

[54] **BULGED SPHINCTERAL SEALS FOR
ELECTROPLATING RACKS**

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[51] Int. Cl. **C23g 5/70**
[58] Field of Search **204/297 R**

[56] **References Cited**

UNITED STATES PATENTS

3,042,605	7/1962	Belke	204/297 R
3,556,977	1/1971	Elbaum	204/297 R
3,366,567	6/1968	Elbaum	204/297 R
3,294,668	12/1966	Belke	204/297 R

OTHER PUBLICATIONS

Canning, Practical Handbook on Electroplating 11th Ed.
1932, p. 152-153
Plating, Mar. 1949 p. 217

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[57] **ABSTRACT**

A sealed electrically conductive connection for a hanger to an insulated spine of an electroplating rack. The rack is coated with a plastisol material which prior to curing in an electroplating bath is flexible and which hardens in use. The connection comprises a plastic connector which has a conical end portion which extends into an annular aperture in the plastisol material and stretches it to obtain a sphincteral embrace thereby and bulge the material to obtain a thick section which resists hardening throughout, and thus maintains its elasticity and seal. A counter-sunk portion in the spine mates with a metallic connecting stud to obtain a good contact and the connector has a bore to tightly admit a hook shank.

6 Claims, 6 Drawing Figures

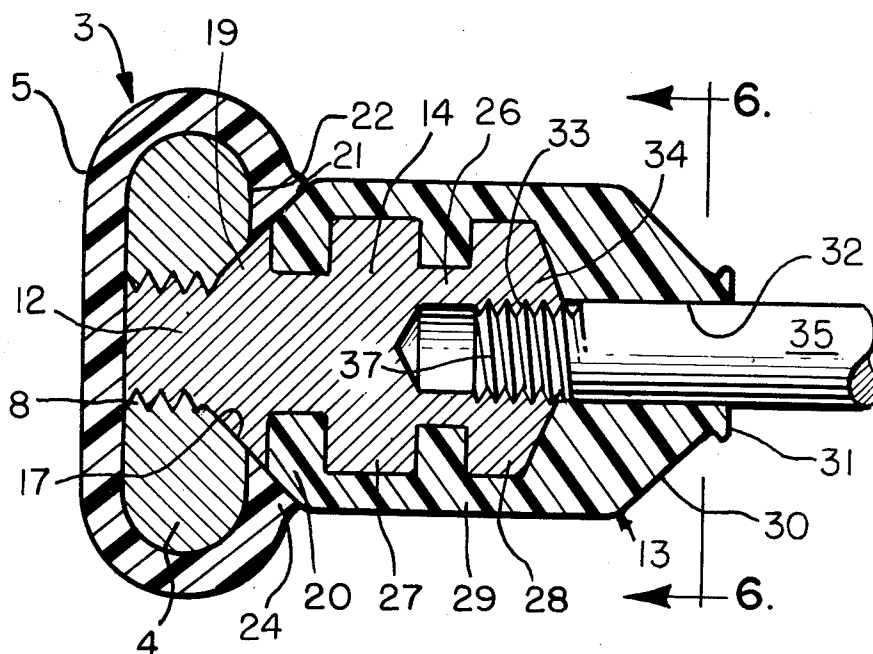


FIG. 1 FIG. 2

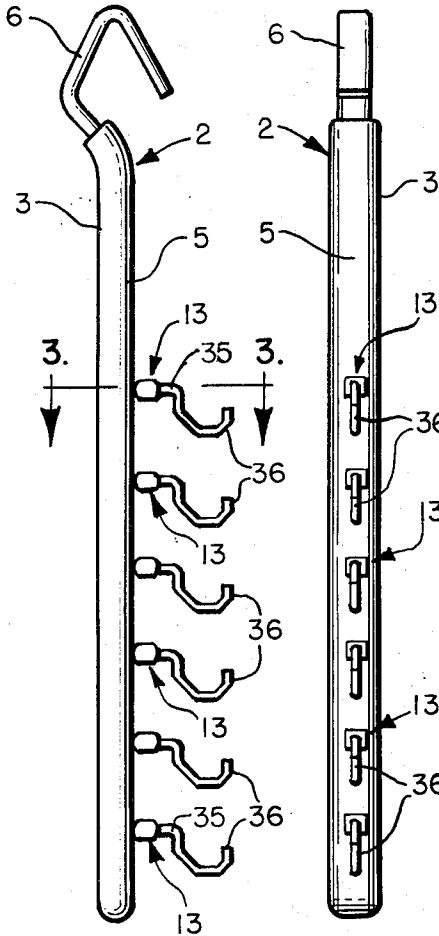


FIG. 3

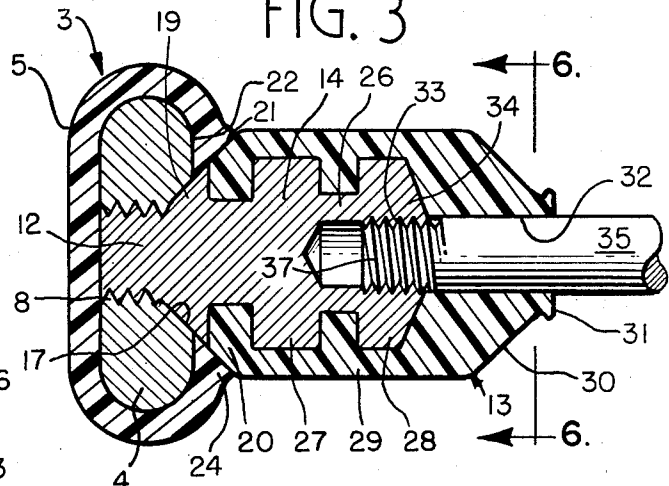


FIG. 4

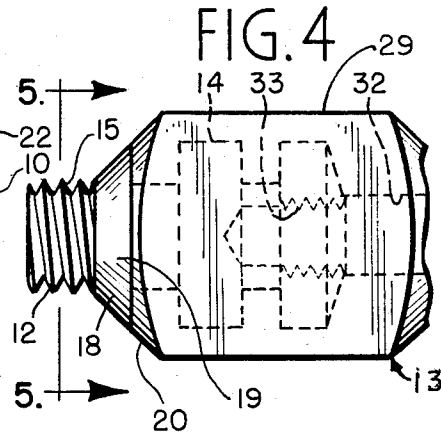
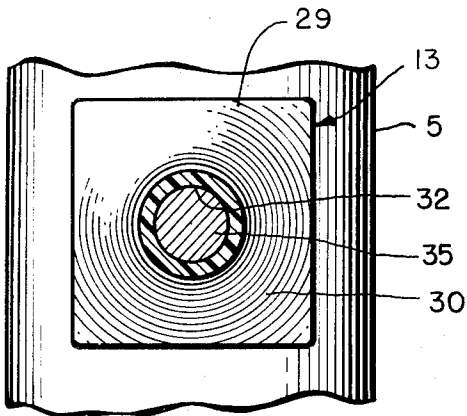


FIG. 6

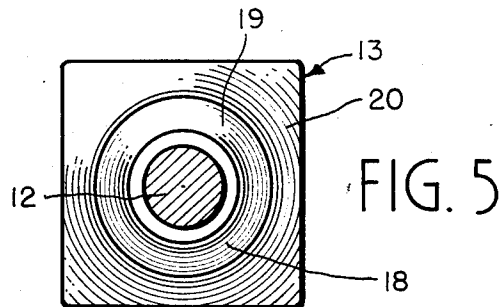


FIG. 5

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BULGED SPHINCTERAL SEALS FOR ELECTROPLATING RACKS

DISCUSSION OF THE PRIOR ART

In general, plating racks comprise an electrically conductive spine coated with a dielectric sheath and the spine is connected to tips or hooks on which the articles to be plated are hung.

The problems still plaguing the industry are extensive maintenance and leaking connections between the hooks and the spine. These connections as soon as a leak develops quickly erode and reduce the electrical conductance which is reflected in poor plating of the supported article.

It is common practice to remove such damaged connection or break off the tip and patch it over with the plastic coating and then to drill out a new spot, tap it and thread in a new tip or hook, with a new plastic seal sleeve or washer thereon which presses against the exterior of the adjacent portion of the plastic jacket covering the spine. A problem arises in attempting to obtain an adequate seal between the jacket which had been immersed into a plating bath and the new sealing sleeve or washer, since the jacket or sheath, after being subjected to the bath, becomes hard and is relatively inflexible to such an extent that it will not usually indent or flow to sealing conformance under the pressures or leads developed as a result of the stud connected to the new sleeve or washer being threaded into the new threaded opening in the spine. Connections which extend through the hanger compound the problems since then both sides must be sealed and attempts to draw up a seal at one side of the hanger by threading a nut which contacts the opposite side of the hanger must of necessity permit the stud some freedom of movement transversely of the spine within the sheath which prevents the stud from obtaining a good electrical connection with the spine.

SUMMARY OF THE INVENTION

This invention is directed to a novel self-sealing connection between a tip-mounting connector and the hanger spine which is durable and which has good current conducting characteristics.

A general object of the invention is to provide a novel connector which has a body made preferably of a high density polyethylene or similar dielectric material and which has a novel conformation obtaining a wedging effect with the plastic sheath covering the spine of the hanger, the wedge stretching a normally round opening in the sheath so that it obtains a sphincteral grip about the wedge tip.

The invention comprehends a novel connection wherein the connector comprises a conical wedging end portion extending into a round opening in the sheath so that the sheath mates in a tight fluid seal fit, and the cone extends substantially through the thickness of the sheath whereby as the sheath hardens from its exterior inwardly, the cone engages the inward pliable sections of the sheath.

More specifically, the invention comprehends a connector having a plastic body of a character which will resist deterioration in an electrolytic plating both while substantially retaining its characteristic elasticity, the body encasing a metallic, preferably brass or copper insert which has a threaded stud at one end projecting from a frusto-conical end of the body and having a frusto-conical base extension adjacent to said end of body, the stud threading into a threaded transverse aperture in the spine, the base mating into a complementary countersink and the body wedging into a circular aperture in the plastic sheath of the hanger and effective to distort the sheath portion about the aperture to thicken that portion of the sheath in order to maintain a tight fit therewith.

These and other objects and advantages inherent in and encompassed by the invention will become more readily apparent from the specifications and the drawings, wherein:

FIG. 1 is a side elevational view of an electroplating rack incorporating the novel hanger connectors;

FIG. 2 is an edge view of the structure shown in FIG. 1;

FIG. 3 is an enlarged cross-sectional view taken substantially on line 3—3 of FIG. 1;

FIG. 4 is an exploded view showing the connector and hanger bar preparatory to connection;

FIG. 5 is a cross-sectional view on line 5—5 of FIG. 4; and

FIG. 6 is a cross-sectional view on line 6—6 of FIG. 3.

DESCRIPTION OF THE INVENTION

Referring to the drawings, the plating rack generally designated 2 comprises a hanger 3 which has a metallic spine 4 and a sheath of plastisol material 5 incasing the spine which is electrically conductive, preferably made of a thick section bar of copper or the like.

The upper end of the bar or spine 4 is bare and has a hook portion 6 adapted to hook over a current conducting bar of copper at the upper end of a tank which contains the electrolytic material within which the hanger is immersed as well known to those skilled in the art.

The plastisol covering 5 on the spine may be of any of the materials described in my U.S. Pat. No. 3,001,926 issued Sept. 26, 1961, including Marlex, Lucite, or Teflon or other similar material which serves as a dielectric and which has good stability and resistance to destruction in the acid electrolytic baths and heat generated during plating. Such materials all become hardened after use and are relatively inflexible, although they are flexible and readily distortable when new.

As best seen in FIG. 4, the spine is drilled at selected intervals along its length and tapped to provide threaded apertures 8 which are countersunk at their forward ends as at 9 to provide a frusto-conical surface of between 45°–55°. The sheath has a cylindrical opening 10 (FIG. 4) of a diameter substantially equal to or slightly larger than the diameter of the adjacent tapped opening 8 to admit the stud 12 of the related connector 13 therethrough.

The stud 12 is part of a metallic insert 14 which is copper, brass or bronze, of good current conducting properties and strength.

The stud 12 is threaded at 15 and threads into the related aperture 8 and to obtain a good physical contact between the insert and the spine, each opening 8 has a countersunk frusto-conical portion 16 of between 45°–55° to provide an extensive surface 17 which engages a complementary frusto-conical surface 18 on the outer end portion 19 of the stud 12.

The inner end of the body is formed with a frusto-conical portion 20 which has a surface 21 which is an extension of the surface 17 on portion 16. It will be noted that the axial depth of portion 16 is less than the thickness of the frusto-cone 20 and projects slightly beyond the surface 22 of the spine and extends into the sheath which at the aperture 8 is distended and stretched by the wedging effect of the portions 16 and 20 attendant to the stud being threaded into the associated aperture 8. Since the opening 10 is of lesser diameter than the conical sections 16, 20 wedging thereinto, the plastisol material tightly sphincterally embraces the surfaces 18 and 21 and distorts or swells the material thereadjacent at 24, increasing its transverse depth. This feature has a salutary effect upon the seal inasmuch as the hardening of the material is at least in part a function of its thickness. Thus, in the area of connection, which is most vulnerable to seepage, parts of this section remain pliable longer than the surrounding areas and thus they do not lose their elasticity to such an extent as to shrink away from the connector, thereby maintaining an adequate seal.

The insert 14 has an inner end portion 26 with a pair of integral annular locking rings 27, 28 spaced axially of portion 26. The portion 26 and rings 27, 28 are molded within a body 29 of plastic material such as polyethylene or the like so as to be firmly anchored therein with a fluid-tight seal. The body preferably is of wrench engaging, preferably square, section and is formed at its outer end as a conical section 30 terminating in a bead-like ring 31 adjacent to the apex thereof whereat it is provided with an axial bore 32 which is coaxial with a threaded bore 33 in the adjacent end 34 of the insert 14.

The bore 32 is slightly smaller than the diameter of shank 35 of a hook 36. The shank is threaded at its distal end 37 and threads into bore 33 while the conical section 30 which gradually increases in diameter inwardly from its outer end, thus causes the sphincteral hold progressively to increase inwardly. The hook is made of suitable material to conduct current such as copper, brass, bronze, etc.

It will be understood that although one form of hook is shown, any other threaded member may be used, having an appropriate shank to enter bore 32 and thread into bore 33.

Having disclosed a preferred embodiment of the invention, it is not intended by way of limitation. I do not wish to be limited by the precise details of the construction set forth, and the breadth of this patent is to be determined as set forth in the appended claims.

I claim:

1. A rack comprising a hanger having a metallic spine and a sheath of flexible plastic material encasing the spine, characterized in that said sheath tends to harden in use reducing the flexibility thereof, said sheath and spine having at least one set of aligned connector — admitting apertures, article — mounting connector means having current — conducting connection means for connection with the spine through the apertures therein, and a contiguous plastic sealing element encasing said connection means and providing a wedging section apexed toward the sheath and adapted to enter into the aperture in the sheath and bulge the contiguous portions thereof attendant to tightening of the connecting means, and thereby increasing the transverse thickness of the portions of the sheath about the connections and developing a sphincteral embracement by the contiguous bulged portions of the sheath to perfect a seal therebetween, the increased cross-sectional area of the bulged portions tending to maintain the flexibility of that

portion of the sheath to maintain the sphincteral effect and wherein the aperture in the spine has a countersunk portion providing a frusto-conical wedging surface, and said connection means having a frusto-conical section in tight engagement with the wedging surface, and said countersunk portion being of greater diameter than said opening in said sheath and said sheath having a portion overhanging the opening of the frusto-conical wedging surface and said wedging section of the sealing element comprising a frusto-conical segment complementary to said frusto-conical section and formed as an extension thereof, and wedging apart said overhanging portion of the sheath.

2. The invention according to claim 1 and said sealing element being fusiform and having an apex remote from said connecting means with a passageway therethrough extending axially of said element and article-supporting means having a shank tightly fitting through said passageway and having a connection with said connecting means within said element.

3. The invention according to claim 2 and said element having a reinforcing bead about said apex.

4. The invention according to claim 1 and said segment and section merging into each other and said section being of greater depth than said countersunk portion, and said connection means comprising a stud projecting from the element and said stud and aperture in the spine having interthreading threads.

5. The invention according to claim 4 and a metallic anchor portion integral with the stud molded within said plastic element.

6. The invention according to claim 5 and said anchor portion and shank having interthreading threads.

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