

(No Model.)

2 Sheets—Sheet 1.

J. M. HARTMAN.
Device for Molding Tuyeres.
No. 239,609.
Patented April 5, 1881.

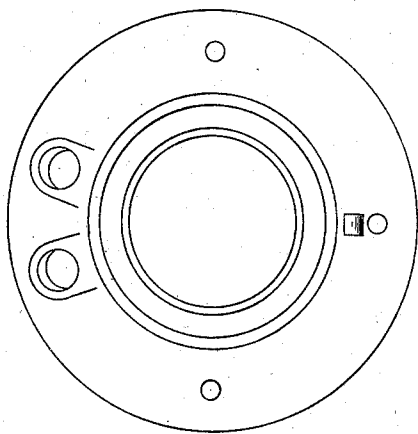


Fig 1

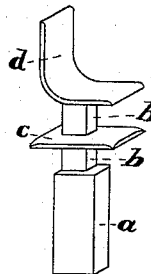


Fig 2

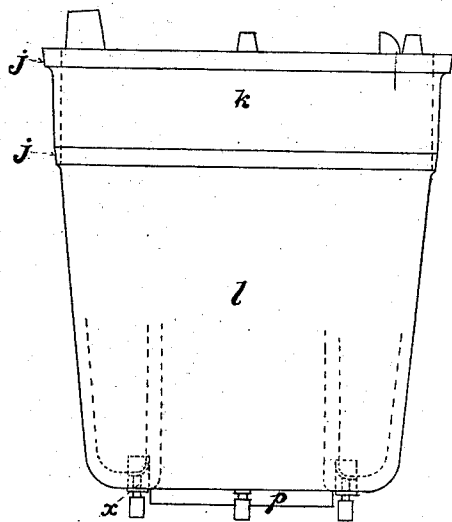


Fig 3

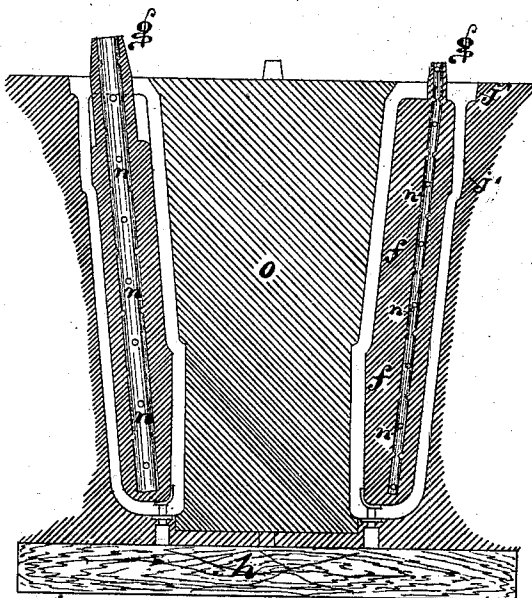


Fig 4

Witnesses

Robert C. Gray
J. M. Loughlin

Inventor

John M. Hartman

(No Model.)

2 Sheets—Sheet 2.

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Device for Molding Tuyeres.
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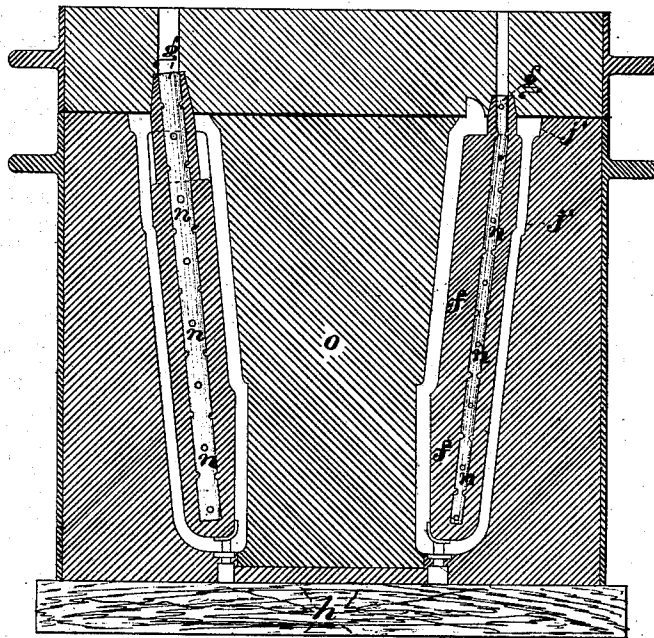


Fig 5

WITNESSES
Robert C. Gray
Geo. W. Laughlin

INVENTOR
John M. Hartman

UNITED STATES PATENT OFFICE.

JOHN M. HARTMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF
ONE-HALF TO LOUIS TAWS, OF SAME PLACE.

DEVICE FOR MOLDING TUYERES.

SPECIFICATION forming part of Letters Patent No. 239,609, dated April 5, 1881.

Application filed January 21, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. HARTMAN, a citizen of Philadelphia, State of Pennsylvania, have invented an Improvement in Devices for Molding Tuyeres for Metallurgical Purposes, of which the following is a specification.

The object of this invention is to improve the molding of tuyeres, whereby better castings and a uniform thickness of metal are obtained. I attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 shows a view of the butt-end of a tuyere-casting. Fig. 2 shows the double anchor. Fig. 3 shows a side view of pattern with the metallic rings around the butt-end, the flange double anchors inserted in the nose, and the core-print *p*. Figs. 4 and 5 show vertical sections of the mold for a tuyere with cores in position.

Similar letters refer to similar parts in all the drawings.

Tuyeres are generally cast with the nose or smaller diameter upward. In casting all the dirt and scoriæ of the metal washes up into the nose of the tuyere, producing a spongy, porous casting, liable to leak water. The nose of the tuyere, being the most exposed part, must be of solid metal, perfectly water-tight, as any leakage of water will generate explosive gases or chill the hearth of the furnace. To obviate this I cast the nose down, and support the annular core *f* with double anchors, as per Fig. 2. These double anchors consist of a shank, *a*, a stem, *b*, a flange, *c*, and a double or L flange, *d*. This double flange is placed at such a distance from the straight flange *c* as corresponds to the thickness of the metal in the nose of the tuyere. The straight flange *c* is made a little larger than the double flange, for the purpose of covering the hole in the pattern, as further shown, and to prevent the sand getting between the double flange and the straight flange *c* while molding. The term "double anchor" is used to define the object of the L-shape flange, which holds the core in two different directions, and avoids the use of two single anchors, one of which would have to be set by hand.

The double anchors are cast of one length

and of the same material of the tuyeres. The stem and flanges of the anchors are made as light as possible, to prevent the molten metal from chilling around them and forming a cold shot, which would leak water. The thinner the metal in the flanges the less heat will be abstracted from the molten metal while flowing around the anchors, and which will cause the molten metal to unite more firmly with them. The cross-section of the stem of the double anchor is reduced to a minimum of crushing strength, and the double flange on which the core rests is enlarged to give sufficient bearing to the core and prevents its crushing. These cores are made of material easily crushed, which prevents the casting from cracking while shrinking in cooling. A large bearing-surface must therefore be provided, which I obtain by extending the double flange some distance beyond the stem of the anchor.

Just before molding a tuyere the anchors are rough-filed on the stem and flanges, which gives a rough surface, free from oxides, and which allows the molten metal of the tuyeres to knit better with them.

The double flange of the double anchor, Fig. 2, supports the annular core *f*, and also guides the core into position and retains it sidewise. The annular core is stiffened with hollow core-rods *g g*, having holes *n n n* through them, by which the gas is carried off from the core while the metal is being poured and set.

The annular rings *j' j'*, Fig. 4, are formed in the mold by a metal ring, *K*, secured to the pattern, *l*. Sufficient taper must be left between the rings *j' j'* for draft to draw the pattern out of the mold readily. These metal rings are turned accurately round in a lathe on the faces *j j*, and produce a true round surface in the mold and on the tuyere-casting, which dispenses with the turning of the rings *j' j'* on the tuyere-casting, as heretofore practiced.

Heretofore, in molding tuyeres, after the pattern was withdrawn from the mold anchors were placed in the mold by hand, which required great skill and time to get the anchors adjusted at the bottom and sides to keep the annular core central and at the proper distance from the bottom. If an anchor projects

too far it scrapes the sand off the core, which, washing up into the casting, destroys it. To obviate this in molding, the bottom plate, *h*, Fig. 4, is placed on the molding-table, the double anchors are inserted in the nose of the pattern, as at *x*, Fig. 3, until the straight flange *c* fetches up against the nose of the pattern, the pattern and anchors are set on the plate *h*, a flask is placed over the pattern, the top edge of which is of the same height as the top of the pattern, the mold is then rammed up with sand, and a parting-line struck at the top of the flask. (The cope of a flask is the upper or movable part of a flask.) The cope is then placed on the flask and rammed up also. On removing the cope it is found that the core-prints for the vent-pipes have formed recesses in the cope for the vent-pipe. As the cope is about three inches deep and the core-prints are one and one-fourth inch high there is some sand left over the core-prints. A hole is then cut through the remaining sand above the core-print, which allows the gas from the core to escape into the open air after the flask is closed and the metal poured. The tuyere pattern is now removed from the mold, leaving the double anchors firmly in the mold and in exact position to set the annular core on them without further adjustment. The vertical part of the double flange *d* guides the core into position, holds it firm sidewise, and thereby gives a uniform thickness of metal in the casting. The core-print *p* having formed a recess in the bottom of the mold the central core, *o*, is then placed in position. The cope is then placed on the flask and secured, when it is ready for pouring the metal to form the casting. The core surrounding the vent-pipes *g g* is made inclosing the top of the flask, which holds

the core down, thereby preventing its floating up by the buoyancy of the molten metal. The core is thus held by the anchors below and the vent-pipes above. I do not confine myself to a particular angle between the two faces of the **L** flange of the double anchor, nor is it necessary that the two faces be joined at the corner, as they can be separate and be joined by a rib.

I do not claim a metallic band on a pattern, excepting so far as it relates to forming the taper rings *j' j'* in the mold direct. The taper rings can be formed by two separate metallic pieces inserted in the pattern, and having no metallic connection between them.

I am aware that tuyeres have been cast with the nose down, and heavy single anchors used to sustain the core in one direction; also, that true faces have been formed on castings by a separate core made in a core-box turned true. These I do not claim; but

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

1. An anchor with a double or **L**-shape flange, forming a support and a guide to a core, for purposes herein specified.

2. In combination with a double anchor inserted in a pattern, a flange, *c*, to cover the hole in the pattern while molding, and to prevent the molding-sand from getting between the flange *c* and the double flange, as herein described.

3. The combination of a double anchor having an **L**-shaped flange, and the bottom plate, *h*, for supporting the anchors and cores, substantially as set forth.

JOHN M. HARTMAN.

Witnesses:

ROBERT C. GRAY,
JAS. McLOUGHLIN.