

No. 740,786.

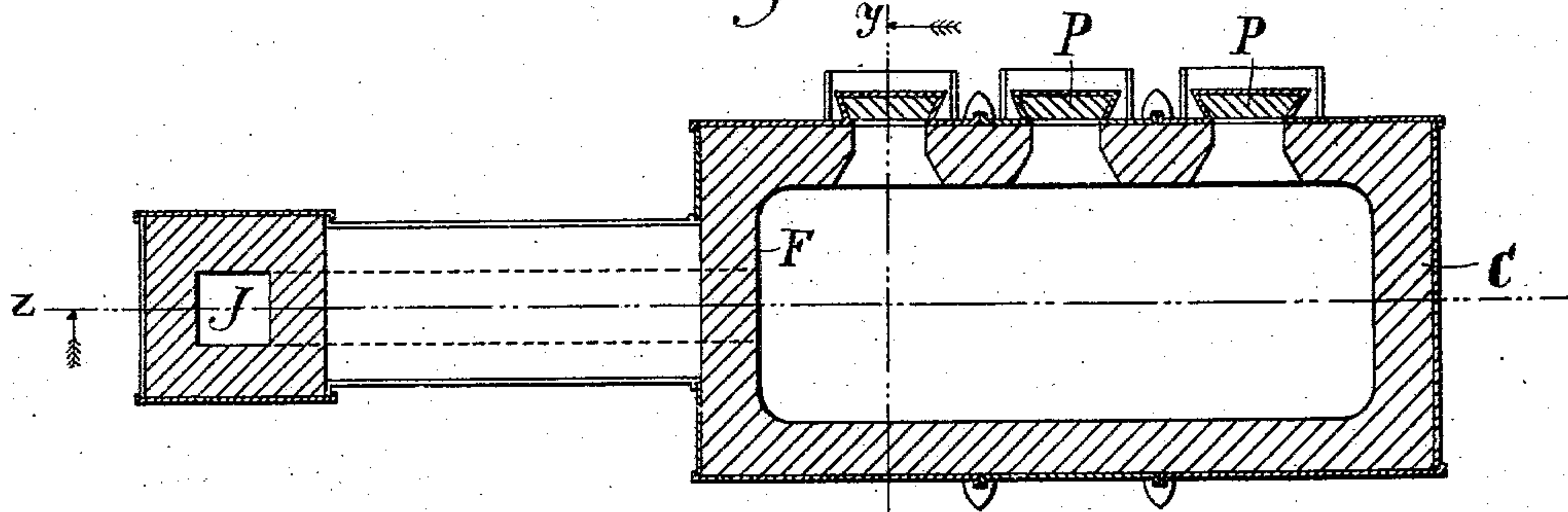
PATENTED OCT. 6, 1903.

S. UREN.  
REVERBERATORY HEATING FURNACE.

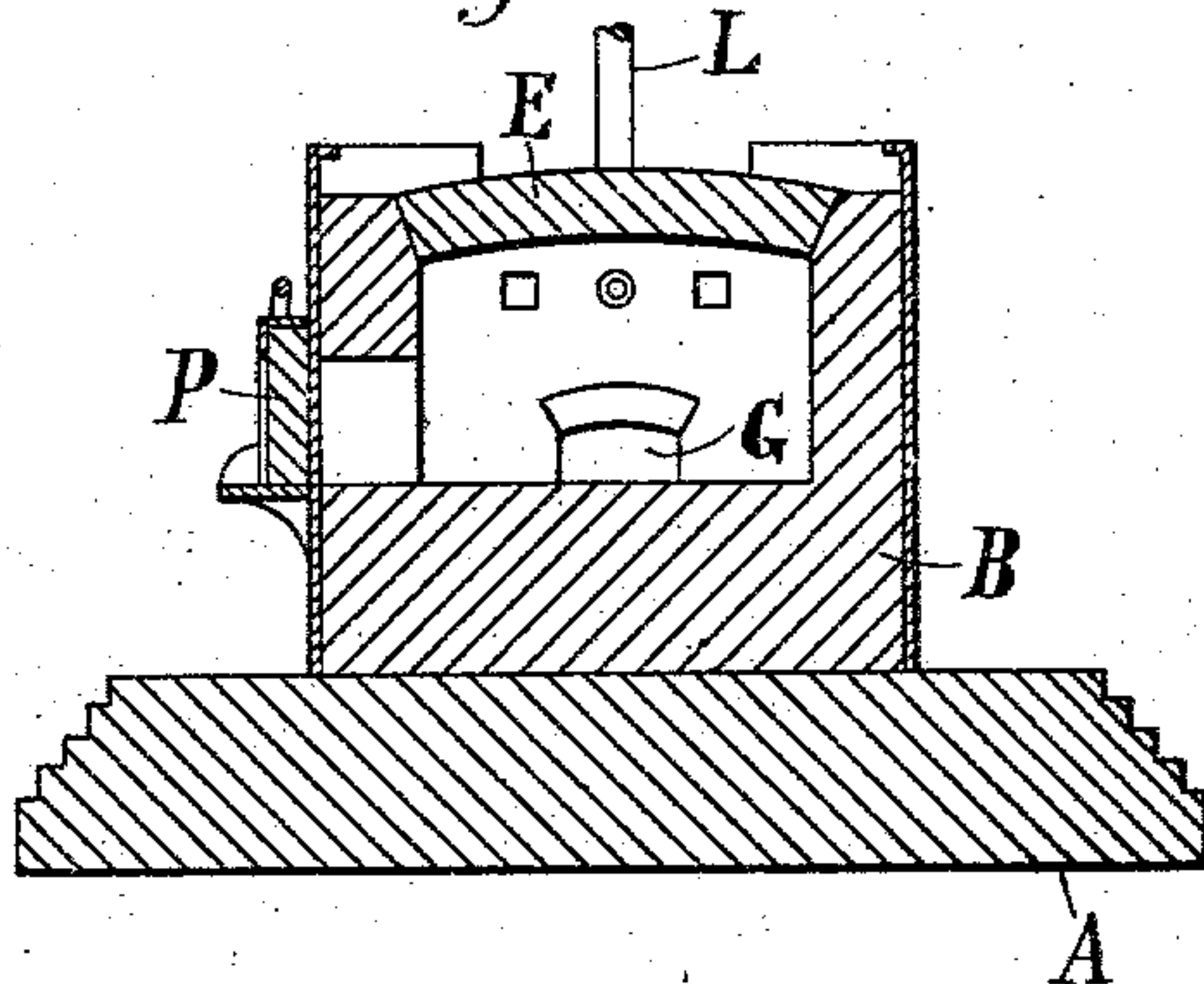
APPLICATION FILED MAY 26, 1903.

NO MODEL.

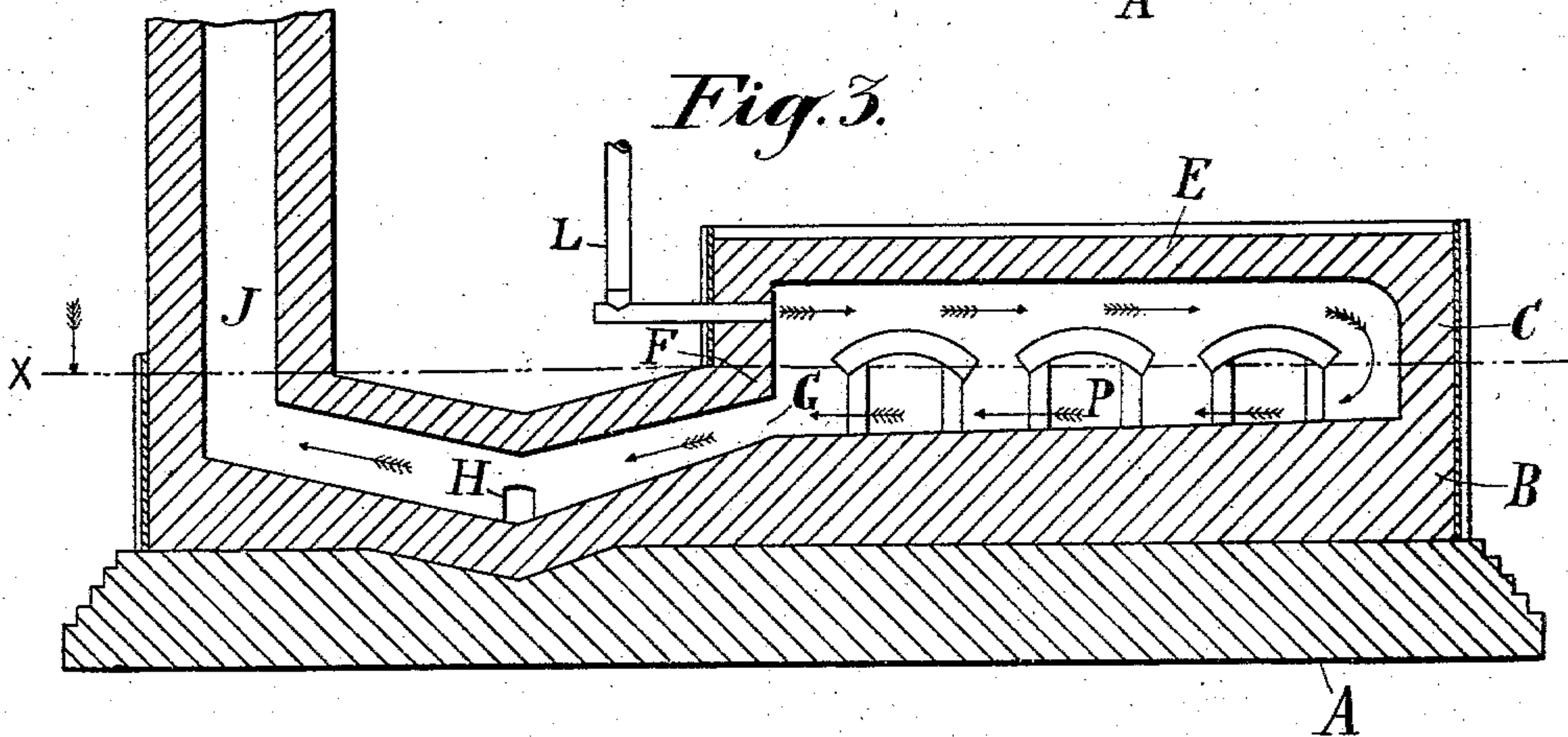
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses:  
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# UNITED STATES PATENT OFFICE.

STEPHEN UREN, OF SACRAMENTO, CALIFORNIA.

## REVERBERATORY HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 740,786, dated October 6, 1903.

Application filed May 26, 1903. Serial No. 158,824. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN UREN, a citizen of the United States, residing at Sacramento, county of Sacramento, State of California, have invented an Improvement in Reverberatory Heating-Furnaces; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an improvement in furnaces which are designed for the purpose of heating iron, steel, for forging, and for other purposes, and is especially designed for the use of crude oil or hydrocarbon products.

It consists of a chamber with suitable closable entrances for the admission of the metal to be heated so that it may lie upon the bottom of the furnace. In conjunction with this of an oil-inlet and burner-opening at one end and the upper part of the furnace through which the liquid fuel is injected and caused to pass along the upper part to the opposite end of the furnace; thence being returned along the bottom and in contact with the articles to be heated, and a discharge-flue located substantially in a plane beneath the burner, and connecting with a chimney at the same end as the inlet.

It also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a horizontal section of my furnace taken through  $x$  of Fig. 3. Fig. 2 is a vertical transverse section taken through  $y$  of Fig. 1. Fig. 3 is a longitudinal vertical section taken through  $z$  of Fig. 1.

In coal or like solid-fuel furnaces, such as have been employed for heating iron bars, steamboat, locomotive, and other axles, or shafts which are to be welded or otherwise worked, it has been common to construct a furnace with a suitable bed for the reception of the material to be heated, and a fireplace with grate-bars located beyond one end of this portion of the furnace to receive the coal or other fuel, the heat passing from the fireplace over an interposed bridge-wall into the heating-furnace, and thence being discharged through the opposite end to an escape flue or chimney or to be used under boilers or for

other purposes where this waste heat can be utilized.

It is the object of my invention to construct a furnace in which I do away entirely with the fireplace, and in reconstructing such furnaces already in existence I simply build the bridge-wall up to make a solid wall at the end of the heating-chamber, thus reducing the expense of rebuilding. I employ oil as a fuel and introduce it through a burner at the end opposite to the one which would normally contain the coal-burning furnace and form a vertical wall at this end, below the bottom of which a discharge-flue leads out beneath the burner-opening and connects with a chimney or other point. In this manner I produce a reverberatory action, the combustible gases and flame first passing along the top of the furnace, striking the rear end, and being returned over the floor and in contact with the material or articles to be heated, which are introduced through suitable doors or openings for the purpose.

As shown in the drawings, A is a bed or foundation, made of brick or any other suitable material, and B is the furnace bed or floor adapted to receive the iron or other material to be heated. This floor is slightly inclined, as shown, toward the discharge-flue G, which is located substantially central of the end of the furnace, and this flue declines to the point H, so that any dross or slag may run down the floor and the flue to this point, where there is a slag-hole, as at H, for its removal. From this point the flue inclines upwardly and connects with a discharge-chimney, as at J. The walls above the floor B are built up of fire-brick, the end C forming an abutment-wall against which the ignited oil will strike near the roof, and this wall in its junction with the roof E, which is also built of fire-brick, may be slightly curved, so as to change the direction of the burning gases.

F is a substantially vertical brick wall built outwardly above the inlet end of the discharge-flue G, and through this wall is an opening made in the center, through which the inlet-pipe and burner for the supply of hydrocarbon oil is admitted. This passage



and burner-pipe is situated near the roof of the heating-chamber, and the ignited oil discharging through there will take the course shown by the arrows.

5 P represents doors through which the substances to be heated may be introduced. These doors are lined with fire-brick and may be opened in any suitable manner, as by raising vertically, and closed after the articles  
10 have been introduced.

The action of the furnace will then be as follows: The crude oil or other liquid fuel, being introduced through the pipe L and discharged by any suitable burner substantially  
15 parallel with and near the roof of the heating-chamber, will arrive at full combustion during its passage along this part of the chamber, and striking the rear wall C it will be returned along the bottom of the chamber,  
20 and while at its most perfect combustion and heating power will pass along the bottom and in contact with the articles to be heated. The location of the discharge-flue G near the  
25 bottom of the furnace and substantially in line beneath the inlet-opening insures the proper direction of the heat-current and its discharge at the same end at which the fuel was admitted. By this construction I provide a greatly-increased heating capacity  
30 and economy of fuel, and when it is desired to apply the device to solid-fuel furnaces already constructed it is only necessary to build up what was formerly the bridge-wall, so as to form a wall similar to that shown at  
35 C, and build up the vertical wall F above the discharge-flue and with the necessary opening for the oil-burner above the discharge-flue.

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

1. The combination in a furnace of an inclosed heating-chamber having vertical sides and ends, a discharge-passage leading from one end at the floor-level and inclining downwardly therefrom, said floor being also inclined from the opposite end toward the discharge-flue, a burner inlet-passage located in the end wall in line above the discharge-flue and near the top of the chamber, said burner  
50 being directed to discharge hydrocarbon fuel against the opposite end of the chamber from which it is deflected and returned along the floor to the discharge-flue.

2. The combination in a furnace of an inclosed heating-chamber having a floor inclining from one end toward the other, substantially vertical walls and a closed roof, openings in the side wall with movable gates, an inverted angular discharge-flue forming  
55 a continuation in line with the bottom of the lower end of the chamber and having a slag-hole at its lowest depression, a hydrocarbon-burner opening through the end wall above the discharge-flue directed along the upper  
60 part against the opposite end of the chamber whereby the products of combustion are deflected downwardly and returned along the floor to the discharge-flue.

In witness whereof I have hereunto set my  
hand.

STEPHEN UREN.

Witnesses:

I. C. NATHAN,  
F. D. PECK.