

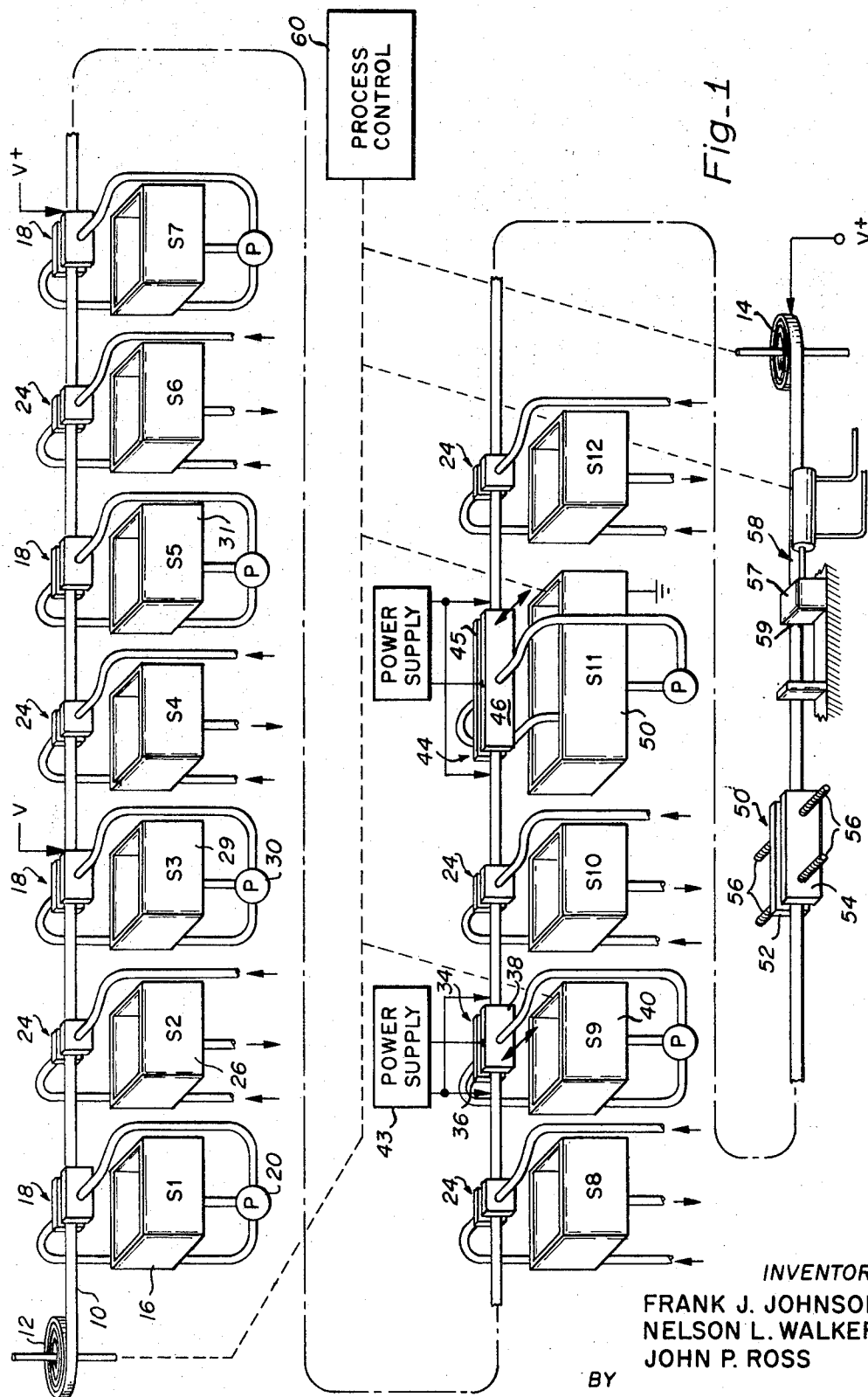
March 27, 1973

F. J. JOHNSON ET AL
SELECTIVE PLATING SYSTEM

3,723,283

Filed Dec. 23, 1970

4 Sheets-Sheet 1



INVENTORS
FRANK J. JOHNSON
NELSON L. WALKER
JOHN P. ROSS

BY

Lowhurst & Hamrick
ATTORNEYS

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4 Sheets-Sheet 2

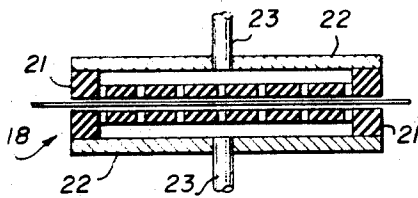


Fig. 2A

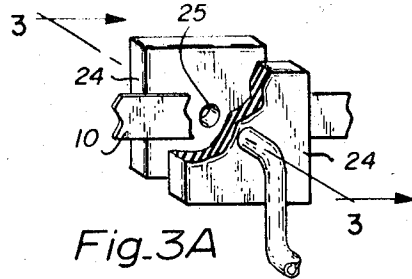


Fig. 3A

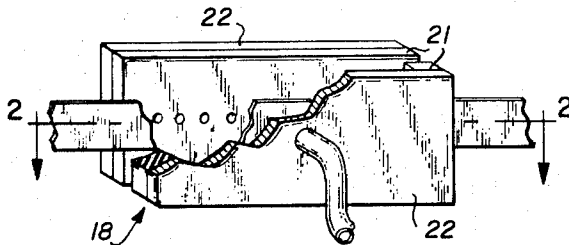


Fig. 2B

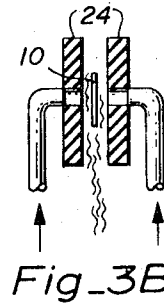


Fig. 3B

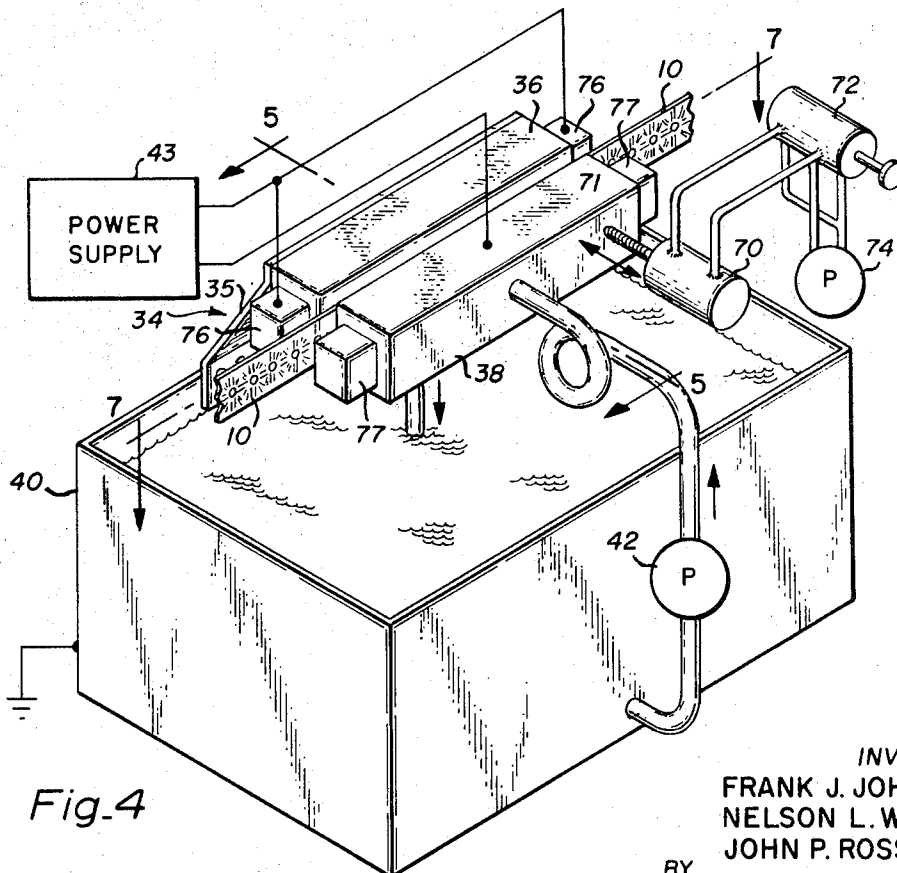


Fig. 4

INVENTORS
FRANK J. JOHNSON
NELSON L. WALKER
JOHN P. ROSS

BY

Lowhurst & Hamrick

ATTORNEYS

March 27, 1973

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4 Sheets-Sheet 3

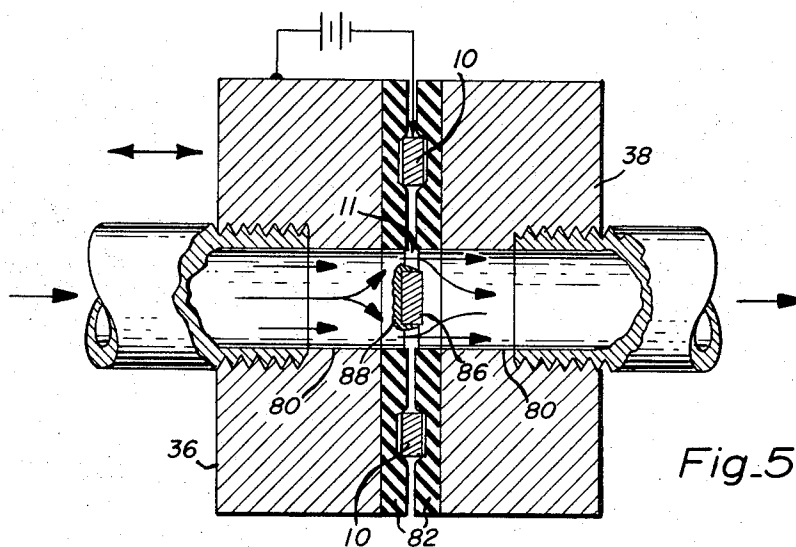


Fig. 5

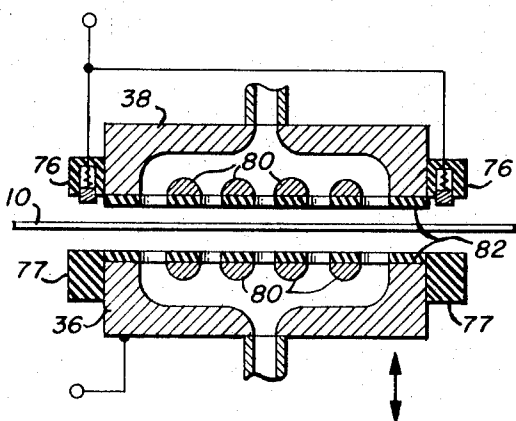


Fig. 6

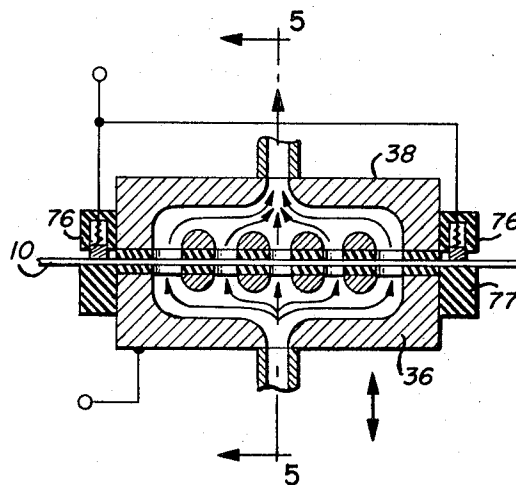


Fig. 7

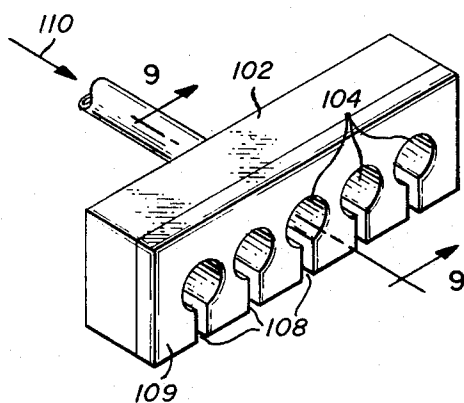


Fig. 8

INVENTORS
FRANK J. JOHNSON
NELSON L. WALKER
BY JOHN P. ROSS

Lowhurst & Hamrick
ATTORNEYS

March 27, 1973

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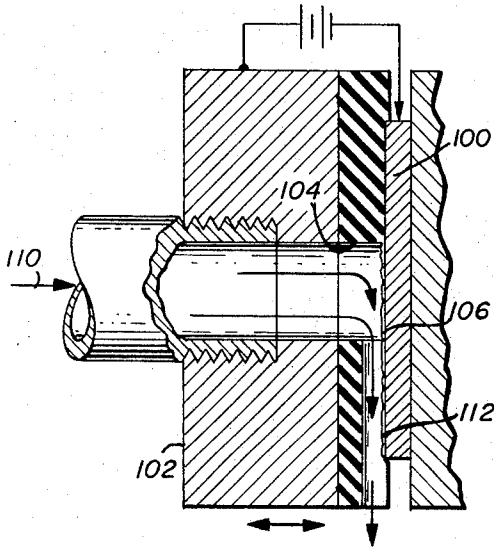


Fig. 9

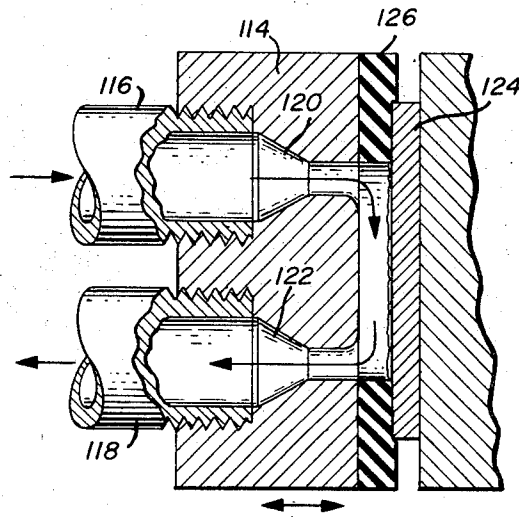


Fig. 10

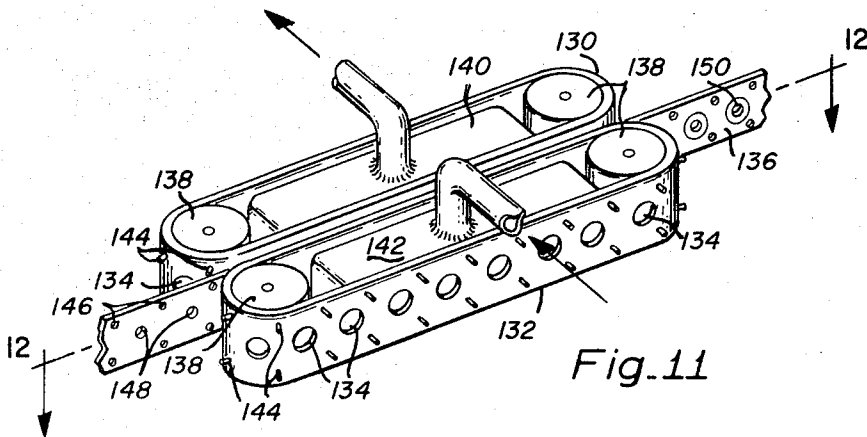


Fig. 11

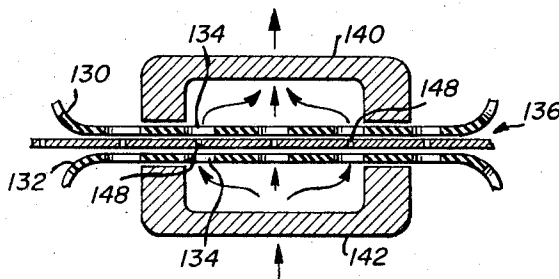


Fig. 12

INVENTORS
FRANK J. JOHNSON
NELSON L. WALKER
JOHN P. ROSS

BY

Lowhurst & Hamrick
ATTORNEYS

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3,723,283

SELECTIVE PLATING SYSTEM

Frank J. Johnson, San Jose, Nelson L. Walker, Saratoga, and John P. Ross, Cupertino, Calif., assignors to Select-Au-Matic, Santa Clara, Calif.

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U.S. Cl. 204—206

15 Claims

ABSTRACT OF THE DISCLOSURE

A selective plating system in which a continuous strip or web of work material is passed through the system without deformation and selected discrete areas of the web surface may be uniformly plated without the use of adhesive masks or other techniques heretofore utilized. The system includes several stations through which the web is drawn in order to perform the required cleaning, rinsing and electroplating operations. The system also includes a novel electrolyte handling structure which engages the web to mask off those surface areas not to be plated and which causes the electrolyte to be passed in flowing relationship with the discrete areas to be plated.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates generally to electroplating apparatus and more particularly to a novel apparatus and system for selectively plating certain areas of a web of work material.

Description of the prior art

In the manufacture of semiconductor circuits and components, the semiconductor chip is mounted on a metallic pad which is surrounded by, but initially disconnected from, a plurality of electrodes extending generally radially therefrom. Before the chip is mounted on the pad, it must be plated, preferably with gold. Initially, these chip mounting pads and the associated electrodes are secured to one another by a frame and a plurality of such frames are joined together to form an elongated strip. After the pad has been placed, the chip mounted thereon, connections made from the chip to the electrodes, and the entire assembly encased in a suitable material, the frames are cut away to leave the electrodes extending from the completed package. Since the plating operation must necessarily take place before the assembly of the complete package and since the frames cannot be cut away before the package is completely assembled, it has been necessary in the past to plate the entire strip of material, including the frames which are subsequently discarded and the electrodes which do not require plating. Such plating of the entire strip, including both sides thereof, consumes a considerable amount of plating material and where the plating materials is gold, the plating of the extraneous surfaces results in a considerable loss of gold.

Although numerous attempts have been made in the prior art to provide apparatus for electroplating selected areas of a web of work material, such methods have generally been found unsuitable because of certain inherent limitations in the method of operation of the apparatus. Examples of prior art selective plating systems and devices are disclosed in the following U.S. patents: Owen 3,088,892, Vaughn et al. 3,137,045; Polichette 3,334,028; Hales 3,340,162; and Sutch 3,361,662.

In accordance with another prior art technique, the strip of material was masked by covering the frames and electrodes with a suitable masking material before the plating operation was initiated. However, this technique has been found unacceptable because of the time expended in first

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placing the masking material on the strip and then subsequently removing the masking material after the plating operation has been completed. Furthermore, such masking techniques could not withstand the corrosive action of various materials employed in the plating operation.

It has generally been the practice, whether masking has been employed or not, to submerge the material to be plated in successive baths of various materials, each performing a specific function in the complete plating operation. However, unless the fluids contained in such baths are displaced with respect to the material being plated, the plating operation was relatively slow, and any attempt to increase the speed of electroplating by increasing the current flow was not successful, since the boundary region between the electrolyte and the material being plated would become depleted of metallic ions and cause the plating operation to discontinue until the process of diffusion carried additional metallic ions to the boundary region. Because of the electrical potentials required and the types of solutions employed, mechanisms for inducing a fluid flow to eliminate this difficulty have not proven successful.

OBJECTS OF THE PRESENT INVENTION

It is therefore a primary object of the present invention to provide a novel selective plating apparatus and system for plating only selected portions of a web of work material which is passed through the system.

Another object of the present invention is to provide a novel selective plating apparatus and system which enables the thickness and quality of plating provided to selected portions of a web of work material to be carefully controlled.

Still another object of the present invention is to provide a novel selective plating apparatus and system which performs the plating operation at a relatively rapid rate.

Still another object of the present invention is to provide a novel selective plating apparatus and system wherein the plating solution used to plate selected surface areas of a web of work material is caused to flow over those areas in a controllable fashion so as to assure plating consistency and reduce the time required to form a given thickness of plating using a given electrolyte solution and plating current density.

SUMMARY OF THE PRESENT INVENTION

In accordance with the present invention, a selective plating apparatus and system is disclosed wherein a web of work material is passed through the system without deformation and selected discrete areas of the web surface are uniformly plated without the use of adhesive masks or other techniques heretofore utilized. The system includes several stations through which the web is drawn and which perform, respectively, the required cleaning, rinsing, striking and finish plating operations. The system also includes a novel electrolyte handling apparatus which engages the web to mask off those surface areas not to be plated and which causes the electrolyte to be passed in continuous flowing relationship across the surface areas to be plated.

A feature of the present invention resides in the provision of a plurality of plating stations disposed for receiving a strip of material, with each station being formed of a pair of opposing heads for receiving the strip therebetween and for directing a solution onto the strip.

Another feature of the present invention resides in the provision of an electroplating section formed of a pair of opposing heads for receiving the strip of material therebetween, with each head forming a manifold for distributing electrolyte onto selected portions of the strip.

Still another feature of the present invention resides in the provision of means for displacing one head with re-

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spect to the other head at the electroplating station to provide sealing engagement with the strip during the plating operation and to permit release of the strip when the plating operation is complete and the strip is being moved. A still further feature of the present invention resides in the provision of means for conductively engaging the strip to permit the application of a voltage thereto during the plating operation.

Additional features and advantages of the present invention will no doubt become apparent to those skilled in the art after having read the following detailed disclosure of the preferred embodiments which are illustrated in the several figures of the drawing.

In the drawing:

FIG. 1 is a diagrammatic illustration of a selective plating system in accordance with the present invention.

FIGS. 2A and 2B illustrate flooding heads of the type utilized in the selective plating system of FIG. 1.

FIGS. 3A and 3B illustrate rinse heads of the type utilized in the selective plating system of FIG. 1.

FIG. 4 illustrates a preferred embodiment of a selective plating mechanism in accordance with the present invention.

FIGS. 5 through 7 are cross sections taken through the selective plating mechanism illustrated in FIG. 4.

FIGS. 8 and 9 illustrate a modification of the selective plating apparatus of the present invention.

FIG. 10 illustrates another modification of the selective plating apparatus of the present invention.

FIGS. 11 and 12 illustrate still another modification of the selective plating apparatus of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 of the drawing, there is shown a selective plating system in accordance with the present invention for plating selected surface portions, a continuous strip or web 10 of work material without requiring that the web be submerged in one or more tanks of treatment fluid. Accordingly, web 10 can be transported through the system on edge without deformation. The illustrated embodiment of the novel system includes a plurality of work stations S_1 through S_{13} which are positioned in line along a web transport path between a discharge reel 12 and a take-up reel 14 positioned to revolve about vertical axes. Station S_1 , for example, may perform an acid etching or other cleaning operation on web 10 to remove unwanted contaminants and oxides. At station S_1 , a catch tank 16 preferably filled with trichlorethylene (TCE) is provided along with a pair of flooding heads 18 through which the TCE is circulated by a pump 20 for flooding web 10 as it is passed therebetween. The heads 18 may be comprised of an apertured dielectric plate 21 and a metallic back plate 22 such as those shown in FIGS. 2A and 2B. The heads 18 are mounted in spaced apart relationship straddling the path to be followed by web 10, with the spacing being sufficient to allow fluid pumped into the heads at the inlets 23 to completely flood web 10 and then fall and be caught by tank 16. Positioned adjacent station S_1 is a rinse station S_2 which is similar to that of station S_1 except that the rinse heads 24 are smaller and are configured as indicated in FIGS. 3A and 3B. Rinse heads 24 are typically made of small blocks of nylon, Teflon or other suitable material and have centrally disposed apertures 25 through which a suitable rinse solution, such as distilled (DI) water or reverse osmosis (RO) water is passed to flood web 10. Rinse heads 24 are likewise spaced apart a distance suitable to enable complete flooding of web 10 as it is passed therethrough. The reason why flooding heads 18 are larger than the rinse heads 24 is that the flooding heads perform a fluid treatment function to a predetermined length of web 10 as it is indexed therethrough while rinse heads 24 merely serve to rinse any vestiges of the treatment fluid from

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the web. Quite clearly, however, flooding heads 18 could also be utilized as rinse heads in place of the more simplified rinse heads 24. Note also that the used rinse solution caught by tank 26 is not recirculated but is discharged into a suitable drain.

Following the first rinse, web 10 is passed through a second treatment station S_3 which includes a pair of flooding heads 18 for flooding the web with an alkaline electrocleaning solution contained in tank 29. In order to provide a selected current flow through the solution, the metallic back plates 22, which contact the fluid as it passes through the heads 18 (see FIGS. 2A and 2B), are electrified. As at station S_1 a pump 30 is provided for recirculating the treatment fluid caught in tank 29 back through the heads 18. After passing through station S_3 , web 10 is passed through a second rinse station S_4 which is identical to the previous rinse station S_2 .

Adjacent rinse station S_4 is a third treatment station S_5 which is identical to station S_1 except that its tank 31 is filled with an acid cleaning solution such as hydrochloric (HCl). The next station S_6 is another rinse station similar to stations S_2 and S_4 .

Following passage through stages S_1 - S_6 , web 10 is passed through still another set of flooding heads 18 at stations S_7 which flood the web with an activator solution, such as the type known in the trade as Kovar Activator. As in station S_3 the flooding heads 18 are also electrified to cause a small current flow through the activator solution. After flowing through heads 18 and over web 10, the activator fluid is collected in tank 32 and recirculated back to heads 18 by the pump 33. Next to activator station S_7 , a fourth rinse station S_8 is provided for flooding web 10 with another rinse solution to remove any remaining vestiges of the activator. As in the previous rinse stages the rinse solution is not recirculated. Instead, it is disposed of and clean rinse solution is provided to rinse heads 24. It is, of course, to be understood that the reason that the rinse solutions are not recirculated is to prevent the recontamination of web 10 with materials previously rinsed therefrom.

The first actual plating operation occurs at station S_9 wherein a gold strike is applied to selected areas of web 10 by a novel plating mechanism 34 of a type which will be described in more detail below. Briefly, however, the mechanism 34 includes a pair of plating heads 36 and 38 (see FIG. 4) which sealingly engage web 10 and subject only selected portions of its surface to an acid gold electrolyte solution that is contained in the tank 40, and which is pumped through the plating heads 36 and 38 by a pump 42. Station S_9 also includes a power supply 43 which is connected to web 10 and the plating heads so as to cause a suitable plating current to flow through the electrolyte solution. After passing through the gold strike stage S_9 , wherein a thin plating of gold is provided over the selected surface areas, web 10 is then passed through another rinse stage S_{10} wherein it is again rinsed to free it of any acid solution remaining from the strike operation. As in the previous rinse stages, station S_{10} includes a pair of rinse heads 24 and a catch tank positioned therebeneath.

At station S_{11} , which is the finish plating station, the same surface areas of web 10 are again electroplated by a plating mechanism 44 which causes a neutral gold plating solution contained in tank 50 to flow in contact with the selected portions of the web surface. Finish plating mechanism 44 is operatively similar to the strike plating mechanism 34, except that it is generally modified to plate twice as many discrete areas of the web surface in a two step process. More particularly, the finish plating heads 45 and 46 are twice as long as the strike plating heads 36 and 38 and contain twice as many plating apertures so that the surface portions plated during one index step in mechanism 34 receive one plating in each half, i.e., two platings, in passing through mechanism 44. Station S_{12} is another rinse station which, as in the preceding

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rinse stations, includes a pair of flooding heads 24 and a catch tank.

After passing through the last rinse station, web 10 is drawn through a dryer 50 where it is heated and completely dried to prevent the formation of water spots which might effect later utilization of the plated web. In the illustrated embodiment, the drying operation is accomplished by a pair of heated flat heads 52 and 54 which are spring biased into engagement with web 10 by springs 56. However, dryer 50 may instead, or in addition, include any of the other well known prior art drying devices.

A pneumatic or hydraulic indexing device 58 is utilized, in accordance with one embodiment of the invention, to stepwise advance web 10 a predetermined distance during each cycle of the plating operation. As illustrated in FIG. 1, indexing device 58 includes a head 57 having projections 59 for engaging indexing apertures in web 10. Alternatively, head 57 may include some type of frictional gripping means where no indexing apertures are provided in the web. In other embodiments of the invention to be explained below, other types of indexing devices such as a sprocketed drive wheel, or the like, may be found more appropriate. After passing through the plating system, web 10 is rewound onto the spool 14. Although the above described system can be operated manually, it is preferable that some automatic process control system 60 be provided so as to actuate discharge reel 21, strike plating mechanism 34, finish plating mechanism 44, indexing means 58 and take-up reel 14 at the proper times and in the proper sequence.

Turning now to FIG. 4 of the drawing, one embodiment of the selective plating mechanism 34 utilized at station S₉ is shown in greater detail, and is seen to include the plating heads or "headers" 36 and 38, a pneumatic or hydraulic ram 70, a control valve 72 and fluid pressure source (pump) 74. Header 36 is fixedly positioned on the far side of web 10 by the bracket 75 which mounts it to the side of tank 40. Header 38, however, is displaceably mounted relative to header 36 and is secured to the actuator 71 of ram 70 so as to be movable into and out of engagement with web 10. Affixed to each end of header 30 is an electrode 76 for electrifying web 10 as it is engaged by headers 36 and 38. Header 38 carries a pair of stops 77 for insuring that electrodes 76 are operatively engaged by web 10 each time header 38 is driven into operative engagement with web 10.

Where web 10 is an apertured strip of metallic material, such as is used to form the metallic lead frames for integrated circuits and other transistorized devices, headers 36 and 38 may take the form illustrated in FIGS. 5-7 wherein the electroplating solution is pumped through the web apertures 11 from one header (36) to the other (38) as an electrical plating current is passed from header 36 to web 10 through the plating solution. As illustrated in FIGS. 6 and 7, headers 36 and 38 provide several identical flow passages or plating apertures 80 through which the electrolytic plating solution is passed to engage web 10. The face of each metallic header is provided with an electrically insulating sealing gasket 82, such as of the Teflon or the like, for sealingly engaging the web when header 36 is driven towards header 38 to engage web 10 as shown in FIGS. 5 and 6, thus defining the surface portions to be electroplated and forming several closed paths for directing the electrolyte through the apertures in web 10.

In FIG. 5 of the drawing, which is a section taken along section lines 5-5 of FIGS. 4 and 7, it will be noted that as headers 36 and 38 are driven together about web 10, the apertured gaskets 82 sealingly engage web 10 to delineate those areas of the surface of web 10 which are to be subjected to the plating solution. Since web 10 (the cathode) is made negative with respect to header 36 (the anode) and since the two are electrically isolated by the gasket 82, current will be caused to flow through the

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electrolyte and consequently an electroplating action will occur upon web 10 whereby gold metal is deposited upon those areas of the web which are contacted by the solution. Thus, as the electrolyte flows about the delineated portions 86 of web 10, which might for example, be the chip mounting pad of an integrated circuit lead frame, a layer of gold 88 will be deposited upon the surface thereof. The thickness of the deposition 88 formed over the respective surfaces of portion 86 will be determined, in part, by the velocity of the electrolyte stream flowing across the respective surfaces of that portion, the electrolyte strength, the current density of the electroplating current and the time during which the surfaces are subjected to the electrolytic action.

It will be noted that in this example, a much larger plating is obtained on the left side of portion 86 than on the right side which is caused by the different electrolyte flow exposure over the various surfaces. Whereas, the plating on the left side of portion 86 is of the intended thickness, the plating on the right side of portion 86 is merely a very thin layer of gold referred to as casual plating. In the case where web 10 includes a plurality of transistor lead frames having a center pad of the type illustrated in FIG. 5, the reduction in plating thickness on the "back side" is beneficial in that it saves gold, and since all of the component interconnects are normally attached to the "front side" of the lead frame, it does not affect the usefulness thereof. Where it is desired that both sides of portion 86 be plated equally, this can be accomplished by making header 38 the anode and reversing the flow of the electrolyte for an equal period of time.

The finish plating mechanism 44 at station S₁₁ is substantially identical to that illustrated in FIGS. 4-7 except that it is twice as long and has twice as many plating apertures. In some cases, it may be desirable to make the strike plated portion slightly larger or of a slightly different configuration than that of the finish plated portion. This can easily be accomplished in the present invention by merely selecting gaskets for the respective headers which have the desired aperture configurations. Furthermore, it may be desirable in some cases to finish plate one portion of the plated surface of web 10 with a greater plating thickness than others. This can be accomplished by suitably selecting and positioning the plating apertures of the second half of headers 45 and 46. It should also be noted that since one of the factors determining the relative thickness of the plating provided over a given surface area is the current density distribution over that surface, a certain degree of plating profile shaping can be accomplished by choosing an anode structure (header configuration) which will create a current density distribution capable of providing the desired plating profile. For example, by increasing the thickness of gaskets 82 so as to remove the anode (header 36) away from the surface to be plated would tend to make for a more uniform plating profile since the distances between the anode and the various portions of the surface being plated are made more uniform.

Turning now to FIGS. 8 and 9, a first modification of the header structure for use in selectively plating a solid, unapertured web 100 is illustrated. In this embodiment, wherein it is desired to plate a circular area of the surface on only one side of a solid web 100 (FIG. 8), a single header 102 is provided with a plurality of circular ports 104 through which the plating solution may be passed to flow over the surface 106 to be plated. In order to allow the electrolyte to be discharged after it is passed over the surface 106, slots 108 are provided in an electrically insulated flexible web engaging mask 109 at the bottom of the plating aperture. Accordingly, as shown in FIG. 9, the electrolyte is introduced into the header 102 at 110, and is caused to flow over the surface 106, and then out through the exit passages 108 for return to a catch tank for recirculation. As in the previous embodiment, those areas of the surface of web 100 which are

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subjected to the fluid will have formed thereon a plating of gold or other material contained within the plating electrolyte solution. Although, in addition to the circular areas 106, the areas 112 adjacent the exit passages 108 will also be plated, these areas can be made quite small to conserve the plating metal.

If the surface areas to be plated are to be strictly defined, an embodiment such as that illustrated in FIG. 10 may be utilized. In this embodiment, the header 114 is provided with an entrance passage 116, as well as an exit passage 118, and suitable flow directing paths 120 and 122 for causing the electrolyte to wet only those surface areas of the web 124 which are exposed and sharply defined by the electrically insulated gasket 126.

In operation of the system illustrated in FIG. 1, web 10 is threaded through the system using a suitable leader. Upon being indexed into position, a first length of the web is flooded with TCE to remove any stamping or residual machine oils therefrom. Subsequently, that section is advanced in stepwise fashion, as determined by indexing means 58, through station S_2 where it is rinsed and then passed through S_3 wherein it receives an alkaline electrolining. After being rinsed at station S_4 , it is flooded with HCl as it is indexed through station S_5 after which it is again rinsed at station S_6 . Subsequently, it is subjected to a Kovar Activator at station S_7 and then passes through station S_8 where it is rinsed. After rinsing at station S_8 , the web section is ready for gold striking at station S_9 to, in effect, provide the equivalent of an undercoating to facilitate later gold plating. Upon being advanced into position and stopped at station S_9 , the header 36 of strike plating mechanism 34 is driven toward web 10 causing it to be clamped between header 36 and header 38. Pump 42 is then actuated to induce a flow of plating fluid through the plating apertures in header 36, across the web surfaces to be plated and through the apertures therein, thence into the apertures in header 38 whereupon it is returned to tank 40. At the same time, a plating current flow is established as electrodes 76 engage web 10. After a predetermined period of time, the pumping action of pump 42 is terminated, header 36 is withdrawn from engagement with web 10, and indexing mechanism 58 is actuated to advance the first section rightwardly a distance equal to that initially between headers 36 and 38 to receive the gold strike. This, of course, causes a second section of web 10 to be positioned between headers 36 and 38 so that header 36 can again be driven into engagement with web 10 and the cycle be repeated.

After the first selectively plated length of web 10 is rinsed as it passes through station S_{10} , it is next advanced to station S_{11} and into position between the first half of the double acting finish plating mechanism 44 wherein those surface areas previously plated with the gold strike are then plated with a neutral gold solution much in the same manner as in the striking operation. The operation of finish plating mechanism 44 is substantially identical to that of the strike mechanism 34. Following the first finish plating operation, header 46 is withdrawn from engagement with web 10, and header 45, and the first web length is advanced into the second half of mechanism 44 wherein the previously plated areas are again plated. Note that while the first section is receiving its second finish plating, the second section is receiving its first finish plating. As the second finish plating operation is terminated and header 46 is withdrawn from engagement with web 10, the first web length is advanced through station S_{12} where it receives a final rinse. It is then dried as it passes through dryer 50 and is then wound upon reel 14.

Referring now to FIGS. 11 and 12, still another alternate embodiment of the present invention is illustrated which differs from the previously described embodiments in that the web may be continuously moved through the system rather than be periodically indexed therethrough. In this embodiment, the web surface portion selectivity

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of the plating operation is accomplished by means of a pair of flexible belt-like gaskets 130 and 132 having apertures 134 therein which are disposed in web engaging relationship on either side of the path to be taken by the web 136. The gaskets 130 and 132 are mounted over rollers 138 so as to be trackable over the surfaces of web 136. Disposed within the loops defined by gaskets 130 and 132 are electrolyte exit and inlet headers 140 and 142, respectively, which are biased toward each other (by means not shown) so as to form sliding seals with the inner surfaces of gaskets 130 and 132 while, at the same time, causing the belts to sealingly engage web 136.

Although other suitable gasket-web registration methods may be utilized, gaskets 130 and 132, in the illustrated embodiment, are provided with indexing bosses 144 which engage indexing holes 146 in the top and bottom edges of web 136 so as to maintain alignment of the apertures 134 in the belts with the apertures 148 in the moving web 136.

As illustrated in the cross section of FIG. 12 taken along the line 12—12 of FIG. 11, an electrolyte introduced into entrance header 142 will be caused to flow through apertures 134 in gasket 132, through apertures 148 in web 136, and then through aperture 134 in gasket 130 into exit header 140. As in the previous embodiment entrance header 142 and web 136 are electrified by suitable means. Since the flexible gaskets 130 and 132 restrict contact between the electrolyte and web 136 to certain well defined discrete areas on the surface of the web, only those discrete areas as shown at 150 (FIG. 11) will be electroplated. This continuously moving plating embodiment can also be modified along the lines illustrated in FIGS. 8, 9 and 10 for selectively plating surface portions on a single side of an unapertured web. The advantages of this embodiment over the previously described embodiments, for certain applications, will undoubtedly be apparent to those skilled in the art.

Although the plated surface portions described in the above embodiments have generally been referred to or illustrated as being circular or oval in nature, it is to be understood that by properly tailoring the headers and properly configuring the electrolyte exit ports and gasket openings, almost any web surface area configuration can be selectively plated in accordance with the present invention. It will thus be appreciated that in accordance with the present invention a unique selective plating system is provided which has the advantages that (1) a faster plating operation is permitted (2) the work material need not be deformed during the plating operation so as to permit it to be submerged in the various cleaning and plating baths as is commonly practiced in the prior art, (3) only certain areas of the web are plated thus conserving substantial quantities of plating material thereby and reducing the cost of the plating operation, and (4) the plating operation is of a type which can be completely automated.

Furthermore, because of the particular nature of the plating operation, the amount of plating provided upon the various surface portions of the web can be carefully controlled. For example, more or less metal can be deposited by merely regulating either the plating current or the electrolyte concentration, or both. Note that this means that the indexing means for the system can always be run at the same speed even though the amount of plating supplied to the work material may be varied.

Still another advantage of the present invention is that since the electrolyte is always flowing over the surface portions to be plated, the actual plating speed is increased over prior art emersion systems because more electrolyte is placed in contact with the work material. This also means that a more uniform plating can be achieved since the plating solution is continuously mixed as it is pumped through the system.

Whereas the present invention has been described with reference to certain preferred embodiments, it is con-

templated that many modifications thereof will be apparent to those skilled in the art after having read the above disclosure. It is therefore to be understood that the particular embodiments described are for illustrative purposes only and are not intended to be limiting. Furthermore, it is intended that the appended claims be interpreted as covering all such modifications as fall within the true spirit and scope of my invention.

What is claimed is:

1. A plating system for selectively plating a web of material comprising:

web transporting means for moving the web over a predetermined path;

flooding means disposed along said path for individually flooding the sections of the web with treatment fluids as it is transported thereby;

first selective plating means disposed along said path for subjecting selected discrete surface portions of the web to an electrolyte solution, said first plating means including a first header means disposed on one side of said path and having a web facing side, said first header means having an apertured electrically insulative sealing means affixed to said web facing side for sealingly engaging the web to define said surface portions, said first header means directing a flow of said electrolyte solution across said surface portions; and

potential supply means causing a plating current to be established through said solution, and between said first header means and the web; whereby said surface portions are subjected to an electroplating action;

said first selective plating means including means for moving said first header means into and out of engagement with the web, and said web transportation means including indexing means synchronized with said first header means for advancing the web along said path a predetermined distance while said header means is out of engagement with the web.

2. A plating system as recited in claim 1 wherein said selected discrete surface portions of the web are apertured so that said electrolyte solution flows therethrough, and wherein said first selective plating means further includes a second header means disposed on the other side of said path opposite said first header means for collecting the solution passed through the apertures in the web.

3. A plating system is recited in claim 1 wherein said sealing means is in the form of a first endless, apertured, belt-like gasket means disposed proximate said path, said first header means biasing one portion of said first gasket means into tracking engagement with the web.

4. A plating system as recited in claim 3 wherein said selective discrete surface portions of the web are apertured so that said electrolyte solution flows therethrough, and wherein said first selective plating means further includes a second continuous, apertured, belt-like gasket means, a second header means disposed adjacent said first gasket means and on the opposite side of said path for biasing said second gasket means into sealing engagement with the web, said second header means being operative to collect the solution passed through the apertures in the web.

5. A plating system as recited in claim 1 wherein said first header means includes means forming an entrance flow passage and an exit flow passage for respectively conducting said electrolyte solution to and from said discrete surface portions.

6. A plating system as recited in claim 1 and further including a second selective plating means disposed along said path for subjecting said discrete surface portion to another electrolyte solution, said second plating means including a second header means disposed on said one side of said path, said second header means having an apertured electrically insulative sealing means affixed to a web facing side thereof for sealingly engaging the web

to defined surface portions thereof, said second header means directing a flow of said another electrolyte solution across said surface portions.

7. A plating system as recited in claim 6 wherein said first plating means simultaneously subjects a predetermined number of said surface portions to said electrolyte solution and said second plating means subjects a multiple of said number of surface portions to said another electrolyte solution.

8. A plating system as recited in claim 1 further comprising a web drying means including a pair of heated members respectively disposed on each side of said path and resiliently biased into engagement with each side of a predetermined length of the web.

9. An apparatus for plating selected portions of a web of material, comprising:

a first header means including an electrically insulative portion forming a first web engaging face, said first header means having a first fluid passage extending therethrough with a first terminus thereof at said web engaging face, the outer periphery of said first terminus serving to define the boundaries of the selected portions of the web to be plated;

means for driving the web and said first header means into and out of engagement;

means for causing an electrolyte to flow through said first fluid passage; and

means for electrofying the web and said first header means to establish a plating current through the electrolyte flowing in said passage.

10. An apparatus for plating selected portions of a web of material as recited in claim 9 and further including a second header means having an electrically insulative portion forming a second web engaging face, said second header means being disposed with said second web engaging face facing said first web engaging face, said second header means having a second fluid passage extending therethrough with a second terminus thereof at said web engaging face, said second terminus conforming with said first terminus whereby said electrolyte is caused to flow from said first passage into said second passage when said first and second header means operatively engage opposite sides of the web.

11. An apparatus for plating selected portions of a web of material as recited in claim 10 wherein said first and second header means include a plurality of said first and second passages with each of said passages having termini at said first and second web engaging faces respectively, whereby a plurality of selected portions of the web can be simultaneously plated.

12. An apparatus for plating selected portions of a web of material as recited in claim 9 wherein said means for electrofying includes a first web engaging electrode means and a second electrode means carried by said first header means for electrically communicating with said electrolyte, said first and second electrode means establishing a current flow from said second electrode means through said electrolyte to the web.

13. An apparatus as claimed in claim 9 wherein said first header means includes a second fluid passage extending therethrough, said electrolyte flowing through said first passage and into engagement with said selected web portions defined by the outer periphery of the terminus and flowing back through said second passage.

14. An apparatus as claimed in claim 9 including means for moving said first header means into and out of engagement with the web, and web transporting means for moving the web over a predetermined path past said first header, said web transporting means including indexing means synchronized with said first header means for advancing the web along said path a predetermined distance while said header means is out of engagement with the web.

15. An apparatus as claimed in claim 14 wherein said web transporting means carries said web with the surface portions thereof to be plated lying in a substantially ver-

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tical plane, said header means being moved in a direction substantially normal to said vertical plane.

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JOHN H. MACK, Primary Examiner
5 D. R. VALENTINE, Assistant Examiner

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