

Jan. 28, 1969

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3,424,668

CATHODE FOR USE IN RECOVERY OF NONFERRROUS METALS

Filed March 8, 1965

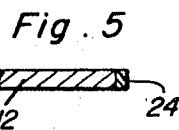
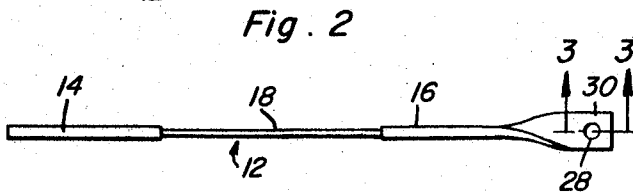
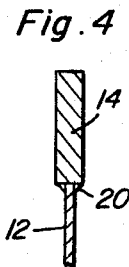
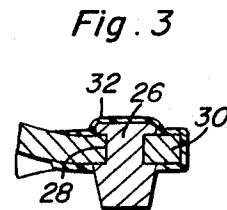
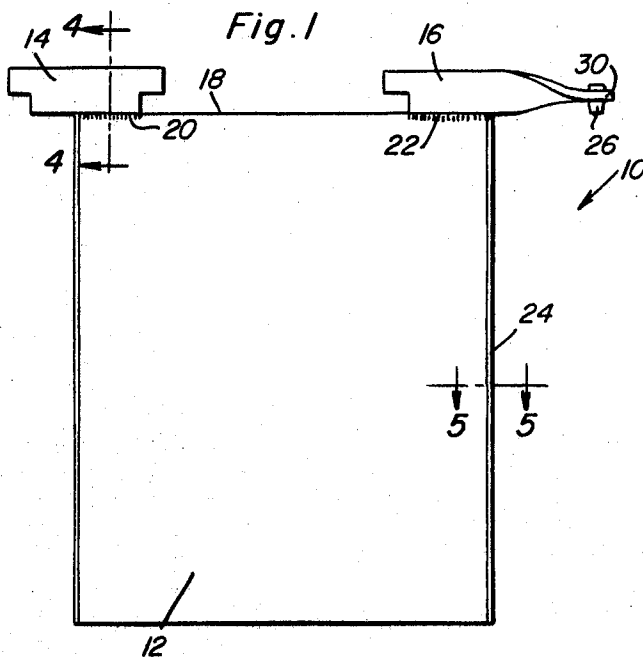
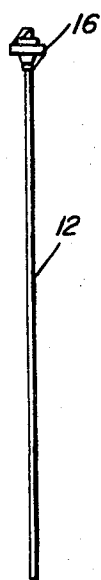


Fig. 6



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3,424,668

CATHODE FOR USE IN RECOVERY OF NONFERROUS METALS

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Filed Mar. 8, 1965, Ser. No. 437,849

U.S. Cl. 204-281

Int. Cl. B01k 3/04

7 Claims

ABSTRACT OF THE DISCLOSURE

A cathode used for electrolytic recovery of metals is made from a sheet of rolled aluminum having edge protectively coated by polyethylene bonded to the sheet in its molten state. Rolled aluminum hanger bars are welded to a portion of a suspension edge of the sheet, with one of the bars twisted to present an aperture into which a copper contact button is shrunk fit.

This invention relates to a new and useful electrode adapted to be used in connection with the electrolytic recovery of metals and more particularly to a cathode construction and its method of fabrication.

It is a primary object of the present invention to provide an improved form of electrolytic cathode adapted to be used in connection with the recovery of nonferrous metals. Cathodes of the type with which the present invention is concerned, usually involve a conductive sheet of metal adapted to be suspended within an electrolytic bath with electrical current being conducted to the sheet of metal through its hanger. As a result of the cathode construction and its method of fabrication, pursuant to the principles of the present invention, electrolytic recovery of nonferrous metals may be achieved with a cathode having a substantially extended life and a lower internal electrical resistance.

In accordance with the foregoing object, the cathode of the present invention may also be manufactured with greater economy. This is achieved to a large measure by the formation of the sheet hanger structure from rolled aluminum and the sheet itself from aluminum which is commercially pure. By use of the rolled aluminum for the hanger structure, casting alloys are avoided to preserve the high conductivity of the electrical path established through the hanger structure to the sheet of aluminum from a protected contact joint. This permits the hanger structure of the present invention to be welded to the sheet of aluminum along a reduced length.

Other manufacturing economies are effected in connection with the construction of the cathode of the present invention by forging of a contact button to one of the rolled aluminum hanger bars while portions of the aluminum sheet to be shielded from electrolytic deposition, have nonconductive material permanently bonded thereto by coating of said portions of the aluminum sheet while it is in a molten state.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a front elevational view of a cathode structure made in accordance with the present invention.

FIGURE 2 is a top plan view of the cathode shown in FIGURE 1.

FIGURE 3 is an enlarged partial sectional view taken substantially through a plane indicated by section line 3-3 in FIGURE 2.

FIGURE 4 is an enlarged partial sectional view taken

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substantially through a plane indicated by section line 4-4 in FIGURE 1.

FIGURE 5 is an enlarged partial sectional view taken substantially through a plane indicated by section line 5-5 in FIGURE 1.

FIGURE 6 is a side elevational view of the cathode.

Referring now to the drawings in detail, it will be observed that the cathode generally referred to by reference numeral 10 includes a rectangular sheet of aluminum 12 of substantially uniform thickness throughout adapted to be suspended within an electrolytic bath as is well known by means of a hanger structure through which electrical current is conducted to the aluminum sheet. In accordance with the present invention, the hanger structure includes a pair of hanger bars 14 and 16 which are made of rolled aluminum and are slightly thicker than the sheet of aluminum itself. The aluminum from which the sheet 12 and hanger bars are made, are at least 99.65% pure. Also, by making the hanger bars from rolled aluminum rather than casting thereof, the high conductivity of the aluminum is preserved. In view thereof, the hanger bars 14 and 16 may be secured to an upper suspension edge 18 of the aluminum sheet 12 in spaced relation to each other along portions of limited length by means of welding 20 and 22 for example. The electrical path established through the welded portions 20 and 22 will be adequate in view of the high conductivity of the hanger bars. Furthermore, inasmuch as the hanger bars are made of rolled aluminum, they will have a high resistance to chemical attack thereby effectively prolonging the life of the cathode.

The sheet of aluminum 12 is also shielded along opposite vertical edges thereof by means of a nonconductive, plastic material such as polyethylene 24. The polyethylene shielding 24 is permanently bonded to the aluminum sheet 12 by coating thereof when it is in a molten state. Accordingly, the vertical edges of the aluminum sheet will not receive any electrolytic deposition thereon in view of the permanent shielding provided by the polyethylene material 24 which will remain permanently bonded to the aluminum sheet throughout the life of the cathode.

One of the hanger bars 16 through which the cathode is suspended as is well known, also establishes an electrical connection to a source of electrical energy by means of a contact button element 26. The contact button is made of a conductive material such as copper having a lower thermal coefficient of expansion so that it may be shrunk fit or forged within an aperture 28 formed in a projecting portion 30 of the hanger bar which has been twisted into a plane substantially perpendicular to the plane of the aluminum sheet 12. One preferred method for shrink fitting the contact button in place, is to cold forge it in the same manner as a rivet for securement to the hanger bar 16. In tests conducted, the cold forged contact points showed excellent electrical properties approaching those of a flash welded joint. Inasmuch as the thermal coefficient of expansion of the copper button 16 is lower than that of the aluminum hanger bar, the connection so established will have a lower electrical resistance than that possible with a machined contact button now in use. It will also be appreciated, that the contact button may be shrunk fit within its aperture 28 by elevating the temperature of the aluminum hanger bar above that of the contact button when it is inserted through the aperture. Protection for the copper-aluminum interface against electrolytic corrosion and chemical attack may also be provided by coating the exposed joint with epoxy or polyethylene material 32 as shown in FIGURE 3.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled

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in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A cathode for use in the electrolytic recovery of nonferrous metals comprising, a sheet of relatively pure aluminum, a nonconductive plastic permanently bonded to portions of said sheet on which deposition is to be avoided, a pair of hanger bars made of rolled aluminum welded at spaced locations to the sheet along one edge thereof, one of said hanger bars having an aperture, and a contact element shrunk fit within said aperture.

2. A cathode for use in the electrolytic recovery of nonferrous metals comprising, a sheet of aluminum, a nonconductive plastic material bonded to portions of said sheet on which deposition is to be avoided, a pair of hanger bars made of rolled aluminum welded at spaced locations to the sheet along one edge thereof, one of said hanger bars having an aperture, and a contact element shrunk fit within said aperture, said contact element being made of a conductive material having a thermal coefficient of expansion lower than aluminum.

3. The combination of claim 2 wherein the sheet and hanger bars are made of aluminum which is at least 99.65% pure.

4. A cathode for use in the electrolytic recovery of nonferrous metals comprising, a sheet of commercially pure aluminum, polyethylene strips bonded to opposite edges of said sheet, a pair of rolled aluminum hanger bars welded at spaced locations to the sheet, extending generally parallel thereto, one of said hanger bars having a portion projecting from the sheet in a plane perpendicular thereto, and a solid copper contact button shrunk fit within an aperture in said portion of the one hanger bar.

5. A cathode for use in the electrolytic recovery of nonferrous metals comprising, a sheet of aluminum, a nonconductive plastic material bonded to portions of said sheet on which deposition is to be avoided, a pair of

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hanger bars made of rolled aluminum welded at spaced locations to the sheet along one edge thereof, one of said hanger bars having an aperture, a copper contact element forged within said aperture to form a joint, and a protective coating formed on said joint to avoid corrosion of the metallic interfaces of the joint.

6. An electrode adapted to be immersed in an electrolytic solution for receiving electrodeposited material, comprising a sheet of substantially uniform thickness having a suspension edge, a pair of hanger bars welded in spaced relation to each other to said suspension edge of the sheet, said hanger bars being made thicker than the sheet and of an identical, electrically conductive metal corrosively resistant to said electrolytic solution, a contact element secured to one of the hanger bars, said contact element being made of a conductive metal having a substantially different coefficient of thermal expansion than the hanger bars to form a joint permanently establishing a path of constant electrical conductivity through a relatively small length of said suspension edge to which said one of the hanger bars is welded and means protectively coating said joint.

7. The combination of claim 6 including a protective polyethylene coating intimately bonded to surface portions of the sheet on which deposition is to be avoided.

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U.S. Cl. X.R.

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