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APPARATUS FOR FABRICATING ELECTROTYPING SHELLS

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Fig. 2

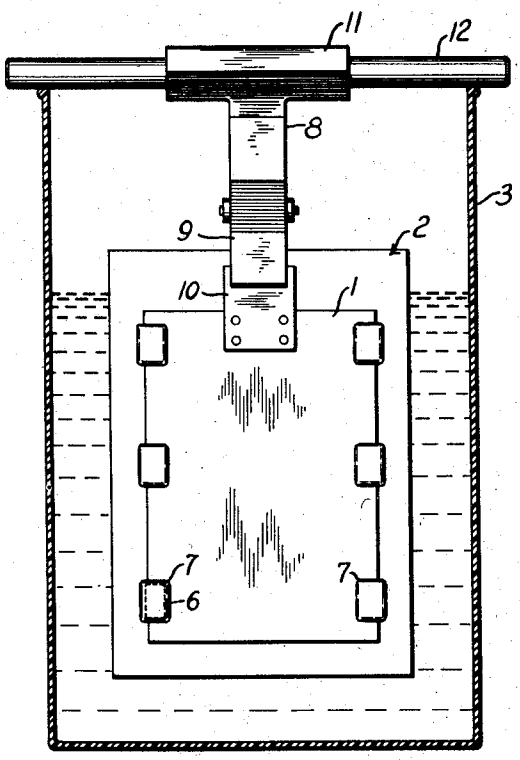


Fig. 1

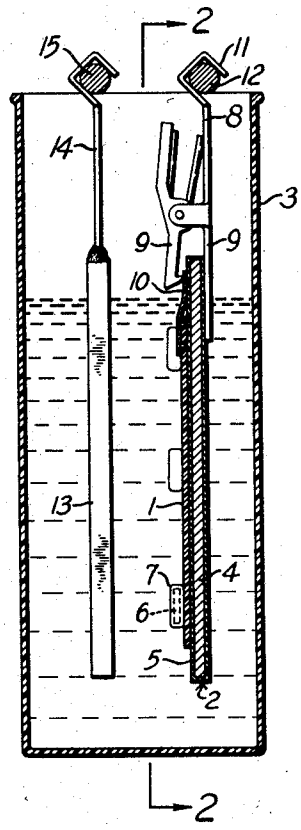
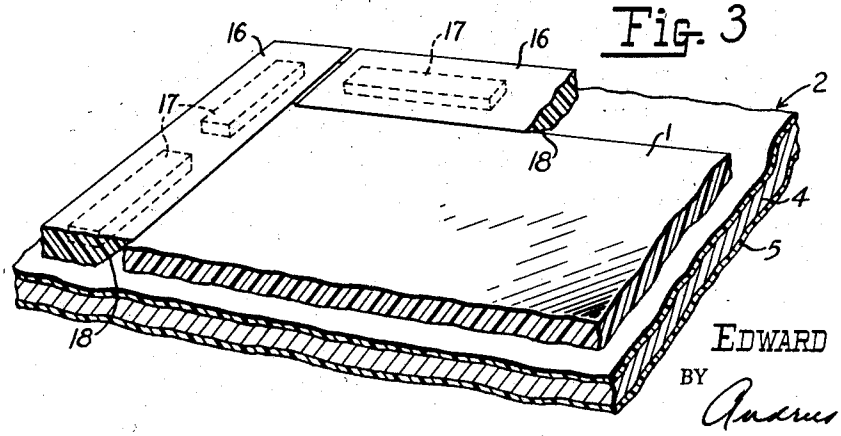


Fig. 3



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APPARATUS FOR FABRICATING ELECTROTYPING SHELLS

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This invention relates to an apparatus for fabricating electrotyping shells for letter press printing and more particularly to an improved apparatus for attaching the electrotyping molds to the case in prepartion for plating of the mold.

In the fabrication of electrotyping shells, a mold, made of plastic or the like, is initially formed having the desired surface contour of the electrotyping shells to be produced. The face of the plastic mold is coated with a layer of silver and subsequently the silvered mold is plated with copper in an electrolytic bath.

The copper shell thus deposited on the mold is stripped from the mold and is the basic electrotyping shell for letter press printing.

To support the mold within the electrolytic bath during the plating operation, the mold is attached to the surface of a case which is formed of a non-conducting material, such as glass or inert plastic. In a conventional apparatus for fabricating electrotyping shells, the mold is held against the case by a series of rubber bands or the like. The use of the rubber bands to hold the mold against the case can result in a serious problem if sulphur is present in the rubber for it may eventually contaminate the electrolytic bath. Furthermore, the rubber bands are difficult to assemble onto the case and require a considerable amount of handling and manipulation to firmly attach the mold to the case.

The present invention is directed to a simple and improved method of attaching an electrotyping mold to the case. According to the invention, the case is formed of a sheet of magnetic permeable material, such as steel, which is coated with an electrically non-conductive material, such as an inert plastic or the like.

The mold is held tightly against the case by a series of permanent magnets which are disposed in spaced relation on the periphery of the mold. The magnets are similarly covered with a coating of an electrically non-conductive material, such as an inert plastic, and serve to hold the mold in flat intimate contact with the case so as to minimize warpage of the mold during the plating operation.

The use of the magnets and the magnetic permeable material of the case eliminates the problem of possible contamination of the electrolytic bath which is associated with the use of rubber bands. Furthermore, the magnets are readily assembled on the mold and can be readily moved to accommodate different mold sizes and shapes.

In addition, the use of the plastic coated magnets substantially eliminates maintenance problems for the magnets have a generally long period of life or service.

The plastic coated steel case itself has advantages over the conventional case in that the use of the steel as a base material provides a case which resists warpage and holds its plane exceedingly well during the plating operation and thereby results in a generally straight mold. Secondly, the plastic coated steel case has excellent weight distribution which reduces swaying of the case within the electrolytic tank.

Other objects and advantages will appear in the course of the following description.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

Figure 1 is a vertical section of the electrolytic bath containing the apparatus of the present invention;

Fig. 2 is a section taken along line 2—2 of Figure 1; and

Fig. 3 is a modified form of the invention in which the magnets are employed in a plastic housing adapted to engage the edges of the mold.

The drawings illustrate an apparatus for plating an electrotyping mold to form an electrotyping shell for use in letter press printing. The apparatus, in general, comprises a mold 1 which is attached flatwise to a case 2 and is suspended within a vessel 3 containing an electrolytic solution to plate a layer of metal, such as copper, on the exposed face of the mold.

The mold 1 to be plated is generally formed of an inert material, such as Vinylite plastic or the like, and is provided with a surface contour or impression corresponding to the electrotyping shell to be subsequently formed. The face of the mold 1 is coated with a thin layer of silver which provides an electrically conductive surface for the mold on which the copper is deposited by electrolytic action.

The case 2 which supports mold 1 is formed of a magnetic permeable material, such as iron or steel 4, which is coated or otherwise covered with an electrically insulated material, such as inert plastic or the like 5. Various plastic materials, such as those sold under the name of "Plastisol" and "Tenadip" are satisfactory materials for use as the coating 5. The plastic coating 5 extends completely over the steel base 4 to completely enclose the base material.

While the case 2 is shown in the drawings as being generally flat, it is contemplated that the case may have a curved or otherwise contoured supporting surface.

According to the invention, the mold 1 is secured to the surface of the case 2 by a series of magnets 6 which are disposed in spaced relation along the periphery of the mold 1. The magnets 6 are each encased in an electrically insulating coating 7 formed of inert plastic or the like, which may be a similar material to that of coating 5. The magnets 6 serve to tightly hold the mold 1 against the case 2 and prevent buckling or warping of the mold during the plating operation. The surfaces of the magnets 6 facing the case have a contour to complement the contour of the supporting surface of the case. The magnets 6 can be disposed anywhere along the edges of the mold 1 and can be located to readily accommodate molds of various shapes and sizes.

The electrolytic solution contained within vessel 3 is of a conventional type and consists generally of a copper salt and an acid in an aqueous solution. For example, the electrolytic bath may contain the following ingredients per one gallon of water:

	Ozs. per gallon
Copper sulphate	30–40
Sulphuric acid	8–10

Copper fluorborate or other copper salts may be substituted for the copper sulphate in the above composition and other acids may be employed in place of the sulphuric acid.

A specific example of a suitable composition for the electrolytic bath per one gallon of water is as follows:

	Ozs. per gallon
Copper sulphate	32
Sulphuric acid	8

The case 2 and the attached mold 1 are suspended within the vessel 3 by an electrically conducting clamp 8. The lower end of clamp 8 is provided with spring-biased jaws 9 which engage the opposite sides of the case 2. The jaws 9 are adapted to clamp against an electrically conducting tab 10 secured to mold 1 to provide an electrical connection from the clamp 8 to the mold 1.

The upper end of the clamp 8 defines a hook 11 which is engaged with a conductor rod 12. Electrical energy is supplied to the conductor rod 12 by suitable connections, not shown.

A copper anode plate 13 is also suspended within the electrolytic solution by an electrically conducting hook 14 which is joined integrally with the anode plate 13 and is engaged with a conductor rod 15. Electrical energy is supplied to the rod through a suitable electrical connection, not shown. The current flow through the electrolytic circuit is such that the copper plate 13 is made the anode in the circuit and the mold 1, the cathode. In operation of the electrolytic bath, the copper anode is corroded forming copper ions in the electrolytic solution which are plated out on the silvered face of mold 1.

After the desired thickness of copper has been electrolytically deposited on the face of the mold 1, the case 2 with the attached mold is removed from the vessel 3. The deposited copper shell is removed from the mold 1 and serves as the basic electrotyping shell for letter press printing.

Figure 3 shows a modified form of the invention in which the mold 1 is held tightly against the case 2 by a series of bars 16 which are formed of an electrically non-conductive material, such as plastic or the like. A series of magnets 17 are imbedded in the bars 16 and are held tightly against the steel base of the case 2 by the magnetic forces.

The inner edge of bar 16 is beveled inwardly or undercut as indicated at 18, and the beveled edge 18 engages and holds the edge of the mold 1 against the case 2.

The bars 16 may be used in combination to hold the side edges of the mold or the bars 16 may be used in combination with a series of magnets 6.

The bars 16 are initially applied to the case and the edges of the mold are slipped under the beveled edge 18. The beveled edge which overlaps the periphery of the mold 1 prevents treeing which is a buildup of copper on the ridges or high points in the margin of the mold. Treeing is generally formed due to the concentration of current at these ridges or corners on the mold face.

In operation of the present invention, the plastic mold 1 is initially cleaned and is thereafter treated with a wetting agent which increases the ability of the mold to accept water. After treatment with the wetting agent, a sensitizer is sprayed on the mold. The sensitizer may take the form of a chloride compound, such as sodium chloride, and serves to make the silver precipitate more evenly on the face of the mold.

After application of the sensitizer, the surface of the mold is then coated with silver. This is generally accomplished by reducing a spray of silver nitrate in front of the mold and the free silver is precipitated on the face of the mold.

After the face of the mold 1 has been silvered, the mold is attached to the casing 2 by clamp 8 and the magnets 6 are disposed along the periphery of the mold to hold the edges of the mold firmly against the case. The mold is then placed in the electrolytic bath and suspended from the conductor rod 12. Current is then applied to the electrolytic circuit and copper is plated onto the face of the mold in a manner previously described.

The use of the magnets and the magnetic permeable case 2 to hold the mold firmly against the flat surface of the case is a simple and inexpensive method of maintaining the mold tightly against the case during the plating operation. The magnets can be placed at the desired locations on the periphery of the mold and serve to prevent the mold from warping or buckling during the electroplating.

The plastic material which is coated on the case and the magnets is selected so that it will not react with the electrolytic solution and, therefore, the electrolytic solution will not be contaminated by the use of the present invention.

The use of the magnets provides a flexible type of apparatus which can readily be used to hold various sized molds and various shaped molds to the surface of the case 2.

The handling and maintenance problems involved with the use of the magnetic holding means is substantially reduced over that of conventional holding devices.

The case, itself, having a steel base is substantially stiffer than conventional type cases and thereby prevents warping or buckling of the mold.

Furthermore, the steel case has excellent weight distribution and swaying of the case within the bath is thereby minimized. In the case of conventional lightweight cases, swaying will occasionally occur and thereby cause shorting when the metal face of the mold comes in contact with the anode 13.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In an apparatus for plating metal on the face of an electrotype mold to produce an electrotype shell, a case adapted to be submerged in an electroplating bath and formed of a magnetically susceptible material and having a surface to support the mold, an electrically insulating material covering said surface of the case, a magnet cooperating with the case and adapted to hold the electrotype mold against the case to minimize warping of the mold during the electroplating operation, and a substantially rigid insulating casing covering the entire surface of said magnet and having at least a portion of an edge thereof contoured to define an overhanging ledge adapted to receive an edge of the mold and prevent treeing of the plating metal along said edge of the mold and hold the mold against the case during the electroplating operation.

2. In an apparatus for plating metal on the face of an electrotype mold to produce an electrotype shell, a case adapted to be submerged in an electroplating bath and formed of a magnetically susceptible material and having a surface to support the mold, an electrically insulating material covering said surface of the case, a substantially rigid bar of electrically insulating material having at least a portion of an edge thereof shaped to define an overhanging lip adapted to receive the edge of the mold and prevent treeing of the plating metal along said edge of the mold and hold the mold against the case, and a series of magnets completely imbedded within the bar and cooperating with said magnetic susceptible case to tightly hold the mold against the case.

3. The structure of claim 2, in which the bar is an elongated member formed of a substantially rigid plastic material and the series of magnets are aligned in end to end relation with the longitudinal edges of said bar.

4. In an apparatus for plating metal on the surface of an article to produce a thin metallic shell, a container for containing an electroplating solution, a support member suspended within the container and disposed for contact with said electroplating solution, said support member being formed of a sheet of magnetically susceptible material and having a surface to support the article to be plated, an electrically insulating coating substantially completely covering the support member and being generally inert to said electroplating solution, a magnet cooperating with the magnetically susceptible support member to tightly hold the article against the support member and minimize warping of the article during the electro-

plating operation, a second electrically insulating coating substantially completely covering the entire outer surface of said magnet and being generally inert to said electroplating solution, and means for making the article held against said support member the cathode in an electrolytic circuit whereby a plating metal is deposited on the exposed surface of the article to form a thin metallic shell.

5. In an apparatus for plating metal on the surface of a mold to produce a thin metallic shell, a non-metallic vessel for containing an electroplating solution, a conductor member mounted on said vessel and connected to a source of electrical energy, a case suspended within the vessell and disposed for contact with said electroplating solution, said case formed of a magnetically susceptible material and having a surface to support the mold to be

plated, a series of magnets cooperating with the magnetic susceptible case to tightly hold the mold against the case, an electrically insulating coating covering the case and being generally inert to said electroplating solution, a second electrically insulating coating covering each of said series of magnets and being generally inert to said electroplating solution, and means for electrically connecting said mold held against said case to said conductor member to thereby establish an electrolytic circuit and deposit the plating metal on the mold to produce the shell.

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