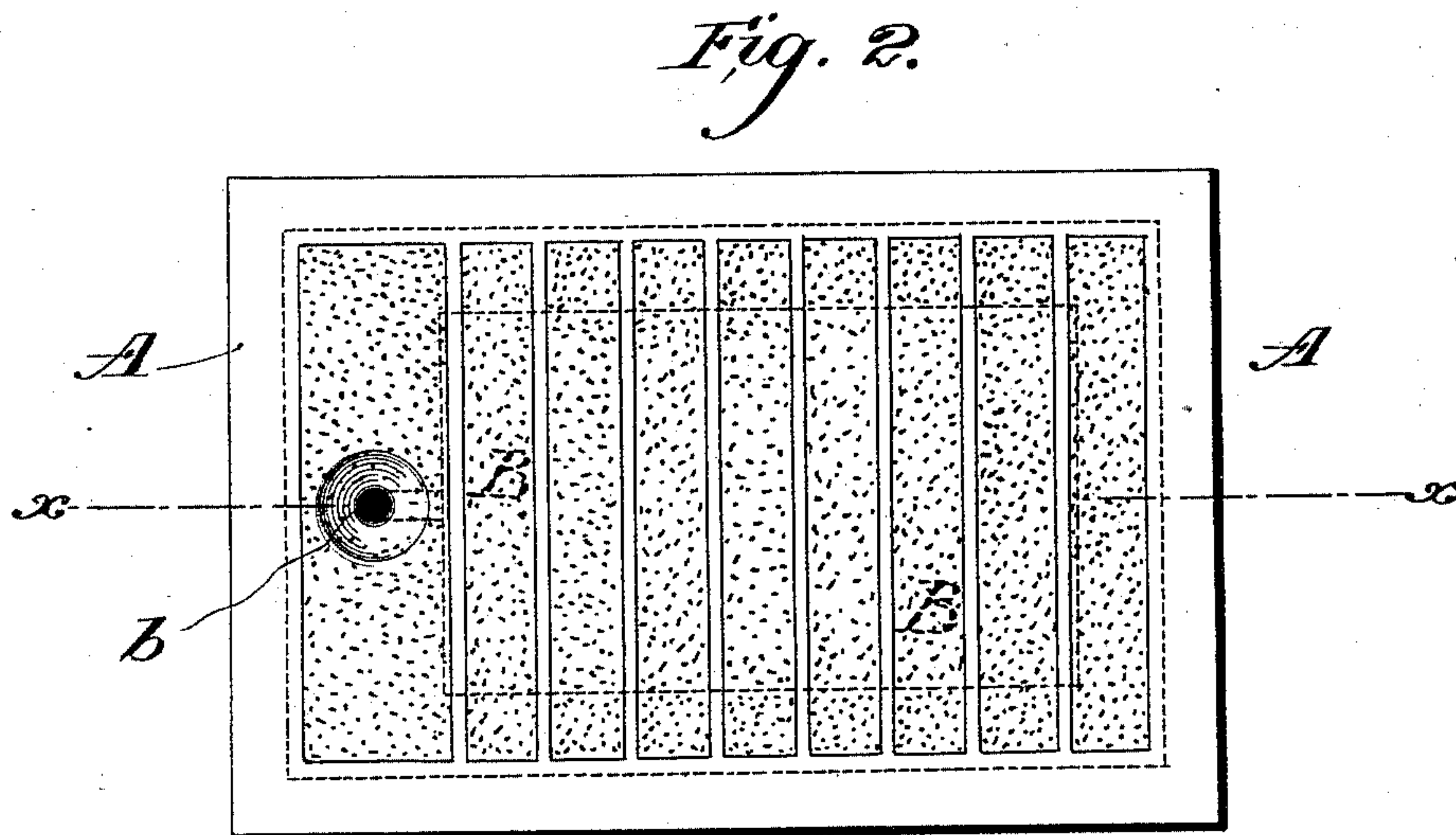
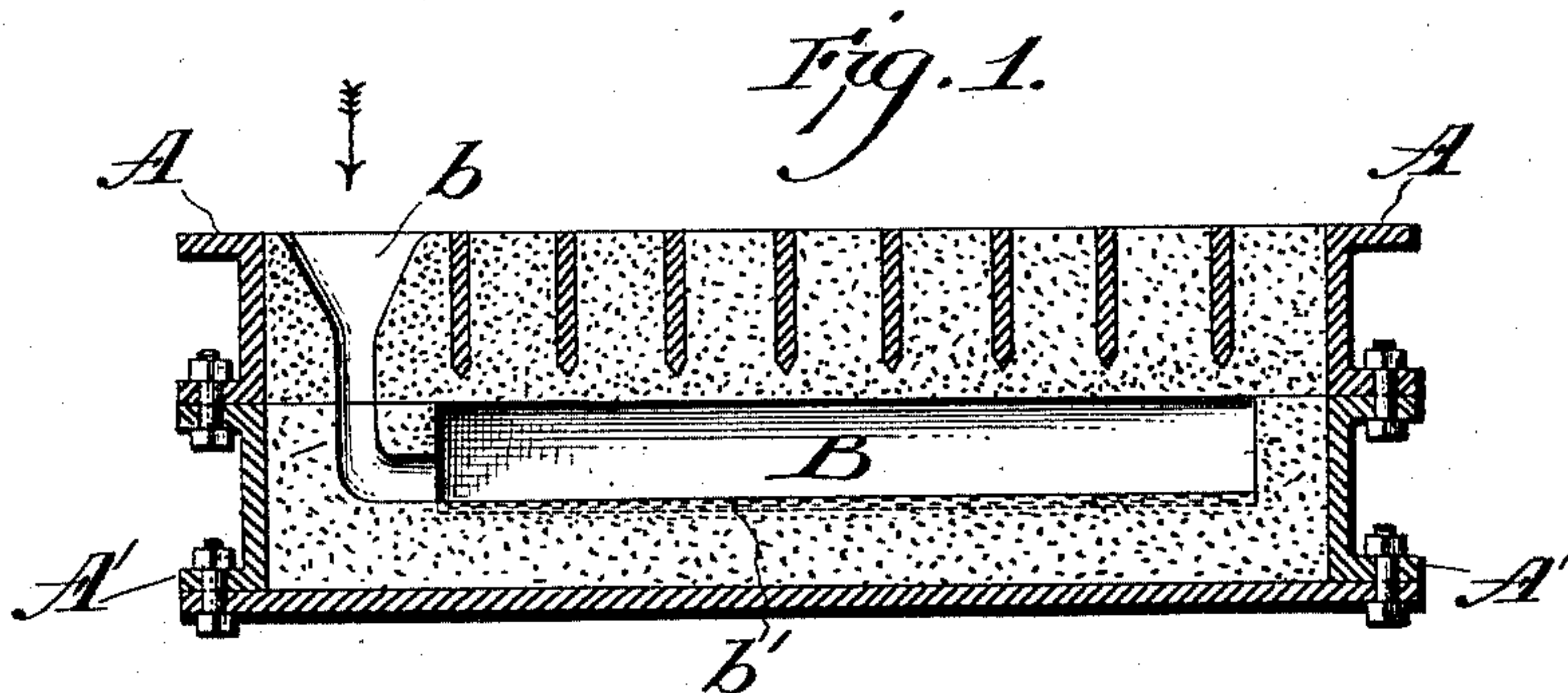


(No Model.)

G. H. CHASE & H. L. GANTT.
PROCESS OF CASTING ARMOR.

No. 485,785.

Patented Nov. 8, 1892.



WITNESSES:

David Williams

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UNITED STATES PATENT OFFICE.

GEORGE H. CHASE AND HENRY L. GANTT, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS OF CASTING ARMOR.

SPECIFICATION forming part of Letters Patent No. 485,785, dated November 8, 1892.

Original application filed December 22, 1891, Serial No. 415,907. Divided and this application filed April 19, 1892. Serial No. 429,769.
(No specimens.)

To all whom it may concern:

Be it known that we, GEORGE H. CHASE and HENRY L. GANTT, of the city of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in the Process of Casting Armor, &c.; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification.

Our invention has relation to the manufacture of steel for armor, rolls, and other objects requiring a hardened surface; and it consists in improved process of casting armor-plate, &c., as hereinafter particularly described, of the class of invention described and claimed in our application for Letters Patent filed December 22, 1891, Serial No. 415,907, of which this is a division.

The object of our invention is to provide a process for casting steel employing a mold having one or more of its interior walls composed of a manganese alloy for fusing with the casting in the molten state in the mold, thereby providing in the surface of the casting coming in contact with such wall composed of manganese alloy and the parts adjacent to the surface a degree of hardness differing from that of the interior portion or other surfaces of the same piece, the steel graduating from such hardened exterior surface into a softer interior.

A special application of our improved molds having one or more of the inner walls composed of manganese alloy is in the manufacture of steel castings for armed vessels and forts, though it is also applicable to numerous other structures used in commerce, such as rolls for rolling-mills, dies for hammering iron and steel, and for other devices requiring a hardened surface and great strength. Manganese when brought into contact, as in mold-walls, with molten steel produces an extremely-hard surface and a superior result in the casting, for the purposes before mentioned.

We have carefully experimented with manganese alloys in mold walls or linings and find that the chemical elements composing them are such as to fuse and alloy in a highly-satisfactory manner with the molten steel com-

ing in contact therewith and to uniformly harden the surface of the steel, graduating in hardness toward the interior.

The accompanying drawings illustrate a mold of ordinary construction having an interior wall composed of the fusible metallic alloying material applied thereto. The mold may be of any desired shape or size and have either one or all of the inner mold-walls provided with the fusible manganese alloying material, which walls may be composed of only a thin stratum of the alloying material, as shown in the drawings, or they may be largely composed of the same.

Figure 1 is a sectional view on the line xx of Fig. 2. Fig. 2 is a plan view.

A is the upper section of the casting of the mold, which is of ordinary construction, and A' is the lower section, joined, as indicated in the drawings, by bolts or other suitable means, so that the sections can be separated after the casting has been made and in this manner removed from the mold.

B is the inner chamber, into which the molten steel is poured through the runner b .

In the drawings only one wall b' of the chamber B is composed of the manganese alloy and the remaining walls are composed of sand or other like suitable material.

In carrying out our invention molds of a desired shape and size, as above stated, are provided, the walls of which are composed wholly or partially of manganese alloy, which will fuse and alloy or combine with the molten steel and harden the surface or surfaces coming in contact with such walls and the parts adjacent thereto in a graduating degree, as before described. The other walls of the mold-chamber are composed of sand or any well-known desirable material. Of the manganese alloys we preferably employ in the construction of the alloying mold-walls ferromanganese, though other manganese alloys may be used with very satisfactory results.

The inner stratum only of one or more of the walls of the mold may be wholly or partially composed of the alloying material, or the walls may be largely composed of the same, if desired.

It is to be noted that our steel after being cast may be treated by any of the well-known

methods in vogue for improving the quality of cast-steel, such as forging, rolling, oil-tempering, annealing, hardening, and toughening.

5 Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

10 1. The process of producing steel castings having a hardened surface gradually decreasing in hardness toward the interior, consisting in providing a dry mold with a lining or facing composed wholly or in part of manganese alloy, pouring the steel into said mold and causing said alloy to be fused and entirely incorporated by alloying with the outer portion of the molten steel, and removing the casting from the mold when sufficiently cooled, substantially as described.

15 2. The process of producing steel castings

having a hardened surface or surfaces gradually decreasing in hardness from the surface, consisting in pouring molten steel into a dry-sand mold, said mold having one or more of the inner walls provided with a lining or facing composed wholly or in part of ferro-manganese, and causing said alloy to be fused and entirely incorporated by alloying with the outer portion of the molten steel, and removing the casting from the mold when sufficiently cooled, substantially as described. 20 25 30

In witness whereof we have hereunto set our hands this 16th day of April, A. D. 1892.

GEORGE H. CHASE.
HENRY L. GANTT.

Witnesses:

F. EARLE VON LEER,
HORACE PETTIT.