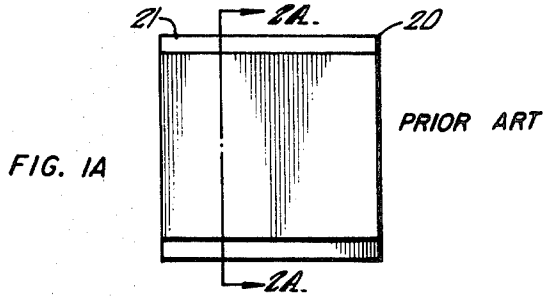
June 1, 1971 F. S. GEARY 3,581,374

METHOD FOR PRINTING MATRIXES

Filed March 8, 1968 2 Sheets-Sheet 1



PRIOR ART

FIG. 1A

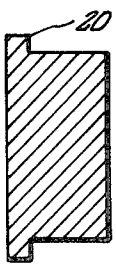


FIG. 2A

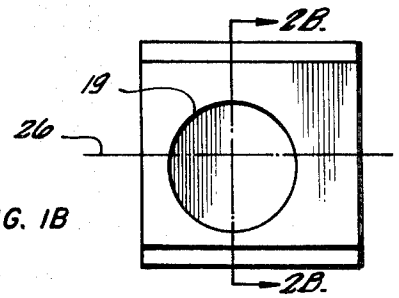


FIG. 1B

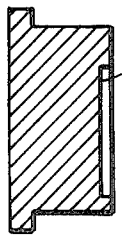


FIG. 2B

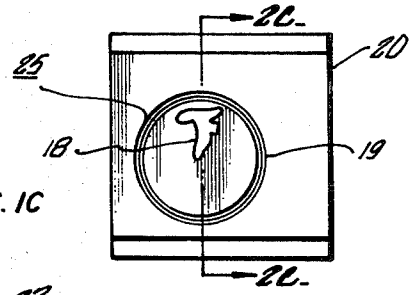


FIG. 1C

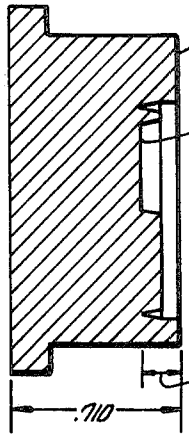


FIG. 2C

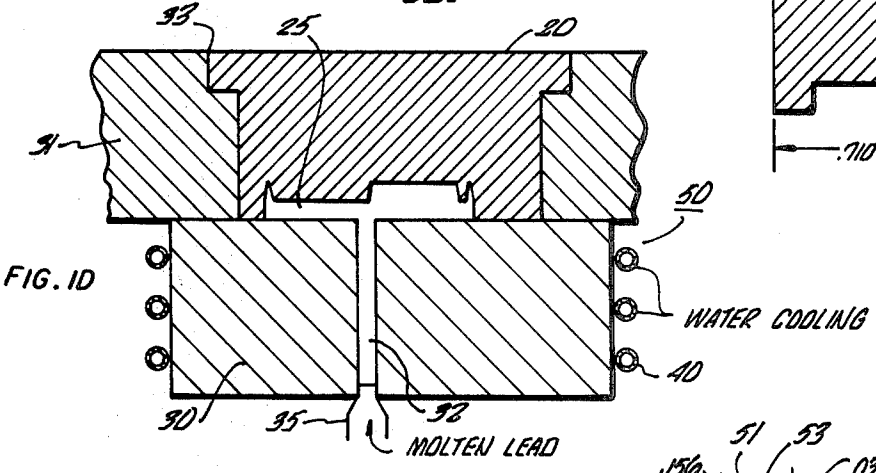


FIG. 1D

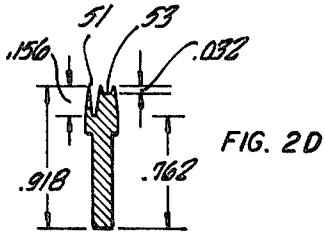


FIG. 2D

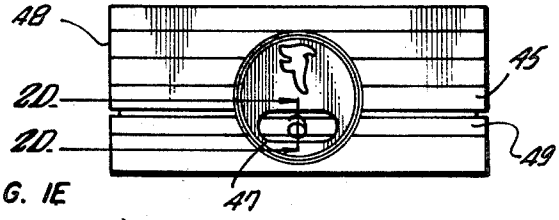


FIG. 1E

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METHOD FOR PRINTING MATRIXES

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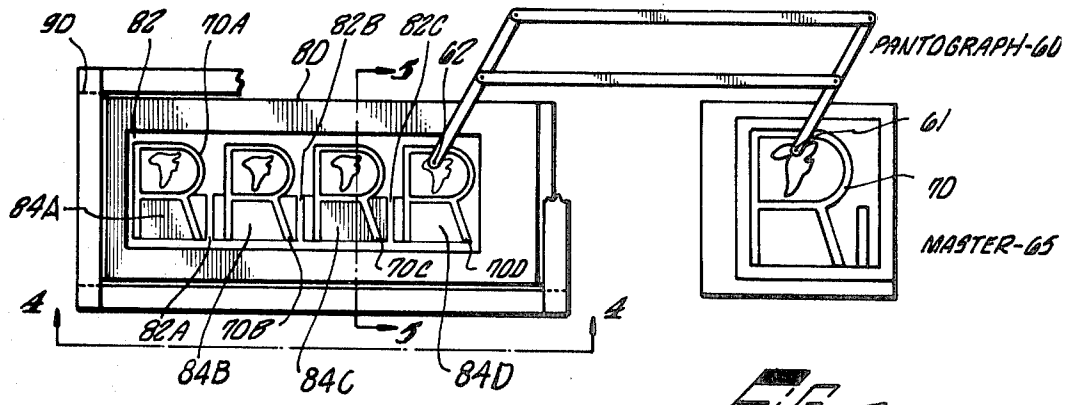


FIG. 3

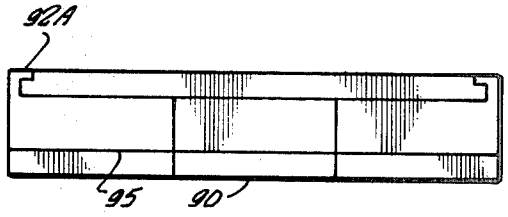


FIG. 4

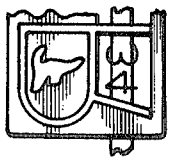


FIG. 10

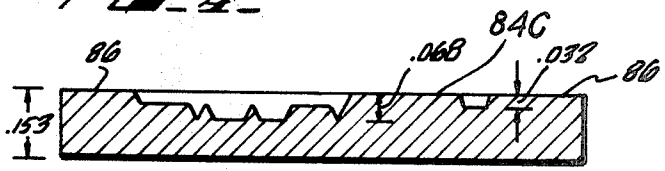


FIG. 5

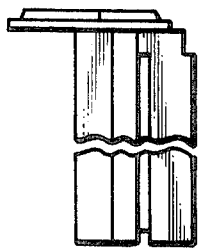


FIG. 9

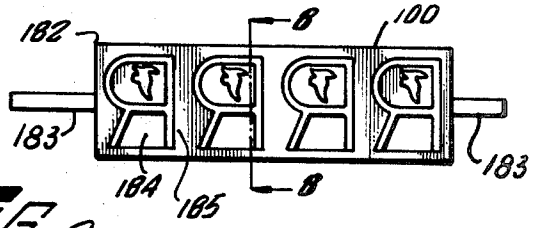


FIG. 6

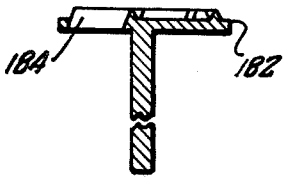


FIG. 8

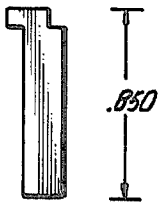


FIG. 7

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3,581,374

METHOD FOR PRINTING MATRIXES

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Int. Cl. B23q 17/00
U.S. Cl. 29—407 9 Claims

ABSTRACT OF THE DISCLOSURE

A method and apparatus for producing a multi-element casting which, in composite form, yields an embossed outline useful in the preparation of flexible stamps is disclosed. The method and appartus is particularly applicable to economically producing a plurality of inspector stamps wherein one particular portion of the design is repeated numerous times and another portion of the design is varied in a series of alpha-numeric designations such as an inspector number, to list a typical example. A pantograph machine is utilized to engrave from a soft material, such as aluminum, the common portion of the design at an unusually low depth with respect to standard type depth. The areas on the design which will ordinarily receive the variable portion such as the inspector numbers is outlined by an engraving operation at a lesser depth, but is otherwise left unengraved. An engraved plate is held in a jig for introduction into a standard casting machine. A cast slug is obtained from the machine which slug includes an embossed design of the portion common to the desired stamp, and further includes holes in the area where the variable portions of the stamp are to be located. The variable portions (i.e., inspector numbers) for the stamp are set up from ordinary print type and are cast in a separate casting operation. The casting for the common design portion has dimensions such that when it is "high-slugged" with the scond lead casting of normal print type, a composite of the two completes the desired stamp design. The combined lead casting are placed into a chase and a matrix is formed from the chase. A normal vulcanizing process supplies a rubber inspector from the matrix.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The fields of this invention include the printing industry in general, and more particularly include the segment of the printing industry dealing with elastic stamps wherein a great number of stamps are formed each of which have one portion thereof common and another portion thereof variable in some alpha-numeric sequence. Typical examples of such stamps include inspector stamps in which the common portion identifies a company or trade association, and a changing series of letters and/or numbers identifying various employees to which stamps are assigned for use in their normal duties.

(2) Description of the prior art

Two separate prior art approaches and the disadvantages associated with each provide a background which amply demonstrates the novel method and apparatus of this invention. The first prior art approach is commonly referred to as "zinc-line engraving." This approach is so named because zinc or brass blocks approximately ¾" thick are laboriously engraved by a skilled engraver to a type-high depth. This engraving is expensive, time-consuming, and requires considerable skill in addition to exacting engraving equipment. Once the common portion of a series of stamps to be formed is engraved in a single zinc block, castings of the common portion are obtained in which the area that is to receive the variable portions

of the stamps is a solid form in the casting. A portion of this area is thereafter drilled out from the casting. The common-portion casting includes downwardly depending alignment slugs which are subsequently employed to mate the common portion with another casting of the variable portion so that a matrix may be obtained. The matrix so obtained is subsequently used in a standard vulcanizing process to obtain a desired flexible stamp. Considerable skill and planning is required in positioning the design in the zinc block in order to obtain proper positioning of the alignment slug when the common and variable portions of the slugs are mated. If such alignment is incorrect, the engraved zinc block is useless and the job starts anew.

Another prior art approach employs a material softer than brass or zinc, such as heat treated aluminum approximately a quarter inch thick. The aluminum is easier to engrave thus reducing the engraving costs by allowing the use of pantograph machine and a master plate formed from plastic or other relatively inexpensive material. The master plate includes cut-outs of all of the inspector stamps that are to be made during one job. An operator using the pantograph traces out on a large sheet of aluminum, each and every one of the stamp designs for that job. In this pantograph operation, it is clear that the operator repeatedly traces out the common portion of the stamps as well as the variable alphanumeric portions of the stamps. In this prior art approach, after the operator has engraved both portions of the stamp design, only one casting operation is required prior to the matrix forming step. However, it is obvious that when a great number of inspector stamps are needed, the operator wastes considerable time, money, material, and labor in repeatedly retracing the common portion for the great number of inspector stamps to be made. Furthermore, in the pantograph operation, there are normally several stamps in one row and if a mistake is made in any one design of a given row, that row must receive extra attention so as to guard against an imperfect stamp carried into other steps and ultimately being delivered to a customer. Furthermore, when an entire row (including disfigured engraving) is cast in a single casting operation, it is obvious that casting costs and handling costs are being directed to what is realized from the beginning is an imperfect design that is designed for subsequent rejection.

SUMMARY OF THE INVENTION

The present invention utilizing the advantageous features of both of the above described prior art approaches and generally avoids the disadvantages of both through a novel method and apparatus which eliminates any drilling operation, provides alignment flexibility through a double casting technique. In applicant's invention, a pantograph machine is employed to engrave a thin magnesium sixteen gauge sheet to a first depth which is considerably lower than type depth. This shallow first depth enables the employment of an extremely narrow cutting tool, thereby providing more open spaces in the engraving to receive larger face type for the variable portion of the stamp to be formed. In applicant's invention a row of the common portion of the desired stamp design is engraved at said first depth. An engraved frame-like outline surrounds the engraved row of the common portion at a second depth which is considerably less than the first depth. All engraving is avoided in the area of the stamp which ultimately is to house the variable alpha-numeric portions of the desired stamp design. These nonengraved areas, according to the process of this invention provide a maximum aperture in the casting, which maximum aperture represents the optimum space available to receive the alpha-numeric characters cast in standard form in another casting operation. The engraved magnesium sheet is sized for

placement in a jig. The ends of the magnesium sheet are stepped so as to jointly provide for mounting the sheet in the jig, and to enthance the alignment in a manner to be described in more detail hereinafter. A lead casting is obtained from the magnesium engraved sheet and this casting is high-slugged with standard printing slugs. A second casting, in standard form, is obtained which includes the variable alpha-numeric portions of the stamp. This second casting is a "low slug" and the alpha-numeric characters on the low slug are cast standard type height. By high-slugging the first casting and suitably employing shims and spacers, an aligned row of stamps having the upper edges of the common portion and the upper edges of the alha-numeric portions lying in a common plane is readily assembled for placement in a composing stick. Thereafter, the standard Bakelite, and standard vulcanizing operations are utilized to obtain the number of inspector stamps provided in the engraved row. The technique of this invention yields a lead casting of the common portion which may be used repeatedly with different alpha-numeric series so as to provide a great number of inspector stamps with increased efficiency. Furthermore, the cost of the materials is reduced, the engraving is less and the engraving operation itself is accomplished with a narrow cutter and is a considerable less depth, the combination of which provides detailed stamp designs which were heretofore considered impossible of attainment.

BRIEF DESCRIPTION OF THE DRAWING

The foregoing principles and objects of this invention may more readily be understood by reference to the accompanying drawing in which:

FIG. 1 and FIG. 2 depict the prior art zinc-line approach for forming a single inspector stamp;

FIG. 3 depicts a plan view of a pantograph operation on a magnesium plate in accordance with the principles of this invention;

FIG. 4 is a side view of the jig and the engraved plate shown in FIG. 3;

FIG. 5 is a cross section depicting the narrow engraving cuts at first and second depths of this invention;

FIG. 6 is a plan view of a lead casting in accordance with this invention;

FIG. 7 is an end view of a typical "high" slug;

FIG. 8 is a cross section of the lead casting of FIG. 6;

FIG. 9 is an end view of two lead castings with high slugs and spacers; and

FIG. 10 is a top view of FIG. 9 depicting a composite inspector stamp casting.

DESCRIPTION OF THE PRIOR ART AND PREFERRED EMBODIMENT

Turning now to FIG. 1 and FIG. 2, the zinc-line prior art method is depicted. A plan view and a side elevation of a zinc block **20** is shown. This block **30** includes stepped edges **21** which steps serve to hold and align the block **20** for its ultimate placement in a slot provided in a mold cap of standard lead casting machines as known to the prior art. One such typical lead casting machine is the Model M Ludlow machine marketed by the Ludlow Typographic Company.

FIGS. 1B and 2B depict the first prior art engraving step wherein the outermost periphery **19** of any desired inspector stamp design is engraved at a first depth in the zinc block **20**. In this instance, the inspector stamp desgin **25** as shown in FIG. 1C, includes the circle **20** with a fanciful "F," **18**, in the upper half of the circle. Ultimately, a series of inspector stamps include a variable series of identifying alpha-numeric characters located in the lower half of circle **19**.

FIG. 1C and 2C depict a second engraving step, wherein the common portions **18** and **19** of a series of inspector stamps to be formed has been engraved to a depth of .156 which is standard type height. As shown in the side elevation of FIG. 2C, the second engraving step is of considerable depth through the use of a fairly wide cutter. It should be noted in FIGS. 1A through 1C that the design **25** is slightly displaced in block **20** below its midline **26**, FIG. 1B. This displacement must be carefully calculated so that the stamp design **25** is positioned on the block **20** at such a location that, during subsequent operation, a mounting and a lead casting alignment slug falls precisely where desired. In this instance, the mounting and alignment slug must be located at the bottom portion of the F in the stamp design. This calculation of the positioning of the stamp design in the engraving steps is critical because the standard lead casting machine is adapted to form the mounting and alignment slug at one predetermined position relative to the mold cap which holds an engraved block **20**.

Reference to FIG. 1D symbolically depicts a cross section of a simplified lead casting mold and mold cap section **50**. Section **50** includes a mold **30** and a mold cap **31** which portions are mated in the position they would assume during a lead casting operation. A longitudinal throat **32** which runs into and out of the drawing is shown at its center location in mold **30**. Molten lead is introduced through the throat **32** by means of a mouthpiece **35** which also is elongated running into and out of the drawing. In the instance shown for FIG. 1D in the block **30** with design **25** engraved therein has been rotated clockwise 90° and placed in a receiving opening **33** in mold cap **31**. Block **20** is secured in cap **31** by any suitable means. A series of conduits **40** surround the mold **30** and serve to cool as by water, oil or other cooling agent, is provided for solidifying the molten lead after it has been injected under pressure into the throat **30** and into the space formed by the engraved design **25** in block **20**. Thereafter, mold **30** and cap **31** are separated, and the solidified lead casting is removed which lead casting includes an alignment slug **45** that previously occupied throat **32**. If desired a more elaborate description of one typical lead casting operation, as symbolically depicted and described with reference to FIG. 1D, may be obtained from the Manual of Instructions and Parts Lists provided for the Model M Ludlow machine sold by the Ludlow Typographical Company, 2032 Clybourne Ave., Chicago, Ill. 60614.

Design **25** is also integrally formed with alignment slug **45** which design is embossed and is reversed relative to the original engraving as shown by FIG. 1E.

Thereafter according to the prior art techniques, a drilling, punching or stamping operation places a hole **47** in the space of the design which has been allotted to receive the alpha-numeric series for the plurality of inspector stamps to be formed. In the example shown in FIG. 1E, the alpha-numeric portion simply includes a number **6** which is also shown reversed. It should be appreciated that this hole **47** requires a highly precised drilling procedure in that any portion of the hole **47** which strikes the raised circumference **19** of design **25** renders that casting useless. Furthermore, it is impossible to remove a portion of the lower half of the design **25** unless elaborate and costly drilling apparatus is employed. It should also be appreciated that the drilling operation subjects the lead casting to stress and may often result in bending, breaking or otherwise rendering it unfit as a useful casting for subsequent steps in the rubber stamp process.

A plurality of slugs and spacers **48** are shown in FIG. 1E together with an aditional mounting and alignment slug **49** which has the No. 6 formed integrally therewith. A cross section of this slug **49** and the No. 6 is shown in FIG. 2D. The No. 6 may be obtained in a standard procedure wherein it is selected from a printer's typeset and is placed in a suitable holder for a second casting operation similar to that described hereinbefore with respect to the casting for design **25**. In FIG. 2D exemplary dimensions commonly employed in the printing industry

today for printer's type such as No. 6 are described. For example, printer's type including a slug and alpha-numeric symbol have overall height of .918". From the top **51** of the symbol No. 6 to the bottom of groove **52** standard printing height for numbers and letters is .156". In any alpha-numeric design wherein the outline closes upon itself, such as in the bottom portion of the No. 6, the dimension from the top of the outline to the surface **53** formed within the closed portion is normally .032" as shown. In FIG. 2D the dimension shown as .762" constitutes what is normally referred to as a "low slug dimension" inasmuch as this height for an alignment slug will properly support standard type.

It is readily apparent, by reference to FIG. 1E that the maximum space under the F is not provided by aperture **47**. This means that the inspector's identifying number must be formed from printing type that will fit within aperture **47**. Such type is normally of a smaller dimension than that which the space under the F could actually receive. Furthermore, if in a subsequent run, identifying letters such as the letters AB are required in another inspector stamp series at some location such as that shown in FIG. 1E, the block **20** and the resulting lead casting therefrom cannot be employed for this subsequent run since the letters AB are positioned over the alignment slug and this section cannot be removed without destroying the castings. Furthermore, it is readily apparent from the foregoing description that the alignment slugs **45** and **49** must be critically positioned inasmuch as there is no flexibility provided in the casting operations. These critical alignments together with increased handling, drilling, advanced planning and the necessity of considerable skill on the part of the engravers, all contribute significantly to the overall cost and complexity of this prior art rubber stamp process.

The foregoing features and disadvantages of the prior art are avoided by the techniques of my invention as shown generally by FIG. 3. In FIG. 3 a pantograph **60** works with one stylus **61** engaging a depressed tracing in a master copy **65**. This master copy **65** can be provided in an enlarged version of the common portion of the inspector stamp to be formed. As is well known, the pantograph machine **60** is adjustable and is simple to operate in that an operator merely traces the outline of the design **70** from master **65** by moving stylus **61** through a groove in an inexpensive sheet of master material such as plastic. The enlarged version of the design **70** is reduced any desired amount by adjustable settings on the pantograph **60**, as is well known, so as to reproduce on the sixteen gauge magnesium sheet **80** reduced versions **70A** through **70D**. One particular material for the sheet **80** which I have found to be of particular advantage in my invention, is a soft magnesium material sold under the trade name "ZOMAG." The engraving depth and cutting width of the engraving stylus **62** of pantograph **60** may be simply and precisely controlled by the operator.

Typically, the length of the sheet **80** is about 3½" inasmuch as this is the maximum length available in the particular lead casting machine mentioned hereinbefore. Obviously, other casting machines may accept different lengths so that the length of the sheet **80** may be suitably adjusted to meet the requirements of the lead casting machine. Irrespective of the lead casting machine employed, the length of the sheet **80** is utilized, through pantographing, to obtain an outline **82** surrounding the area allotted for the common portion of the stamps to be formed. In this instance, the common portion consists of R with an F in the closed portion of the R. Although various depths may be employed I have discovered that if section **82** is engraved to a depth about .032" and a deeper cut for **70A** through **70D** is engraved to a depth of about .068" advantageous results are obtained. These respective depths are shown in FIG. 5.

Engraved portion **82** serves as a frame for the stamp designs **70A** through **70D** which frame gives support to the portions of the design which are not closed upon themselves and which overhang the mounting and alignment slug when the lead casting is formed. In this particular design, the bottom portion of the R is open and thus the lead casting is obtained. This portion of the casting is in need of support as formed by castings in the engraved portion **82**. Additional strength for supporting the lower R design is obtained by the vertical engraved sections **82A** through **82C** placed between the individual design outlines. It should be noted that the portions **84A** through **84D** (FIG. 3) directly beneath the F in the R design, does not receive any engraving as is shown in FIG. 5 and referenced by the numeral **84C**. Rather, these portions are left at the outer surface of the plate.

A jig block **90** holds the engraved plate **80** which jig block **90** has at opposed ends an overhang section **92A** shown in FIG. 4. The ends of the plate **80** through pantographing or otherwise are milled down so that the plate is slideably secured within the overhangs **92A** on the jig **90**. Although jig block **90** is depicted in FIG. 3 in conjunction with the pantograph machine **60**, it should be understood that depiction is merely for illustrative purposes since the normal procedure is to engrave the design in a magnesium plate and thereafter simply cut the plate to size and step down the ends to meet the dimensions of the jig **90**. This jig **90** includes, along both lengths thereof, outwardly extending steps **95** which steps are utilized when the jig **90** is placed in the standard mold cap in the manner described hereinbefore in the prior art discussion of FIG. 1D. Inasmuch as the width of the sheet **80** is less than the width of the jig **90**, it is clear that sheet **80** may be slideably positioned at various points within the jig **90**. This slideable adjustment removes the critical alignment problem of the prior art in that trial casting runs will indicate whether or not the alignment slug is properly located for the particular design in question. It further enhances the stamp operation in that should the design requirement change as by additional numbers or additional locations for certain portions of the stamp, then the lengthwise edges up to engraved portion **82** of the sheet **80** may be cut away and the sheet **80** slidingly repositioned to meet any new alignment requirement.

FIG. 6 depicts a lead casting **100** obtained by employment of the sheet **80** in a typical lead casting operation described hereinbefore. FIG. 8 depicts a cross section of the lead casting **100**. The two lesser depth employed by pantographically engraving sheet **80** in accordance with my invention serves a further significant feature in that normal lead pressure for the casting machine will force lead into all spaces of the designs **70A** through **70D**. If normal print type engraving depths were employed, it would not be possible to obtain four or more designs in the finished casting **100** of FIG. 6. By the narrower and shallower cuts of my invention, designs of intricacies previously considered impossible of economically being formed are now possible for the stamp industry. It is apparent from FIGS. 6 and 8 that the engraved section **82** (FIG. 3) yields a platform **182** in the lead casting to support the embossed designs **70A** through **70D**. Within the lower portion **184** of each embossed design **70** is a space which extends through the platform **182**. The presence of this space eliminates any drilling procedure as required by the prior art. Accordingly, this space is of optimum configuration and maximum area to receive inspector numbers or letters which are of considerable larger size than those allowed by the drilling operation of the prior art. Fingers **183** are present in the casting of FIG. 6 to add additional support to the portions of the design and table which surround the apertures **184** and **185**.

FIG. 7 depicts an end view of a slug commonly available in printing shops today having a dimension of .850".

This slug is normally used in printing operations to form spaces between letters and lines of print as typical examples. It is referred to as a "high slug" since it normally serves to form a "space" in a line of print. I have utilized these high slugs to an unusual advantage in my invention in that I mount the lead casting **100** on a plurality of these high slugs to form a base portion to be received in a composing stick well known to the art. Through the employment of the dimensions discussed hereinbefore and depicted in FIG. 5. My overall casting height of the common design portion is .068" for the casting and .850" for the high sug thus yielding .918" which is the standard for the printing industry.

A plurality of numbers identifying the inspectors are printed in a standard lead casting operation which numbers may also be pantographed as desired and aligned so as to fall within spaces **184** in the lead casting **100** of FIG. 6. The flexibility of my invention allows the numbers to be precisely positioned by the use of spacers and shims in the manner shown by the end view of FIG. 9. FIG. 10 is a top view of FIG. 9 showing one stamp with number **30** properly positioned. Again alignment flexibility is readily obtained, and thus simple repositioning of sheet **80** in my novel jig **90** can be employed in order to achieve the accurate alignment of number **34** as shown in FIG. 10. The casting **100**, of course, serves as a repeating form for hundreds of different inspector numbers. It may be stored and used in subsequent jobs. Any additional common portion design changes may readily be engraved in plate **80** thus providing further savings by my printing method and apparatus.

The subject invention has been described with reference to certain preferred embodiments; it will be understood by those skilled in the art to which this invention pertains that the scope and spirit of the appended claims should not necessarily be limited to the illustrative embodiments described in detail herein.

What is claimed is:

1. A method for assembling an embossed design from which a printing matrix may be formed for use in standard stamp forming operations, comprising the steps of:

(a) engraving in a plate, a cut having a depth less than standard type depth in the form of an outline of a design portion which is common to a large number of stamps having a composite design to be repeatedly formed;

(b) leaving the design portion reserved for a variable section of design unengraved;

(c) engraving in the plate, at a depth less than said first depth, at least a partial frame cut which touches part of the common design portion and extends across an area assigned for a mounting and alignment slug to be formed in a casting operation;

(d) casting a malleable material in the engraved sections to obtain a solidified casting having the unengraved sections thereof appearing as an aperture, and

(e) forming the composite design by composing a second casting of the variable design portion in the aperture of said first casting.

2. A method in accordance with claim **1** wherein said engraving steps include the additional step of selecting the plate from a soft material such as magnesium.

3. A method in accordance with claim **2** wherein said selecting step further includes selecting a plate having a depth less than standard printing type depth.

4. A method in accordance with claim **1** wherein said engraving steps include the additional step of pantographing the design portion with one pantograph stylus in a master tracing of the design, while simultaneously cutting the engraved design portions in said sheet with a second engraving stylus.

5. A method in accordance with claim **1** comprising the additional steps of:

cutting stepped sides on said plate; and

slidably mounting said plate in a holding jig for variable positioning of said casting of said design portion relative to the location of said alignment slug.

6. A method in accordance with claim **5** wherein the plate and the holding jig are sized for insertion in a mold cap on a lead casting machine, and said casting steps comprising the additional steps of:

forcing molten lead through an aperture in a mold mated with the mold cap to fill only the engraved portions of said sheet with molten lead; and

cooling the molten lead until it solidifies for removal of the casting from the sheet.

7. A method in accordance with claim **1** wherein:

standard type depth is about 0.15 inch;

said first engraving step is engraved to a depth of about .06 inch; and

said second engraving step is engraved to a depth of about .03 inch.

8. A method for producing raised metal article in the outline of a composite design to be formed in a printing operation for printing stamps, which design has a first portion common to all stamps to be formed and a second portion which varies from stamp-to-stamp, said method comprising:

forming a first casting having sloped and raised curves in the reverse form of the first design portion, which curves extend upward from an integrally cast plane transverse to an integrally cast vertical alignment slug, said casting further including at least one aperture cast in the plane at the design locations allotted to said second design portion;

forming a second casting also having sloped and raised curves in the reverse form of the second design portion extending upwardly from another vertical alignment slug; and

interleaving said first and second castings with said second design portion positioned in said aperture to complete said composite design.

9. A method in accordance with claim **8** wherein:

standard type depth is about 0.15 inch;

said second casting is at type high; and

said first casting extends upwards an amount about .03 inch and said transverse plane is about .03 inch thick.

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