Nov. 17, 1970 R. E. BELKE 3,540,992

COMBINED MASKING AND ELECTROPLATING TIPS

Filed Feb. 16, 1967 2 Sheets-Sheet 1

Fig. 1.

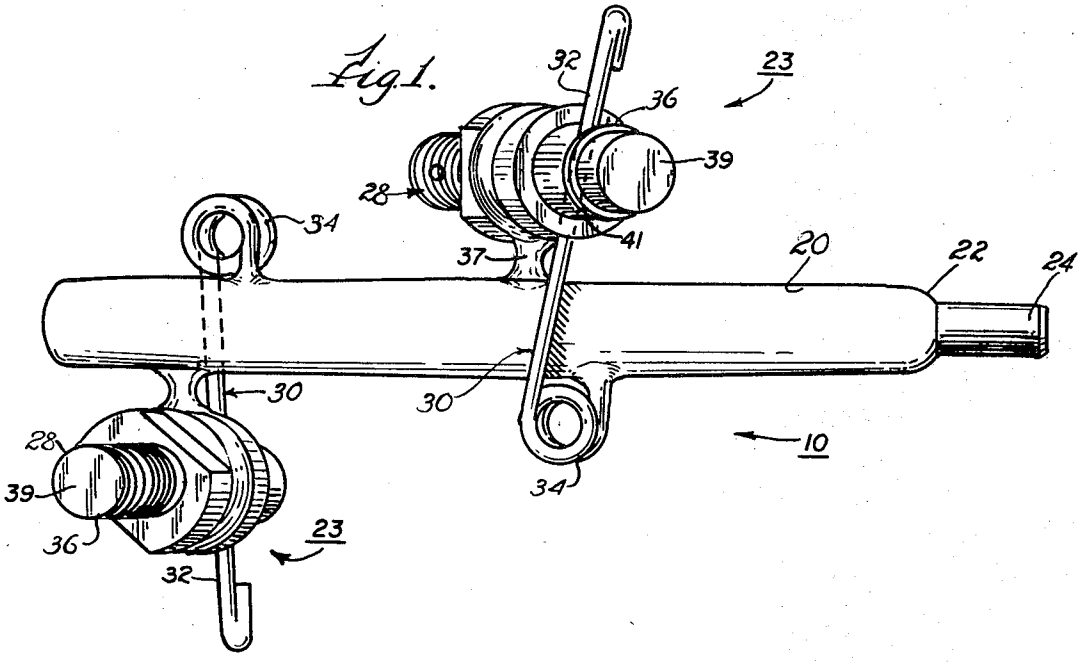


Fig. 2.

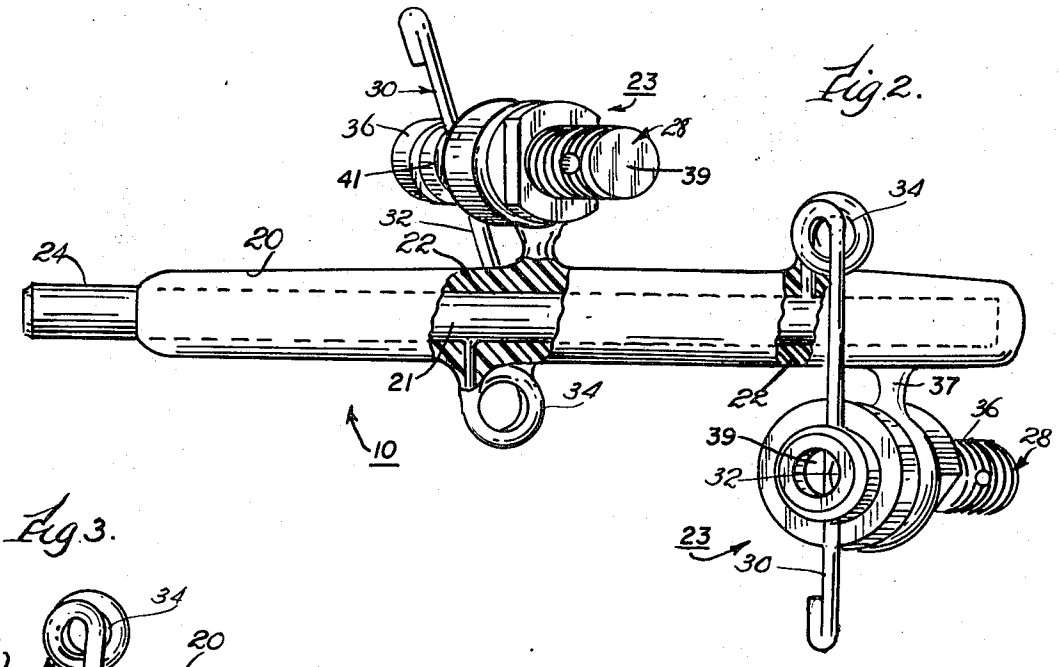


Fig. 3.

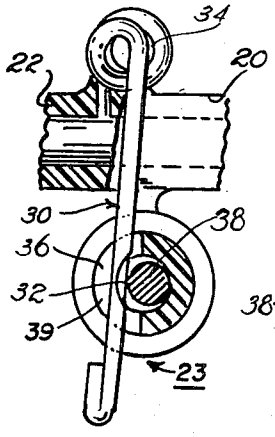
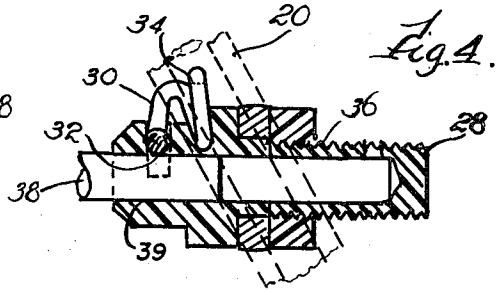


Fig. 4.



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COMBINED MASKING AND ELECTROPLATING TIPS

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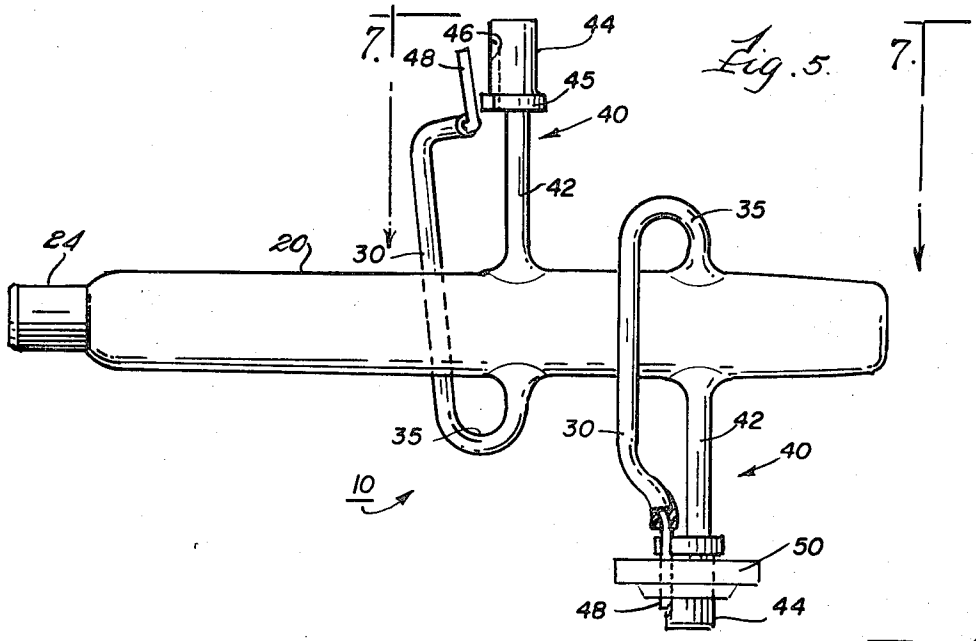


Fig. 5.

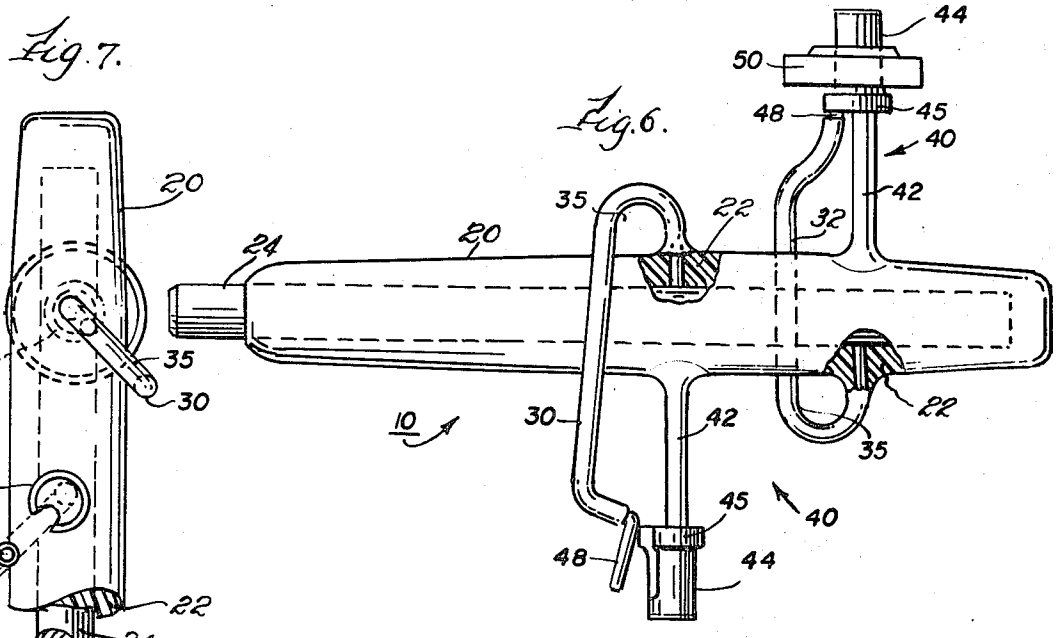


Fig. 6.

Fig. 7.

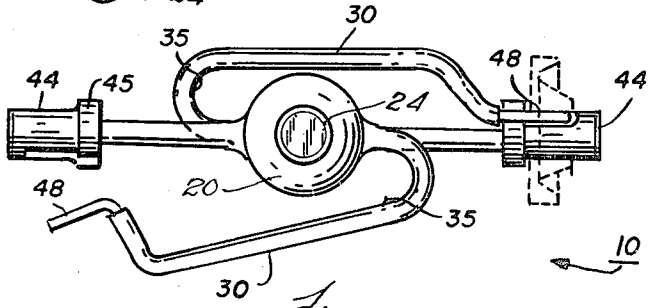


Fig. 8.

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COMBINED MASKING AND ELECTRO-PLATING TIPS

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Int. Cl. C23b 5/70
U.S. Cl. 204—297 9 Claims

ABSTRACT OF THE DISCLOSURE

An electroplating assembly for carrying a plurality of electroplating tips mounted on a supporting body having an elongated electrical conductor member covered with insulating material except for an exposed end, which is secured to a bus bar of an electroplating rack. Each electroplating tip consists of a support member and a spring member. The support member of electrical insulating material extending transversely from the supporting body having an outer end portion with an article supporting surface formed to loosely hold an article to be plated. The spring member of electrical conducting material extending transversely from the supporting body with its fixed end connected to the electrical conductor member and covered with insulating material except for an exposed portion along its free end, which under spring tension cooperates with the article supporting surface to lockingly engage an article to be plated.

BACKGROUND OF THE INVENTION

In plating articles in large quantities it is important that the electroplating rack and more particularly, the electroplating tips on the racks be designed to permit quick insertion and removal of the article to be plated. Most prior art devices use electroplating tips having two or more spring members which must be either squeezed together or spread apart to support the article thereon. After a short period of use, these spring members become bent with respect to each other, which makes the mounting of an article more difficult and time consuming and requiring frequent replacement of these parts. My invention avoids this problem by using a tip having one stationary member and one spring member, requiring the manipulation of only one member in mounting an article to be plated. This arrangement permits the articles to be handled automatically by a machine, which was not heretofore possible.

In the plating of some articles it is often desirable to mask certain portions. One embodiment of this invention provides an electroplating tip which shields one end of an elongated article to be plated.

The present invention relates to combined masking and electroplating tips, and is particularly concerned with spring tips and masking tips of the type adapted to be unlocked and/or unloaded automatically.

One of the objects of the invention is the provision of improved masking and electroplating tips, of a plurality of types, each comprising an electrically conducting supporting body, entirely covered with insulating plastic, except for certain exposed areas, for the purpose of effecting an electrical connection, and for reducing, as far as possible, the build-up on said exposed areas.

Another object is the provision of improved tips, of the class described, which are adapted to be loaded and/or unloaded, automatically, and which are peculiarly adapted for plating knobs and cylindrical items, and establishing a perfect control, and for holding devices and establishing contact with them.

Another object is the provision of improved combined masking and electroplating tips, which are simple in construction, adapted to be manufactured at a low cost, more efficient than the prior art devices, and adapted to be used to accomplish the results desired with a minimum amount of labor and expense.

Other objects and advantages of the invention, will be apparent from the following description, and the accompanying drawings, in which similar characters of reference, indicate similar parts throughout the several views.

Referring to the two sheets of drawings, accompanying the specification;

FIG. 1 is a top plan view of one embodiment of the invention;

FIG. 2 is a similar view of the opposite side, partially broken away to show electrical connections;

FIG. 3 is a fragmentary view, in partial section, showing one of the tips; and

FIG. 4 is a fragmentary sectional view taken through one of the bodies and tips;

FIG. 5 is a top plan view of a modification;

FIG. 6 is a similar view of the opposite side, in partial section;

FIG. 7 is a fragmentary view, taken on the plane of the line 7—7, looking in the direction of the arrows; and

FIG. 8 is an end view, taken from the left end of FIG. 5.

Referring to FIG. 1, there is shown one embodiment of an electroplating tip assembly of this invention, generally designated by the reference numeral **10**, having a supporting body, **20**, consisting of an electrical conductor member **21** of suitable electrically conducting material, such as brass, aluminum, bronze, or other suitable metal, which is almost entirely covered with a layer **22**, of electrical insulating material such as plastic, except for certain exposed areas, such as the bare end **24**. The end **24** is adapted to support the tip assembly **10** on a conducting member, or bus bar of an electroplating rack.

The body **20**, is shown as substantially cylindrical, and tapered from its blunt end to the bare end **24**, but the shape of this and other parts may be varied, such as square, hexagonal, octagonal, etc.

The body **20**, supports one or more springs **30**, having one end fixedly secured to the body **20**, and having a plurality of spring coils **34**, and a stem **32**, with a backwardly turned end. Springs **30**, are covered with an electrical insulating material, such as plastic, except for an exposed portion which seats in an opening formed in a plastic plug **36**, for receiving the shaft **38**, of a part to be plated carried by a knob **28**, of conducting material, for establishing contact, between the shaft **28**, and stem **32**. To provide a means of supporting an article to be plated, a stationary member **23** is provided which consists of an outer end portion **36** and a stem portion **37** formed integrally with layer **22** (see FIG. 2). The outer end portion **36** includes a cylindrical shaped plug **28**,

having an open-end circular bore **39** formed along its axis.

The type of articles to be used with the FIG. 1–4 embodiment includes such items as a push button or knob having a shaft or stem portion **38** (only partially shown), which can be loosely inserted into bore **39** of plug **28**. Since stem portion **38** is enclosed by the plug **28** it will be masked and consequently will not be plated when the article is dipped into the plating solution.

As shown in FIGS. 3 and 4, to lock the stem portion **38** in the bore **39**, the exposed portion of stem **32** is snapped into a groove **41** formed in plug **36** under spring tension. Since the spring **30** is electrically connected to conductor **21**, the exposed portion serves to provide an electrical connection that completes the electrical circuit between the article and the conductor **21**.

Referring to FIGS. 5, to 8, there is shown a second embodiment of an electroplating tip assembly **10**, which has a similar supporting body **20**, with an electrical conductor member **21** having an insulating covering **22**, to cover all portions except a bare end **24**. The body **20**, supports a plurality of springs **30**, having a resilient portion **35**. Each spring **30** is covered with an electrical insulating material, except for a bare end portion **48**.

To provide a means of supporting an article to be plated, stationary member **40** is provided which consist of a stem portion **42** and a cap **44**. The outer surface of the stem portion **42** and the cap **44** are made of an electrical insulating material. The cap **44** has a cylindrical cross-section with an annular shoulder **45** on its lower end and a longitudinal groove or recess **46** formed in its side wall to receive the exposed end **48** of spring **30**.

The type of articles intended to be used with the second embodiment shown in FIGS. 5–8, would have a central opening with a slightly larger cross sectional area than the cross sectional area of cap **46**.

In FIG. 6, a disc element **48** is illustrated as the article to be plated having a circular opening in its center section which fits loosely over cap **44**. Before and during placement of the article **48** onto the cap **44**, the exposed end **48** is held in groove **46** under spring tension. Upon release of this force, the exposed end **48** springs outwardly against the article **50** to provide a locking force which holds the article in place. Additionally, the exposed end **37** provides an electrical connection between the article **48** and the electrical conductor **21**.

It will thus be observed that I have invented a plurality of forms of my combined masking and electroplating tips, each of which has an electrically conducting supporting body, entirely covered with insulating plastic, except for certain exposed areas for the purpose of effecting an electrical connection, and for reducing, as far as possible, the build-up on said exposed areas.

The present devices are adapted to be loaded and/or unloaded, automatically, and which are peculiarly adapted for plating knobs and cylindrical items, and establishing contact with them.

My combined masking and electroplating tips, are simple in construction, adapted to be manufactured at a low cost, more efficient than the prior art devices, and adapted to be used to accomplish the results desired with a minimum, amount of labor and expense.

I claim:

1. An electroplating assembly adapted to be connected to a bus bar of an electroplating rack comprising a supporting body having an electrical conductor member covered with a layer of electrical insulating material over its entire surface except for an exposed portion which is adapted to be secured to the bus bar of the electroplating rack, a stationary member of electrical insulating material having a stem portion extending from said supporting body and having an outer end portion, said outer end portion including a groove and an article supporting surface to loosely hold an article to be plated, and a

spring member having a fixed end secured to said electrical conductor member and a free end disposed towards said outer end portion of said stationary member, said spring member covered with an electrical insulating material except for an exposed portion which is adapted to fit under spring tension in said groove formed in said outer end portion of said stationary member for communicating with said article supporting surface, whereby said exposed portion of said spring member when positioned in said groove functions to lockingly engage the article to be plated and to provide an electrical path between said electrical conductor member and the article to be plated.

2. An electroplating assembly as defined in claim **1**, wherein said outer end portion comprises a solid cylindrical piece and said groove comprises a recess formed in its sidewall to receive said exposed portion of said spring member and a threaded bore formed in one end which can be screwed on threads provided on the outer end of said stem portion, whereby the size of said cylindrical piece may be such that its cross section has a diameter slightly less than the circular opening of an article to be plated.

3. An electroplating assembly as defined in claim **2**, wherein said cylindrical piece includes an annular shoulder formed around said sidewall adjacent to said one end of sufficient thickness to prevent the article to be plated from falling on said stem portion.

4. An electroplating assembly as defined in claim **2**, wherein said spring member is coiled adjacent to said fixed end to bias said free end away from said groove and said exposed portion of said spring member includes the portion adjacent to said free end.

5. An electroplating assembly as defined in claim **1**, wherein said outer end portion has an open end cylindrical shaped bore formed therein and said groove is defined as a slit opening formed through a wall of said outer end portion to communicate with said bore, whereby the shaft of an article to be plated is inserted into said bore and is held therein by the springing engagement of said exposed portion of said spring member.

6. An electroplating assembly as defined in claim **1**, wherein adjacent to said fixed end at least one coil is formed in said spring member to provide a biasing force on said free end towards said groove.

7. An electroplating assembly adapted to be connected to a bus bar of an electroplating rack comprising a supporting body having an electrical conducting member and a layer of electrical insulating material entirely covering said conducting member except for an exposed portion which is adapted to be secured to the bus bar of the electroplating rack, a stationary member of electrical insulating material extending transversely from said supporting body with its outer end including a groove and an article supporting surface to loosely hold an article to be plated, a spring member having a fixed end secured to said electrical conducting member and a free end extending towards said outer end of said stationary member, said spring member covered with an electrical insulating material except for an exposed portion which is adapted to fit under spring tension in said groove formed in said outer end of said stationary member, for communicating with said article supporting surface, whereby said exposed portion of said spring member when positioned in said groove functions to lockingly engage the article to be plated and to provide an electrical path between said electrical conducting member and the article to be plated.

8. An electroplating assembly as defined in claim **7**, wherein said outer end of said stationary member includes a solid cylindrical piece and said groove is formed as a recess in its sidewall, whereby said exposed portion of said spring member is pushed into said groove under spring tension before the circular opening of the article

to be plated and slid over said cylindrical piece and then the pushing force is released permitting said exposed portion to press against the article to be plated.

9. An electroplating assembly as defined in claim 7, wherein said article supporting surface is defined as a tubular shaped bore formed in said outer end of said arm member and said groove is defined as a slit opening cut through the sidewall of said outer end to communicate with said bore, whereby said exposed portion of said spring member is adapted to be positioned in said groove under spring tension to press against the stem of an article to be plated.

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