

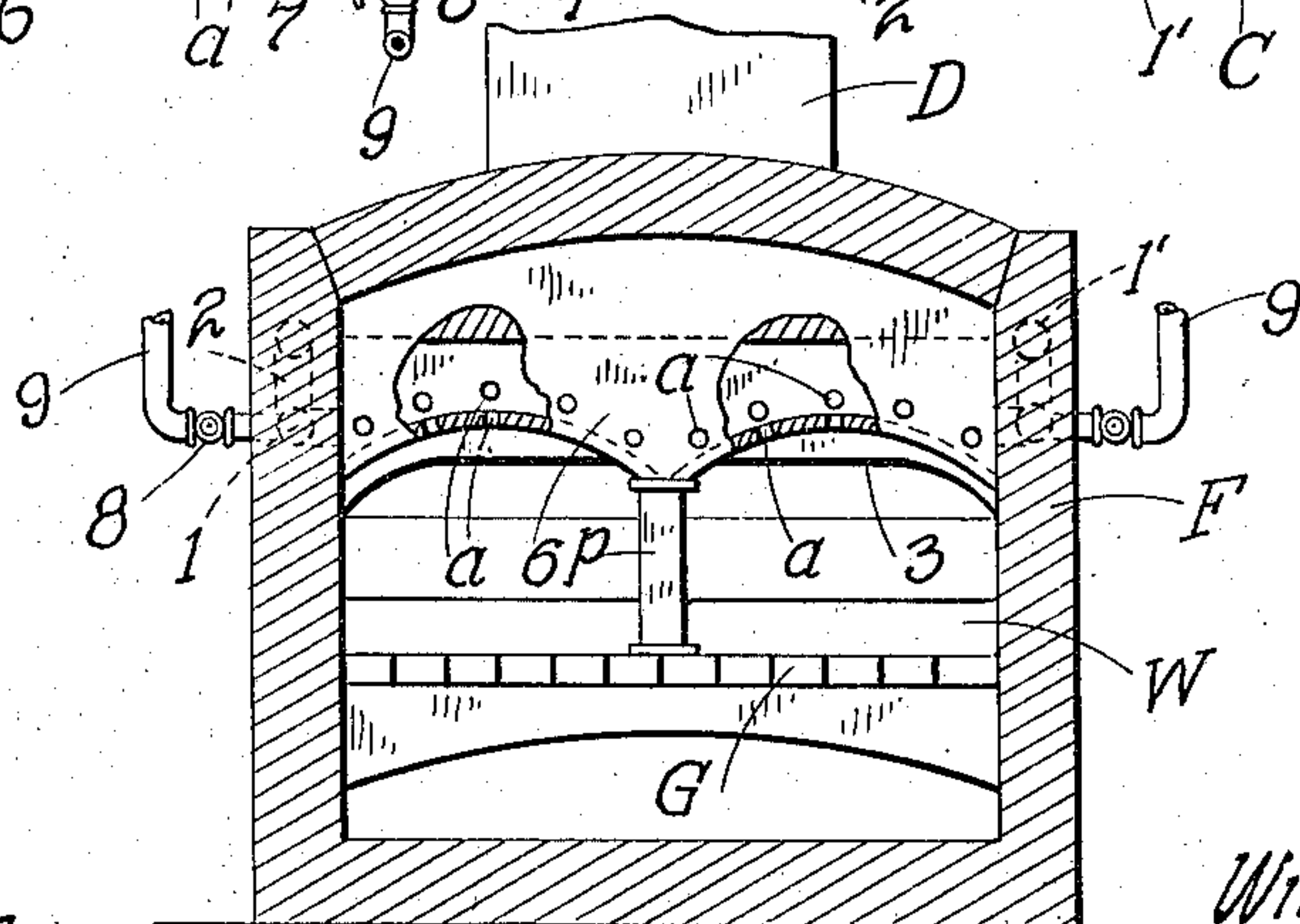
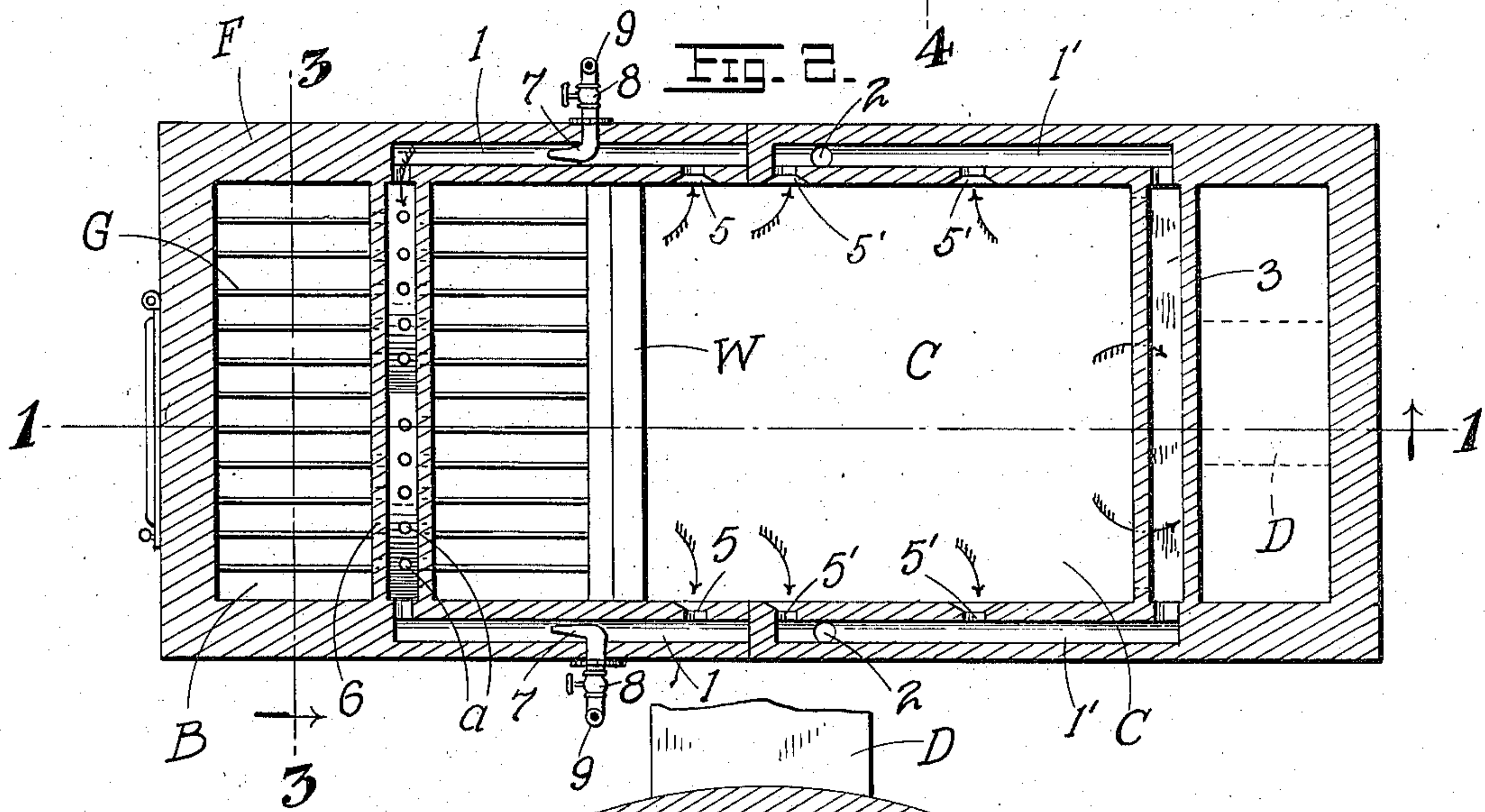
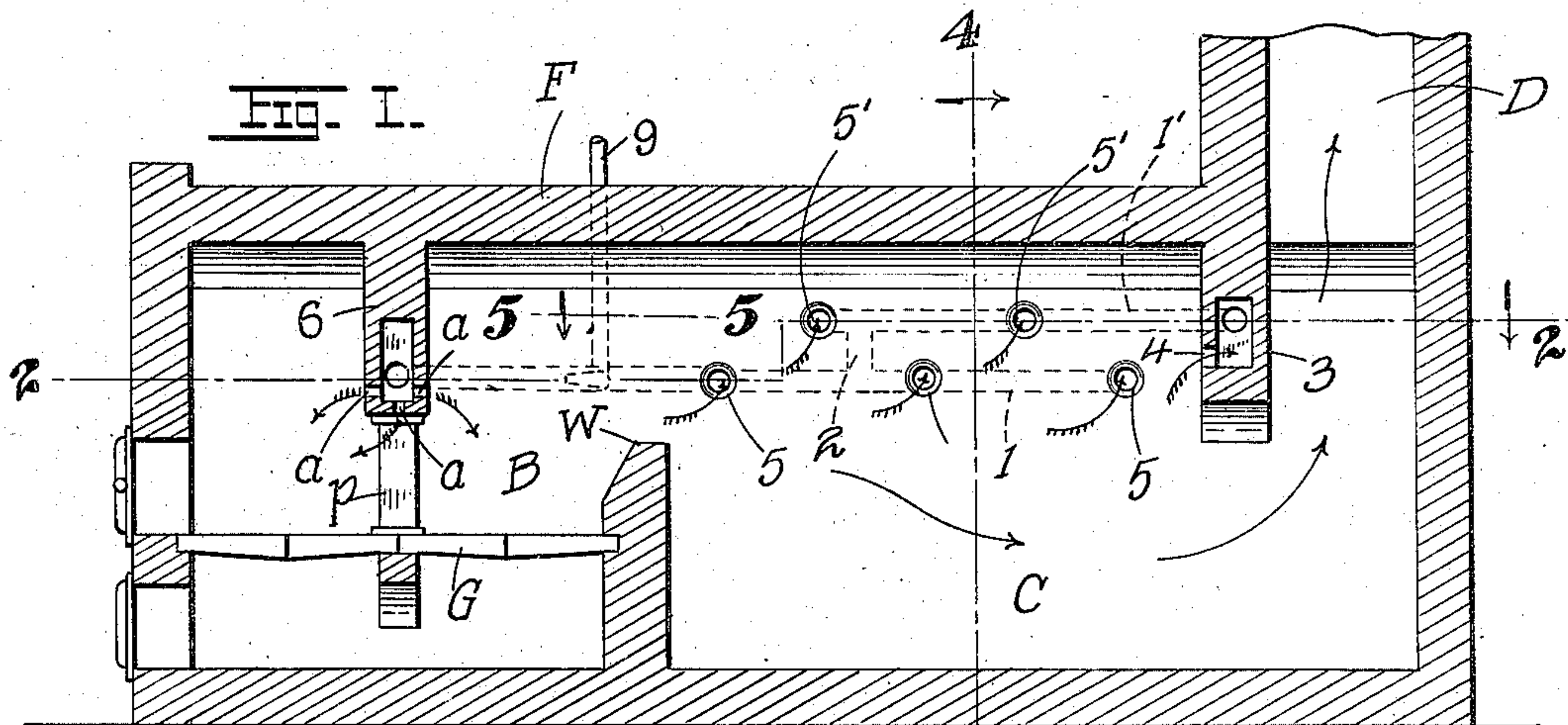
W. A. GARVENS.
FURNACE.

APPLICATION FILED FEB. 3, 1908.

900,513.

Patented Oct. 6, 1908.

2 SHEETS—SHEET 1.



WITNESSES:

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Fig. 3.

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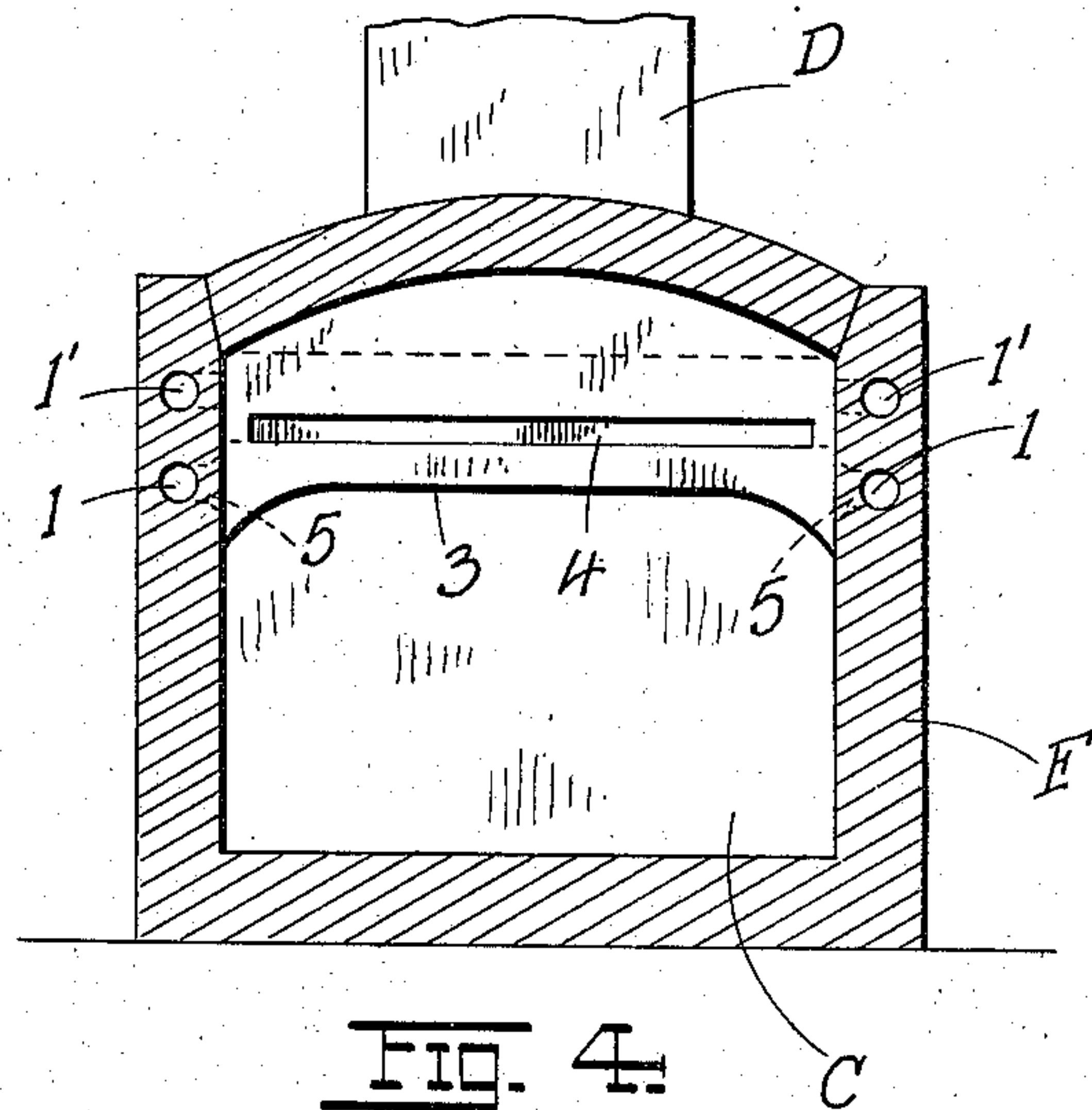


Fig. 4.

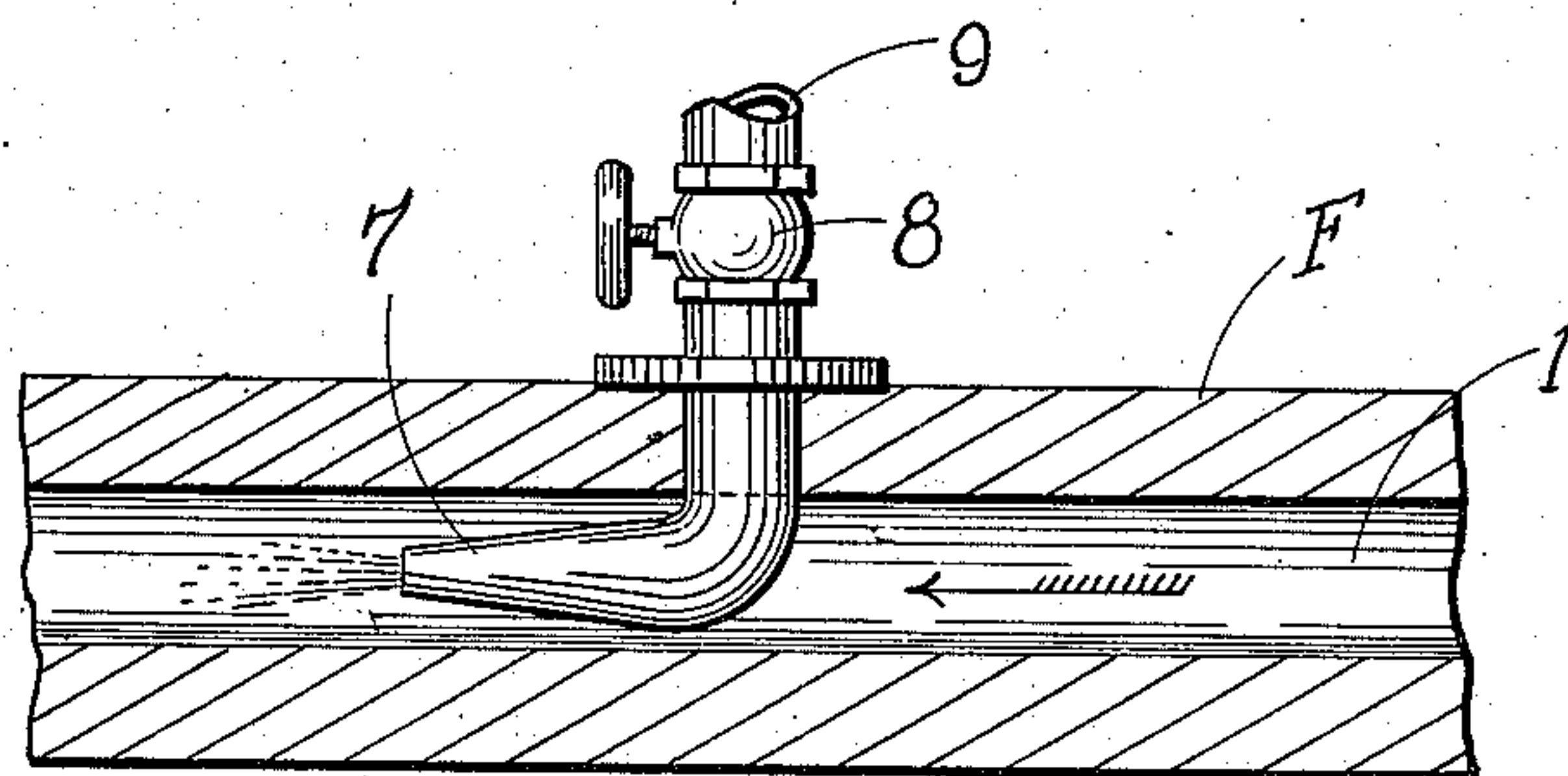


Fig. 5.

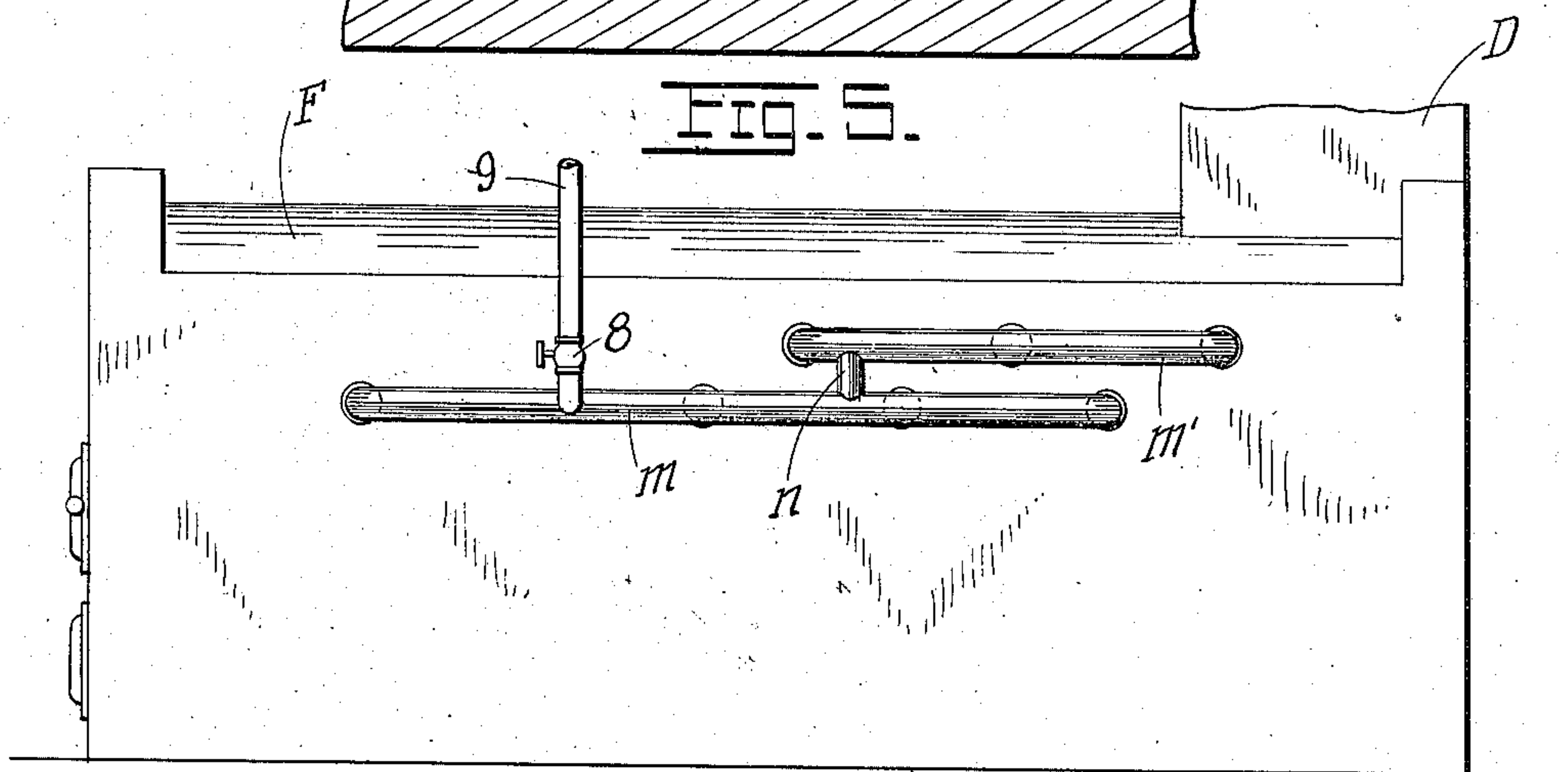


Fig. 6.

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UNITED STATES PATENT OFFICE.

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FURNACE.

No. 900,513.

Specification of Letters Patent.

Patented Oct. 6, 1908.

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To all whom it may concern:

Be it known that I, WILLIAM A. GARVENS, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in smoke consuming furnaces, and it consists in the novel details of construction more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a vertical longitudinal section on line 1—1 of Fig. 2 of one form of my furnace; Fig. 2 is a horizontal section on the broken line 2—2 of Fig. 1; Fig. 3 is a vertical transverse section (parts being broken away) on the line 3—3 of Fig. 2; Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 1; Fig. 5 is an enlarged horizontal sectional detail through the injector on the line 5—5 of Fig. 1; and Fig. 6 is a side elevation of a modified form of furnace.

The object of my invention is to construct a furnace for general commercial and industrial purposes, which shall effectively consume all the fuel with which the same is charged, the means employed being eminently adapted to insure the perfect consumption of all smoke, gases, and carbonaceous matter so that a maximum efficiency is the result and no fuel is wasted. Such a furnace may be installed with any boiler or steam generator, may be employed for the burning of garbage, waste, and the like, may supply heat for the manufacture of brick and tiling, for drying purposes, and in fact may be utilized in any of the known industrial arts. The advantages thereof will be better apparent from a detailed description of the invention, which is as follows:

Referring to the drawings, and particularly to Figs. 1 to 5 inclusive, F, represents the furnace casing or inclosure, G the grate, B, the fire-box, W, the bridge-wall, and C, the combustion chamber, and D, the stack or exit flue all well understood in the art. Disposed in the side walls of the casing are flues or passages 1, 1, which communicate with similar superposed parallel passages or flues 1' 1', through connecting passages 2, 2. The rear ends of the passages 1' 1' open into the chamber of a rear hollow deflecting wall

3 located at the base of the exit flue D, the inner face of the wall 3 being provided with an intake opening or slot 4. Disposed along the length of each passage 1 and establishing communication between said passage and the combustion chamber are series of flaring intake openings 5, 5, similar openings 5' 5' establishing communication between the passage-ways 1' and the combustion chamber. The forward ends of the passage-ways 1, 1, open into the chamber of the hollow front deflecting wall 6 (which is preferably double-arched and supported on a post P), the said wall having discharge openings *a a a* which return the unconsumed products of combustion into the fire-box above the grate-bars as presently to be described. Cooperating with each of the passage-ways 1, 1, is a steam (or other fluid) injector 7 controlled by a valve 8, the steam pipe 9 therefor leading to any source of steam supply (not shown).

In lieu of the passage-ways 1, 1, 1' 1', being built into the wall of the furnace casing, I may substitute the form shown in Fig. 6, where the injector pipe 9 enters a longitudinally disposed pipe *m* located on the outside of the furnace, and corresponding to the passage-way 1, the pipe *m* being connected by a branch *n* (corresponding to passage 2) with a pipe *m'* corresponding to passage-way 1', the terminals of such pipes *m m'*, tapping the furnace similarly to the passage-ways 1, 1, and communicating with the combustion chamber similarly to the passage-ways 1', 1'.

The operation of the furnace, which as above stated, is intended to consume all the available combustible matter on the grate-bars, is as follows: Referring more particularly to Figs. 1, 2 and 5, the products of combustion obviously will take the course shown by the plain arrows, Fig. 1. The majority of furnaces, particularly those burning soft coal throw off vast volumes of smoke, and those burning fuel not particularly disposed to smoke, permit a large percentage of the available hydrocarbon gases, hydrogen, carbon, and other unconsumed constituents to escape through the stack, so that only a small per cent. of the heat units of the fuel is utilized. By means of my invention however, the majority of such unconsumed products is returned into the fire-box through the instrumentality of the injector (of which there may be any number). The spray or jet of the injector which is directed toward

the fire-box end of the passage-way 1, will induce a current in the said passage-way and likewise in the passage-way 1', drawing in the unconsumed products referred to, not only through the intake openings 5, 5' on the sides of the furnace, but through the intake 4 in the rear deflecting wall, and delivering them into the chamber of the front hollow deflecting wall 6, whence they are discharged and returned to the fire-box through the openings *a a a*, all as fully indicated by the feathered arrows in Figs. 1 and 2. Such portions of the unconsumed products not so returned to the fire-box will follow the general course indicated by the plain arrows and escape into the stack. In such return of the unconsumed products to the fire-box their temperature does not drop, passing as they do through highly heated passage-ways, and becoming in a measure pre-heated or super-heated in passing through the chamber of the front deflecting wall located above the grate-bars. I am therefore able to consume the majority of the otherwise unconsumed products without the necessity of admitting cold air either into the combustion chamber or fire-box, that reaching the latter being admitted through the grate and the incandescent fuel resting thereon so that it becomes highly heated by the time the available oxygen constituent thereof is called into requisition to combine with the products escaping through the opening *a a a*.

A furnace of the character here described may be employed in any of the industrial arts, and is particularly desirable as a boiler furnace. By superposing the passage-ways 1' above the passage ways 1, the products are taken at different levels so that the efficiency of the system is increased. I may of course substitute any equivalent for the injector as fully understood in the art, for producing a flow of the products in proper direction.

Having described my invention what I claim is:—

1. In a furnace having a fire-box and a combustion chamber, the furnace being provided at the sides with intercommunicating passageways disposed at different levels, and also provided with common discharge openings into the fire box for establishing communication between the passageways and said fire-box, and with intake openings along

the length of said passageways, said intake openings establishing communication between the passageways and the combustion chamber, whereby a portion of the unconsumed products are free to return from the combustion chamber to the fire-box, and devices for effecting such return of said products, substantially as set forth.

2. In a furnace having a fire-box, and a combustion chamber, an exit flue leading from the combustion chamber, a hollow deflecting wall at the base of the exit flue having an intake opening communicating with the combustion chamber, the furnace being provided at the sides with passageways leading from the chamber of said deflecting wall to the fire-box, said passageways having intake openings disposed along the length thereof for establishing communication between the passageways and the combustion chamber, and an injector for returning a portion of the products from the combustion chamber into the fire-box, substantially as set forth.

3. In a furnace having a fire-box and a combustion chamber, an exit flue leading from the combustion chamber, a hollow deflecting wall at the base of the exit flue, a hollow deflecting wall above the fire-box, the said deflecting walls being respectively provided with intake openings and discharge openings, the furnace being provided at the sides with passage-ways establishing intercommunication between the chambers of the respective hollow deflecting walls, said passage-ways having intake openings establishing communication between the passage-ways and the interior of the combustion chamber at different levels in the latter chamber, and injectors located in the passage-ways and inducing a current therein in proper direction to return the products from the combustion chamber through the chamber of the deflecting wall at the base of the exit flue, and through the passage-ways directly from said combustion chamber, into the chamber of the deflecting wall above the grate and into the fire-box, substantially as set forth.

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

WILLIAM A. GARVENS.

Witnesses:

EMIL STAREK,
JOS. A. MICHEL.