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3,339,965

CRUCIBLE SLING

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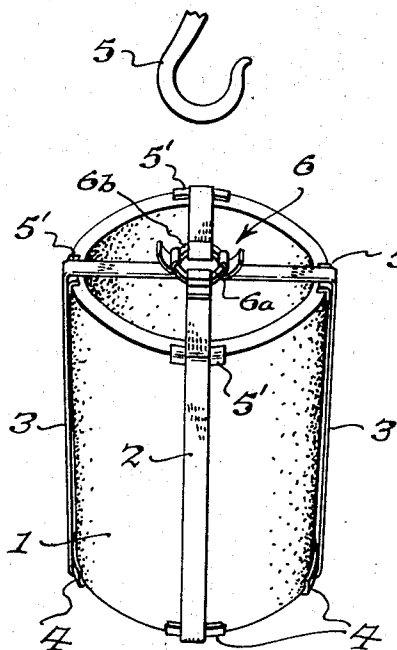


Fig. 1.

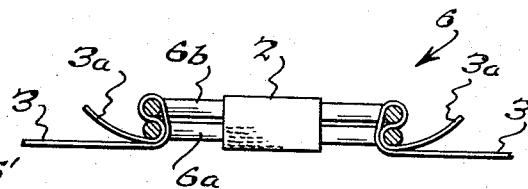


Fig. 2.

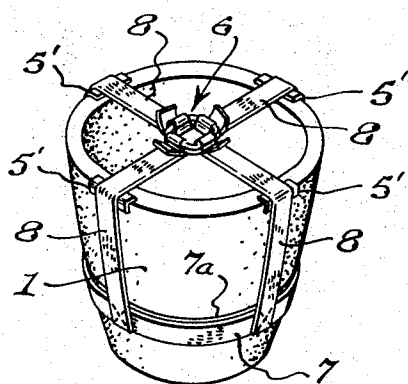


Fig. 3.

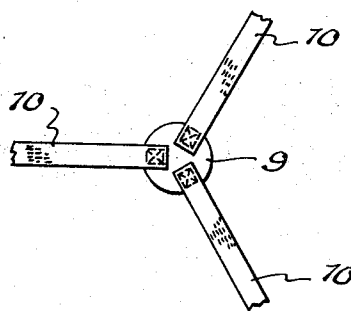


Fig. 4.

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CRUCIBLE SLING

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3 Claims. (Cl. 294-74)

This invention relates to an improved method of handling graphite and similar crucibles and a device therefor so that they can be more easily and safely moved about and/or inserted in place in packing cases for shipment and in furnaces preparatory to use.

Such crucibles are old in the art, being made for example as described in Patents Nos. 1,356,939, 1,458,724, 1,458,726, and 1,479,107, out of a mixture of graphite and silicon carbide held together by a binder of carbonized tar or pitch with a protective glaze such as that described in Patent No. 1,828,767. Other crucibles are made of clay bonded graphite, vitrified by suitable firing. They are in all cases relatively delicate and subject to serious damage by chipping or other breakage during handling. Originally American crucibles were made barrel shaped with an expanded bilge so that they were easily handled with finger-like tongs which clasped them firmly for lifting.

As the art progressed however, the crucibles became more cylindrical or even bowl shaped and very much larger. In many cases very large built-on lips are permanently attached at the upper edge. All these changes made handling more difficult, while the greatly increased weight of the crucible or pot or bowl made handling more dangerous and difficult. Crucible diameters came to exceed 30" with heights of almost three feet. Such crucibles weighed up to 1500 lbs. Bowls are even larger and heavier. The underneath supporting areas are often considerably less in diameter so that care has to be used to prevent accidental upsets with serious damage to the article.

To move such crucibles from the manufacturing area to the packing room, they were dragged or rolled up boards onto small trucks which moved them carefully to the shipping room where they were similarly taken from the trucks and in due time rolled onto a cushioning base of straw or similar packing on a base of a crate and the sides of the crate built up around them after which the surrounding space in the crate was stuffed with more straw to protect them during shipping.

Before opening them in the customer's plant, these crates were taken as near as possible to the place the crucible was to be installed, then opened up and the crucible tilted over by an operator until it rested on its side on the projecting forks of a lift truck. This truck then fed the crucible, base first, into the open mouth of a tilting furnace which had been tipped to receive it. By careful jiggling and a certain amount of luck, the crucible was there adjusted in position to rest on or against its supporting members after the fork was withdrawn.

In the case of bowls where the furnace was not tiltable, a series of ropes might be tied around the side of the bowl and then over strong wooden timbers which were lifted by several workmen to move the bowl into place in the furnace, and the ropes then removed.

The use of these various clumsy and uncertain devices is obviated by my invention in which I apply to the crucible at as early a stage as it is known to be sound, an inexpensive, closely fitting permanent sling of combustible material whereby the crucible can be lifted vertically and moved about as may be required while so supported and thereafter deposited accurately in any desired position for further attention or use.

For example, I may use a lift truck with an overhead hoisting mechanism to pick the crucible directly from the

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inspection floor and while suspended from above convey it quickly to the shipping room where the crucible can be set directly downward into the center of a cylindrical packing container on a pad of straw packing and additional packing stuffed around it. I find such containers cheaper to provide and easier to move about than the old type with built up rectangular sides and my new device is ideally adapted for use with them.

When the time comes to put the crucible in the furnace, it is lifted vertically out of the packing container by a suitable hoist and set directly down, accurately in position in the furnace. My handling sling stays in position during all this and is left on the crucible until it burns away after the furnace is put in service.

My device is exceedingly simple, consisting of a plurality (three or four give excellent results) of combustible fabric straps such as nylon webbing which support the crucible and extend up its sides and across the top to a central fastening which holds them tautly in place and serves as a support by which the whole may be lifted by a hook.

The accompanying figures illustrate various forms and aspects of my invention.

FIG. 1 shows a side view of a crucible with one my slings on it in position to be picked up by a hook above it.

FIG. 2 shows a cross section of a pair of rings with straps around them which constitute one simple form of holding the straps securely in place and providing a fitting for lifting the crucible.

FIG. 3 shows an alternative form of my sling in place on a bowl.

FIG. 4 shows an alternative method of assembling straps to go under a crucible before they extend up its sides.

In general in the various figures similar numerals designate similar members where the meaning seems clear. In FIG. 1 the crucible 1 has running down its outside face a strap 2 of nylon webbing which passes diametrically across under the bottom of the crucible and up its back side. A similar strap 3 is positioned 90° around the crucible, the straps 2 and 3 crossing each other under the bottom of the crucible.

Both straps 2 and 3 are brought in over the top edge of the crucible to a central fastening 6 where they are made taut and firmly secured by any suitable means, such for example as the pair of rings shown in FIG. 2. When it is desired to lift the crucible, hook 5 on a hoisting device engages member 6 whereby the crucible may be raised safely. It is important that the various straps be drawn up relatively tight as otherwise they could slip sideways to an unbalanced position or even slip off the crucible completely.

In FIG. 1 I show between the straps 2 and 3 and the bottom of the crucible, but particularly at the sharper corners of the latter, a protective pad 4 which may be of heavy, soft cardboard or other material whereby any tendency of the strap to cut into the crucible is minimized. Similar pads 5¹ are also shown protecting the upper edge of the crucible where the straps cross it. The use of such protective pads is not strictly essential, but their use is recommended at angular points of contact between the strap and the crucible as a safety measure which is inexpensive.

While the straps may be fastened to the upper holding member 6 by any suitable means such as various buckles or staples, the device shown in FIG. 2 has been used with success and is easily applied. Here two similar steel rings 6a and 6b are provided. Each of these is perhaps 3½ to 5 inches in overall diameter and is made of ¼ inch diameter steel rod welded to form a circular ring.

The strapping, here indicated as 3, is brought in over

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the top edge of the crucible and upward through the center of both rings as shown. It is then turned down around the outside of the upper ring 6b and again brought inside the lower ring 6a where it is inserted between this ring and the strap as it first turns up through this ring. The strap from the opposite side is similarly secured to the opposite side of the two rings. The loose ends 3a of the straps are then pulled up snug and the rings can thereafter be dislodged only with difficulty. Actually the rings and straps thus secured are left permanently in place until the crucible is ready to use, when the straps may be cut or burned away.

I have found relatively light webbing such as American Viscose Co.'s Avis strip which is $\frac{3}{4}$ inch wide and has a breaking strength of 500 lbs. tensile to be well suited for slings of smaller crucibles weighing up to 300 lbs. For heavier ones, I prefer nylon webbing of the type designated as 10x which has a tensile strength of 2000 lbs. This I use in $1\frac{1}{4}$ inch width.

An alternative form of sling is shown in FIG. 3 in which I provide a lower supporting strap 7 of similar nylon material stitched together to form a belt which surrounds the lower portion of the crucible or bowl in a region of decreased diameter. A protective pad 7a may be provided here. The supporting straps 8 are firmly stitched to belt 7 at their lower ends. At their upper ends, they pass over the edge of the crucible with similar protective pads 5¹ and as in FIGS. 1 and 2 are secured to a central holding and lifting device 6.

FIG. 4 illustrates another alternative sling method in which three supporting nylon straps 10 spaced 120° apart are sewed to a fabric disc 9 which is placed under the bottom of the crucible before the straps are led out and up the sides of the crucible (not shown here).

The various devices shown are for purpose of illustration and further alternative forms and materials may be substituted within the scope of the appended claims. In general it is preferred that the supporting straps be made of combustible material, of which nylon is an example, because the material can then be burned away when the crucible is put in service without leaving a residue which requires removal to avoid obstructing the furnace or contaminating the metal being processed.

I claim:

1. A readily handled crucible assembly, comprising:
 - (a) a frangible crucible having a substantial percentage of carbon which has an open top defined by a substantially circular peripheral edge,
 - (b) a plurality of spaced longitudinally extending straps tightly engaging the outside of said crucible

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and which have free end sections passing over said peripheral edge and across the open top of said crucible substantially in a flat plane to engage and support at their ends a centrally disposed adjustable fastening means,

- (c) said straps being made of combustible material,
 - (d) said fastening means being made of metal and permitting take-up on the straps by pulling on the ends of said straps, whereby tension adjustment and take-up for crucible size may be made by simply pulling on the free end of each of said straps, and
 - (e) said fastening means and said straps are sufficiently taut and strong to permit grasping of said fastening means by a hoist assembly so that the entire crucible assembly may be lifted, transported and accurately inserted in a melting furnace.
2. A crucible assembly as set forth in claim 1, wherein:
 - (a) said fastening means comprises two superposed metal rings of the same size, and
 - (b) the strap ends are each passed under both rings, up along the insides thereof, around the top and down the outside of the top ring, in between the top and bottom rings, and behind and under and out from the bottom ring between the bottom ring and the intermediate portion of the strap which extends under the bottom ring.
 3. A crucible assembly as set forth in claim 1, wherein:
 - (a) protective pads composed of soft yieldable material are inserted between the said straps and the crucible at angular points of contact of the straps with the crucible.

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