(No Model.)

J. PEDDER.

MOLD FOR CASTING INGOTS.

No. 307,583. Patented Nov. 4, 1884.

Fig 1.

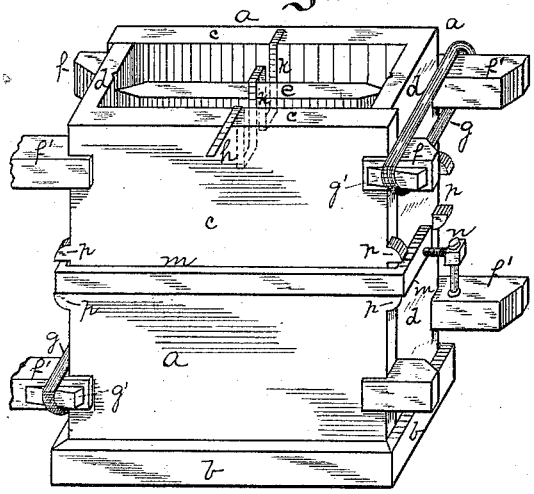


Fig 2.

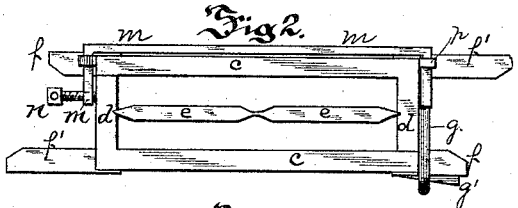


Fig 3.

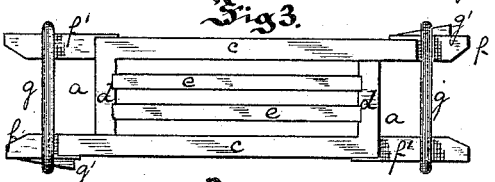


Fig 4.

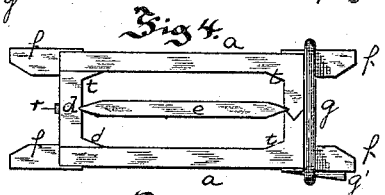


Fig 5.

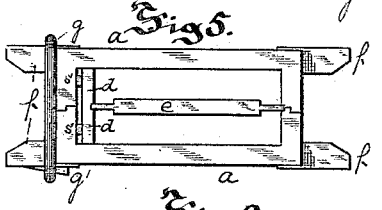


Fig 6.

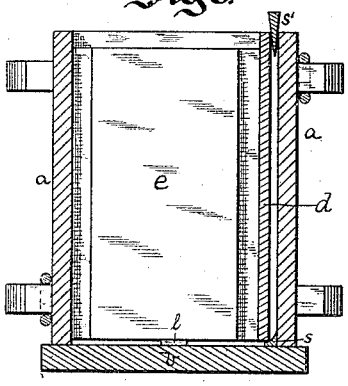


Fig 7.

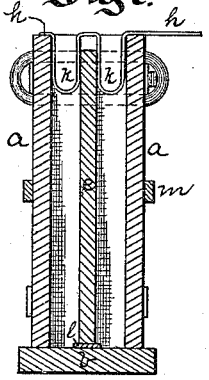


Fig 8.

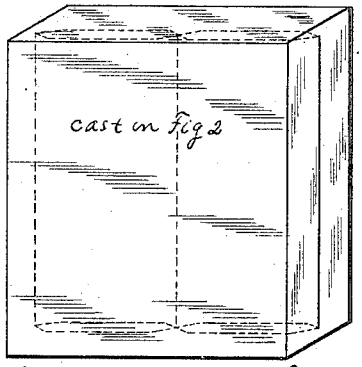


Fig 9.

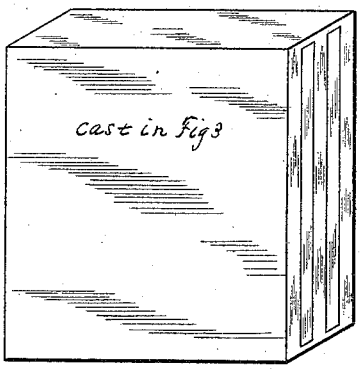


Fig 10.

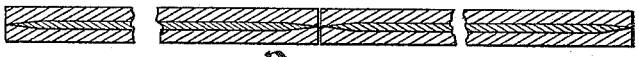
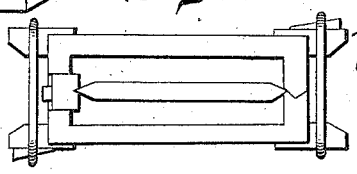


Fig 11.

Fig 12.



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Attorney

UNITED STATES PATENT OFFICE.

JOHN PEDDER, OF PITTSBURG, PENNSYLVANIA.

MOLD FOR CASTING INGOTS.

SPECIFICATION forming part of Letters Patent No. 307,583, dated November 4, 1884.

Application filed May 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN PEDDER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Molds for Casting Ingots Having Layers of Different Metals or Carbons; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to molds for casting ingots, having special reference to molds for casting ingots formed of several layers or strata of metal—as, for example, iron or soft-steel center ingots or hard-steel center ingots employed for the manufacture of agricultural plates and implements, tools, nails, and other articles, or ingots having four or more layers or strata of these metals, for safe or vault plates, the iron or soft steel being employed to resist strokes, blows, or strains on the implements, tools, or plates, and to support the hard-steel strata, which form the wearing surfaces or edges in the implements and resist the action of boring or cutting tools in safe-plates. Heretofore these plates have been formed by casting the metal around one or more plates inserted in the mold and rolling the ingot to the proper thickness between flat-faced rolls, the heated ingot being passed lengthwise and sidewise through the rolls, and the metals of the outer layers being rolled over the inner layers, and afterward cut off to expose the inner layer or layers. As described in Letters Patent No. 300,730, dated June 17, 1884, I have claimed as an improvement in the art of making these plates casting the ingot with the plate inserted in the mold even with or extending slightly beyond the layers or strata cast thereto, and reducing the ingot by presenting it to the rolls edgewise as well as flatwise, so that the plate is formed having finished uncut side edges exposing the several strata of metal. In forming these ingots, however, it was found exceedingly difficult to fit the plate neatly into the ordinary mold and prevent the steel cast thereto from lapping around its side edges; and to prevent this it was found necessary to fit the edges of the plates into grooves in the mold, and in the finished ingot the square edges of the plate extended slightly beyond the steel cast to it. In edge-rolling these ingots the lips of the center plates were liable to be bent or lapped over sidewise unless the ingot was very carefully fed to the rolls, and hence the inner layer of the rolled plate was bent out of proper relative position, and there was not the same, or approximately the same, amount of steel on either side thereof, and it sometimes happened that the inner layer was bent over so far as to form one edge of the finished plate. It was also found desirable to have a greater proportion of steel along the cutting or wearing edge of the finished agricultural implements than in the body, as their wear was proportionately increased, and the thinner iron or soft-steel center was sufficient to support said edges, and would have the further advantage that it would not be guttered or worn out by the soil and leave the steel unsupported.

In an application for patent filed February 11, 1884, Serial No. 102,349, I have fully described the means of casting ingots for making these improved plates, and sought protection for the ingots and plates. The special objects of my invention as set forth in this application are to provide suitable molds for casting these ingots with the side edges of the plates inserted in the mold presented to view and yet substantially even with the steel cast thereto to overcome the objections to the ingots above referred to, as well as molds suitable for casting ingots for making the improved plates above described, though my improved molds are found advantageous in casting solid ingots, as they may be employed for different widths of ingots.

It consists, essentially, in a mold for casting ingots having several layers or strata of metals, having a portion thereof movable or adjustable against the edge of the plate or plates inserted in the mold to form one or more of the layers of metal in the ingot.

It also consists in certain other improvements in the construction of the ingot-molds, and plates inserted, and the tools employed for centering the plates and clamping the molds against the edges of the plates.

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 illustrating my improved mold, with the center plate therein. Fig. 2 is a top view thereof showing the center plate inserted and ready for casting. Fig. 3 is a top view thereof showing the formation of ingots having four or more layers or strata. Figs. 4, 5, and 12 are top views of other forms of the mold. Fig. 6 is a longitudinal central section of the mold shown in Fig. 5. Fig. 7 is a longitudinal cross-section of Fig. 1. Figs. 8 and 9 are views of ingots formed, and Figs. 10 and 11 are views of the finished rolled plate, showing the layers or strata of metal therein.

Like letters of reference indicate like parts in each.

The ingot-molds preferred by me are illustrated in Figs. 1, 2, 3, and 7, the molds being formed in two halves, *a a*, these halves resting on the bed-plate *b*, each half having one side and one end portion or wall of the mold formed together, the ends of the end portions, *d*, fitting against the inside of the side portions, *c*, so that the said halves may be adjusted to vary the width of the mold-cavity, and thus arrange it for casting different widths of ingots, or to press the end portions against the center plate or plates, *e*, the plate being inserted within the mold and the molds being moved or adjusted against the side edges of the plate, so that the end portions, *d*, of the mold may be clamped tightly against the side edges of the plate, and thus prevent the molten steel from running around the side edges thereof. The mold is provided with the lugs *f f'*, around which the links *g* fit, the links being held in place and the portions of the molds being clamped together by the wedges *g'*, as fully described in Letters Patent granted to me May 29, 1883, being No. 278,593; but as the two halves of the molds are made adjustable, as before described, the lugs *f'* are made of sufficient length to engage with the lugs *f* without reference to the width of the mold-cavity. In the inner faces of the end portions, *d*, I prefer to make very shallow grooves, in which the side edges of the plate inserted fit, in order to hold it in the exact position desired; but this is not necessary, as the plate may be brought to the proper position therein by suitable holding apparatus, and when the end walls of the mold are clamped against the plate it is firmly held by them, the holding apparatus being then removed.

The apparatus employed by me is shown in Figs. 1 and 7, being simply an iron bar, *h*, having two loops, *k*, the outer faces of the loops fitting against the inner faces of the side walls, *c*, and the plate inserted fitting between the loops, so that when the plate is placed within the mold this bar is placed over it and both guides it to and holds it in the center of the mold until the end walls, *d*, are clamped against it. As it is desired that the steel shall pass under the bottom edge of the plate in order to form a solid mass of steel at the ends of the ingot, and inclose the plate within the steel, to bind the ingot together and prevent its parting when fed to the rolls, in the bottom of the mold I place the metal block, *l*, to hold the plate inserted a short distance above the bottom of the mold, and when the steel is poured it will pass under the plate inserted and so inclose its end. To inclose the upper end of the plate inserted, I make it shorter than the mold, so that the steel may flow over the top of the plate and so inclose the top thereof, the ingot cast having the side edges of the plate extending out to the side edges of the ingot, and substantially even therewith, but having solid steel ends, so that there is no danger of the plate parting during rolling. After the plate is rolled these solid ends, which are generally ragged, are sheared off, to expose the center plate.

In order to clamp the end walls of the mold tightly against the plate inserted, I employ the clamp *m*, one arm of which fits against the end portion, *d*, of one half-mold *a*, the body of the clamp fitting along the side of said half-mold, while the other arm extends over the end of said side portion opposite the end portion, *d*, of the other half of the mold, and is provided with the screw-bar *n*, which is screwed against said end portion, and thus forces the end walls tightly against the plate inserted.

In order to hold the clamps in proper position I have provided the mold with the lugs *p*, the clamp being placed within these lugs and so supported centrally of the mold and caused to press more evenly on the plate, and supported by them until the plate inserted is clamped within the mold. After the plate inserted is so clamped the wedges *g'* are driven tight, and so bind the mold in position ready for casting that the clamp *m* may be removed to be employed with another mold. Where two or more plates are inserted within the mold, as shown in Fig. 3, the mold is clamped together in the same manner, care being taken that each of the plates inserted is of the same width and that the end walls of the mold may thus be clamped tightly against all the plates inserted therein.

In Fig. 4 the mold shown is divided into two halves in the center of one end wall, and the opposite end wall is formed separate, so that when the plate is inserted within the mold this block fits against one edge of the plate and is driven or clamped tightly against that side edge of the plate, and the mold then clamped together by means of the links and wedges, as above described. The end wall is provided with lugs *r*, by means of which it may be driven tight against the side edges of the plate, though the clamping apparatus above referred to may also be employed with it.

Instead of forming the entire end wall separate, a portion thereof may be cut away and a block inserted therein to form the adjustable portion of the mold, as shown in Fig. 12.

In Figs. 5 and 6 is shown another means for

adjusting a portion of the mold against the plate inserted, in which the ordinary ingot-mold is employed, the ordinary half-molds being secured together in any suitable way and having the wedge piece or pieces *s* fitting tightly against the base of one end wall, these wedge-pieces being either separate or cast with the molds, and a plate or block, *d*, corresponding in width to the diameter of the mold-cavity, is then placed within said cavity along the end wall, against which the wedge-piece *s* fits.

To secure the center plates in the mold it is lowered in place and the lower part of the block or plate *d* is forced against the plate *e* by driving it down against the wedge-piece *s*, and the upper part is then forced against the center plate by means of the wedges *s'*.

In forming ingots having the inner layer extending out to the side edges of the ingot and the said inner layer reduced in thickness along said side edges, I generally employ the form of center plate, or plate inserted, shown in Figs. 1, 2, and 4, though the plates shown in Figs. 5 and 6 may also be employed, as is fully set forth in said application for patent filed February 11, 1884, Serial No. 120,349. In the preferred form of plate the side edges are rolled gradually, decreasing in thickness toward said side edges, as is fully shown in the figures above referred to, and when the steel is poured on either side of the plate the ingots formed have the center plate extending out to the side edges thereof, and the said center plate or inner layer gradually reduced in thickness along said side edges, as shown in Fig. 8, though the side edges of the inner layer extend out to the side edges of the ingot for the entire length of the plate. Where it is not desired to vary materially the thickness of the outer layers of the ingot, the plate inserted is rolled with tapering or reduced edges, and a mold having inner walls corresponding in shape to the plate inserted is employed, as shown in Fig. 4, the corners *t* of the mold-cavity being filled out to correspond to the taper or reduction of the inner layer, and when this ingot is rolled to shape the finished plate has the outer layers of the same, or approximately the same, thickness. When the plate inserted is substantially the shape shown in Figs. 5 and 6, the ingot having substantially the same form as that shown in Fig. 8 is obtained, except that the side edges of the inner layer are not tapering, and when the plate is rolled the inner layer is the same thickness for a short distance back from the side edges of the plate.

When it is desired to form one or more plates from the same ingot, in which the side edges of the inner layer shall be tapering or reduced in thickness, as above described, the center plate or plate inserted is formed substantially the shape shown in Fig. 2, the plate being rolled with one or more thin or tapering portions therein and the steel being cast thereto in the same manner. The ingot formed is rolled to the desired width and thickness by edge-rolling and flat-rolling, and when so formed at the last pass, or after cooling, the plate is sheared along the line of thinning of the center plate, and is thus divided into two plates having the inner layer tapering or reduced in thickness along the side edges, as above described.

It is evident that other forms of ingot-molds may be constructed having the essential features heretofore described, and these are of course included within my invention, the several molds shown being merely illustrative of the invention as it can be carried out.

No specific claim is made in this application to the ingots shown and described, as these are made the subject of another application filed September 22, 1884, Serial No. 143,636.

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

1. In molds for casting ingots having several layers or strata of metals, the combination, with the plate or plates inserted to form one or more of said strata, of the mold having a portion thereof movable or adjustable against the side edges of the plate or plates inserted, substantially as and for the purposes set forth.

2. The combination, with the ingot-mold having a portion thereof movable or adjustable against the edge of the plate inserted, of the holding-bar fitting over said plate and against the inner walls of the mold, substantially as and for the purposes set forth.

3. In combination with the ingot-mold for casting ingots having several layers or strata, the holding-bar *h*, having the loops *k*, substantially as and for the purposes set forth.

4. In combination with the ingot-mold having a portion thereof movable or adjustable against the edge of the plate inserted, the clamp *m*, adapted to force said portion against the plate, substantially as and for the purposes set forth.

5. In combination with the ingot-mold having a portion thereof movable or adjustable against the edge of the plate inserted, and having the lugs *p*, the clamp *m*, substantially as and for the purposes set forth.

6. The combination, with the ingot-mold divided into two halves, each formed of a side wall, *c*, and end wall, *d*, said end walls being movable or adjustable in the direction of the width of the mold, and said half-molds being provided with elongated lugs *f'*, of the links *g* and wedges *g'*, substantially as and for the purposes set forth.

In testimony whereof I, the said JOHN PEDDER, have hereunto set my hand.

JOHN PEDDER.

Witnesses:

L. P. BLANCHARD,

JAMES I. KAY.