No. 867,692. PATENTED OCT. 8, 1907.

F. L. ANTISELL.

MOLD FOR CASTING COPPER.

APPLICATION FILED NOV. 21, 1905.

Fig. 1

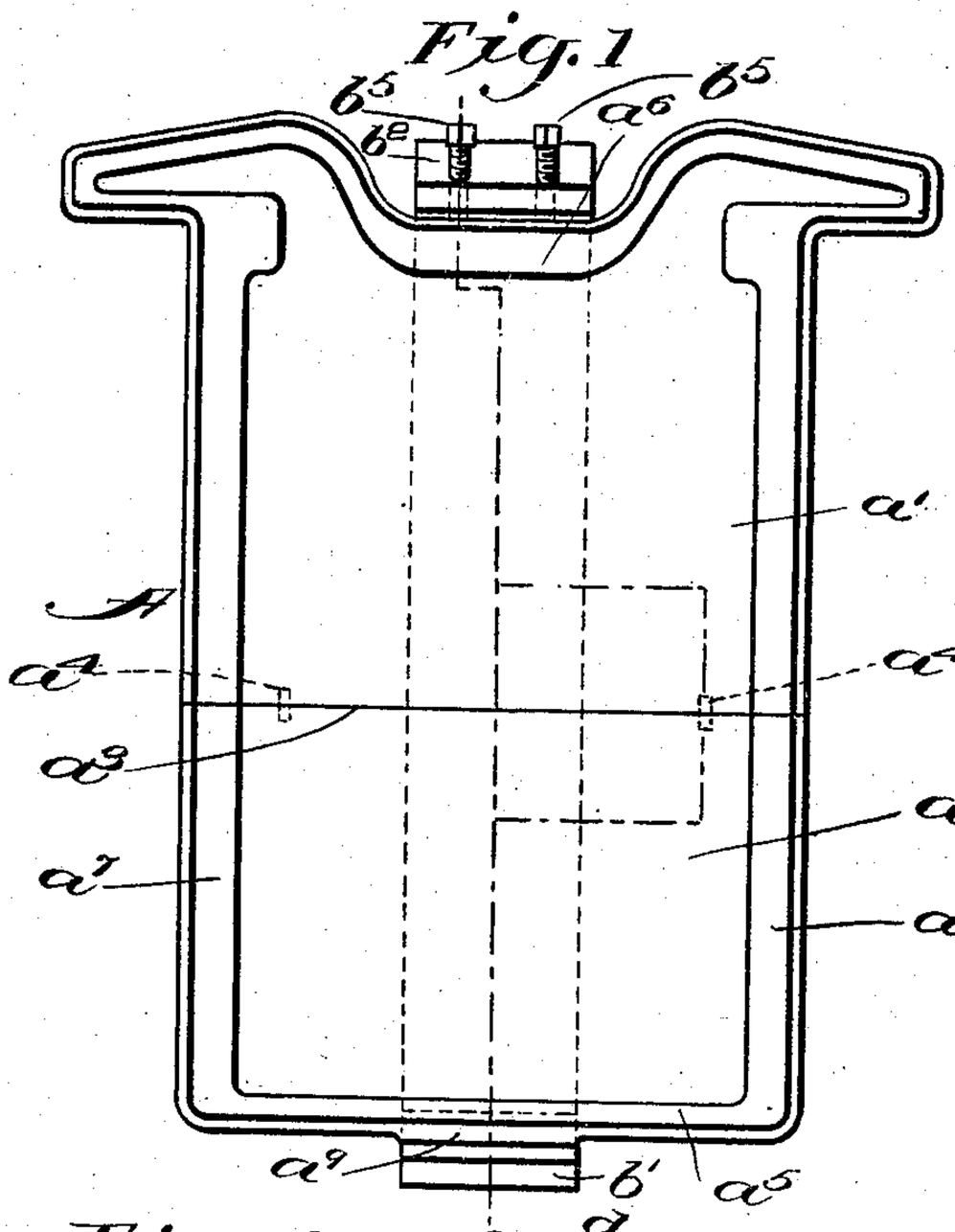


Fig. 4.

Fig. 2.

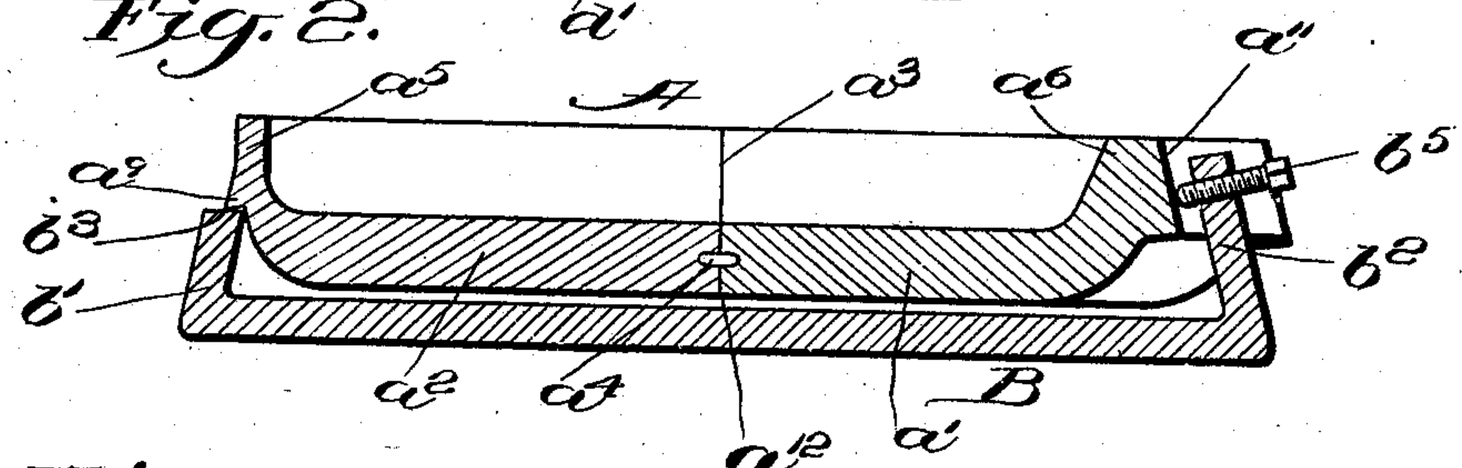
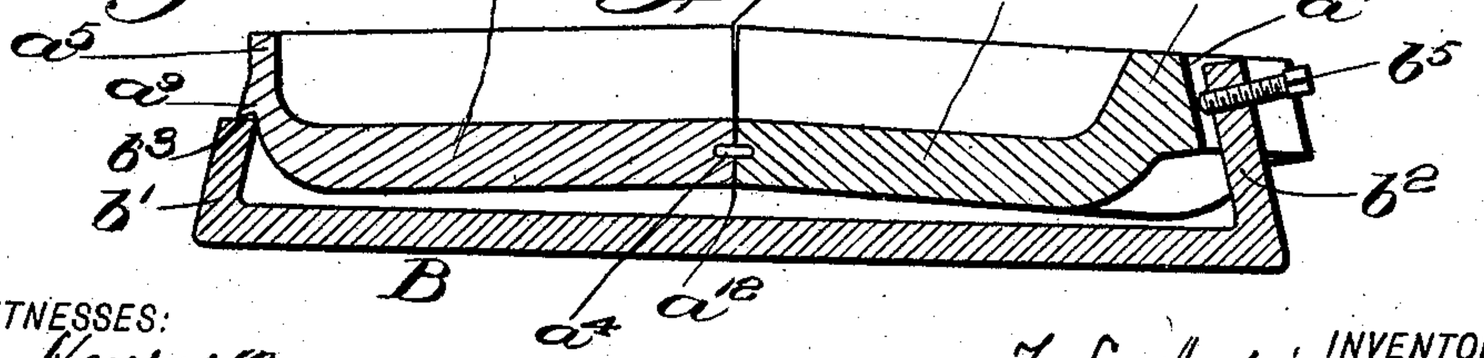


Fig. 3.



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FRANK LINDEN ANTISELL, OF NEW YORK, N. Y.

MOLD FOR CASTING COPPER.

No. 867,692. Specification of Letters Patent. Patented Oct. 8, 1907

Application filed November 21, 1905. Serial No. 288,394.

To all whom it may concern:

Be it known that I, FRANK LINDEN ANTISELL, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Molds for Casting Copper, and especially for casting copper anodes for electrolytic refining-batteries, of which the following is a specification.

My invention relates to improvements in molds in which copper anodes for electrolytic refining batteries are cast. As a preliminary to describing my invention, I will briefly set forth the means heretofore used and the process heretofore practiced in casting copper anodes so that the importance of my invention may be more readily understood.

The mold heretofore used in casting such anodes was made of a single piece of metal, usually cast iron. This mold consisted of a comparatively thick bottom and upwardly projecting walls approximately the shape of the anode to be cast. The mold was left entirely open on its upper side and the metal was poured into the mold near the center thereof, and the molten metal spread out to the walls of the mold. The copper used in casting the anodes was melted in a reverberatory furnace of about 100 tons capacity. In casting the anode, molten copper to the amount of 500 pounds and at 2000° F. was poured into the mold near the center, striking approximately within a space of about two inches wide and 14 inches long, and the heat of the molten copper as it was poured into the mold soon raised the temperature of the upper surface of the bottom of the mold to 2000° F. while the under surface possibly was not more than 500°, which caused the upper surface to expand to a great extent compared with the expansion of the under surface. This tended to bow or lift the mold in the center which caused cracks to appear across the mold a short while after the mold was used. The largest crack was always at right angles to the length of the mold. In other words, a break in the mold occurred at right angles to the length thereof upon its upper surface, while the outer metal or lower surface of the mold remained intact. When a crack once appeared in the mold it did not close when the mold cooled off, but became permanent. When the molten metal was poured into such a mold, the metal filled the crack and the under side of the casting was not perfect owing to the projection or fin that was made thereon. This fin had to be removed at expense, of course, for the anode must be as smooth as possible on its two faces to permit the cathode to be placed close thereto when put in the bath, to reduce the electro motive force, and also to permit the insoluble substances in the bath to be precipitated and not deposited on any ledges or projections extending from the surface of the anode. Furthermore, after a crack occurred in the mold, the expansion of the metal at the time of its solidification tended to still further enlarge the crack and also caused the cracked edges of the mold to break and scale off, whereby a rapid deterioration of the mold followed and in a short time the mold had to be thrown away and a new one used.

To overcome the objections resulting from the uneven expansion of the mold ordinarily used heretofore, it has been proposed to cast the mold out of a high grade iron resembling a gun metal mixture, and also to make the molds of steel, but such molds have been found to be open to the same objections as iron molds. It has also been proposed to make the bottom of the mold comparatively thin, but this has not been found satisfactory and it did not overcome the existing objections.

It is the object of my invention to overcome the objections existing in prior molds and to produce a mold which will allow for expansion and which will assume its original shape when cool, and in which the anode will be cast smooth and which will not quickly deteriorate.

Other objects will appear from the hereinafter description.

My invention is illustrated in the accompanying drawing in which the same reference character indicates the same part in the several views.

Figure 1 is a plan view of my mold. Fig. 2 is a cross section thereof on line 2 of Fig. 1. Fig. 3 is a similar section showing how the mold will expand during casting. Fig. 4 is a detail showing the means for filling in the space which may be formed between the meeting edges of the sections of the mold.

The part lettered A on the drawing represents a mold which consists of two sections or parts a^1 a^2 which are joined together at the edges on line a^3.

a^4 represents pins or dowels used to hold the inner ends of the two sections together and to keep the upper or inner surface of the mold in alinement.

a^5 and a^6 are the two upwardly extending end walls of the mold and a^7 and a^8 are the upwardly extending side walls thereof. The walls of the mold are given substantially the shape of the anode, as shown in Fig. 1 of the drawing. The end wall a^5 of the mold is provided with a lug or projection a^9 with an upwardly beveled under edge. The outer surface of the other end wall a^{10} near the middle thereof is beveled or inclined, as shown at a^{11}.

B is a clamp which supports and holds together the two sections of the mold. This clamp has two upturned ends b^1 b^2 and extends longitudinally underneath the mold with the upper edge b^3 of the end b^1 resting against the under beveled surface of the projection a^9 of the mold. Through the upturned end b^2 of the clamp pass set screws b^5, the inner ends of which rest against the beveled portion a^{11} of the end wall a^6 of the mold. All this is clearly shown in the drawing. This construction securely supports and holds the two

parts of the mold together, but permits the two parts to move upwardly in the center and with a hinge action on the lower meeting edges a^{12} as will appear from Fig. 3 of the drawing.

By making the mold in two parts and clamping the parts together in the manner herein described, a great part of the internal stress is relieved during the operation of casting, and the two parts operating on a hinge principle permit the upper surface of the mold to expand, and the elastic limit of the cast iron forming the mold is not exceeded and cracks are thus avoided. If the meeting edges a^3 of the two sections of the mold become worn for any reason, it is not necessary to throw the mold away, as it may be easily repaired by placing therein a metal filler and some such material as asbestos. In some cases it may be desirable to form the meeting edges of the mold so that even when cold, the upper part of these edges will have a space between which may be filled by a metal filling and asbestos or similar material. In Fig. 4 I have shown such a construction in which the opening is indicated by C. The part marked D represents the metal filling which may have an opening d at each end through which passes the dowel a^4 to hold the filling in place. d' represents the asbestos or similar filling material which is tacked in on each side of the filling piece and completely fills up the opening or space between the sections of the mold. In some cases the metal filling may be entirely omitted and the space filled by the asbestos. In this construction when the inner surface of the mold expands and begins to assume the form indicated in Fig. 3 of the drawing, the asbestos filling will keep the opening completely closed and when the mold contracts it presses the asbestos together again. At all times the opening is completely filled. In this mold it will be seen that there will be no cracks or openings to cause fins or projections to be cast upon the anode.

Such a mold is easily and cheaply constructed and may be easily repaired and will last longer than molds heretofore constructed.

While I have described my mold as made of two sections, it is evident that it may be made of more than two, and furthermore, it is obvious that various changes and modifications may be made therein without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A metal mold having a bottom and side walls extending around and connected to the bottom, the said bottom and walls consisting of a plurality of sections loosely connected together, and means for holding the sections together while in use and permitting the bottom to expand on one surface to a greater extent than the other and to resume its normal position without cracking the mold.

2. A metal mold consisting of a bottom and side walls, said bottom and walls being made up of a plurality of sections loosely connected together so that when the sections are joined together an open top mold is formed, and means for holding the sections together, but permitting the upper or inner surface of the mold to expand to a greater degree than the outer surface when the mold is used, and also permitting the mold to resume its normal position when cold without cracking.

3. A mold consisting of sections joined together, one wall of the mold being provided with a ledge and the other with an inclined surface, a clamp below the mold extending from one of these walls to the other, said clamp having upturned ends on one of which rests the ledge of the mold, a set screw passing through the other end and resting against the other wall of the mold, as and for the purpose set forth.

4. A mold consisting of sections of metal loosely joined together, dowels extending across the joined edges, one section having a ledge on the outside thereof and the other having an inclined surface, a clamp extending underneath the two sections, said clamp having two upturned ends resting against the lug, and a set screw passing through the other end which bears against the inclined edge of the other part of the mold, whereby the two sections are held together to form a completed mold and whereby the two sections are permitted to expand and move on the lower meeting edges without straining or cracking the mold.

5. A metal mold consisting of a plurality of sections joined together with a space between the meeting edges of said sections, a flat metal filler in said space, means for holding the metal filler in said space asbestos also in said space, and means for holding the sections together.

6. A metal mold consisting of a plurality of sections having an opening between the meeting edges, a dowel connecting the sections, a metal filler in said space, said filler having an opening therein through which the dowel passes, asbestos or similar material also in said space, and means for holding the sections together.

In testimony whereof I have hereunto set my hand at the city, county and State of New York this sixteenth day of November, 1905.

FRANK LINDEN ANTISELL.

In presence of—
ALLAN W. FOOSE,
JOHN J. RANAGAN.