

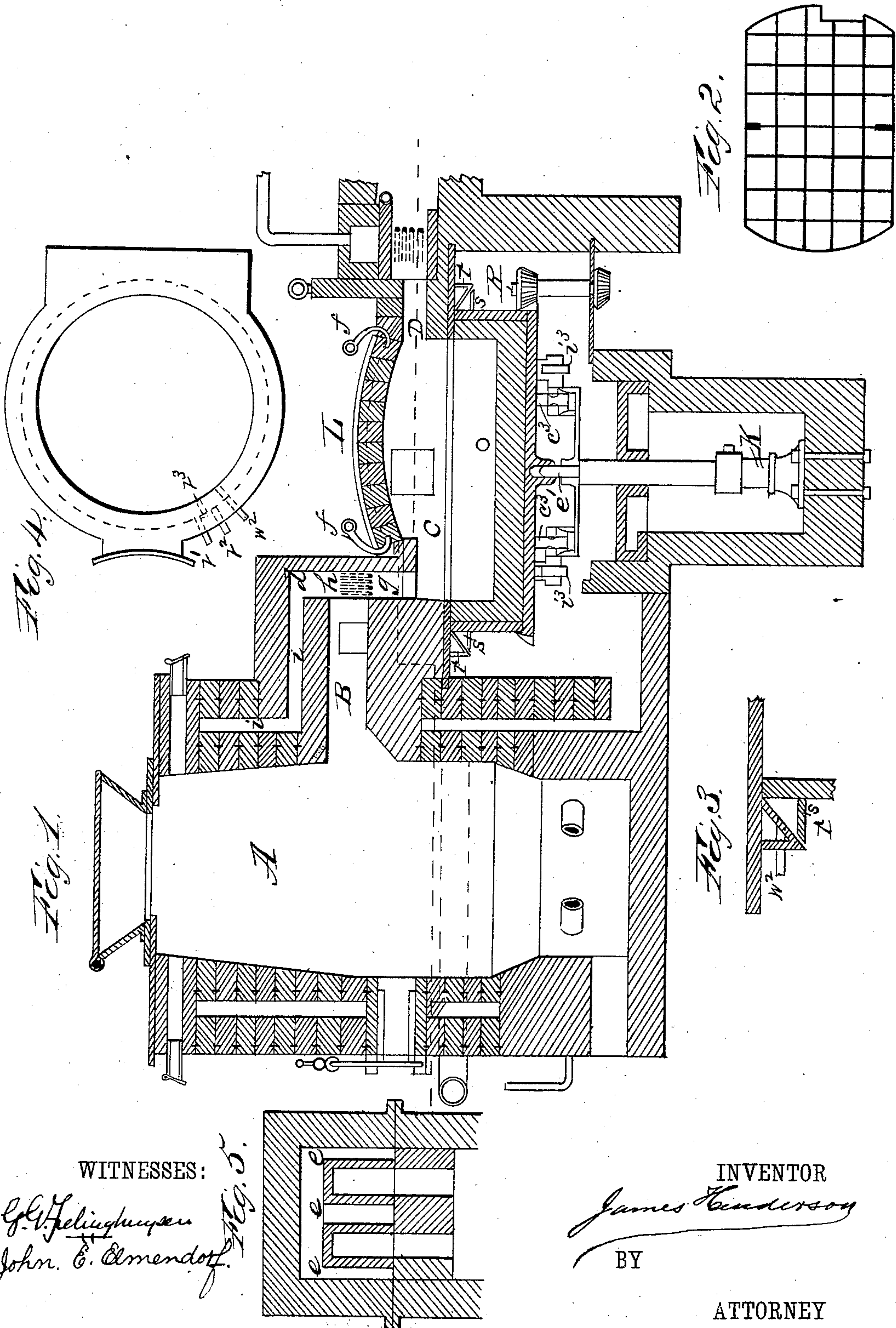
(No Model.)

J. HENDERSON.

FURNACE FOR MANUFACTURING IRON AND STEEL.

No. 281,764.

Patented July 24, 1883.



WITNESSES:

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INVENTOR

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BY

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# UNITED STATES PATENT OFFICE.

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## FURNACE FOR MANUFACTURING IRON AND STEEL.

SPECIFICATION forming part of Letters Patent No. 281,764, dated July 24, 1883.

Application filed July 11, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES HENDERSON, of the city, county, and State of New York, have made an invention of certain new and useful  
5 Improvements in Furnaces for Manufacturing Iron and Steel and other Purposes, of which the following is such a full, clear, and exact description as will enable others skilled in the art to make and use the same, when taken in  
10 connection with the accompanying drawings, in which—

Figure 1 is a longitudinal section of the furnace or apparatus for the production of iron or steel. Fig. 2 is a plan of the roof of the  
15 same. Fig. 3 is a vertical section of the seal-joint between the hearth and roof of the furnace. Fig. 4 is a plan of the plate forming part of the seal-joint. Fig. 5 is a vertical section of outlet-neck of gas-producer.

20 One of the principal parts of the furnace represented in the said drawings is the gas-producer A, from which B is the outlet for the resulting gases into C, a reverberatory furnace from which the gases escape by the outlet D,  
25 and thence to other apparatus, (not shown in the drawings,) and to a chimney to the outer air.

The gas-flue B is attached stationary to the gas-producer and the furnace, and delivers the  
30 gases to the small flues *g*. The air for burning these gases passes through the channel *i*, above the flue B, to the end of the channel *d*, where the vertical channels *e e* communicate by the tuyeres *h* with the flues *g*. The air and  
35 gases are mixed in these flues by the air passing diagonally forward and downward among the gases, thereby causing intimate admixture and combustion in the flues *g*. As these flues are upright, the flame is projected in a down-  
40 ward direction upon the material in the hearth of the furnace.

The portion of the roof of the chamber C at L is made movable by placing the brick in an iron frame, with hooks *f f*, for attaching chains  
45 for raising or lowering; but I do not claim, broadly, the movable roof, as it is a well-known device. Fig. 2 is a plan view of the same.

The vertical gas-flues and movable roof here-  
50 inbefore described will be found of special advantage in other uses than those hereintended,

such as puddling, glass, and other furnaces generally subjected to very great heat, and hence liable to rapid deterioration, as the movable roof covers the portion of the hearth which is not covered by the walls of the up- 55 right flame-delivery flue, which may therefore be stationary.

The hearth of the furnace in the chamber C is moved by being mounted on a table and placed under its center and mounted on a hy- 60 draulic ram, K. The hearth is moved or turned in the furnace by the spur-wheel R, working into teeth on the rim of the hearth. The hearth rests upon the table, which is raised or lowered, as required, by the hydraulic ram. 65

As the teeth upon the rim of the hearth are nearly upright, and the teeth of the spur-wheel R are also nearly upright, the hearth may be lowered and raised without removing the spur-wheel R from its position. Wheels *e'* are 70 placed stationary upon the table, and the hearth revolved upon them. A pivot, *e'*, is shown, which retains the hearth and table in their position.

*i' i'* are wheels with parallel axles, upon 75 which wheels the hearth is moved in and out under the furnace-chamber C; and the hearth is provided with one or more tap-holes, through which the metal and slag may be run or poured from it. 80

Fig. 4 is a plan of a bottom plate of the reverberatory chamber C, and supports the brick and iron superstructure of it. It has the form of a ring, and is fastened at one side to the iron shell of the gas-producer by rivets or 85 bolts, and its opposite side rests in the opposite wall of the furnace. The chamber *r* (shown in section in Figs. 1 and 3) is formed on the bottom of the ring-plate, the upright ring-walls of the chamber being cast 90 fast to the ring-plate, so as to strengthen it, and the chamber made water-tight by a ring-bottom, which is secured to the walls. Water or air is introduced into the chamber *r* through the pipe *v'* and passes out through the pipe 95 *v''*, circulation around the chamber being caused by the partition *v''*, (shown placed between the pipe *v'* and the exit-pipe *v''*.)

*w''*, Figs. 3 and 4, is a water-pipe which passes transversely through the chamber *r*, 100



but does not connect with it. The water, passing through this pipe, drips at the inner side of the chamber upon the clay which is packed on the iron ledge *s* of the cylindrical wall of the hearth, to form a joint that will prevent the passage of air or gases from the hearth between it and the water-box *r*. The clay is thus kept wet, and at the same time the hearth is cooled. The water in the box *r* keeps the bottom plate of the chamber cool.

What I claim as my invention is—

1. The combination, substantially as before set forth, of the hearth of the furnace with an upright flame-delivery flue whose walls cover a portion of said hearth, and a removable roof which covers another portion of said hearth.

2. The combination, substantially as before set forth, of the ring-plate which supports the walls of the reverberatory chamber separately from the hearth thereof, with a ring-cooling chamber connected with said ring-plate and disconnected from said hearth.

3. The combination of the circular cooling-channel beneath the reverberatory chamber,

with a ledge on the side of the movable hearth for packing clay to seal the joint beneath the hearth and the upper part of the chamber, substantially as herein set forth.

4. The combination of the circular cooling-channel beneath the reverberatory chamber, with a water-jet to wet the clay upon the ledge of the movable hearth, substantially as herein set forth.

5. The combination of a hydraulic ram, a table supported thereby and provided with wheels, a pivot upon which the hearth revolves, and a movable hearth provided with wheels having parallel axles for removing said hearth from the furnace, substantially as herein set forth.

6. The combination of a hydraulic ram, a movable hearth with a toothed rim whose teeth are upright, and a spur-wheel having upright teeth, substantially as herein set forth.

JAMES HENDERSON.

Witnesses:

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