B. C. LAUTH

Manufacture of Railway-Rail.

No. 210,616. Patented Dec. 10, 1878.

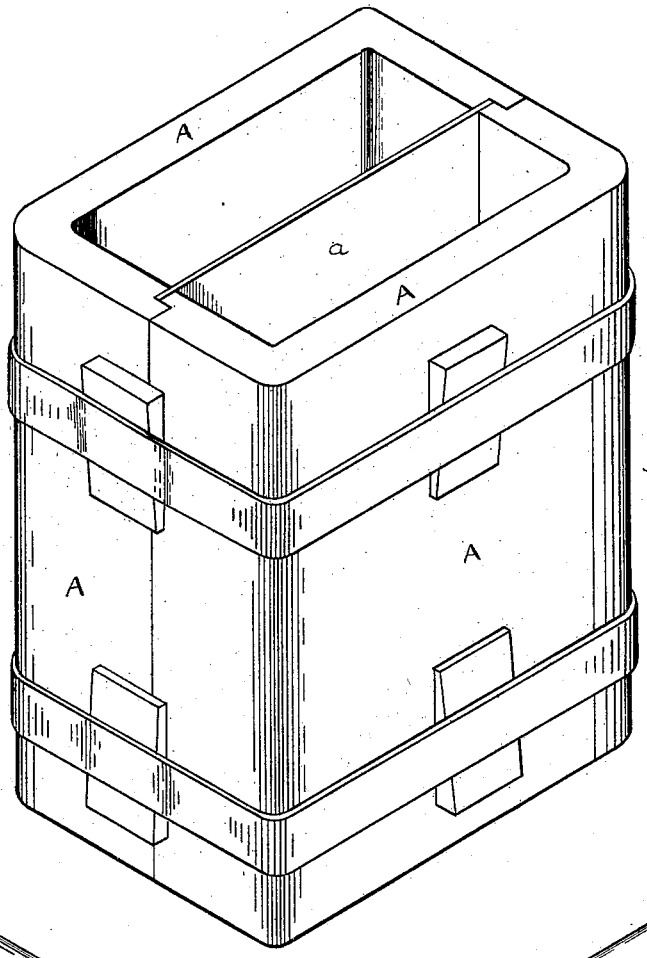

Fig. 1.

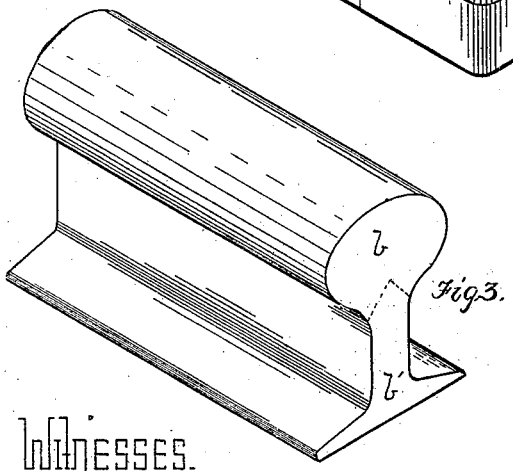

Fig. 3.

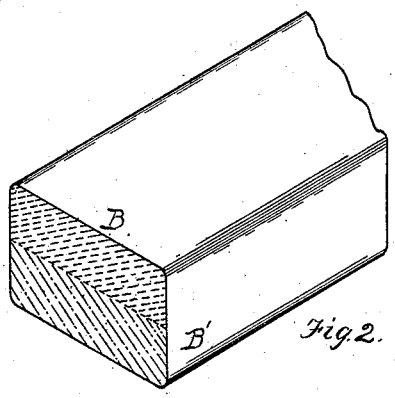

Fig. 2.

WITNESSES.

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UNITED STATES PATENT OFFICE.

BERNARD C. LAUTH, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MANUFACTURE OF RAILWAY-RAILS.

Specification forming part of Letters Patent No. **210,616**, dated December 10, 1878; application filed September 20, 1876.

To all whom it may concern:

Be it known that I, BERNARD C. LAUTH, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Manufacture of Railroad-Rails; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a perspective view of an ordinary ingot-mold, with a sheet-metal diaphragm arranged therein in position for the pouring of the metals, or different qualities of the same metal, so as to make the compound rail-ingot. Fig. 2 shows in perspective one end of such ingot; and Fig. 3 shows in perspective one end of a compound railway-rail produced from such ingot.

My invention relates to the manufacture of railway-rails, in which two or more malleable cast metals, or two or more qualities of the same malleable metal, are required or desired in the finished rail—say, one metal or one quality in the head of the rail, another in the base, with either or a third in the web, or with one in the top wearing part of the head, the rest of the rail being of one or more other metals or qualities of metals. The desirability of such a rail has long been recognized; but, so far as I am aware, a durable product of such character has not heretofore been found practically attainable. Probably the greatest practical difficulty has been encountered in the effort to secure an inseparable union between the different qualities or grades of metals employed, while at the same time keeping them so far distinct that one shall not become seriously intermingled with the other. This difficulty I have overcome by casting the different metals or the different qualities or grades of the same metal simultaneously in the same mold, but on the opposite sides of a sheet-metal diaphragm, which shall be so thin and of such degree of fusibility as to become practically fused by and assimilated with the metals so poured in, and permit a perfect union of the latter, but durable enough to prevent the qualities of metal on its opposite sides from becoming commingled to any great extent before they pass from a fluid condition.

The mold A is of the usual or any suitable construction, such as may be adapted to produce the shape of ingot desired preparatory to making the rail. At the proper place in such mold, so that the space for the different metals or qualities of metals may be properly divided, I arrange a thin sheet-metal diaphragm, *a*, and secure it in position in any convenient manner by lugs, grooves, or other device, or with a two-part mold, jointed at the proper place. The edges of the plate may be clamped in at the joint, as shown in the drawing. In this way I divide the mold-cavity into the desired number of cells, two or more, according to the number of grades or qualities of metals desired in the finished rails, and for this purpose I use either cast-steel, Bessemer steel, or homogeneous iron, or any qualities or grades of these metals, or any of them capable of being cast and worked. These partitions being properly arranged, the different grades or qualities of metals are poured simultaneously, each into its appropriate cell, so as to produce a compound ingot, B B′, which, when worked down by hammering or rolling, or both, shall give in the finished rail *b b′* the proper or desired distribution of the metals.

The molten metals so poured in will rise simultaneously in the different cells, and by the time they set or lose their fluidity they will so far have effected a fusion of the diaphragm *a* as to result in a complete and perfect amalgamation or union of the metals so poured in.

Preferably the partition-sheets *a* are so thin that they will be practically fused by the action of the molten metals at the same time that the latter becomes set, or so far hardened that the different grades, or qualities, or kinds of metals on opposite sides of such diaphragms will not commingle to any great extent; but these diaphragms must be so thin that they will be substantially, and to all practical intents and purposes, destroyed as separate component parts of the rail, or so far diffused by and assimilated with the metals on its opposite sides that, in the rail produced, each quality or grade of metal will be united and solidified with the next contiguous grade or quality without the presence of an intervening layer or stratum of unassimilated or unconverted material.

The thickness of such diaphragms will depend somewhat on the size, and degree of heat,

when the ingot is cast; for the greater the amount of molten metal employed, and the higher its temperature, the thicker must be the diaphragms, or otherwise they would be liable to fuse too soon, and allow the different grades or qualities of molten metals to run into each other and commingle.

The molten metals can be poured in at the top or run in from the bottom into the different cells, bottom pouring being preferred.

After the ingot B B′ is thus made, it can be worked in any known way into the finished rail desired.

By this process I can produce finished rails in which a hard durable head or cap shall be combined with a soft tough flange and web, and the relative degrees of each may be varied at pleasure.

The different hatchings in the ingot B B′, and the dotted line in the rail *b b′*, are intended to represent the different metals or qualities of metals employed, the division-line between being the plane of the diaphragm.

By the terms "inseparable union" and "perfect union," and other like expressions, I mean not only that the union in the ingot shall be perfect, but also that during the subsequent working of the ingot by which it is reduced to a rail shape, and also in the subsequent use of the rail, this union shall continue "perfect" and "inseparable" for all practical purposes.

I am aware that it is not new to use a thin fusible sheet-metal band between different qualities of non-malleable cast-iron in making car-wheels of cast-iron; but the use of a sheet-metal diaphragm in connection with malleable metals, as and for the uses described, constitutes an independent invention, since the former is not suggestive of the latter, and the use of a diaphragm in making a cast-iron car-wheel would not and could not import or imply that even the same diaphragm could be successfully and practically used in making malleable ingots, such that the union so formed should not be destroyed or practically weakened by subsequent reworking into railroad-rails. One invention ends where experiment in making another begins.

I am aware that comparatively thin sheet-metal plates have been inserted in ingot-molds, and cast malleable metals have been poured on one or both sides thereof, at such temperature as to effect a fusion of the face surfaces of such plates; but I am not aware that such process has ever been carried to the extent of incorporating therein a sheet or plate adapted to be rendered fluid throughout by and under the heat of the metal so poured in.

I claim herein as my invention—

1. The process of manufacturing rail-ingots, to be subsequently worked into railway-rails, which consists in casting two malleable metals, or two qualities of the same malleable metal, simultaneously in an ingot-mold on opposite sides of a thin sheet-metal diaphragm capable of being rendered fluid under the heat of the poured metals, substantially as set forth.

2. The method of making railway-rails hereinbefore described, which consists in casting two malleable metals, or different qualities of the same malleable metal, simultaneously in an ingot-mold, on opposite sides of a thin fusible sheet-metal diaphragm capable of being rendered fluid under the heat of the poured metals, and then reducing by hammers or rolls, or both, the ingot so made to the desired rail form, substantially as set forth.

In testimony whereof I have hereunto set my hand.

BERNARD C. LAUTH.

Witnesses:
CLAUDIUS L. PARKER,
GEORGE H. CHRISTY.