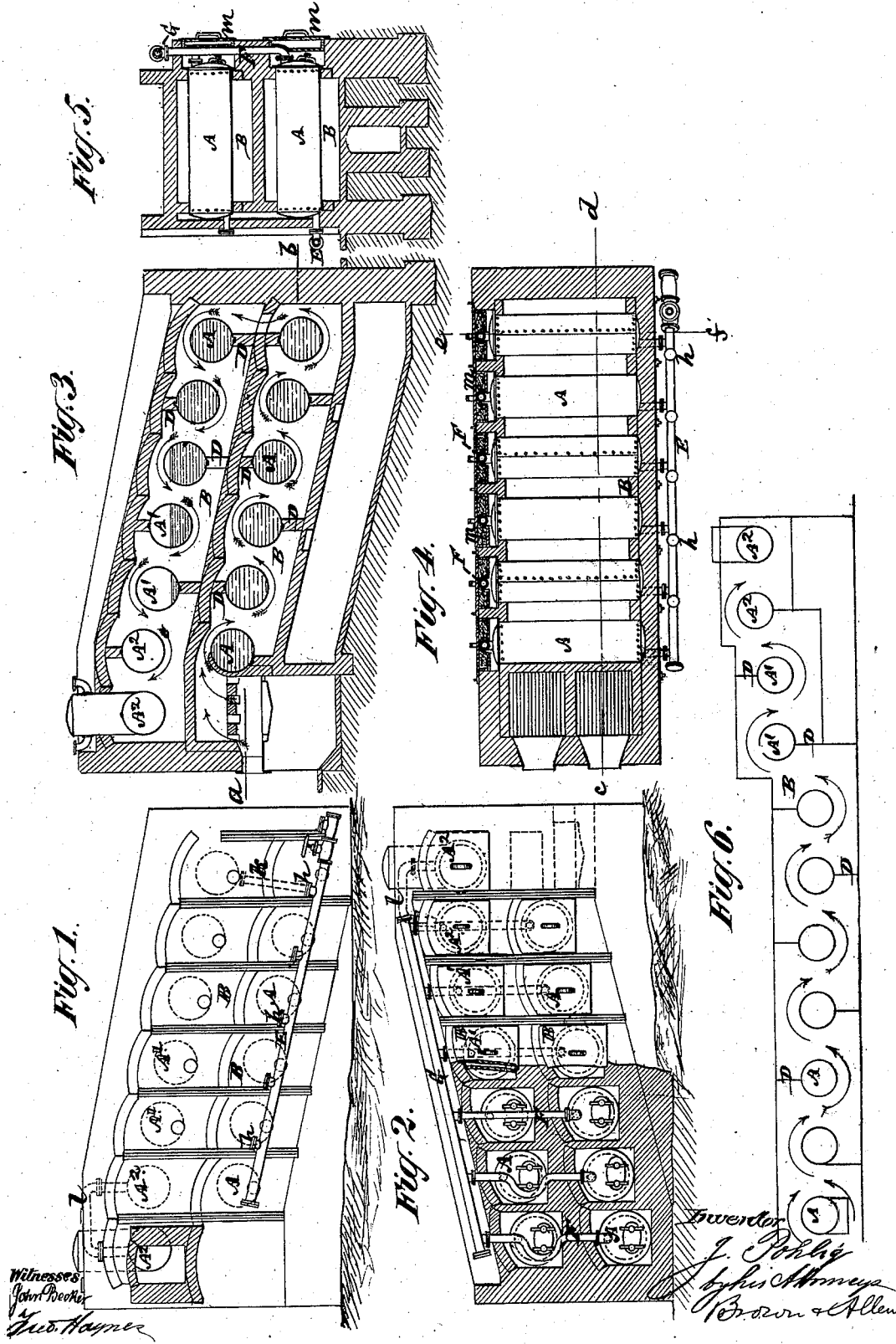


J. POHLIG.
 Steam-Boiler Furnace.

No. 197,894.

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JULIUS POHLIG, OF SIEGEN, PRUSSIA.

IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **197,894**, dated December 4, 1877; application filed May 1, 1877.

To all whom it may concern:

Be it known that I, JULIUS POHLIG, of Siegen, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Steam-Boilers, which improvements are fully set forth in the following specification and accompanying drawing.

This invention relates to a steam-generator composed of a series of separate cylindrical boiler-sections, constituting a battery of cylindrical boilers, connected by steam and water pipes with one another; and consists in certain novel constructions and combinations of the boiler-sections and their pertaining parts, whereby the heating gases or currents have a serpentine action in a transverse relation about or over and under said cylinders, and a free escape for the steam as generated is obtained, substantially as hereinafter described, and whereby I combine all the advantages of an ordinary cylindrical steam-boiler with a multitudinous tubular one, and obtain many other advantages.

In the accompanying drawing, Figure 1 represents a side view of a steam-boiler constructed in accordance with my invention, the same illustrating one modification thereof, in which the boiler is composed of an upper and lower series of steam-generating cylinders or boiler-sections, to provide for both a direct and return action of the draft across which said cylinders are arranged. Fig. 2 is a partly-broken side view thereof, to show certain connections; Fig. 3, a vertical longitudinal section on the line *c d*; Fig. 4, a sectional plan on the line *a b*, and Fig. 5 a transverse section on the line *e f*. Fig. 6 is a diagram showing only a single series of steam-generating cylinders or boiler-sections, in illustration of the general principle of action as regards the tortuous course of the heating-currents and exposure of the detached cylindrical boiler-sections to said currents.

Prior to describing the construction of the boiler, it will here be observed that the gaseous products of combustion used to heat the boiler may either be derived from a puddling or other extraneous furnace, or from a fire-place which belongs to the boiler.

Referring, in the first instance, briefly to Fig. 6, A, A¹, and A² represent a series of in-

dependent cylindrical boiler-sections, arranged transversely within a main longitudinal flue, B, through which the currents are circulated in a tortuous manner, as indicated by arrow, by means of baffle-plates D, mainly alternately arranged under and over said boiler-sections successively. The first of the sections A, however, may be protected by a bridge from exposure on its bottom to the heating-gases, also the fore side of the next section A be similarly protected. The boiler-sections A¹, which occupy a position near the rear end of the boiler, are arranged above the level of the preceding sections A, and are only designed to be partially filled with water, while the sections A are wholly full. These several sections A A¹ connect at their one end with a feed-water pipe, and are otherwise suitably connected, to pass the steam as generated to the rear boiler-sections A², which are exclusively steam-chests or superheaters, and are at a sufficient elevation above the boiler-sections A¹ to exclude water from them.

For a more minute description of the invention, reference will now be made to the modification shown in Figs. 1, 2, 3, 4, and 5 of the drawing, in which there are duplicate main flues B B, the lower one of which is the primary one, and has a downward dip, while the upper one is a return-flue, and is set to incline upward to the chimney. Transversely crossing these flues, at suitable distances apart, are the independent cylindrical boiler-sections A A¹ A², having their baffle-plates D mainly arranged alternately above and below said boiler-sections successively, to give the necessary serpentine course to the heating-gases passing through the flues. The lower one of these flues has only those cylindrical boiler-sections A in it which are purely water-chambers, while the upper and ascending one of said flues contains both the water, or water and steam, chambers or sections A A¹, and the superheating-sections A², hereinbefore referred to.

These several cylindrical boiler-sections it is my intention to restrict in diameter to a size no greater than is necessary to allow of a workmen getting inside to clean or repair them, in order that the heat may be readily transmitted by making them of thin sheet

metal. Said boiler-sections may, in fact, be even smaller, and a greater number of them be used, in two or more series, arranged in two or more flues, one above the other. Each of said sections, however, I prefer to make of a single sheet, so that there will be no cross-seams exposed to the flame or heated gases, and so that the longitudinal seams of each cylindrical section are covered by baffle-plates D.

In the tortuous course of the heating-current each succeeding cylindrical boiler-section receives or is exposed to fresh supplies of heat, and the coldest gases escape by the chimney.

E is the feed-water pipe, which is in direct connection, by nozzles or branches, with the lower series of boiler-sections A, while the upper series of boiler-sections A and A¹ are supplied with water, and the steam generated in the lower series of the boiler-sections by pipes F at the opposite ends of the two series of boiler-sections A A¹.

The feed-pipe E is provided with a series of independent nozzles, *h*, which are ordinarily closed, but which may serve, by the independent attachment to them of a separate or reserve pipe, *k*, to establish water-communication between the feed-pipe E and an upper boiler-section, A or A¹, in case the lower boiler-section, with which such upper section is connected by its pipe F, has been removed for repair or otherwise.

The steam-chests or superheating boiler-sections A² are not connected with the feed-pipe E, but are connected by a steam branch or pipe, *l*, with each other, and the first or inner one of said superheating-sections connected by branch with a steam-supply collecting-pipe, G, which connects with the upper ends of the pipes F, to take the steam from the boiler-sections A A¹ in the upper series, and convey it to the first superheater, from whence it passes to the second superheater, and thence may be taken or drawn as required.

The rising grade of the upper series of boiler-sections A A¹, relatively with each other, and in relation to the superheating-sections A², provides for the ready escape of the steam as formed.

The sections A¹ are provided with water-gages for indicating the water-level in the boiler.

Each cylindrical boiler-section is fitted with a removable cover, a man-hole lid at its one

end, and the several sections supported by suitable metallic supports in the outside masonry. To give access to the opening ends of the boiler-sections, the masonry fronting said ends has openings in it, closed by doors *m*. These doors, as well as the exposed steam-pipe, may have any suitable non-conductor applied to them to retain heat.

In some cases the cylindrical boiler-sections, arranged transversely to the flue or flues, as described, may be combined with one or more cylindrical boilers, arranged longitudinally with said flues.

A boiler constructed in accordance with this invention utilizes the heat in the most perfect and economical manner, the same having both a large heating-surface, with a reduced thickness of metal to convey the heat to the water, and a large working capacity, which may be increased or diminished by adding or removing one or more boiler-sections without interfering with the use of the remaining sections. Combined, the several boiler-sections constitute a battery of independent generators, with the steam as generated or collected contained within one or more superheaters exposed to the escaping gases, and all the boiler-sections presenting a largely-exposed surface to the heating-gases. Furthermore, there is little or no danger of explosion, inasmuch as the boiler-sections first exposed to the heat are necessarily full of water, and every facility is afforded for the independent repair of the sections.

I claim—

1. The combination, with one or more flues, B, of one or more series of transversely-arranged boiler-sections or cylinders, A A¹ A², the rear ones of which are on a rising grade relatively with each other, and the alternately-arranged upper and lower baffle-plates D, essentially as described.

2. The feed-water pipe E, provided with a series of nozzles, *h*, to provide for the attachment of one or more reserve pipes, *k*, in combination with the upper and lower series of cylindrical boiler-sections A A¹, and the pipes F at the opposite ends of said sections, substantially as and for the purpose herein set forth.

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Witnesses:

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