B. E. ELDRED.

CHEMICAL VESSEL.

APPLICATION FILED JAN. 7, 1908. RENEWED MAY 9, 1912.

1,043,579. Patented Nov. 5, 1912.

Fig. 1.

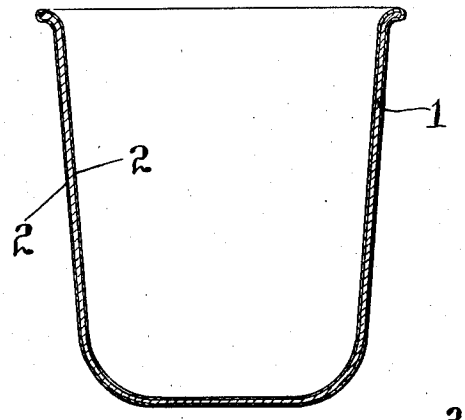


Fig. 4.

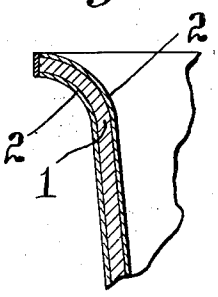


Fig. 3

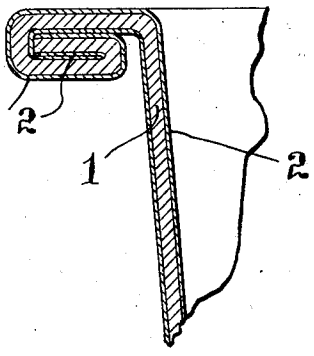
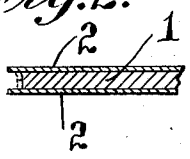


Fig. 2.



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UNITED STATES PATENT OFFICE.

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CHEMICAL VESSEL.

1,043,579. Specification of Letters Patent. Patented Nov. 5, 1912.

Application filed January 7, 1908, Serial No. 409,620. Renewed May 9, 1912. Serial No. 696,278.

To all whom it may concern:

Be it known that I, BYRON E. ELDRED, a citizen of the United States, residing at Bronxville, in the county of Westchester and State of New York, have invented certain new and useful Chemical Vessels; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to chemical vessels and consists in a crucible or other chemical vessel of platinum, gold or other noble metal having cored walls containing a reinforcing and strengthening core layer of a ferrous metal inseparably and permanently welded to the surrounding noble metal and hermetically sealed in thereby; all as more fully hereinafter set forth and as claimed.

While platinum is extensively used for chemical vesels where resistance to chemical reagents is desired, its extremely high cost is an obstacle to its extensive use, and its physical properties are not so desirable as its chemical properties. For many uses, it is lacking in strength and hardness, and though alloying with iridium will counteract its softness to some extent it does not increase its strength. As a metal it is hardly strong enough, with or without alloying with iridium, to make vessels of any great size. And it would be useful for many more purposes than at present if it could be hardened, or made stiffer or stronger without alloying, and if it were cheaper.

It is the purpose of the present invention to provide crucibles, evaporating dishes and other chemical articles which shall have the advantages of platinum or other noble metal as respects use with corrosive reagents while being cheaper, stronger and stiffer. To this end, the platinum is provided with a reinforcement of a stronger ferrous metal, such reinforcement being hermetically sealed within the body of platinum. In companion applications Ser. Nos. 409,617, 409,618 and 409,619, all filed Jan. 7, 1908, I have set forth means and methods of procuring unions of platinum and similar noble metals with the stronger and stiffer ferrous metals, the platinum and the iron or steel being either united directly, or by means of intermediate linking layers of other metals. Preferably the platinum and the ferrous metal are united to form a compound billet, and this billet is then rolled or otherwise extended to form sheets or extended ware from which complete articles may be stamped out or otherwise formed. In the extension, for many purposes, the platinum coating may be, and preferably is, reduced to extreme tenuity; to such a thinness that without the aid of the underlying ferrous metal to which it is weld-united and by which it is supported, the film would hardly hold together. Such very thin films are harder surfaced than would be a substantial body of the same metal and have about the superficial hardness of the metal to which they are united; a very valuable property for many purposes. Such a thin filmlike coating is, however, for the purposes of resisting reagents practically as valuable as a solid body of platinum. Gold may be cored and reinforced in the same manner as platinum and with the like valuable results for the present purposes.

Preferably in the present invention, a compound billet of steel or iron coated with gold or platinum is extended to form sheet metal and such sheet metal is then stamped or spun to form crucibles, dishes and the like. Such a stamped or spun dish will of course present an exposed edge of steel or iron at its mouth where the compound plate has been cut. This exposed edge must next be covered, and this may be done by drawing or working the platinum or gold coating over such edge until the noble metal coatings from the two sides meet and contact. This contacting line is next subjected to an intense heat, as by the arc or by an oxyhydrogen flame till the line disappears and a permanent, autogenous union is formed. The ferrous metal core or reinforcing body will then be hermetically sealed within and shielded by the noble metal. Where the coating is made filmlike, a strip of the noble metal may be laid over the exposed edge of the ferrous metal and welded to the coating on either side. This is a useful expedient in any case since the chemical vessels are generally subject to considerable wear about their mouths and a greater thickness of noble metal is desirable there.

By using soft, substantially pure iron for the core metal vessels very desirable for

many purposes may be obtained since such pure iron has a very high melting point. Such iron also has a specific expansion under temperature changes which is not widely different from that of platinum so that the joined metals behave as one under violent changes of temperature. For other purposes, as for large vessels, it is desirable to use a mild steel or alloy steel of considerable resiliency and tensile strength.

In the accompanying drawings, Figure 1 shows a central vertical section of such a receptacle; Fig. 2 a larger-scale detail view illustrating one method of protecting the edges of the base metal; Figs. 3 and 4 are detail sectional views showing other ways of protecting the edges of the base metal.

In said drawings, 1 designates the core or base of strong base metal, and 2, 2 designate layers of platinum or other platinum-group metal or noble metal (gold for example) united to said base metal in such manner as to be inseparable therefrom by changes of temperature, moderate heat, the splitting action of edged tools, etc. Such material, rolled or otherwise extended to sheet form, may be worked into the desired form for the receptacle in the ordinary manner, steel (if of proper grade) and iron being sufficiently malleable and ductile, even when cold, to permit of such working in ordinary cases. To prevent exposure of the cut edge of the sheet metal to the effects of oxygen and other gases and vapors, liquids, etc., the base may be eaten away somewhat with acid or other reagent so as to cause the coating to project slightly beyond the base, as indicated in Fig. 2, and these projecting portions may then be brought together and pressed, burnished, or fused together to unite them so as to protect the base metal thoroughly; or, for many purposes, the edge of the vessel may be merely turned in as indicated in Fig. 3; so as not to be reached readily by liquids or vapors; or where extreme freedom from chemical attack is required, as when the vessel is to be used as a weighing receptacle, the edges may be covered with a layer of noble metal applied by fusing a strip of such metal against such edge by means of a blowpipe or in various other ways.

Crucibles and like vessels so made are obviously much stronger and stiffer than solid-platinum vessels of corresponding size and thickness of walls, while equally suitable for most if not all uses.

What I claim is:—

1. A chemical crucible comprising a surface layer of a noble metal and a core layer of ferrous metal completely enveloped and hermetically sealed in by such surface layer, such surface layer being welded to said ferrous metal.

2. A chemical vessel for withstanding high temperatures comprising a core layer of a high melting iron completely enveloped in and hermetically sealed by a layer of a noble metal welded to said iron.

3. A chemical vessel for withstanding high temperatures comprising a core layer of ferrous metal completely enveloped in and hermetically sealed by a layer of platinum welded to said ferrous metal.

4. A chemical vessel for withstanding high temperatures comprising a core layer of a high melting iron completely enveloped in and hermetically sealed by a layer of platinum welded to said iron.

5. A chemical vessel having a mouth and composed of a core layer of ferrous metal completely enveloped in and hermetically sealed by a layer of noble metal, said layer of noble metal being somewhat thicker about said mouth.

6. As a new article of manufacture, a crucible having a body of heat-resistant base metal and a sheathing layer of platinum, said body metal being completely enveloped by and hermetically sealed in said platinum sheath, and said base metal and said platinum being metallically united at all abutting surfaces.

In testimony whereof I affix my signature, in the presence of two witnesses.

BYRON E. ELDRED.

Witnesses:
J. G. MONNOT,
H. M. MARBLE.