G. M. KRAFT.

STEAM BOILER.

No. 187,869. Patented Feb. 27, 1877.

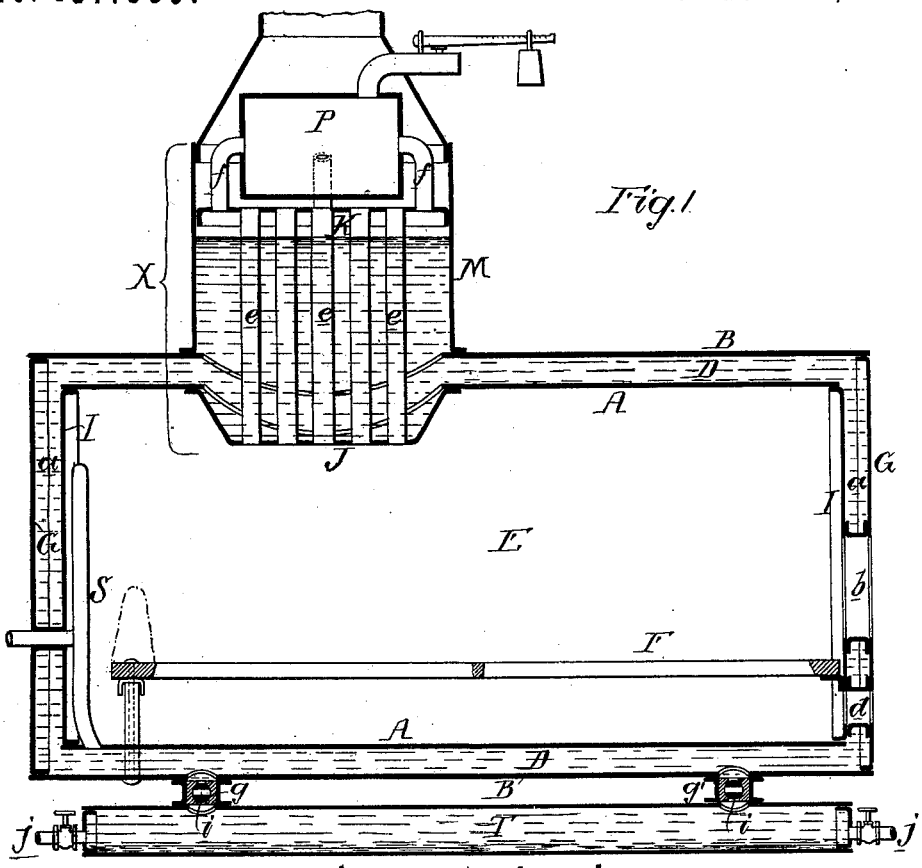

Fig. 1

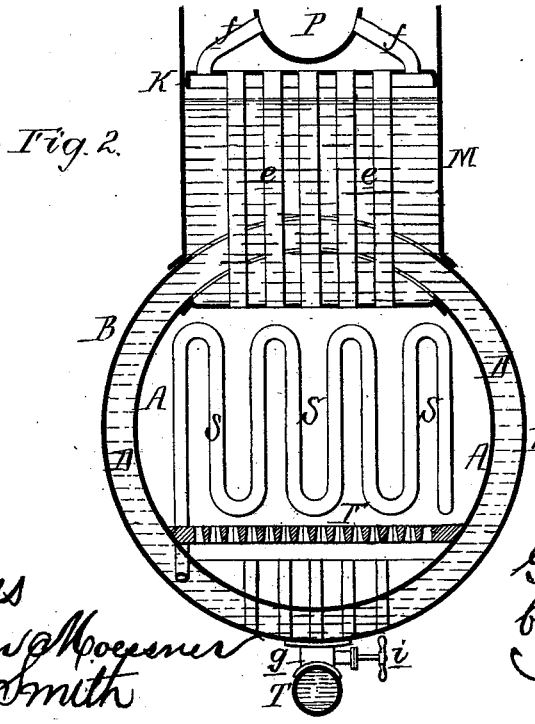

Fig. 2

Witnesses
Hymann & Mocsner
Harry Smith

George M. Kraft
by his Attorneys.
Howson and Sons

UNITED STATES PATENT OFFICE.

GEORGE M. KRAFT, OF EVANSVILLE, INDIANA.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **187,869**, dated February 27, 1877; application filed December 16, 1876.

To all whom it may concern:

Be it known that I, GEORGE MICHAEL KRAFT, of Evansville, Indiana, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification:

The object of my invention is to so construct a steam-boiler that it will have an extended heating-surface, and can be readily and thoroughly cleansed; and this object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a longitudinal vertical section of my improved steam-boiler, and Fig. 2 a transverse section of the same.

The main shell of the boiler consists of two cylindrical casings, A and B, the two casings inclosing between them an annular space, D, and the inner casing A inclosing a chamber, E, in which is arranged the fire-grate F.

In practice the casings A and B should be braced laterally by suitable stay-bolts, which it has not been deemed necessary to show in the drawing.

The outer cylinder B is closed at each end by a head, G, and the inner cylinder by a head, I, so as to form at each end of the boiler a water-space, *a*, communicating with the annular space D, the space *a* at the front of the boiler being broken by the fire-door *b* and ash-door *d*. Both of the casings A and B are cut away at the top, near the rear end, and surrounding the opening of the casing A, within the chamber E, is a dished plate, *g*, forming a tube-sheet, from which extend upward tubes *e*, adapted at their upper ends to a tube-sheet, K, fitted within an upright cylindrical casing, M, the lower end of which surrounds the opening in the casing B, to which it is secured, the casing M, tube-sheets, and tubes thus forming an upright tubular boiler, X. The casing M is contracted at the upper end, and communicates with the chimney or stack; and in the upper portion of the casing, above the tube-sheet K, is arranged a steam-drum, P, which communicates with the steam-space of the boiler through bent tubes *f*, the latter also serving to support the said drum clear of the tube-sheets. At the rear of the chamber E, and beyond the rear end of the grate, is a bent tube, S, one end of which communicates with the water-space of the boiler at the lower portion of the same, while its opposite end extends through the end of the boiler, and is connected to the usual feed-water force-pump. The heat from the burning fuel on the grate impinges upon this tube, and imparts a high degree of heat to the feed-water, which passes through the same before it enters the boiler.

A mud-drum, T, extends the entire length of the boiler, and communicates with the lower portion of the same, near each end, through branches *g* and *g'*, each provided with a valve, *i*. Each end of the mud-drum is also provided with a blow-off valve, *j*.

Owing to the comparative coolness of the water in that portion of the annular boiler beneath the grate F, the sediment will have a tendency to collect at this point, from which it may be removed by first opening the valve *i* in the branch *g* and the valve *j* at the opposite end of the drum, until one end of the boiler has been cleaned, and then repeating the operation at the other end until the mud is removed from this end also. In this way the current is caused to pass through the mud-drum from end to end, and the collection of sediment in the center of the same is effectually prevented, thus overcoming an objection to which the mud-drum is liable, owing to its unusual length, caused by the peculiar character of the boiler.

By dishing the lower tube-sheet J not only am I enabled to considerably increase the water capacity of the boiler, but the dished plate, extending down into the combustion-chamber, presents an extended surface for the action of the products of combustion.

Instead of making both heads of the boiler double, as shown, the rear end only may be made double, the front of the boiler consisting of a single cast-iron plate; or both heads may be made in this way, in order to reduce the weight of the boiler.

If desired, a bridge-wall (shown by the dotted lines) may be arranged at the rear end of the grate F, in order to permit the fuel to be banked up on the grate at this end.

I claim as my invention—

1. The combination, in a steam-boiler, of

the horizontal casings A and B, the opposite heads G G, the upright casing M, the combustion-chamber E and its grate F, the dished tube-sheet J within the combustion-chamber, the tubes *e*, and the tube-sheet K within the casing M, as set forth.

2. The combination of a boiler of the character described with the mud-drum T, its connections *g g'*, having valves *i*, and the cocks *j j* at opposite ends of the drum, as set forth.

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

GEORGE MICHAEL KRAFT.

Witnesses:

A. C. ANCONA,

WILLIAM LINTHWAITE.