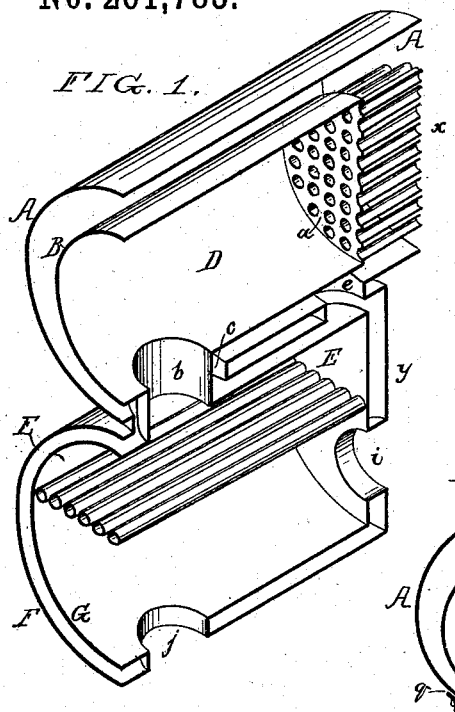


FIG. 5.

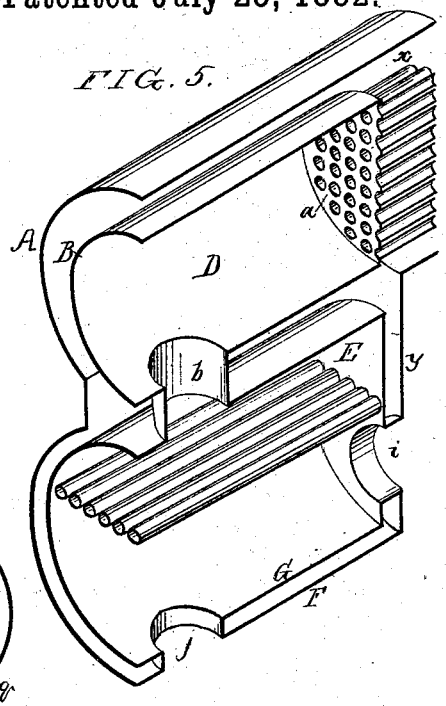


FIG. 6.

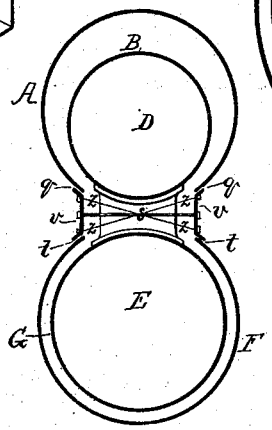


FIG. 2.

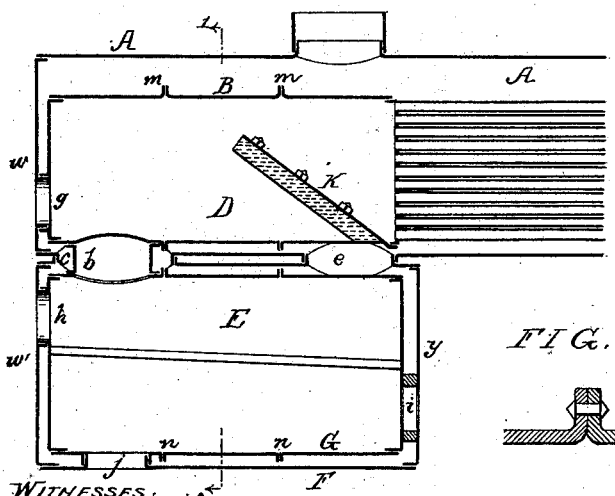
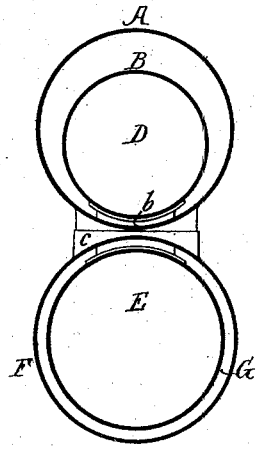


FIG. 4.

FIG. 3



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UNITED STATES PATENT OFFICE.

GEORGE S. STRONG, OF PHILADELPHIA, PENNSYLVANIA.

LOCOMOTIVE-BOILER.

SPECIFICATION forming part of Letters Patent No. 261,783, dated July 25, 1882.

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

To all whom it may concern:

Be it known that I, GEORGE S. STRONG, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Locomotive-Boilers, of which the following is a specification.

My invention relates to improvements in steam-boilers of the locomotive type; and the main object of my invention is to discard the ordinary fire-box and its crown-bars and to substitute therefor the structure described hereinafter, by which the greatest strength is obtained by the least amount of metal.

In the accompanying drawings, Figure 1 is a sectional perspective view of a portion of the improved steam-boiler; Fig. 2, a vertical section; Fig. 3, a section on the line 1 2, Fig. 2; Fig. 4, an enlarged view, showing the detailed construction of parts of the invention; and Figs. 5 and 6 views illustrating a modification of my invention.

A general preliminary understanding of my invention may be most readily acquired by reference to the sectional perspective view, Fig. 1, in which A is the outer cylindrical shell or barrel of the boiler, the fire-box end of this shell containing a cylindrical casing, B, which terminates in a tube-sheet, *a*, the usual tubes, *x*, extending from the latter to the tube-sheet near the front or smoke-box end of the boiler, which is not shown in the drawings, as it may be similar to those of ordinary locomotive-boilers. The space within the casing B, I term the "combustion-chamber" D, below which is the fire-chamber E, formed by the outer cylindrical shell, F, and the inner cylindrical casing, G, containing the grate. This inner casing, G, is connected to the casing B of the combustion-chamber by a short tube, *b*, through which the products of combustion pass, a short tube, *c*, concentric with the tube *b*, connecting the outer shells, A and F together, there being a water-space between the two short tubes. There is also a tubular connection, *e*, between the two outer shells, and there may be as many of these connections forming communications between the two chambers for the passage of the products of combustion or forming communications between the water-spaces of the two chambers as the length of these chambers and other circumstances may suggest; but in steam-boilers of the ordinary size one communication for the passage of the products of combustion and two water-communications situated in the positions shown will suffice.

It will be seen that the communication *b* for the passage of the products of combustion from the fire-chamber to the combustion-chamber is near the firing end of the boiler—a feature which I consider important, as it promotes the thorough combustion of the gases.

By thus discarding the usual quadrangular fire box of a locomotive, continuing the barrel or cylindrical shell to the extreme rear of the boiler, forming within the rear portion of this shell a combustion-chamber, and suspending therefrom another cylindrical shell containing a cylindrical casing, within which is the fire-chamber communicating with the said combustion-chamber, I obtain a fire-box structure which, owing to the cylindrical form of the shells and casings of which it is composed, possesses the maximum of strength with the least amount of metal, for the heavy and expensive crown-bars necessary for flat-top fire-boxes are dispensed with and the well-known evils due to these bars obviated.

The usual stays which cross the water-spaces on the opposite sides of ordinary fire-boxes of locomotive-boilers are also rendered unnecessary; and it will be seen on reference to the vertical section, Fig. 2, that the flat rears *w w'* and the flat front *y* only of the fire-box structure require stays across the water-spaces.

While these prominent advantages are attained by my invention, there is every opportunity for a free circulation of water throughout the water-spaces between the inner casings and outer shells of the structure.

The boiler is necessarily much less expensive than ordinary locomotive-boilers. At the same time there will be no diminution in the extent of effective heating-surface.

There is an opening, *g*, into the combustion-chamber, a fuel-opening, *h*, into the fire-chamber, and the latter is provided with an air-opening, *i*, and ash-pit opening *j*, all these openings being provided with suitable doors.

I prefer to build a deflector, *k*, in the combustion-chamber D for the purpose of insuring a more even distribution of the products of combustion to the different tubes *x*, and also

for insuring the ignition of the gases by contact with the deflector, which becomes very highly heated. I also prefer to make the inner casings of both chambers in flanged sections, so that the flanges may add strength to the said casings. The inner casing of the combustion-chamber is, for instance, made in three sections, each having an annular flange, the flanges of adjoining sections being riveted together at *m m*, Fig. 2, these flanges being more clearly indicated in Fig. 4. The inner casing of the fire-chamber is also made in three sections, united by flanges and rivets at *n n*.

In the modifications shown in Figs. 5 and 6 the outer shell, A, of the combustion-chamber, while essentially cylindrical, is not in the form of a continuous cylinder, the continuity being interrupted at *q q*, Fig. 6. In the same manner the continuity of the outer cylindrical shell, F, of the fire-chamber is interrupted at *t t*, and the two casings are connected together by plates *v v*.

In referring hereinafter to shells and casings as being "cylindrical" I wish it to be understood that the term applies both to continuous cylinders and cylinders the continuity of which is interrupted.

While an extended water-space is afforded between the two inner casings by the mode of construction shown in Figs. 5 and 6, the adoption of the flat plates *v v* will involve the necessity of employing stays *s* and *z* between the flat side plates at frequent intervals throughout the length of the chambers.

I claim as my invention—

1. The combination of the tubed barrel of a locomotive-boiler with a fire-box structure consisting of two outer cylindrical shells, one above the other, two inner cylindrical and communicating casings, one for each shell, the upper inner casing forming a combustion-chamber and the lower inner casing a fire-chamber, all substantially as set forth.

2. The combination, in a locomotive-boiler, of the cylindrical shell or barrel A, containing the usual horizontal tubes, *x*, and continued to the rear of the boiler, and the inner cylindrical casing, D, forming a combustion-chamber and terminating in the tube-sheet *a*, with the outer cylindrical shell, F, and the inner cylindrical casing, G, forming the fire-chamber, and with connections between the two outer shells and two inner casings, all substantially as described.

3. The combination of the upper cylindrical shell and casing, within which is the combustion-chamber, and the lower cylindrical shell and casing, within which is the fire-chamber, with the connection *b*, situated near the firing end of the structure, and forming the sole communication for the passage of the products of combustion from the lower to the upper chamber, substantially as set forth.

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

GEO. S. STRONG.

Witnesses:
HARRY DRURY,
HARRY SMITH.