(No Model.)

F. LUDWIG.

BOILER.

No. 403,599. Patented May 21, 1889.

Fig. 1.

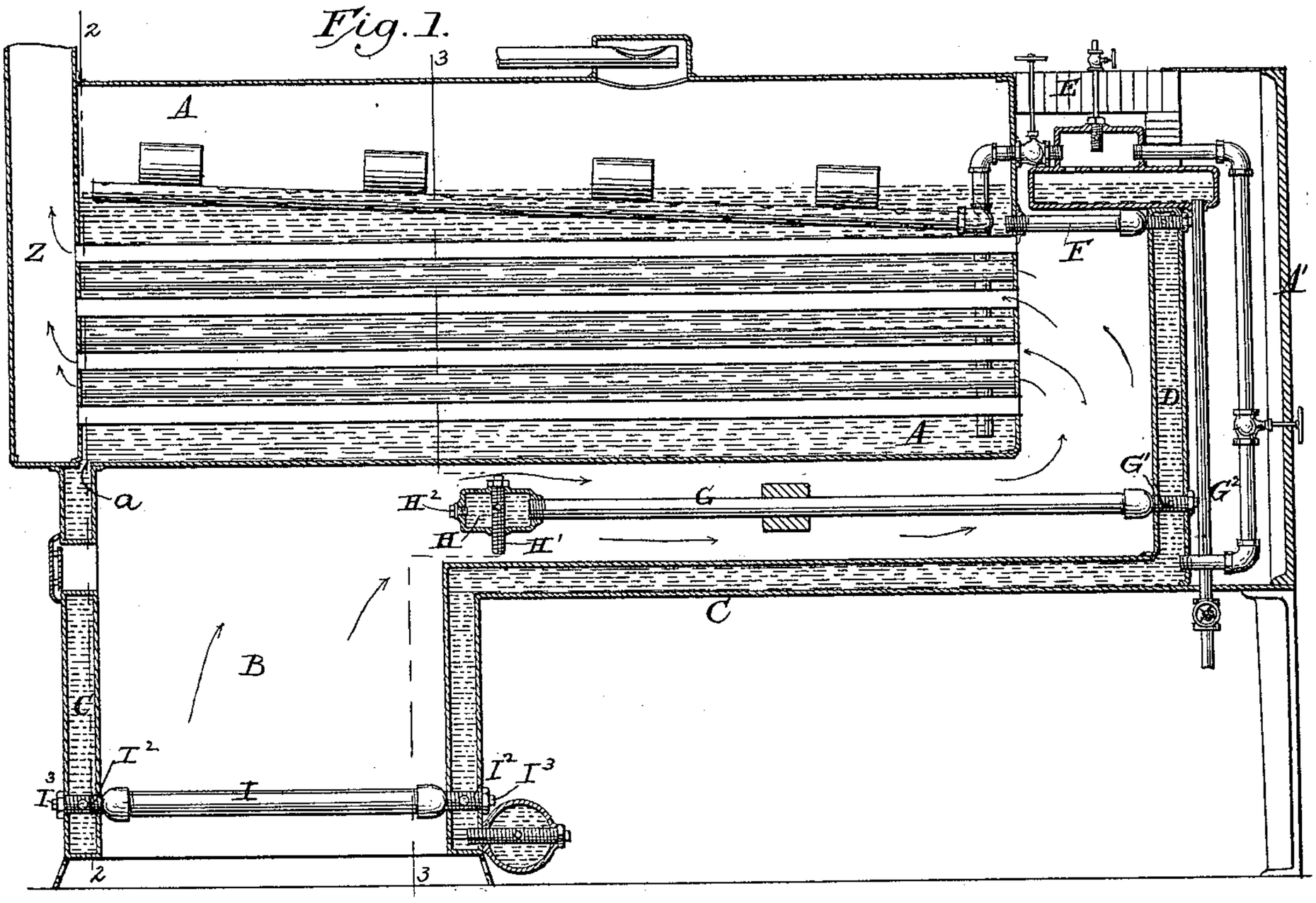


Fig. 2.

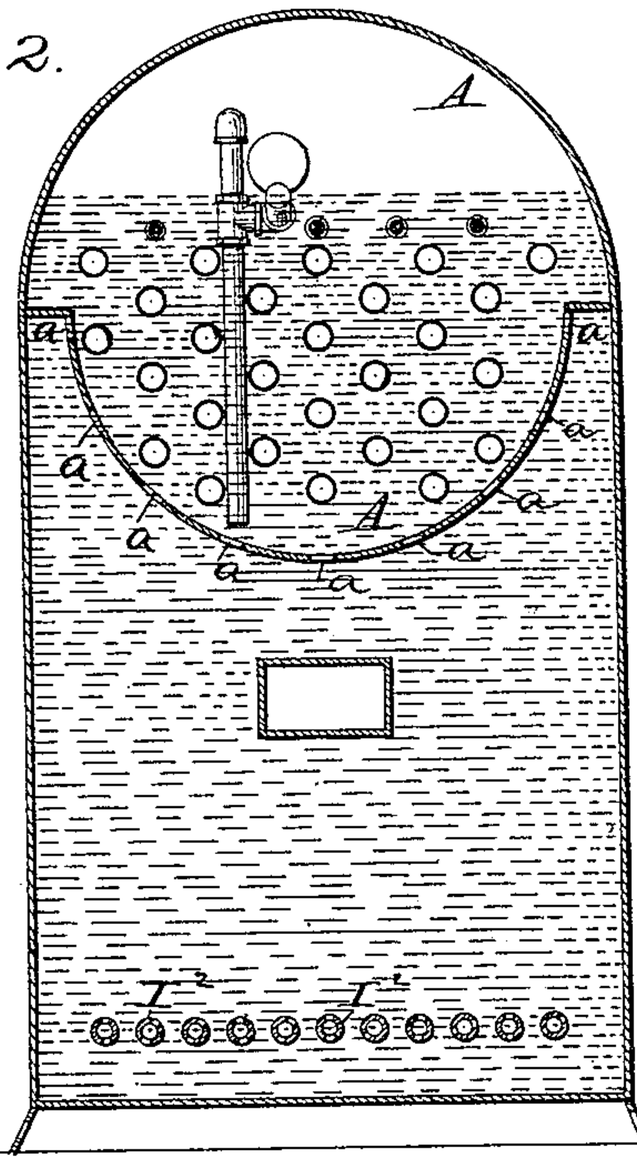
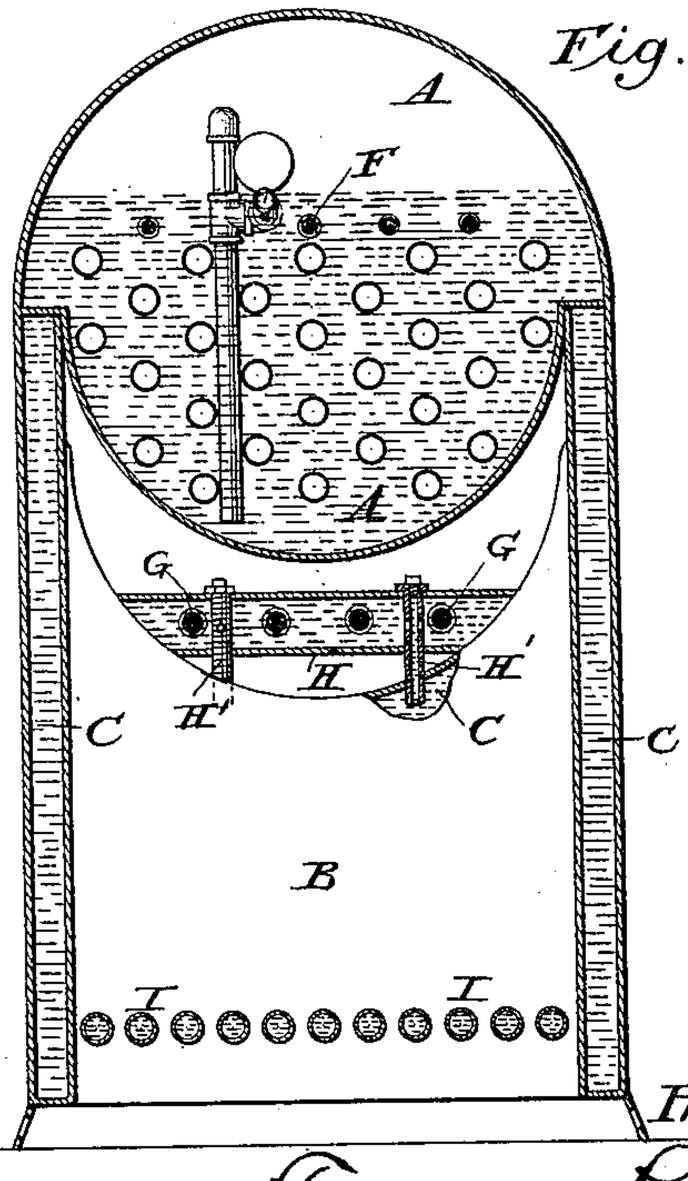


Fig. 3.



Attest:

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UNITED STATES PATENT OFFICE.

FREDERICK LUDWIG, OF GLENCOE, MINNESOTA.

BOILER.

SPECIFICATION forming part of Letters Patent No. 403,599, dated May 21, 1889.

Application filed August 30, 1888. Serial No. 284,127. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK LUDWIG, of Glencoe, in the county of McLeod and State of Minnesota, have invented certain new and useful Improvements in Boilers, of which the following is a specification.

My invention relates to boilers designed more particularly for use upon locomotives, and has reference to a novel construction of the boiler itself, all as hereinafter set forth and claimed.

The boiler in its general plan resembles that for which Letters Patent No. 372,422 were granted to me, bearing date November 1, 1887.

In the drawings, Figure 1 is a longitudinal sectional view through my improved boiler; Fig. 2, a vertical sectional view on the line 2 2; Fig. 3, a similar view on the line 3 3.

A indicates the boiler proper, B the fire-box or chamber, and C the U-shaped shell partially surrounding the boiler, as shown. This shell C is riveted to the boiler A, and its front is set somewhat in advance of the front of the former, as shown in Fig. 1, so as to form an opening, *a*, by means of which water may pass from the boiler into the shell. The shell C extends in rear of the boiler, and its end is turned upward to form an upright water-chamber, D, which latter forms the rear end of the smoke-chamber, as shown in Fig. 1, while a fire-brick covering, E, closes the upper side of the said smoke-chamber. From this construction it will be seen that the smoke-chamber is surrounded on nearly all sides by a water-chamber, and consequently all of the heat will be utilized. The upright water-chamber D is connected at its upper end, above the upper row of flues, with the boiler A by means of a number of pipes, F, which, instead of extending transversely across the smoke-chamber, as in my former patent, extend longitudinally thereof, as shown in Fig. 1. The construction of the hollow threaded-bolts, by which the tubes or pipes are connected with the shell C, is substantially the same as in my former patent, to which reference is hereby made.

To further utilize the products of combustion and to expose the greatest amount of surface to the heat, I place within the horizontal portion of the smoke-chamber a series of pipes, G, connected at their rear ends, by means of hollow bolts G′, with the lower end of the upright water-chamber D, and screwing at their forward ends into a hollow box or chamber, H, as shown in Figs. 1 and 3. This hollow box or chamber H is secured to the shell C by means of hollow bolts H′, as shown in Figs. 1 and 3, which bolts permit the water to pass from the shell into the hollow box, or vice versa.

Directly opposite the ends of the pipes G the box H is provided with removable plugs H^2, so that by removing them and the plugs G^2 in the ends of the hollow bolts G′ the pipes may be cleaned.

In order to further utilize the heat, the grate-bars I will be made hollow and arranged to communicate with the hollow walls of the fire-box by means of hollow bolts I^2, and to permit of the ready cleaning of the bars I the bolts I^2 will be provided with plugs I^3, by removing which access may be had to the interior of the grate-bars, as shown in Fig. 1.

The construction herein shown and described is designed more particularly for locomotives.

Having thus described my invention, what I claim is—

1. In combination with the boiler A and the shell C, provided with the upturned end D, a box, H, placed between the boiler and shell and connected with the latter by means of hollow bolts H′, and pipes G, connected at opposite ends with the parts D and H.

2. In combination with the boiler A and the shell C, provided with an upturned end, D, a box, H, connected with the shell by hollow bolts H′, pipes G, connected with the box H and end D, and plugs G^2 and H^2, having removable plugs and arranged in line with the pipes.

In witness whereof I hereunto set my hand in the presence of two witnesses.

FREDERICK LUDWIG.

Witnesses:

JOHN LUITEN,

WILHELM GROSS.