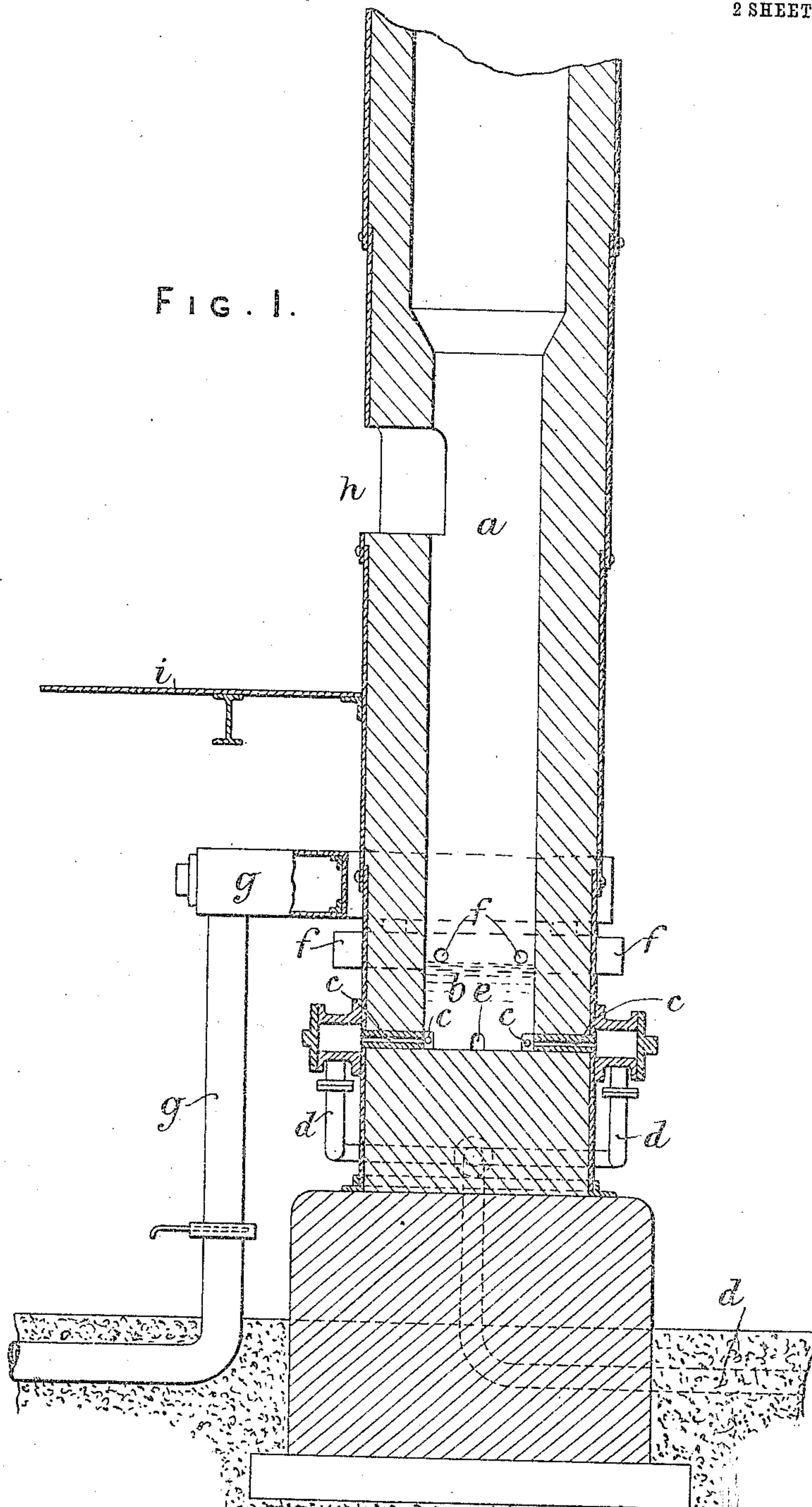


H. JOHNSON.
PROCESS FOR MELTING AND REFINING IRON.
APPLICATION FILED NOV. 4, 1909.

952,260.

Patented Mar. 15, 1910.
2 SHEETS—SHEET 1.

FIG. 1.



Witnesses,
[Signature]
[Signature]

Inventor
Henry Johnson
By *[Signature]*
James E. Norris

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FIG. 2.

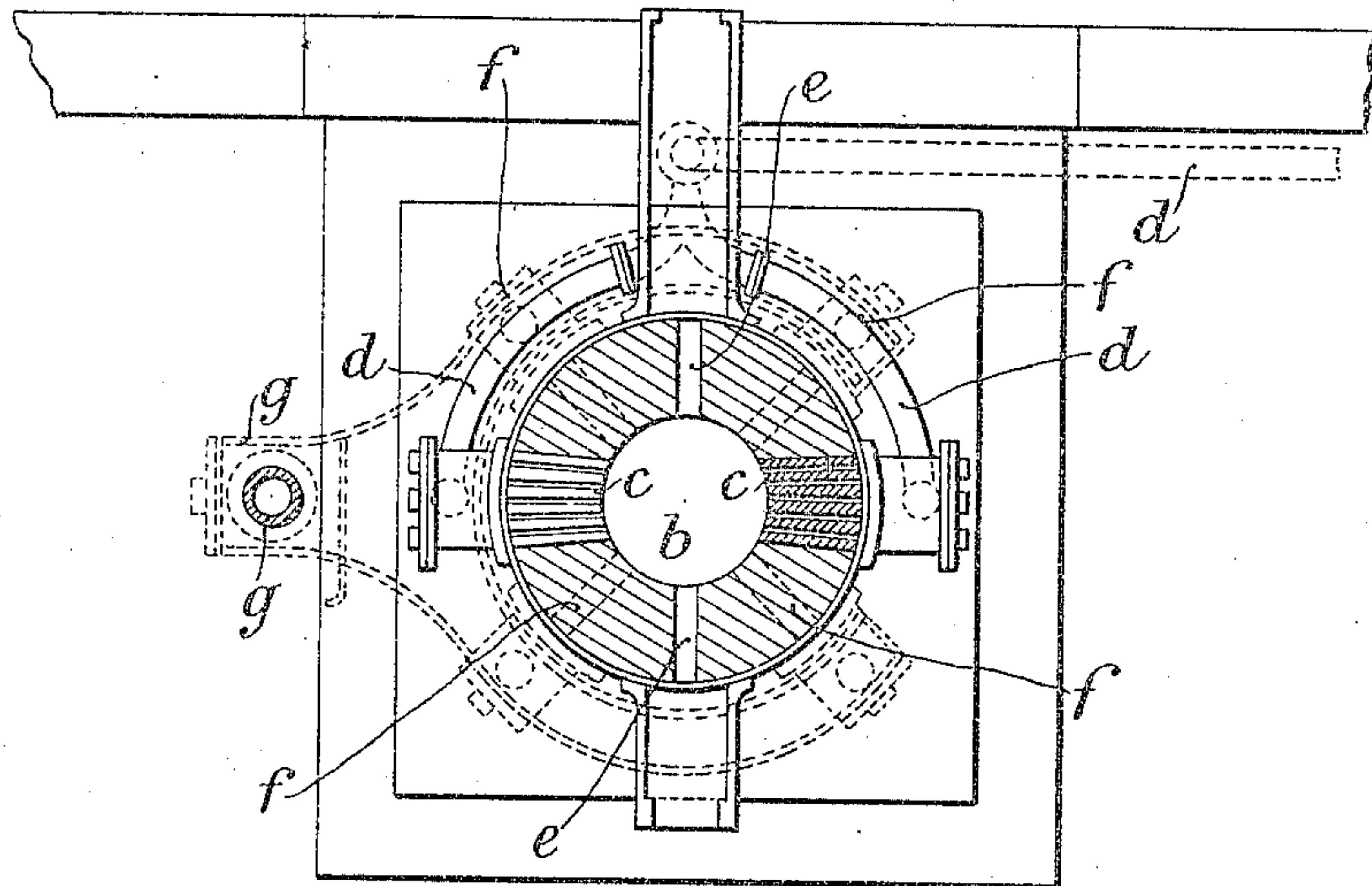
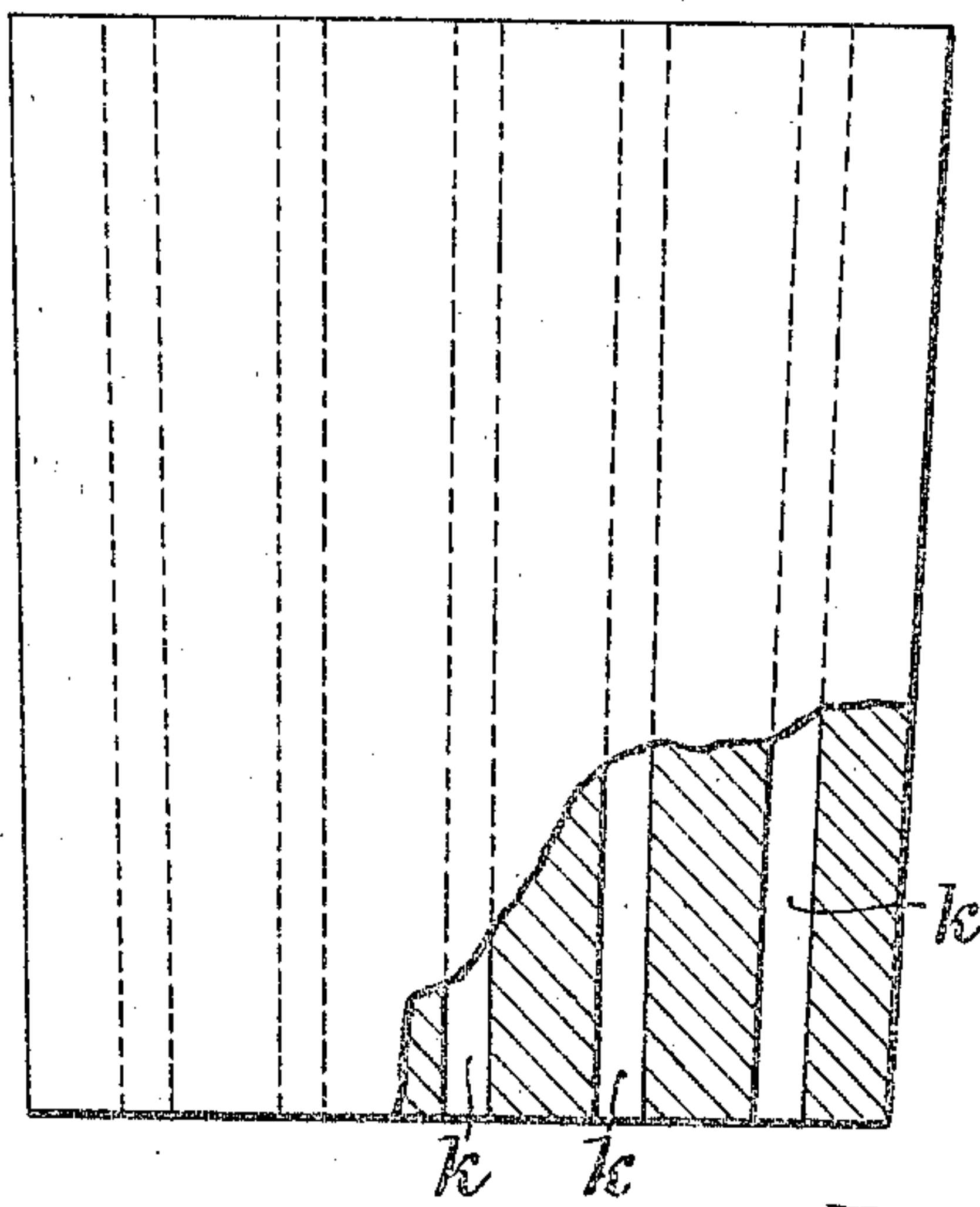


FIG. 3.



Witnesses:

[Signature]
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By *[Signature]*
James L. Norris
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UNITED STATES PATENT OFFICE.

HENRY JOHNSON, OF SAXILBY, ENGLAND.

PROCESS FOR MELTING AND REFINING IRON.

952,260.

Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed November 4, 1909. Serial No. 526,241.

To all whom it may concern:

Be it known that I, HENRY JOHNSON, a subject of the King of Great Britain, residing at Church Lane, Saxilby, in the county of Lincoln, England, steel-founder, have invented certain new and useful Improvements in Processes for Melting and Refining Iron, of which the following is a specification.

As usually constructed, cupolas are only capable of melting the iron, the cupolas being charged with pig or scrap iron and coke. No means are provided whereby the quality of the metal can be improved or the cost of melting can be reduced.

My invention has for its object a process by the employment of which the quality of the metal can be improved to the highest degree possible and the cost of melting materially reduced.

According to my invention, I force the main body of air through the molten metal at the bottom of a cupola and the burning gases given off are utilized to heat and melt the descending charges of iron.

A cupola constructed to carry out the process according to my invention may be designed as follows:—The cupola, which may be of the ordinary type with or without a receiver, is formed with a bath at the bottom capable of holding a suitable quantity of molten metal. A set of high pressure blast twyers are provided in the side walls at the bottom of the bath, the size and number being governed by the melting capacity of the cupola, said twyers being connected to a suitable air compressor or pressure blower and serve to refine the metal. The bottom of the bath may be formed with a tapping hole through which the metal remaining at the end of a blow may be run off. A set of twyers are provided at a higher level than the blast twyers and are connected to a suitable fan or blower, these low pressure twyers being approximately at the same level as the overflow.

Preferably, the charging door is arranged at a suitable height so that the descending charge may be acted upon as a reducing agent by the burning gases as they pass from the bath through the charge to the atmosphere.

In the accompanying drawings, which illustrate a cupola capable of carrying out the process, according to my invention, Fig-

ure 1 is a vertical section, Fig. 2 is a horizontal section and Fig. 3 is a sectional plan of one of the air bricks.

The cupola *a* is formed with a bath *b* at its bottom capable of holding a suitable quantity of molten metal. Blast twyers *c* are fitted at the side of the bath, and are connected by pipes *d* with a suitable source of high pressure air, such as an air compressor or pressure blower. One or more tapping hole or holes *e* is or are formed at the bottom of the bath *b*. A set of twyers *f* are fitted at about the same level as the top of the bath and are connected by pipes and trunks *g* (shown in dotted lines in Fig. 2) to a suitable source of comparatively low pressure air, such as a suitable fan or blower.

h is the charging door and *i* is the charging platform.

The twyers *c* are preferably formed as bricks (Fig. 3) which are molded or formed with tubular air passages *k*, the general formation of the brick being slightly wedge shaped.

In using the improved cupola, the charges of coke may be gradually reduced as soon as the melting has commenced and the temperature increases, and the gases set free by the blow alone are used to continue the melting operation. The upper twyers *f* may then be opened to the atmosphere or supplied with steam or both, to mix with the burning gases and support the combustion.

I claim:—

1. A process of reducing and refining iron which consists in forming a bath of molten iron at the bottom of a cupola and providing charges of the ore and fuel above such bath, forcing air at high pressure into the bottom of the bath of molten iron to liberate therefrom gases in a burning condition, causing said burning gases to act upon the descending charges as a reducing agent, and admitting a supplementary amount of combustion sustaining gas at substantially the level of the top of the bath of molten iron.

2. A process of reducing and refining iron which consists in forming a bath of molten iron at the bottom of a cupola and providing charges of iron ore and fuel above such bath, forcing air at high pressure horizontally into the bottom of the bath of molten iron to uniformly liberate therefrom gases in a burning condition, causing said burning gases liberated from the bath of molten iron

to act upon the descending charges as a reducing agent, and admitting a supplementary amount of low pressure air at substantially the level of the top of the bath to assist or support combustion in the zone occupied by the charges.

In testimony whereof I have hereunto set

my hand in presence of two subscribing witnesses.

HENRY JOHNSON.

Witnesses:

LUTHER J. PARR,
CHAS. N. DANIELS.