Aug. 15, 1933. J. A. DE GOYER 1,922,031

MATRIX

Filed Jan. 4, 1932

Fig. 1.

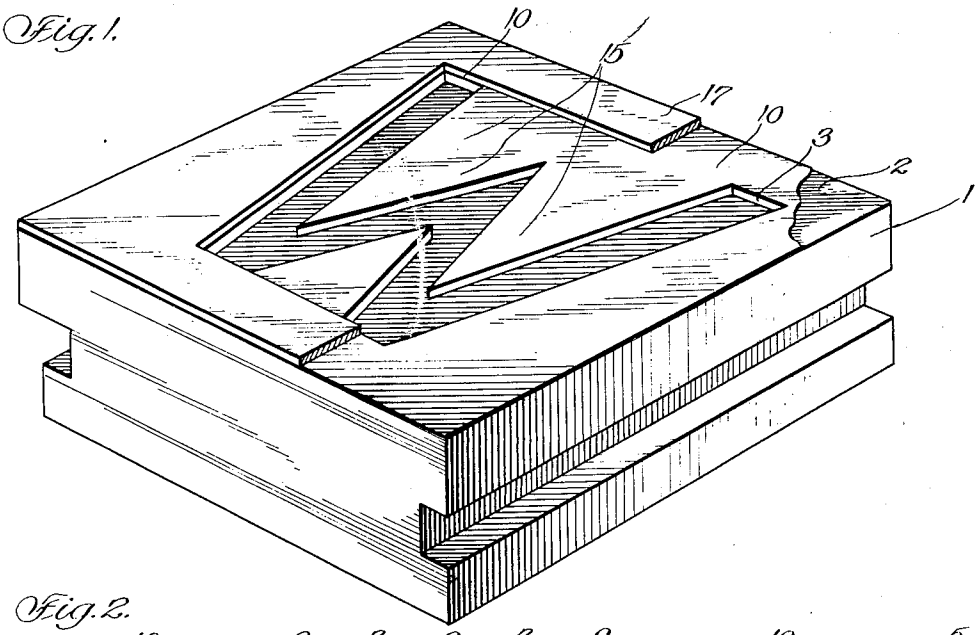


Fig. 2.

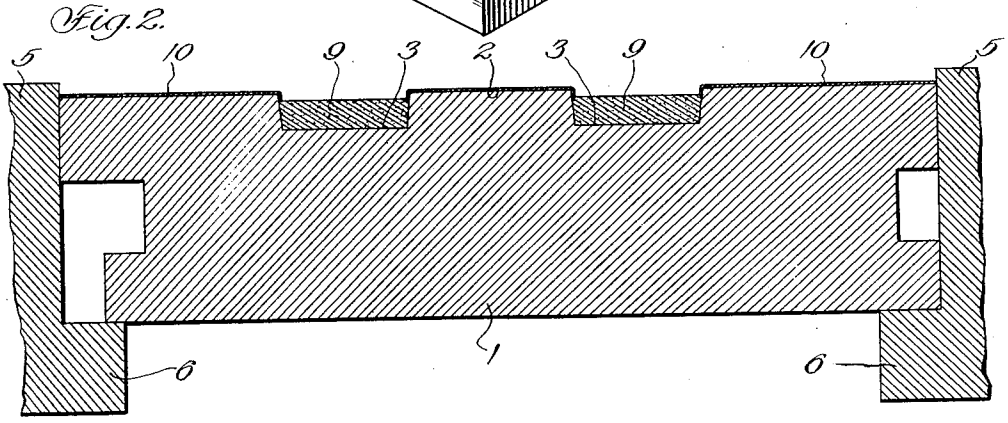


Fig. 3.

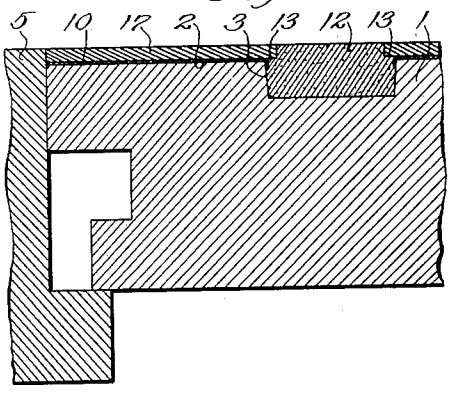
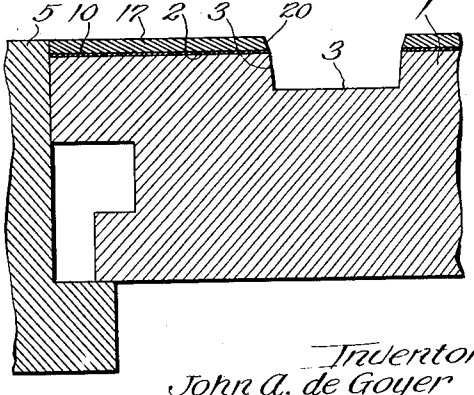


Fig. 4.



Inventor:
John A. de Goyer

By Brown, Jackson, Boettcher & Dienner
Attys.

Patented Aug. 15, 1933 1,922,031

UNITED STATES PATENT OFFICE

1,922,031

MATRIX

John A. de Goyer, Oak Park, Ill.

Application January 4, 1932. Serial No. 584,662

9 Claims. (Cl. 101—401.2)

The present invention relates to molds or matrices for casting type and the like and is particularly concerned with the provision of means and methods for utilizing standard or existing matrices in the production of type having type faces somewhat higher than is generally customary at the present time.

In rotary press work the process of making curved stereotype plates by the use of flexible paper matrices involves the formation of the paper matrices by pressing the same when flat onto the type matter and then curving the paper matrix to cylindrical formation from which the curved stereotype plates can then be produced. In this process, which is well known, difficulties are sometimes encountered in securing proper impressions, particularly of the larger letters and other characters. This arises, it is believed, from the fact that the curving of the paper matrices causes the impressions of the larger characters to be distorted, usually becoming shallower due to the stretching of the material of the paper matrices because of the curvature imparted thereto in order to form a cylindrical stereotype plate. It is recognized that such difficulties can be overcome by causing deeper impressions to be made in the paper matrices, particularly of the larger letters. In order to form deeper impressions in paper matrix it is of course necessary to provide type having a somewhat higher type face than is customarily standard. Type, particularly the larger sizes, are generally formed in type casting machines which utilize a mold and a movable matrix, usually formed of aluminum alloy, in one surface of which is cut in intaglio the impression or character which it is desired that the type shall print. The molds and matrices are usually formed to standard dimensons, and type founders, printing establishments and the like generally keep in stock considerable quantities of type matrices for use as needed.

Now in order to form type having high type faces it would, of course, be a simple matter to procure new matrices in which the intaglio character is cut deeper, but this would entail the discarding of considerable quantities of the standard or existing matrices on hand and the purchase of new matrices at considerable expense.

With the above factors in mind, the present invention contemplates the provision of a means and method for utilizing standard or existing matrices in the production of type having high type faces in order to improve the impression made by the type cast therefrom. More particularly, it is the object of the present invention to fuse onto the face of standard matrices an additional film or layer of metal or the like but without filling the intaglio impression, with the result that by the use of standard matrices so treated or prepared type may be cast which have high type faces.

As stated above, standard type matrices are customarily formed of various alloys having an aluminum base and a number of factors must be kept in mind when fusing any additional material onto the face of the matrices. Such alloys usually have a melting point of approximately 1200° F. and in applying the additional material by fusing it is, as will be recognized, nessessary to employ a fusing temperature somewhat less than 1200° F., otherwise the delicate outlines and counters of the intaglio character on the matrix may be disturbed and the matrix damaged. At the same time, the material deposited must have sufficient hardness and resistance at the temperature of fusing of type metal, so that the added accretion of metal on the face of the matrix will not be softened or disturbed during the process of casting a type therefrom. It is also necessary to provide a good bond between the aluminum alloy of the matrix and the metal deposited thereon in order to produce a type matrix having a satisfactorily long life. These and other objects of the present invention are accomplished by the means and method later to be described in detail.

In the drawing illustrating, by way of example, the preferred embodiment of the present invention:

Figure 1 is a perspective view illustrating a standard type matrix with a deposition of metal on the face thereof in order to cast type having high type faces, a portion of the deposition of metal being broken away;

Figure 2 is a cross sectional view illustrating the tinned surface of the matrix and the application of heat resistant material in the intaglio character of the matrix for the purpose of protecting the surface thereof;

Figure 3 illustrates the second application of heat resisting material and the body of additional metal fused onto the face of the matrix; and

Figure 4 illustrates the matrix after the heat resistant material and other matter has been cleared out of the intaglio impression of the matrix and the fused film or layer of additional metal routed out or cut back at a slightly greater

angle than the angle of the intaglio impression in the matrix.

In Figure 1 the reference numeral 1 indicates a conventional or standard matrix having a flat face 2 in which is cut, in intaglio, a character forming impression 3 for the purpose of forming the face of a type, the matrix illustrated serving to form the letter "W". As is well understood in the art, these matrices are used to form one end of a mold in which the type is cast. The depth of the intaglio impression 3 governs, of course, the height of the type face cast therefrom.

In order to increase the height of type face while still using standard matrices the present invention contemplates depositing, as by fusing, a film or layer of metal onto the face 2 of the matrix, thereby increasing the effective depth of the intaglio impression 3.

Standard matrices are generally formed of an alloy having an aluminum base, the proportion of aluminum being in the neighborhood of 80%, and in order to effectively bond a film of additional material onto the face 2 of the matrix it is necessary to employ materials and methods effective in the working of aluminum compounds. It is also necessary to deposit a substance onto the face of the matrix which has a melting point well above the melting point of the usual type metal or otherwise the new face of the matrix will be destroyed after a few operations. It is also necessary to employ a substance whose melting point is somewhat below the melting point of the matrix or otherwise the application of the substance by fusing or the like to the matrix would tend to distort or destroy the delicate lines and edges of the intaglio impression of the matrix. Further, it is also necessary to provide a strong bond so that the mechanical stresses involved in casting type and in removing the same from the matrix and from the mold will not tend to remove the additional metal added to the standard matrix.

In preparing a standard matrix or casting type having high type faces I first provide a frame 5 having shoulders 6 dimensioned to receive one or more of the matrices. If desired, the frames may have a ridge or ridges to engage one or more of the grooves in the matrices. This frame may be any convenient size or arrangement, and is only for the purpose of providing a convenient work holder to contain the matrices. In order to protect the smooth hard surface of the intaglio impression 3 and also to prevent the deposition of material therein, first I entirely fill the intagliated portions of the matrix with heat resistant material, such as clay or any other argillaceous material up to approximately 1/64 of an inch of the surface 2 of the matrix. In Figure 2 the heat resistant material is indicated by the reference numeral 9.

The next step involves the tinning of the surface of the matrix. Preferably this is accomplished by using any commercial form of high melting point aluminum solder which is applied to the face of the matrix after the heat resisting material 9 has dried to a material extent. Usually this requires allowing the matrices to stand for some little time, depending upon the material used. The matrices, preferably disposed in the work holders, are preheated, as by placing them over a gas flame or being otherwise subjected to a source of heat. The high melting point aluminum solder is then applied at a temperature approximately 630° F. to 650° F., and during the application of the solder it is very desirable to brush the face of the matrix with abrading tools, such as steel brushes and the like, in order to secure an intimate bond between the solder and the material of the matrix. I have found that with the use of such tools as steel brushes and the like the surface 2 of the matrix is roughened and minute particles of the matrix material are detached so that there is actually formed an alloy disposed between and blending with the material of the matrix and the material of the solder. As a source of heat for this operation an ordinary blow torch or a gas flame has been found to be satisfactory. The result of this operation is indicated in Figure 2 where the reference numeral 10 designates the tinned surface of the mold or the thin film of solder bonded and actually alloyed with the face 2 of the matrix. As shown in this figure a portion of the tinned surface extends down into the intaglio impression 3 to a point where it meets with the heat resistant material 9. This assures that the edge or shoulder of the intaglio impression 3 receives a full and complete application of the aluminum solder.

The next step is to wash out the heat resistant material 9 by the application of water or other solvent. This is done, of course, when the tinned matrices have cooled after the application of one high melting point aluminum solder. Preferably, this cooling is done in air so that the matrices may cool gradually. After all of the old heat resistant material has been removed a fresh supply is again introduced into the intaglio impression 3, this second mass of heat resistant material being indicated in Figure 3 by the reference numeral 12. As there shown, however, the material 12 is disposed so as to entirely fill the intaglio impression 3 and to also extend a distance above the tinned surface 2 of the matrix somewhat greater than the thickness of the material to be added to the face of the matrix. The heat resistant material extending above the plane of the face of the matrix is cut back a slight amount from the edges of the intaglio, as indicated at 13 in Figure 3, so that the heat resisting material above the face of the matrix is somewhat narrower than the width of the intaglio.

Not only may the intagliated portions 3 of the matrix be filled with heat resistant material but also any counters 15 may be covered by the application of the heat resistant material thereto so as to prevent any deposition of metal thereon, see Figure 1.

The next step is the application or deposition of the metal to be fused onto the face 2 of the matrix. Preferably the metal employed is that which is commercially available in the form of cast aluminum welding rods, ordinarily used in welding aluminum and aluminum alloys. Generally these welding rods consists of practically pure aluminum or aluminum alloys having a high aluminum content, the melting point of which is in the neighborhood of 1000° F. to 1200° F., some 200° lower than the melting point of the alloy from which the matrices 1 are usually formed, the latter having a melting point in the neighborhood from 1200° F. to 1300° F. or sometimes higher.

In the application of the fused metal to the face of the matrix, the first step is to heat the latter up to approximately the melting point of the aluminum solder with which the face of the matrix has been tinned, as described above, this being approximately 625° F. to 650° F. When this temperature has been attained the tinned surface of

the matrix is in a molten state or thereabouts. When this point has been reached the cast aluminum welding rod is heated by the application of a torch flame or the like until it is approaching its point of fusion, then the rod is applied to the molten tinned surface of the matrix so that the material fused from the aluminum welding rod is run into the already molten tinned surface and joins the same. Preferably, the welding rod is moved from place to place about the face of the mold without taking the point thereof out of the molten tinned surface so that any slag or oxide will remain on top and will not be impregnated within the body of the metal deposited or fused onto the face of the matrix. Preferably the frames or work holders are so formed that they extend above the face of the matrix a distance slightly in excess of the depth or thickness of material it is desired to add to the matrix. These work holders thus serve as gauges, for as soon as the pool of fused material fills the space above the face of the matrix up to the top of the work holder the operator knows that sufficient material has been added to the matrix. Generally approximately 0.038 of an inch is satisfactory for the thickness of the material added to the face of the matrix.

This deposition of metal, indicated by the reference numeral 17, onto the face of the matrix is continued until the film or layer added is of the required thickness. Due to the intimate bond originally established between the aluminum solder and the original face of the matrix and due also the to fusing of the aluminum welding material into the molten tinned surface an intimate bond is established between the deposition of metal and the body of the matrix. By melting the cast aluminum welding rod into the molten tinned surface a deposition of metal is alloyed or fused onto the surface of the matrix 1, the constituency and the characteristics of the metal depending upon the composition of the aluminum solder and aluminum welding material chosen. Thus, there is built up or alloyed onto the face of the matrix a metallic material whose characteristics, such as hardness, softness, melting points and the like, are determined at the time of application.

After the matrices have been allowed to gradually cool and the deposition hardened the heat resistant material 12 is washed out. By cutting back this material prior to the application of the aluminum welding material the latter is caused to extend over the edge of the intaglio 3 to a slight extent, as at 13 in Figure 3. This feature, together with the feature of having the tinned surface 10 extend down slightly into the intaglio 3 assures a firm and intimate bond between the material deposited at the edges of the intaglio and the face of the matrix.

The last operation includes milling the new surfaces of the matrices to the required height and then routing out the intaglio 3 to trim the edges thereof. This operation is of considerable importance in that it is desirable to cut back the metal deposited at a slightly greater angle than the angle of the original intaglio so that there will be no danger of the type sticking to the matrix during the casting operation, as indicated in Figure 4 by the reference numeral 20.

While the preferred method of preparing standard matrices is set forth above it will be apparent to those skilled in the art that many modifications may be made without departing from the spirit of my invention. For example, where the high melting point aluminum solder and the cast aluminum welding rods commercially available do not fall within the preferred ranges as to melting points it is a simple matter to utilize as the material to be fused onto the face of the matrix a material composed partly of aluminum welding and partly of aluminum solder should the aluminum welding material available have a higher melting point than indicated above. For example, if the melting point of the welding material is too high the amount of heat necessary to fuse this material onto the face of the matrix may be great enough to produce a temperature sufficient to destroy or distort the intaglio character or impression cut in the face of the matrix. Hence the mixture of some of the aluminum solder with such welding material will form a compound having the required melting point which is high enough not to be disturbed by the temperature of hot type metal and is low enough not to disturb the intaglio character of the matrix.

It will also be understood that while the steps outlined above have been described in particular connection with the application of a deposition of metal to the face of a type matrix the same steps may be utilized in the deposition of metallic coatings and the like onto the surface of objects other than type matrices, and such is to be contemplated as falling within the scope of the present invention.

It is to be further understood that while high melting point aluminum solder and cast aluminum welding rods are preferred, other solders and material with the same or different characteristics and melting points may be utilized in the practice of my invention. Thus my invention is not to be limited to the specific material and specific temperature ranges set forth above. For example, where depositions and the like are to be added to surfaces other than type matrix faces the characterictics and melting points of the material to be deposited should be chosen to correspond with the material of the surface to be treated, in accordance with the principles outlined above.

What I claim therefore, and desire to secure by Letters Patent is:

1. The method of preparing a standard type matrix for casting type having high type faces which comprises fusing onto the surface of the matrix around the intaglio thereof a film of metal of substantial thickness and then clearing the intaglio of any of the fused metal therein.

2. The method of preparing a standard type matrix for casting type having high type faces which comprises filling the intagliated portions of the matrix with heat resistant material, fusing metal onto the surface of the matrix around the intagliated portions, and then clearing out the intaglio of the matrix.

3. The method of preparing a standard type matrix for casting type having high type faces which comprises filling the intagliated portions of the matrix with heat resistant material, tinning the face of the matrix, and fusing metal onto the surface of the matrix around the intagliated portions.

4. The method of preparing a standard type matrix for casting type having high type faces which comprises filling the intagliated portions of the matrix with heat resistant material, building up a pool of metal to the desired thickness onto the face of the matrix by the application

of heat, cooling the matrix, and then clearing out the intaglio of the matrix.

5. The method of preparing a standard aluminum base type matrix for casting type having high type face which comprises tinning the face of the matrix with aluminum solder having a high melting point and simultaneously abrading the face of the matrix, heating the tinned matrix to the point of fusion of the solder, then fusing material from a cast aluminum welding rod into the molten tinned surface by the application of additional heat to the rod.

6. The method of preparing a standard aluminum base type matrix for casting type having high type face which comprises filling the intagliated portions of the matrix with heat resistant material up to a point slightly below the face of the matrix, tinning the face of the matrix with aluminum solder having a high melting point and simultaneously abrading the face of the matrix, to establish a film of alloyed material from the matrix and the solder therebetween, cooling the matrix and washing out said heat resistant material, again filling the intagliated portions of the matrix with heat resistant material to a point above the face of the matrix, heating the tinned matrix to the point of fusion of the solder, then fusing aluminum into the molten tinned surface of the matrix until the required additional material is added, cooling the matrix, washing out the heat resistant material, milling the surface of the matrix to the required height, and then cutting back the added metal from the edges of the intaglio at a slightly greater angle than the latter.

7. The method of applying a film of additional metal to an aluminum base alloy by fusion which comprises tinning the surface of the alloy, heating the tinned surface to the point of fusion, then fusing into the molten surface an additional mass of aluminum.

8. The method of applying a film of additional metal to an aluminum base alloy by fusion which comprises tinning the surface of the aluminum alloy with high melting point aluminum solder and simultaneously abrading said surface to thoroughly bond the solder to the alloy, heating the alloy substantially up to the point of fusion of the solder, then fusing into the molten tinned surface the metal to be added.

9. The method of applying a film of additional metal to an aluminum base alloy by fusion which comprises tinning the surface of the aluminum alloy with aluminum solder having a melting point between 600° F. and 650° F. and simultaneously abrading said surface to thoroughly bond the solder to the alloy, heating the alloy substantially up to the point of fusion of the solder, then fusing into the molten tinned surface additional aluminum containing metal having a melting point slightly lower than the melting point of the aluminum alloy.

JOHN A. DE GOYER.