

(No Model.)

J. MONTGOMERY.
GRATE BAR.

2 Sheets—Sheet 1.

No. 478,013.

Patented June 28, 1892.

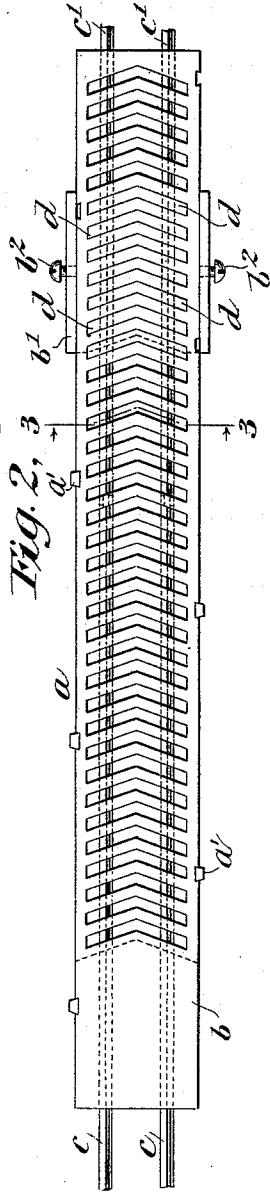
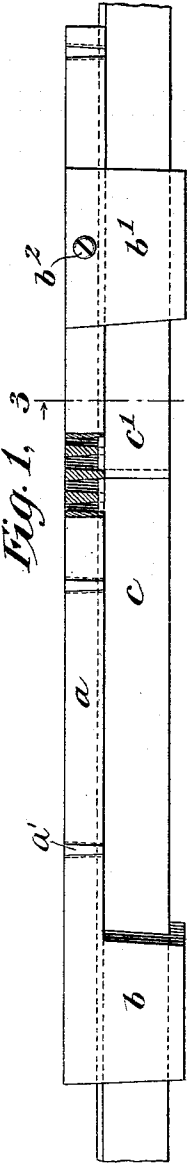
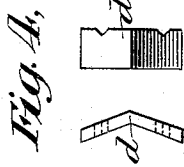
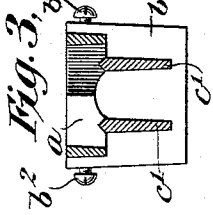


Fig. 5.

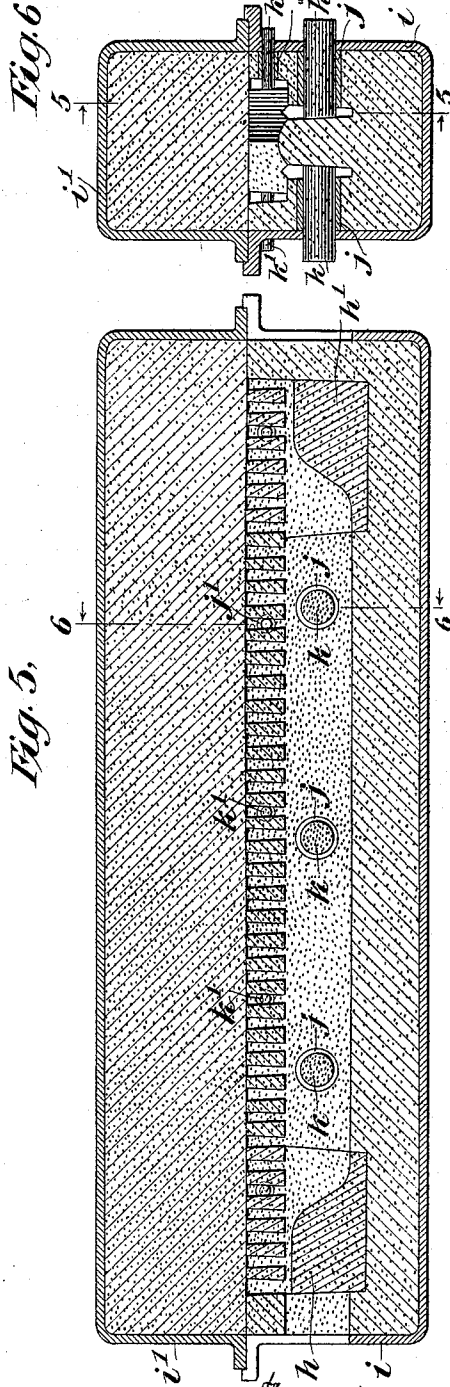
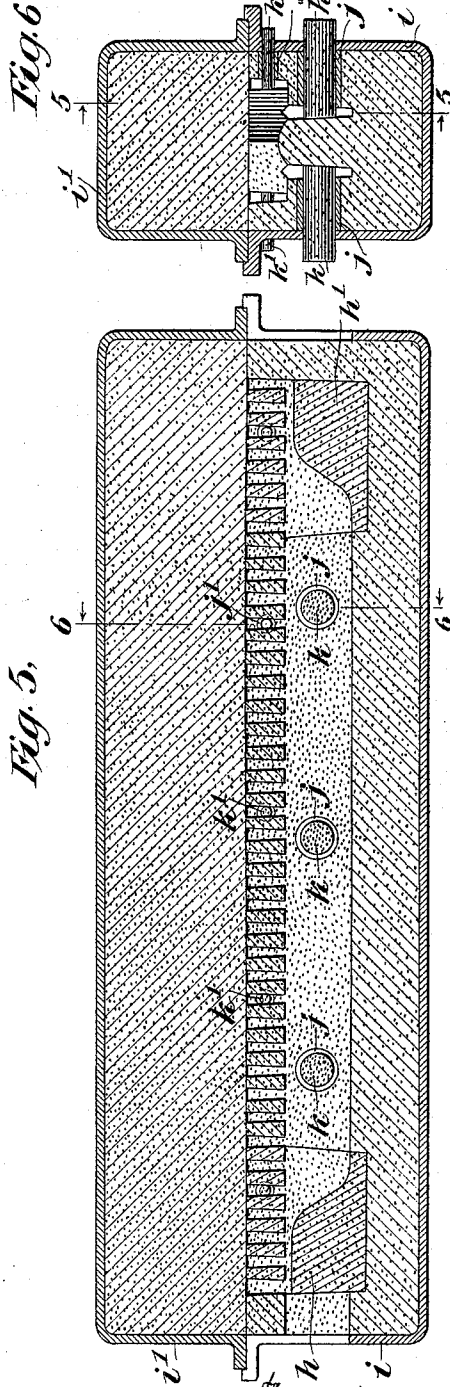


Fig. 6.



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(No Model.)

2 Sheets—Sheet 2.

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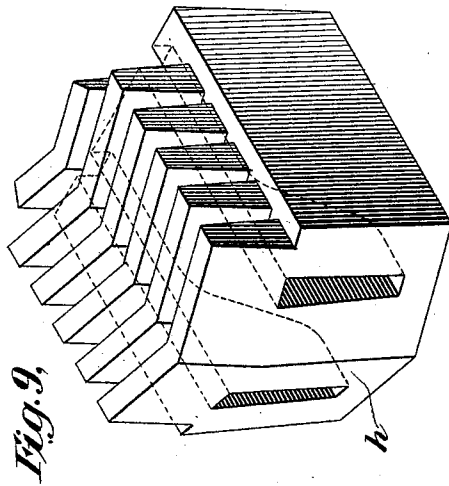


Fig. 7.

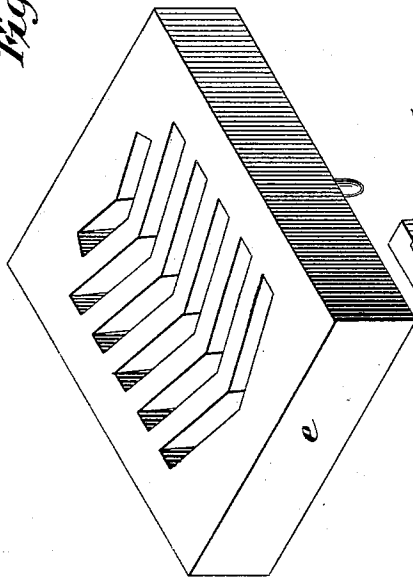
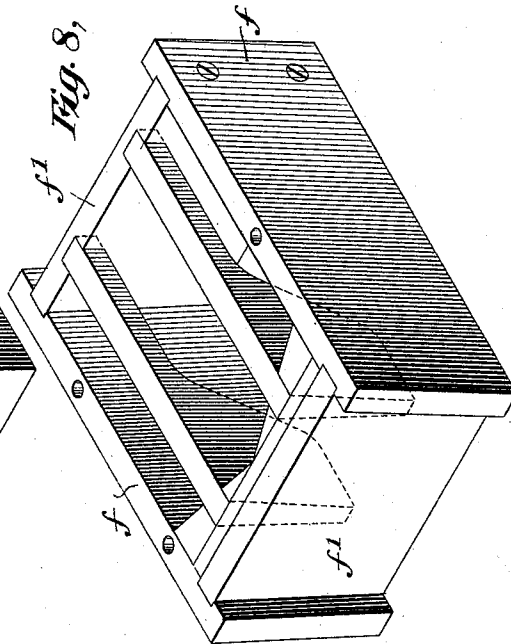


Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES MONTGOMERY, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF TO RICHARD GRANT, OF SAME PLACE.

GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 478,013, dated June 28, 1892.

Application filed January 23, 1892. Serial No. 418,993. (No model.)

To all whom it may concern:

Be it known that I, JAMES MONTGOMERY, a citizen of the United States, residing at Jersey City, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Casting Grate-Bars, of which the following is a specification, reference being had to the accompanying drawings, forming part hereof.

This invention relates to casting grate-bars for furnaces, and has for its object to simplify and improve the means for making such castings.

It consists of certain improvements in the patterns, cores, and core-boxes and in the means for holding such cores in place in the flask.

When my entire invention is used, the pattern is adjustable for different lengths of grate-bars, so that one pattern can be used for producing grate-bars of various lengths.

The particular form of grate-bar to which my invention is especially adapted is that which consists of an apertured top plate and longitudinal supporting ribs or bars extending nearly from end to end of the top plate and joined to the top plate along their upper edges. Such grate-bars have heretofore been cast in three-part flasks of special construction.

My invention permits such grate-bars to be cast in a two-part flask, thus greatly reducing the cost as well as the time required in forming the mold and casting the bar.

My invention also greatly facilitates the shaping of the mold by removable sliding pieces which form the molds for the longitudinal bars and insures greater certainty of forming perfect molds, the ends of the grate-bar being shaped by cores of simple construction.

My invention also provides an efficient means for forming apertures in the longitudinal bars and bands.

In the accompanying drawings, Figure 1 is a side elevation of my improved adjustable pattern. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section on the line 3 3, Figs. 1 and 2. Fig. 4 shows a plan and side elevation of one of the removable pieces for closing the apertures in the top plate of the pattern. Fig. 5 is a longitudinal vertical section on the line 5 5, Fig. 6, of a flask and sand-

mold, the mold having been formed by my improved pattern shown in Figs. 1, 2, 3, and 4, and the cores for forming apertures in the longitudinal bands and bars being held in place according to my invention. Fig. 6 is a transverse vertical section of the same on the line 6 6, Fig. 5. Figs. 7 and 8 are two enlarged detached perspectives completely showing my improved core-box for shaping the cores for the ends of the grate-bar; and Fig. 9 is a perspective view of such core ready for insertion in the mold, drawn to the same scale as Figs. 7 and 8.

The pattern shown in Figs. 1, 2, 3, and 4 consists of a top plate *a*, two core-print-forming projections *b* and *b'* at each end thereof, and removable sliding longitudinal pieces *c c'*, two for each longitudinal bar, such pieces *c c'* being fitted to slide through the core-print-forming projections *b* and *b'* and against the under surface of the top plate *a*, and the opposite pieces *c* and *c'* of each bar meeting and abutting against each other at a point between the core-print-forming projections *b* and *b'*. These sliding pieces preferably taper very slightly but inappreciably toward their inner ends, so that they may be readily withdrawn from the sand mold after the same is shaped thereby. The usual V shape of the upper edge of the longitudinal bar provides a guide for the longitudinal pieces throughout their length, as shown.

When my entire invention is used, one of the core-print-forming projections, as *b'*, is adjustable and is fitted to slide along the top plate *a*, being held in desired position by the set-screws *b²*. By the adjustment of the core-print-forming projection *b'* the one pattern can be used in producing bars of various lengths, limited only by the extreme length of the pattern, thus greatly reducing the cost of manufacturing the grate-bars. Heretofore in manufacturing grate-bars of this class it has been necessary to keep on hand and use a large number of patterns differing from each other but slightly in length to accommodate the demand for many different lengths of grate-bars, and this has necessitated a heavy original expense, as well as the cost of repairing and renewing these many patterns.

At those portions of the top plate *a* that

are directly over the core-forming projections there should be no apertures, as the formation of the apertures at these places in the casting will be effected by the cores. I therefore provide removable pieces *d*, (see Fig. 4,) adapted to fit within and close the apertures of the top plate, and these pieces are inserted in such apertures above the adjustable core-print-forming projection *b'* whatever may be its position, as shown in Fig. 2.

The mold is shaped for the side lugs that are usually present in bars of this class by means of the removable wedge-shaped pieces *a'*, which slide in tapering dovetailed slots in the sides of the top plate *a*. These pieces *a'* may be removed, as shown, to permit the adjustable projection *b'* to occupy any desired position.

The core-box for forming the core which acts as the mold for the end of the left-hand bar is shown in Figs. 7 and 8. It is composed of several pieces removably fitted together, so that after the sand for the core has been tightly packed therein the portions of the box may be removed without breaking the core. These pieces comprise the top piece *e*, provided with apertures corresponding to the apertures that will appear in the cast bar, the side pieces *f f* and end pieces *f' f'*, (the front side piece *f* and the right-hand end piece *f'* being secured together and the rear side piece *f* and left-hand end piece *f'* being fastened together,) and the longitudinal ribs *g g*, which correspond in shape to the ends of the longitudinal supporting ribs or bars of the grate-bar. The core *h* as shaped by this core-box is shown in Fig. 9. The core-box for the right-hand end of the grate-bar is not shown, as it would closely correspond to the core-box shown. The core *h* for the left-hand end of the bar and the core *h'* for the right-hand end of the grate-bar are both shown in place in the mold in Fig. 5.

The flask for the sand mold is an ordinary two-part flask *i i'*; but the lower flask *i* is provided with suitable openings at its ends to accommodate the projecting right-hand end of the pattern when the pattern is being used to form a mold shorter than the extreme length of the pattern and to accommodate the ends of and permit the removal of the longitudinal sliding pieces *c c'*. It is also provided with suitable openings at its sides for the insertion and removal of the cores for forming the openings in the longitudinal bars and bands of the grate-bar. Metallic envelopes or guides consisting of the tubes *j* and *j'* for cores that will form openings in the longitudinal bars and bands of the grate-bar are inserted in proper place in the sand mold, with the ends of the tubes projecting through the sand to the face of the mold and their interior opening registering with the openings in the sides of the flask *i*. The cores *k* and *k'* may be readily inserted or removed through these tubes without fear of breaking the mold. The only

effect of the small metallic rings in the face of the mold around such cores is to chill the cast metal around the openings formed by such cores in the casting. This materially strengthens the bars at these places, and is therefore desirable. By means of these metallic envelopes or tubes I am enabled to form any desired number of openings through the longitudinal bands or bars of the grate-bar, and am thus enabled to economically produce the improved bar set forth and claimed in my application filed simultaneously herewith under Serial No. 418,994.

The sand mold is formed in the usual manner about my improved pattern and the tubes above described. The longitudinal pieces *c c'* are then pulled outward longitudinally, and the pattern is then removed from the flask. The cores *h* and *h'* for forming the ends of the bars are then placed in the prints that have been formed therefor by the pattern. The cylindrical cores *k* and *k'* are also pushed in through the tubes *j* and *j'*. The mold is now completely formed. It will be noted that both ends of the mold have openings that were formed by the ends of the longitudinal pieces *c c'*. If the metal is to be poured from both ends of the flasks, these openings will be used for that purpose, but if from only one end the small openings of the other end are stopped up with sand, as shown in Fig. 5, where the openings at the right-hand end of flask are stopped up. It will be evident that the sand mold thus formed is composed of cores at both ends and has suitable openings for receiving the molten metal. Where the ends of the grate-bar are the ordinary rammed-sand mold, they are apt to break down under the first impulse of the flow of the metal poured into the mold. This can never occur in a mold made according to my invention.

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

1. A pattern for shaping molds for grate-bars, consisting of a top plate having core-print-forming projections at each end thereof and of removable sliding longitudinal pieces fitted to slide through such core-print-forming projections and against the under surface of such top plate and meeting and abutting against each other at a point between such core-print-forming projections, substantially as set forth.

2. A pattern for shaping molds for grate-bars, consisting of an apertured top plate having a core-print-forming projection fixed at one end thereof and an adjustable core-print-forming projection fitted to slide thereon, removable sliding longitudinal pieces fitted to slide through such core-print-forming projections and against the under surface of the top plate and meeting and abutting against each other at a point between such core-print-forming projections, and removable pieces fitted in and closing the apertures of

the top plate above such adjustable core-print-forming projection, substantially as set forth.

3. The core-box for forming the end cores of a grate-bar, consisting of the apertured top piece *e*, the side pieces *f f*, the end pieces *f'* *f'*, and the longitudinal ribs *g g*, substantially as shown and described.

4. The pattern for shaping molds for grate-bars, consisting of the apertured top plate *a*, the fixed core-print-forming projection *b*, the adjustable core-print-forming projection *b'*, the longitudinal sliding pieces *c c'*, the removable pieces *d d* for closing apertures in the top plate, and the removable wedge-shaped pieces

a', fitted in slots in the sides of the top plate *a*, substantially as shown and described. 15

5. The combination, with the two-part flask *i i'*, the sand mold formed therein, and the openings in the sides of such flask, of the tubes *j* and *j'*, each extending from the side 20 of the flask to the side of the mold, and the cylindrical cores *k* and *k'*, respectively fitting within the tubes *j* and *j'*, substantially as shown and described.

JAMES MONTGOMERY.

Witnesses:

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HERBERT H. GIBBS.