Feb. 20, 1934. T. F. MITCHELL 1,947,916

METHOD OF MAKING DIES

Filed June 17, 1931

Fig. 1

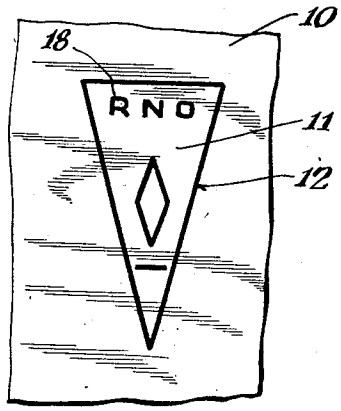


Fig. 2

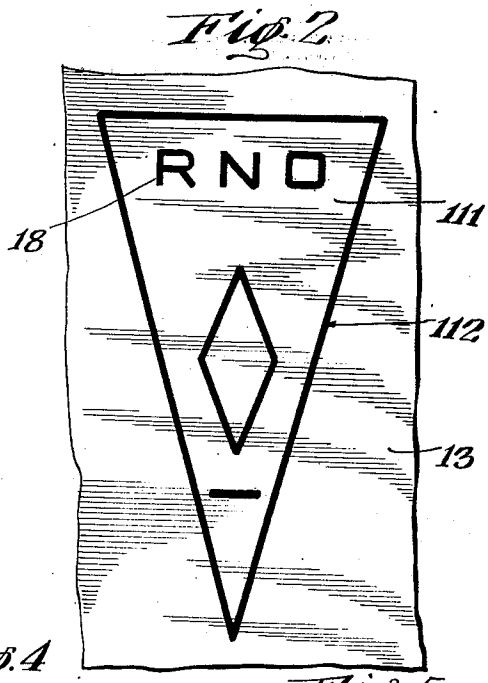


Fig. 3

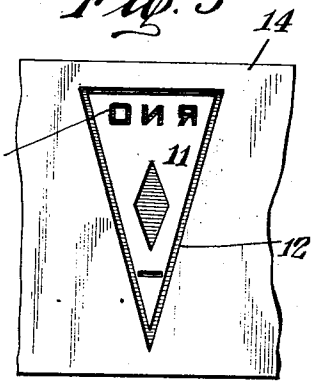


Fig. 4

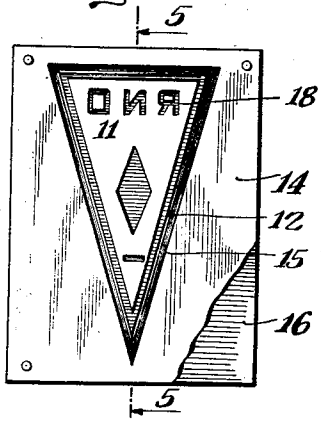


Fig. 5

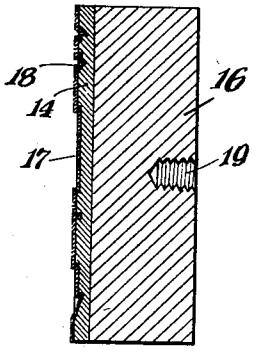


Fig. 6

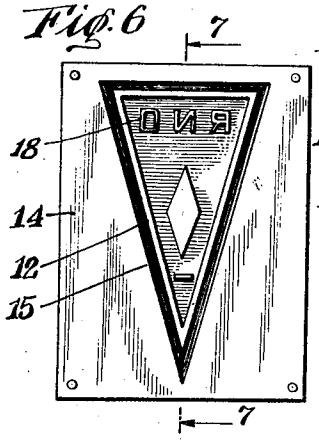
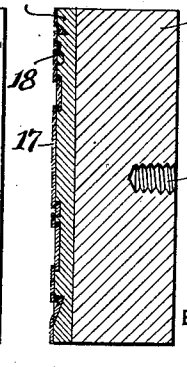


Fig. 7



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Patented Feb. 20, 1934 1,947,916

UNITED STATES PATENT OFFICE

1,947,916

METHOD OF MAKING DIES

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Application June 17, 1931. Serial No. 545,019

5 Claims. (Cl. 76—107)

This invention relates to improvements in the method of making dies. Dies made in accordance with the process hereinafter described are particularly adapted for use in that department of the printing art which relates to embossing or debossing and which includes the manufacture of art labels.

In the embossed printing art it is necessary to make a die in the form of a reversed replica of the desired art work. The well known copper plate used for making engraved business cards and the like represents one form of die of the known art. A copper die or copper plate however owing to the softness of the metal of which it is made has a relatively short useful life and is unfit for further use after a comparatively small number of engraved pieces have been produced. When a die is to be used for embossing or debossing, or for manufacturing art labels it is necessary to use greater pressure than when the die is to be used for ordinary copper plate engraving and as the required number of impressions or reproductions may run into hundreds of thousands a copper plate or die made of copper owing to its short useful life would be entirely unsuited for this purpose and accordingly it has heretofore been customary to replace the copper die with one or more steel dies. As dies must be hand engraved and steel is hard to cut steel dies are very expensive to make and increase the ultimate cost of the art product. When the order is for many thousands of reproductions it is customary to make a multiple unit consisting of a plurality of dies which can be mounted in a single press to simultaneously produce a plurality of reproductions so that the output of the operator of the press in any given period of time can be multiplied accordingly thereby appreciably reducing the cost of production insofar as the cost of the labor of the press operator is concerned, while at the same time increasing the die cost. Obviously it is of great importance in estimating the cost of producing any given quantity of art productions to strike a correct balance between the cost of any given number of dies required and the saving in wages to be accomplished by the use thereof. When hand tooled steel dies are used the cost of the dies increases in direct ratio to their number and the die must be made from an illustration conforming in size to the ultimate reproduction so that when the reproduction desired is small it is very difficult, if not impossible, to insert much detail, and it is still more difficult for the engraver to reproduce fine detail work on a steel die. Steel dies have also been made by an etching process employing acid but owing to the time required in the acid bath for etching steel this process is both slow and costly.

One of the principal objects of this invention is an inexpensive substitute for a steel die.

Another object is to decrease the proportionate cost of a series of dies when the same are made as a multiple unit.

Another object is to reduce the time required in the manufacture of printers' dies.

Another object is the inexpensive production of a die bearing a largely increased amount of detail.

Other objects will appear from the detailed description which follows:—

In the drawing comprising but a single sheet of seven figures numbered Figures 1 to 7 inclusive, certain embodiments of the invention are set forth:—

Figure 1 illustrates an art sketch of the desired reproduction drawn to exact scale;

Figure 2 represents a black and white enlargement of the sketch of Figure 1;

Figure 3 is a plan view of a copper die for reproducing an impression of the art work of Figure 1 to scale;

Figure 4 is a plan view of the finished die of Figure 3;

Figure 5 is a vertical cross section of the die of Figure 4 taken along the line 5—5 of Figure 4 looking in the direction of the arrows;

Figure 6 is a top plan view of a variation; and

Figure 7 is a vertical section taken along the line 7—7 of Figure 6 looking in the direction of the arrows.

Like reference characters designate corresponding parts throughout the several figures of the drawing.

An art sketch 11 (Figure 1) on any form of paper 10 is first made. This art sketch consisting of a series of characters or symbols 18 assembled to produce the desired tout ensemble surrounded with a peripheral line 12 preferably defining a closed figure is preferably of the exact size of the ultimate reproduction.

From the art sketch of Figure 1 an enlargement (Figure 2) on a suitable background 13 is prepared in black and white the symbols 18 being arranged to reproduce the tout ensemble 111 surrounded by the peripheral line 112 defining the shape of the die. Figure 2 may be enlarged on any preferred scale best suited to bring out all of the desired detail.

If the die is to be in the form of a single unit the black and white enlargement of Figure 2 reduced to the size of the ultimate die is photographically reproduced upon a light sensitive copper plate 14 (Figure 3). On the other hand if it is intended to make a multiple unit die, a sufficient number of photostatic reproductions of the black and white enlargement are made and said photostats are then placed side by side so as to occupy a minimum amount of space

wherein the finished product (as for example in the manufacture of art labels and seals) the space between dies would be waste material. The photostats thus unitarily arranged are then photographically reproduced to the size of the ultimate die upon a light sensitive copper plate. In any event the copper plate is now subjected to a photoengraving or photoetching process by being immersed in an acid bath whereby the art work of Figure 1 is reversely engraved upon the copper plate 14. It should be understood that while for purposes of illustation only one reproduction 11 is disclosed upon the copper plate 14 (Figure 3) any desired number of reproductions placed for example, base to apex, could be reproduced upon the copper plate 14 the number of reproductions being dependent upon the number of dies to be assembled in the multiple unit die.

After the photoengraving process has been completed the die may be provided with a hand tooled or hand engraved cutting edge 15 (Figure 4) individually surrounding each closed figure if it is intended to be used for the manufacture of art labels or seals, while if it is to be used for embossing by a die stamping operation the cutting edge 15 will not be required. In either event however whether the cutting edge 15 is supplied or omitted the die 14 is now subjected to an electroplating process for the purpose of covering the surface of the die with an electrolytically deposited chromium surface 17 (Figure 5) after which the die 14 is mounted upon a suitable metal base 16 which may be threaded as indicated at 19 to permit the die to be readily mounted in a die stamping press or automatic label press according to the use to which the die is intended to be put.

It is assumed that the die illustrated in Figures 4 and 5 is intended to be used for embossing purposes in which event the symbols 18 will define recesses in the face of the die 14, while it is assumed that the die disclosed in Figures 6 and 7 is to be used for debossing purposes in which event the symbols 18 will be in raised relief above the surface 14 of the die.

The thickness of the chromium plated deposit 17 will vary dependent upon the amount of detail work carried by the die. Where the detail work is delicate only a light chromium plate will be applied, whereas when the symbols are more substantial a heavier chromium plate 17 can be applied without blurring the die. Obviously any detail work no matter how complicated which the artist is able to insert in the black and white enlargement of Figure 2 will be faithfully reproduced on a reduced scale during the photoengraving process and the artist will be able to make alterations and corrections in the black and white enlargement of Figure 2 without difficulty until the tout ensemble is perfectly satisfactory, whereas if the die 14 was made of steel and hand tooled any mistakes made by the engraver would necessitate the making of an entirely new die and the more nearly the die was completed when the mistake arose the greater would be the expense involved in eliminating the mistake.

The die produced by the process described herein has all the advantages of a copper plate as to cost of production and of a steel die as to durability.

While in the embodiment illustrated the die is made of copper plated with chromium any other inexpensive acid responsive metal might be substituted for the copper so long as it possesses an electrolytic affinity for chromium and any other plated steel-like surface might be substituted for the chromium plated surface 17 so long as the substituted metal can be electrolytically deposited upon the acid responsive base 16.

If the die is provided with a cutting edge 15 it can be used in an automatic label press for cutting out labels, seals, and the like, irrespective as to whether the same are embossed or debossed, while if the die is intended to be used for die stamping purposes, that is, for embossing cards, labels, etc., previously or subsequently cut to size by a separate operation the cutting edge 15 will not be required. It should be understood however, that where the die is intended to be used for making labels or seals in an automatic label press the cutting edge must remain sharp at all times as the life of such a die is in effect determined by the life of the cutting edge and the cutting edge can only be retained if the die has a hard surface, such as is obtained with steel or with a chromium plated steel-like surface 17.

What is claimed is:

1. The method of making a die for an automatic label press which consists in delineating the design upon a foundation of relatively soft metal, hand-tooling a raised encircling cutting edge out of said metal about the peripheral edge of the foundation design, and chromium plating the foundation design and the cutting edge to provide an exceedingly hard working surface for the die.

2. The method of making a die for an automatic label press which consists in photo-engraving the detail of the ultimate die upon a soft metal body, hand-tooling a raised encircling cutting edge of said metal about the peripheral edge of the engraved detail, and uniformly surfacing said engraved detail and said cutting edge with an electrolytically deposited coating of chromium.

3. The method of making a die for an automatic label press which consists in photo-engraving the die detail upon an acid-responsive relatively soft metallic foundation, hand-tooling an encircling cutting edge of said soft metal about the peripheral edge of the engraved die, and superimposing a hard working surface of uniform thickness upon the soft metal die by electrolytically depositing a layer of chromium thereon.

4. The method of making a die for an automatic label press which consists in photo-engraving the die detail upon a copper foundation, hand-tooling an encircling cutting edge of copper around the peripheral edge of the die detail, and reinforcing the die with a hard working surface faithfully conforming to the surface contour of the die by electrolytically depositing a layer of chromium thereon.

5. The method of making a die for an automatic label press which consists in preparing an art sketch conforming in size, shape and design to the finished die, enlarging the art sketch and bringing out the desired detail, photographically reproducing the die in its ultimate size from said enlargement upon a light sensitive copper plate, hand-tooling an encircling cutting edge around the die detail, and chromium plating said detail and said cutting edge.

THOMAS F. MITCHELL.