(No Model.)

A. REESE.

INGOT MOLD.

No. 318,206. Patented May 19, 1885.

Fig. 1.

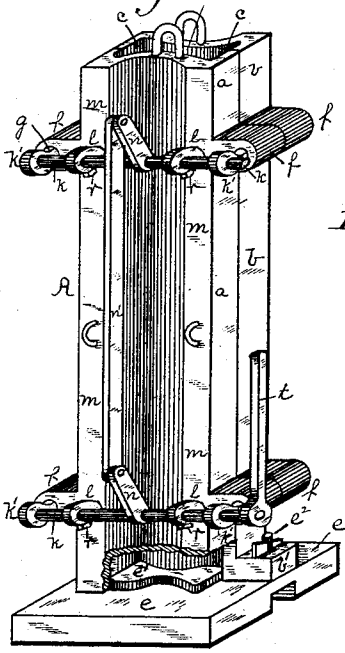


Fig. 2.

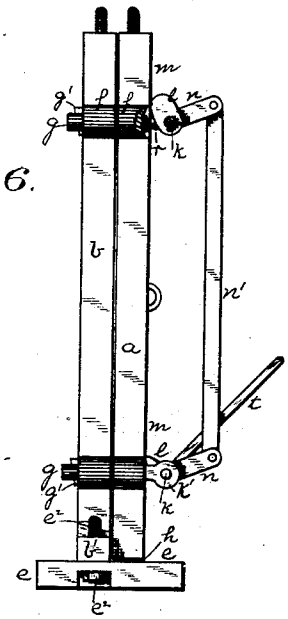


Fig. 5.



Fig. 6.



Fig. 9.

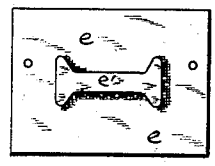


Fig. 3.

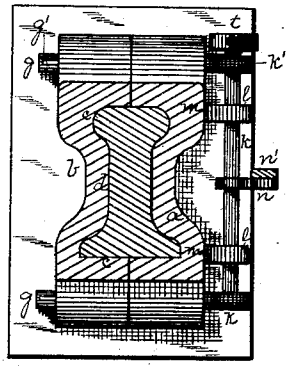


Fig. 7.

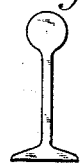


Fig. 4.

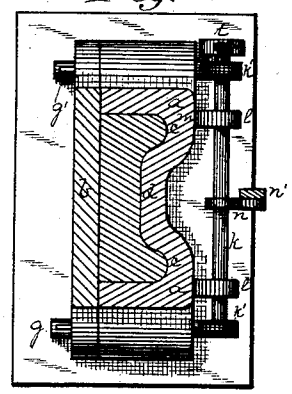
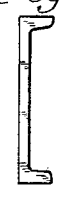


Fig. 8.



Witnesses.

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UNITED STATES PATENT OFFICE.

ABRAM REESE, OF PITTSBURG, ASSIGNOR OF ONE-HALF TO ROBERT C. TOTTEN, OF ALLEGHENY CITY, PENNSYLVANIA.

INGOT-MOLD.

SPECIFICATION forming part of Letters Patent No. 318,206, dated May 19, 1885.

Application filed July 17, 1884. (No model.)

To all whom it may concern:

Be it known that I, ABRAM REESE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Ingot-Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to molds for casting steel ingots, having special reference to the metal molds employed for casting steel ingots for the manufacture of deck-beams, **I**-beams, railroad-rails, channel-bars, and like articles having a head or flange on each side and a contracted or thinner portion between them. In the manufacture of these articles from iron difficulty has always been encountered on account of the greater reduction and stretching of the central or web portion in comparison with the flanges or enlargements of the beam, bar, or rail, this increased reduction or stretching of the central or web portion throwing the entire beam on a strain, so that the strength of the article is materially decreased, and any fracture of the web portion leaves the heads or flanges unsupported and capable of sustaining but little weight.

In the manufacture of deck-beams and like articles from steel, efforts have been made to cast the ingots to approximately the shape of the article to be rolled from them—that is, of greater thickness at one or both sides or edges than in the central or web portion—so that the ingot may be rolled to the finished article by substantially an even reduction on both sides, and the finished steel beam or like article be formed free from the strain above referred to. In casting these shape ingots difficulty has been encountered because of the peculiar shape of the ingot, the ingot having enlarged portions at the edges, being thinned or contracted between these enlarged portions, and the ingot-mold corresponding in shape to the ingot, and when the molten steel is poured the ingot-mold is of course expanded thereby, and the parts of the mold forming the inner faces of the large cavities at each edge of the mold are expanded against the metal in the mold bearing against the inner faces of the enlargements of the ingot, and thus preventing its normal contraction, molten steel in setting and cooling contracting or drawing toward the center, and the form of the mold preventing the enlargements of the ingot from being drawn toward the thin central portion thereof. As the steel of the ingot is in a soft and granular condition, it is evident that it is weaker than the ingot-mold, and consequently that the ingot is liable to rupture in the thin central portion or web thereof; consequently all previous efforts to cast these shape ingots have been unsuccessful.

The object of my invention is to form an ingot-mold in which these shape ingots may be cast without being subjected to this strain.

It consists, essentially, in an ingot-mold divided longitudinally into two or more parts, each provided with connecting-lugs, in combination with securing-bolts passing through the lugs, and cam-bars journaled in the bolts and carrying cams or eccentrics adapted to press against the mold, so that the two parts of the mold may be firmly clamped together by means of these cams or eccentrics during the casting of the ingot therein, and as soon as the molten steel is sufficiently set the mold opened by these cams or eccentrics a sufficient distance to allow of the even contraction of the ingot without its being subjected to these strains, the enlarged portions of the ingot sliding over the inner faces of the enlarged cavities of the mold, and thus being free to contract, so that all liability of strain in or rupture of the central or web portion is overcome.

It also consists in combining with the partible mold and cam-bars journaled in the securing-bolts connecting-levers and a link-bar, whereby all the cam apparatus may be operated together.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a perspective view of a mold illustrating my invention, the mold being for the manufacture of ingots for **I**-beams. Fig. 2 is a side view of the same. Fig. 3 is a cross-section of the mold for the manufacture of deck-beams. Fig. 4 is a cross-section of the mold for the manufacture of channel-bars. Fig. 5 is an end view of the ingot for the manufacture of **I**-beams. Figs. 6, 7, and 8 are end views of the finished **I**-beam, deck-beam, and

channel-bar formed from the ingots. Fig. 9 is a top view of the base-plate of the mold.

The ingot-mold A is formed in two or more parts, according to the shape of the ingot to be cast, being generally formed in two parts, *a b*, the mold being divided longitudinally along the edges, either centrally or at one side, according to the shape of the article to be formed.

The mold-cavity corresponds in shape to the ingot to be cast, whether for a deck-beam, I-beam, channel-bar, or like article, and has the enlarged cavities *c* and the contracted space *d* between them. It is supported on a suitable base-plate, *e*, one or both mold-halves resting on said base-plate, and the base-plate *e* has a raised portion, *e'*, corresponding in shape to the mold-cavity, around which the bases of the mold-halves *a b* fit.

In the construction preferred by me one mold-half, *b*, is secured to the base-plate, being bolted thereto by bolts e^2, passing through flanges *b'* at the base of the mold, and secured by nuts or wedges, as may be desired, and the other mold-half, *a*, is supported entirely by the mold-half *b*, being secured to it in the manner hereinafter described, the mold-half *a* being, therefore, free to move under pressure of the steel in the mold during contraction. Where both mold-halves rest on the base-plate, its surface is formed smooth to prevent friction between it and the bases of the mold-halves as the mold is opened by the pressure of the ingot in contracting. The mold-halves are provided with the lugs *f*, and are secured together by bolts *g*, passing through these lugs, and having slots in their ends, through which the wedges *g'* pass. The bolts *g* are sufficiently heavy to support the mold-half *a* in proper line with the mold-half *b*. A small space, as at *h*, is left between the base-plate *e* and the mold-half *a*, so that this mold is supported slightly above the base-plate, and all friction between the mold-half and the base-plate is overcome when the mold is opened to allow the contraction of the ingot. The bolts *g* have at each end a journal, *k'*, through which the cam-bar *k* passes, the bar being provided with the cams or eccentrics *l* opposite the faces *m* of the mold, and these cams bear against the faces of the mold, and serve to press the mold portions firmly together, or, when moved in the opposite direction, to leave the mold free to be opened by the pressure of the ingot when contracting. The levers *n* are rigidly secured to the cam-bars, and are connected by the link-bar *n'*, and one cam-bar is provided with a handle-lever, *t*, by means of which the cam-bars may be turned, and thus, by means of the cams *l*, draw the mold-halves tightly together or leave them free to open, as desired.

To prevent the molds from being opened too far, the cams are provided with the lugs *r*, which strike against the faces of the mold, and thus prevent the further movement of the cams. These lugs so serve as guide or stops to regulate the opening of the mold. The mold-cavities of course vary in size and shape according to the shape of the ingot to be cast, the ingot corresponding substantially to the shape of the finished article, according to the reduction to be given to them in rolling: For example, where the finished I-beam is fifteen inches in diameter, five-eighths of an inch thick in the web, and provided with flanges five inches across their outer faces, the steel ingots will be preferably formed fifteen inches in diameter, the web or contracted central portion being two and five-eighths inches thick, and the enlargement to form the flanged portions of the beam seven inches in diameter. In rolling the beam, as it is not necessary to stretch the central portion or web more than the edges of the ingot, it can be reduced to the proper size and shape by a substantially even reduction in the rolls, and all strains on account of the uneven stretching of the ingot be done away with.

The proportions of the mold-cavities of the molds for forming ingots for channel-bars and deck-beams and other like articles will correspond substantially to those set forth.

In casting the ingots in my improved mold the two parts *a* and *b* are secured together by means of bolts *g* passing through the lugs, the largest portions of the cams being turned against the sides or faces *m* of the mold-half *a*, and the wedges *g'* being driven tight along the outer faces of the lugs *f* on the mold-half *b*, so that the mold-halves are held firmly together by the pressure of the cams and wedges. The molten steel is then poured into the mold in the ordinary manner, and as soon as the steel is sufficiently set the operator, through hand-lever *t*, turns the cams, so as to allow for the usual contraction of the ingot in the mold, the hand-lever being turned several times, if necessary, so as to allow of the gradual opening of the mold by the inside pressure during the contraction of the ingot, thus preventing the escape of the molten steel, and also enabling the walls of the mold to give the proper support to the ingot therein, the lugs *r* on the cams preventing the mold from being opened too far. As the ingot contracts, the enlarged portions thereof are gradually drawn toward the contracted portions between them and press out the mold, the inner faces of the enlargements of the ingots sliding over the inner walls of the cavities *c* of the mold as they contract. As one mold-half is supported slightly above the bed-plate, and the cams permit of the opening of the mold by the pressure of the steel in contracting, but little force is required to press open the mold and allow the proper contraction of the ingot, and yet the mold gives all necessary support to the ingot during cooling and setting. The apparatus is simple in construction, and can be employed with the ordinary two-part mold, the only change necessary being the connecting-bolts and the cam mechanism.

I am aware that ingot-molds for casting rectangular ingots have been divided longi-

tudinally and the mold-halves hinged together at the top or along one side, said mold-halves having bars pivoted thereto and carrying an eccentric mounted between them and pressing against the mold, and hence do not claim, broadly, clamping ingot-molds together by means of eccentric mechanism; but in the molds referred to the clamping apparatus did not hold the mold-halves in line, hinges or other apparatus being required for this purpose; and this mechanism could not be employed in molds for shape ingots, because it did not permit the even opening of the mold, which is necessary to allow of the even contraction of the ingot cast therein.

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

1. A partible ingot-mold having lugs integral with the mold-halves thereof, in combination with securing-bolts passing through said lugs, and bars journaled in said bolts and carrying cams or eccentrics adapted to press against the mold, substantially as and for the purposes set forth.

2. In a partible ingot-mold, the combination of the mold-halves, securing-bolts, bars journaled therein and carrying cams or eccentrics, and the connecting-levers and link-bar, substantially as and for the purposes set forth.

In testimony whereof I, the said ABRAM REESE, have hereunto set my hand.

ABRAM REESE.

Witnesses:
JAMES I. KAY,
J. N. COOKE.