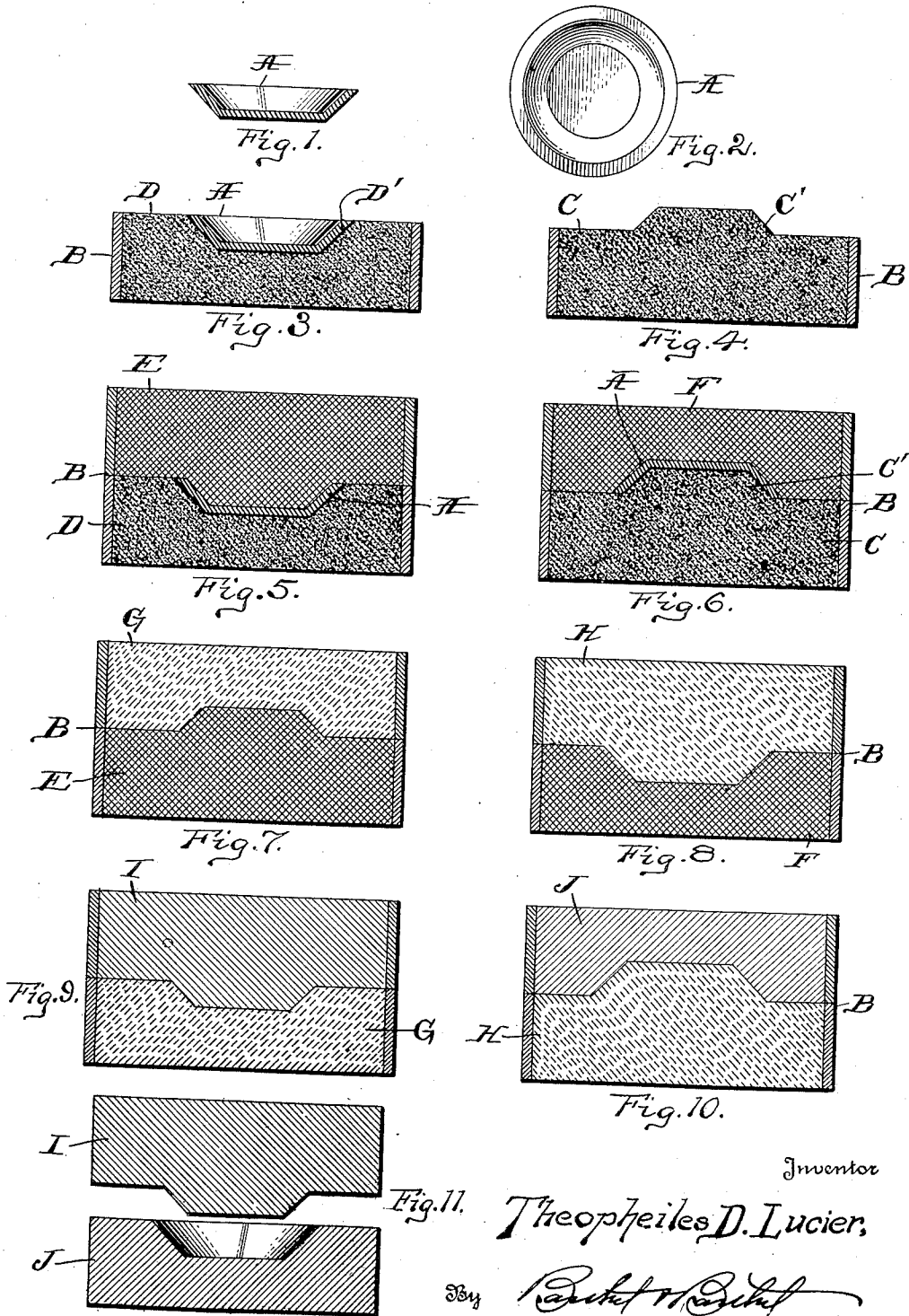


1,357,503.

Patented Nov. 2, 1920.



Inventor

Theopheiles D. Lucier,

By

Robert W. Lucier

Attorneys

UNITED STATES PATENT OFFICE.

THEOPHEILES D. LUCIER, OF DETROIT, MICHIGAN.

PROCESS OF MAKING DIES.

1,357,503.

Specification of Letters Patent.

Patented Nov. 2, 1920.

Application filed November 13, 1919. Serial No. 337,801.

To all whom it may concern:

Be it known that I, THEOPHEILES D. LUCIER, a subject of the King of England, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Processes of Making Dies, of which the following is a specification, reference being had therein to the accompanying drawings.

Dies for forming articles or parts from metal blanks are usually formed from solid blocks of steel or other suitable metal, by machining, routing, chipping or otherwise cutting away the metal by hand or the use of various machines and when the dies are at all complicated, this is a long tedious and expensive operation.

This invention aims to greatly reduce the expense and time required in making up male and female parts of dies, by employing a casting process embodying the invention wherein such dies may be produced with great facility and accuracy and without the necessity for employing the expensive processes of machining, hand and other detail work in forming the depressions in and mating projections upon the faces of solid blocks. A further object is to provide a process which may be varied according to the form and nature of the article to be produced and the kinds of metals employed.

With the above and other ends in view, the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawing which is merely illustrative of means for and a method of carrying out a process embodying the invention, and wherein

Figure 1 is a transverse section through a pattern of an article, the dies for forming which are to be produced by a process embodying the invention;

Fig. 2, a plan view of the same;

Fig. 3 is a sand or similar mold with the pattern in place therein;

Fig. 4, is a reverse of the mold shown in Fig. 3, with the pattern removed;

Figs. 5 and 6 show the step of casing replicas or die parts in a firm substance, preferably metal of comparatively low melting temperature;

Figs. 7 and 8 show the step of casting replicas of die parts from a material, preferably of a plastic nature and of high heat resisting qualities;

Figs. 9 and 10 show the step of casting the parts of the desired die; and

Fig. 11 shows the finished die parts.

For the purpose of illustration, a pattern 60 or duplicate A of a very simple article is shown in the drawing, but it will be understood that a pattern of any article of any size or configuration capable of being formed in a die, may be used in this process of casting dies for forming such article, and it will also be understood that any suitable form of flask B or other devices necessary in carrying out the method or process embodying the invention may be employed. The pattern A is preferably made of metal but it will be understood that any material suitable for the purpose may be employed.

As illustrated in Figs. 3 and 4 a mold is formed of sand or other suitable material in the usual manner within the flask B by the use of the pattern A, giving the cope C with the raised portion C' thereon and the drag D with the depression D'. By the use of the sand cope and drag, as shown in Figs. 5 and 6, castings E and F are made preferably from a suitable metal which will melt at a lower temperature than the melting point of the pattern, these castings being cast upon the cope and drag within the upper half of the flasks, with the pattern in place so that cope and drag are reproduced in a metal of sufficient rigidity to withstand crushing strains or loads and these castings will be a replica, in soft metal, of the male and female dies which it is desired to produce.

It is obvious that in some instances, these castings may be produced without employing the sand mold, this depending upon the configuration of the pattern, as for instance, the casting F could be produced by placing the pattern and half of flask upon the usual match surface or board (not shown), casting the block F thereon within said flask member and after this casting has cooled, use it as a mold with the pattern therein, for casting the block E thereon within another flask member placed upon the first.

These blocks or castings E and F of metal which, because of the low temperature at which it melts, may be cast upon the pattern, are then reversed, as shown in Figs. 7 and 8 and used as molds upon which to form blocks G and H within upper flask parts placed upon the flask parts containing the said castings. These blocks G and H are

formed of a material having a very high melting point, preferably a plastic material such as graphite and other material of high heat resistance mixed with a suitable binder, by forcing this material into the flask and upon the face of the block, under high pressures. The blocks thus formed are then baked to give them the desired hardness and when so prepared will withstand very high temperatures without disintegration, so that when reversed as shown in Figs. 9 and 10 and used as molds for forming the final dies they will retain their shape without an undue shrinkage or distortion, giving sharp outlines and accurate counterparts by pouring molten steel or other metal suitable for dies into the mating upper part of the flasks, thus producing the finished male and female die blocks I and J, with great accuracy and without the necessity for machining or otherwise finishing.

The flask, where such form is feasible, is preferably in the form of two rings of equal diameter and each of a depth to give the desired thickness to the blocks to be cast therein, said rings being detachably held in perfect vertical alinement in any suitable manner, not shown. Where the article to be formed in the die, and therefore the pattern thereof, is of irregular form, it may be desirable to spin the mold in the process of casting, and this circular form of flask is particularly adapted to such process.

Having obtained the male and female die blocks I, J as described, the surfaces of these blocks may be treated in the usual manner to prevent burning and effectually resist the heat of cast or other metal blanks to be forged or otherwise formed by the die.

By this method or process, dies formed of any suitable hard metal may be cast, giving the maximum of accuracy with the minimum cost of production.

Obviously changes may be made in this method and in the means for carrying out the steps thereof, within the scope of the appended claims, without departing from the spirit of the invention and I do not, therefore, limit myself to the means or method illustrated in the accompanying drawings.

Having thus fully described my invention, what I claim is:

1. A method of making dies which consists in providing a pattern, casting a block from said pattern of a metal having a low melting point, forming by means of said

block another block of a material of high heat resistance, and then casting from the latter block, the final die part.

2. A method of making dies which consists in casting by means of a pattern, a block having an imprint of the pattern and formed of a metal of low heat resistance, then forming, upon the imprinted surface of said block, a second block from a material of high heat resistance, and finally casting a die block of hard metal upon said second block.

3. A method of making dies which consists in casting a block in the exact form of a die block of the dies to be made and from a pattern of the article to be formed in said dies, then producing a duplicate of said block in a material having high heat resistance, and finally casting the desired metal die block from said duplicate block.

4. A method of making dies which consists in casting a block in a mold with a pattern of an article to be formed by the finished dies in place in said mold, reversing said block and forming thereon by pressure a second block from plastic material having a high heat resistance, and finally casting upon said second block, a die block.

5. A method of making dies which consists in forming a metal pattern of an article to be produced by the dies, placing the pattern in a mold and casting in the mold in contact with the pattern, metal blocks, then forming blocks from plastic material of high heat resistance upon said blocks by heavy pressure to compress said material, and finally casting die blocks upon the blocks of plastic material.

6. A method of making dies which consists in forming a mold, placing a pattern in the mold, casting upon said mold and pattern blocks of metal of lower melting point than the pattern and corresponding in form to the desired form of die parts, then using these metal blocks as molds and forming thereon by pressure, blocks of plastic material corresponding in form to the metal blocks, and finally employing the blocks of plastic material as molds and casting therefrom the dies.

In testimony whereof I affix my signature in the presence of two witnesses.

THEOPHEILES D. LUCIER.

Witnesses:

LEWIS E. FLANDERS,
ANNA M. DORR.