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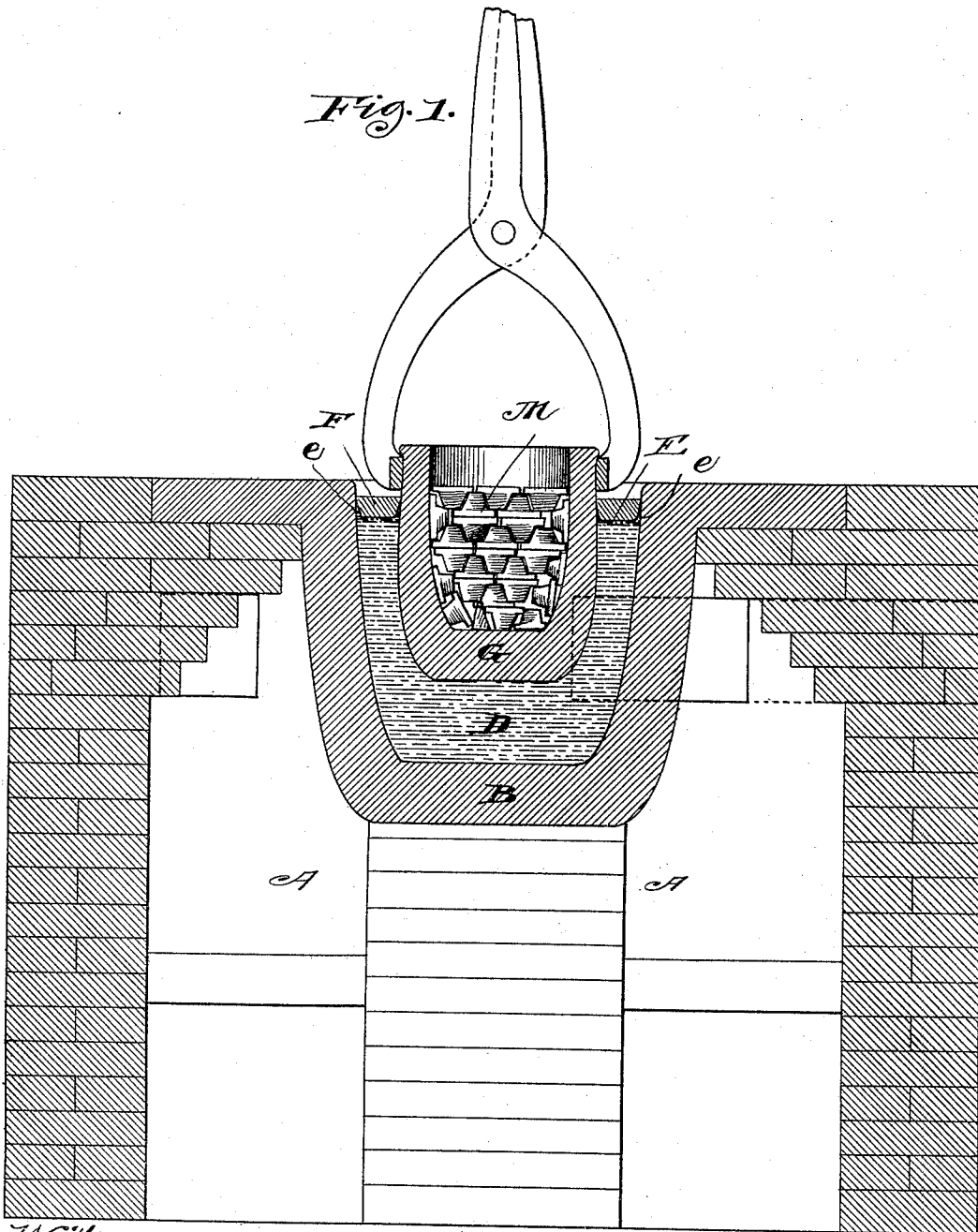
2 Sheets—Sheet 1.

F. L. WHITE.  
METHOD OF HEATING BY METAL BATH.

No. 487,310.

Patented Dec. 6, 1892.

*Fig. 1.*



Witnesses,

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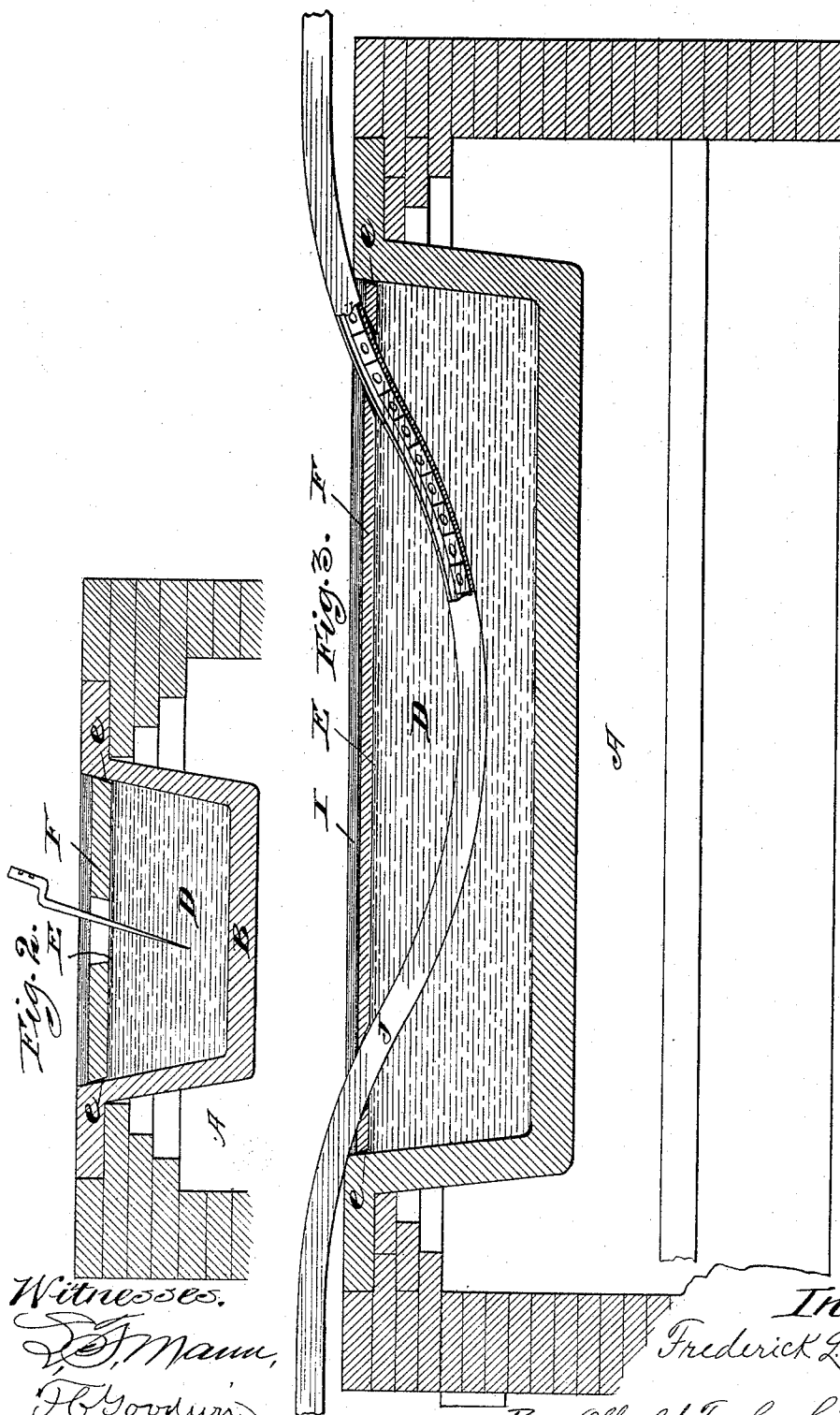
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# UNITED STATES PATENT OFFICE.

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TO ALBERT J. PICKETT, OF CHICAGO, ILLINOIS.

## METHOD OF HEATING BY METAL BATH.

SPECIFICATION forming part of Letters Patent No. 487,310, dated December 6, 1892.

Application filed January 12, 1892. Serial No. 417,827. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK L. WHITE, a citizen of the United States, residing at Milwaukee, Wisconsin, have invented a certain new and useful Method of Heating by Metal Bath, of which the following is a specification.

The use of a metal bath as a medium for heating and melting metals for tempering and other purposes has long been common; but certain difficulties have been encountered in the use of this heating means incident to the nature of the heating-bath employed. The metal most commonly used for this purpose is lead, this metal having a low melting point, but oxidizing at a degree of heat so low that it is not capable of being used to transmit the requisite degree of heat to other metals, which it is often desired to heat or melt by the use of the lead bath. Another difficulty incident to the raising of the bath to a high degree of heat is that the character of the lead is changed thereby, becoming spongy, and thus rendered unfit for use again, except by special treatment.

I have discovered that the lead bath may be successfully employed at a much higher degree of heat than has been heretofore attained, and that, too, without impairing the efficiency of the bath for repeated use, by employing a seal of liquid or molten aluminum resting upon the top of the lead bath, thus excluding the atmosphere and enabling the lead bath to be raised to a very high degree of heat without oxidation, whereby it would be wasted, and without converting the lead into a spongy mass, thus destroying its efficiency for reuse.

My invention consists, therefore, in the method of heating by means of a metal bath having a supernatant seal of molten aluminum.

The bath itself may be applied to almost innumerable uses. For example, it may be used to heat metals for tempering, the heat being applied directly by immersion of the metal in the bath. It may also be used for the melting of metals placed within a suitable melting pot or vessel wholly or partially immersed in the liquid bath, the heat in this

case being indirect as it is radiated or transmitted through the walls of the melting-pot.

My invention is therefore not confined to any specific use of the bath itself, and in the accompanying drawings I have illustrated two uses of the invention to which it is well adapted—viz., the melting of metals in a pot partially immersed in the bath contained in a crucible and the heating of metals by direct immersion in the bath.

In the drawings, Figure 1 is a sectional elevation showing a furnace, crucible, and melting-pot, and showing, also, the metal bath in the crucible, the liquid seal and the bars of metal within the melting-pot, and asbestos packing closing the mouth of the pot and crucible. Fig. 2 is a like view of a crucible and furnace, the latter broken away, and pieces of metal immersed in the bath. Fig. 3 is a similar view showing a furnace and open tank or pan having a track or carrier dipping into the tank for carrying small articles of metal through the bath.

In the drawings, A represents the fire-chamber of an ordinary furnace, B a crucible suspended therein, and this crucible contains a metal bath D, which is kept in a molten condition and at a greatly-elevated temperature by the fire. This metal bath is preferably lead and may be maintained by the use of my invention at a temperature of from 2,500° to 3,000° Fahrenheit, although lead oxidizes at 600° Fahrenheit when exposed to the atmosphere. To prevent this oxidation and provide for this elevated temperature while preventing volatilization and the creation of poisonous fumes, I employ a seal consisting of molten aluminum, which, being of very much less specific gravity than the lead, is supernatant thereon and forms a perfect liquid seal capable of withstanding a high degree of heat while excluding the atmosphere from the molten lead beneath.

In preparing the bath and seal a quantity of lead, proportioned to the capacity of the crucible and suitable to the use to which it is to be put, is charged into the crucible, and a small quantity of aluminum is also placed therein. The metals may both be charged

into the crucible cold and melted therein, or one or both may be first melted. In either case the aluminum, by reason of the difference in specific gravity, rises to the top of the lead and forms a thin film thereon.

In carrying out this invention I have observed that the molten aluminum will rise at the sides of the vessel higher than in the middle, and in the drawings, E represents the body of the film of molten aluminum, and the margin thereof, which rises along the walls of the crucible. A ring of asbestos F may be placed upon top of the aluminum seal and then the melting-pot G introduced through the opening. Within this pot metal M may be placed for smelting.

If it be desired to heat metals by direct immersion in the bath, it may be carried out in a small crucible, such as shown in Fig. 2, the melting-pot not being used, and the articles to be heated—such as the bayonet shown—being plunged through the aluminum seal into the molten bath.

In Fig. 3 the long tank or pan I contains the metal bath D, the fluid aluminum seal E, and the asbestos F, and a curved track or way J dips into the bath and the articles are pushed or drawn along the way through the bath. A carrier in the form of a belt, on which small

pieces of metal can be placed, may be employed, the belt passing down into and then out of the bath, the articles being heated in the passage.

I do not claim herein any particular apparatus for carrying out my invention, nor do I limit my invention to the use specified nor to the apparatus shown.

I have described the use of a lead bath because I have found that a much greater heat can be attained by the use of this metal with an aluminum seal than can be obtained with a bath of lead alone; but other metals may be substituted for the lead, and the thickness of the film may be varied.

I claim—

1. The herein-described method of heating, which consists in employing a metal bath having a supernatant seal of liquid aluminum.

2. The herein-described method of heating, which consists in employing a lead bath having a supernatant seal of liquid aluminum and subjecting the articles to be heated to contact with the bath below the seal.

FREDERICK L. WHITE.

Witnesses:

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H. L. CHURCH.