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ELECTRICAL CONTACTOR ROLL FOR ELECTROPLATING MACHINES

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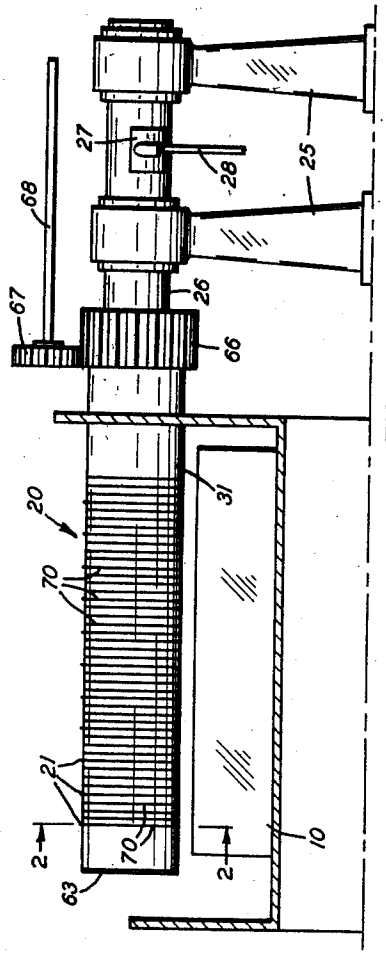


FIG. 1

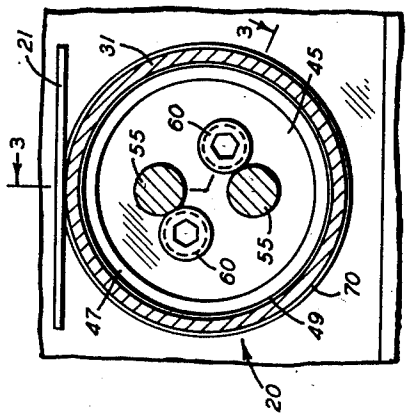


FIG. 2

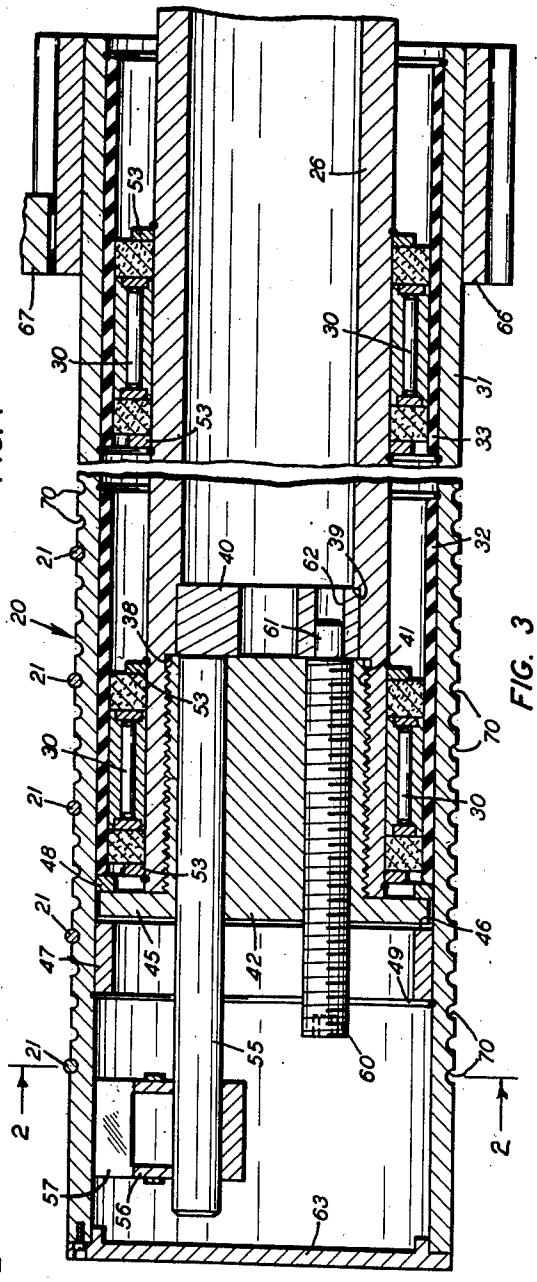


FIG. 3

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ELECTRICAL CONTACTOR ROLL FOR ELECTROPLATING MACHINES

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7 Claims. (Cl. 191—1)

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This invention relates to electrical contactor rolls for electroplating machines.

An object of this invention is the provision of a simple and practicable electrical contactor roll construction.

Another object is the provision of a contactor roll arrangement having internal contact brushes for use in electroplating machines.

Still another object is the provision of a contactor roll wherein an outer shell of the roll may be readily longitudinally shifted when worn to provide different wearing surfaces for engagement by the material being plated without disturbing the arrangement of the brushes.

In accordance with one embodiment of this invention there is provided an electrical contactor roll comprising an outer copper shell peripherally grooved for receiving a plurality of wires passing thereover, such shell being rotatably driven from one end about a fixed inner tubular support insulated from the inner surface of the shell. Threadedly carried upon the outer end of the support is a longitudinally adjustable plug having a circular flange at its outer end which extends into a groove provided on the inner surface of the outer shell. The outer shell extends beyond the outer end of the plug and is closed at its end to provide a chamber in which is housed a plurality of contact brush assemblages attached to supporting rods fixed to the adjustable plug, the brushes engaging the inner surface of the outer shell. Upon the flanged plug being rotated, the outer shell will be micrometrically shifted longitudinally relative to its inner fixed support, thus displacing the grooves worn too deeply and aligning new grooves formed between the worn grooves, into the path of the wire, and without dismantling or disturbing the arrangement of the brushes. Suitable means is provided to permit step shifting of the adjusting plug and to lock it in position after adjustment.

Other objects and advantages of this invention will be apparent from the following detailed description taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a fragmentary vertical sectional view of an electroplating machine shown schematically and primarily illustrating the driving means and support for the electrical contact roll embodying the features of the invention;

Fig. 2 is an enlarged fragmentary vertical sectional view taken on the line 2—2 of Figs. 1 and 3; and

Fig. 3 is an enlarged vertical irregular sectional view taken on the line 3—3 of Fig. 2.

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Referring to the drawing and more particularly to Fig. 1 there is schematically illustrated an electroplating tank, indicated at 10, and above the tank is shown a single electrical contactor roll, indicated in general at 20, which embodies the features of the invention. A plurality of wires 21—21 to be electroplated engage the roll 20, as well as other rolls including rolls similar to the roll 20 (not shown) in order to guide the wires through the electrolytic bath contained in the tank 10 and to provide a conducting path for the electroplating current. The wires 21—21 act as the cathodes and the roll 20 is connected to the negative side of the electroplating circuit. A more detailed description and disclosure of other elements of the electroplating machine with which the contactor roll is used have been omitted from the present application for the sake of simplicity, since a full disclosure thereof is not essential to a complete understanding of the invention.

For supporting the contactor roll 20, a pair of pedestals 25 are arranged at the right of the tank 10 and have fixed to them one end of a stationary tubular support 26, which may be of steel, copper plated, and to which is conductively connected, as indicated at 27, a conductor 28 included in the negative side of the electroplating circuit. The outer end of the support 26 extends over the tank 10 and rotatably supported thereon at spaced points by means of roller bearings 30—30 is a copper shell 31. Secured to the inner surface of the shell 31 and interposed between the bearings 30—30 and the shell are insulator sleeves 32 and 33 which serve to prevent a conducting path being formed between the support 26 and shell 31 through the bearings. At its left end, the tubular support 26 is counterbored, as indicated at 38 and 39, and press-fitted into the bore 39 is a ring 40. The bore 38 is screw threaded at 41, and threadedly carried in the bore 38 is a plug 42 having an annular flange 45 on its outer end, the flange extending into a groove 46 formed between spaced annular rings 47 and 48 fitted to the inner surface of the shell 31. The ring 48 may be press-fitted in the shell 31 and abutted against the annular end face of the adjacent insulator sleeve 32 while the ring 47 is held in position to prevent movement thereof longitudinally of the shell 31 by a split wire ring 49 expandable into cooperating grooved seats provided in the shell 31 and ring 47.

The opposite annular end face of the insulator sleeve 32, as well as each annular end face of the insulator sleeve 33 and opposite end faces of rings 53—53 of the roller bearings 30—30 have

associated therewith suitable split wire rings for holding the insulator sleeves and bearing rings in position to prevent movement thereof longitudinally of the shell 31 and support 26.

Press-fitted into diametrically opposed apertures in the plug 42 are rods 55—55 to which are suitably fixed brush assemblages 56—56, one of which is illustrated in section in Fig. 3. The brush assemblages 56—56 each support a graphite brush 57 which engage and effect electrical contact with the inner surface of the rotatable shell 31. Threadedly carried in screw threaded diametrically opposed apertures in the plug 42 are two screw threaded rods 60—60, having reduced inner ends 61—61 for locking engagement in apertures 62—62 provided in the ring 40 which is fixed in the stationary tubular support 26. A plate 63 secured to the annular end face of the shell 31 serves to close the outer end of the contactor roll 20 and provide a closed chamber between the plug 42 carrying the brush supporting rods 55—55 and the locking rods 60—60 and the outer end of the contactor roll.

In the operation of the electroplating machine the contactor rolls are preferably positively driven at a peripheral speed substantially identical to the speed of the wire or stock through the machine, thus reducing friction between the wires 21—21 and surface of the shell 31. To effect this rotation of the contactor roll 20, the inner end of the shell 31 adjacent the pedestals 25—25 has fixed thereto a gear 66 which is relatively wide compared to a driving pinion 67 fixed to shaft 68 which may be driven from a suitable source of power (not shown). This arrangement between the gear 66 and pinion 67 permits the roller shell 31 to be shifted longitudinally while still maintaining the gear and pinion in operative driving engagement.

The outer shell 31 of the contactor roll 30 is illustrated with a plurality of peripheral grooves 70—70 for receiving a plurality of wires 21—21 passing thereover during their electroplating for the purpose of maintaining the wires in position and out of contact with each other. It will be obvious, however, that an ungrooved shell may be used in the electroplating of plane surfaced strips or ribbons. In time the grooves 70—70 will become worn too deeply after a long period of use, in the case of the wires 21—21, and an ungrooved shell surface will, in time, have channels formed therein, in the case of strips or ribbons passing thereover.

When the grooves 70—70 in the shell 31 of the contactor roll 20 of this invention become worn too deeply, the end plate 63 may be removed from the shell 31 and the screw threaded locking rods 60—60 are then rotated to withdraw the reduced inner ends 61—61 thereof from locking engagement in the apertures 62—62 of the ring 40. By grasping and bodily rotating the rods 55 as a unit about the longitudinal axis of the roller 20, the plug 42 may be rotated and through the plug flange 45 entered in the groove 46 in the outer shell 31 the latter will be micrometrically shifted longitudinally to the left, as viewed in Figs. 1 and 3, with respect to the support 26 and thus other grooves 70—70, already cut in the peripheral surface of the shell between the worn grooves 70—70, may be accurately aligned with the paths of travel of the wires 21—21, or the shell may be removed from its support 26 and additional grooves 70—70 cut therein. In the case of strips or ribbons passing over an ungrooved shell surface and wearing channels in such surface, the shell may be shifted as described above to align unworm surfaces with the paths of travel of the strips or ribbons. In either of the arrangements discussed the screw threaded locking rods 60—60 are then rotated to insert the reduced inner ends 61—61 into the apertures 62—62 of the ring 40. The apertures 62—62 are spaced 180° apart so that, for each one-half revolution of the nut 42, the ends 61—61 of the rods 60—60 will be aligned with the apertures, thus providing for a step by step shifting of the plug and a locking thereof to prevent a change in its adjustment due to forces exerted at the periphery of the brushes 57 in the rotation of the roller shell 31.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An electrical contactor for electroplating machines comprising an internally threaded fixed shaft, an elongated roller rotatably mounted upon the fixed shaft, and an externally threaded member threaded into the internally threaded shaft and engaging the roller effective, upon rotation thereof, to shift the roller along its longitudinal axis while still mounted upon the fixed shaft, whereby different portions of the peripheral surface of the roller may be engaged by elongated electrical conducting members passing thereover.

2. An electrical contactor for electroplating machines comprising a fixed shaft, an elongated roller rotatably mounted and longitudinally slidable upon the fixed shaft, rotatable means carried by the shaft and engaging the roller effective, upon rotation thereof, to shift the roller along its longitudinal axis while still mounted upon the fixed shaft, whereby different portions of the peripheral surface of the roller may be engaged by elongated electrical conducting members passing thereover, and cooperating members carried on the rotatable means and fixed shaft for maintaining the rotatable means in position after a shifting of the roller.

3. An electrical contactor for electroplating machines comprising a fixed shaft, an elongated roller rotatably mounted upon the fixed shaft, and means within the roller having a portion freely rotatably engaged therewith and a second portion screw threadedly engaged in a screw threaded axial recess in the shaft effective, upon rotation thereof, to micrometrically shift the roller along its longitudinal axis while still mounted upon the fixed shaft, whereby different portions of the peripheral surface of the roller may be engaged by elongated electrical conducting members passing thereover.

4. An electrical contactor for electroplating machines comprising a fixed shaft, an elongated shell-type roller rotatably mounted upon the fixed shaft and extending at its outer end beyond the outer end of the shaft, insulator elements between the roller and shaft, a member within the roller having a portion freely rotatably engaged therewith and a second portion screw threadedly engaged in a screw threaded axial recess in the shaft effective, upon rotation thereof, to micrometrically shift the roller along its longitudinal axis while still mounted upon the fixed shaft, whereby different portions of the peripheral

surface of the roller may be engaged by elongated electrical conducting members passing thereover, and electrical contactor brush assemblages carried by the member in electrical conducting engagement with an inner surface of the roller adjacent its outer end.

5. An electrical contactor for electroplating machines comprising a tubular fixed shaft, an elongated tubular roller rotatably mounted upon the fixed shaft and extending at its outer end beyond the outer end of the shaft, insulator elements between the roller and shaft, a member screw-threadedly engaged with an inner surface of the tubular shaft at its outer end, an annular flange on the member freely rotatably engaged in a groove in the inner surface of the roller adjacent the outer end of the member effective, upon rotation of the member, to micrometrically shift the roller along its longitudinal axis while still mounted upon the fixed shaft, whereby different portions of the peripheral surface of the roller may be engaged by elongated electrical conducting members passing thereover, and electrical contactor brush assemblages carried by the member in electrical conducting engagement with an inner surface of the roller adjacent its outer end.

6. An electrical contactor for electroplating machines comprising a tubular fixed shaft, an elongated tubular roller rotatably mounted upon the fixed shaft and extending at its outer end beyond the outer end of the shaft, a flanged plug screw threadedly engaged with an inner surface of the tubular shaft at its outer end, the flange being engaged in a groove in the inner surface of the roller adjacent the outer end of the plug effective upon rotation of the plug to micrometrically shift the roller along its longitudinal axis while still mounted upon the fixed shaft, whereby different portions of the peripheral surface of the roller may be engaged by elongated electrical conducting members passing thereover, members

screw-threadedly engaged in screw threaded apertures in the plug, and a member fixed in the tubular shaft having apertures for receiving inner ends of the screw threaded members for locking the rotatable plug in position after a shifting of the roller.

7. An electrical contactor for electroplating machine comprising a tubular fixed shaft, an elongated tubular roller having a series of grooves in its peripheral surface to receive wires passing thereover rotatably mounted upon the fixed shaft and extending at its outer end beyond the outer end of the shaft, insulator elements between the roller and shaft, means for rotating the roller, rotatable means carried by the shaft and engaging the roller effective, upon rotation thereof, to shift the roller along its longitudinal axis while still mounted upon the fixed shaft whereby different grooves in the peripheral surface of the roller may be engaged by wires passing thereover, cooperating members carried on the rotatable means and fixed shaft for maintaining the rotatable means in position after a shifting of the roller, and electrical contactor brush assemblages carried by the rotatable means in electrical conducting engagement with an inner surface of the tubular roller adjacent its outer end.

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