

(No Model.)

J. PEDDER.

Repairing Steel and other Crucibles.

No. 239,619.

Patented April 5, 1881.

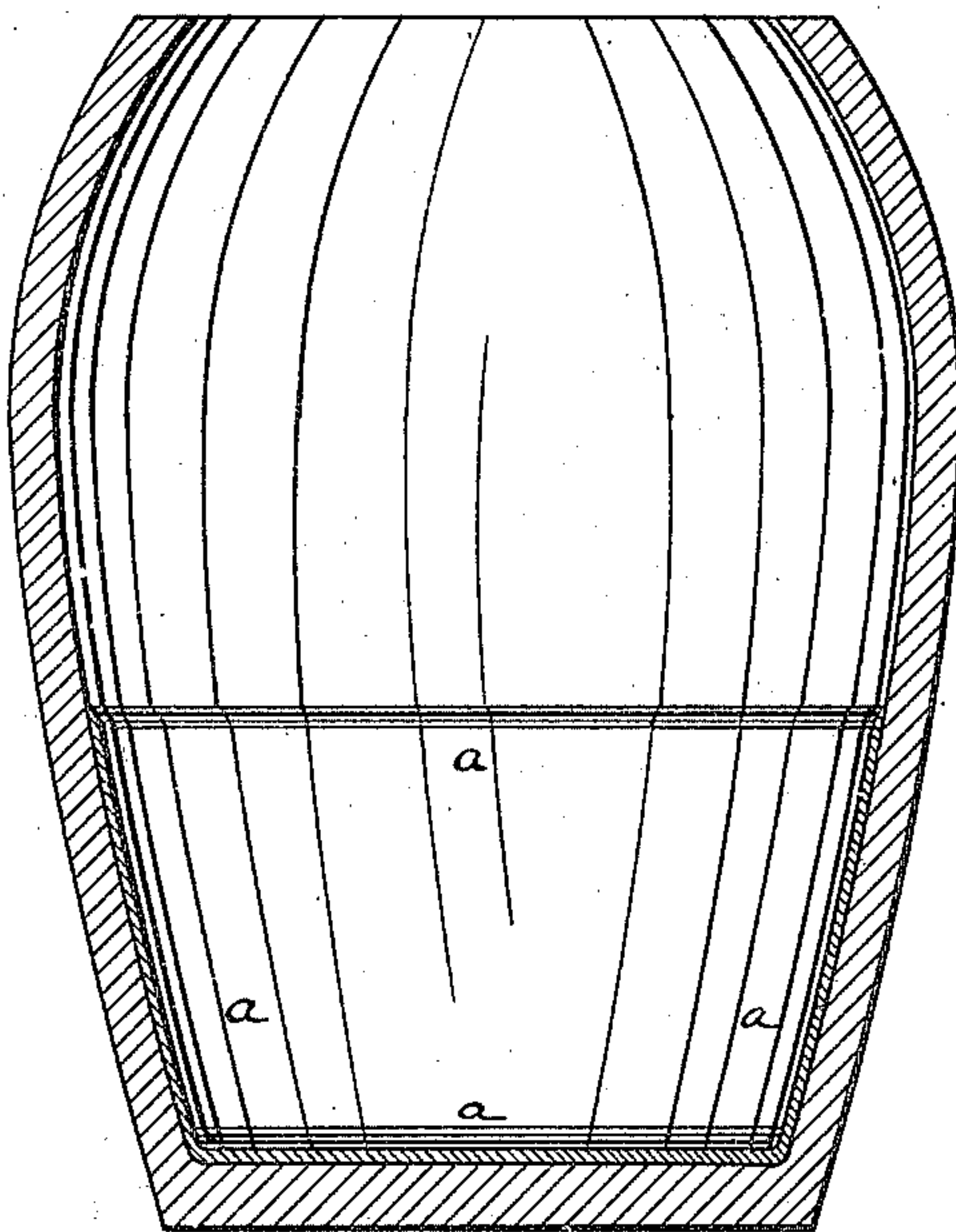


Fig. 1.

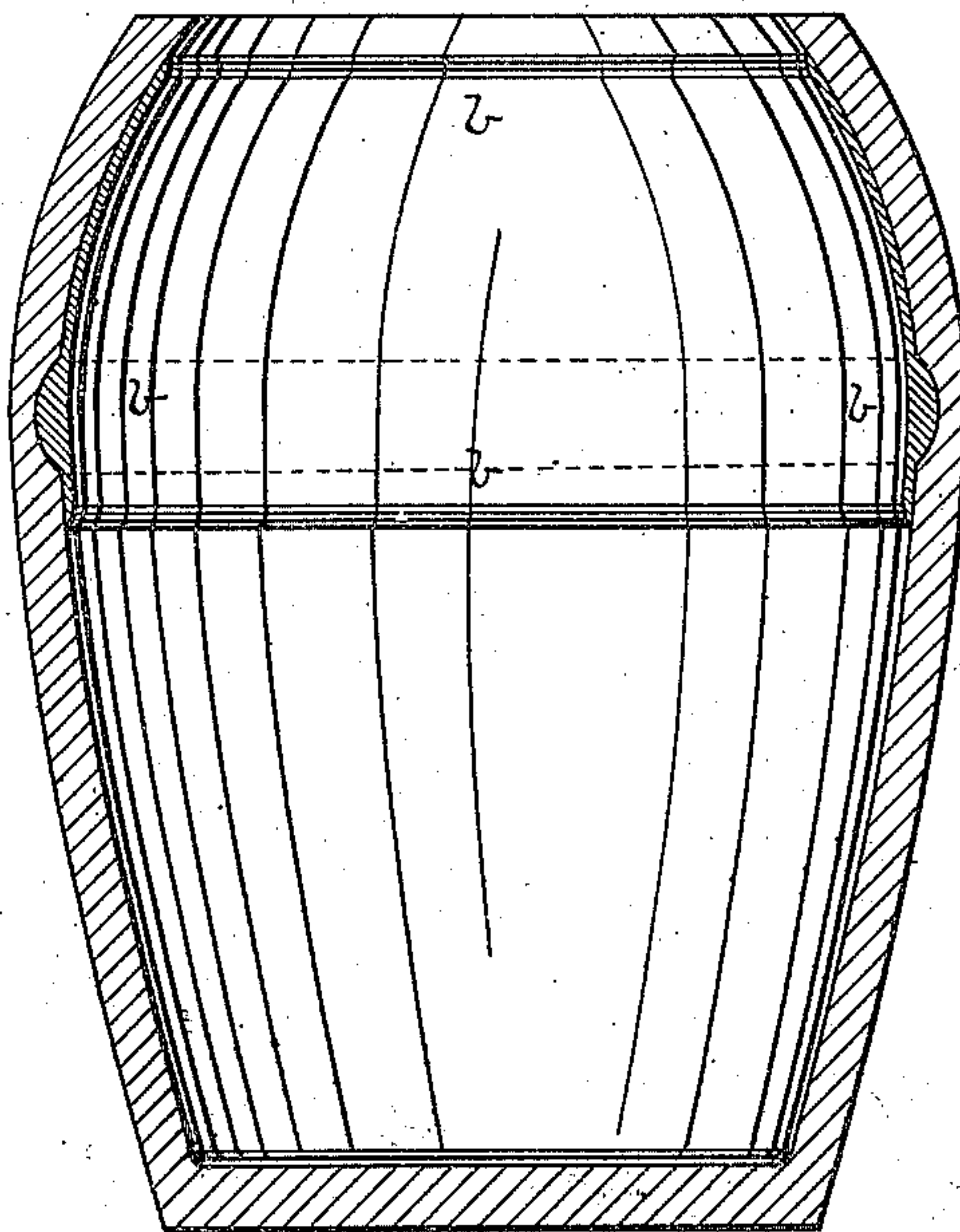


Fig. 2.

Witnessed.

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REPAIRING STEEL AND OTHER CRUCIBLES.

SPECIFICATION forming part of Letters Patent No. 239,619, dated April 5, 1881.

Application filed February 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN PEDDER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful
5 Improvement in Repairing Steel and other Crucibles; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

10 Figure 1 is a vertical section of a steel-melting crucible, illustrating my invention when applied to the lower part of the crucible interior. Fig. 2 is a like view, illustrating the same
15 when applied to the upper part of the crucible interior to repair the flux-ring.

Like letters of reference indicate like parts in each.

20 My invention relates to the repairing of the plumbago crucibles used in melting cast-steel, brass, and other metals and alloys, to enable them to stand longer, so that more heats and a larger amount of steel can be obtained from each crucible, thus reducing the relative cost
25 of crucibles in the manufacture or refining of these metals. These crucibles are generally formed of plumbago or German clay, with a slight portion of sand, and are generally known as "plumbago crucibles." These are usually
30 contracted at the mouth, forming a bulge a short distance below the mouth to strengthen them and increase their capacity, and are made of different sizes, to hold from fifty to one hundred pounds of metal. During the process of
35 melting the metals the intense heat, flame, and draft of the furnaces burn away and wear off the outer surfaces of these crucibles very rapidly, the upper part of the crucibles being most affected in gas-furnaces, and the lower part in
40 coke or coal furnaces. The metal and fluxes contained in the crucibles also wear away and eat off the interior of the crucibles, the metal absorbing a portion of the carbon, and the spiegeleisen and manganese eating or cutting
45 off the surface, and often cutting what is termed a "flux-ring" all around the crucible, where the different fluxes float on the molten metal. The means heretofore adopted for repairing these crucibles have all been directed toward
50 building up or increasing the outer surface of the crucible, to prevent the heat and flame

from burning them off and making them too thin for use.

The object of my invention is to repair the interior of the crucible, so as to prevent the
55 metals and fluxes from eating through the crucible, and by this means to cause the principal wear to come on the outer surface of the crucible and enable it to stand more heats.

It consists in forming at any desired place
60 on the interior of the crucible, after it has stood one or more heats, a lining or case composed of plumbago, silicon and plumbago, or other suitable material, whereby the crucible is built
65 up, so that the metal or fluxes in melting cannot cut through this case into and eat off the body of the crucible.

To enable others skilled in the art to make and use my invention, I will describe the same
70 more fully.

It is well known to steel-manufacturers that
75 new plumbago crucibles, if they become damp or come in contact with water, will scalp or crack when subjected to the intense heat of the melting-furnace, and are hence rendered
80 unfit for use. When, however, the pot or crucible has once been brought to a high heat, such as that necessary to melt steel, it is not liable to damage from any such cause, and
85 water can be used with it without fear of subsequent injury therefrom, and for this reason it is necessary that my improved lining be not
90 formed in the crucible until it has been brought to such high heat.

In carrying out my improved process of re-
85 pairing crucibles, I generally treat the crucible after it has stood but one heat, as the lining formed in the crucible will serve as a protection to its inner surface as long as it is used there-
90 after, though the crucible may be treated in the same manner at any time subsequent to that heat, if desired. I generally form a thin
95 plaster or mortar of ground plumbago and silicon, using about two parts of plumbago to one of silicon, and mixing them together with a little water, so as to form a plaster which will
100 "run," as hereinafter referred to. The plaster may also be formed entirely of plumbago, or of plumbago mixed with German clay and other suitable materials, and in some cases these different materials may be used without any
plumbago. The plumbago is generally made by

grinding up old crucibles, and the silicon is a common sand, such as is used in connection with furnaces. In forming a cup or case, *a*, in the bottom of the crucible, as shown in Fig. 1, I place a sufficient quantity of this plaster or mortar in the bottom of the crucible, and then gradually turn the crucible around, and the plaster will gradually run around the crucible and form a lining from an eighth to three-eighths of an inch all over the base of the crucible, and around the sides thereof.

If it is desired only to fill up the flux-ring or form a case or lining around the upper part of the crucible to repair the crucibles used in gas-furnaces, as shown at *b*, Fig. 2, the crucible is turned on its side and a sufficient quantity of the plastic compound placed therein, and the crucible is turned, as above described, so that the compound will run around and form a ring, filling the flux-ring, or covering the interior of the mouth of the pot. The lining may also, if desired, be formed all over the interior of the pot; but this is seldom necessary. After the lining or case has thus been formed it is baked or dried, to give it a hard surface and prevent the steel-scrap from penetrating the case when it is shaken in to fill the crucible. When the crucible, thus lined, is again subjected to the intense heat of the melting-furnace, the case will be baked or united firmly therewith, and a hard glazed surface formed all over the case, through which the spiegeleisen, manganese, or other fluxes cannot cut, and as no air or flame can come in contact with the lining, the case will stand any further heats to which the crucible is subjected, and will effectually protect the interior of the body of the crucible, and any subsequent wear will come only on the outer surface, thus enabling the crucible to be used for two or three heats longer than where no inner lining is employed, and a lighter and consequently less expensive crucible to be employed.

If any of the steel-scrap punctures the fresh lining, in being shaken into the crucible, another lining can be formed in the manner above described, thus filling up any holes made.

Where plumbago forms part of the plastic lining it serves to add carbon to the melting steel, in the same manner as the body of the new crucible, so that it is unnecessary to add

so much carbon in the subsequent heats made in the crucible.

Where a crucible is cracked, and is generally considered as worthless, by forming the lining within the crucible over the crack, this lining holds the crucible together, wholly mending the crack and making the crucible perfectly safe for use.

Where it is desired to use the crucible immediately after the lining is formed therein, a cap of heavy paper, sheet-iron, or cast-steel may be placed over the lining, to prevent the scrap from puncturing it as the crucible is filled. The paper or other cap will be burned or melt away at the first heat, and leave the hard glazed case or lining in the crucible.

In some cases the cast-steel cap may be placed in the bottom of the crucible, and the plumbago and silicon or other material, in a dry or pulverulent state, placed around the cap, and upon bringing the crucible to a high heat this dry material will be baked or glazed in the same manner as the plastic lining. The lining or case may be also formed in a rather thick mortar or plaster and molded in by hand or tools; but this is harder to accomplish, and does not give so even a lining as where the thin mortar is used.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The herein-described process of repairing plumbago crucibles, consisting in forming at any desired place in the interior of the crucible, after it has stood one or more heats, a lining or case composed of plumbago, silicon and plumbago, or other suitable material, to build up the interior of the crucible, substantially as set forth.

2. In combination with a crucible having a lining or case of plumbago and silicon, or other suitable material, formed at any desired place on the interior of the crucible, a cap placed within the crucible to protect or sustain the inner lining, substantially as set forth.

In testimony whereof I, the said JOHN PEDDER, have hereunto set my hand.

JOHN PEDDER.

Witnesses:

F. G. KAY,
JAMES I. KAY.