Oct. 2, 1962 R. F. SPURCK 3,056,739

ELECTROPLATING RACK

Filed Nov. 13, 1959

FIG. 1

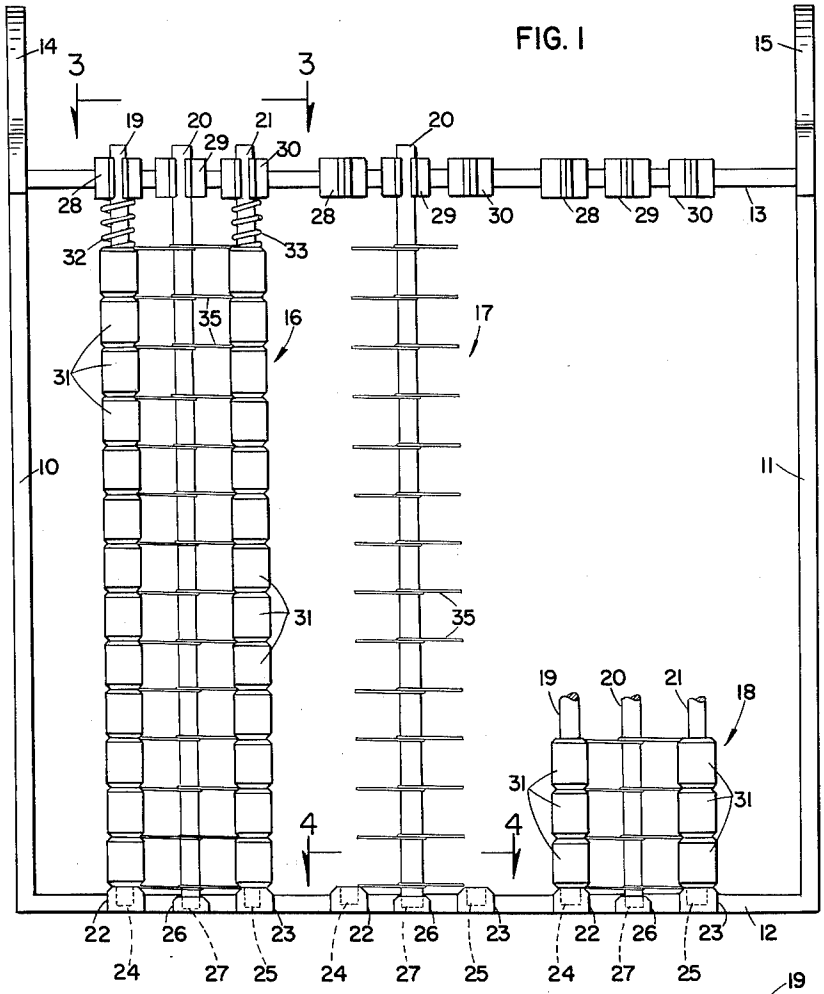
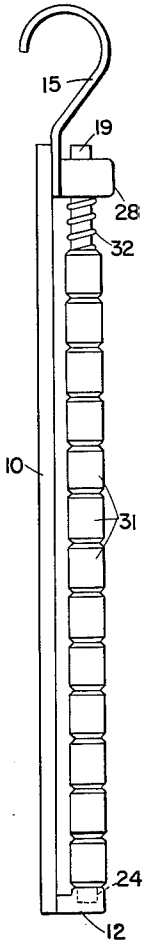


FIG. 2



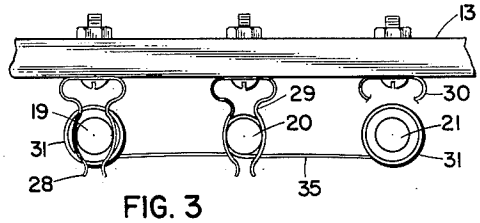


FIG. 3

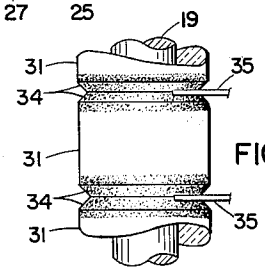


FIG. 5

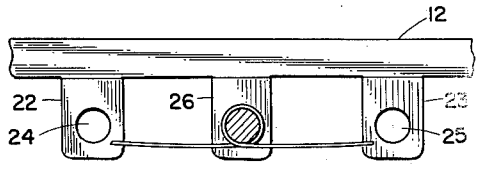


FIG. 4

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ELECTROPLATING RACK

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This invention relates to electroplating apparatus for use in simultaneously electroplating a multiplicity of relatively small articles, and has particular reference to a novel plating rack having means for supporting a relatively large number of small articles and means for providing electrical contact with restricted portions of each individual article whereby localized electroplating of such articles may be efficiently and economically accomplished.

The prior art discloses many various methods of electroplating small articles, some of which methods require separate electroplating operations for each article and others requiring the attachment of separate current-carrying wires to each of the individual articles being electroplated. Many of the more efficient electroplating devices are relatively complicated in structure and, hence, expensive.

It is, accordingly, a primary object of the present invention to provide a simple and inexpensive plating rack for efficiently supporting a large number of relatively small articles in proper positions for satisfactory electroplating.

Another object is to provide a plating rack which is so constructed as to enable only restricted areas of each article to be electroplated.

A further object is to provide a plating rack wherein articles to be electroplated may be easily and quickly mounted on or removed from the rack.

Still another object is the provision of a plating rack which permits interchangeability of the article-supporting members.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawing, wherein:

FIG. 1 is a front elevational view of a plating rack embodying the invention;

FIG. 2 is a side elevational view of the rack shown in FIG. 1;

FIG. 3 is an enlarged fragmentary top plan view taken in the area designated 3—3 in FIG. 1;

FIG. 4 is an enlarged horizontal sectional view taken substantially on line 4—4 of FIG. 1 looking in the direction of the arrows; and

FIG. 5 is an enlarged elevational view of a group of articles in position to be electroplated.

In the manufacture of electron tubes and other items which embody relatively small ceramic parts joined together or to metal parts by brazing processes, one of the major problems associated with the processing of high temperature metalized ceramic parts for brazing is the coating of the metalizing layer. This coating facilitates brazing by providing a surface that is easily wetted by the brazing alloy. Copper and nickel or combinations thereof are commonly used as coating materials for this purpose.

The present invention is concerned primarily with cylindrical ceramic parts which are each initially provided with a metalized band which is formed by applying a coating of metalizing material to a circumferential area of the article. Electroplating is the preferred method for applying a metal coating to the metalized bands, but this process is difficult, especially when the process must be applied to large quantities of the articles, and when the bands are narrow, making it difficult to provide electrical contact to the bands. In some cases, furthermore, shielding (polarization) of the bands occurs.

With a plating rack constructed as shown in FIGS. 1 and 2, electrical contact to the metalized bands on each of a large number of small articles is readily achieved, no shielding occurs, and the bands may be electroplated with a uniformly thick layer of metal over the entire surface. Furthermore, as many as 300 or more small ceramic parts may be electroplated simultaneously, the actual number of parts being dependent upon the size of the apparatus.

The rack is a substantially U-shaped frame comprising vertical side bars 10—11 connected at their lower ends by a bottom bar 12. Near their upper ends the side bars are connected by a top bar 13, and each side bar carries at its upper end a respective hook 14 and 15 which provide means for supporting the rack and also provide a current-carrying connection with the usual negative terminal bars of an electro-plating vat (not shown).

The rack is made to accommodate a selected number of supporting units, three such units 16, 17 and 18 being shown in FIG. 1. Each supporting unit comprises three spaced vertically extending rods 19, 20 and 21 which are removably attached at their opposite ends to the top and bottom bars 12 and 13. For this purpose the bottom bar 12 is provided with the required number of transversely extending supporting lugs, three lugs for each unit, the two outer lugs 22 and 23 of each unit having respective recesses or bores 24 and 25 therein for receiving the adjacent ends of the article-supporting rods 19 and 21, and the middle lug 26 being recessed, as shown at 27, to receive the lower end of the contact-carrying rod 20. The rods are loosely fitted into the respective recesses or bores 23—24—27 so that they may be easily lifted out when desired.

The upper ends of the rods 19—20—21 are each held in position on the top bar 13 by respective spring clamps 28—29—30 which are bolted or otherwise fixedly secured to bar 13. The spring clamps thus enable quick and easy removal of the rods when desired.

The articles to be supported on the presently described rack and subsequently electroplated are ringlike or tubular-shaped hollow ceramic cylinders 31 which are fitted upon the rods 19 and 21 in abutting aligned end-to-end relation, with the lowermost article on each rod resting upon lugs 22 and 23, or separated from the lugs by suitable spacers, if desired. Between the uppermost articles and the adjacent spring clamps 28 and 30 are springs 32—33 which maintain the articles in closely stacked abutting relation with one another.

Each article 31 has its ends beveled or rounded off as indicated by numeral 34 in FIG. 5, thus providing a circumferential grove between each pair of articles, and the beveled surfaces as well as the adjacent edges of the outer surfaces of the articles are provided with an initially applied metalized coating, preferably of molybdenum or other selected metal. It is these metalized surfaces which are electroplated in accordance with this invention.

The middle or contact-carrying rod 20 is provided at spaced intervals throughout its length with wire members or contacts 35 which are preferably each wound around and affixed, as by soldering, to the rod 20 and have their ends extending in opposite directions toward respective article-carrying rods 19 and 21.

The ends of the contacts are each adapted to enter one of the grooves formed by the beveled adjacent surfaces of abutting articles, as shown in FIGS. 1 and 3, and simultaneously contact the metal coatings on the adjacent beveled surfaces as shown in FIG. 5.

When groups of articles are thus mounted on the rack, the rack may be suspended within the electroplating bath by engaging the hooks 14—15 with the current-carrying bars which normally extend across and above the level of the electroplating solution in the tank. At the completion of the electroplating operation, the rack may be

removed from the bath. At this time the article-supporting rods 19 and 21 may be quickly removed and replaced by other preloaded rods. This enables efficient high-speed production methods to be achieved.

The parts of the rack which are exposed to the electroplating bath, and which are not in themselves electrical contacts, may be coated with an insulating enamel, plastic or other non-conductive material, if desired.

From the foregoing description it will be apparent that a simple, novel, and economical device has been provided in accordance with the objects of this invention for accomplishing fast and efficient electroplating simultaneously of a relatively large number of small articles in an economical manner. While the preferred embodiment of the invention is shown and described and pointed out in the annexed claims, it is to be understood that many changes may be made by those skilled in the art without departing from the spirit of the invention.

I claim:

1. A plating rack for use in simultaneously plating spaced metalized end portions on each nonmetallic object in a group thereof comprising a frame including conductive upper and lower cross bars, a pair of supporting rods mounted adjacent their opposed ends on said upper and lower cross bars for carrying a multiplicity of objects to be plated in aligned end-to-end relation with the metalized end portions of each object contiguous with metalized end portions of adjacent objects, a conductive contact-carrying rod mounted adjacent its opposed ends to said upper and lower cross bars and in electrical contact with at least one thereof, lugs on said lower cross bar each having means thereon for receiving a respective lower end of the supporting and contact-carrying rods, spring clamps fixedly mounted on the upper cross bar and having gripping portions yieldably engaging said rods for removably retaining the upper ends of the rods stationary, conductive contact members affixed to the contact-carrying rod at spaced intervals thereon and in electrical contact therewith, the ends of said contact members extending toward respective supporting rods for simultaneous engagement with the metalized end portions of two objects thereon.

2. A plating rack for use in simultaneously plating spaced metalized end portions on each nonmetallic object in a group thereof comprising a frame including conductive spaced upper and lower cross bars, lugs on said lower cross bar each having a recess in its surface facing the upper cross bar, spring clamps fixedly mounted on the upper cross bar opposite and in number equal to the number of lugs on the lower cross bar, said clamps having resilient gripping portions extending outwardly from the upper cross bar, a plurality of supporting rods arranged in pairs mounted adjacent their opposed ends on said upper and lower cross bars for carrying a multiplicity of objects to be plated in aligned end-to-end relation with the metalized end portions of each object contiguous with metalized end portions of adjacent objects, conductive contact-carrying rods secured adjacent their

opposed ends to said upper and lower cross bars, each contact-carrying rod extending between two of the supporting rods and forming a unit therewith and in electrical contact with the frame, the lower ends of said supporting rods and contact-carrying rods being located in recesses in respective lugs, and the upper ends thereof being removably retained in supported position upon the upper cross bar by the gripping portions of said spring clamps, and conductive contact members conductively affixed to the contact-carrying rods at spaced intervals thereon and comprising wirelike members having their end portions extending outwardly from the respective contact-carrying rod toward respective adjacent supporting rods for simultaneous engagement with the metalized end portions of two objects on the supporting rods.

3. A plating rack for use in simultaneously plating spaced metalized end portions on each nonmetallic object in a group thereof, comprising a frame including spaced conductive cross bars, and a unit comprising a pair of supporting rods mounted adjacent their opposed ends on said cross bars for carrying a multiplicity of objects to be plated in aligned end-to-end relation with metallized end portions of each object contiguous with metalized end portions of adjacent objects, a conductive contact-carrying rod mounted adjacent its opposed ends on said cross bars and in electrical contact with at least one thereof, means on one of said cross bars for freely receiving and supporting one end of the supporting and contact-carrying rods, retaining means fixedly mounted on the other cross bar having spring members yieldably engaging and removably retaining the other ends of the rods stationary, and conductive contact members affixed to the contact-carrying rod at spaced intervals thereon and in electrical contact therewith, the ends of said contact members extending toward respective supporting rods for simultaneous engagement each with the metalized end portions of two objects thereon.

4. A rack substantially as set forth in claim 3 wherein a plurality of said units are mounted in spaced relation on said frame.

5. A rack substantially as set forth in claim 3 wherein the contacts are spaced apart longitudinally of the conductive rod at intervals substantially equal to the lengths of the objects to be plated.

6. A rack substantially as set forth in claim 3 wherein said retaining means yieldably and removably support one end of the supports.

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