

G. O. SEWARD.
TAPPING FURNACE.
APPLICATION FILED MAY 3, 1904.

940,561.

Patented Nov. 16, 1909.

FIG. 1.

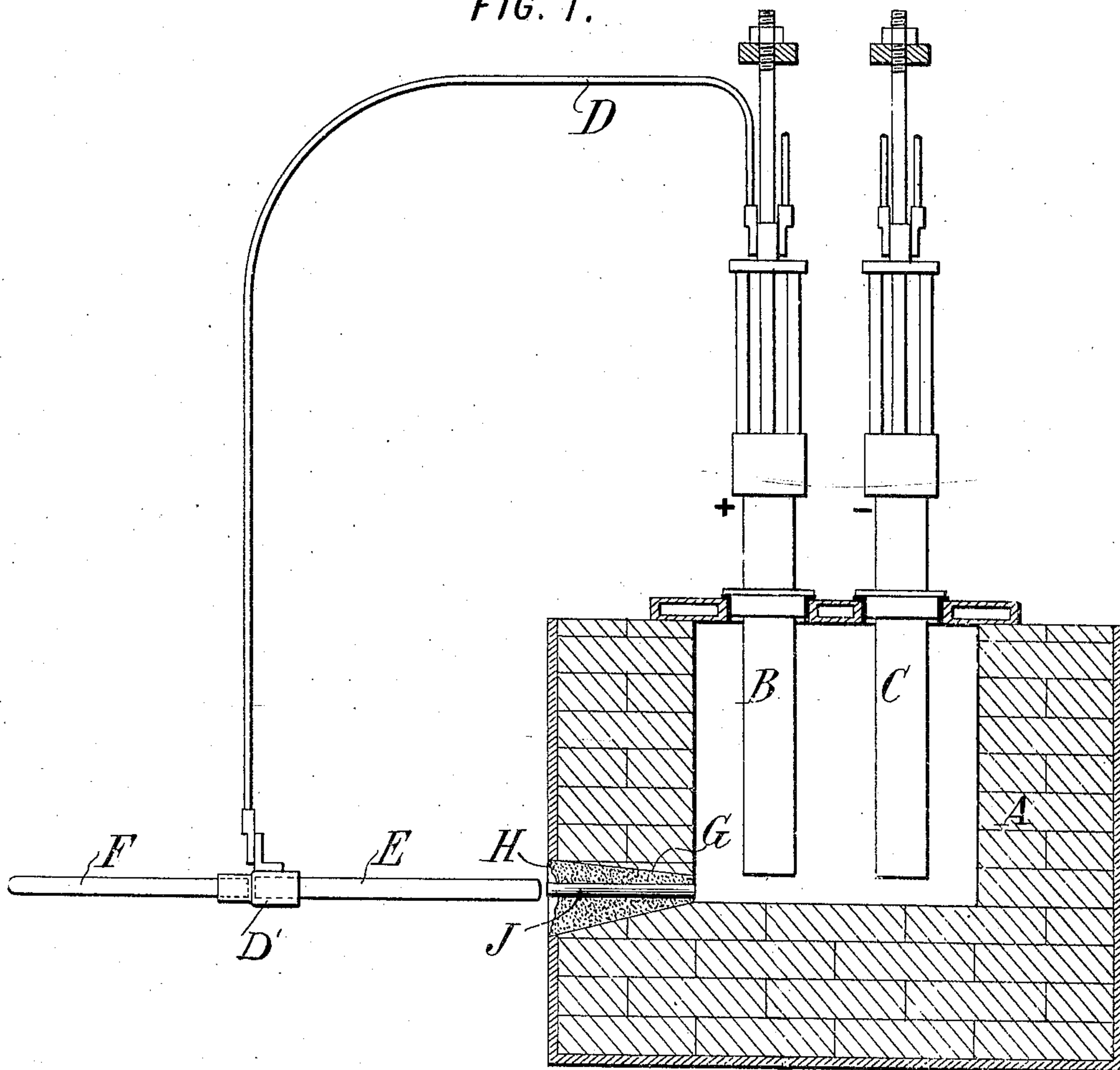
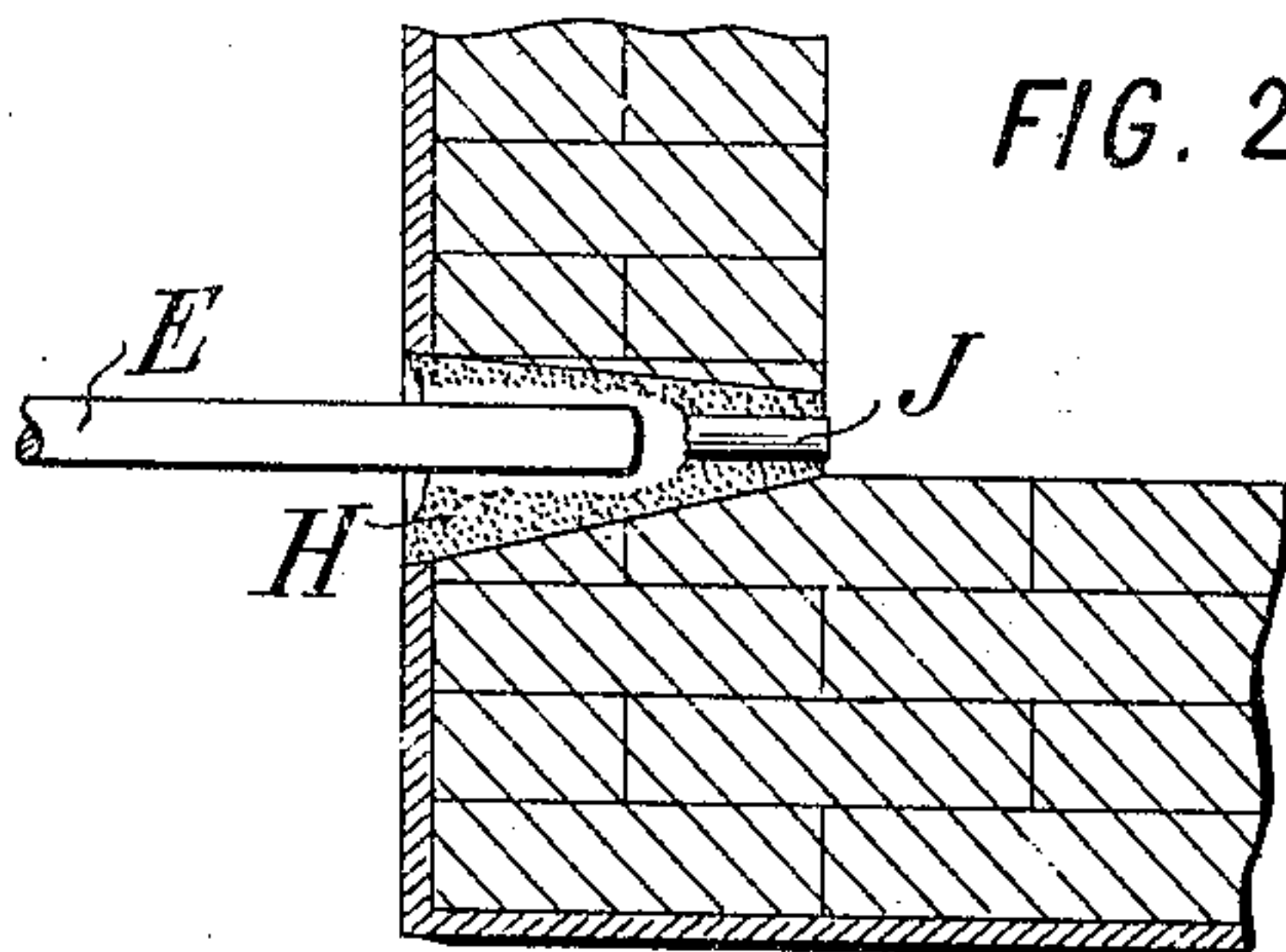


FIG. 2.



WITNESSES:
Fred White
Rene Ruine

INVENTOR:
George O. Seward,
By Attorneys,
Arthur O. Traver & Co

UNITED STATES PATENT OFFICE.

GEORGE O. SEWARD, OF HOLCOMBS ROCK, VIRGINIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ELECTRO METALLURGICAL COMPANY, A CORPORATION OF WEST VIRGINIA.

TAPPING-FURNACE.

940,561.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed May 3, 1904. Serial No. 206,252.

To all whom it may concern:

Be it known that I, GEORGE O. SEWARD, a citizen of the United States, residing at Holcombs Rock, in the county of Bedford and State of Virginia, have invented certain new and useful Improvements in Tapping-Furnaces, of which the following is a specification.

In tapping furnaces, and especially electric furnaces in which highly refractory materials are encountered, the tap hole often becomes filled with slag and metal despite the greatest care used in applying the clay or other filling for closing it after tapping. In such cases it is very difficult to drive the tapping bar through the obstructions when it is desired to tap the furnace again. It occasionally happens that the bottom of the molten metal in the furnace becomes chilled, rendering the opening of the furnace almost impossible, and always necessitating a great amount of sledging and drilling with steel bars.

The present invention aims to obviate these difficulties, and provides for electrically generating heat to burn a hole through the material filling the tap hole of the furnace, preferably by the application of an electric arc.

The invention provides also for the introduction of a special plug in the tap hole, which may be pulled out of or driven through the same, or which may be melted out according to the necessities of the case.

Suppose for example an ordinary electric furnace is used. After the tap hole has been plugged up with clay or the like, an iron rod smaller than the tap hole (say an inch or an inch and a half in diameter) is driven through the clay far enough to make electrical connection with the conductive contents of the furnace. Then in order to tap the furnace a special tapping electrode is brought up to the iron rod to establish an arc between the two. This arc is maintained, melting away the incombustible iron rod and clay, and the tapping electrode is gradually advanced into the furnace until the hole made reaches the contents of the furnace.

A suitable apparatus is illustrated in the accompanying drawings.

Figure 1 is partly a section and partly an elevation of an electric furnace at the beginning of the process described; Fig. 2 is a

fragmentary view at an advanced stage of the process.

Referring to the specific apparatus illustrated, A is an electric furnace of the usual or any suitable type having two electrodes B and C by which the mixture in the furnace is melted in the usual manner. From one of the electrodes (or from any other suitable point of connection) a branch cable D extends to the vicinity of the tap hole, where it is mechanically and electrically connected through a metal socket D' with a tapping electrode E of carbon, a handle F of non-conducting material being also attached to the socket D'.

With this apparatus, after each tapping, the tap hole G is plugged with clay or other suitable incombustible material H. Then a rod J of iron or other incombustible conducting material is driven into the tap hole until its inner end makes connection with the contents of the furnace. Now when it is desired to tap, it may be found that the rod J can be withdrawn or driven in without great difficulty, opening the tap hole at once without the necessity of using the electrode E. But supposing the slag or metal at the inner end of the rod J to have become hardened or crusted around the tap hole to such extent as to prevent removal of the rod J, then the electrode E is brought up to the rod J, and an arc established between the two. This arc melts away the rod J and the surrounding clay H, and may be gradually advanced by advancing the electrode E (Fig. 2) to such point as to release the contents or to permit the driving in of the rod J.

The process is not restricted to the specific apparatus shown, nor to any particular style of furnace. It has been used with success in electric furnaces of the single pole type in which the crucible itself forms one electrode. It is only necessary in such cases to use care to avoid overloading the tapping electrode by a current directly from the crucible.

It is to be observed that the word "removable" is applied to the bar J in a broad sense, which includes pulling it out and driving it in, and also melting it away.

Though I have described with great particularity of detail a certain process and apparatus embodying this invention, yet it is not to be understood therefrom that the in-

vention is limited to the specific embodiments described.

Various modifications in detail and in the arrangement and combination of the parts of the apparatus, may be made by those skilled in the art without departure from the invention.

What I claim is:—

1. The process of operating a tapping furnace, which consists in closing the tap hole with a plug of incombustible material which includes a conductor, providing an electric arc at the tap hole, and melting out the closing material therewith.

2. The process of operating an electric tapping furnace which consists in closing the tap hole by means including a conductive material, and opening the tap hole by the heat from an electric current arcing to and carried through said conductive material.

3. The process of operating an electric tapping furnace which consists in closing the tap hole with a refractory material, and driving a rod of conductive material there-through into contact with the conductive contents, and opening the tap hole by establishing an arc between said rod and an ex-

ternal electrode and thus burning a hole into the furnace.

4. The process of operating a tapping furnace which consists in closing the tap hole with a refractory material, driving therethrough a removable rod, and removing said rod by melting away the same.

5. The combination with an electric furnace of an external electrode and a conductive rod connecting with the conductive contents and passing to the outside of the furnace, said electrode being arranged in position to spring an electric arc to said rod.

6. The process of operating a tapping furnace, which consists in closing the tap hole by a plug primarily consisting of incombustible electrically-non-conductive material, and opening the tap hole by melting out the plug by means of an electric arc.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

GEORGE O. SEWARD.

Witnesses:

GEO. T. LANCASTER,
E. VON KÜGELGEN.