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ELECTROLYTIC FUSED SALT CLEANING BATH

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Fig. 1

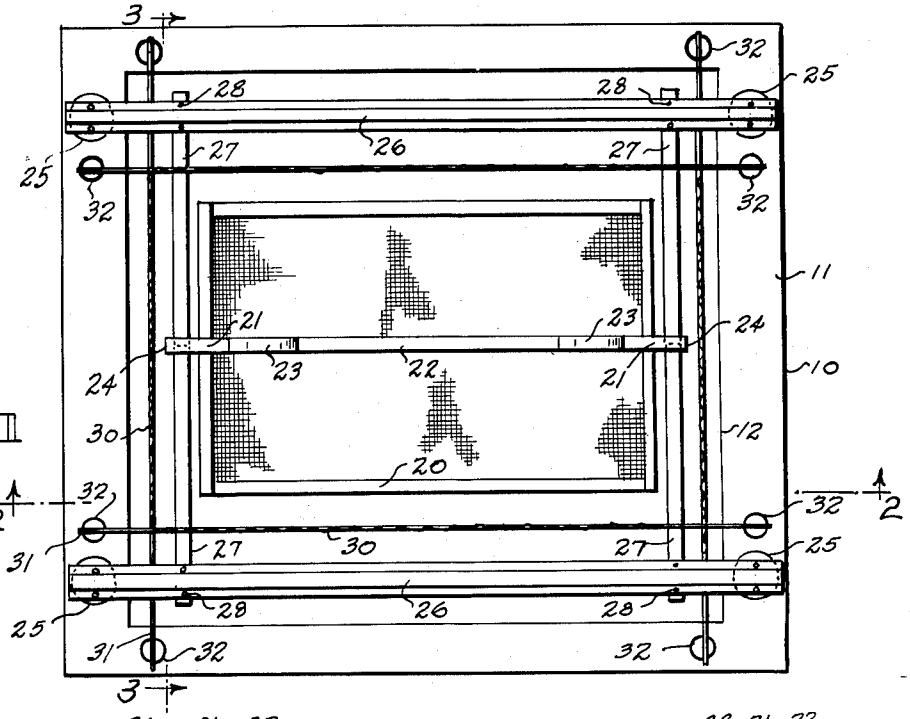
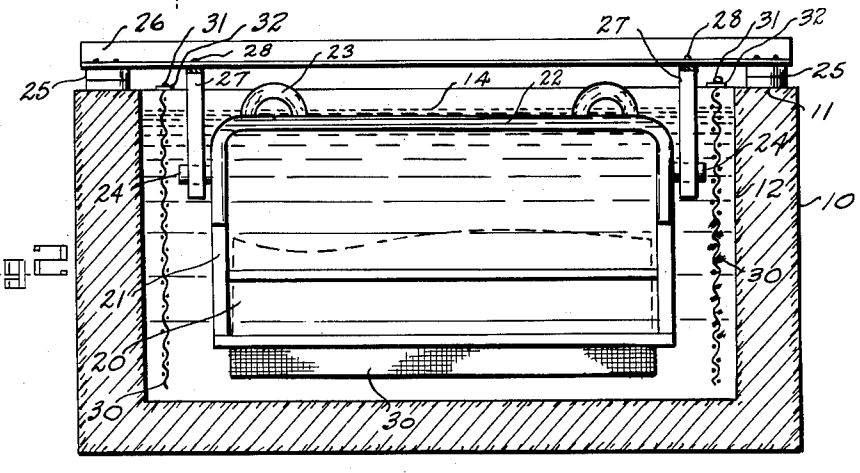


Fig. 2



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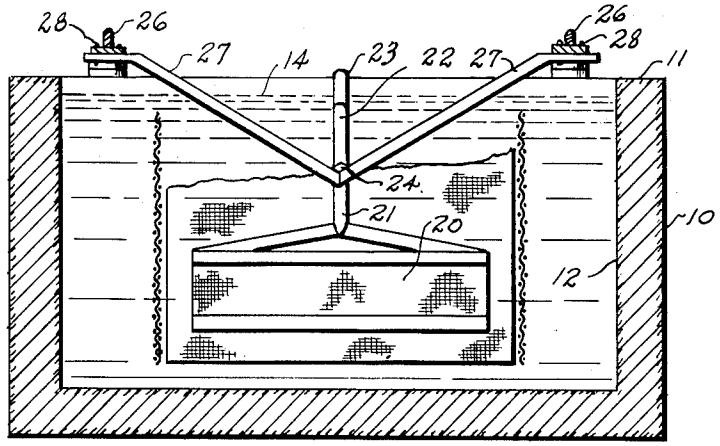


Fig. 3

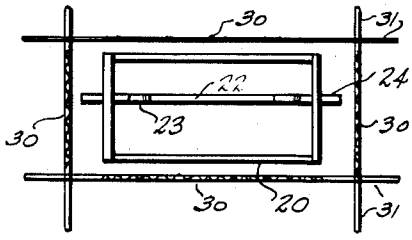


Fig. 4

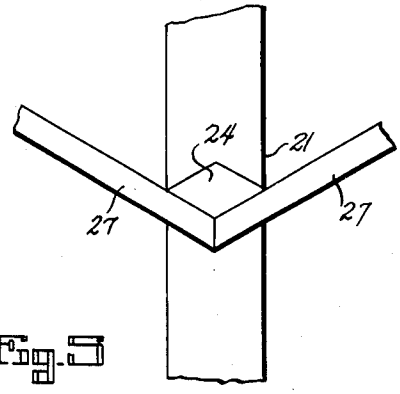


Fig. 5

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2,732,339

ELECTROLYTIC FUSED SALT CLEANING BATH

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Application August 2, 1951, Serial No. 239,934

2 Claims. (Cl. 204—243)

This application relates to electrolytic liquid bath constructions and aims to provide new and useful improvements in such constructions.

A prior Patent No. 2,515,148 of July 11, 1950, describes an electrolytic bath of the molten alkali salt type for cleaning work pieces immersed in such bath, the bath itself being a molten, fused mixture of sodium hydroxide, sodium chloride, and sodium aluminate, with or without, as desired, a modicum of sodium fluoride. In some uses of that bath, the work is electrically connected as a cathode; in others, alternately as cathode and anode cyclically. This application specifically relates to construction features particularly designed for such baths.

For an understanding of such features, reference will be had to the appended drawings and to the following specification.

In such drawings:

Fig. 1 is a diagrammatic top plan view of an electrolytic bath.

Fig. 2 is a diagrammatic longitudinal section view.

Fig. 3 is a diagrammatic end section view.

Fig. 4 is a fragmentary diagrammatic top plan view.

Fig. 5 is an enlarged fragmentary diagrammatic end view.

An electrolytic bath construction includes a double walled pot or tub **10** having an upper wall or edges **11** and having means, not shown, for heating the contents of the inner wall or tub **12**. Such contents may be any desired electrolytic composition and, for purposes of illustration, such contents will be the molten fused mixture, as above described, with such mixture filling the tub **12** to the level shown at **14**.

A. *Work mounting*

For removably supporting and for making temporary electrical contact with the work immersed in the bath, means such as will now be described are provided. Such means includes a work holder in the form of a mesh or perforate basket or tray **20** having at its ends yokes **21** connected at the top by a bail **22** provided with handling hooks **23** and outwardly extending mounting and contact lugs **24**.

Mounted in any suitable manner above the tub as, for example, on insulating blocks **25**, are rails or bus bars **26** to which are bolted at points near the ends of the tub **12** means for removably supporting and making temporary electrical contact with the work holder. Such means comprises straps or bars **27** permanently but removably joined at their upper ends, as by means of bolts **28**, to the bus bars **26** and permanently joined to each other, as by welding, at their lower ends to form V-shaped stirrups or cradles. In these V stirrups are adapted to be removably supported the lugs **24** projecting outwardly from the yokes **21** of the work holder **20**.

It is important to observe that the V joints of straps **27** are below the level **14** of the bath so that the lugs **24** are immersed in the bath when there is current flow between the bus bars and the work on the one hand, and the tub **12** on the other.

In a preferred form the lugs **24**, as shown best in Fig. 5, are of a cross-section complementing the intersection or V joints of the straps **27** whereby these lugs engage the strap with surface-to-surface contact with as little air gap as possible between the lugs **24** and the straps **27**.

The straps **27** are intended to be expendable and for this reason, though considered as permanently mounted, the fact is that they are secured to the permanently mounted bus bars **26** by bolts **28** which when tightened create low resistance joints at **28** between the straps **27** and the bus bars **26**, but which may be removed to permit replacement of eroded straps **27** by fresh ones to restore the satisfactory functioning of the bus bars **26** for supporting the work and the work holder **20**.

It has been found that a remarkable reduction in erosion and a remarkable improvement in the functioning of the bath has been effected by the disposition of the points of removable attachment and of temporary electrical contact between the work holder **20** and the work holder support **27** below the level of and constantly immersed in the bath **12**.

B. *Sacrificial plate*

Instead of utilizing the pot or tub **12** as one of the electrodes of the bath, particularly where the bath is of the direct current type with the work as the cathode and the tub **12** as the anode, improvement is effected by the use of a sacrificial plate to which the anodic current supply is connected, such plate serving as the anode. The drawings show such a construction comprising one or more plates **30** arranged to line the tub **12** and having outwardly extending lugs **31** resting on blocks **32** mounted on the upper wall **11** of the pot. Blocks **32** are of insulating material and, hence, insulate the pot from these anodes **30**, connected in any suitable manner to the anodic supply.

The plates **30** are immersed in the bath. For purposes of economy and for improving their functioning, it is preferred to make the plates **30** of grid or mesh form.

Grids must have no horizontal surfaces, upon which sludge can settle. However, they have been used in plate form or strip form and found satisfactory.

It has been found desirable to space the grids somewhat remote from the straps or V's **27**, the distances being varied as found best. It is observed that if the grids and V's are too close together in a molten salt bath, current will flow directly from the straps to the grids, rather than from the straps through the work pieces in the basket to the grids, due to the fact that the salt bath is a good conductor of electricity. A flow of current, not through the work pieces, impairs the efficiency of the bath.

It has also been found desirable to construct each grid of uniform cross section to avoid concentration of current flow on heavier or larger portions of grids of non-uniform cross section. For similar reasons all grids in a bath should preferably be as nearly identical as possible and of nearly identical positioning with respect to the basket and work pieces.

It has also been found desirable to form the grids with as little horizontal sludge deposit surfaces as possible, to avoid the deposit of sludge on the grids and thus to avoid short circuiting of current from basket to grid sludge deposits.

Long use of the electrolytic baths has been found to cause electrolytic erosion of the tubs **12**, particularly where these are connected as anodes. Replacement of eroded tubs **12** is a very expensive and delaying matter. Great economies are effected by the use of the sacrificial

plates **30** as the anodes for electrolytic erosion will be on these plates which are inexpensive and which may easily be replaced.

One or more plates **30** may be used, as desired. If several are used, they may be of the form shown, and they may be interconnected electrically, by straps or other means, or separately connected to the anodic supply, all as desired. However, it has been found that when the sacrificial plates of grid form are arranged in loop form, as shown in Figs. 1 and 4, there has resulted a greater degree of uniformity of electrolytic bath action on the work on holder **20**.

Though the loop form is preferred, the single plate form has also been found satisfactory and has the advantage that it is much cheaper to fabricate and much more easy to remove the install.

Where the sacrificial plate, particularly of grid or mesh form, instead of the pot, is utilized as the anodic electrode, it functions as a heating plate to add heat to the bath. When the pot itself is used as an electrode, the heat dissipation from it destroys the effect of the pot as a heater.

The sacrificial plate immersed in the bath keeps itself clean and does not scale and has a tendency to add heat to the bath.

Particularly where the bath is of the reversing current type where the work is successively cathode and anode, improvement has been observed in arranging that the sacrificial plate **30** and the pot **12** be electrically interconnected so that the sacrificial plate and the pot together form the electrode, with the sacrificial plate functioning as an erodable sacrificial and removable liner for the tub **12**.

Where the sacrificial plate is utilized with reversing current, i. e., where the work is alternately cathodic and anodic, it has been found that the end of the pot is subject to a greater amount of electrolytic erosion and, hence, the sacrificial plates, even if not used on the sides of the pot, should at least be used on the ends of the pot adjacent the ends **21**, **24** of the work holder or basket.

Now having described the bath constructions and improvements herein disclosed, reference should be had to the claims which follow.

We claim:

1. An electrolytic fused salt cleaning bath for cleaning a metal work piece suspended in the liquid of said bath by passing electric current therethrough while maintaining the work piece for at least about one half of the electrolytic treatment period as a cathode, comprising an open top container forming a cell, two bus bars mounted substantially parallel along opposite upper edges of said container, a pair of V-shaped metallic stirrup members disposed a substantial distance from each other having each of their arms removably but firmly fastened to an opposite bus bar in current conductive support with the crotches of the said V members depending a substantial distance downward into the container as supporting members for objects positionable below the upper surface level of bath liquid in said container, a basket of foraminous metal comprising a work holder within which the work pieces may be disposed, said basket having a pair of horizontal supporting lugs each laterally extending from an opposite end thereof, each positioned to be engaged within a depending crotch of one of the V-shaped stirrups for gravitational support and temporary electroconductive contact therewith, whereby the foraminous basket is supported through said lugs between the pair of V-shaped stirrups gravitationally without further fastening while being disposed completely immersed within the liquid of said bath.

2. The apparatus as defined in claim 1 wherein each of said lugs have at least the lower sides angularly bevelled to complement the sloping sides of the said V-shaped stirrups to form a substantial surface area for enhanced electroconductive contact with said V-shaped members.

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