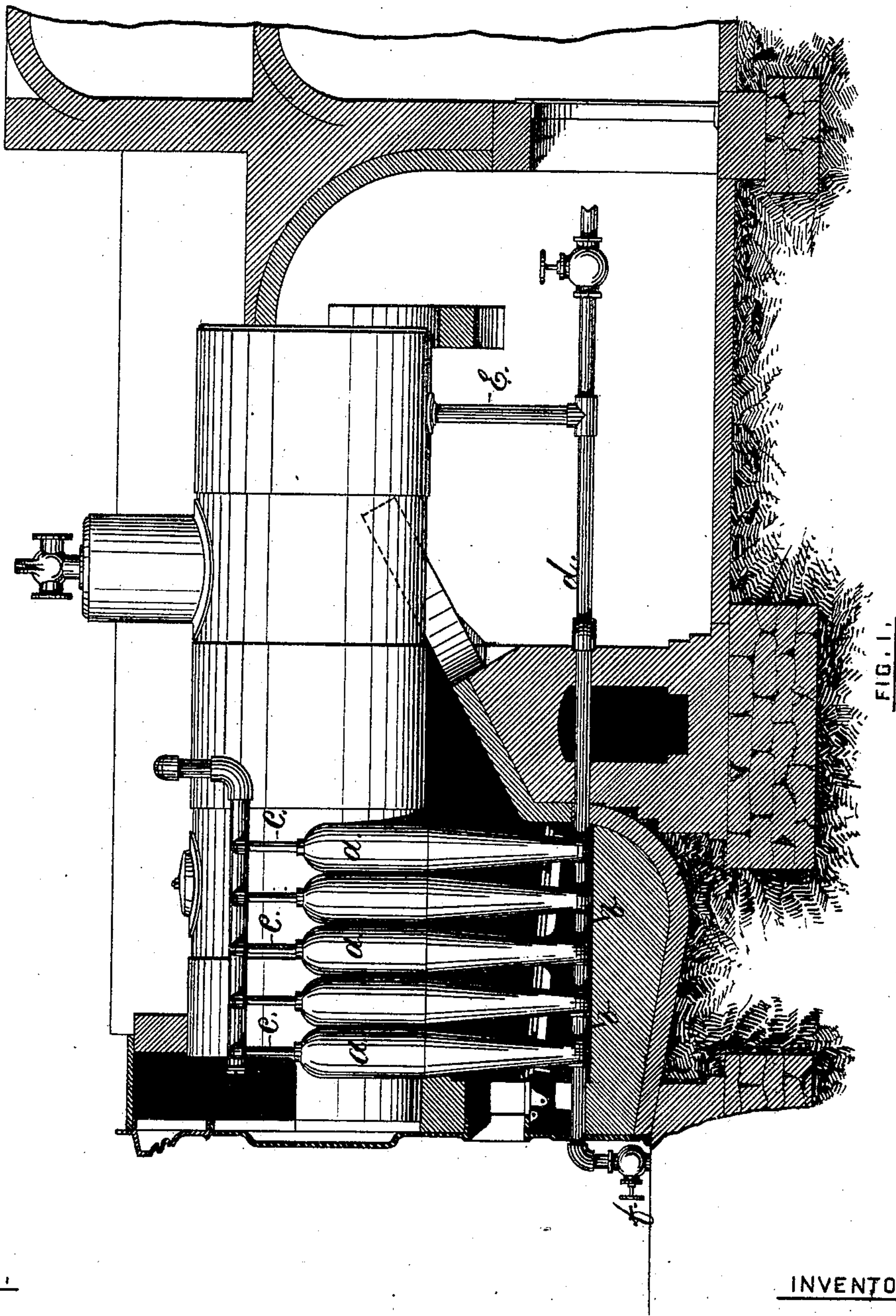


J. A. MILLER.
STEAM GENERATOR.

No. 178,868.

Patented June 20, 1876.



WITNESSES,

Ernest C. Barth
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INVENTOR,

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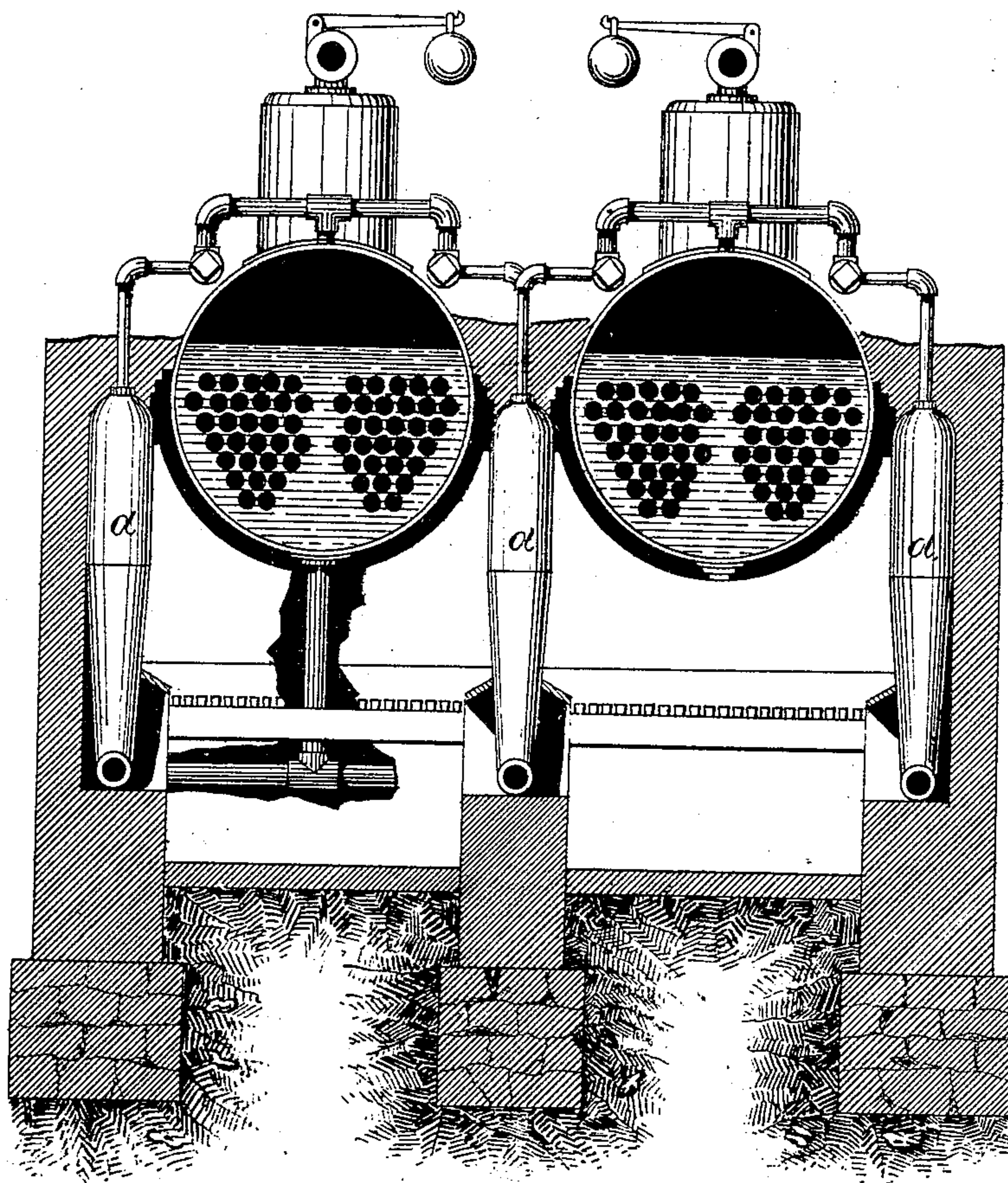


FIG. 2.

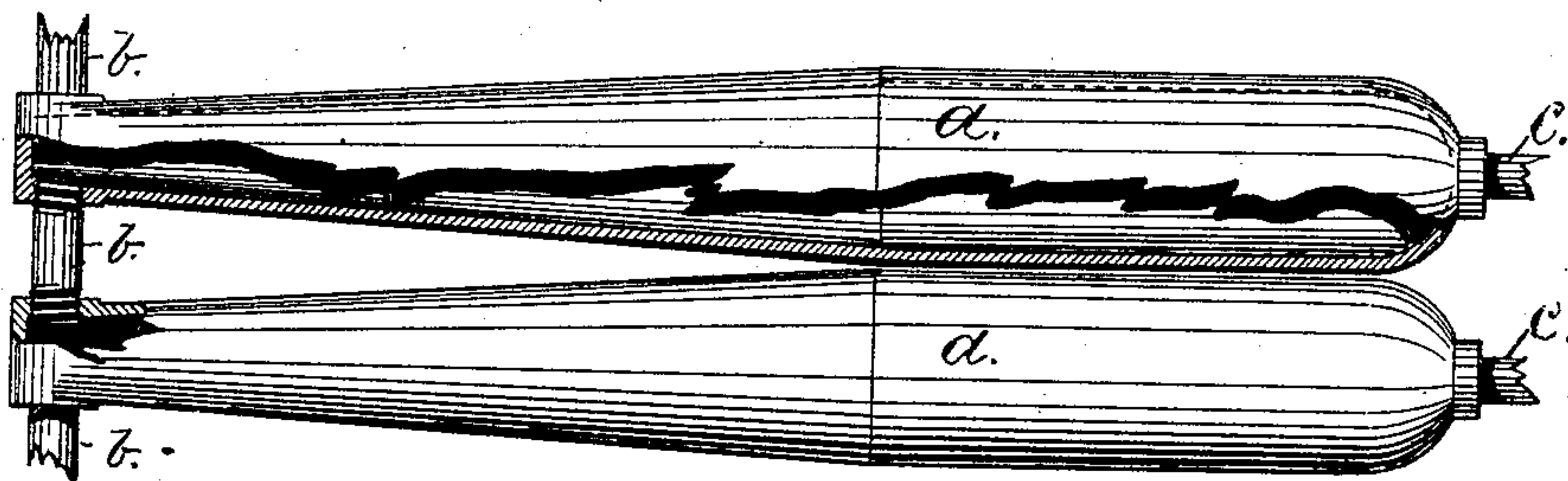


FIG. 3.

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JOSEPH A. MILLER, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **178,868**, dated June 20, 1876; application filed April 12, 1876.

To all whom it may concern :

Be it known that I, JOSEPH A. MILLER, of the city of Providence and State of Rhode Island, have invented certain new and useful Improvements in Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in the construction and arrangement of auxiliary steam-generators, which are connected with steam-generators proper, and arranged to utilize more fully the radiated heat from the fuel, and is an improvement on my previous invention, for which Letters Patent where issued to me February 26, 1867, No. 62,494, and which were reissued January 18, 1876, No. 6,862.

In the drawings, Figure 1 is a side view of a steam-boiler with the auxiliary steam-generators attached, the wall being removed to show more clearly the arrangement and the manner of connecting the same. Fig. 2 is a cross-section, showing two steam-boilers with the auxiliary steam-generators attached to the sides and between the boilers, as also the arrangement of connecting the same with the boilers. Fig. 3 is an enlarged view of two of the pipes out of which the auxiliary steam-generators are constructed, one being shown partly in section, and also the manner in which they are connected.

Auxiliary steam-generators, forming the sides of the furnace, or a partition between two boilers, have heretofore been made in large slabs or boxes, or of a number of pipes or tubes, being firmly connected either on both ends or on one end. Such boxes and clusters of pipes or tubes are liable to leak on account of the unequal expansion of the several parts. Portions of such auxiliary steam-generators are also liable to burn out or crack, and the whole or the larger portion of a side has to be removed. This could not be done without much labor in tacking down the fronts and portions of the walls, causing large expense and delay. When such auxiliary steam-generators, forming the sides of a steam-boiler, are made of tubes or pipes, such tubes or pipes are of uniform diameter, and the steam, made

within the same near the fire, has to pass upward along the sides, such vertical surface being inferior to an inclined or conical surface.

In my present invention these defects are entirely overcome. The sides are constructed out of a number of sections, *a a*, each forming a tapering cylindrical pipe, presenting an efficient heating-surface to the fire, and, by virtue of the taper allowing the different pipes to be connected by a simple gas-pipe connection, *b*, the fire can freely circulate around the tapering portion of the pipe. The connecting-pipe *b*, being below the action of the fire, cannot be injured. The upper parts of the pipes *a a* are connected with the steam-space of the boiler by suitable pipes arranged to allow of perfect freedom for expansion and contraction, as is shown in the drawings.

Any desired number of these pipes *a a* may be connected together, and form the sides of the boiler, or partition between two boilers, the whole being connected, by the pipes *d* and *E*, with the rear of the boiler, and in front with the blow-off pipe and valve *f*, so that the water from the boiler may at any time be blown through the lower part of the same, and the pipes be kept free from mud and sediment; the upper part being connected by the pipes *c c*, either directly with the steam-boiler, or with a pipe which is connected with the same, as shown. The pipes *a a* may be arranged to extend to or above the water-line in the boilers, or they may be arranged so as to have their upper parts below the water-line. In the first instance they will deliver to the boiler dry steam, while in the latter instance they will force large quantities of water mixed with steam into the boiler, as I firmly believe that a rapid circulation of water in a steam-boiler will prevent boiler-explosions by preventing the accumulation of heat in the water. I prefer to arrange the auxiliary steam-generators when connected with boilers in which no special provision for circulation is made, so that a large and constant flow of water leaves the rear end of the boiler, passes into the auxiliary steam-generators, and is discharged into the forward end of the boiler, mixed with steam, so as to insure a perfect circulation of the water.

The present improvement greatly facilitates

repairs in case of injury to one of the pipes *a*, as with aid of an ordinary gas-tongs the upper and lower connection can be removed, and a pipe be taken out through the fire-door without disturbing any other part. A new pipe may be inserted in the same manner through the fire-door, and if no new pipe is at hand the space may be temporarily left, and a connecting-pipe, *b*, long enough to connect the two nearest pipes, be screwed in, and the boiler run until a new pipe, *a*, is secured. As the auxiliary steam-generators are made up of a number of like parts, each pipe *a* being a duplicate of the others, the construction can be more perfect, the cores, when cast, can be better supported, and, when welded to sheet metal, special tools may be provided, which could not have been done when made as heretofore.

By properly-arranged connections, these pipes *a* may be arranged around vertical steam-boilers, as also around cupolas, ovens, kilns,

and furnaces, so as to protect the brick-work from the action of the fire, and also generate steam for various purposes. Thus, any shape or form may be surrounded with these generators by the arrangement of the said connections.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

In an auxiliary steam-generator, the combination of the cylindrical vertically-arranged pipes *a a*, their lower part diminishing in diameter, and constructed with bosses to receive the pipes or couplings *b b*, and the upper connecting-pipes *c c*, said pipes *a a* being arranged at the sides of the furnace, and connected with the water and steam space of the boiler or boilers, as and for the purpose described.

JOSEPH A. MILLER.

Witnesses:

OSCAR LAPHAM,
JNO. D. PATTEN.