

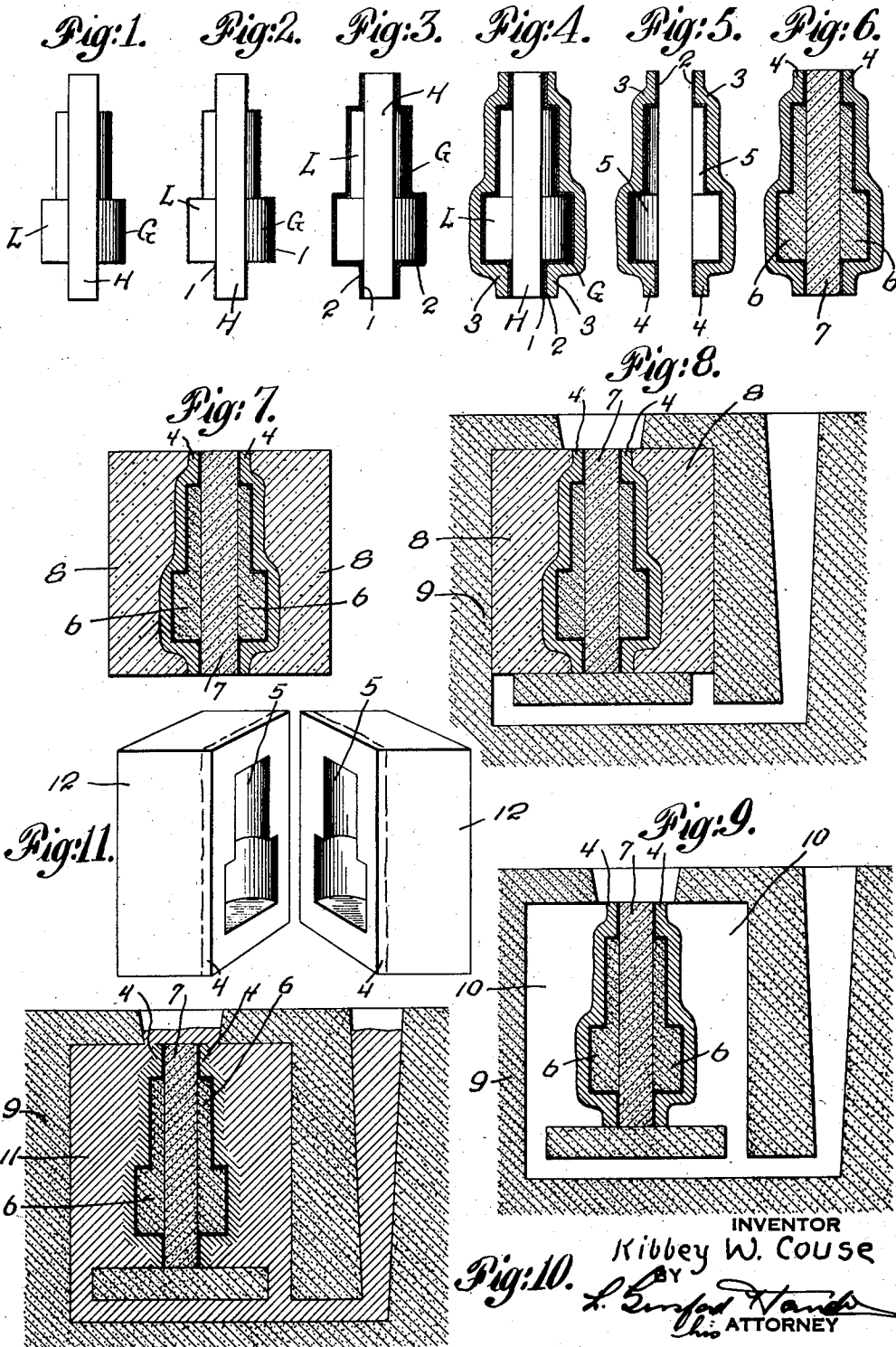
June 6, 1933.

K. W. COUSE

1,912,889

METHOD OF PRODUCING METALLIC DIES

Filed March 17, 1931



UNITED STATES PATENT OFFICE

KIBBEY W. COUSE, OF TAOS, NEW MEXICO

METHOD OF PRODUCING METALLIC DIES

Application filed March 17, 1931. Serial No. 523,238.

This invention relates to a method of producing metallic dies, and an object is to provide an improved method whereby metallic dies for use in various relations, as for instance the production of die castings and the like, may be readily produced at small cost.

A further object is to provide a method whereby such dies may be produced having great accuracy of form and of high quality and durability.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts, steps of procedure and applications of principles constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawing which is to be taken as a part of this specification, and in which I have shown merely a preferred form of device by which to perform the present method.

Fig. 1 is an elevational view illustrating a pair of half masters mounted upon a carrying plate.

Fig. 2 is a similar view illustrating the parts of Fig. 1 as having a surface treatment thereon.

Fig. 3 is a similar view but showing the parts of Fig. 1 as being further coated with a coating of metal.

Fig. 4 is a similar view illustrating an additional coating of metal upon the parts shown in Fig. 1.

Fig. 5 is a sectional view illustrating the several coatings now constituting a pair of metallic half shells.

Fig. 6 is a similar sectional view showing the half shells of Fig. 5 as being filled with refractory material and mounted upon a carrying plate.

Fig. 7 is a similar sectional view showing the parts of Fig. 6 as being built up with a suitable removable material.

Fig. 8 is a similar sectional view showing

the parts of Fig. 7 as they appear in position within a suitable mold.

Fig. 9 is a view similar to Fig. 8 but the removable material being now removed.

Fig. 10 is a view similar to Fig. 9 but the removable material of Fig. 8 being replaced by metal, and

Fig. 11 is a perspective view illustrating the mating pair of metallic die blocks as they appear when completed.

The various steps of procedure illustrated may be described as follows:

In Fig. 1 an article consisting of two half models, or "half masters", as L and G are shown, being arranged in proper mating relation at opposite sides of a carrier plate as H. These elements, L, G and H may be of any appropriate material such as wood, composition, metal, or otherwise, and it will be understood that the "half masters" L and G, if brought together without the presence of the carrier plate H, are of the precise form for which the finished dies, or die blocks, is desired. Each half master constitutes a pattern for the moulding cavity or impression of one die block. They may for instance be a wood or metallic model of the precise article which is to be reproduced by the die.

The carrier plate H may be of any appropriate thickness but its height and width correspond preferably with the height and width of the completed die blocks to be produced.

After applying a light coating of grease or other appropriate treatment, as indicated by the dotted lines 1 in Fig. 2, to the opposite side surfaces of the parts illustrated in Fig. 1, then said surfaces are flashed over with a very light coating of copper plating, as indicated at 2 in Fig. 3, and then said surfaces are covered with a layer of nickel as indicated at 3 in Fig. 4.

The layers 1, 2 and 3 may be applied in any appropriate manner, but the layers 2 and 3 at least are preferably applied by electro-deposition or metal spraying or in like manner.

It may be here noted that the layer of grease 1 is merely to prevent adhesion of the copper 2 to the master, and that the copper

is merely an expedient to facilitate the application of the nickel 3 upon the master. Both the grease and the copper are negligible elements in the final result. The grease disappears completely, and the copper is so thin as to be of no consequence. The coating 3 of nickel however is of such thickness as to constitute a pair of substantial half shells as 4—4 which may be readily lifted away from opposite sides of the masters, and according to this invention, said shell parts, as indicated in Fig. 5, are to be separated from the masters, and from the plate H. The cavities as 5—5 of course have the identical shape of the exterior surface of the parts L and G. The walls of the cavities are of nickel, the copper 2 being, as above stated, of such great thinness as to be of no consequence.

These two shell parts 4—4 are now filled with a suitable refractory material as 6—6, such as fireclay, or carbon paste, or the like, and are now dried and mounted back to back upon a carbon or other suitable plate 7 which corresponds with or replaces the carrier plate H, as illustrated in Fig. 6.

After the shell parts have been filled and mounted upon the plate 7 as in Fig. 6 then they are built up with wax or the like as at 8—8 to represent the desired die blocks as indicated in Fig. 7.

After the wax has been applied as in Fig. 7 then the whole is used as a pattern about which a mould 9 is rammed up as indicated in Fig. 8.

After the mould has been completed as in Fig. 8 then heat is applied and the wax thereby melted and drawn off so that the two shells 4—4 with their filling 6 and the intervening carbon plate 7 is left standing within the mould with open spaces 10—10 at opposite sides previously occupied by the wax, as indicated in Fig. 9.

After the wax has been withdrawn as in Fig. 9 then the mould is filled in the usual manner with a suitable molten metal 11 such as iron, steel, bronze, thermit nickel steel or otherwise, the thermit nickel steel being preferable on account of its high melting point, ease of obtaining the desired composition and the purity of the resulting metal, as indicated in Fig. 10.

It is a feature of this invention that the metal 11 when poured into the mould shall alloy with the metal comprising the shell parts 4—4 but without breaking down said shell parts. Where the shell parts 4—4 are of nickel, the thermit nickel steel, alloying therewith but not breaking down said shell parts, will produce a pair of nickel steel die blocks wherein the surfaces of the impressions, that is the walls of the cavities 5—5 above referred to, are rich in nickel.

After the metal 11 has been allowed to cool and has been removed from the mould 9, and the gates cut-off, the fillers 6—6 and

the plate 7 are removed leaving the completed pair of die blocks 12—12 as indicated in Fig. 11.

Removal of the plate 7 of course permits the die blocks to come flush together for use as will be readily understood.

The impression cavities 5—5 of the die blocks produced by this method are of precisely the same contour as the masters L and G and any number of die blocks may be produced from a single pair of masters and all will be of the same uniform accuracy in every respect. The walls of the impression cavities may be of any desired metal, and the bodies of the die blocks may likewise be made of any desired material, all to the end that the finished die blocks may be of desired efficiency for their intended purpose at a minimum of production cost. If the die blocks are to be used for the casting of material having a high melting point then the materials used in the die block formation should of course have a high melting point, whereas if the dies are to be used for the casting of material of low melting point then the material from which the dies are formed may be correspondingly cheaper and of lower melting point.

It may be stated that if desired the steps indicated in Figs. 1 to 4, and by which the shell parts 4—4 of Fig. 5 are produced, may in some instances be omitted and that said shell parts 4—4 may be produced by any other preferred means such for instance as by being stamped up or pressed into form from a piece of appropriate sheet metal.

Also it may be noted that in some instances if preferred the refractory materials 6—6 and 7, instead of being used as a filler for the completed shell parts 4—4, may themselves be used as a master upon which said shell parts may be formed directly.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The herein described method of producing a mating pair of metallic die blocks, which method consists in providing a pair of metallic half shells having the interior contour desired for the impression cavities of the die blocks, filling said shells with refractory material, mounting said filled half shells in mating relation upon the opposite side surfaces of a suitable carrying plate, building up with removable material the outer surfaces of said half shells to the size desired for the completed die blocks, providing a mold about said built up half shells and carrying plate, removing said removable material so as to leave said half shells in supported relation upon the carrying plate within the mold, filling the mold with molten metal to replace said removed material and to alloy with the metal of the half shells without breaking down said half shells, and then allowing the

whole to cool and removing the completed die blocks from the mold and from said carrying plate and refractory filling material.

2. The herein described method of producing a mating pair of metallic die blocks, which method consists in providing a pair of half masters, mounting said half masters in mating relation upon the opposite side surfaces of a suitable supporting plate marginal portions of which project beyond said half masters, forming metallic half shells upon said plate and said half masters so that said half shells fit accurately to said plate and half masters and hence have interior contours corresponding with the interior contours desired for the impression cavities of the die blocks, removing said half shells from said plate and half masters, filling the cavities of said half shells with refractory material, mounting said filled half shells in mating relation upon the opposite side surfaces of a suitable carrying plate, building up with removable material the outer surfaces of said half shells to the size desired for the completed die blocks, providing a mold about said built up half shells and carrying plate, removing said removable material while said half shells continue undisturbed in supported relation upon the carrying plate within the mold, filling the mold with molten metal to replace said removed material and to alloy with the metal of the half shells without breaking down said half shells, and then allowing the whole to cool and removing the completed die blocks from the mold and from said carrying plate and refractory filling material.

In testimony whereof I affix my signature.
KIBBEY W. COUSE.