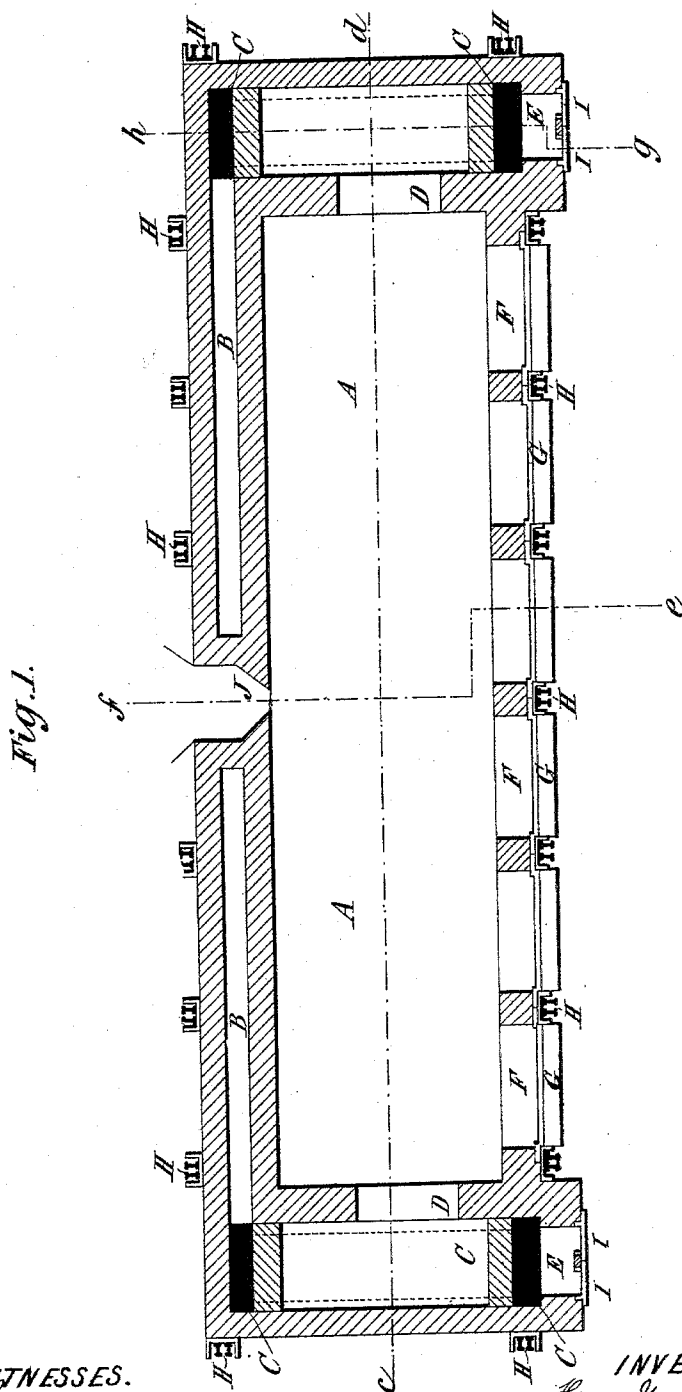


4 Sheets—Sheet 1.

FURNACE FOR HEATING STEEL OR IRON INGOTS.

Patented Nov. 17, 1896.



WITNESSES.

Taurosstoma
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INVENTOR.

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(No Model.)

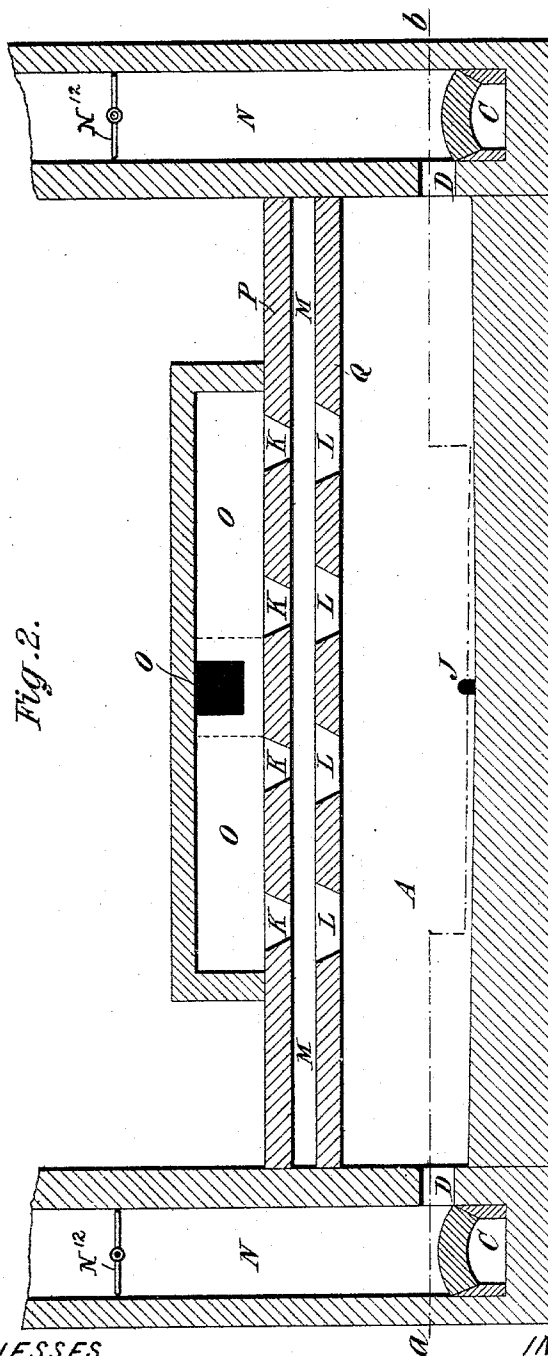
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FURNACE FOR HEATING STEEL OR IRON INGOTS.

No. 571,667.

Patented Nov. 17, 1896.



WITNESSES.

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4 Sheets—Sheet 3.

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FURNACE FOR HEATING STEEL OR IRON INGOTS.

No. 571,667.

Patented Nov. 17, 1896.

Fig. 3.

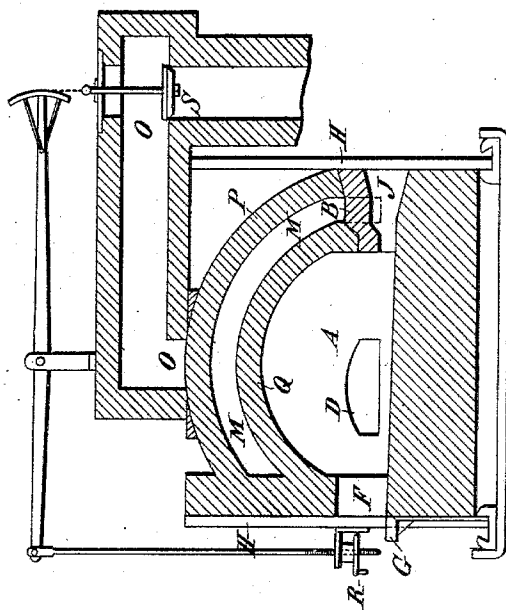
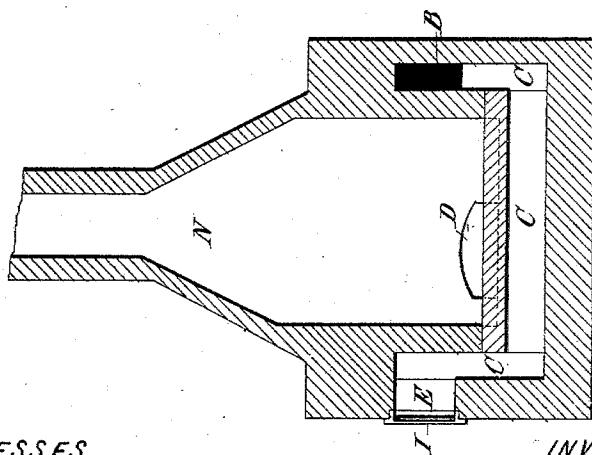


Fig. 4.



WITNESSES.

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(No Model.)

4 Sheets—Sheet 4.

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FURNACE FOR HEATING STEEL OR IRON INGOTS.

No. 571,667.

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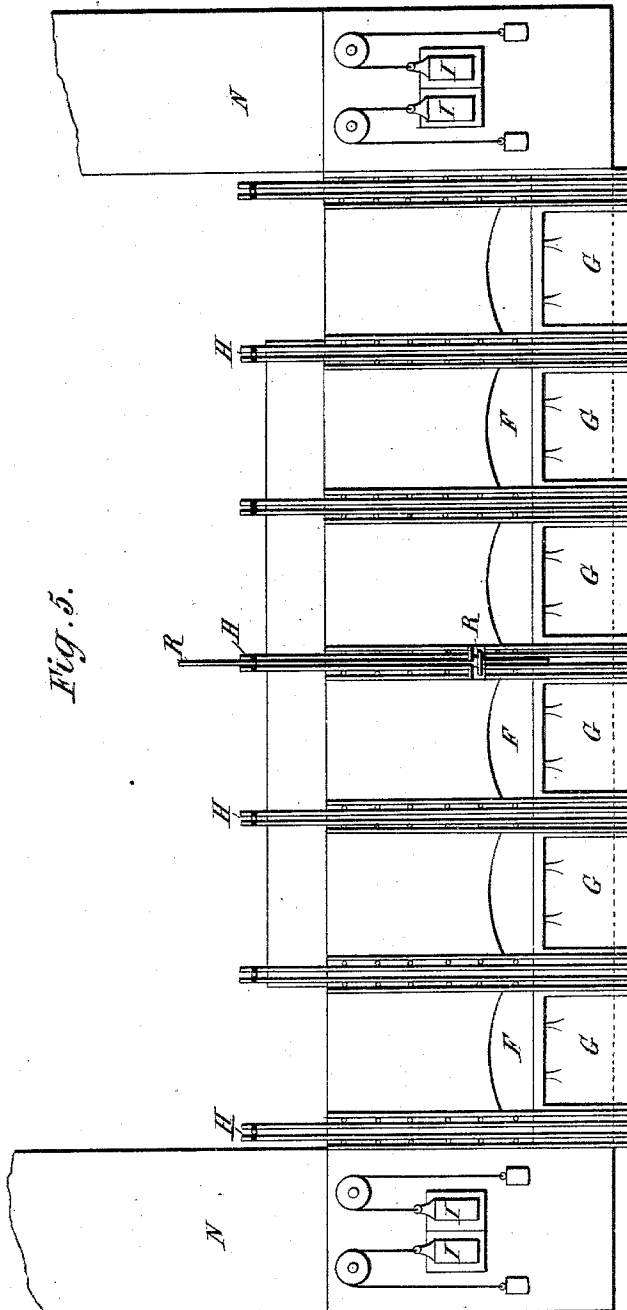


Fig. 5.

WITNESSES.

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UNITED STATES PATENT OFFICE.

HENRY WILLIAM HOLLIS, OF SPENNYMOOR, ENGLAND.

FURNACE FOR HEATING STEEL OR IRON INGOTS.

SPECIFICATION forming part of Letters Patent No. 571,667, dated November 17, 1896.

Application filed June 20, 1896. Serial No. 596,311. (No model.)

To all whom it may concern:

Be it known that I, HENRY WILLIAM HOLLIS, a subject of Her Majesty the Queen of Great Britain, residing at Spennymoor, in the county of Durham, England, have invented a certain new and useful Improvement in Furnaces for Heating Steel or Iron Ingots and for other Purposes, of which the following is a specification.

This invention relates to improved means for heating furnaces by one or more jets of burning gas introduced through the crown or roof of the furnace instead of the heat being obtained either from a fire at one end of the furnace or from a gas-flame entering at either end of the furnace, one of which methods is at present the usual practice.

According to this invention it is proposed that the gas, with the air necessary to support combustion, shall enter the furnace at its highest point through a port or ports, the flame passing downward upon the ingots, slabs, or piles to be heated and issuing from the furnace through other ports, say, at each end thereof, into chambers leading by suitable flues into a chimney or chimneys. The air may be drawn in by the action of the chimney-draft or forced in by steam-jets or otherwise at a pressure above that of the atmosphere, and may be used at the atmospheric temperature or heated by being passed through hot chambers or flues above or below the outlet-ports, such chambers or flues being maintained at a high temperature by means of the outgoing flame from the furnace, the air afterward passing into the furnace through other hot-chambers between the double walls and roof-arches of the furnace itself.

In the accompanying drawings, Figure 1 is a horizontal sectional plan on the line *a b* of Fig. 2. Fig. 2 is a vertical longitudinal section on line *c d* of Fig. 1. Fig. 3 is a vertical cross-section on line *e f* of Fig. 1. Fig. 4 is a vertical cross-section on line *g h* of Fig. 1. Fig. 5 is an elevation of the front or working side of the furnace.

The drawings and the scale upon which they are made have reference to a furnace the inside measurement of the working chamber of which is thirty feet long and seven feet wide; but the size of the furnace would be such as to be suitable for the purpose it is in-

tended to serve, and the dimensions indicated by the drawings would be varied in accordance therewith.

In the drawings, A represents the chamber of the furnace; B, the hot-air chamber at back of furnace; C, the flues from cold-air inlets to chamber B; D, the outlet-ports; E, the cold-air inlets; F, the doorways; G, the fore-plates of doors; H, the buckstays; I, the shutters regulating admission of air to flues C; J, the slag-hole; K, the gas-inlet ports in upper arch of roof; L, the flame-inlet ports in lower arch of roof; M, the hot-air chamber between arches of roof; N, the chimneys; O, the gas-flue; P, the upper arch of roof; Q, the lower arch of roof; R, the hand-wheel and connections for opening and shutting gas-valve; S, the gas-valve.

The mode of working the furnace is as follows: After the whole of the brickwork of the furnace has been thoroughly dried by a fire kept burning in the interior for a sufficient length of time the gas is admitted through S by turning the hand-wheel R and is ignited by the fire left burning for that purpose. The gas-flame strikes the floor of the furnace and passes along it through the outlet-ports D at each end of the furnace to the chimneys, on its way passing over the arch of the air-flues C, which it brings to a red heat. The air to support combustion of the gas is drawn in at the inlets E and passes through the flues C into the hot-air chamber B at back of furnace and thence into the hot-air chamber M, between the arches, which form the roof of the furnace, the chambers B and M being in free communication.

It will be noted that the heated air from the space M is the only supply of air to the chamber and that consequently a strong draft is produced which draws the air from the space M.

From the chamber M the hot air passes, with the ignited gas, through the inlet-ports L into the interior of the furnace, the gas burning with an intense white flame, which in a short time brings the whole of the interior of the furnace to a white heat. The relative proportions of gas and air required to produce the character of flame and degree of heat desired are adjusted by the hand-wheel R and the shutters I. The chimneys

N are provided with dampers N¹², either at the top or elsewhere, by which they can be regulated either to have an equal draft and so distribute the flame equally over the floor 5 of the furnace, or one chimney may be allowed to have a stronger draft than the other, in which case the flame may be directed to one end of the furnace, if it be so desired, on account of the nature or progress of the work 10 to be done. The floor of the furnace is formed so as to have an inclination to the slag-hole J, in the center of the back wall, through which any melted slag produced flows out of the furnace either continuously or at intervals 15 when the stopping of the tap-hole is removed. The iron or steel ingots, slabs or piles, or other articles to be heated are introduced into the furnace or withdrawn therefrom through the doorways F in the usual 20 way, the doors being hung upon counterpoised levers, by which they are made to slide up and down as required.

It will be noted that in a furnace constructed as described the two internal end walls, 25 the internal back wall, and the internal roof form the internal walls of hot air chambers and are thus protected from the cooling action of the atmosphere outside the furnace, and also increase the useful effect of the gas-flame 30 by the radiation of heat from their intensely-heated internal faces.

What I claim is—

1. In a furnace, and in combination, the heating-chamber, an upper and a lower arch 35 above the same, a space between said arches, means for supplying air to said space, gas-inlet ports in the upper arch, flame-inlet ports in the lower arch, and means for supplying gas to the gas-inlet ports, the pressure 40 of which together with the draft in the chamber draws air from the space between the arches into the furnace so that the gas passes into the chamber surrounded by a stratum of highly-heated air which supports the com- 45 bustion of said gas, substantially as described.

2. In a furnace, and in combination, the

heating-chamber, an upper and lower arch above the same, a space between said arches, a double wall at the back of the furnace with the space formed in which the first 50 space communicates, air-flues communicating with said space in the walls, gas-inlet ports in the upper arch, flame-inlet ports in the lower arch, means for supplying gas to the gas-inlet ports, the pressure of which to- 55 gether with the draft in the chamber draws air from the space between the arches into the furnace so that the gas passes into the chamber surrounded by a stratum of highly-heated air which supports the combustion of 60 said gas, and outlets from the heating-chamber arranged near the air-flues, so that the waste heat raises the temperature of the air in said flues, substantially as described.

3. In a furnace, and in combination, the 65 heating-chamber, an upper and lower arch above the same, a space between said arches, a double wall at the back of the furnace with the space formed in which the first space communicates, air-flues communicating 70 with said spaces in the walls, gas-inlet ports formed at the highest point of the upper arch, flame-inlet ports in the lower arch and directly beneath the gas-inlet ports, means for supplying gas to the gas-inlet ports, the 75 pressure of which together with the draft in the chamber draws air from the space between the arches into the furnace so that the gas passes into the chamber at the highest point of the furnace crown surrounded by a 80 stratum of highly-heated air, and outlets from the heating-chamber arranged near the air-flues so that the waste heat raises the temperature of the air in said flues, substantially as described. 85

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HENRY WILLIAM HOLLIS.

Witnesses:

ARTHUR ULHATER,
W. EMPST A. ATKINSON.