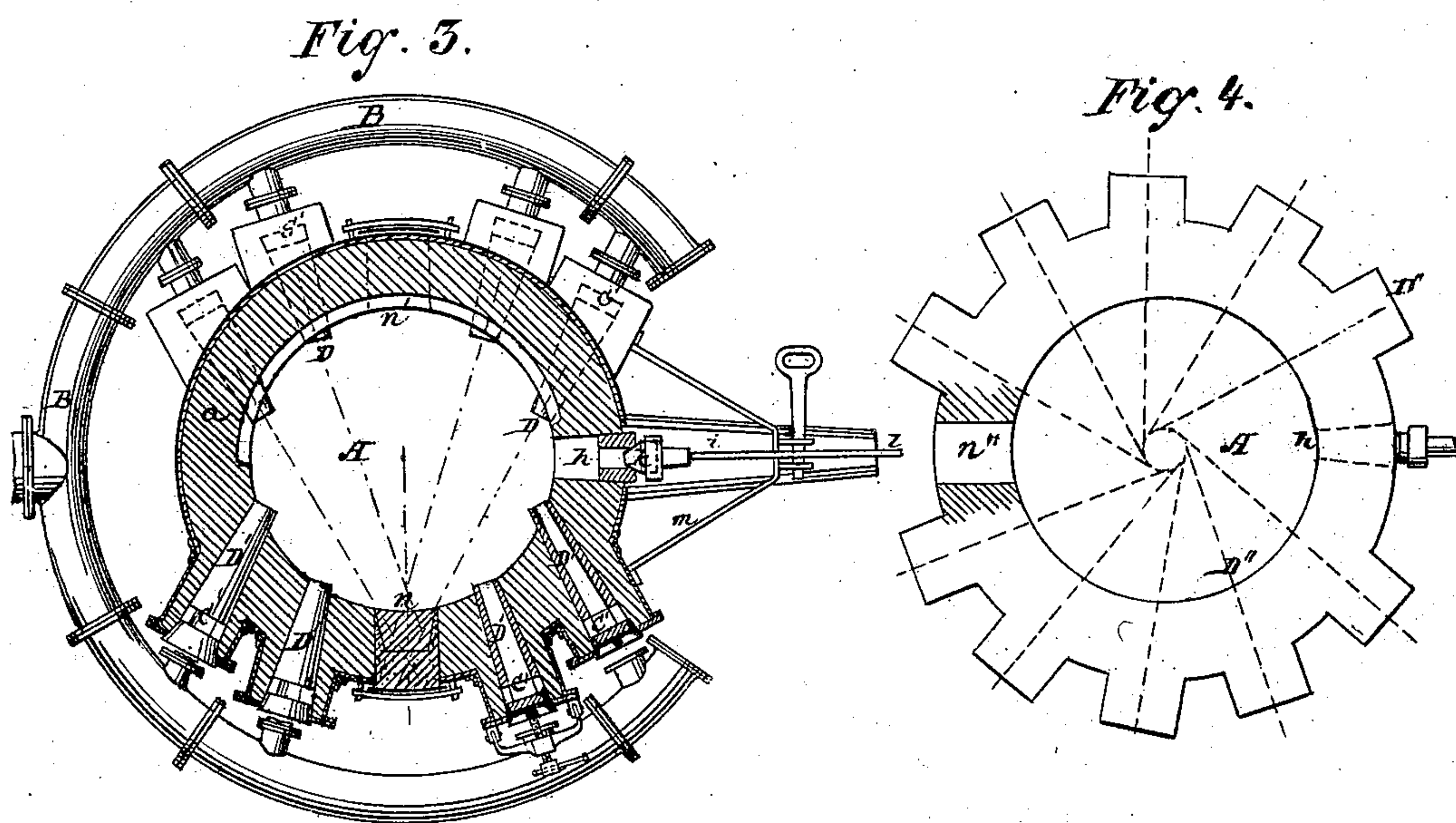
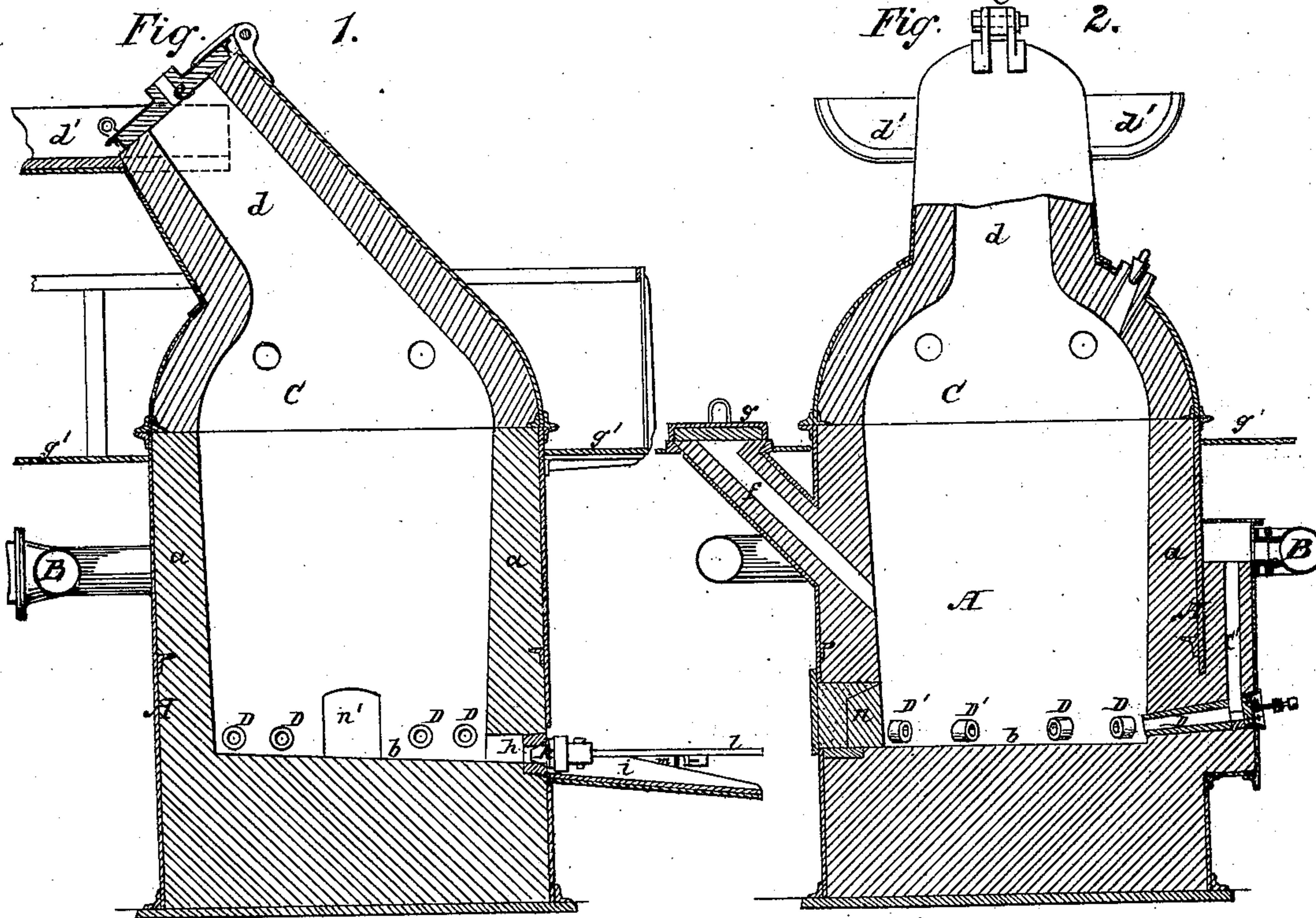


L. WITTHOFFT.
CONVERTER FOR THE MANUFACTURE OF BESSEMER STEEL.

No. 195,196.

Patented Sept. 11, 1877.



Witnesses
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LUDWIG WITTHÖFFT, OF BOCHUM, GERMANY.

IMPROVEMENT IN CONVERTERS FOR THE MANUFACTURE OF BESSEMER STEEL.

Specification forming part of Letters Patent No. **195,196**, dated September 11, 1877; application filed June 26, 1877.

To all whom it may concern:

Be it known that I, L. WITTHÖFFT, of the city of Bochum, in the county of Westphalia and Empire of Germany, have invented a new and improved converter to be employed for the manufacture of steel according to what is known as the Bessemer process, of which the following is a specification:

Figure 1 is a vertical transverse section of the converter. Fig. 2 is a vertical transverse section taken at right angles to Fig. 1. Fig. 3 is a horizontal section. Fig. 4 is a horizontal section of a modification.

The object of my invention is to furnish a device by which the expense of manufacturing steel by the Bessemer process is reduced, and nearly all the danger to the lives of the operatives is averted.

The invention relates to an improved fixed converter to be employed in the manufacture of steel; and consists of a circular iron vessel, A, lined with ganister, fire-brick, or any other suitable fire-resisting material, *a*, and provided with a flat bottom or hearth, *b*, while the usual domed top C terminates in a large opening, *d*, similar to that employed in converters of ordinary construction, but provided with a hinged plate, *e*, lined with refractory material for closing the opening *d* after the blowing operation is completed, thus preventing unnecessary cooling, and with a guard, *d'*, for protecting the attendants from injury or inconvenience by the emission of sparks.

Around the converter there is placed a cast-iron pipe, B, through which the blast passes into any suitable number of vertical flues C' C', formed of fire-resisting material, and thence into and through the tuyeres D D'. The flues C C', as well as the outer portions of the tuyeres D D', are formed in an extension or series of extensions of the walls of the converter, said extension or extensions being lined with the same or similar fire-resisting material to that with which the furnace is lined. A minimum number of tuyeres are employed, and they are constructed with proportionately large openings, so that the blast is introduced in a minimum number of jets of a maximum volume, whereby a saving in the

expenditure of power requisite to supply the blast is effected. The tuyeres are placed in the side of the vessel at a short distance above the hearth *b*, and at a slight angle thereto. They may be arranged either radially, or, by preference, as shown in the drawings, with their axes forming tangents to imaginary circles struck from the center of the vessel A.

In the side of the vessel, at a suitable distance above the floor, there is formed an aperture, *f*, for the passage of the molten metal to be operated upon, which aperture may be maintained air-tight during the operation by a weighted cover, *g*, or other convenient means. The stage *g'* for the attendants is provided for the facility of serving the apparatus.

h is a tap-hole fitted with a spout, *i*, for the discharge of the steel from the converter into the ladle. When the tap-hole is closed in the ordinary manner, a liability is incurred of the closing-plug being clogged in its aperture by reason of the heat, and hence considerable difficulty is experienced in effecting its removal. In order to obviate this defect, there is substituted for the entering-plug an external closer, *k*, composed of fire-resisting material, and bearing against and closing the outer end of the tap-hole, the external surface of which is made to correspond to the form of the closer *k*. This closer is carried by a rod, *l*, supported by a bracket, *m*, and suitably balanced.

The converter is also provided with side doors, two of which, *n n'*, are shown in the drawings, for the facility of cleaning and repairing the floor and the removal of the tuyeres when required, the door *n* being arranged opposite the four tuyeres D, and the door *n'* opposite the tuyeres D', so as to enable each set to be removed, when required, through its corresponding door.

When the converter is intended to be used after the manner of a cupola—that is to say, to be maintained in operation until the lining is completely destroyed, and then repaired by the renewal of the lining—the tuyeres may be arranged either radially, or as shown in the diagram, Fig. 4, with their axes D'' tangentially to a common imaginary circle struck from the center of the vessel A, in which case

a single door, n'' , for affording access to the interior, will be sufficient, such door being most conveniently placed opposite the tap-hole, as shown in the diagram.

The converter may also be constructed in two parts, an upper and a lower part, in order to facilitate the removal of the shell of metal usually formed after a certain number of castings, without disturbing the lining.

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

1. In a fixed converter for the manufacture of steel, the combination of the flues $C'C$ and $D'D'$, formed in an extension or a series of exten-

sions of the side walls of the converter and of fire-resisting material, substantially as set forth.

2. In combination with the tuyeres $D'D'$, the doors nn , located opposite said tuyeres, for the purpose of giving access to the furnace at convenient points for repairing said tuyeres, substantially as set forth.

3. In combination with the mouth of the converter and its hinged plate, the guard d' for protecting the workmen, substantially as set forth.

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