March 25, 1947. J. T. BARNES ET AL 2,418,007

METHOD OF REPRODUCING TEMPLETS OR PATTERNS

Filed April 14, 1942 2 Sheets-Sheet 1

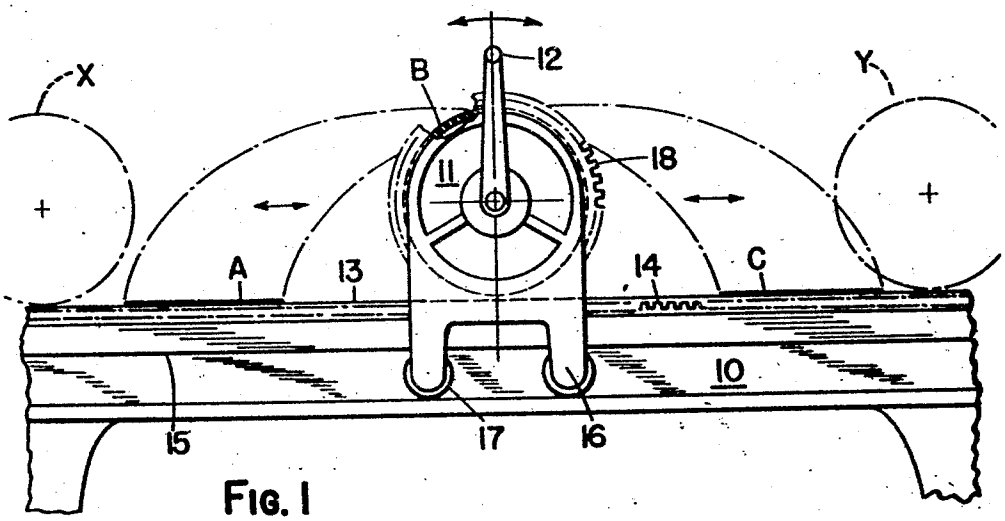


FIG. 1

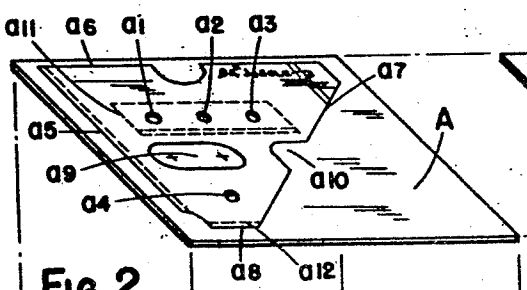


FIG. 2

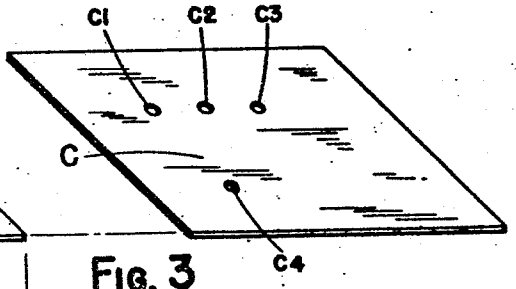


FIG. 3

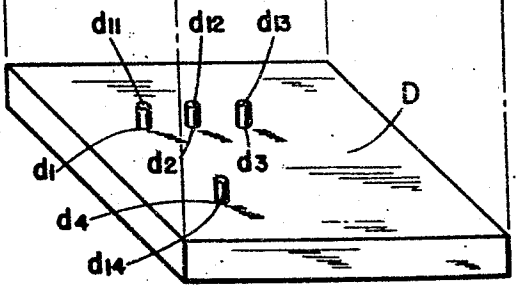


FIG. 4

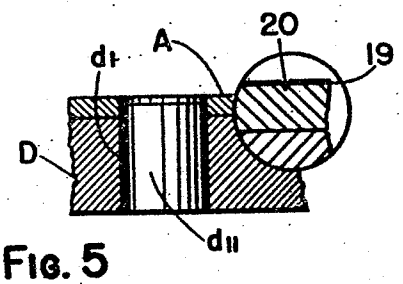


FIG. 5

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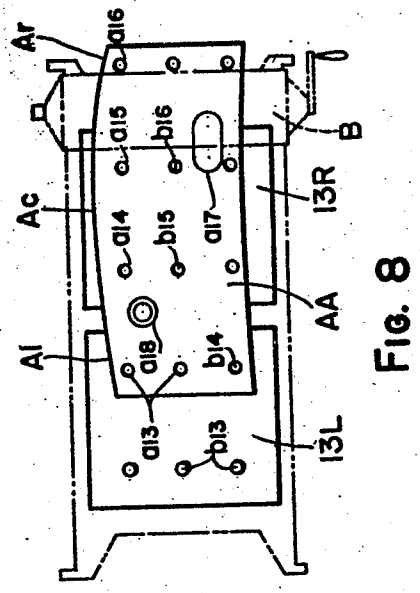


Fig. 8

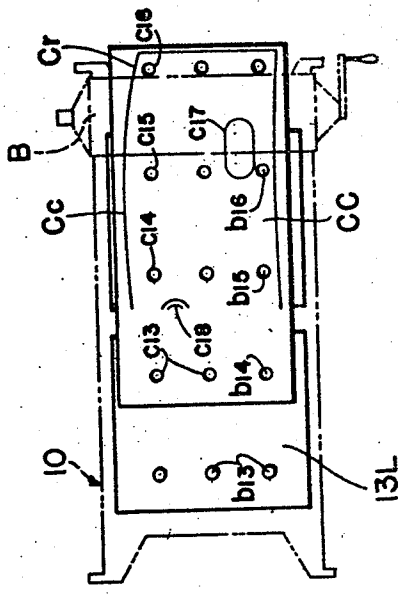


Fig. 9

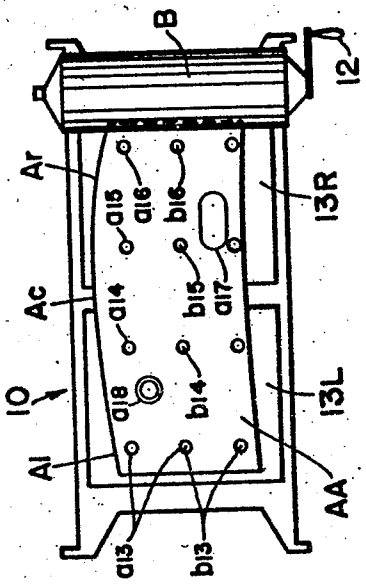


Fig. 6

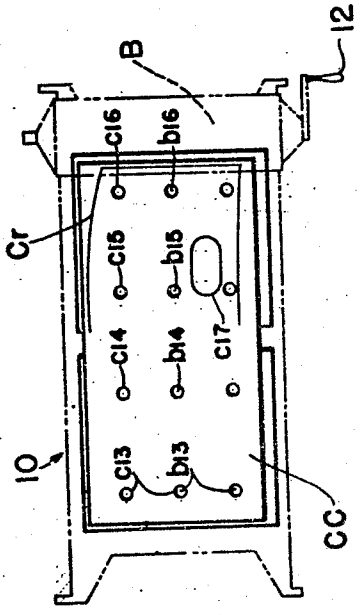


Fig. 7

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UNITED STATES PATENT OFFICE

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METHOD OF REPRODUCING TEMPLETS OR PATTERNS

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Application April 14, 1942, Serial No. 438,968

2 Claims. (Cl. 101—426)

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The present invention relates to improvements in reproduction processes and more particularly to improved methods and means for reproducing identical templets or patterns from an original master drawing or templet.

In manufacturing processes, particularly in the mass production of aircraft, it is frequently necessary to reproduce accurately, economically and quickly, layouts, instructions and other indicia from master drawings or templets upon duplicate templets to be used in producing the finished part or upon the sheet stock or other material which is to be fabricated into the finished part. In the design and construction of aircraft the parts of the airplane, the basic section and contour lines determining the external covering or skin for the fuselage, wings and other faired portions are usually drawn out to full scale upon a single large prepared surface such as the floor of a mold or layout loft. To these basic section or contour lines are then added the structural layouts and design details which are based upon preliminary sketches obtained from the designers and stress engineers. When finally corrected and completed to the satisfaction of all concerned that the lines are faired properly and the relationship of all parts are right, the full scale loft layout is duplicated in complete detail and assembly of the various parts upon large metal sheets which are known as the original or master templets.

The indicia shown upon each master templet is required to be reproduced or laid out either upon duplicate templets to be used in fabrication of parts in the factory or upon metal stock which ultimately becomes a part of the finished airplane. Many prior methods have been in use for reproducing the duplicate templets from the original templet. These methods include variations of substantially all of the known methods of duplication or reproduction including photographic, photographic projection, photographic contact and photo-reflex, X-ray methods, electrolytic processes, as well as the tedious and time-consuming hand method of laying out and scribing on each individual sheet the drawing and information which is copied from the master templet. While many of these processes are relatively economical as compared to the prior hand scribing methods they each require expensive equipment and material for their use and most of these prior photographic processes additionally have the undesirable requirement of a relatively large dark-room with its developing tanks and other photographic processing equipment. Certain of these prior photographic methods also

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have the disadvantage that they require extremely accurate long focal length lenses of an expensive nature and electric or other illumination of sufficient intensity to produce fine and accurate lines upon the duplicate templets. Many of these prior processes also require a multiplicity of intermediate steps and the production of negatives and reversed patterns which cannot be utilized in themselves for fabrication into the final templet or part. These prior processes have also been objectionable in that they do not lend themselves readily to sufficiently accurate and rapid reproduction of duplicate templets and in certain instances the accuracy is impaired by the necessity of transferring the drawings from one type of material to another having different coefficients of expansion.

The present invention relates to a greatly simplified and inexpensive method for producing both accurately and rapidly any number of identical duplicates with a minimum number of process steps and which utilizes readily obtainable material. Briefly stated the present method in an entirely mechanical process comprises the preparation of an original sheet into which is inscribed the drawing or that portion of the original loft layout for which duplicate templets are desired. This original sheet may or may not be initially coated and when properly scribed becomes the master templet which is then inked over all of its surface with the exception of the inscribed depressions. An impression of the inked surface is then transferred to a rubber offset blanket carried upon a cylinder which may be mounted on a printer's or lithographer's proof press and the blanket then rolled and impressed upon a sheet forming the duplicate templet, which may preferably be coated with a color contrasting with that of the inked impression. By re-inking the original templet and similarly offset transferring the impression to coated templet sheets any desired number of duplicate templets may be obtained, each being identical with the original and with each other. The present method and equipment also lends itself to the reproduction of positively registering duplicate templets in which a drilled master templet serves as a drill jig for insuring the accurate registration of the holes in relation to the scribed lines on the duplicate templets. By applying ink to the scribed indicia of the master templet a deeper impression can be taken and transferred to tracing cloth or paper for the making of blueprints.

Accordingly it is a major object of the present invention to provide a simple and economical

process, utilizing readily available materials and equipment, for the rapid and accurate reproduction of templets from an original templet or metal layout. It is also an object to reproduce such templets by means of an entirely mechanical process which eliminates all photographic and other similar steps. Another object lies in a method whereby the outline of a master templet longer than the normal capacity of the press may be transferred to a copy templet.

It is a further object of this invention to provide a reproduction process in which no special training of the personnel is required nor the use of any special tools or equipment. A further object resides in the provision of a system which readily permits obliteration of any undesired part of the original by inking over that portion of the copy templet and subsequently making the desired corrections or revisions by scribing through the inked portion. A still further object resides in the provision of a reproduction system which readily permits the transfer of an impression from a templet to tracing cloth or tracing paper for the making of blueprints.

Other objects and advantages of the present invention will become apparent to those skilled in the art after a reading of the present specification and the accompanying drawings forming a part hereof, in which:

Fig. 1 shows a diagrammatic elevation of a preferred arrangement of equipment to carry out the present invention;

Fig. 2 is a perspective view of a typical master templet selected to teach the present invention;

Fig. 3 is a corresponding perspective view of the copy templet;

Fig. 4 is a corresponding perspective view of an underlay block;

Fig. 5 is a detail sectional view showing the relative positioning of the master templet upon the underlay; and

Figs. 6 to 9 inclusive show the progressive steps in reproducing outlines from master templets of greater length than the normal capacity of the bed of the press.

The improved methods and means comprising the present invention are capable of use with either the simple printer's proof press of the fixed-bed hand-operated type, or with the hand- or power-operated lithographer's proof press having adjustable bed sections. Accordingly, we will describe methods or systems which are adapted for each type of press, as well as systems which are suited to different needs or requirements. These methods fall broadly into two general groups, namely that in which the templets are provided with matching holes through the actual plates with which the layout has to register perfectly and that group in which the holes, if any, are indicated only on the surface of the templets along with the layout. The systems relating to the matched hole templets comprise essentially the three modified methods which we more particularly prefer to designate as follows: (I) The lead underlay system for use primarily with simple fixed-bed proof presses (in which the bed of the machine is usually .918 inch below the pitch line, or the actual contact line); (II) the match grid system adapted for use on the grid sections of the bed of a lithographer's proof press; and (III) the match pin system, also for use with lithographer's proof presses in which each of the adjustable beds are provided with matched pins. The latter system is the preferred form of our invention as more

particularly adapted for the mass production of metal templets. As a modification of these systems, and more particularly a method which is suited to the match grid and pin systems, there is shown in Figs. 6 to 9 inclusive an arrangement whereby extra long master templets can be reproduced as copy templets.

Referring now to Fig. 1 there is indicated by the numeral 10 a portion of a hand-operated proof press which can readily be utilized in connection with the present invention. This proof press 10 can be one of the suitable types which are provided with a cylinder 11 having an attached handle 12 for manual operation back and forth over the bed 13 of the press. At either side of the bed 13 there are provided parallel racks 14 suitably engaged by spur gears 18 carried at each end of the cylinder 11. At each side of the bed of the press and preferably disposed beneath the racks 14 there are provided parallel guides 15 adapted to be closely engaged by rollers 17 carried upon the cylinder carriage 16. The equipment which has just been described is typical of that which is well known in the printing art and in itself does not form a novel part of the present invention except in the novel manner in which it is used in the following description.

Referring now to Fig. 2 there is shown in perspective a master or original templet A on which there is shown a drawing or outline of a part which it is desired be reproduced in a number of duplicates or prototypes. The drawing indicated on the master templet A has been selected merely to explain the present invention and the arrangement of the lines in this figure are typical of any templet and it will be understood by those skilled in the art that it is possible to take many different forms and appearances, all of which are readily accommodated for reproduction by the present invention. The part indicated in the master templet is shown as of triangular shape being provided with four drilled holes, *a1*, *a2*, *a3* and *a4* which it is desired be accurately located with respect to the edges *a5*, *a6*, *a7* and *a8* as well as the other indicia outlined on the templet. In this templet A, which has been selected for explanatory purposes only, there is also shown an elliptical hole *a9*, an irregular peripheral recess *a10* in the edge *a7* as well as dotted construction lines *a11* and *a12* which indicate the assembly position of adjacent parts or structure.

The master templet A is preferably formed from a metal sheet, either steel, aluminum, or an aluminum alloy, or other material, depending upon the extent to which it will be used or the material of the ultimate part which will be made from it. Commercial sheet material is not of uniformly perfect surface to permit accurate metal-to-metal contact printing due to the slight surface defects which appear on the commercial sheet iron and like materials which are frequently used as templet stock. However, we have found that by carrying a .010 inch impression the offset blanket absorbs these small surface irregularities, which accounts for those of the same magnitude without any material considerations. The master templet A is provided with a base coat 19 (Fig. 5) of lacquer or enamel which is preferably of dark green, brown or black of a dead flat finish primarily to obtain contrast and to reduce eye strain of layout personnel. The drawing is then scribed with a sharp pointed tool through the surface coating 19 to form the fine lines 20 on the

metal. These lines contrast sufficiently with the coating to clearly indicate the drawing outlines.

In Fig. 3 there is indicated a sheet of templet stock upon which it is desired to accurately reproduce the drawing which has been scribed upon the master templet A. The copy templet C, which is preferably of the same thickness and material as the templet A, although it need not necessarily be, is first provided with a coating of lacquer or enamel which is applied either by spraying, whirling, brushing or other suitable methods and which should be of a color which will contrast with that of the ink which is to be used in the duplicating process. This base coat is preferably a white or other light coating to obtain a contrast background, although printing upon the base metal is entirely satisfactory and is preferred by some. The black ink duplicate on bare metal has the advantage that there is no lacquer or enamel at the lines of the outline to burn or peel during sanding, cutting and filing operations. In an alternative procedure the copy templet C can first be prepared by rolling thereupon a base coat of ink and then using a contrasting color of ink in the duplicating process.

Let us now assume that it is desired to reproduce the master templet A upon one or more copy templets C, each templet having been prepared as described above, and in which it is not required that the holes *a1* to *a4* inclusive in each templet be drilled and registered with each other prior to the duplication of the remainder of the drawing of the master templet. Referring again to Fig. 1, the master templet A is suitably supported upon the bed 13 of the press as shown to the left of the cylinder 11 and the copy templet upon which the drawing is to be duplicated is placed in the position indicated at C to the right of the cylinder. The press cylinder is provided with a rubber offset blanket B of a width and length to cover the cylinder upon which it is suitably supported in a well known manner. The cylinder is then preferably moved into its extreme position to the left of the templet A. Printer's ink is then rolled onto the surface of the templet A by using a hand brayer or an automatic inking device which spreads the ink thinly over the templet while leaving the scribed lines 20 of the drawing free of ink. The cylinder 11 is then rotated by means of the handle 12 in a clockwise direction over the form or templet A with just enough impression so as to pick up the ink from the surface of the templet.

Continued rotation of the cylinder in a clockwise direction causes the rubber blanket B which still holds the ink which has been picked up from the templet A to be rolled over upon the blank sheet of metal C, thus giving a duplicate of the original templet. This process can be repeated as many times as desired merely by substituting new blank metal sheets at C and re-inking the master templet A before taking each impression. It will be found that the duplications of the original drawing are extremely accurate and that the lines are as fine or frequently finer than the scribed lines on the master templet itself. Where extremely accurate reproductions are required a good precision proof press must be used and the lines on such a press plate when taken parallel to the axis of the blanket cylinder may be re-inked many times and each time they will transfer the printed line to the copy templet C without any noticeable thickening of the line on the copy templet. The above mentioned method is entirely satisfactory for use with the simple proof press and for reproducing templets in which the holes are either scribed upon or drilled through the master templet but in which these holes are not required to be of match drilled accuracy in the copy templets.

When it is desired that the duplicate blank be match drilled with the master templet and then reproduced with the outline drawing with positive register between the drilled holes and the lines of the templet, either of the following procedures may be used:

I. *The lead underlay system.*—The master templet A is placed upon the underlay D which is preferably a lead block to permit its being drilled easily, of a suitable thickness such that the top of the contact line is brought up to the pitch line of the printer's proof press. Using the master templet A as a drill jig the holes *a1* to *a4* inclusive are used as a guide and corresponding holes *d1* to *d4* are drilled into the underlay block D. Guide pins *d11* to *d14* inclusive are then dropped into the drilled holes in the underlay block, the pins being substantially the same size as the holes to provide a close sliding fit and being of a length such that they project into but do not quite extend to the upper surface of the master templet A when it is superimposed upon and matched with the underlay D, as more clearly shown in the enlarged detail in Fig. 5. The desired number of duplicate templet blanks C are then prepared with or without suitable coating, as decribed above, and the first of these blank templets is drilled with the four holes *c1* to *c4* inclusive using the master templet A as the drill jig. With the cylinder 11 preferably in its central position as indicated in Fig. 1, the underlay D is placed upon the bed 13 of the press in the position where it supports the templet A as shown in Fig. 1. The master templet A is then placed upon the underlay D such that the pins *d11* to *d14* match and project partially into the holes *a1* to *a4* inclusive and the bed of the press is suitably adjusted such that when the cylinder 11 is passed over the master templet A the correct degree of impression is taken. The master templet A is then prepared with printer's offset ink by rolling the same thereon by means of a hand brayer or other suitable inking device which again covers the surface of the templet but leaves the scribed lines free of ink. The templet A is now removed from the machine and the blank sheet C in which the holes *c1* to *c4* have already been drilled using the templet A as a guide, is substituted in its place, being superimposed over the underlay D and having its holes matched with the pins *d11* to *d14*. The cylinder is again rotated into its position where the rubber blanket B, which still holds the ink that had been picked up, is then rolled over the blank sheet of metal C, thus giving a duplicate of the original templet. This procedure may be repeated as many times as required to produce the desired number of duplicate templets and the method insures positive duplication of the locating holes due to the fact that they were matched drilled through each copy templet using the master templet as the drill jig. The lead underlay method can, of course, also be used if necessary with the lithographer's proof press.

II. *The match grid system.*—In this method two plates of, say 3/16 inch thick steel are prepared and match drilled together, preferably on about one inch centers such that these plates are for all practical purposes identical one to the

other. One plate is mounted upon the work bed of a lithographer's proof press which might be the position at A on the bed of the press 10, the latter now being for the present purposes a lithographer's proof press with two independently adjustable beds A and C. The other plate is adjusted to a position on the reproduction bed, for example, position C in Fig. 1, until this latter plate is in registration with the first grid, and when it is in the proper position it is then securely fastened with pins, screws, or other suitable means through the holes which have been located on predetermined centers. In operation a jig bar, drilled on these same centers, is used to drill matched holes into both the templet and the blank stock together either before, or after, the blank has been drilled from the master templet. By matching holes, the master templet is pinned to the work bed and the blank is similarly pinned to the corresponding holes on the reproduction bed. The master templet is then inked and an impression taken therefrom and offset printed upon the duplicate in the same manner as described above for the transfer of the impression from the master templet to the printed duplicate. In a variation of the same general method, a composition known to the trade as Booth Zinc Cut Cement, or a type of double gummed tape such as "Scotch Tape" or "Plate Tak" can be used to advantage to make the master templet or the duplicate stock adhere to and register with the bed of the press if it is desired to dispense with the use of pins during the printing process.

III. *The match pin system.*—This method is also adapted for use with the lithographer's proof press and is the method recommended particularly where relatively large quantities of templets are required to be reproduced rapidly and accurately for mass production purposes. Referring now to Fig. 6, let us assume that numeral 10 designates a lithographer's proof press, being provided with an adjustable work bed 13L and a similarly adjustable reproduction bed 13R. Each of these bed portions are provided with spaced rows of holes into which the matched pins *b*13, *b*14, *b*15 and *b*16 may be set in an identical relationship to those in the other bed, and symmetrically arranged with respect to the adjacent bed portion. Corresponding holes are then jig-drilled into a blank sheet of stock to match the pins *b*13, *b*14, etc., which have been set into and in proper relation with each bed of the lithographer's proof press. Onto one such blank sheet the master templets are attached by means of double-faced tape or other suitable adhesive. After having been so mounted, the blank sheets of metal, which are to be printed in the reproduction process, are stacked under the sheet to which the master templets are now drilled through the underlying stacked sheets, or in other words, they are stacked drilled. It will now be apparent that all the holes are thus drilled in proper relation to the master templet. The sheet with the master templet A is now placed on the press over the master pins *b*13 and *b*14 on the work bed 13L, and the sheets that are to become the copy templets C are placed on one at a time over the pins *b*15 and *b*16 on the reproduction bed 13R of the press. It will be understood that the templets A and C are of sizes which fit within each of the beds 13R and 13L and are not of the excessive size of the master templet AA which is shown in Fig. 8, and that the press and pin arrangement of this figure is referred to only for explanatory purposes. The ink is then applied to the master set, the impression taken and offset to the copy sheet of metal in very much the same fashion as described for the above methods. The present method, as has been indicated above, has been found to be the most satisfactory when mass production is required.

When it is required to reproduce a layout from a master templet which is longer than the length of either bed of the lithographer's proof press, the system which is indicated in Figs. 6 to 9 inclusive of the drawings may be used. For the purposes of this method let us assume that the press 10 is a lithographer's proof press, being provided with a suitable rubber cylindrical blanket B and a handle 12 for rotating the same. The press is provided with a work bed 13L and a reproduction bed 13R. In Fig. 6 there is shown placed across both beds of the press a master templet AA which is much greater in length than that of either of the press beds. Each bed of the press is provided with spaced rows of pin holes into which the match pins *b*13, *b*14, *b*15 and *b*16 may be closely fitted. Preferably the distance between the rows of pins *b*13 and *b*14 in the work bed are spaced apart a distance which is equal to that between the adjacent rows of pins *b*14 and *b*15 as measured across the intermediate portion of the press between the two beds. From a jig or other templet which is matched with the pin holes in the press, corresponding rows of holes are drilled in the master templet AA, these rows of holes being *a*13, *a*14, *a*15 and *a*16, such that when the master templet AA is placed upon the press it registers with the pins *b*13 to *b*16 inclusive, the pins not quite reaching to the working surface of the templet. The blank sheets CC upon which the master templet outline is to be reproduced, is similarly drilled either from the master jig or the master templet, such that it is also provided with the matched rows of holes *c*13, *c*14, *c*15 and *c*16. For the purposes of the present explanation the master templet AA is provided with an elliptical outline *a*17 and a pair of concentric circles *a*18 which are both accurately spaced as required by the layout with respect to the other indicia which may appear thereon, and with respect to the margins of the templet outline.

The method of reproducing the master templet, as shown in Figs. 6 to 9 inclusive is as follows: The master templet AA is first placed with its holes *a*13 to *a*16 in registry with the corresponding pins *b*13 to *b*16 as shown in Fig. 6, the master templet being of such length that it extends substantially across both beds 13L and 13R of the press. The right hand portion Ar of the master templet is then inked and the roller with its blanket B rolled thereupon to pick up the impression. As shown in Fig. 7 the copy templet stock CC which has previously been match drilled is now placed in registry with the corresponding sets of pins *b*13 to *b*16 inclusive extending up into the holes *c*13 to *c*16 of the copy sheet, bringing the latter into proper registry. The roller B is then rolled over the copy templet and the right hand portion of the layout transferred thereto as indicated at Cr and *c*17. The master templet AA is then replaced upon the press 10, but this time its row of holes *a*13 is matched with the second row of pins *b*14 in the work bed 13L, such that its second row of holes *a*14 matches the third row of pins *b*15, its third row of holes *a*15 matches the last row of pins *b*16 in the bed 13R. The last row of holes *a*16 in the master templet AA may

project beyond the right hand bed 13R of the press as indicated in Fig. 8. After the rubber blanket B has been washed or cleaned of any remaining ink from the previous offset operation, the intermediate or central portion Ac of the master templet AA is then suitably inked, an impression picked up by rolling the blanket B thereupon and returning the same to its end position, as shown in Fig. 8. The copy templet CC is then placed upon the pins of the press in the same position as that last occupied by the master templet AA, that is, one set of holes removed or displaced toward the right and with its last row of holes extending beyond the right edge 13R of the press as shown in Fig. 9. After the copy templet has thus been placed in proper registry the blanket B on the cylinder is then rotated across the central portion of the copy templet transferring its impression thereto, as indicated in Fig. 9 at Cc and c18. The last and final step in this process, in order to complete the transfer of the layout, is obtained by again setting the master templet AA upon the bed of the press 10 such that its left row of holes a13 are matched with the third row of pins b15. The remaining master templet portion Af is then inked and the impression transferred by the rubber blanket to the corresponding portion of the copy templet, after the latter has been similarly registered on the same pins of the press. The foregoing variation of the reproduction process is of considerable advantage because it increases the scope of existing equipment and permits greater flexibility and the handling of larger templets. Where templets of a shorter length are to be reproduced this may be done in two steps instead of the three described, and, of course, longer templets can be accommodated by four or more steps with the match pins arranged to suit the templet requirements.

In many manufacturing processes it is desirable, in addition to the reproduction of metal templets, to produce a number of blueprints. Our improved reproduction process readily permits the printing of the master templet onto tracing paper or tracing cloth from which any desired number of blueprints or other prints may be reproduced. In order to print the original templet upon a sheet of tracing paper the master templet A is placed on the bed of the press in the work position of the lithographer's press. Printer's ink is then rolled onto the surface of the templet by the hand brayer or other inking device. This ink is then forced into the scribed lines by the use of a sharp edged tool and at the same time the major portion of the ink is scraped from the surface of the templet. The excess ink remaining on the surface after the scraping operation is then blotted off by running the cylinder back and forth several times over the templet surface using news print for the blotting paper. This blotting of the excess ink does not pick up the ink in the scribed holes because this ink is below the surface of the templet. The necessary added impression is provided for the rubber blanket to pick up the ink in the scribed lines 20 below the surface of the templet. The cylinder 11 upon which the rubber blanket is carried and has just been inked by virtue of this added impression, is then rolled over upon a sheet of tracing paper which is placed on the reproduction bed of the press. The inked lines are accordingly transferred to the tracing paper or cloth as the result of this operation. It should be noted that the above outlined procedure gives a tracing paper or vellum copy similar to that made by ordinary drafting procedure. Additional information in the form of dash numbers, notes, bills of material, desirable corrections or additions to the drawing itself can, therefore, be made upon the copy reproduced in the manner described. Should all the material necessary to produce a drawing be on the master templet, and should it therefore not be desirable or necessary to add further notes, changes or other information, the copy can be made under the same procedure as that used in reproducing a templet and a copy similar to a Van Dyke will be produced. In the event the simple proof press is used, it will, of course, be necessary to provide an underlay under the tracing paper. With the reproduction proof press it is not necessary to have an underlay under the tracing paper. The templet can be placed on bed No. 1 or 13L in Fig. 6, and the tracing paper on bed No. 2 or 13R. The beds of such presses are both accurate and smooth enough for the tracing paper and they can be adjusted to proper pitch line.

It will accordingly be seen that by means of the above described methods extremely accurate templets can be obtained from a master templet without the necessity of any photographic steps in the process and directly in a positive pattern which is a true copy and is not reversed in any manner. These processes are basically mechanical in their nature and the equipment consists primarily of a printer's proof press provided with a special rubber offset blanket on its cylinder using the master templet or layout as the printing form. It is also shown that locating holes can be drilled from the master templet into the blank and the master templet thereupon reproduced onto the blank with positive register between the drilled holes and the printed lines on the copy templet. This permits the use of the master templet as a drill jig for the duplicate templet insuring absolute accuracy of the location of the holes in relation one to the other and in relation to the scribed lines on the duplicate templet. It will be understood that any suitable material may be utilized for the master templet and the drawing may be reproduced upon copy templets of the same or other material. Since both templets during the offset transfer process are under the same conditions and temperature, and such other conditions as humidity and the like which would affect other materials, there is little possibility of variations in transferred images such as are met with in photographic processes where negatives are produced either upon glass or film and the same are developed and fixed in chemical solutions and during which the temperature and humidity of the medium carrying the image is varied over a considerable range. In this connection the present reproduction processes are capable of reproducing the master layout or templet on any material which has a uniform surface and upon which ink will adhere and which is capable of reproducing the master templet upon die stock, form blank stock or Masonite, thus eliminating the necessity of making separate templets to be used to transfer lines to each of these materials. It should also be noted that introduction of this process will not disrupt or interfere with the basic processes of a loft or templet layout department. No additional training of loft layout personnel is required and neither will this personnel have to replace their tools or equipment as is necessary when other reproduction processes are used.

In using the presently described methods in the building of an experimental airplane the following procedure has been found advantageous. The master templet, which is required in any event whether the present or other reproduction processes are used, is first completed. If the part is to be formed, the master templet can be reproduced on the form block material and the form block can be made therefrom. The master templet can then be reproduced on the actual stock from which the part is to be made and the part can then be cut out and fabricated over the form block. Another advantage of the present process permits any portion of the duplicated or copy templet which is not actually wanted, to be obliterated by simply rolling the ink coated brayer over that portion of the copied templet. This permits additional layout to be added to the templet and has been found very useful in changing from one airplane model to another model of the same type.

Other forms and modifications of the present invention both with respect to the general procedure and equipment, or to the detailed steps or parts, which may become obvious to those skilled in the art after a reading of this description are all intended to come within the scope and spirit of the present invention as more particularly defined in the appended claims.

We claim:

1. The method of reproducing a match drilled master templet by the use of a lithographer's proof press having adjustable work and reproduction beds, the said press having identically disposed matched pin holes in each bed and matched pins within said holes, comprising and jig-drilling of a stack of copy templet blanks to match the said matched bed holes and the holes in the master templet, positioning of the master templet upon the pins of the work bed of the press, positioning a copy templet blank upon the matched pins of the reproduction bed of the press, inking the said master templet and transferring an impression from said inked master templet to each of said copy templet blanks.

2. The method of reproducing a templet upon a proof press having adjustable work and reproduction beds, each of said beds having identically disposed matched pin holes and provided with pins in each of said holes, the preparation of a blank sheet of stock by jig-drilling the same to match said bed holes, using said blank stock as a jig to drill the matched holes in said master templet, adhering said drilled blank sheet to a stack of copy templet blanks, jig-drilling said stack of copy templet blanks through said drilled blank sheet, positioning said master templet upon the matched pins of the work bed of the press, positioning each of said drilled copy templet blanks individually in registration upon the matched pin holes of said reproduction bed, and transferring an inked impression from said master templet to each of said copy templet blanks.

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