J. & G. FIRMENICH.

Steam-Generators.

No. 210,312. Patented Nov. 26, 1878.

FIG. 1.

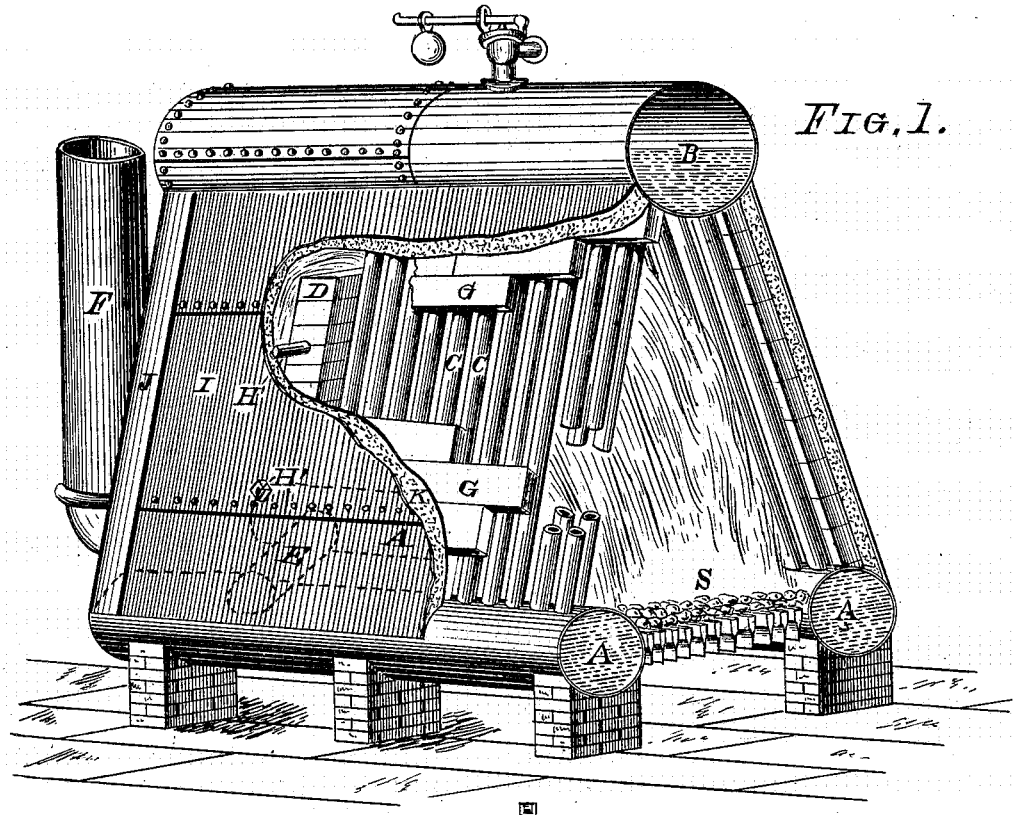
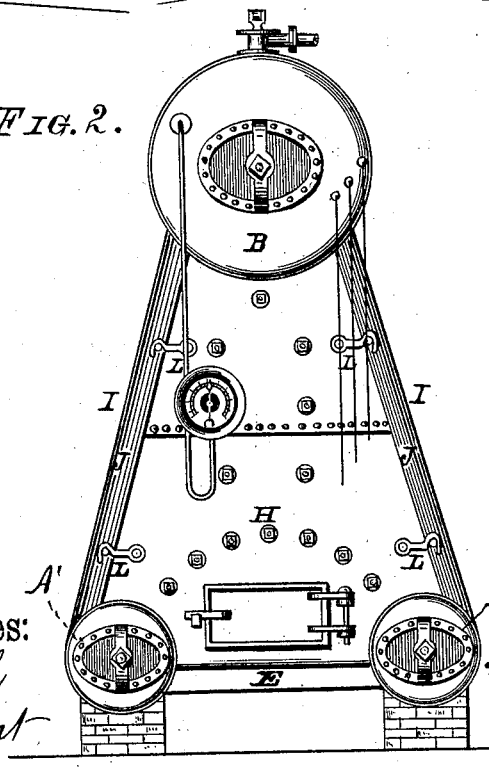


FIG. 2.



Witnesses:

Frank Hirsch

Chas. Brosart

Inventors:

Joseph & Geo. Firmenich

by Michael J. Stark

their attys

UNITED STATES PATENT OFFICE.

JOSEPH FIRMENICH AND GEORGE FIRMENICH, OF BUFFALO, NEW YORK, ASSIGNORS OF ONE-THIRD THEIR RIGHT TO FRANK FIRMENICH, OF SAME PLACE.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **210,312**, dated November 26, 1878; application filed April 4, 1877.

To all whom it may concern:

Be it known that we, JOSEPH FIRMENICH and GEORGE FIRMENICH, both of Buffalo, in Erie county, State of New York, have jointly invented certain new and useful Improvements on Steam-Generators; and we do hereby declare that the following description of our said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has special reference to improvements upon our recently-patented steam-generators; and it consists in the peculiar arrangement of parts and details of construction, as hereinafter fully set forth and described, whereby our said steam-generator is rendered readily accessible for examination and other purposes.

In the drawings heretofore mentioned, Figure 1 is an elevation, in perspective, of our improved portable wrought-iron tubular safety-boiler. Fig. 2 is a front elevation.

Like letters of reference indicate similar parts in all the figures.

A are two longitudinal mud-drums, consisting of plain shells provided with properly-secured heads, having man-holes A′, fitted with plates and clamps in the usual manner, said shells being connected together near their rear end by a pipe, E, and placed a suitable distance apart to admit the fire-grates S between them. The upper part of these shells is flattened longitudinally, and provided with a suitable number of apertures, wherein the lower ends of a series of multiple rows of heating-tubes, C, are properly expanded. These heating-tubes are inclined, and enter apertures in the lower part of a single longitudinal steam and water drum, B.

The space between the heating-tubes C is divided into a combustion-chamber, C′, and an auxiliary combustion-chamber, C″, by means of a bridge-wall, D, made of fire-bricks in the customary manner.

This boiler is incased into a jacket consisting, essentially, of a fire-brick lining, G, a layer of non-conducting material, K, and an iron jacket, I, which arrangement we shall make the subject of a subsequent application, and needs not therefore be here described.

By the construction of a steam-generator as heretofore described we have produced a very cheap, effectual, durable, and economical boiler, possessing the latter quality in the highest degree, and it is, therefore, particularly suitable for factory and other analogous purposes.

We further secure a decided advantage by our present construction, on account of the readiness with which every part of the boiler can be inspected and leakages or other derangements detected and remedied, because the whole structure can be easily taken apart and again put together in a reasonably short space of time.

One of the greatest advantages gained by our present construction is the economy of fuel, which result is largely due to the fact that the flame and hot gases of combustion are not divided and compelled to pass through narrow flues, but are kept in one bulk, so as to enable the consumption of every particle of carbon and render the same available for evaporative surfaces.

In the drawings we have shown a combustion-chamber, C′, and an auxiliary combustion-chamber, C″. This can, however, be modified by the introduction of an additional bridge-wall, so as to divide the space bounded by the heating-tubes C into three chambers, whereby the gases of combustion would be caused to descend in the middle and ascend in the rear chamber, in which case the escape-flue will be located in the upper part of said rear chamber. Such an arrangement is very advantageous with that kind of fuel producing a very large flame or an intense heat, capable of being advantageously led through said three chambers.

Having thus fully described our invention, we desire to secure to us by Letters Patent of the United States—

In a sectional steam-generator, the combination of the upper or single longitudinal drum B, the side longitudinal water-drums A, a double series of multiple water-tubes, C,

connecting said drums, and arranged at an inclination, so as to form an angular combustion-chamber, C″, between them, the bridge-wall D, and the rear pipe E, connecting the mud-drums, all constructed and arranged substantially as described.

In testimony that we claim the foregoing as our invention we have hereto set our hands and affixed our seals in the presence of two subscribing witnesses.

JOSEPH FIRMENICH. [L. S.]
GEORGE FIRMENICH. [L. S.]

Witnesses:
MICHAEL J. STARK,
FRANK HIRSCH.