

United States Patent

[11] 3,616,447

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 [21] Appl. No. **792,508**
 [22] Filed **Jan. 21, 1969**
 [45] Patented **Oct. 26, 1971**
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[56]

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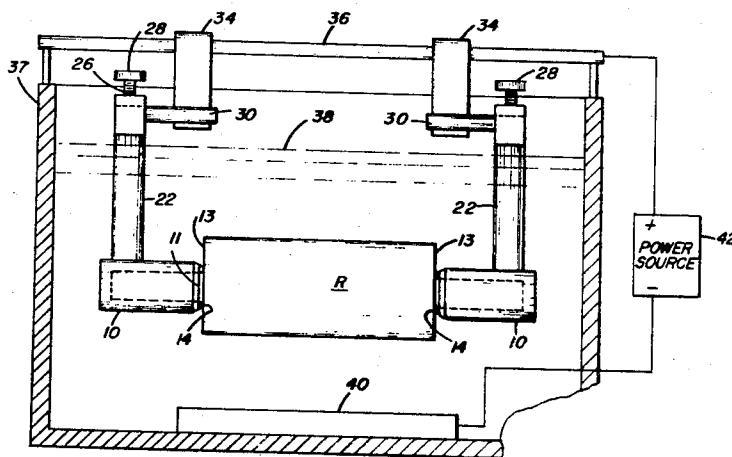
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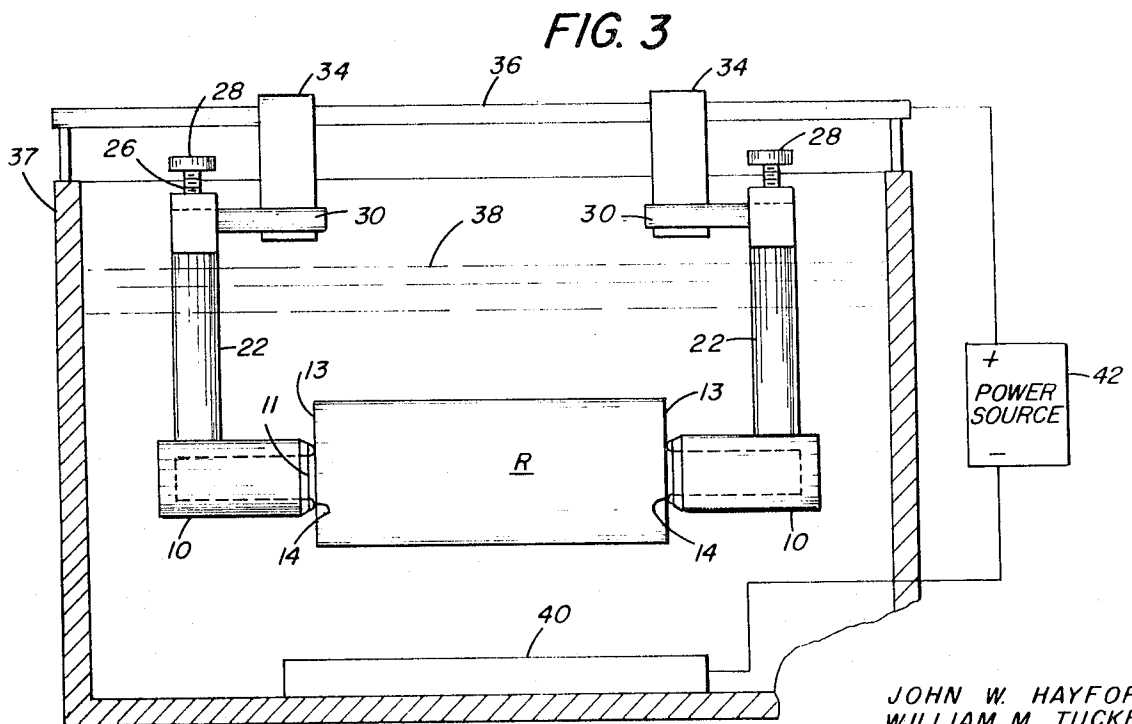
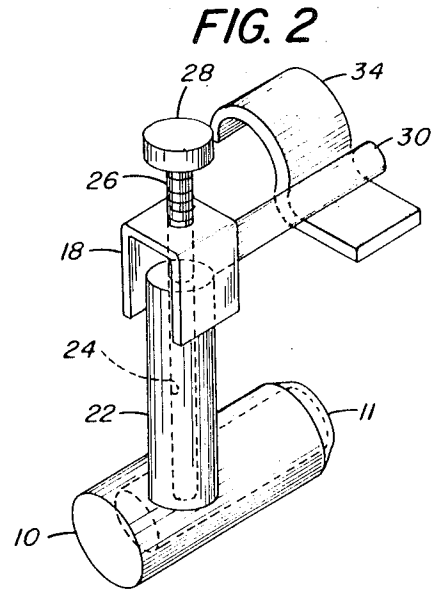
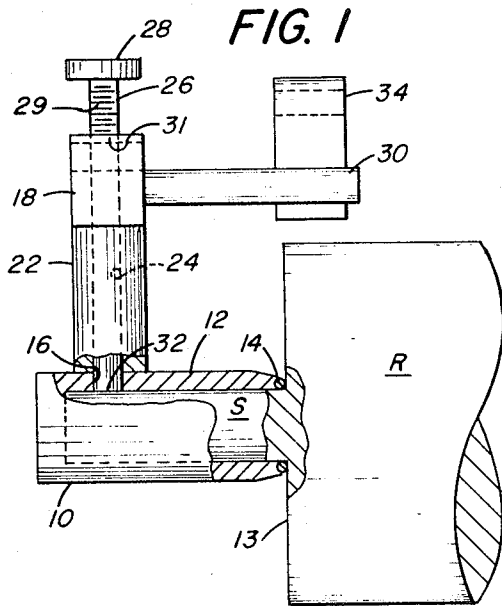
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[54] **APPARATUS FOR SUSPENDING A BODY IN A CORROSIVE SOLUTION**
 1 Claim, 3 Drawing Figs.

[52] U.S. Cl.....	204/297
[51] Int. Cl.....	C23b 5/70
[50] Field of Search.....	204/297, 212, 25

ABSTRACT: A fixture for suspending a body having shafts in a corrosive solution wherein the fixture protects the shafts from contact by the corrosive solution while providing a path for the flow of electricity to the body.





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APPARATUS FOR SUSPENDING A BODY IN A CORROSIVE SOLUTION

BACKGROUND OF THE INVENTION

The present invention relates to an anodizing and plating apparatus. More particularly this invention relates to a fixture which protects the shafts of a body from contact by the electrolyte utilized in such an apparatus and into which the body is submerged.

In the art of plating and anodizing rollers such as, for example, transparent rollers, coating rollers, printing and pressure rollers, one of the most difficult problems is to protect the metal roller shafts from contact by the electrolyte.

In anodizing a roller, the roller is the anode of the electrical circuit, and the anodizing bath (the electrolyte) tends to dissolve the shaft metal (typically steel or stainless steel) causing pitting or etching of the shaft surface and making the shafts less suitable for rotatably supporting the roller in the equipment in which it is ultimately to be used.

In a plating bath the roller is a cathode in the electrical circuit and the plating solution tends to plate out the metal onto the roller shaft causing metallic deposits on the shaft surface. Some corrosive plating baths will also pit and otherwise corrode the shaft surface. In either case the shaft is less suitable for rotatably supporting the roller.

Heretofore the prior art has dealt with this problem in a rather cumbersome manner. First of all, because the roller becomes a part of the electrical circuit, means are provided to connect the roller to the circuit by suitably attaching a metal strip or wire to the shaft. The strip or wire is then connected to the appropriate pole of the electrical source depending upon whether the roll is to anodic or cathodic.

A corrosive-resistant coating is then placed over the area of the shaft to be protected while allowing the wire or strip to pass therethrough. The coating is usually an organic corrosion-resistant paint. In some cases, layers of corrosion-resistant paint and a corrosion-resistant tape are built up over the area to be protected.

The technique is time consuming and, unless extreme care is taken in applying the coating, the technique does not always result in a completely leakproof cover. Furthermore, once the roll is plated or anodized, the coating is stripped off and discarded because it cannot be used again.

Thus there is a need for a reusable fixture which will protect the shafts of the body from contact by the electrolyte bath while providing the proper electrical contact, and which is easily and efficiently installed.

SUMMARY OF THE INVENTION

The fixture embodying the present invention protects the shafts of a body from contact by an electrolyte while providing an electrical path between the body and an electric circuit.

The fixture may be readily incorporated into an anodizing or plating apparatus and includes a cup member for encasing a shaft and a sealing means disposed on the outer periphery of the shaft between the cup rim and the roll body for preventing flow of the electrolyte onto the encased shaft. The fixture further includes means which extend through the wall of the cup for engaging the shaft to hold the cup rim in operative engagement with the sealing means and for completing an electrical path between the fixture and the roller. Further means are included for connecting the cup member to the suspending means.

In one embodiment of the present invention the holding and completing means includes a threaded hole in the cup wall and a bolt threadedly mounted in the hole and extending into engagement with the shaft.

In accordance with a further aspect of the preferred embodiment, the cup member, the holding and completing means and the connecting means are formed from an aluminum alloy and are covered with a corrosion-resistant coating.

In another aspect of the preferred embodiment of the fixture in which the concepts of the present invention are utilized, the holding and completing means includes a hole formed in the wall portion of the cup member and an elongated guide tube positioned in contact with the cup over the hole so that the base of the tube is in alignment with the hole. The tube has a thread portion in the base at the end opposite the end of the tube in contact with the cup member. An elongated screw rod is threadedly positioned in the tube base with one end in contact with the roller shaft. The screw rod and guide tube are of sufficient length so that when the roller is submerged in the electrolyte, the threaded end of the guide tube is above the surface of the electrolyte.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of the specification. For a better understanding of the invention, the operating advantages and the objectives obtained by its use, reference should be had to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention has been illustrated.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of the fixture of the present invention engaging a shaft.

FIG. 2 is a perspective view of the fixture.

FIG. 3 is a side view of an anodizing tank in which the fixture of FIGS. 1 and 2 has been incorporated.

DESCRIPTION OF THE PREFERRED EMBODIMENT

While the preferred embodiment of a fixture utilizing the present invention is described in terms of its use in an anodizing apparatus, it will be obvious to one skilled in the art that the present invention could be easily used in similar type equipment such as a plating apparatus.

Referring to FIGS. 1 and 2: The elements of the preferred embodiment of the present invention are a cup member 10, shaft seals 14, screw bracket 18, a guide tube 22, screw rod 26, a bracket rod 30, and a hook member 34.

The cup member 10 is a cylindrical sleeve having one end open and the opposite end capped off so that the sleeve can be slipped over the end of the shaft S as shown in FIG. 1. A guide tube 22 is radially disposed from the cup wall 12. A hole 16 is formed in the cup wall 12 and the bore 24 of the guide tube 22 is positioned in alignment over the hole 16 in the cup 10. The guide tube 22 is welded or otherwise suitably attached to the cup 10.

The screw rod 26 is an elongated rod which is positioned in the bore 24 of the guide tube 22 and has a knob 28 attached to one end. A portion of the rod adjacent the knob 28 is threaded 29.

The threads 29 in the screw rod 26 correspond to threads in the bore 31 of a screw bracket 18 which is attached to the end of the guide tube 22. By this arrangement, the screw rod 26 is held in place so that the contact end 32 of the rod firmly and securely contacts the shaft S.

A bracket rod 30 extends from the guide tube 22 and has a hook member 34 disposed from its free end as shown in the figures. The hook member 34 is used to support a roller R on a work rod 36 as shown in FIG. 3.

In actual practice the fixture of the present invention is used in pairs for supporting both ends of a roller as shown in FIG. 3. FIGS. 1 and 2 show the arrangement of the fixture for installing on one end of a roller. A mirror image of the fixture in FIGS. 1 and 2 is made for installation on the opposite end of the roller.

Referring again to FIG. 1: When the fixture according to the present invention is installed, one or more "O" rings 14 or similar type elastomeric seals such as a washer, which are chemically resistant to the electrolyte, are first placed on the shaft in contact with the side or shoulder 13 of the rollers R. The cup is then pushed over the shaft until the cup rim or lip 11 tightly engages the "O" ring 14 and the "O" ring is com-

pressed between the cup lip 11 and the shoulder 13. Thereupon the screw rod 26 is tightened to contact the shaft surface and to hold the cup in contact with the shaft.

The screw rod 26 serves a twofold purpose; the first is to hold the cup lip 11 in engagement with the "O" ring 14 to prevent fluid from leaking inside the cup when the roller is submerged in the fluid; the second is to press the cup 10 into good electrical contact with the shaft of the roller R. The inside diameter of the cup is dimensioned to have a close "slip" fit onto the shaft so that the cup is held in uniform contact with the shaft to make a good electrical connection. The cup 10 is also dimensioned sufficiently long enough so that it can be used to protect a variety of shaft lengths of a given shaft diameter.

FIG. 3 shows an arrangement of an anodizing tank 37 in which the preferred embodiment of the present invention is especially useful.

The tank 37 is fabricated from a typical corrosion-resistant material and is filled with a typical anodizing acid up to the indicated level 38. The cathode 40 is disposed near the bottom of the tank and is connected to an electrical power source 42 of typical design. At the top of the tank is mounted the work rod 36. The work rod 36 is positioned across the tank 37 and is properly insulated therefrom because the work rod is also connected to the power source 42 and is part of the electrical circuit.

As shown in FIG. 3 a roller R is suspended in the tank 37 from the work rod 36 by means of the fixture in which the present invention is embodied. The hook members 34 are in physical contact with the work rod 36 and the electrical current flows from the power source 42 through the work rod 36 through the fixture of the present invention and into the roller R.

The screw rod 26 is made from a metal (such as aluminum) which is softer than the steel roller shaft S so that when the rod is tightened, it will not scar or damage the shaft surface.

The entire fixture of the preferred embodiment of the present invention is fabricated from a suitable aluminum alloy which may be coated with a suitable corrosion-resistant coating such as a vinyl plastisol.

In the preferred embodiment, the guide tube 22 and screw rod 26 are made to a sufficient length so that the fixtures can suspend rollers of various diameters from the work rod while allowing the screw knob 28 of the screw rod 26 to remain above the electrolyte surface. However, it can be easily visualized that the guide tube and screw rod be properly sealed and fabricated so that the guide tube and knob could be submerged.

Furthermore, it can also be easily visualized that the method

of loading and suspending a roller having the present fixtures attached thereto depends upon the size and weight of the rollers. Small, light rollers can be loaded on the work rod by hand. If large heavier rollers are being anodized, the work rod may have to be eliminated and the present fixture will be used to suspend a roller from other types of support means such as overhead cranes, etc. Of course, suitable arrangements would have to be made to provide electrical power to the fixture and to insulate the support equipment from that electrical power.

The present fixture is readily adaptable to a modification of the use described above. In the modification, instead of compressing the "O" ring between the cup and the roller, a collar could first be slipped on the shaft and held in place by set-screws. The "O" ring would be slipped over the shaft, and the fixture would then be placed on the shaft to compress the "O" ring between the collar and the cup rim. With such a modification of the use of the fixture, the fixture can be used in longer shafts or shafts where it is desirable only to protect the end portion thereof.

In another modification of the present fixture the sealing means is positioned adjacent the cup rim between the cup and the shaft. In this modification the seal is mounted in a groove formed in the interior surface of the cup wall.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

We claim:

1. A fixture for suspending a body having at least one shaft in an electrolyte contained in a tank comprising, a cup member having a wall portion adapted to encase the shaft, sealing means associated with said cup member for preventing the flow of electrolyte onto said cup member, means defining a hole in said wall portion, an elongated guide tube having a first and a second end and a bore formed longitudinally therethrough, the first end of said tube positioned so that the bore is in alignment with said hole, said bore having a threaded portion at the end corresponding to the second end of said guide rod, an elongated screw rod having a contact end and a knob end, and positioned in said bore, said screw rod having a threaded portion adjacent the knob end for threading with the threaded portion of said bore to hold the contact end of said screw rod into engagement with a shaft in said cup member, said screw rod and guide rod being of sufficient length so that when a body is submerged in said electrolyte the second end of said guide bore and the knob end of the screw rod are above the surface of the electrolyte, and means for connecting said guide tube to said tank.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,616,447 Dated October 26, 1971

Inventor(s) John W. Hayford and William M. Tucker

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 39, cancel "rod", first occurrence, insert
--tube--.

Column 4, line 44, cancel "rod", second occurrence, insert
--tube--.

Signed and sealed this 13th day of June 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents