(No Model.)

2 Sheets—Sheet 1.

R. H. LIBBY.

BOX PILE.

No. 342,447. Patented May 25, 1886.

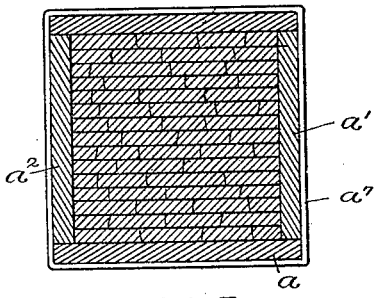

Fig. 3.

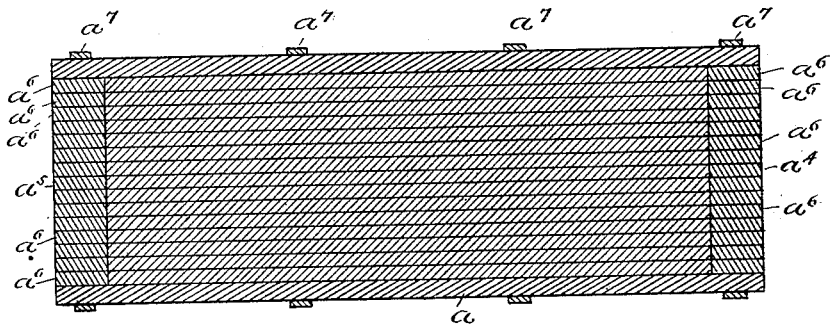

Fig. 2.

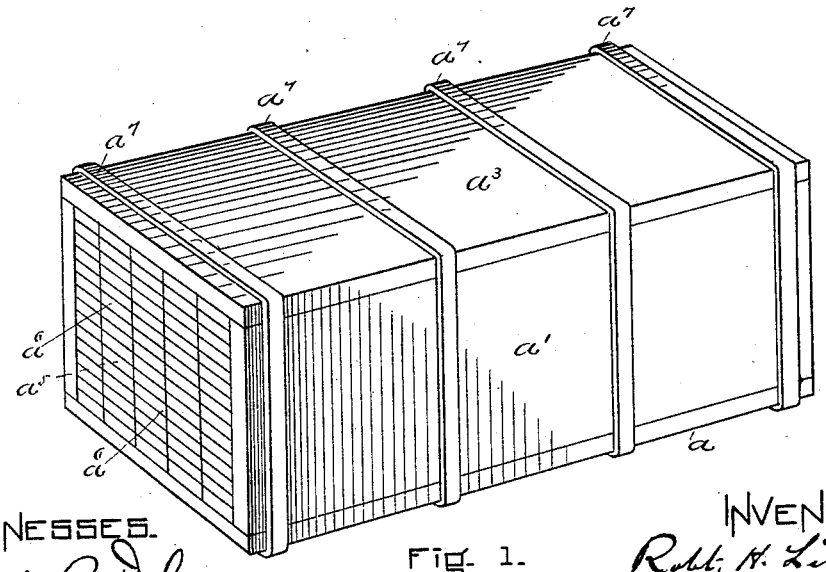

Fig. 1.

WITNESSES.
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J. M. Dolan.

INVENTOR.
Robt. H. Libby
by his atty.
Clarke & Raymond.

(No Model.) 2 Sheets—Sheet 2.

R. H. LIBBY.

BOX PILE.

No. 342,447. Patented May 25, 1886.

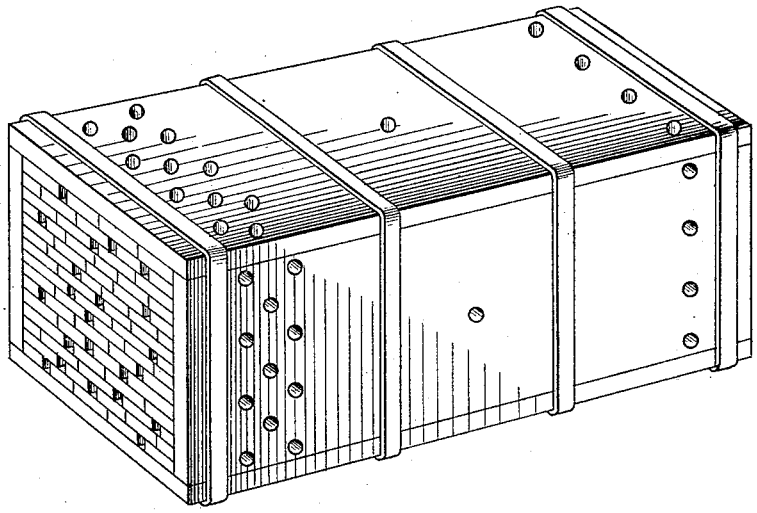

Fig. 4.

WITNESSES.

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UNITED STATES PATENT OFFICE.

ROBERT H. LIBBY, OF BOSTON, MASSACHUSETTS.

BOX-PILE.

SPECIFICATION forming part of Letters Patent No. 342,447, dated May 25, 1886.

Application filed December 26, 1885. Serial No. 186,702. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. LIBBY, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in the Manufacture of Composite Metals, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to that manufacture of composite metals which comprises the assembling of the metals in the form of a box-pile, and their subsequent reduction to a composite integral form by heating and rolling; and it refers, especially, to the form or mode of making the box-pile.

Heretofore such piles have generally been made from boxes more or less elaborate, having flat metal ends secured thereto in an expensive way. By my invention the ends of the pile are made of slabs or plates piled one upon the other, and are united to the remainder of the box by straps which encircle the entire box, or in any other desired way.

Referring to the drawings, Figure 1 is a perspective of a box-pile having the features of my invention. Fig. 2 is a longitudinal vertical section, and Fig. 3 is a cross-section thereof. Fig. 4 illustrates a pile having holes or apertures formed therein at or near the ends thereof, for the purpose hereinafter stated.

a represents the bottom plate of the pile; *a'*, one side plate, and a^2 the other side plate; a^3, the top plate; a^4, one end, and a^5 the other end thereof. The ends are made up of metal slabs or pieces of plate a^6, placed or piled as shown, so that the box as a whole comprises the bottom, side, and top plates, and the pile of slabs or plates forming the ends. The space within the box is filled with metal having any desired arrangement, according to the article to be produced. The exterior metal may be of iron or any material which will stand a welding heat and protect the interior metal during the heating process. The interior metal may be of steel, copper, or any other metal, or an alloy. The sides, top, and bottom, while represented as secured together by straps a^7, may be attached together in any other form, so as to securely hold the piled ends in place. The pile when thus made is subjected to a welding heat, and then submitted to the action of compacting, shaping, and forming rolls or devices.

This construction of pile not only is cheaper than any now in use, but it possesses another material advantage which arises from its peculiar construction which provides spaces or passages at the ends, through which gases produced or evolved during the heating of the pile can readily escape in the subsequent rolling or reducing operation. In piles having a solid or substantially solid end, there is no way by which these gases can escape while the metal is being rolled or reduced, as in such reduction one end of the pile is first submitted to the action of the rolling or reducing mechanism, and if gases have been evolved during the heating, they are pressed or crowded forward from that end to the other end of the pile, and if there are no means provided for their escape they are very likely to burst open the end and cause a loss of metal and an imperfect product, while if passages are provided through which the gases can escape this result is avoided. By piling the ends these escape-passages are provided, as of course the ends cannot be piled so closely as to make a substantially solid or continuous end before rolling. This effect can also be obtained by punching or forming holes in the exterior of the casing of the pile near the ends, or in the end piece when a solid plate is used, but this is a more expensive operation, and while I consider that it involves this feature of my invention, I prefer the form of construction first named.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. A metal pile comprising the bottom, side, and top plates, *a a'* a^2 a^3, the ends a^5, made of plates or slabs of metal piled one upon the other, as described, and an interior metal filling, all substantially as described.

2. The combination, in a metal pile, of the bottom, side, and top plates, *a a'* a^2 a^3, the

piled ends a^5, the metal filling, and the straps a^7, substantially as described.

3. The metal pile comprising the plates $a\,a'$ a^2 a^3, the piled end sections, a^5, forming an exterior casing, and an interior metal of a different character or kind from the exterior and inclosed upon all sides by the casing of the pile, substantially as set forth.

4. A metal pile having holes, ducts, or passages arranged therein at or near the ends thereof, substantially as described.

ROBERT H. LIBBY.

Witnesses:
F. F. RAYMOND, 2d,
FRED. B. DOLAN.