

(No Model.)

G. P. DENIS.  
FURNACE.

No. 422,188.

Patented Feb. 25, 1890.

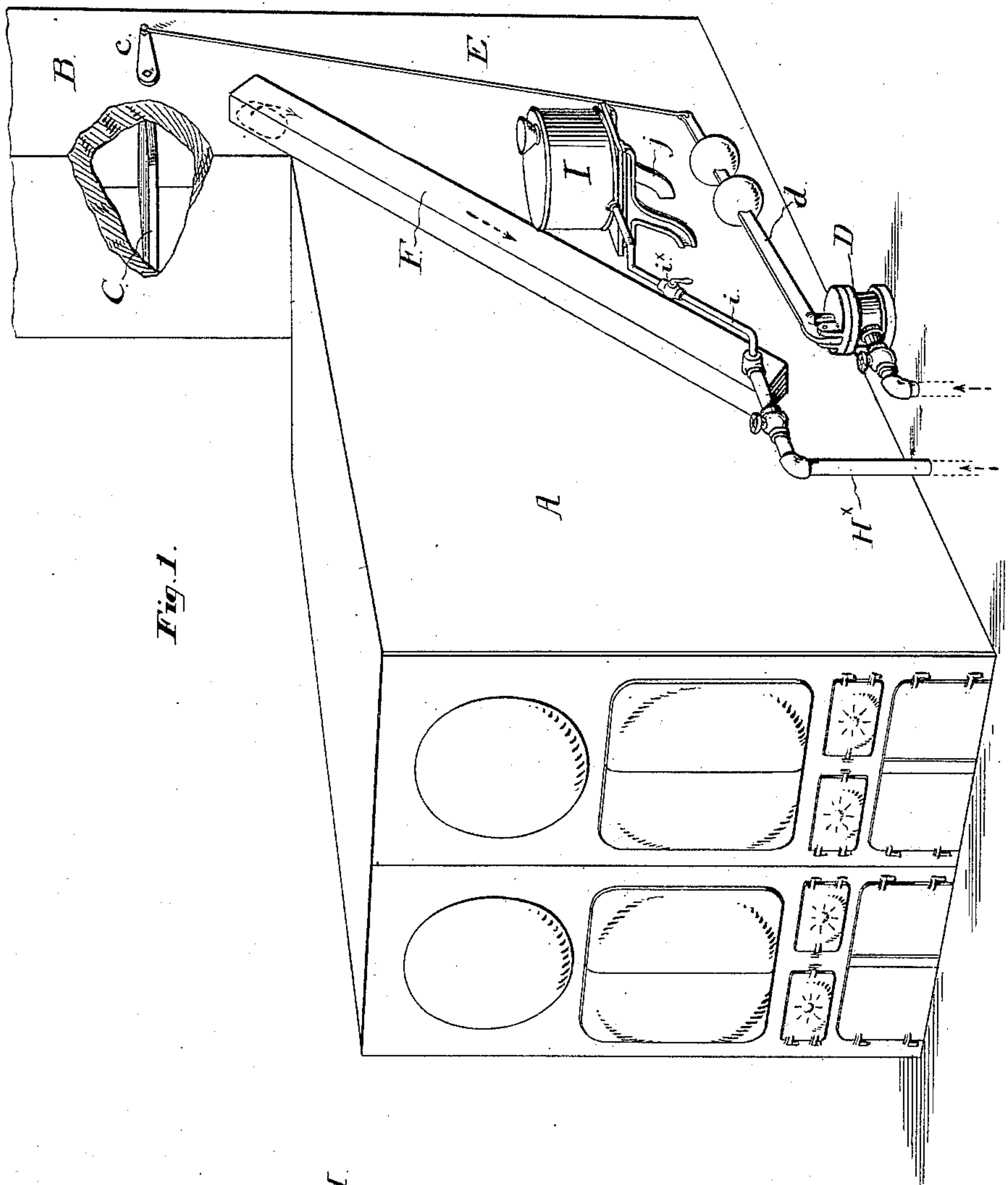


Fig. 1.

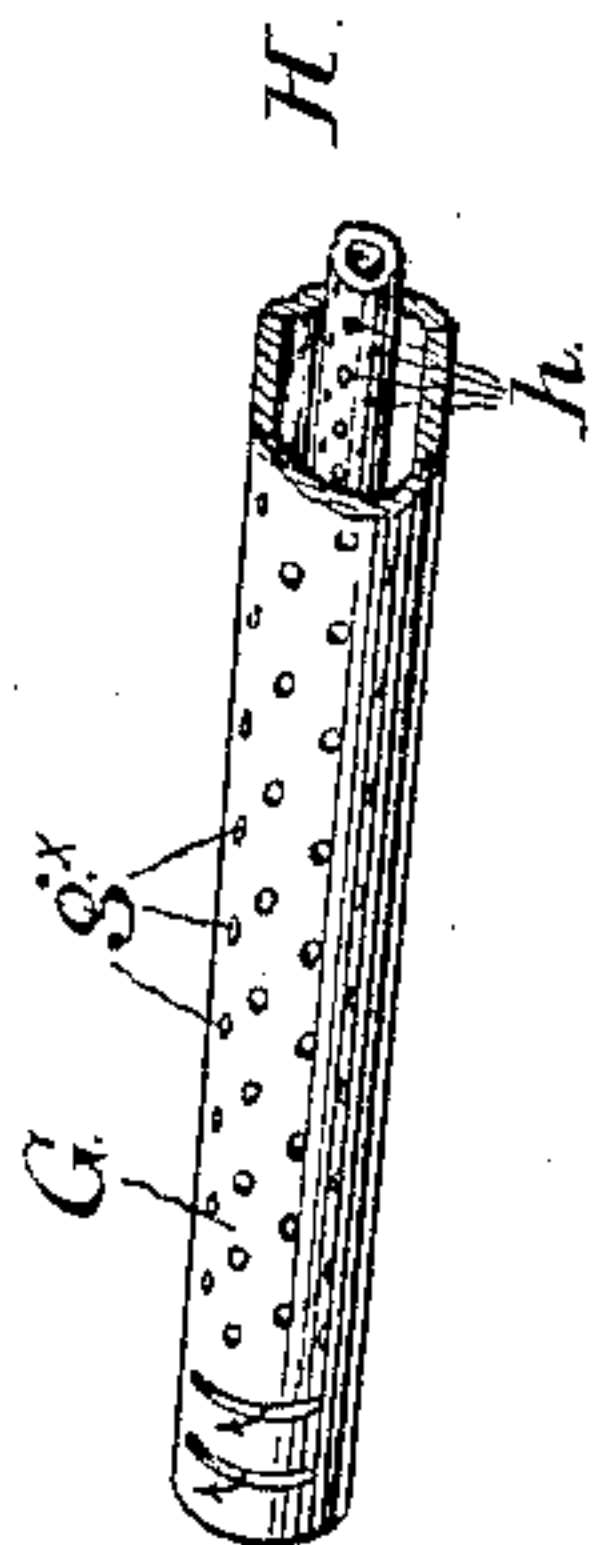


Fig. 2.

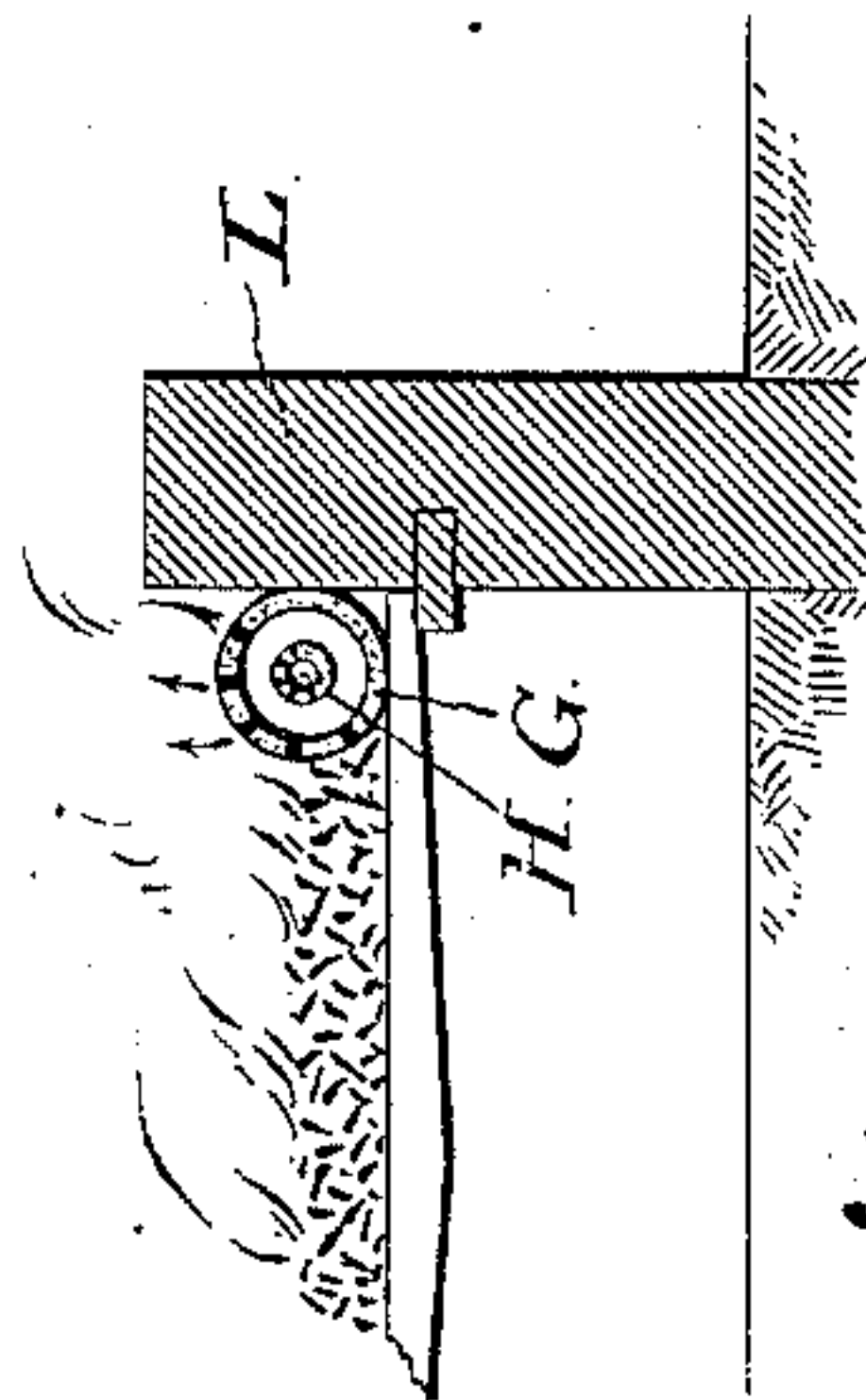


Fig. 3.

Witnesses:

*J. Norman Dixon*  
*Lewis Altmair,*

*G. P. Denis,*

Inventor,

*By his attorneys*  
*Wm C. Strawbridge*  
*J. Bonsall Taylor*



# UNITED STATES PATENT OFFICE.

GEFFROY P. DENIS, OF CHESTER, PENNSYLVANIA.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 422,188, dated February 25, 1890.

Application filed July 17, 1889. Serial No. 317,834. (No model.)

*To all whom it may concern:*

Be it known that I, GEFFROY P. DENIS, a citizen of the United States, residing at Chester, in the county of Delaware, and State of Pennsylvania, have invented an Improvement in Furnaces, of which the following is a specification.

My invention relates to a class of furnaces in which provision is made for arresting the smoke and gases which would otherwise escape through the chimney, and for causing their discharge into the fire-box of the furnace to be therein consumed,—and it is its object to facilitate the combustion of the smoke and gases and at the same time to provide an economical fuel supply, by intermingling with said smoke and gases a volume of steam and oil, and also to provide an apparatus to conveniently effectuate such intermingling of said elements and the feeding of the same to the furnace.

In the drawings, Figure 1 is a perspective view of a furnace provided with a convenient embodiment of my invention. Fig. 2 is a detailed perspective view of a portion of a retort which is a part of the apparatus employed to carry out my invention. Fig. 3 is a transverse sectional elevation of a portion of the grate and bridge wall of a furnace, illustrative of the position occupied by the retort.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents a furnace of any ordinary and convenient type, embodying a fire-box or chamber, a grate, boilers, and other usual parts of a furnace.

B is the chimney, C a damper mounted therein, c a damper lever, D an automatic steam damper regulator, d a weighted arm of said regulator, and E a rod connecting said weighted arm with said damper lever.

F is a pipe or conduit, the upper end of which is in communication with the interior of the chimney at a point below the damper, and the lower portion of which leads to and discharges into a retort G situated within the furnace.

I prefer to construct the retort G above referred to as a cylindrical body, of iron, soapstone, or any material capable of resisting the

action of the fire, to locate it just in front of the bridge wall L of the furnace, as it is desirable that the fire should be hottest at such point, and to connect one of its ends in any convenient manner with the lower end of the pipe F, so that it will receive the entire contents of said pipe. The other end of the said retort may be closed, or may be fitted to receive the discharge of smoke and gases from another pipe leading from the chimney. The retort, intermediate of its length, is provided with a number of orifices  $g^x$  through which the matters fed to it escape into the fire.

H is a section of pipe provided with a series of perforations  $h$ ,—which perforated pipe section I herein term the steam nozzle,—situated, conveniently, axially within the retort G, and connected at one end with the end of a steam pipe  $H^x$  leading from any suitable source of steam supply, of which steam pipe said steam nozzle is in effect a continuation.

I is a tank, situated at any convenient point in the vicinity of the furnace, and designed to contain coal oil or other oleaginous material, to be intermingled with the steam forced into the retort. I find it convenient to support the tank at a greater elevation than the retort, by means for instance, of the bracket J shown in the drawings, and to connect said tank with the steam pipe  $H^x$  by a connecting pipe  $i$ , so that the contents of the tank may flow through said pipe  $i$  and discharge into the pipe  $H^x$  by gravity merely. The oil thus received in the steam pipe  $H^x$  is atomized by the rush of the steam past the oil inlet, and carried forward by the steam to the steam nozzle.  $i^x$  is a cock mounted in the pipe  $i$  to control the flow of the oil.

In the operation of the device, the combined oil and steam escape through the orifices  $h$  in the steam nozzle into an annular interspace within the retort G and exterior to said nozzle, which space forms a convenient mixing chamber wherein they intermingle with the smoke and gases which are fed to said retort by the pipe F, while the commingled smoke, gases, oil, and steam, which form a mixture of a very combustible nature, afterward escape through the orifices  $g^x$  of the retort, and are consumed in the furnace. The



steam fed through the steam pipe H<sup>x</sup> is simply exhaust steam, derived from the main engine pumps or an auxiliary engine. The passage of the steam through the retort will al-  
5 ways create more or less draft downward through the pipe F and will consequently draw down smoke and gases from the chimney at all times when steam is so fed to the retort, whether the damper D be open or not,  
10 but it is obvious that it is only when the steam in the regulator has arrived at a predetermined pressure at which the regulator is arranged to close the damper, that all of the smoke and gases in the chimney will be re-  
15 turned to the furnace and consumed.

Having thus described my invention, I claim:

1. In combination with a furnace, as a device to exist therein and mix and distribute  
20 smoke, steam, gas, and similar combustible materials, a retort embodying a series of escape apertures, a nozzle also embodying a series of escape apertures, which latter structure exists in and extends longitudinally through  
25 said retort and is smaller in diameter than said retort so as to form between the two a

mixing chamber,—and supply pipes leading to said retort and nozzle,—substantially as set forth.

2. In combination with a furnace provided 30 with a chimney, as a device to exist therein and to mix and distribute products of combustion, steam, and oil, a retort embodying a series of escape apertures, a nozzle also embodying a series of escape apertures, which 35 latter structure exists in and extends longitudinally through said retort and is smaller in diameter than said retort so as to form between the two a mixing chamber, a pipe leading from the chimney and discharging into 40 said retort, a source of steam and oil supply, and a pipe leading from said source of steam and oil and discharging into said nozzle, substantially as set forth.

In testimony that I claim the foregoing as 45 my invention I hereunto sign my name this 18th day of May, A. D. 1889.

GEFFROY P. DENIS.

In presence of—

WM. C. STRAWBRIDGE,  
F. NORMAN DIXON.