The Production of Electroplated Printing Plates

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Some time ago I purchased a copy of the book *Postage Stamps in the Making* (see next page), a publication from 1949 by John Easton (London, Faber&Faber). Interesting as it described the various printing techniques used and the origin of flaws in stamps, associated with those techniques. It also discusses the production of typographic plates. Curiously it does not mention the photographic etching technique used for the Czechoslovak plates up to 1923, but it does discuss the electrolytic process to produce duplicates from an original (die or etched plate). What becomes clear is that the use of wax moulds was clearly the established technique (citations from the book):

> *1. Making an impression from the original in wax:*
> As a preliminary the die, or forme of type [original etched plate – JS], is dusted with blacklead. Simultaneously a slab of wax has been prepared by pouring molten wax into a tray and allowing it to cool. This slab is usually planed to a given thickness, dusted with blacklead, and laid on the die or forme of type. An impression is then taken in a hydraulic press and the complete image of the die or type is thus moulded in wax." (…) "the wax mould is again coated with blacklead and is ready for the electrotyping vat. (…)

The *blacklead* referred to is in fact finely powdered graphite, used to make the surface conductive, which is essential for the next step.

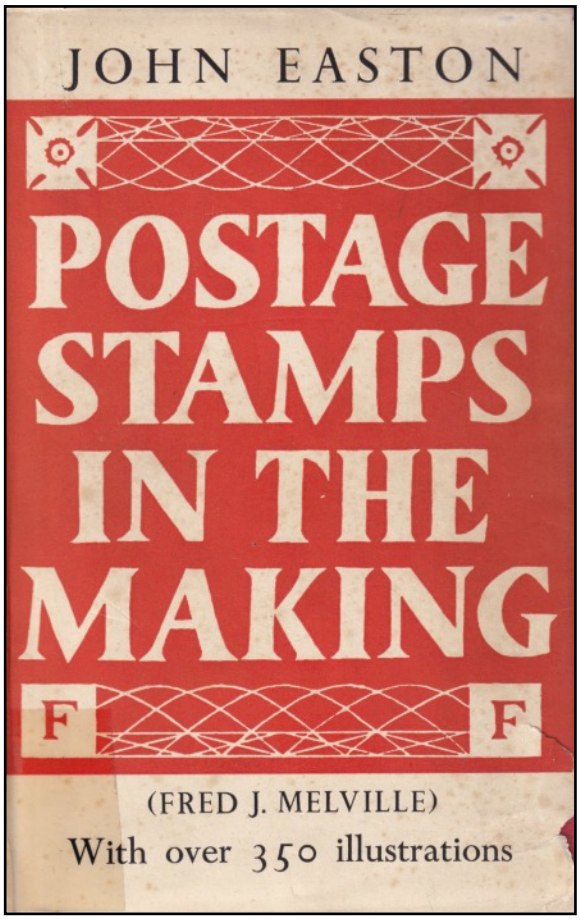
> *2. Electroplating the wax mould*
> The mould is fitted with brass hooks and hung on to one of the rods connected with the negative pole. A sheet of copper (the anode) is suspended opposite the mould from a rod connected with the positive pole of the battery. The current is then switched on and a copper shell is slowly deposited from the anode to the surface of the mould, owing to the presence of the coating of blacklead. It takes from five to eight hours to reach the required thickness, when the mould is taken out of the vat and the copper shell removed. The surface of the copper shell which was next to the mould becomes the printing surface of the plate into which it is next converted. This surface will show the type, or the design of the die, in negative, exactly corresponding to the original." (…)
>
> In a large printing house several moulds in various states would be in process of being electrotyped in a vat simultaneously, and many printers start the growth of the shell before the mould is inserted in the vat by brushing the face of the mould with iron filings in solution. This hastens the deposit and ensures the copper being evenly deposited from the moment that the electrolytic action begins.

> *3. Preparing the printing plate*
> The copper shell is carefully cleaned and then backed with a metal alloy composed of lead, tin and antimony. Before this backing metal is applied, the shell is placed printing-face downwards on an iron tray. The back of the shell is then brushed over with spirits of salt, and covered with sheets of tinfoil. The tray has already been heated by being placed on the surface of the molten metal which is to be used for backing the shell, and the tinfoil immediately becomes liquid and fuses to the back of the shell. Molten metal is then poured over the back of the tinned shell, and when it has cooled the manufacture of the printing plate, in its rough state, is finished. The plate is then cut and trimmed to shape, hammered up and flattened to an even surface, planed to a standard thickness and bevelled at the edges. (…) The plate is now ready for the printing-press.

The alloy used as backing metal had the convenient property that it does not shrink when it solidifies and cools. Thus it just strengthens the thin copper foil.

To make the printing plates produced more durable (and resistant to chemical reaction with components of the printing ink) they were commonly *steel-faced* or in the 1920s more probably *nickel-faced*; that is, a thin coating of nickel was deposited on the copper surface by electro-plating in a nickel bath.

What remains unclear in this description is whether the wax mould (or matrix as called in Mark's text) was a one-off, made anew for every plate, or if it could be reused. I can imagine that the same original etched plate could be used to make a series of wax moulds without any excessive wear or damage occurring.



Electrotyping

There is no need to describe the process of electrotyping in great detail. As a preliminary the die, or forme of type, is dusted with blacklead. Simultaneously a slab of wax has been prepared by pouring molten wax into a tray and allowing it to cool. This slab is usually planed to a given thickness, dusted with blacklead, and laid on the die or forme of type. An impression is then taken in a hydraulic press and the complete image of the die or type is thus moulded in wax.

Wax moulding

Radical alterations cannot be made on the wax mould, for the 'downs' caused by the spacing material, or shoulders of the type, represent roughly the surface of the wax mould, and the type face itself appears in positive in crevices. As this position will be reversed in the next process opportunity is usually taken of accentuating the 'downs' further by building up on them little heaps of molten wax, which quickly harden. This is necessary because the spaces used when setting type to be electrotyped are higher than the normal spaces used when the job is to be printed direct from type; in fact, they are level with the shoulders of the type. This limits the extent to which the wax will be pushed into the type during moulding, and gives added strength to the foundation of the letters on the electroplate.

When the building-up process has been completed the wax mould is again coated with blacklead and is ready for the electrotyping vat.

Lead moulding

Soft sheet-lead can be used as the moulding medium, and was in fact so used by de la Rue for duplicating their dies. It gives a finer impression than wax, and is not liable to shrinkage. It requires much greater pressure for the transfer.

Electrolytic deposit

Wooden vats, lined with lead, are filled with a solution of copper sulphate, which is capable of being agitated either by the

introduction of air or by constantly raising and lowering the level of the solution with a pump connected to an exhaust pipe. This agitation prevents particles of dirt or grit from settling on the mould while the deposit is in progress, or a bubble of air from sticking to the mould, either of which would create a weakness in the plate at that particular point.

Across the top of the vats a series of brass rods is fixed, connected with an electric battery. The rods are connected alternately to the positive and negative poles of the battery (81).

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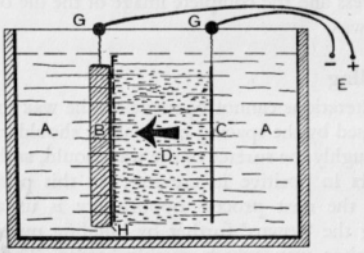

81. Diagrammatic illustration of the general principles of the electrolytic deposit: (**A**) sulphate of copper solution in vat; (**B**) wax mould; (**C**) copper plate, or anode; (**D**) direction of copper deposit; (**E**) leads connecting to battery or dynamo; (**F**) the blackleaded surface of the mould; (**G**) brass rods on which the mould and copper sheet are suspended, lying across the vat; (**H**) copper shell growing over the face of the mould.

anode) is suspended opposite the mould from a rod connected with the positive pole of the battery. The current is then switched on and a copper shell is slowly deposited from the anode to the surface of the mould, owing to the presence of the coating of blacklead. It takes from five to eight hours to reach the required thickness, when the mould is taken out of the vat and the copper shell removed.

The surface of the copper shell which was next to the mould becomes the printing surface of the plate into which it is next converted. This surface will show the type, or the design of the die, in negative, exactly corresponding to the original.

In a large printing-office, dynamos take the place of a battery of cells.

Making the printing plate

The copper shell is carefully cleaned and then backed with a metal alloy composed of lead, tin and antimony. Before this backing metal is applied, the shell is placed printing-face downwards on an iron tray. The back of the shell is then brushed over with spirits of salt, and covered with sheets of tinfoil. The tray has already been heated by being placed on the surface of the molten metal which is to be used for backing the shell, and the tinfoil immediately becomes liquid and fuses to the back of the shell. Molten metal is then poured over the back of the tinned shell, and when it has cooled the manufacture of the printing-plate, in its rough state, is finished.

The plate is then cut and trimmed to shape, hammered up and flattened to an even surface, planed to a standard thickness and bevelled at the edges. If it has large patches of white 'downs' they will be routed down still further in order to avoid any risk of their marking the paper during printing. The plate is now ready for the printing-press.

Special methods employed when printing stamps

The die of a stamp is a very small subject to electrotype separately by the method described above. It was de la Rue's practice to take as many separate lead moulds from the die as there were to be units of the printing-plate and clamp them together in a special chase, building them round with solid metal furniture. The chase itself was then suspended from the rods of the vat instead of a lead or wax mould. For a sheet of 240 units, divided into four panes of 60 units, it would only be necessary to make a plate for one pane of 60 units by this method. The remaining three plates could be duplicated from the first plate by straightforward electrotyping.

In a large printing house several moulds in various states would be in process of being electrotyped in a vat simultaneously, and many printers start the growth of the shell before the mould is inserted in the vat by brushing the face of the mould with iron filings in solution. This hastens the deposit and ensures the copper being evenly deposited from the moment that the electrolytic action begins.

For the early French stamps Hulot used gutta-percha instead of wax for making his moulds, as it is tougher. Previously he had used little blocks of lead, and it is related that when Ormond Hill visited the French printer's premises the use of lead for moulds