

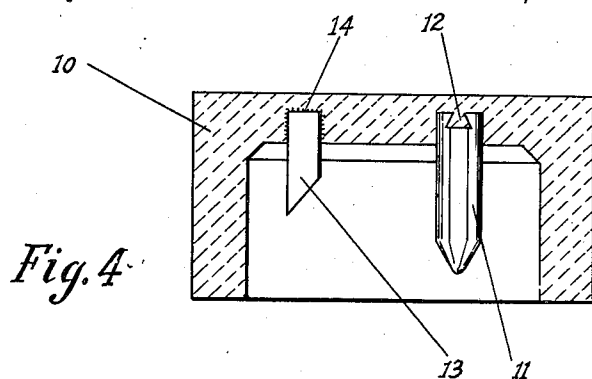
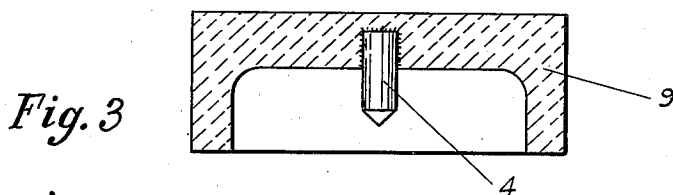
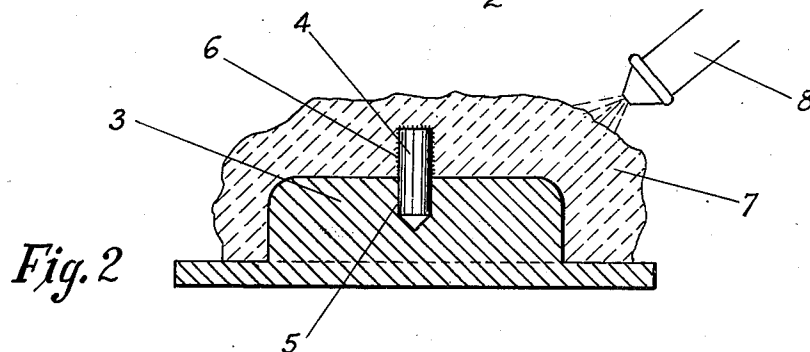
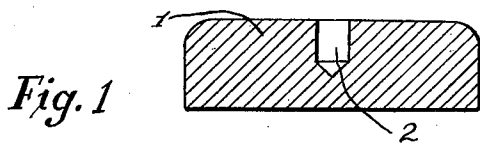
May 13, 1941.

H. S. INGHAM

2,241,996

MOLD

Filed Jan. 31, 1940



Herbert S. Ingham
INVENTOR.

BY

Louis Briggs
ATTORNEY.

UNITED STATES PATENT OFFICE

2,241,996

MOLD

Herbert S. Ingham, Jamaica, N. Y., assignor to
Metallizing Engineering Company, Inc., Long
Island City, N. Y., a corporation of New Jersey

Application January 31, 1940, Serial No. 316,581

1 Claim. (Cl. 22—190)

This invention relates to new and useful improvements in molds.

It is possible to make metal molds by spraying. Metal spraying is carried out as a rule by the use of metal spray guns, i. e., devices by which metal is fed to a heating zone and from which zone metal particles, at least some of which are molten or in a heat plastic condition, are propelled against the surface of a suitable object by a blast of air or other gas. Spray metal molds may be made for instance by first preparing a suitable master, spraying the master with metal in a manner understood in the art to produce a separable spray metal coating on the same and thereafter separating the spray metal coating from the master. A spray metal mold thus comprises a spray metal mold shell and a spray metal mold surface, the latter carrying in negative the design of the master surface to which it was applied. In the spraying of metal by means of a metal spray gun, ideal spraying conditions are such that the metal particles impinge upon the surface or object sprayed at an angle as closely as possible to 90°. In practice, however, satisfactory spray metal coatings can be obtained at angles less than 90°. If, however, the spraying is conducted so as to cause the particles to impinge upon the surface at a relatively small angle, the applied spray metal will build up in ridges and no uniform spray metal coating is obtained. Furthermore, fissures and cracks appear in the so applied coating, and the degree of adhesion between the individual spray metal particles of thusly applied spray metal coatings is not very great. In most cases an angle of approximately 30° at which the particles impinge upon the surface sprayed is the safe limit for the procurement of a satisfactory spray metal coating. When spraying into relatively deep narrow crevices it is only possible to satisfactorily fill the same with spray metal if the surface sections of the crevices adjacent the deepest point of such crevices can be reached by the spray metal particles at an angle of impingement of at least 30° with said surface sections. In the production of spray metal molds, therefore, if the master design includes deep, narrow crevices, holes or the like, which in their relation of depth to width will not permit the spraying of their deeper portions except at an angle smaller than that required to procure a satisfactory spray metal coating, it is practically impossible to obtain accurate negative reproductions of the master surface. Even if substantially accurate negative reproductions could be obtained the de-

fects attending the spraying at an angle of impingement of less than approximately 30° would render the mold projections weak and cracked.

I have discovered that satisfactory spray metal molds carrying relatively narrow and deep projections as a constituent part of their mold surface design may be obtained by providing the mold shell with one or more suitable substantially rigid inserts extending to the mold surface so as to form projections thereon as an integral constituent part of the design of the mold surface. In accordance with my invention I first produce for the comparatively narrow and deep crevices of the master (i. e., a substantially accurate duplicate of an object or part of an object to be reproduced) suitable inserts constituting substantially accurate negatives of these crevices and fitting substantially snugly into the same. The inserts are so made that, when placed into the crevices of the master, they will protrude therefrom. In practicing my invention, the inserts are placed into the corresponding crevices of the master design whereupon the mold metal is sprayed onto the surface of the insert fitted master. The protruding sections of the inserts are preferably roughened, dovetailed, keyed or otherwise treated or constructed to improve the anchorage of the same in the spray metal. After a spray metal shell of suitable thickness is formed the same is separated from the master and the mold thusly obtained now possesses as an integral part of its surface the desired narrow and deep projections.

In the following a specific embodiment of my invention is set forth by way of example and not by way of limitation and the invention will be more fully understood from the description thereof read in conjunction with the drawing in which

Fig. 1 is a cross section through an article to be reproduced;

Fig. 2 shows a cross section through a master of the article shown in Fig. 1 having a recess fitted insert partly imbedded in a coating of spray metal; and

Fig. 3 illustrates a cross section through the finished mold; and

Fig. 4 is a cross section through a finished mold having multiple inserts.

In the drawing 1 designates the article to be reproduced and having as part of its surface design a narrow and deep crevice 2. A master 3, in the form of a substantially accurate duplicate of the article 1, is provided with a suitable insert 4 fitting substantially accurately the contours of

the design crevice 5. The surface roughened protruding end 6 of the insert 4 is imbedded in the spray metal coating 7 applied in a manner well known in the metal spraying art to produce a separable mold shell by means of a gas-blast type spray gun schematically indicated at 8. After separation of the spray metal shell from the master, the former may be suitably machined to represent the finished mold 9 shown in Fig. 3, possessing the solid metal insert 4 as an integral part of its surface.

It is of course possible to provide for multiple inserts and such multiple insert mold is for instance illustrated in Fig. 4 in which the machined spray metal mold 10 has the insert 11 dove-tailed at 12 and the insert 13 roughened at 14.

The material of the master may be any suitable metallic or non-metallic material provided the same lends itself to be suitably separated from the spray metal coating thereto applied in accordance with well known practices. I prefer, however, to use a metal master.

The material of the inserts may be any suitable metallic or non-metallic material. I prefer a material having a high tensile and transverse loading strength. Metal inserts are particularly adapted for use in connection with my invention.

Depending upon the material of the master, the separation of the spray metal shell therefrom may be effected in numerous ways. Where the master for instance comprises a metallic material, the detachable spray metal shell may be for example formed thereon and removed therefrom in accordance with the process set forth in the United States patent to Wm. C. Reid, No. 2,171,599. If the master comprises a non-metallic material its separation from the spray metal shell may be ac-

complished in most cases by suitable stripping from the master.

Instead of using, in accordance with the invention, a master of the article to be reproduced, it is possible and often of advantage to use the original article itself as a master and where therefore the term "master" or such equivalent expression is used herein, it is intended to mean any positive of an article to be duplicated irrespective of whether such positive is the original article itself or a substantial duplicate thereof.

The foregoing specific description is for purposes of illustration and not of limitation, and it is therefore my intention that the invention be limited only by the appended claim or its equivalent wherein I have endeavored to claim broadly all inherent novelty.

I claim:

Method of making a spray metal mold having at least one relatively narrow and deep projection as an integral part of the mold surface, which comprises placing into a relatively narrow and deep crevice on a master surface, which crevice substantially corresponds in configuration to the relatively narrow and deep mold projections desired to be obtained, a substantially rigid insert in part substantially fitting said crevice and in part protruding therefrom, spraying metal onto the insert fitted master until a spray metal shell has formed thereon and removing said shell and imbedded insert to recover a spray metal mold having said insert anchored in said shell and extending to the mold surface to form a relatively narrow and deep projection thereon as an integral constituent part of said mold surface.

HERBERT S. INGHAM.