

No. 789,453.

PATENTED MAY 9, 1905.

A. L. J. QUENEAU.
METALLURGICAL VESSEL.
APPLICATION FILED NOV. 9, 1904.

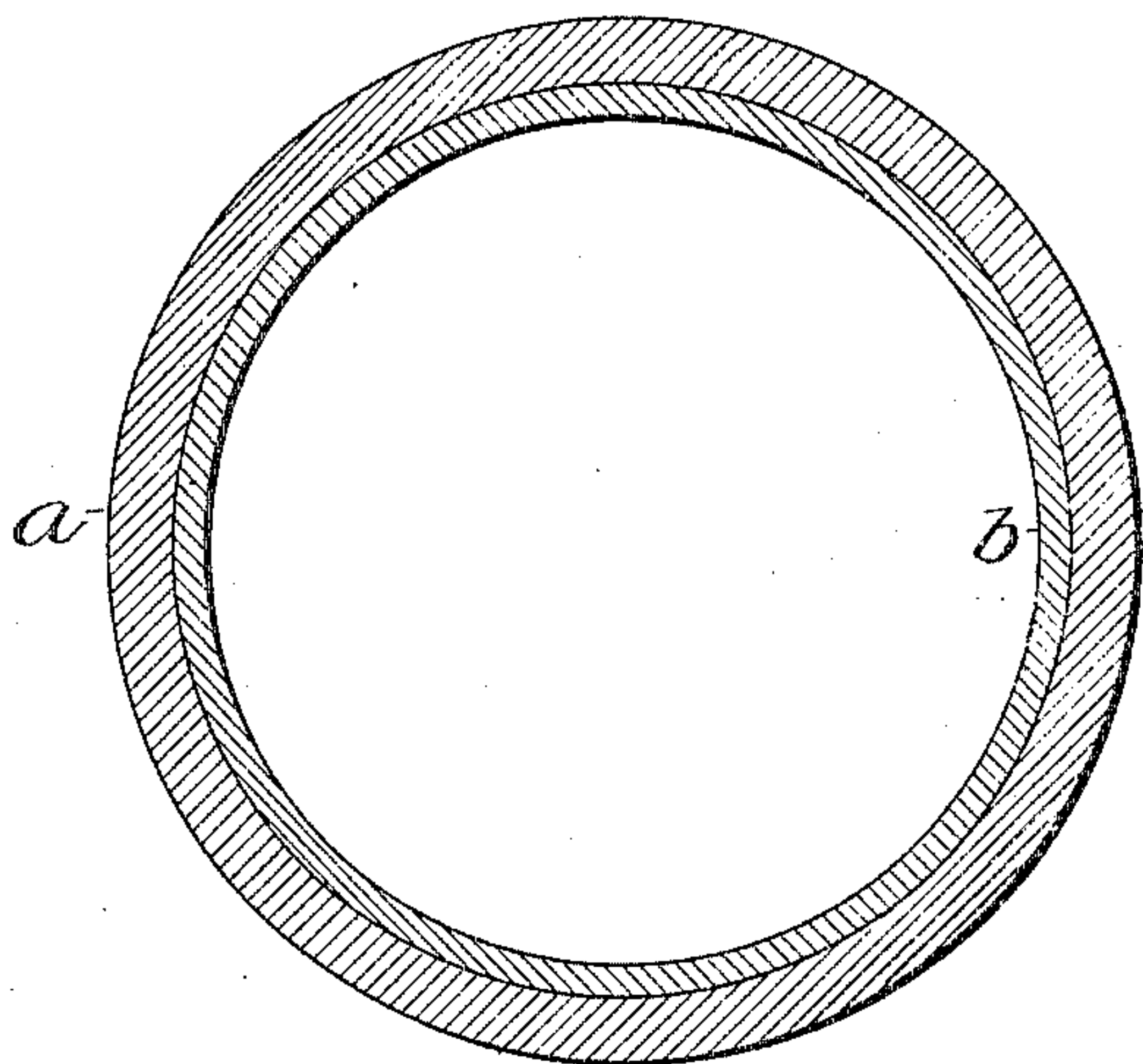


Fig. 1.

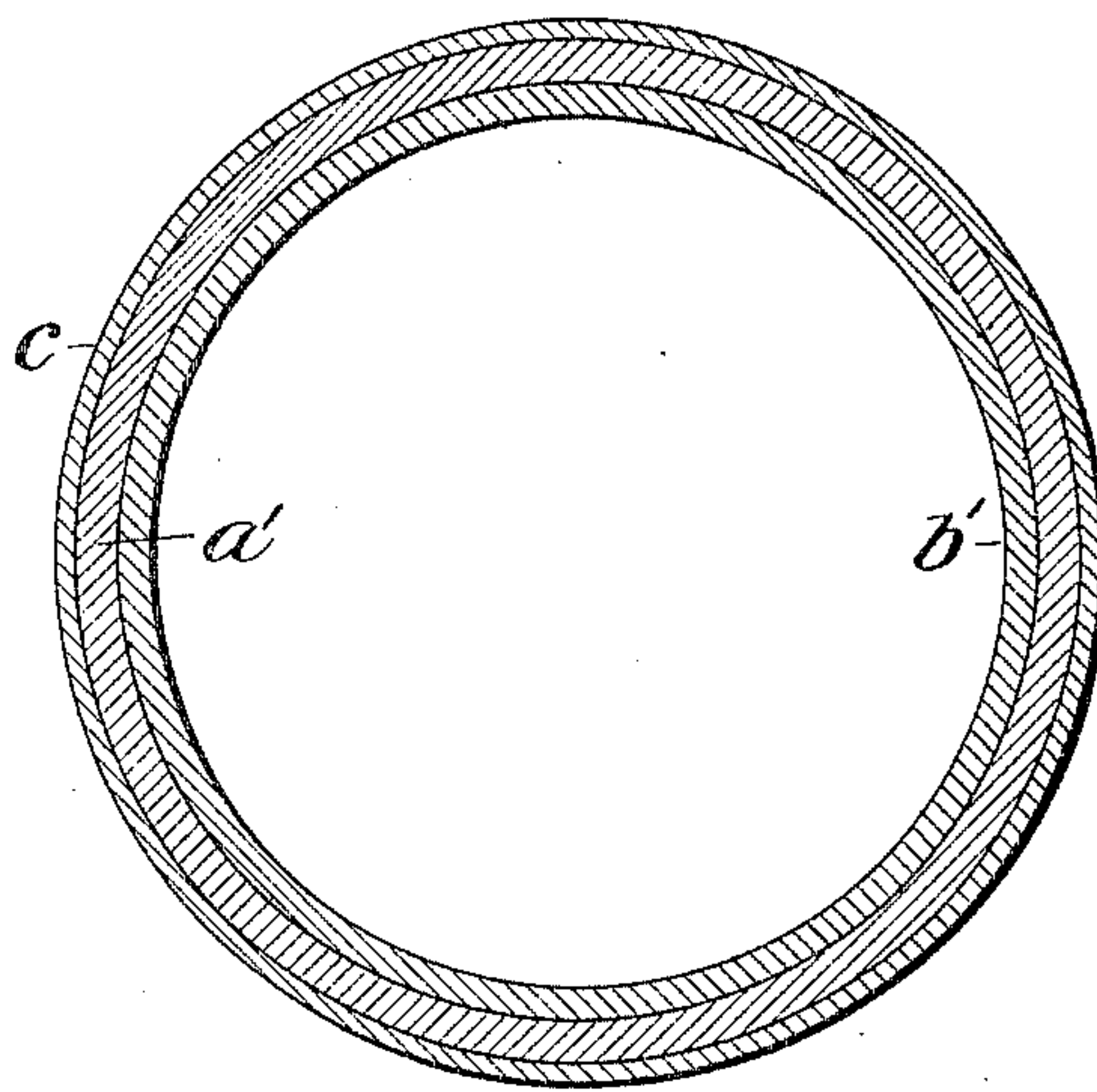


Fig. 2.

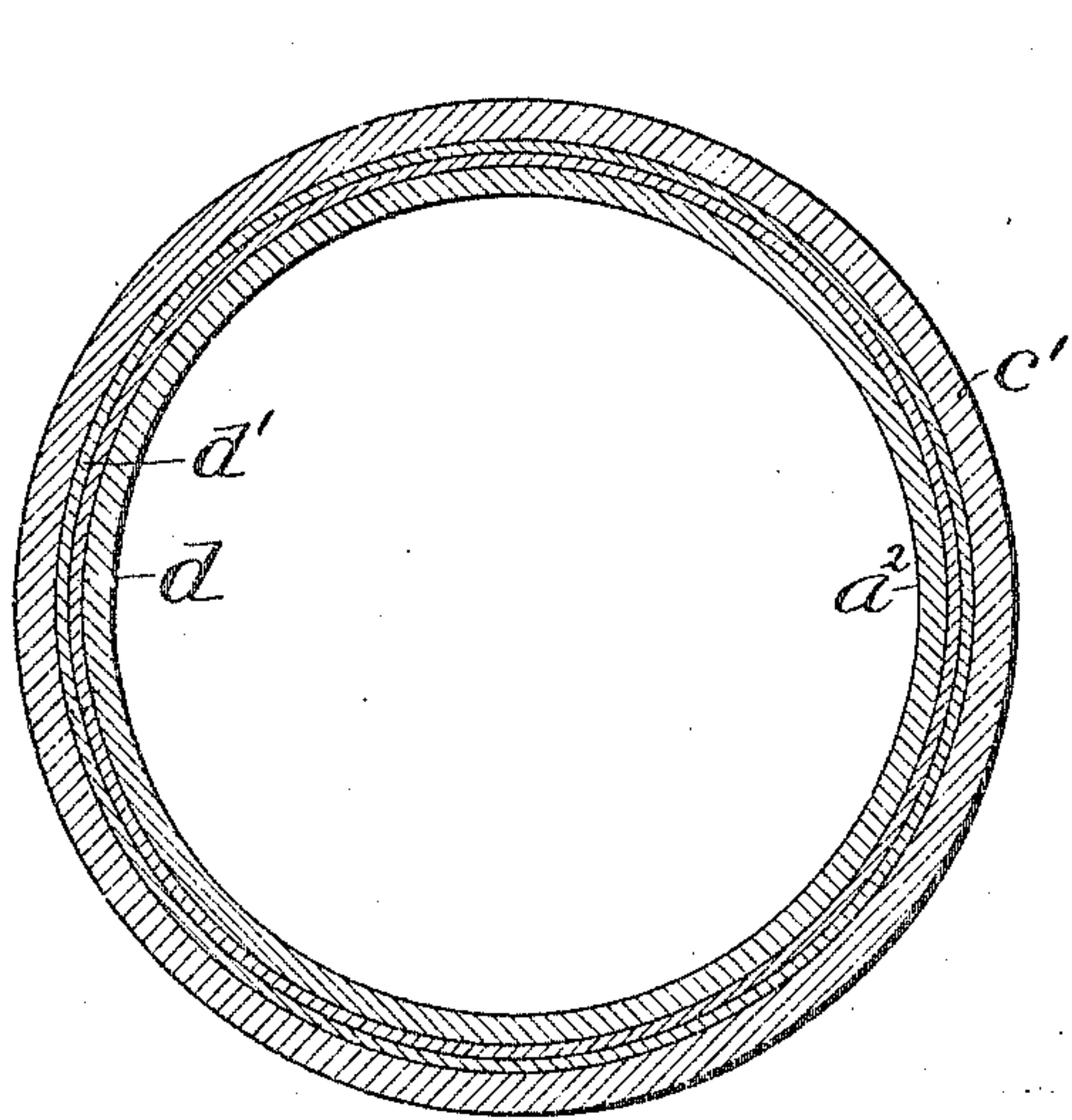


Fig. 3.

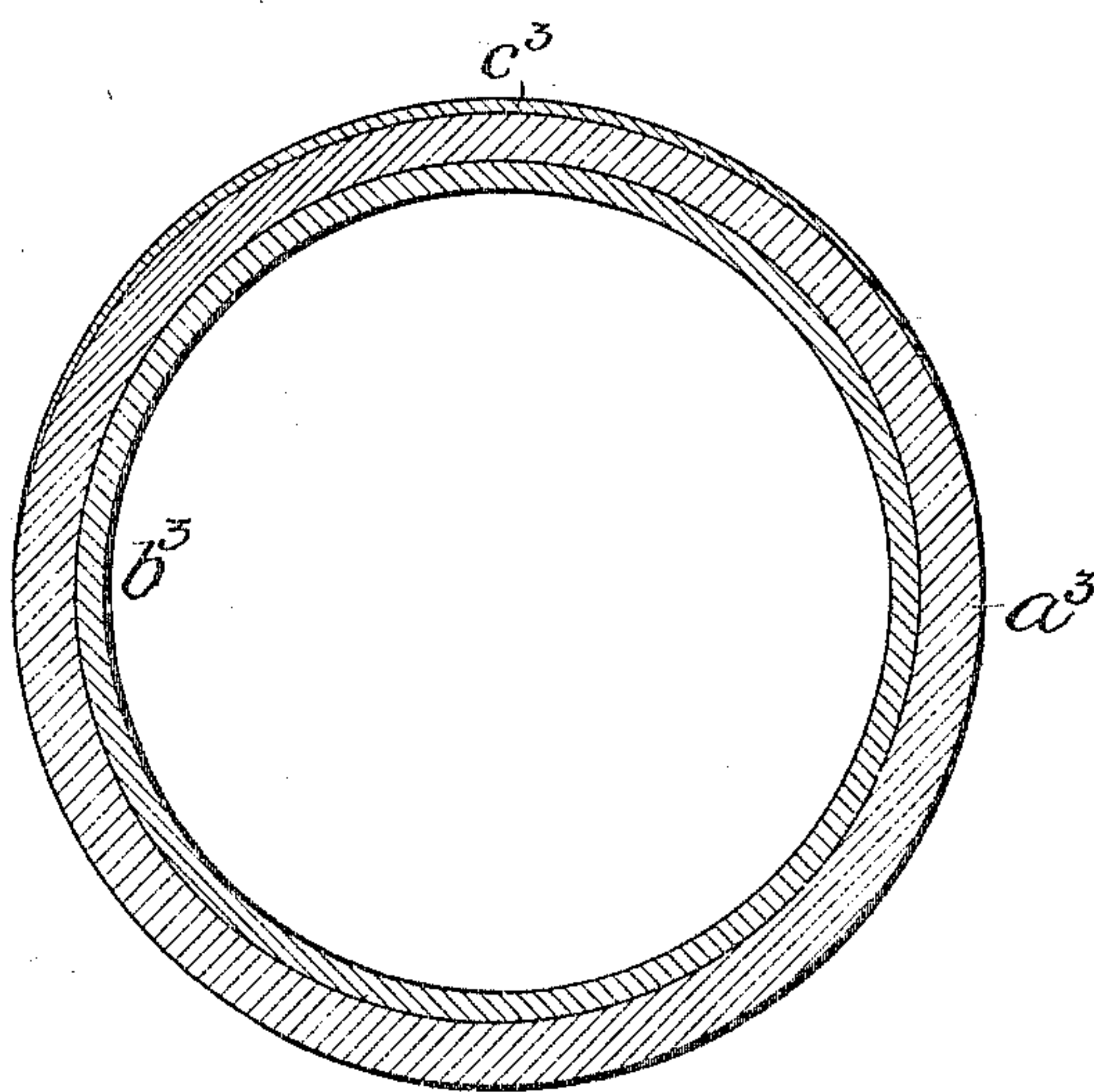


Fig. 4.

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UNITED STATES PATENT OFFICE.

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METALLURGICAL VESSEL.

SPECIFICATION forming part of Letters Patent No. 789,453, dated May 9, 1905.

Original application filed May 21, 1904, Serial No. 209,138. Divided and this application filed November 9, 1904. Serial No. 232,264.

To all whom it may concern:

Be it known that I, AUGUSTIN L. J. QUENEAU, a citizen of the Republic of France, residing at South Bethlehem, county of Northampton, State of Pennsylvania, have invented certain new and useful Improvements in Metallurgical Vessels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of composite metallurgical vessels, chiefly designed for use in the metallurgy of zinc.

In the metallurgy of zinc as carried out in the reducing-furnace it is found necessary to limit the amount of iron, manganese, garnet, fluor-spar, fusible silicates, or the like that may be present in the charge, so that the resultant slag shall contain but a relatively small quantity of these injurious elements. If present in large quantity, it is found that the acid walls and bottoms of the retorts are soon destroyed, and the retorts are rendered useless and have to be replaced by others. In view of this limitation upon the character or composition of the charge and the corrosive action to which the retorts are exposed when the slag is too highly basic it is impracticable to reduce in said retorts many kinds of zinkiferous ores containing notable percentages of bases, the attempt to use such ores (except in admixture with ores containing a relatively low percentage of such injurious elements) exposing the retorts to such deterioration as to prove financially prohibitory. In order to remedy this defect, it has been heretofore proposed to coat the surface of the retort with basic material—such as dolomite, magnesia, and the like—and to unite said coating with the surface of the retort by means of a sintering agent, such as silicate of sodium interposed between the wall of the retort and the otherwise non-adherent basic material. This proposal involves, first, the preliminary manufacture of the retort proper; second, the coating of the retort with the silicate of soda; third, the coating of the retort

with the basic material, and, fourth, the subsequent sintering operation.

In an application for Letters Patent of the United States, filed by me May 21, 1904, Serial No. 209,138, I have described a method of obtaining in a single operation a composite retort entirely adapted to the purpose desired and of the proper and predetermined wall thickness. The present application is a division of my said former application and is for the retort itself as an article of manufacture. The completed article has a main body portion of the usual fire-clay and sand mixture, and an outer surface of predetermined and appropriate thickness made up of a mixture of fire-clay and a basic material, the basic material taking the place of the customary sand either wholly or in part, as required by the particular exigencies of use. The "outer surface" referred to, it will be understood, may be either the interior or the exterior of the retort, or both, it being borne in mind that these retorts are usually arranged in tiers in the furnace and that their exterior surfaces are sometimes subjected to the action of basic slag which may be dropped upon them from a broken or leaking retort above.

In the accompanying drawings, Figures 1, 2, 3, and 4 represent in cross-section metallurgical vessels embodying my invention.

In carrying out my invention I make the batch of material for the main body portion of the retort from a pugged mixture of fire-clay and sand in the usual manner. In preparing the batch for the surface portion of the retort I take the same fire-clay and mix with it an inert or a basic material, preferably in granular form—such as chromite, carborundum, or the like—said inert or basic material taking the place of the sand in the proportion desired to correspond to the particular mixture of ores for which the retort is intended. In some instances the inert or basic material may take the place of all of the sand which is employed in the usual batch, and in other instances it may be supplied in varying proportions in conjunction with a correspondingly less proportion of sand. The mixture

of refractory fire-clay and inert or basic material is then pugged in a pug-mill to the desired plasticity. It is then stamped in the hammering-machine. After the hammering operation it is superimposed upon the preliminarily-stamped clay-and-sand mixture intended for the main body portion of the retort, and the whole is then thoroughly hammered to a solid wad. This wad is then introduced in the proper position in the chamber of the retort-press, so that at the termination of the operation the retort will be produced as a vessel having a main body portion composed of a mixture of refractory clay and sand and outer surfaces composed of a mixture of refractory fire-clay and inert or basic material in which sand may or may not be present to a greater or less extent, dependent upon the particular character of the ores to be treated. The remaining manipulations necessary to the completion of the vessel do not differ from the ordinary practice.

It will of course be understood that the thickness of the surfacing of basic or inert material may be varied at different points, if desired, or may be restricted to such parts of the retort as require it. For instance, it will usually be unnecessary to provide a surfacing of basic or inert material for the outer bottom of the retort and in some instances it may be omitted from the entire exterior surface, although, as I have stated above, I prefer to use it upon the outer and inner sides of the retort for the reasons given. It is also within the scope of my invention to provide an intermediate body of material between the main body portion of the retort and the outer surface portion, which intermediate portion may contain a less proportion of basic or inert material than the outer portions, the purpose of this arrangement being to obviate too abrupt a transition from the basic material of the outer portions to the clay-and-sand mixture of the main body portion.

In some instances I employ as the inert material comminuted graphite, mixed either with fire-clay alone or with fire-clay and sand. As is well known, however, graphite burns when exposed to an oxidizing atmosphere at high temperatures. It is therefore not feasible to leave the outer surface of a graphite-coated retort unprotected for the reason that the graphite in burning out would leave the remainder of the coating porous, which would be of course undesirable. For this reason when I coat the main body portion of a retort with a mixture containing graphite I further cover the said graphite coating with an additional thin coating of clay and sand, which I find is an efficient protector against the burning out of the graphite. It will be understood that this thin coating of a mixture of clay and sand may be applied either to the

exterior or interior of the retort, or to both exterior and interior, according to whether the graphite mixture itself is applied to the exterior or interior of the retort, or both.

Although I have described my invention as particularly adapted to the manufacture of retorts for the treatment of zinc ores, it will be understood that it is likewise applicable generally to the manufacture of other metallurgical vessels, such as crucibles or the like, intended for use in the metallurgy of steel and other metals and wherein it is desirable to provide a basic or inert outer surface.

In the drawings I have shown in Fig. 1 a cross-sectional representation of a metallurgical vessel—for instance, a retort or crucible—wherein *a* indicates the main body portion, and *b* the interior lining. In Fig. 2, *a'* indicates the main body portion; *b'*, the interior lining, and *c* the exterior lining. In Fig. 3, *a''* indicates the main body portion; *c'*, the exterior lining, and *d d'* indicate intermediate portions containing a less proportion of basic or inert material than the exterior lining. In Fig. 4, *a'''* indicates the main body portion; *b'''*, the interior layer, and *c'''* an exterior layer over the top portion of the vessel.

Having thus described my invention, what I claim is—

1. A metallurgical vessel, having its main body portion made up of a composition differing from that of portions of its outer surfaces united thereto by pressure, the said main body portion and the said outer surfaces containing fire-clay; substantially as described.

2. A metallurgical vessel, provided with a main body portion made up of a mixture of fire-clay and sand, and having outer surfaces united thereto by pressure, and made up of a mixture of fire-clay and a material inert to a fused base; substantially as described.

3. A metallurgical vessel, provided with a main body portion made up of a mixture of fire-clay and sand, and having outer surfaces united thereto by pressure, and made up of a mixture of fire-clay and a basic material; substantially as described.

4. A metallurgical vessel, provided with a main body portion made up of a mixture of fire-clay and sand, an outer surface portion made up of a mixture of fire-clay and a material inert to a fused base, and an intermediate portion made up of fire-clay, sand, and a material inert to a fused base; substantially as described.

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

AUGUSTIN L. J. QUENEAU.

Witnesses:

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