

L. G. WOODS.  
 CONVERTER.  
 APPLICATION FILED JUNE 6, 1910.

986,534.

Patented Mar. 14, 1911.

2 SHEETS—SHEET 1.

FIG. 1

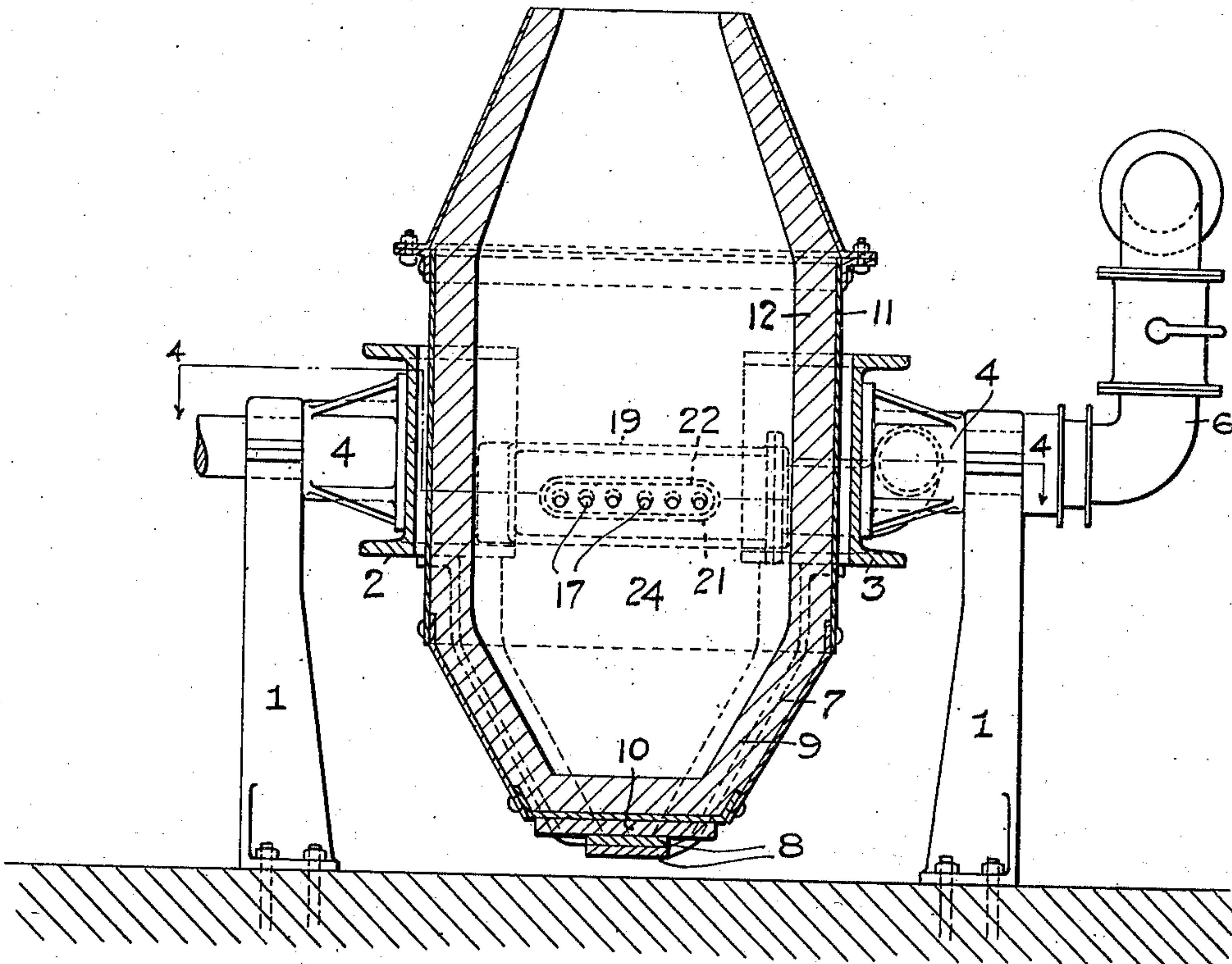
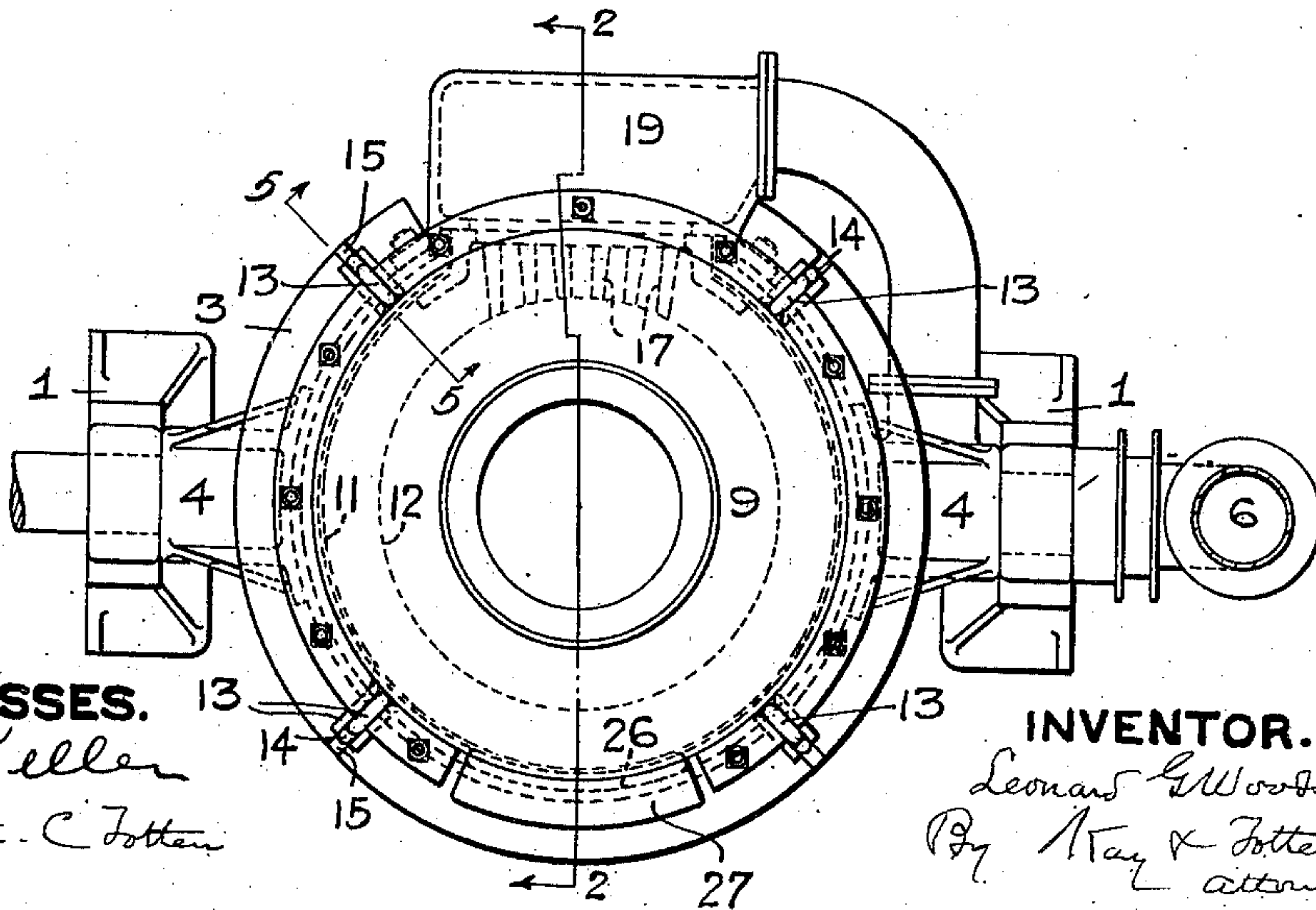


FIG. 3



WITNESSES.

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FIG. 2

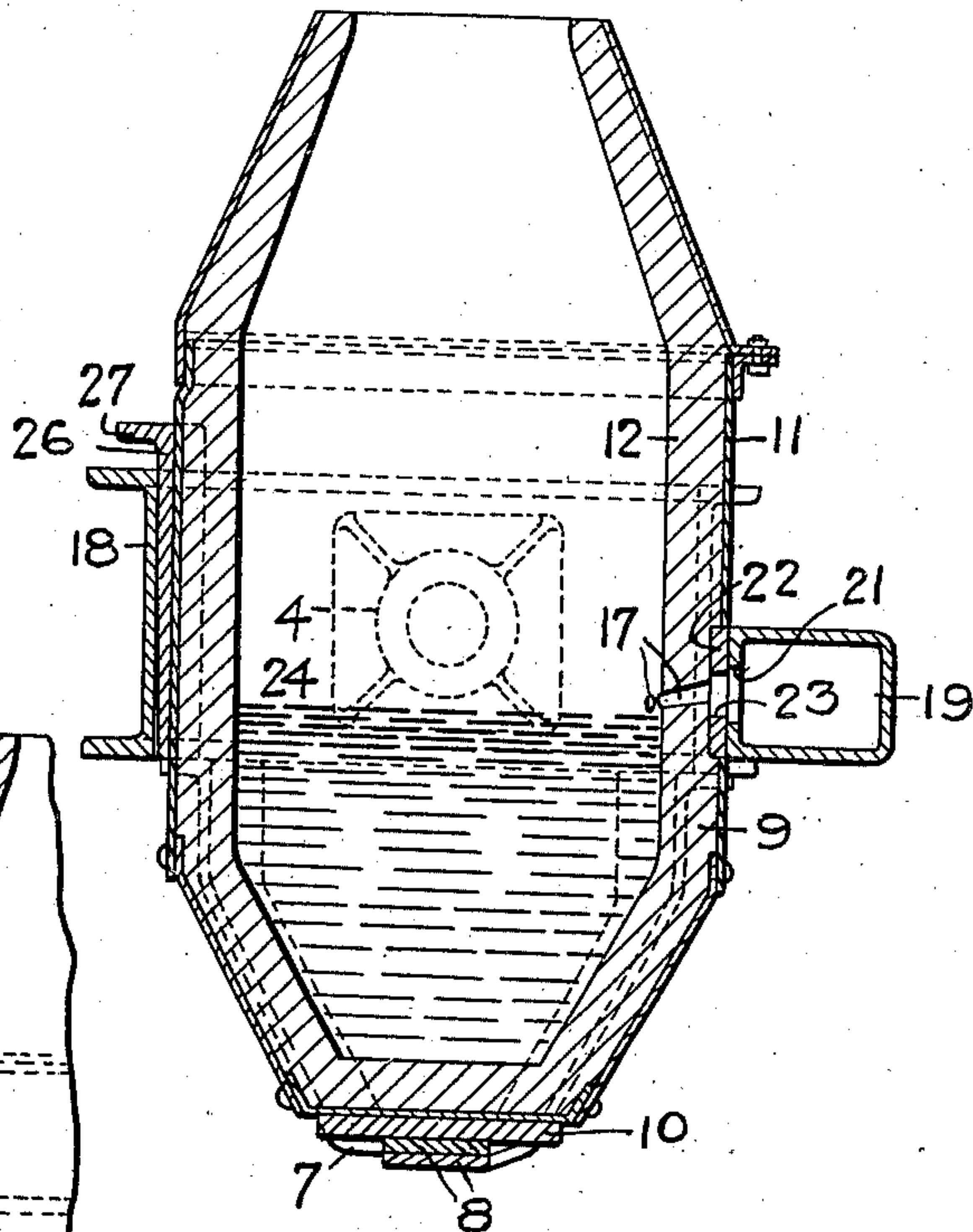


FIG. 5

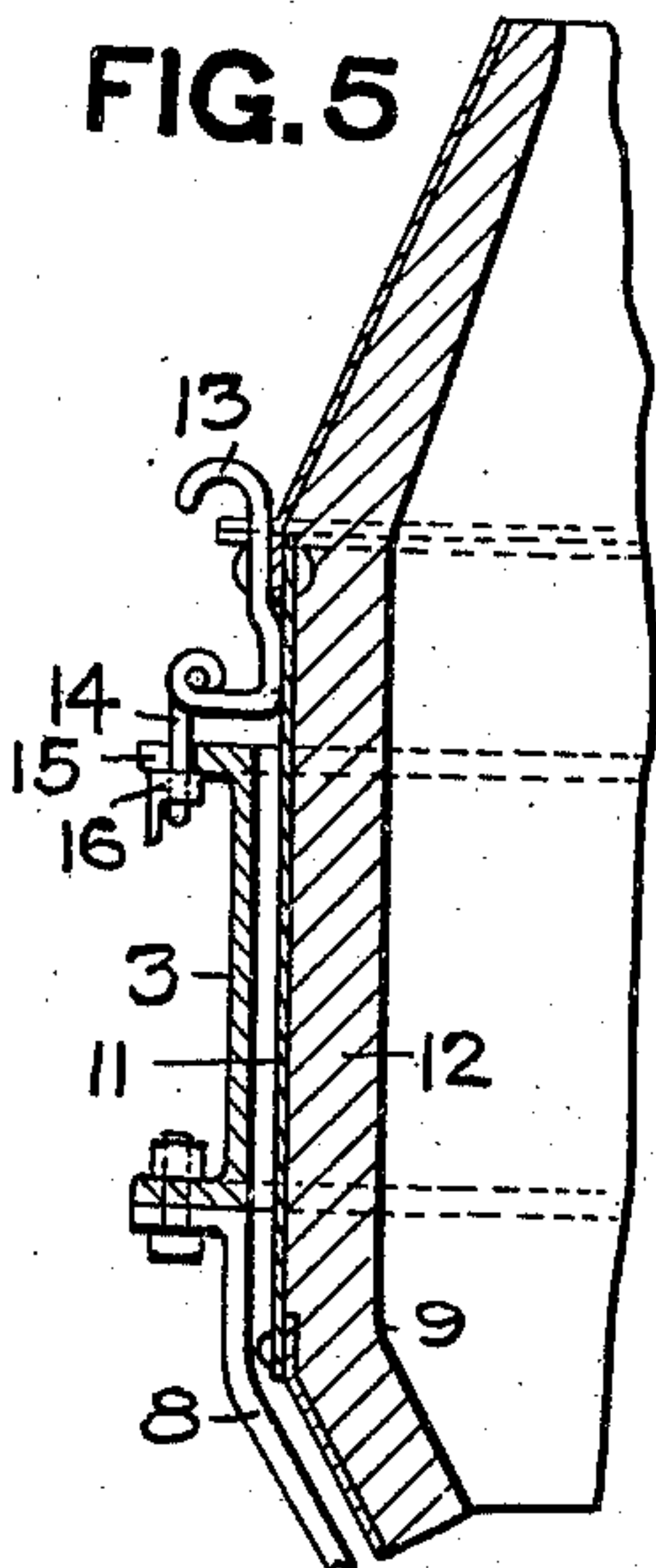
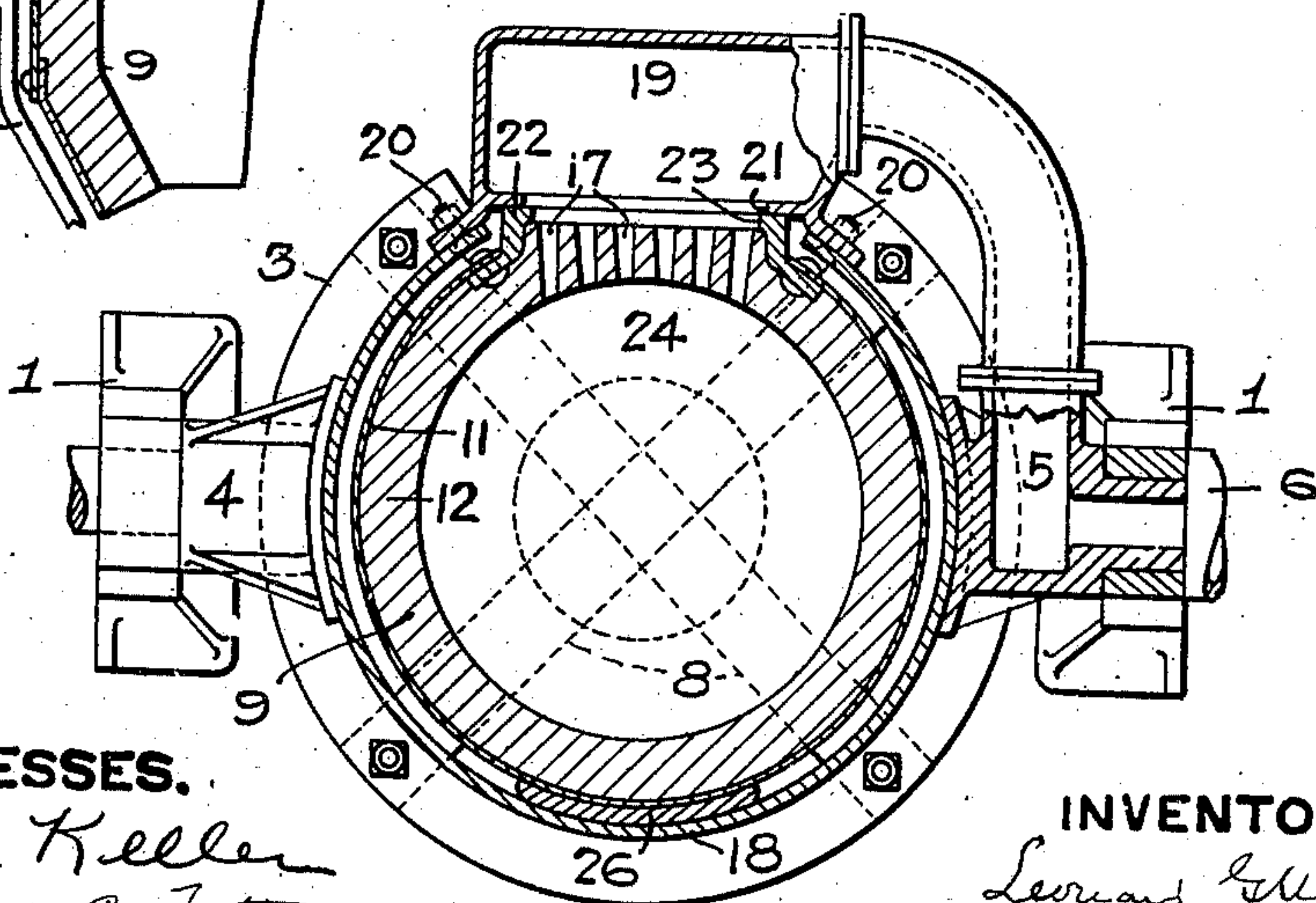


FIG. 4



WITNESSES.

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# UNITED STATES PATENT OFFICE.

LEONARD G. WOODS, OF PITTSBURG, PENNSYLVANIA.

## CONVERTER.

986,534.

Specification of Letters Patent.

Patented Mar. 14, 1911.

Application filed June 6, 1910. Serial No. 565,274.

*To all whom it may concern:*

Be it known that I, LEONARD G. WOODS, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Converters; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to converters for the manufacture of steel. These converters are large vessels built within a metal casing and having twyer openings extending through the refractory lining through which an air blast enters to act upon the crude molten pig metal within the vessel to convert it into steel. In such conversion an exceedingly high heat is developed and the refractory lining is liable to burn out, making it necessary to reline or repair the vessel, and such repair causes delays interfering with the operation of the plant so that it is customary to have at least two converting vessels in a plant, and there are at times delays arising from the fact that both converters are out of order.

The object of the present invention is to provide an improved construction of converter having a removable converter vessel which can be easily and quickly inserted in its support and adapted to provide an air tight register between the permanent air blast connection of the support and the air inlet or twyer opening of the vessel without the fastening of any bolts or insertion of separate removable parts or like steps.

To this end the main feature of my invention contemplates broadly the combination in a converter of this type of a vessel support, preferably trunnioned or pivoted in the usual or any convenient manner, and provided with an air blast connection permanently attached to the support having an air blast port opening inwardly and preferably through the wall of the support proper, with a removable converter vessel provided with an inlet opening adapted to be forced into air tight register with said air blast opening when the vessel is inserted in the support, and to disengage therefrom when the vessel is removed, without the unfastening or removal of any parts except the means employed for holding the vessel itself in the support.

In the accompanying drawings Figure 1 is a vertical section of the converter showing parts of the connections in full lines; Fig. 2

is a vertical section of the vessel and the connections thereto at right angles to Fig. 1 and on the line 2—2, Fig. 3; Fig. 3 is a top or plan view of the converter; and Fig. 4 is a cross section partly in full lines and Fig. 5 is a detail view.

The drawing illustrates a converter vessel having the twyer openings entering through the side and the invention will be described in connection with such type of vessel to which it is specially applicable, though it is of course to be understood that the invention applies to all converters with which it may be employed. The standards in which the vessel is mounted are shown at 1, and mounted in said standards is the support 2 which, as illustrated, is in the form of a basket, said basket having the circular frame 3 carrying the trunnions 4, one of said trunnions having the air passage 5 connected in the usual manner to the air blast pipe 6. The circular frame 3 has connected to it the basket 7 formed of the bars or straps 8 bolted to the circular frame 3 and extending downward and crossing each other below the bottom of the converting vessel 9, as shown in dotted lines, said bars carrying the bottom plate 10. It is of course to be understood that any proper form of support may be employed within which the removable converter vessel 9 is supported and to which it is secured. The converter vessel 9 is formed of an outer casing 11 of suitable shape provided with a refractory lining 12. This converter vessel rests within the support and its basket and is provided with any suitable means for lifting it out of the vessel, such as the hooks 13 secured to the converter vessel. It may be connected to the support in any suitable way, for instance by means of the bolts 14 pivoted on the hooks 13 and entering through slots 15 in the flange of the supporting ring 3 and held therein by suitable nuts 16.

Extending through the lining 12 of the converter vessel are the twyer openings 17 illustrated as passing through the side wall of the converter vessel, connected automatically with the air blast pipe 5 when the vessel is lowered into the supporting ring 3, which is preferably formed of a channel 18, of cast or wrought metal which forms a partial circle, the remainder of the circle being formed of the air box 19 which communicates with the blast passage 5 and is



bolted to the channel 18 as at 20, so forming the complete circle. The inner face of the air box is preferably formed flat as shown and has the outlet opening 21. The casing 11 of the converter vessel has an inlet plate or a casting 22 riveted at the side thereof so as to register with the outlet opening 21 of the air box 19 said casting having a flat face adapted to fit against the inner face of the air box and form a joint therewith and having the inlet opening 23 registering with the outlet opening or port 21 of the box, as shown in Figs. 2 and 4. The air blast thus enters through the blast pipe 5 into the box 19 and thence through the openings 21 and 23 and through the twyer openings 17 into the converting chamber 24.

Any suitable means for forcing the registering face of the air box and the converter body into proper contact to form an air tight joint may be employed, it being important, however, that such means shall be of simple construction, so that when the converter is lowered into the support it may be quickly seated therein so as to form the joint between the air passage of the support and the vessel itself. The construction illustrated has a wedge 26 entering between the ring 18 of the support and the casing of the converter so as to force the casting 22 into close contact with the air box 19, such wedge being quickly driven to place and being capable of quick removal as by means of a bar or lever entering under the lug 27 of the wedge.

The supporting frame always remains in place mounted in the standards 21 and permanently connected to the driving means and the air blast. The converter vessel hung from a suitable crane as by the hooks 13, is lowered into the support and rests within the basket, and the connections are then made so as to make a proper joint between the air blast and the twyers. In the invention as illustrated the wedge 26 is then driven to place, forcing the casting 22 and the air box into contact to form a proper air tight joint, and the converter vessel is secured to the support in any suitable way such as by the hinged bolts 14, as above described. The converter is then ready for use and may be used in the ordinary way.

When the converter vessel gets out of order a new one can be quickly substituted therefor by breaking the connections between the vessel and the support by the loosening of the bolts 14 and the removal of the wedge 26, and the vessel can then be lifted by a suitable crane out of the support and another converter vessel be lowered into the support and secured in place, when the plant is again ready for use, this requiring a comparatively short delay. The plant can be

provided with any number of converter vessels which can be repaired when standing idle and without the necessity of shutting down the plant, which of course involves the delay of letting the converter vessel cool and the awkward work of repairing the same encountered where the vessel has trunnions permanently secured thereto and is mounted directly in the standards. Where only a single converter is required to produce the amount of steel necessary only a single converter plant is required, as through the employment of two or more removable converter vessels it can always be kept in running order. A large saving in cost of plant is also obtained, as instead of requiring separate complete plants only two or more removable converter vessels are needed.

What I claim is:

1. In converters, the combination with a vessel support provided with an air blast connection permanent therewith and having an air blast port opening inwardly, of a removable converter vessel provided with an air inlet opening adapted to be forced into air tight register with said port when the vessel is inserted in the support.

2. In converters, the combination with a vessel support having an air blast connection permanent therewith, and an air blast port leading therefrom and a face around the port, of a removable converter vessel provided with an air blast port and a face around the same adapted to be forced into mating air tight register with aforesaid face of said air blast port when the vessel is inserted in the support, substantially as described.

3. In converters, the combination with a vessel support provided with a permanently attached air box and an air blast opening inwardly leading therefrom, of a removable converter vessel provided with an air inlet opening adapted to register with said air blast opening when the vessel is inserted in the support, and means for forcing said openings into register and maintaining a mating air tight fit between them.

4. In converters, the combination with a removable converter vessel provided with an air inlet opening in its side wall, of a vessel support adapted to encircle the vessel and provided with an air blast connection permanently attached thereto, and an inwardly extending air blast passage communicating with said air blast connection, said support being adapted to carry said vessel and maintain said air openings in air tight register.

5. In converters, the combination with a removable converter vessel provided with an air inlet opening in its side wall, of a vessel support adapted to encircle the vessel and provided with an air blast connection permanently attached thereto, and an in-



wardly extending air blast passage permanently communicating with said air blast connection, and wedging means arranged between said support and said vessel to force said air openings into mating contact.

6. In converters, the combination of a vessel support provided with an air opening communicating with an air blast connection, a removable converter vessel carried within the support and provided with an air opening, and a wedge arranged between said vessel and support and adapted to maintain an air tight fit between said air openings.

7. In converters, the combination of a vessel support provided with a permanently attached air blast connection and having an interior face and an air blast port therein communicating with said air blast connection, a removable converter vessel provided with a face adapted to register with aforesaid inner face and having an air inlet port adapted to register with said air blast port, and means positioned across the vessel when the same is inserted in the registering position specified to maintain said air ports and faces in air tight contact.

8. In a converter, the combination of a vessel support surrounding the vessel and having an air box communicating with the air blast connection, a removable converter vessel carried within said support having an air port, and an inlet plate corresponding in contour to said inner face of said air box, and a wedge adapted to enter between said vessel and said vessel support and positioned oppositely to said inlet plate to force the same into mating register with the inner face of the air box.

9. In a converter, the combination of a

vessel support provided with an air passage, an air box communicating therewith having an inner face provided with an air outlet, a removable converter vessel having twyers entering through the side into the vessel chamber and having an inlet plate corresponding in contour to the inner face of the air box and having a port communicating with the twyers, and means for forcing the inlet plate into contact with the air box.

10. In a converter, the combination of a vessel support provided with an air box and an air passage communicating therewith, said air box having an inner face provided with an air outlet, a removable converter vessel having twyers entering through the side into the vessel chamber and having an inlet plate corresponding in contour to the inner face of the air box and having a port communicating with the twyers, and a wedge entering within the support and forcing the inlet plate into contact with the air box.

11. In a converter, the combination of a vessel support having a basket, a converter vessel fitting within the support and resting in said basket, and swinging bolts connecting the vessel support and the vessel.

12. In a converter, the combination of a removable converter vessel, and a vessel support comprising a basket adapted to bear upon the bottom of the removable vessel and support the same therefrom.

In testimony whereof, I the said LEONARD G. Woods have hereunto set my hand.

LEONARD G. WOODS.

Witnesses:

JAMES I. KAY,

ROBERT C. TOTTEN.