Sept. 11, 1923. 1,467,563

P. A. E. ARMSTRONG

CORROSION AND HEAT RESISTING APPARATUS

Filed Jan. 5, 1922

Fig 1

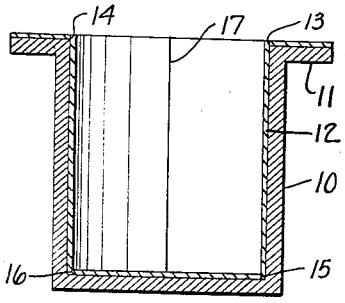


Fig 2

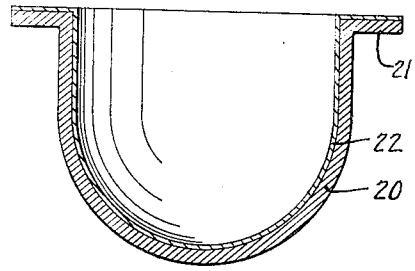


Fig 3

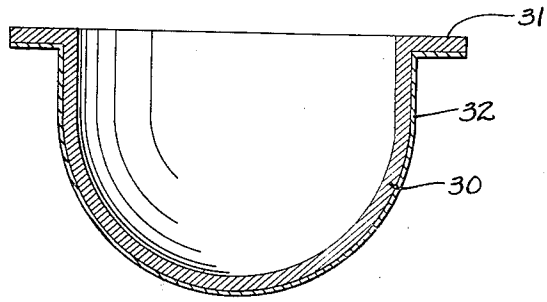


Fig 4

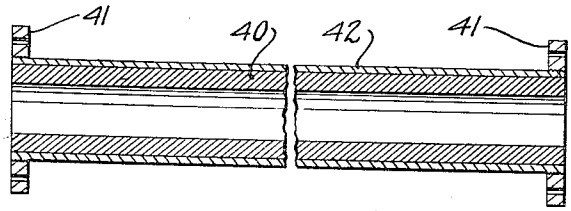
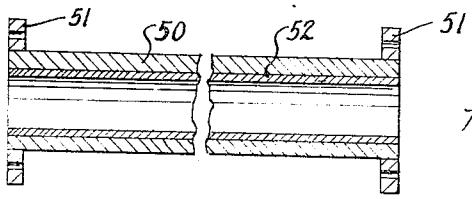


Fig 5



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UNITED STATES PATENT OFFICE.

PERCY A. E. ARMSTRONG, OF LOUDONVILLE, NEW YORK.

CORROSION AND HEAT RESISTING APPARATUS.

Application filed January 5, 1922. Serial No. 527,226.

To all whom it may concern:

Be it known that I, PERCY A. E. ARMSTRONG, a subject of the King of Great Britain, and a resident of Loudonville, county of Albany, and State of New York, have invented certain new and useful Improvements in Corrosion and Heat Resisting Apparatus, of which the following is a specification.

My invention relates to apparatus such as receptacles or conducting passages which are intended to be resistant to the destructive action of heat or acid or other corrosive agents.

Broadly stated it is the object of the present invention to provide an improved form of construction for such receptacles or conducting passages, whereby a relatively small amount of one material is used in combination with a greater amount of a different material, one of the materials being employed to impart special characteristics, such as will enable the structure to withstand the action of heat or corrosive agents, while the other material is employed to impart strength to the structure.

Among the many uses for apparatus constructed in accordance with this invention, there may be mentioned by way of illustration, so-called lead baths used in heat treating steel.

As is well known, it is desirable to control or limit the temperature to which steel is heated, and this can be done with accuracy by means of a so-called lead bath. Furnaces for such treatment are provided with a receptacle for holding the bath liquid, which is heated in any suitable manner, to the highest temperature to which the steel should be heated. Usually after preliminary heating in an ordinary furnace, the steel is immersed in the liquid bath, being kept there long enough to attain the temperature of the bath, and then removed for cooling. The bath usually consists of lead, although other materials, such as metallic salts, may be employed.

An object of the present invention is to provide a receptacle with a two-part laminated wall structure, one wall layer being preferably of sheet metal adapted to give the necessary strength, freedom from leaks and the like, and the other preferably cast layer being adapted to withstand heat, effect of acids and other corrosive agents and the like. Other objects will appear as the description of the invention progresses.

Referring to the drawings, Fig. 1 is a vertical cross-sectional view of a lead bath apparatus embodying my invention; Fig. 2 is a vertical cross-sectional view of a modified form of apparatus; Fig. 3 is a vertical cross-sectional view of a different form of apparatus; and Figs. 4 and 5 are longitudinal sections of further modifications of the invention.

Referring to Fig. 1, one embodiment of my invention comprises a receptacle, shown rectangular in vertical section and open at the top, having its sides and bottom formed of a laminated material. The inner layer or liner 12 is of sheet metal, such as of mild steel, and may be formed in two or more pieces, the different parts thereof being fastened together in any suitable manner, as, for example, by being welded at the seams indicated by the reference characters 13, 14, 15, 16, and 17. The preferred way of forming the pot of Fig. 1 is by supporting the liner 12 in a suitable mold and casting the material of which the layer 10 is formed, around it. The layer 10 of Fig. 1 is cast around the liner 12, and is thus brought into close contact with the layer 12 throughout the structure. When the liner 12 is made of mild steel, for example, having a melting point higher than that of the cast metal, a weld can be formed between the two layers, but welding is not essential in all cases so long as the two layers are brought into intimate contact throughout. One good heat resistant material for the outer layer is silcrome, containing carbon about .40%, chromium about 9%, silicon about 3.5% and the principal part of the remainder iron. The receptacle is provided with outwardly extending peripheral flanges 11, whereby it may be readily supported in position for use.

Thus a liquid tight container is provided, the liquid contents being in contact only with the liner 12, which may be relatively thin compared with the layer 10. When used as a lead pot, for example, any possibility of burning out is eliminated by the use of the heat resistant cast metal on the exterior, and the sheet metal liner 12 will not crack or become porous as may happen when an all cast pot is used.

In the modified form of the invention

shown in Fig. 2 there is provided a receptacle of circular cross-section, open at the top, formed of a similar laminated material. The round bottomed liner 22 of sheet metal is provided and a layer of heat resistant metal is cast around it as previously described. In this or any equivalent way, the liner 22 is secured in intimate contact with the interior surface of the outer layer 20 throughout. The receptacle may be made in a single piece, as by stamping out of a piece of flat sheet metal. The receptacle is provided with outwardly extending peripheral flanges 21, whereby it may be readily supported in convenient position for use.

Thus a liquid tight container is provided, the liquid contents being in contact only with the liner 22, which may be relatively thin compared with the heat resistant layer 20, as previously described. Burning through the walls of the receptacle is effectually prevented by the heat resisting qualities of the layer 20.

In the modified form of the invention shown in Fig. 3, there is provided a receptacle of circular cross-section, open at the top, having its sides and bottom formed of a laminated material. One layer 32 is formed of sheet metal and there is cast in intimate contact with the liner surface thereof a layer of non-corrosive material 30. For supporting the receptacle there is provided outwardly extending peripheral flanges 31. The structure of Fig 3 may be efficiently employed for containing acids and the like, the characteristics of the layer 30 being such as to withstand corrosive effects of such agents, and the outside layer 30 will not crack or become porous during use.

In the modified form shown in Fig. 4, there is provided a tube formed of laminated material. The laminations comprise two layers 40 and 42 in intimate contact with one another. As shown in Fig. 4, the layer 40 is positioned on the interior of the layer 42. The layer 42 is formed of a tough material, such as drawn metal, and is adapted to impart strength and rigidity to the structure. The layer 40 may be cast within the layer 42 in any suitable manner, and its outer surface is in intimate contact with the inner surface of the layer 42 throughout. The extremities of the tube may be provided with suitable flanges 41, whereby connections may be established with associated equipment. The cast metal layer 40 is preferably made of non-corrosive material, and thus the tube may be employed as a conducting passage for acids and the like without material damage to the structure.

In the modified embodiment shown in Fig. 5, a layer 50 may be cast around the exterior of a layer 52, if desired, and may be formed of a heat resisting material. The layer 52 is formed of a tough material, such as wrought iron. The wrought iron pipe may be supported in a mold, and the layer 50 cast around the outside. Thus the tube may be employed as a conducting passage for liquids which are to be heated, the tube being exposed to fire or flame. When thus used the heat resisting casting on the exterior will effectually prevent burning out of the structure and the drawn metal liner will not crack or become porous, as may happen with prior forms of construction. A particularly strong tube is thus provided, which is gas and liquid tight, and which may be handled with freedom from breakage. The tubes may be connected together in various ways, as, for example, by being bolted together, the bolts passing through openings in the flanges 51.

The two layers may be unlike in regard to their non-corrosive characteristics, or their heat resisting characteristics, or in regard to their ductility. For example, the layers 10, 20, 30 and 40 may be of a non-corrosive or heat resisting alloy material, the other layer being cast or sheet iron or steel, or the layers 10, 20, 30 and 40 may be of drawn alloy material, such as nichrome, for example, while the respective supporting layer may be of cast nichrome.

It will be seen that I have provided a receptacle which may be readily and economically constructed, employing the component materials efficiently, well adapted to the purpose for which it is intended. The improved receptacle is particularly adapted for use where the conditions on the inside of the pot or tube differ from those on the outside.

Illustrative apparatus has been shown for the purpose of illustrating a way in which the invention may be practiced, but it is expressly understood that the scope of the invention is not to be limited thereby, reference being had to the appended claims for that purpose.

I claim:

1. Heat or corrosion resisting apparatus comprising a laminated structure having one layer of non-corrosive material and another layer of cast metal cast into the form of the apparatus.

2. Corrosion resisting apparatus comprising a laminated structure having one layer of non-corrosive material and another layer of cast metal secured thereto in intimate contact and cast into the form of the apparatus.

3. Corrosion resisting apparatus comprising a laminated structure having an inner layer of non-corrosive sheet material and an outer layer of heat resisting material cast in its final form into intimate contact with the inner layer.

4. A lead bath comprising a laminated

structure having one layer of non-corrosive material and another layer of cast metal secured thereto in intimate contact.

5. A lead bath comprising a laminated structure having one cast layer of non-corrosive material and another layer of sheet metal.

6. The process of forming lead baths, which consists of supporting in a mold a liner of tough reenforcing material, having the form of the lead bath casting a layer of molten metal having a melting point relatively less than the melting point of the reenforcing material, in contact with the reenforcing material to form a weld therewith.

7. The process of forming lead baths, which consists of supporting in a mold a liner of tough reenforcing material, having the form of the bath, and casting a layer of molten metal in intimate contact therewith.

8. The process of forming lead baths, which consists of supporting in a mold a liner of one material, having the form of the lead bath, and casting a layer of relatively different material in intimate contact with a surface of the liner.

9. The process of forming lead baths, which consists of supporting a sheet metal liner, having the form of the bath in a mold, and casting a layer of molten metal having relatively different characteristics, in intimate contact with a surface of the liner.

10. Heat or corrosion resisting apparatus, comprising a laminated structure formed of layers of unlike materials, having relatively different melting points, in which the layers are welded together at the joint, one layer being of drawn material of the form of the apparatus and the other layer cast.

11. Apparatus comprising a laminated structure, having one layer of sheet metal in the form of the apparatus and another layer of cast metal having a melting point relatively lower than the melting point of the sheet metal, and cast in intimate contact therewith to form a weld.

12. A lead bath comprising a laminated structure having one layer of sheet metal of the form of the lead bath and another layer of cast metal having a lower melting point than the sheet metal, and cast in intimate contact therewith to form a weld.

In testimony whereof, I have signed by name hereto.

PERCY A. E. ARMSTRONG.