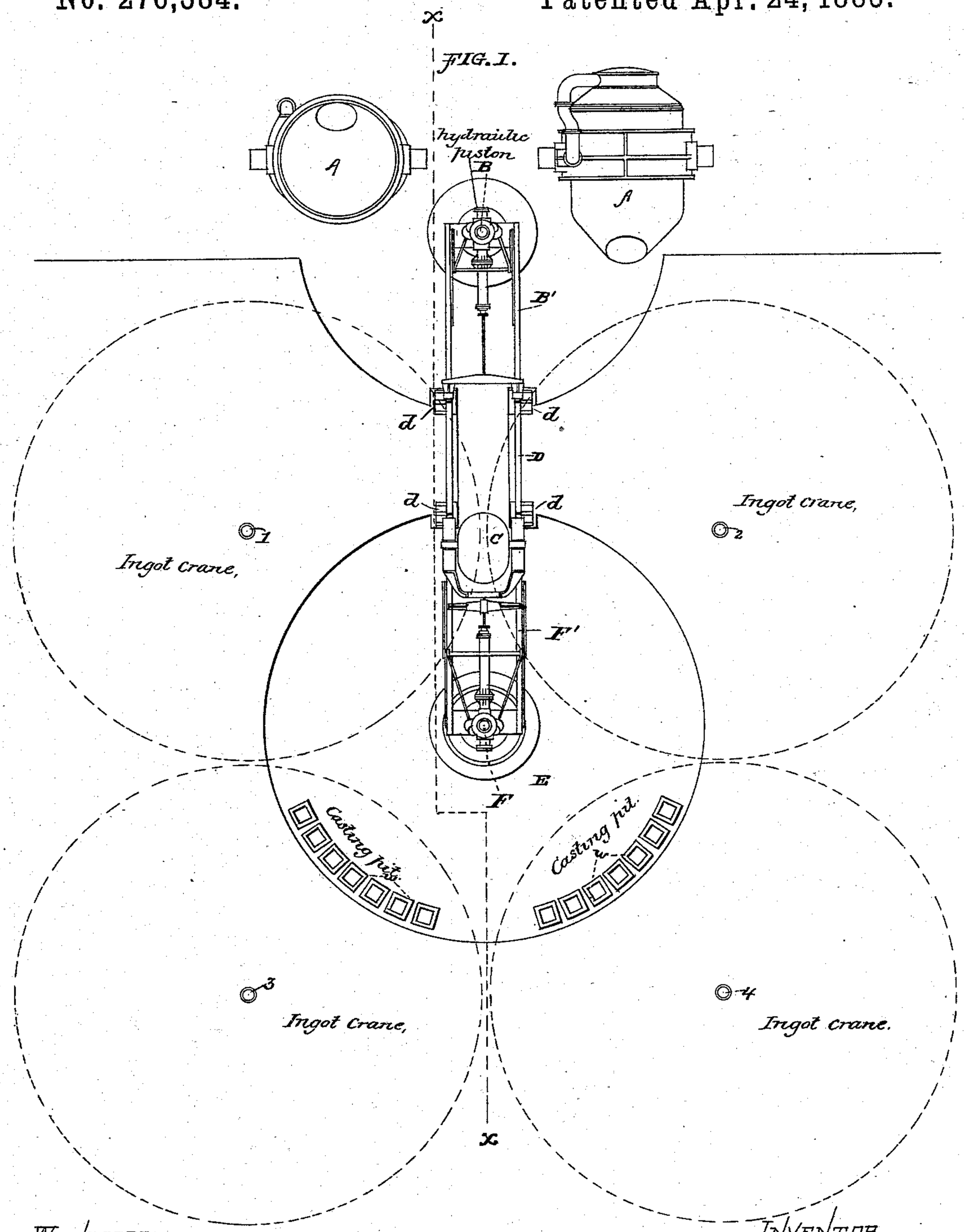
(No Model.) 4 Sheets—Sheet 1.

R. FORSYTH.

METALLURGICAL PLANT.

No. 276,384. Patented Apr. 24, 1883.

FIG. 1.



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(No Model.)

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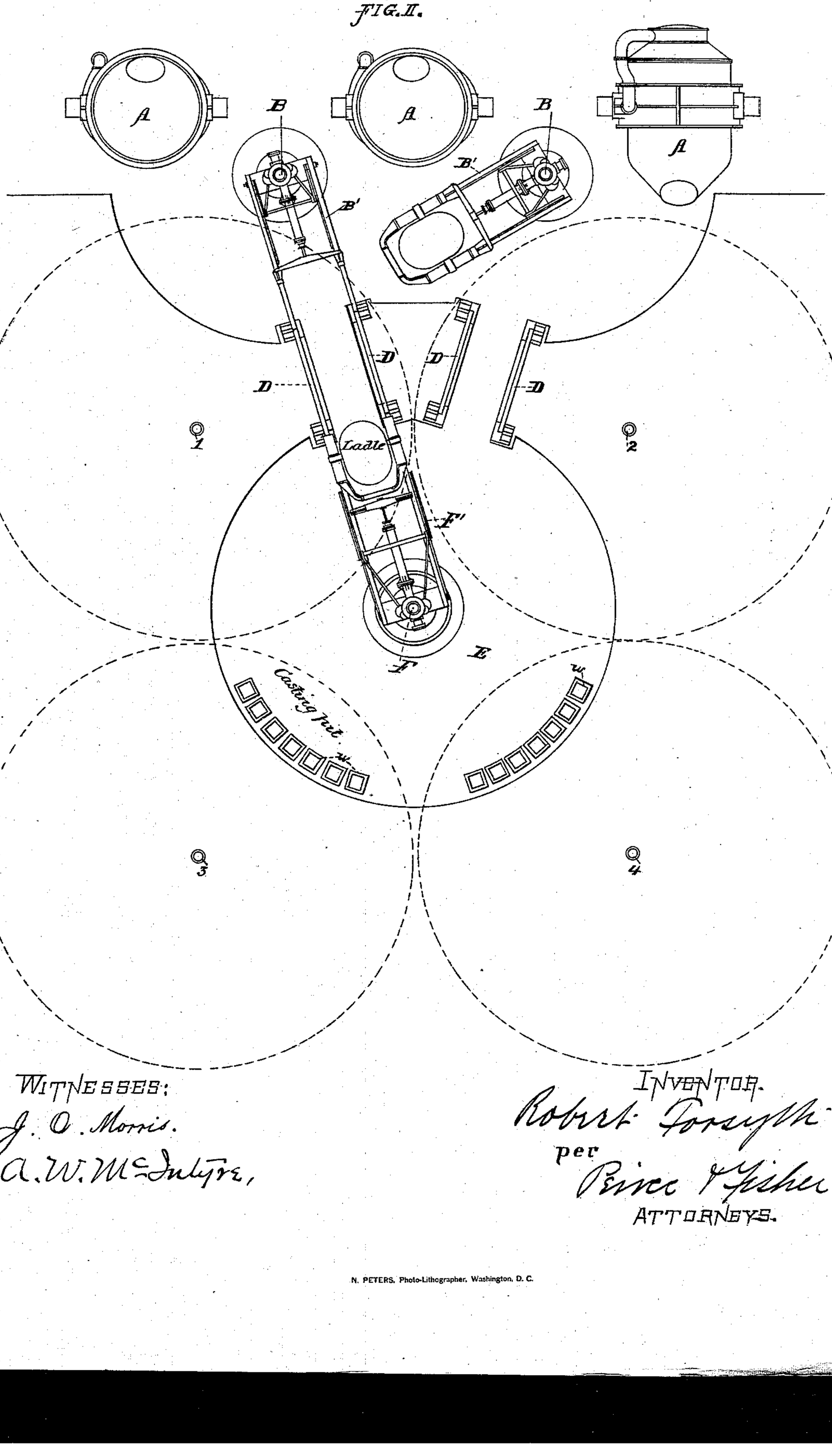
FIG. II.



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(No Model.) 4 Sheets—Sheet 3.

R. FORSYTH.

METALLURGICAL PLANT.

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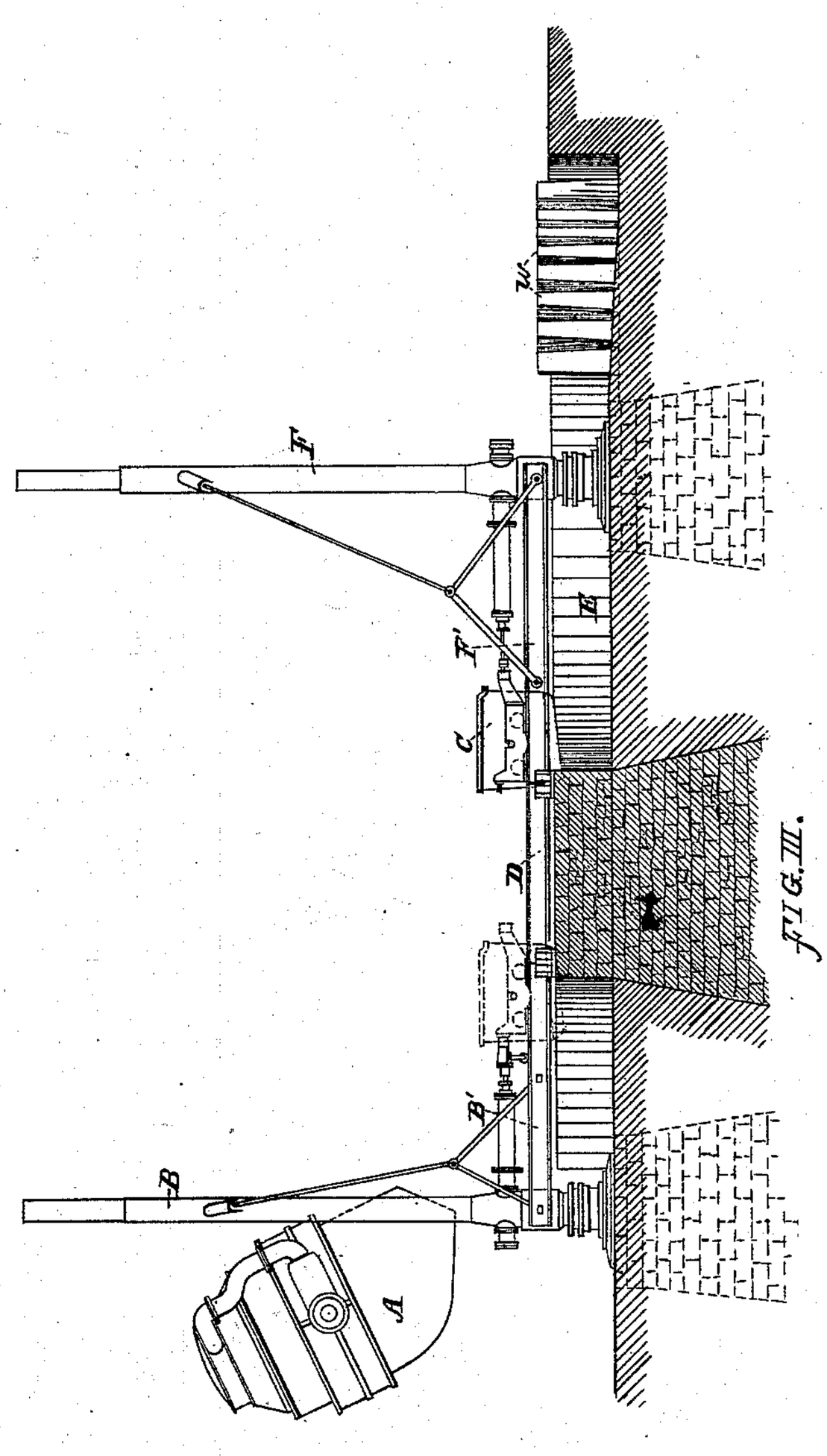

FIG. III.

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(No Model.) 4 Sheets—Sheet 4.

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METALLURGICAL PLANT.

No. 276,384. Patented Apr. 24, 1883.

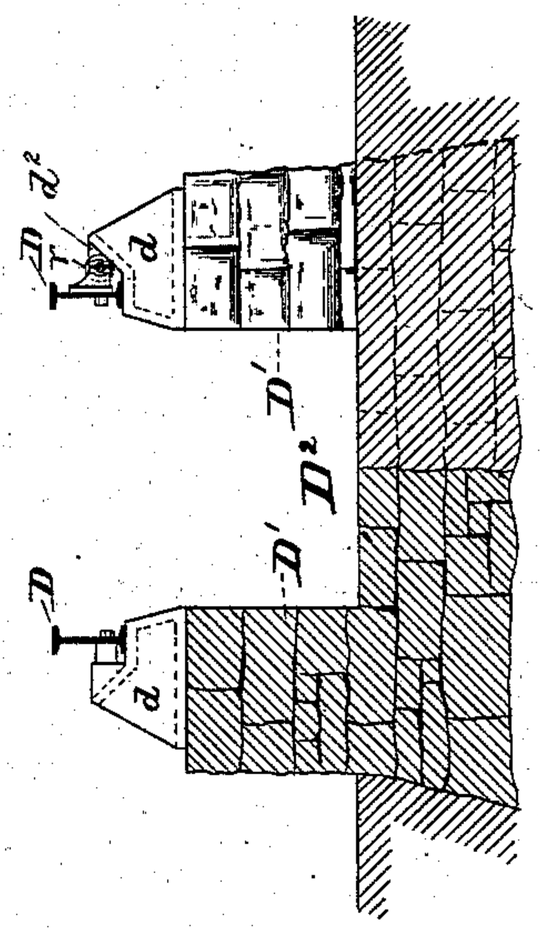

FIG. VI.

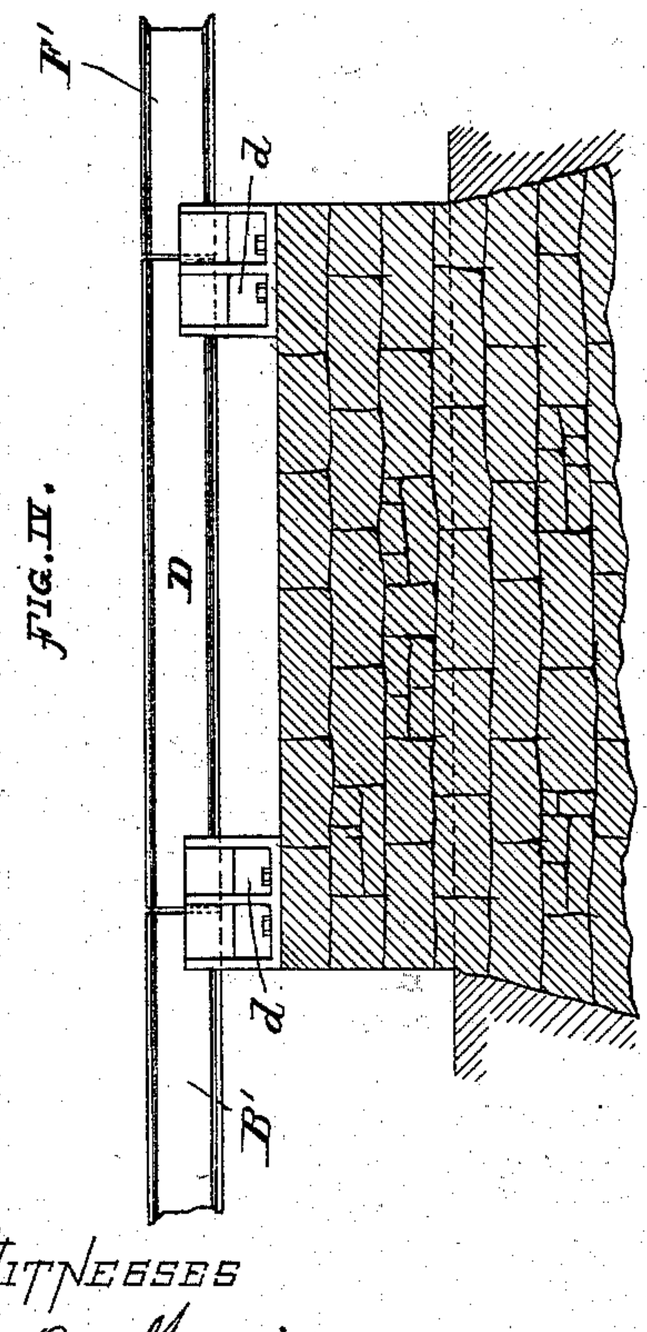

FIG. III.

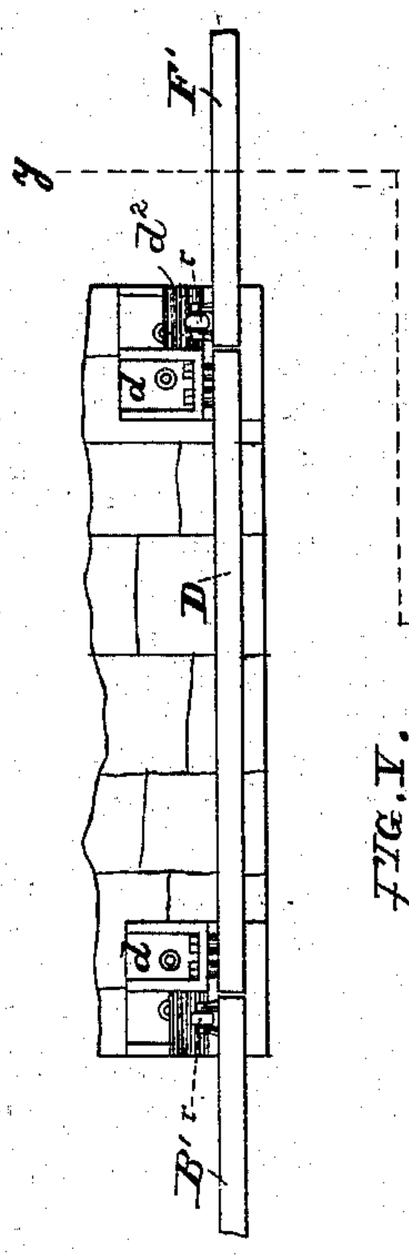

FIG. IV.

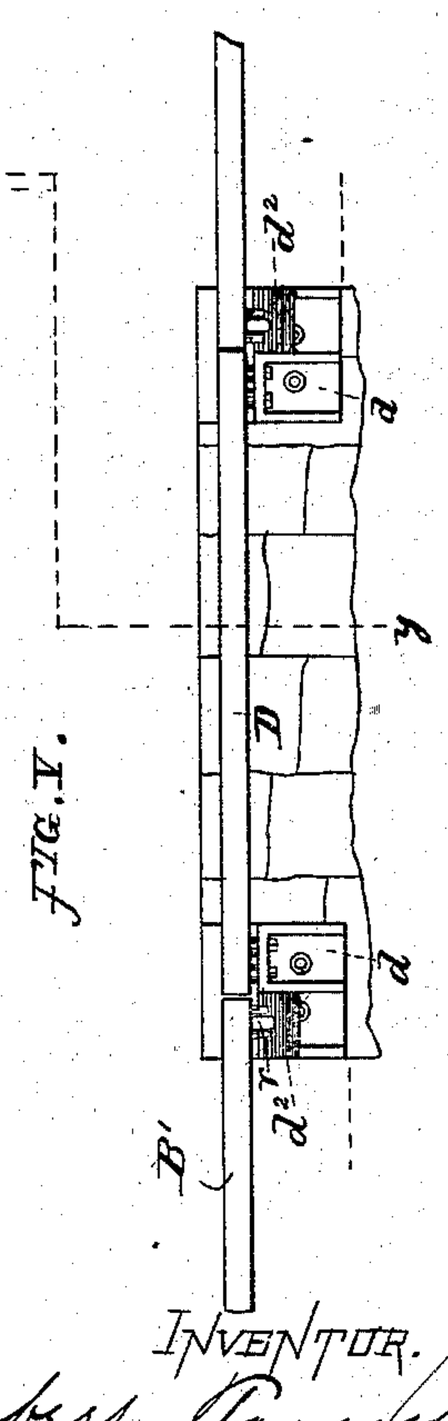

FIG. V.

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Attorneys

UNITED STATES PATENT OFFICE.

ROBERT FORSYTH, OF CHICAGO, ILLINOIS.

METALLURGICAL PLANT.

SPECIFICATION forming part of Letters Patent No. 276,384, dated April 24, 1883.

Application filed February 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, ROBERT FORSYTH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Metallurgical Plants, of which the following is a full, clear, and exact description.

In carrying out the Bessemer or pneumatic and also the open-hearth steel-making processes the usual arrangement of the plant is a casting-pit having a ladle-crane in its center, and on one side a pair of converters or a melting-furnace. This arrangement necessarily so restricts the available room in the pit for casting ingots that less than half the circumference of the pit can be used, and the proximity of the converters or furnaces to the men working in and about the pit is a source of great inconvenience and delay. These difficulties, which are well known to those engaged in making steel by the Bessemer or open-hearth process, have led to various dispositions of plants, especially Bessemer plants, for securing more room in the casting-pit and for removing the casting-pit farther from the converters. Increasing the diameter of the casting-pit gives room in the pit for ingots; but as the length of the crane-jib must be increased with the diameter of the pit great strains are thrown upon the crane, and the apparatus becomes unwieldy and unsafe. Moreover, this increase in size of pit does not remove the objection of the proximity of the converters or furnaces to the men at work.

My invention, which obviates all the above-mentioned difficulties, consists in placing between the receiving and casting cranes or their equivalent mechanism a track, upon which the carriage carrying the casting-ladle may be run. This track may be of any convenient length, and its length will determine the distance to which the casting-pit is removed from the converters or furnaces.

In the accompanying drawings I have shown my invention as used in connection with Bessemer plants; but it will be understood by those skilled in the art that it may be readily applied without material change to plants wherein open-hearth furnaces are employed.

Figure I represents a plan view of a two-vessel plant, and Fig. II is a plan view of a three-vessel plant, embodying my invention. Fig. III is a view in side elevation upon line *x x* of Fig. I. Fig. IV is an enlarged detail view in side elevation of the transfer-track and portion of the crane-jibs. Fig. V is a plan view of the transfer-track and ends of the crane-jibs. Fig. 6 is a view partly in end elevation and partly in section on line *y y* of Fig. V.

Referring to the arrangement shown in Figs. I and III, A designates two Bessemer converters, which are of ordinary construction, and are provided with the usual operating mechanism. Intermediate these converters, and equidistant therefrom, is placed the hydraulic receiving-crane B, of well-known form, the jib B′ of which is furnished with rails, upon which travels the casting-ladle C. At a distance from the crane B, determined by the length of its jib B′, is placed what I designate the "transfer-track," consisting of the rails D, resting upon the blocks *d*, supported on the masonry piers D′, which extend to the casting-pit E and form the channel D^2, for the passage of the casting-ladle, as clearly shown in Fig. V. The blocks *d*, which support the track-rails and jib ends, are provided with the inclined planes d^2, the purpose of which is to guide the crane-jibs, furnished at their ends with the rollers *r*, into ready alignment with the transfer-track. Centrally of the casting-pit is placed the hydraulic casting-crane F, the jib F′ of which extends to the transfer-track. The cranes B and F are preferably furnished, as shown, with the usual hydraulic pistons for moving the ladle-carriage, although for this purpose other suitable mechanism may be employed.

In the three-vessel plant (illustrated in Fig. II) the converters A are arranged in line, and two receiving-cranes, B, are placed intermediate the central and outer vessels, two transfer-tracks being in this case employed. The rails of these tracks are supported similarly to those shown in Figs. I and II, but the tracks are placed obliquely to each other and in such position that each shall be in alignment with the jib of its receiving-crane when the latter is brought opposite to the casting-crane F, common to both.

The centers 1, 2, 3, and 4 indicate the positions of the usual cranes employed for the purpose of lifting out the ingots and transfer-

ring the ingot-molds *w* to and from the casting-pit.

The operation of the apparatus is as follows: The ladle, having been placed upon the receiving-crane, is filled with steel from the converter or furnace, (when the latter is used,) and the receiving-crane is then swung around until the rails of its jib are in line with the transfer-track and the jib-rails of the casting-crane. The receiving crane-jib is then lowered, its ends being guided by the inclined planes of the blocks d^2 until it comes to rest, and is firmly supported by the piers in line with the transfer-track. The ladle is then transferred from the receiving-crane jib to the track, and from the track to the jib of the casting-crane, which carries the ladle successively over the ingot-molds.

The advantages resulting from the foregoing construction are, first, the casting-pit may be placed at any desired distance or in any desired direction from the converters or furnaces; second, nearly the whole circumference of the casting-pit may be used for casting ingots, thus considerably increasing the number of ingots that can be handled in a given pit without lengthening the crane-jib to a dangerous extent; and, third, a smooth and even passage of the casting-ladle from crane to track and from track to crane is secured.

Although in the accompanying drawings I have illustrated hydraulic receiving and casting cranes which are the most approved construction of apparatus for handling the casting-ladle, I do not wish to be understood as restricting the scope of my invention thereto, since it is obvious that any other suitable mechanism may be employed for this purpose in connection with my intermediate track. Thus, if desired, the well-known hydraulic ladle-lift may be used for presenting the casting-ladle to receive its charge of metal, and the ingot-molds, instead of being placed in a pit having a central casting-crane, may be carried upon a turn-table, which will be separated from the hydraulic lift by my intermediate track.

It will also be obvious to those skilled in the art that the details of construction above described may be further varied without departing from the spirit of the invention. Thus, for example, other means than those here shown may be employed for guiding the ends of the crane-jibs into place. So, also, the transfer-track used in connection with the cranes, instead of being fixed, may be mounted on a turn-table, so that the ladle may, when desired, be switched upon a side track, or when run upon a track on each side of which is a row of ingot-molds may have its position reversed, so as to bring its tap hole above each row of molds. In some instances the intermediate track may be made portable, so that it can be removed and put in position for use as desired. Again, it will be apparent that without material change the track may be placed above, below, or upon the working level to correspond to the particular construction of plant in connection with which it is employed.

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

1. In a metallurgical plant, the combination, with the receiving and casting cranes or their equivalents, of an intermediate track, substantially as described.

2. In a metallurgical plant, the combination, with the two receiving-cranes and a casting-crane or their equivalents, of two intermediate transfer-tracks, substantially as described.

3. In a metallurgical plant, the combination, with the receiving and casting cranes, of an intermediate transfer-track and means, substantially as described, for sustaining the ends of the crane-jibs, substantially as set forth.

4. In a metallurgical plant, the combination, with the receiving and casting cranes or their equivalents, of an intermediate transfer-track and means, substantially as described, for guiding the ends of the crane-jibs into alignment with the track, substantially as set forth.

In testimony whereof I have hereunto set my hand this 6th day of February, 1883.

ROBERT FORSYTH.

Witnesses:

GEORGE P. FISHER, Jr.,

JAMES H. PEIRCE.