

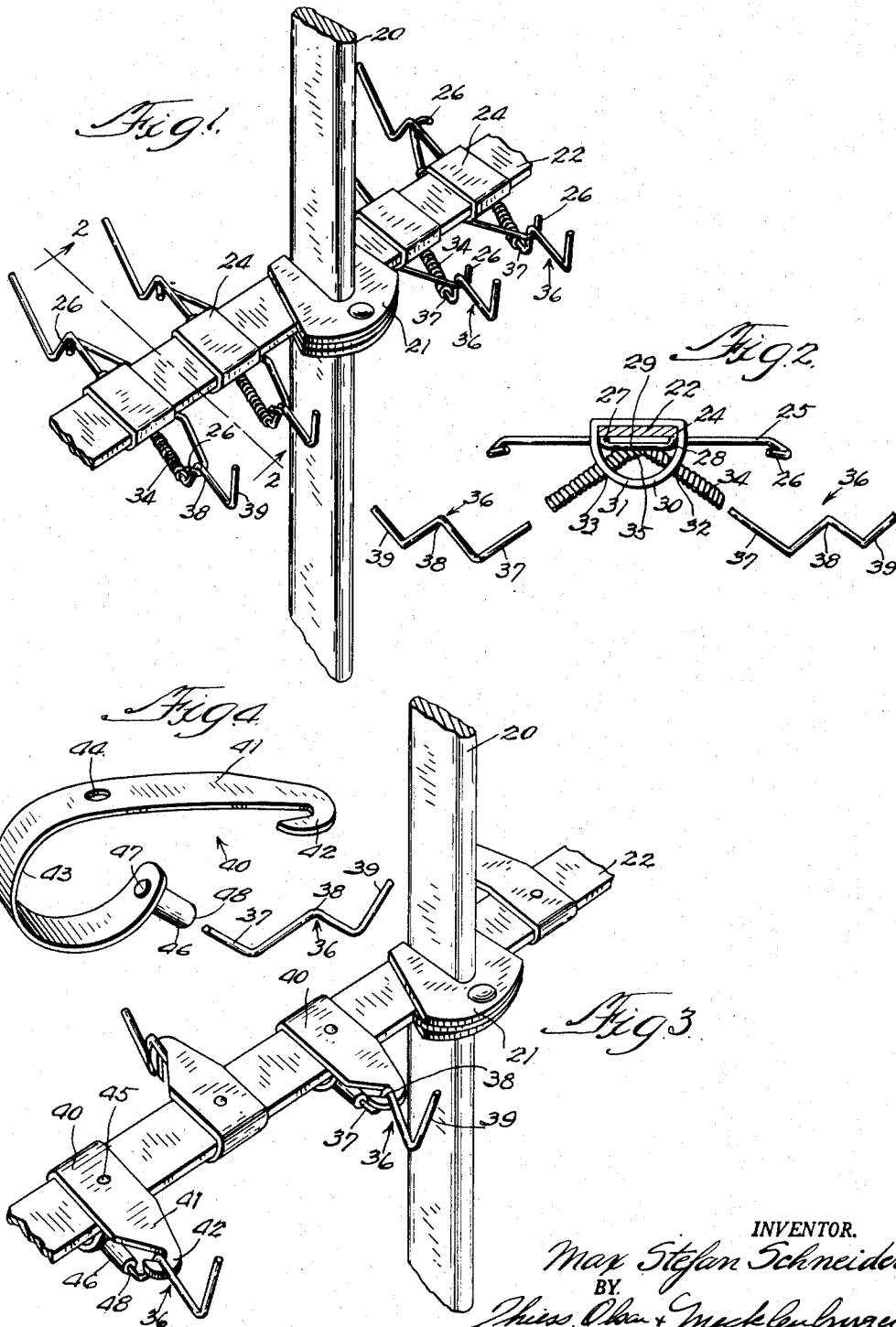
Sept. 15, 1953

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SUPPORTING MEANS USED IN CONNECTION
WITH ELECTROPLATING RACKS

2,652,359

Filed Feb. 1, 1951

2 Sheets-Sheet 1



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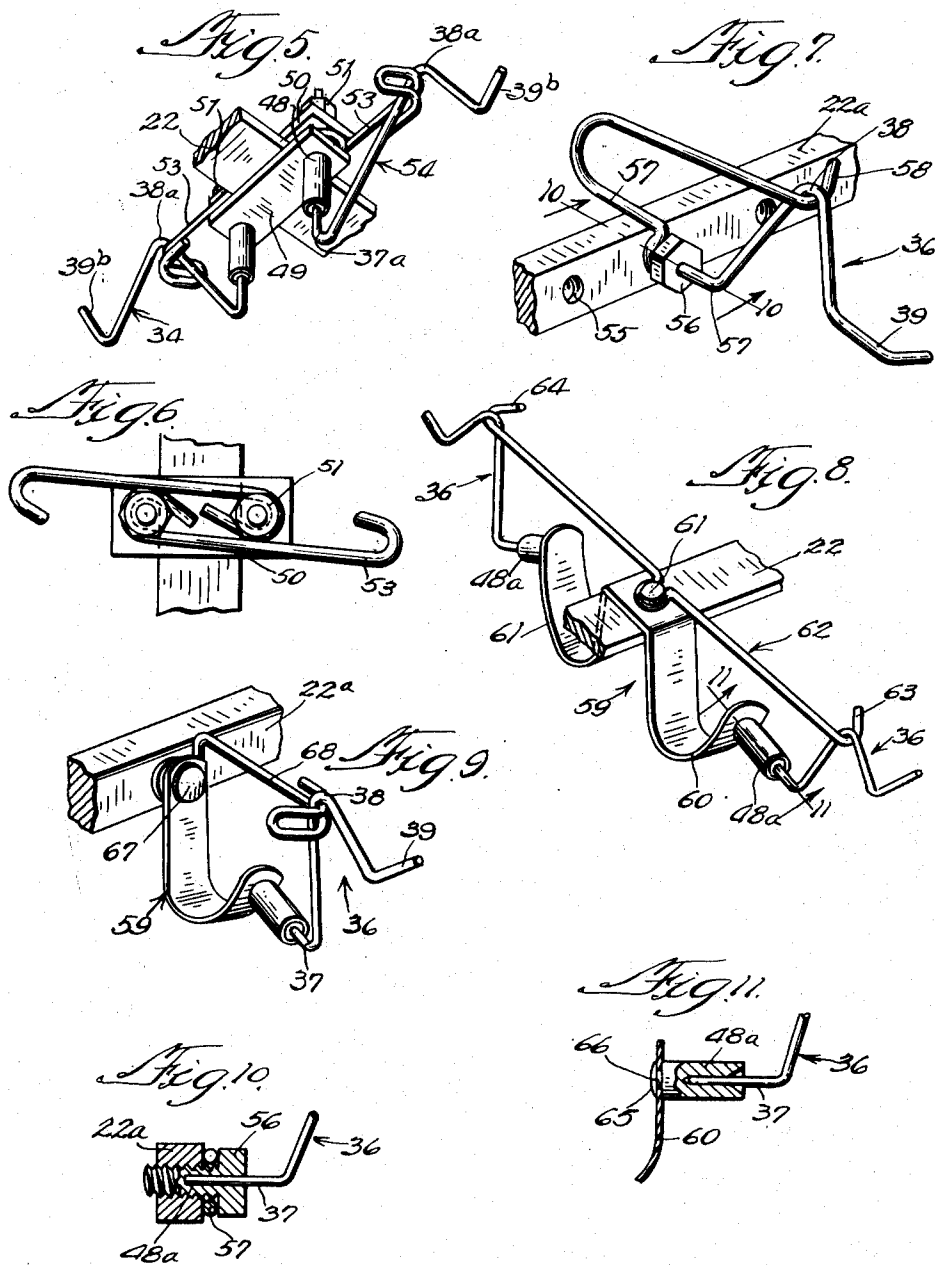
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UNITED STATES PATENT OFFICE

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SUPPORTING MEANS USED IN CONNECTION
WITH ELECTROPLATING RACKS

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5 Claims. (Cl. 204—297)

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The present invention relates to the art of electroplating, and more particularly to improvements in the supporting means used in connection with electroplating racks.

In the art of electroplating it has become customary to suspend articles which are to be electroplated in the electroplating solution by means of supports which also serve as the means for carrying electric current to the articles.

When the articles are to be plated with metal, the articles themselves, and hence their supports, are the cathode, while the current is supplied from a suitable anode, usually consisting of the metal which is to be deposited upon the articles which are to be plated. In the case of copper, therefore, one would use a solution containing suitable copper ions and use a copper anode, which would gradually dissolve while the copper would be plated out onto the articles which are suspended in the electrolyte. Similarly with other metals or alloys.

Many means have been used in the past for accomplishing the above purposes, but the present invention is more concerned with the particular parts of the supporting means which come into direct contact with the articles which are to be plated, and which therefore, at least for a portion of their extent, must be in direct and effective metallic contact with the articles which are to be plated. Usually the conducting parts which carry the current to the articles to be plated are themselves covered with a protective layer of some plastic material, such as rubber or, more recently, with plastic materials such as various forms of vinyl resins, polyethylene or similar non-conducting and noncorrodable substances, except at the places where conducting contact is essential.

The parts which are therefore thus exposed to the electrolyte are subjected to having metal deposited thereon and are also gradually embrittled during use, so that they frequently break off and hence require replacement.

In prior art devices in which the connections were made by means of screw threads and threaded parts it was found that the threads soon became corroded and useless.

Accordingly it is one of the objects of the present invention to provide supporting means on electroplating racks which are held in place by lateral pressure exerted upon certain parts thereof by reason of the resilience either of the supporting part or the part cooperating therewith, or both.

It is a further object of the present invention

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to provide individual supporting means to be applied to the arms of electroplating racks so constructed that they may be placed, removed and replaced, or placed back into position without the necessity of any tools whatsoever; being kept in place either by their own resilience or the resilience of a cooperating part, this resilience also being relied upon to assure good electrical contact between the conducting means which are secured to the conducting arms.

Further objects of the present invention will become apparent from the further description hereinbelow when considered in connection with the two sheets of drawings filed concurrently herewith.

In these drawings the invention is disclosed in a number of forms all of which, however, have one thing in common, namely, the fact that the individual supporting members are held in position by either their resilience or that of the part with which they cooperate, or both.

Fig. 1 is a perspective view of one form of carrying out the present invention, while

Fig. 2, on a somewhat enlarged scale, is a cross sectional view taken along the line 2—2 of Fig. 1, the parts being shown partly in exploded or disconnected position;

Fig. 3 is a view similar to Fig. 1 of a modified form of connecting means;

Fig. 4 is a detailed view, on a somewhat enlarged scale and also in perspective, of some of the means shown connected to the same parts as in Fig. 3;

Fig. 5 is a perspective view of still another modification of the present invention;

Fig. 6 is a bottom plan view of a portion of the device shown in Fig. 5;

Fig. 7 is a perspective view of still a further modification of the manner of carrying out the present invention;

Fig. 8 is a perspective view of a twin part also constructed in accordance with the present invention;

Fig. 9 is a perspective view of a further modification, being somewhat similar in operation to the device shown in Fig. 8;

Fig. 10 is a cross sectional view along the line 10—10 of Fig. 7, and

Fig. 11 is a cross sectional view along the line 11—11 of Fig. 8.

Referring now to the particular modification shown in Fig. 1, it will be seen that this includes a vertically extending heavy bus bar 20, usually made of copper or brass or similar good electrically conducting material.

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Secured to the bus bar 20 by means of the clamping device broadly referred to by the reference numeral 21, and which itself is described in greater detail and claimed in applicant's co-pending application Serial No. 97,934 filed June 8, 1949, now Patent No. 2,562,683, is a transverse horizontally extending secondary bus bar 22 to which are secured a plurality (for example four) of clamping members 24 which are in the form of flat straps bent around the secondary bar 22. Also clamped between the bar 22 and the flat straps 24 are laterally extending resilient electrically conducting wire hooks 25 having reversely bent ends 26. The wires 25 are also bent at the points 27 and 28 so as to form an inwardly extending part 29 which lies between the bar 22 and the inwardly bent and substantially touching parts 30 and 31 of the straps 24.

Extending through holes 32 and 33 in the straps 22 is a tightly wound metallic spring member 34 which presses with its inwardly bent middle part 35 against the part 29 of the wire hooks 25, whereby the spring members 34 are tightly held in place but are so shaped as to extend diagonally outwardly as can best be seen in Fig. 2. The parts thus described are in effect therefore clamped against the secondary bus bar 22 so as to make good electrical connection therewith.

It will be understood, although not shown on the drawings, that the parts thus far shown may be covered with a plastic nonconducting material, leaving open only the inside of the springs 34 and likewise leaving uncovered the outwardly extending portions of the hooks 25 or at least the inwardly bent terminal portions 26 thereof. The actual members used for supporting the articles to be plated consist of resilient wire supports 36 having one leg 37 which is intended for insertion into the interior of the tightly wound spring member 34, then being hooked with its knee portion 38 over the reversely bent terminal portion 26 of the wire hooks 25 thereby placing the spring 34 under lateral tension, as a result of which the inside of the knee portion 38 will press against the inward portion of the inwardly bent terminal part of the wire hooks 25. The parts are shown so connected on Fig. 1.

Suitable articles which it may be desired to plate are then supported from the outwardly extending parts 39 of the article-supports, hanging either loosely therefrom or pressing against the inside of the article when for example the article is large enough to span two adjacent extensions 39, in which case these may be pressed toward each other and then allowed to resume their position thereby clamping themselves against the inside of the article which is to be plated, if for example it will be a cup-like or similar article (not shown in the drawings). By virtue of the fact that the springs 38 are resilient, that is to say will bend in a lateral direction, and the further fact that the wire hooks 25 are also resilient, there will thus be a double pressure effect holding the parts in place.

It will be apparent that if the article-supports 36 become corroded, embrittled, or break off in some other manner, they can be readily replaced by merely unhooking the part or knee 38 over the hooks 26 whereafter the shank 37 is pulled out of the inside of the spring 34 and a new article-support 36 put into place in the manner already described. It will of course be understood that the support 36 could also be made of a resilient material, for instance copper wire or bronze or brass wire so that it also will have a

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certain degree of resilience so that the connection will not be entirely dependent upon the resilience of the spring 34.

In the modification illustrated in Figs. 3 and 4 there is present the same central main vertical bus bar 20 and the same horizontally extending secondary bus bar 22 connected by a member 21 precisely as illustrated and described in connection with Fig. 1. The main connecting members, however, in this case, consist of flat spring-like metallic members broadly designated by the reference numeral 40 comprising a substantially horizontally extending portion 41 which terminates in a hook 42. There is also the reversely bent bight 43 which subtends the horizontal secondary bus bar 22, the upper flat part 41 being secured to the bus bar through the hole 44 by means of the rivet 45 (as shown in Fig. 3).

Secured to the other end of the part 40 is a sleeve 46 which is suitably riveted, at 47, to the end of the member 40. The sleeve 46 has an opening 48 in it into which there may extend the shank 37 of a support which is identical to all intents and purposes with the support 36 already shown and described in connection with Figs. 1 and 2. This part, being also resilient, is attached to the device as illustrated by having the part or shank 37 thereof pushed into the hole 48 whereafter the knee 38 is bent over the hook 42 and allowed to rest thereon under the resilient pressure of the part 36. It will of course be understood that the part 40 also has a certain modicum of elasticity so that here, just as in the parts illustrated in Figs. 1 and 2, the support 36 is resiliently kept in place. Its manner of removal is, of course, the reverse of its manner of placing into position; in this case being unhooked from the hook 42 and pulled out of the hole 48 in the part 46. In this particular modification the resilience of the support 36 is the main reliance, coupled however also with the resilience in the part 43. Here again, just as in the case of the previous figures, all the parts except the hooks 42 and the entire supporting member 36 are covered with a suitable nonconducting, noncorrodible plastic material so that the only parts which will contact the electrolyte, and hence will be subject to possible embrittlement, will be the rather thin and tender supports 36, which, being made of bronze, copper, or other metallic wire, are expendable and inexpensive.

It will be obvious that the present invention lends itself to a number of modifications a few of which are illustrated in Figs. 5 through 11, in order to demonstrate the versatility and generic nature of the present invention. For example, in Fig. 5 there is shown a fragmentary portion of the horizontally extending secondary bus bar 22 to which there is secured a bridging and contacting member 49 and a corresponding, opposed, similar member 50, the two being connected to each other by means of nuts 51 and 52, which also serve to affix sleeves 48, which are like those shown in connection with the other figures. Held against the part 50 by the nuts 51 are hooks 53, which are thereby put into electrical connection with the part 50 and hence also the bus bar 22. Expendable resilient connecting supporting members 54, which are not covered by a non-conducting material, extend with their ends 37a into the sleeves 48, the knee-portions 38a being hooked over the ends of the hooks 53, as shown in Fig. 5. The parts to be electroplated are engaged by the ends 39b, as in case of the other modifications already described.

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A further modification is shown in Figs. 7 and 10, in which a cross-bar 22a is used as a main support, being provided with threaded holes 55 through which extend hollow externally threaded sleeves 48a having heads 56 thereon. These sleeves serve to affix spring-members 57 which terminate in hooks 58. Supports 36, of the same type as already described, extend with their ends 37 into the opening in the sleeve 48a, the knee portion 38 being hooked over the hook 58, and the articles to be plated being suspended from or contacted by, the ends 39.

In the form shown in Figs. 8 and 11, there is the usual horizontal bar 22, but there is a connector 59 which has oppositely extending curved resilient arms 60 and 61, the connector being affixed to the bar 22 by the rivet 61, which also serves to attach the hook member 62 which latter terminates in hooks 63 and 64. The connectors carry sleeves 48a and therewith cooperating supports 36, identical with similarly numbered parts described in connection with the other modifications. These sleeves 48a (see Fig. 11) have a rivet-like head 65 which is used to secure the sleeve, through hole 66, to the arms 60. Ends 37 of the supports 36 extend into the opening of the sleeve 48a.

Still another modification is shown in Fig. 9, in which a bar 22a is used, in the same manner as in the construction shown in Fig. 8, except that the connectors 59 are riveted onto the arm 22a by rivet 67 which also serves to affix spring hook 68 as shown. The same kind of support 36 is used as shown in the other figures.

It will thus be seen that I have provided simple but highly effective means for securing good electrical connection between the bus bars and the supporting members used to support the articles which are to be plated, while securing rapid and simple exchangeability of said supporting members.

The substitution of rivets for screws or bolts, etc., will be obvious, and I desire to have my claims construed so as to include either type of fastening means. While the various metallic electrically conducting parts may be advantageously made of copper, brass or bronze, the use of other metals or electrically conducting materials is to be considered as an equivalent.

I claim:

1. In an electroplating rack the improvement which comprises an electrically conducting bus-bar, an electrically conducting sleeve and a hook both in electrical contact therewith, and a free-

ly removable resilient wire article support extending with one free end into said sleeve and resiliently pressing against said hook, its other free end being bent to engage an article which is to be plated.

2. The improvement defined in claim 1 in which the sleeve is in the form of a helically wound wire.

3. In the electroplating rack the improvement which comprises supporting means for attaching an article to be subjected to electrolytic treatment to an electrically conducting bus-bar which comprises an electrically conducting hollow sleeve secured to said bar, a hook secured to said bus-bar, and a freely removable resilient electrically conducting article support which extends with one end into said sleeve and resiliently engages said hook at a point intermediate said end and its free end.

4. In an electroplating rack the improvement which comprises supporting means for attaching an article to be subjected to electrolytic treatment to an electrically conducting bus-bar which comprises a tightly wound helical spring secured to said bus-bar in a manner to leave one end of said spring extending outwardly therefrom, a hook secured to said bus-bar, and a resilient electrically conducting article support extending with one end into said spring and resiliently pressing with an intermediate portion against said hook.

5. In an electroplating rack the improvement which comprises supporting means for attaching articles to be subjected to electrolytic treatment to an electrically conducting bus-bar which comprises an electrically conducting hollow sleeve secured in good electrical contact with said bus-bar, a hook secured to said bus-bar, and an electrically conducting resilient article support extending with one of its ends into said sleeve and resiliently pressing with an intermediate portion against said hook, leaving the other end of said support free for attachment of the parts which are to be subjected to said treatment.

MAX STEFAN SCHNEIDER.

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