No. 707,601. Patented Aug. 26, 1902.

C. LAUGHLIN.

SMELTING FURNACE.

(Application filed Apr. 11, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

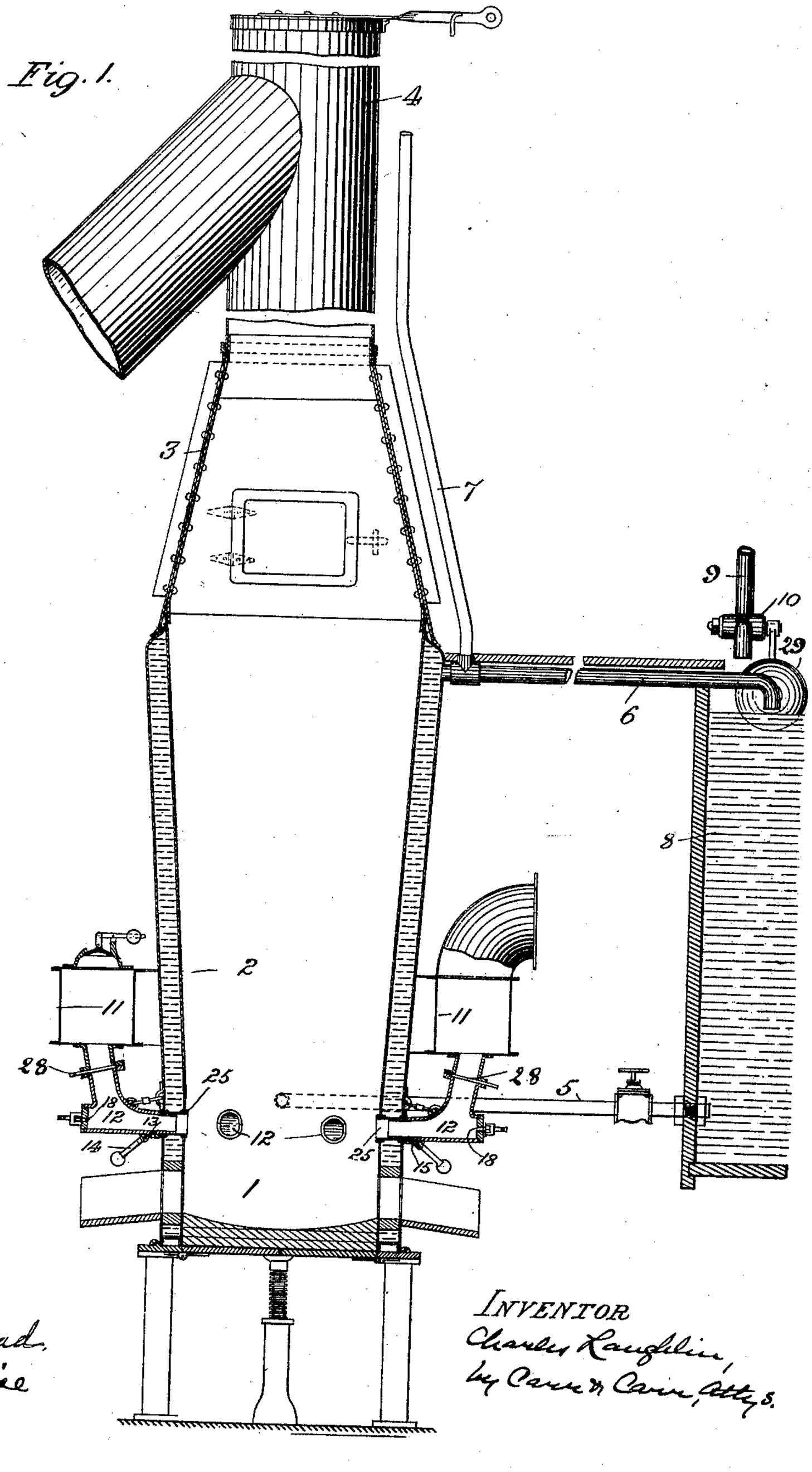

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Fig. 4.

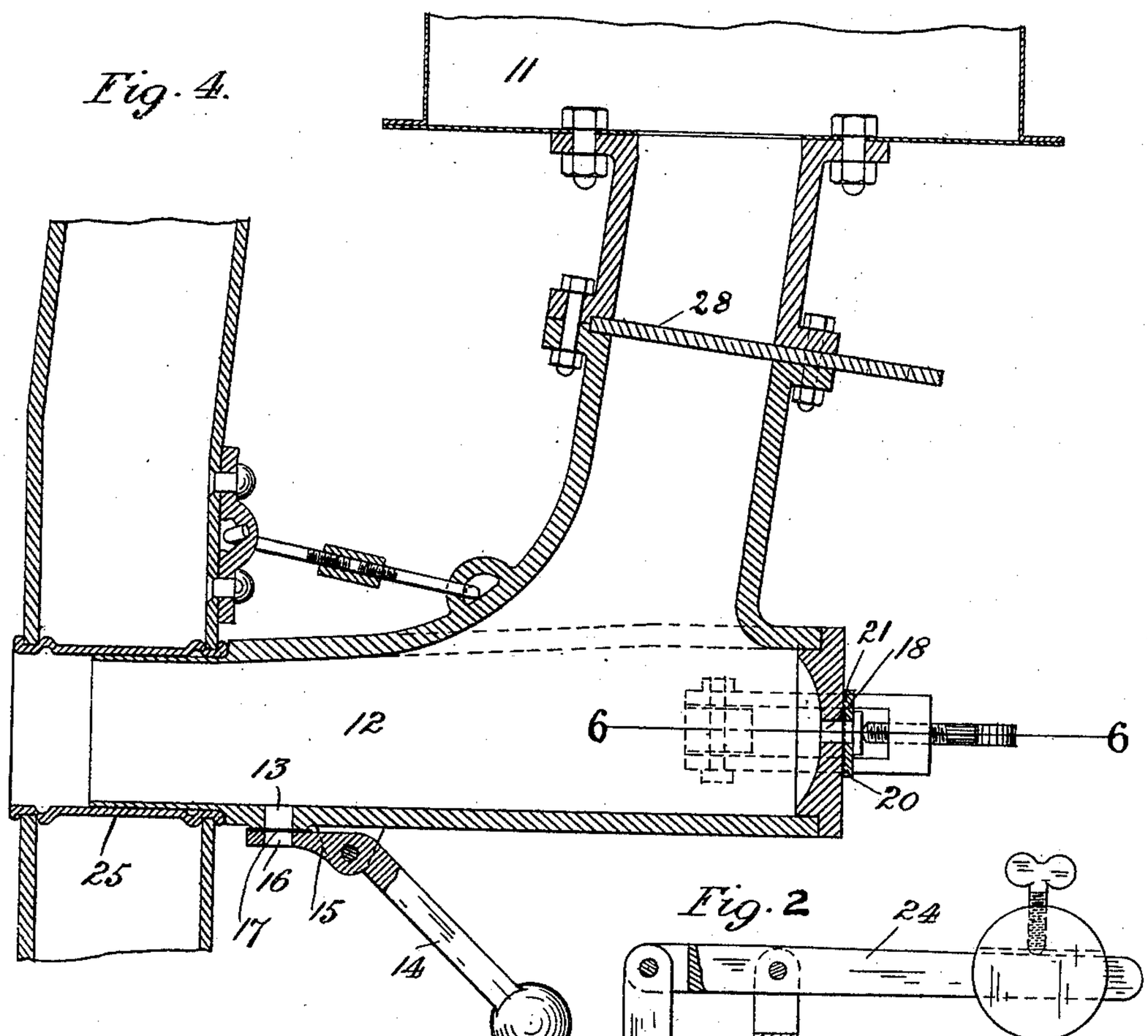


Fig. 2

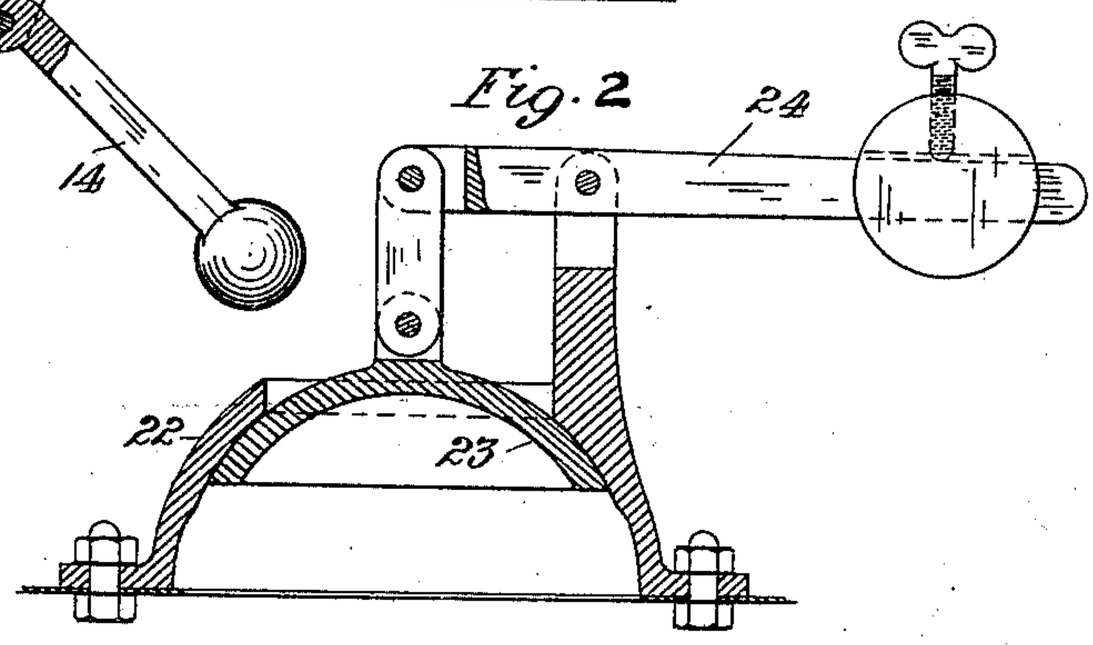


Fig. 5.

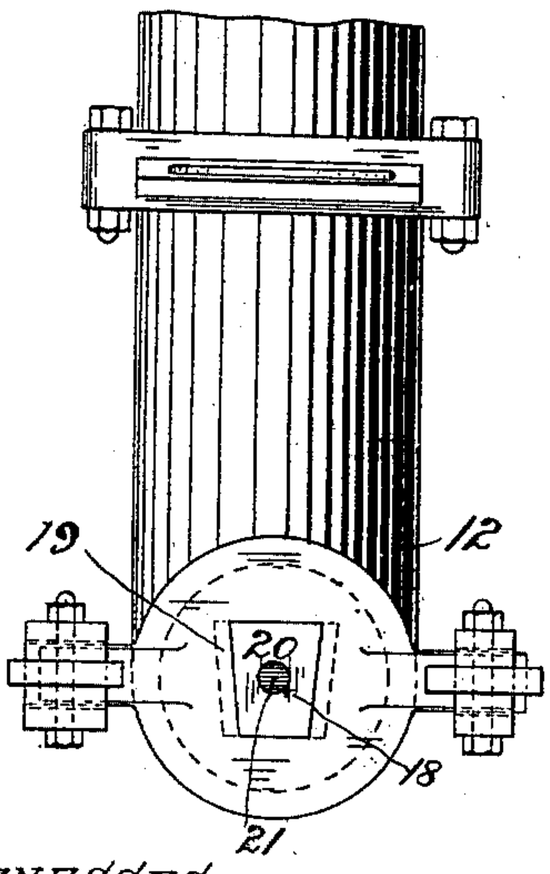
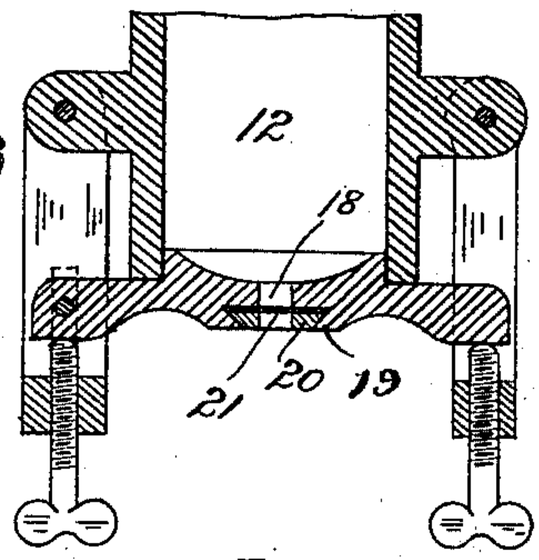


Fig. 3



Witnesses
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Inventor
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UNITED STATES PATENT OFFICE.

CHARLES LAUGHLIN, OF ST. LOUIS, MISSOURI.

SMELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 707,601, dated August 26, 1902.

Application filed April 11, 1901. Serial No. 55,331. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LAUGHLIN, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Smelting-Furnaces, of which the following is a specification.

My invention relates to smelting-furnaces, and has for its principal object to provide for the automatic relief of furnace-gases and overflowing slag and to improve the twyer-openings and generally to improve the construction of furnaces.

My invention consists in the parts and in the arrangement and combination of parts hereinafter described and claimed.

In the accompanying drawings, which form part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a vertical section of a smelting-furnace embodying my improvements. Fig. 2 is a vertical sectional detail of the gas-relief valve. Fig. 3 is a horizontal detail of the outer end of the twyer. Fig. 4 is an enlarged sectional detail of the twyer, pipe, and portions connected thereto; and Fig. 5 is an end view of the twyer-pipe, showing the inspection-hole.

My furnace comprises the usual elements, namely: the hearth 1, whose wall is preferably vertical, the smelting zone 2, whose wall is preferably boshed or flared outwardly, the hood 3, and the stack 4, whose wall conforms to any of the usual furnace designs. The walls of the hearth and smelting zone are preferably a hollow metal shell made in sections and constituting a water-jacket, as more fully described in application for Letters Patent therefor, Serial No. 87,576, filed by me December 28, 1901. Twyer-openings are formed in the wall of the furnace at the customary locations at the upper portion of the hearth. Each of the twyer-openings is formed of a tube 25, fitting in holes provided therefor in the metal sheets of the wall. The ends of this tube are rolled and beaded to fit closely against the respective plates, and the tube is likewise beaded at a short distance from each end thereof, so as to form a circumferential rib therein. This arrangement is such that each of the plates of the furnace-casing is firmly fastened between the turned or rolled end and the adjacent bead or rib of such tube. This construction thus forms a secure fastening without bolts or rivets, and the corrugations in the tube allow it to conform automatically to the requirements of a changing temperature.

The furnace is provided, as usual, with a bustle-pipe 11, operatively located between the air-forcing apparatus on the one side and the twyers 12, extending through the jacket, on the other. A valve 28 is provided in the upper part of said twyers for regulating the amount of air entering the same. In order to relieve the slag overflowing into the twyers, I provide an opening 13 in the under side of the horizontal portion of each of the twyer-pipes just outside of the jacket. Alongside of this opening 13 on the under side of said pipe is a bent lever 14, weighted on one arm and carrying on its other arm a plate 15, adapted to close the opening. This plate also has an opening 16, arranged therein, and a gasket or device adapted to clamp a sheet of paper 17 in position over said opening. In practice the sheet of paper thus clamped by the plate constitutes a closure for said opening 13. In case the slag rises to the level of the twyers it will flow out into contact with the sheet of paper and ignite the same, thereby opening the relief-hole and allowing the slag to escape without injury to the twyers and without filling them.

It is customary in smelting-furnaces to provide a peep-hole 18 in alinement with the twyers, which peep-holes are usually covered with mica sheets. These mica sheets require frequent replacing, which is a matter of some difficulty when the parts are hot. For this purpose I locate the peep-hole in the end plate of the twyer, as heretofore, and I provide the following device to facilitate the replacing of the mica sheet: On the two sides of the peep-hole I provide a pair of lugs 19, converging downwardly and having lips or flanges on their adjacent edges. In the sockets or grooves thus formed by the overhanging edges fits a wedge-shaped plate 20, having an opening therethrough and provided with a lug or other suitable means for gripping the same. In use a sheet of mica 21 is placed flatwise against the end plate between the inclined lugs, and the wedge-plate is then inserted between said lugs. This operation can be re-

versed and repeated while the furnace is in full blast.

The upper side of the bustle-pipe 11 is provided with a hemispherical dome 22, open at its top. Inside of said dome is a plate 23, whose surface is spherical to conform to the shape of the dome. This plate is larger than the opening in the dome and is suspended from one end of a lever 24, which is mounted on the bustle-pipe, and whose other end carries a weight. This weight is slightly less than sufficient to counterbalance the spherical plate, so that when there is no air-pressure in the bustle-pipe said plate overbalances the weight and uncovers the opening in the dome. By this arrangement whenever the air-forcing apparatus is in operation the upward pressure of the air in the bustle-pipe against the spherical plate coöperates with the weight on the lever to raise said plate, and thereby close the opening in the dome; but when the air-forcing apparatus ceases to act the pressure in the bustle-pipe is reduced and the plate automatically drops, so as to furnish a relief for any gases that may find their way into the bustle-pipe.

What I claim, and desire to secure by Letters Patent, is—

1. A smelting-furnace having double walls, and a tube extending through said walls for the twyer-opening, said tube being beaded on each side of the wall-plates, substantially as described.

2. A smelting-furnace comprising a twyer-pipe having a hole in the bottom thereof, and a lever pivotally mounted on the under side of said pipe alongside of said hole, said lever having on one arm a plate provided with a hole adapted to register with said first-mentioned hole and having its other arm weighted, whereby said lever acts automatically to clamp a sheet of paper between the twyer-pipe and said plate and over the holes therein, substantially as described.

3. A smelting-furnace comprising a twyer-pipe, an end plate therefor having an inspection-hole therein, said end plate having downwardly-converging lugs, and a wedge-shaped plate fitting in said lugs and having a hole adapted to register with the inspection-hole, and said plate being arranged to clamp a sheet of mica over the inspection-hole, substantially as described.

CHAS. LAUGHLIN.

In presence of—
WM. P. CARR,
MAMIE E. MEAD.