

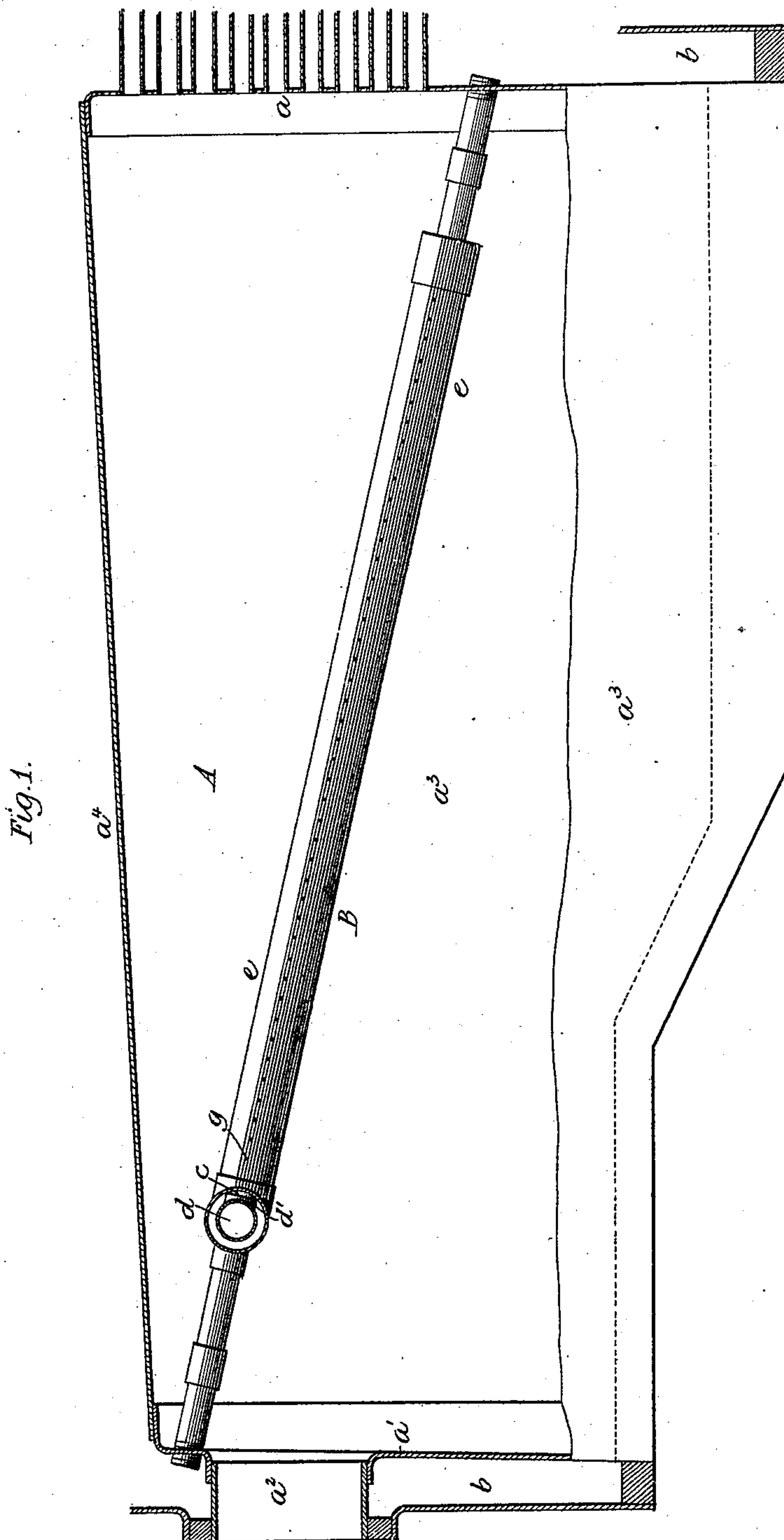
(No Model.)

2 Sheets—Sheet 1.

J. MILTON.
STEAM BOILER FURNACE.

No. 516,975.

Patented Mar. 20, 1894.



Inventor

John Milton

Witnesses

W. A. Norton

E. M. Klein

By

W. H. Dudley & Co. Attorneys

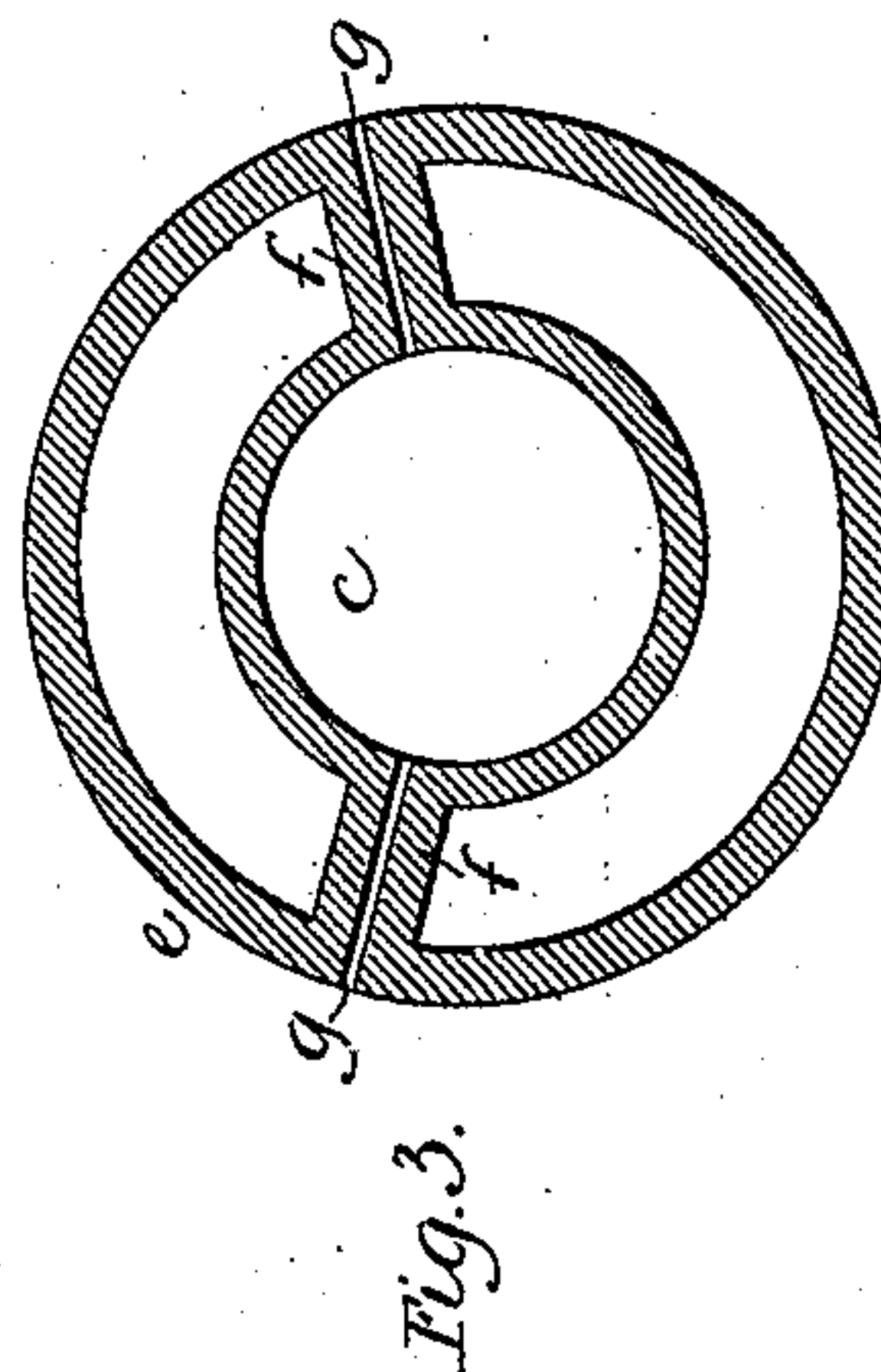
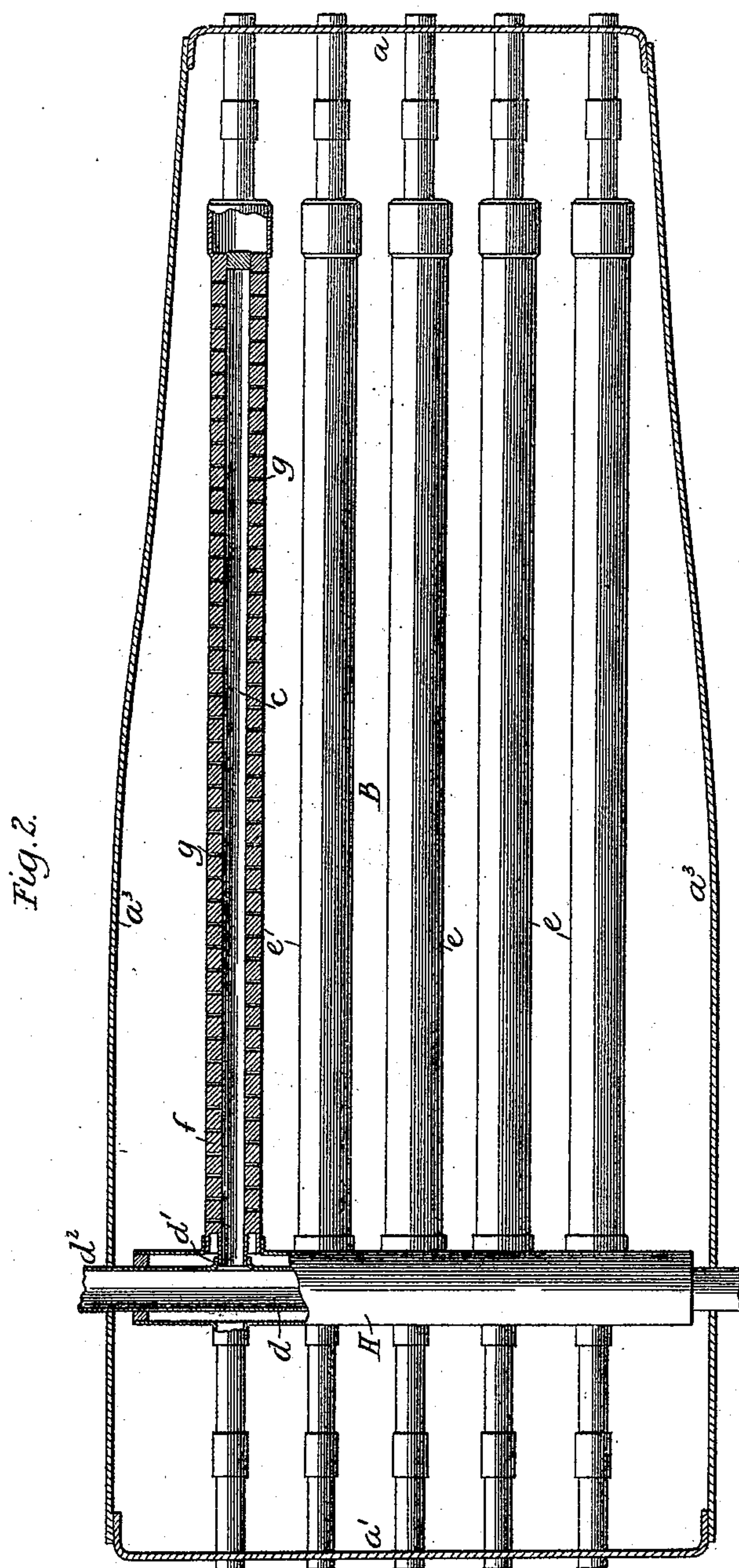
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UNITED STATES PATENT OFFICE.

JOHN MILTON, OF WASHINGTON, DISTRICT OF COLUMBIA.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 516,975, dated March 20, 1894.

Application filed December 20, 1893. Serial No. 494,159. (No model.)

To all whom it may concern:

Be it known that I, JOHN MILTON, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Steam-Boiler Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to boiler furnaces and more particularly to means for burning the smoke within the fire boxes thereof, the object being to prevent the escape of the smoke and cinders into the outer atmosphere, and to reduce the consumption of fuel.

In an application for patent filed by me on the 11th day of December I have shown and described a smoke consuming device adapted to be placed in the fire box, the same consisting of a series of air distributing pipes having connections with an air supply and protected from the heat of the burning fuel by inclosing water pipes having connection with the water space of the boiler. The air is discharged through connections made between the pipes, which consist of perforated lugs cast or otherwise formed on one of the pipes, and nipples passed through the outer or water pipe and into said lugs.

In my present invention I have provided an arrangement similar to that described, with respect to the inclosing of the air pipes by water pipes, but instead of employing the perforated lugs on one of the pipes and nipples for the connections between the two pipes, I cast or otherwise form said pipes and their connections in one piece, thereby dispensing with the employment of nipples. The advantage of such a construction, aside from simplicity and economy in the use of materials, is that I am enabled to make the connections between the pipes free from screw joints, inasmuch as the outlets for the air are made by drilling or otherwise forming passages through the pipes and their integral connections.

The operation of my present device is similar to that described in my application above referred to, in that the air is distributed un-

der pressure in the form of a thin sheet at a certain plane with relation to the surface of the bed of fuel which I designate the plane of combination of the air and products of combustion and the plane of combustion of such products as will become visible in the form of smoke.

I will now describe in detail my preferred arrangement and construction of smoke consuming device which, as shown, is applied to the fire box of a locomotive boiler, but I do not confine myself to what is shown and described, as the principle may be carried out in many different ways.

In the drawings which form a part of this specification, Figure 1 is a vertical, longitudinal central section of enough of a locomotive with my improvement applied to illustrate my invention. Fig. 2, is a horizontal section of the same showing my improvement partly in plan and partly in section; and Fig. 3 is a cross section of one of the pipes.

Referring to the said drawings by letter A denotes the fire box within which my device is adapted to be arranged and supported by connections with the flue sheet *a*, and back sheet *a'*, which latter is provided with a stoking hole *a²*.

a³ a³ are the side sheets and *a⁴* the crown sheet, and these sheets or walls are as usual protected from the heat of the furnace by water circulating in the space *b* which is in communication with the boiler.

The smoke consuming device is shown at B, and consists of a series of air pipes *c* preferably arranged to form a diaphragm and located at a plane a short distance above the surface of the bed of fuel or at what I have previously termed the plane of combination and combustion. There may be any number of pipes and the arrangement may be modified, as for instance, instead of the five pipes arranged longitudinally with the fire box as shown, there may be a greater or less number, and the same may be arranged transversely or in the form of a ladder with two longitudinally arranged pipes and a series of cross pipes connecting same, or in any other way. In the present arrangement I have shown the pipes connected at one end to a manifold *d* having perforated screw threaded lugs *d'* and extensions *d²*, the former serving for connec-

tion with the air pipes and the latter for connection with a suitable air supply not here shown. In order to protect the said pipes from the action of the intense heat of the furnace, I inclose the same by water pipes *e* which are connected with the water space of the boiler, and are of sufficient diameter to accommodate the air pipes and leave ample space around the latter for the circulation of the water. Connections between the pipes for the passage of the air from the inner pipe to the interior of the fire box are made by means of lugs or ribs *f* which are cast with said pipes, and openings or passages *g* are made through the pipes and the connecting lugs or ribs as shown. In practice I propose to cast the inner and outer pipes and the connecting lugs or ribs together in order not only to obviate the necessity of screw joints but, to provide for a uniform expansion and contraction throughout. I may use one lug for each hole or by making the same of greater length two or more holes can be made therein; or if desired and as shown, the lugs or ribs may extend the entire length of the space occupied by the line of holes. Where the holes or perforations are drilled or otherwise formed there is solid metal from the outside of the outer or water pipe to the inside of the inner or air pipe, and consequently screw joints are entirely obviated. The air and water pipes may be concentric with each other or eccentric as preferred, and I may if desirable employ a water pipe to inclose two or more air pipes. The water pipes as shown are connected at one end to a manifold, *H* of sufficient diameter to receive the air pipe manifold and provide for water space around the same, and having connections with the water space. If desired however, I may dis-

pense with the manifold for the water pipes, and with the air pipe manifold, as it is obvious that I may employ individual connections for each water and air pipe. Each length of pipe may be made in one piece, or in sections as shown. I prefer to employ the latter method as the short sections can be cast much more readily, and can be made of different sizes and lengths and connected to form a diaphragm of any required dimensions.

The device when applied is homogeneous, and the degree of expansion and contraction is the same throughout. There are no screw joints except where the connections are made, and consequently no leakage even under high steam pressure. The construction employed moreover is such as will permit of a rigid connection with the walls of the fire box, and consequently accidental displacement is avoided. The pipes being protected by circulating water have a maximum longevity, or in other words will last as long as the fire box.

What I claim as my invention, and desire to secure by Letters Patent, is—

In a boiler furnace, an air distributing pipe or pipes having connection with an air supply, a water pipe or pipes surrounding the air pipe or pipes and connected with a water supply, lugs or ribs connecting the water pipe and the inclosed air pipe formed integrally therewith, and air passages through the pipes and their integral connections.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN MILTON.

Witnesses:

W. T. NORTON,
JOHN W. DUDLEY.