Aug. 18, 1953 R. L. WEISBECK 2,649,157

MASTER TEMPLATE SETUP FOR PUNCH PRESSES

Filed May 31, 1951 4 Sheets-Sheet 1

Fig. 1.

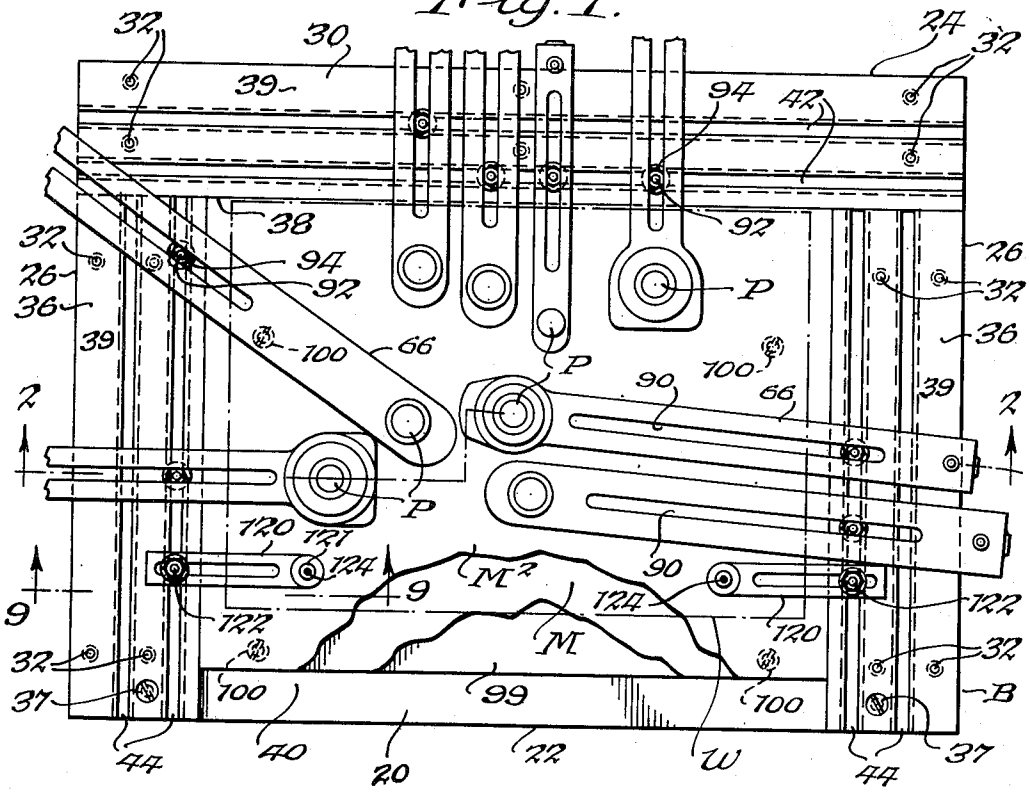
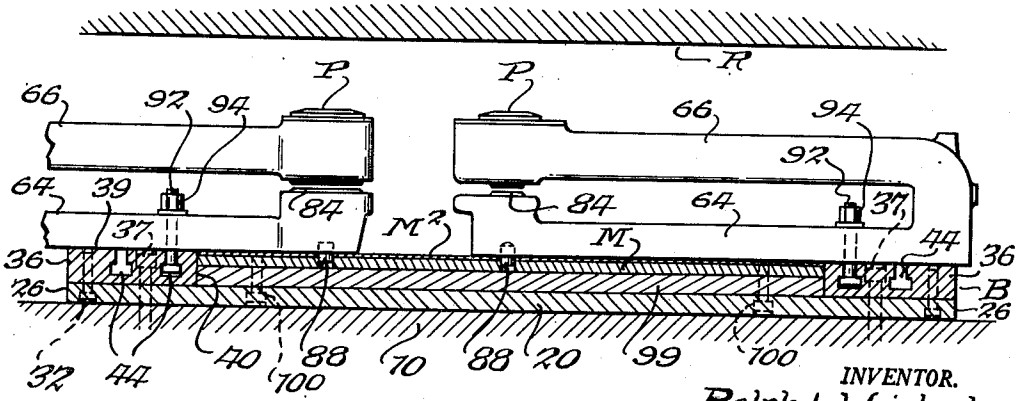


Fig. 2.



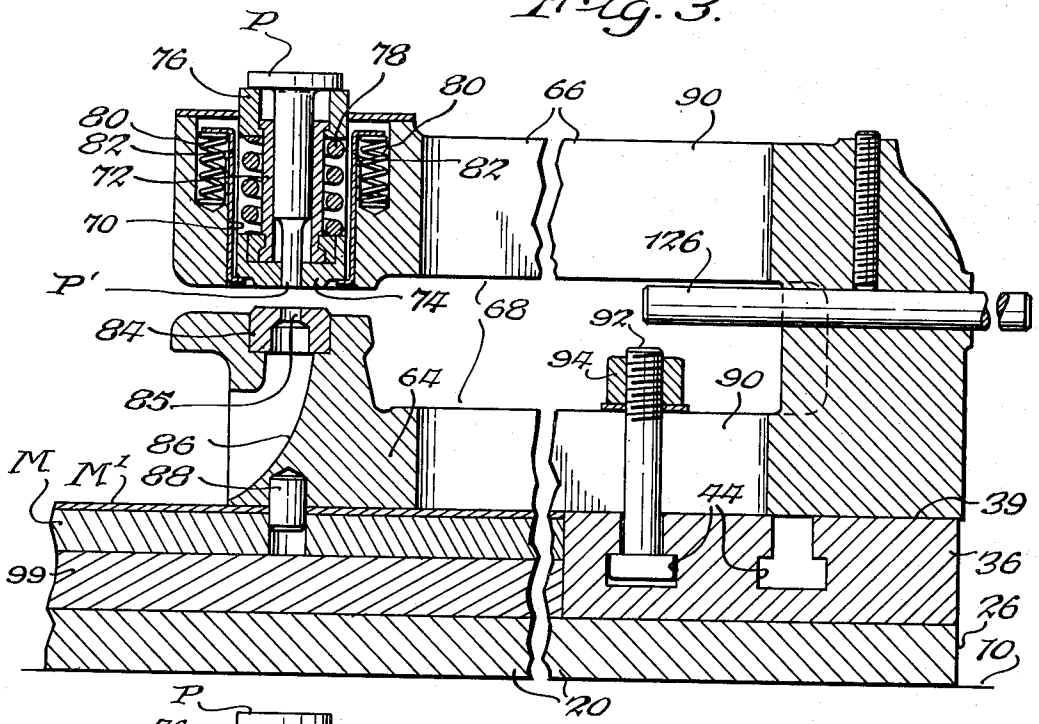
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MASTER TEMPLATE SETUP FOR PUNCH PRESSES

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Fig. 3.



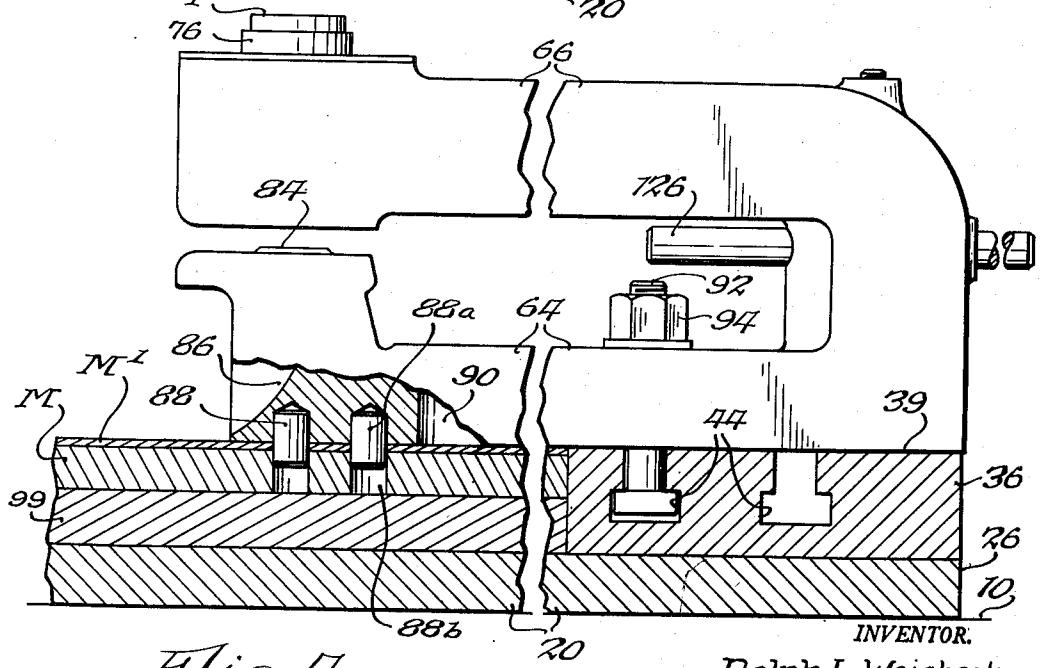


Fig. 4.

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MASTER TEMPLATE SETUP FOR PUNCH PRESSES

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Fig. 5.

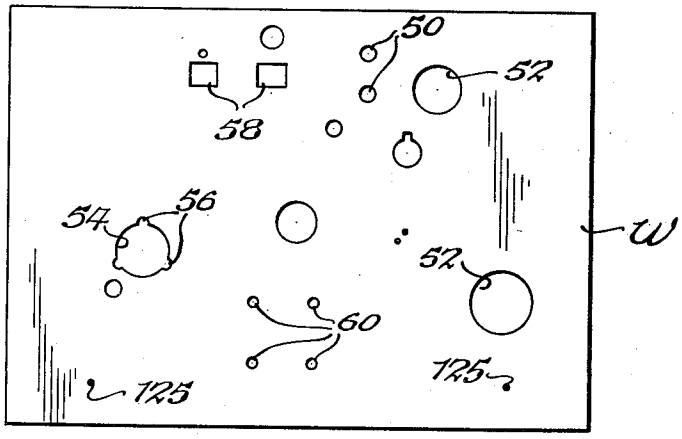
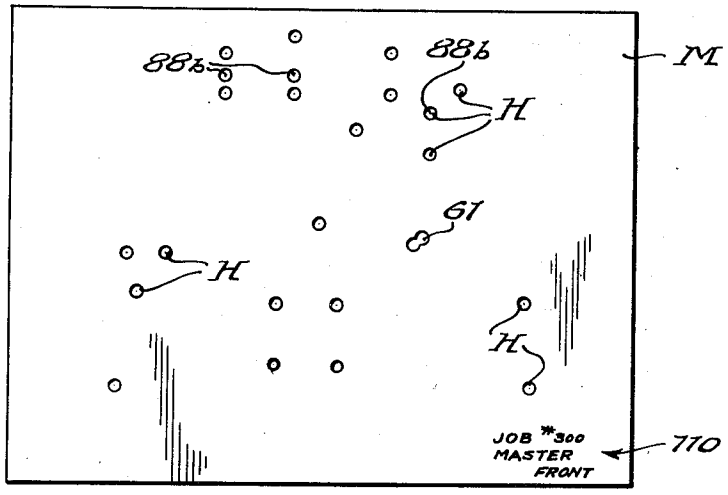


Fig. 6.



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Fig. 7.

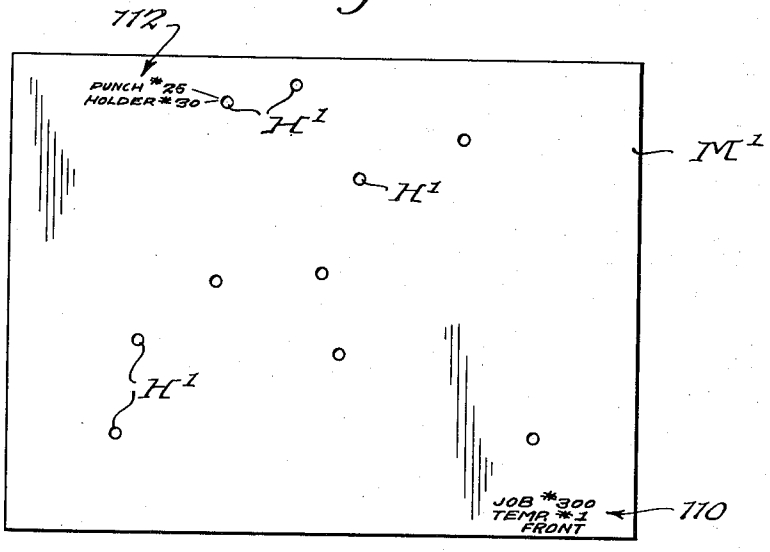


Fig. 8.

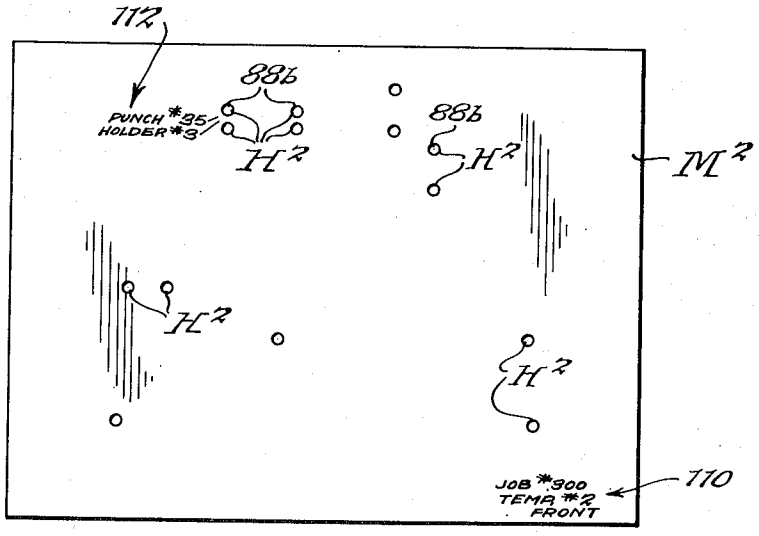
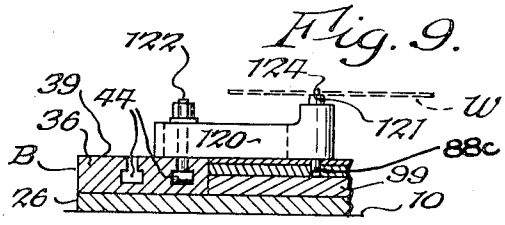


Fig. 9.



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2,649,157

UNITED STATES PATENT OFFICE

2,649,157

MASTER TEMPLATE SETUP FOR PUNCH PRESSES

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Application May 31, 1951, Serial No. 229,089

12 Claims. (Cl. 164—94)

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This invention relates to improvements in template equipment for use in connection with punch and die holders of the type disclosed in Patent 1,955,866, issued to George F. Wales, April 24, 1934.

In apparatus such as disclosed in said patent, a plurality of punch and die holders are supported in a group in a press so that the punches of the various assemblies may be actuated simultaneously by the ram of the press to perforate the work-piece located between the punches and dies of the various holders. The punch and die holders are located in the desired relation to produce a predetermined pattern of perforations by a template, the latter having pilot holes which pilot pins on the holders enter to locate the holders so that when the punches are actuated simultaneously by the operation of the press the work-piece will be perforated in accordance with the pattern of holes in the template.

There are limitations to the use of punch and die apparatus of the type and in the manner described. The holes which must be formed, for example, in chassis for television, radio and radar apparatus are not only numerous and of various sizes and shapes but are also closely spaced together. In this connection, it will be apparent that when the distance between the centers of adjacent holes is such that the punch and die holders, because of interference with one another, cannot be mounted close enough together as called for by the spacing of the holes, then formation of the holes by apparatus of the type described cannot be accomplished in a single operation but must be performed in a series of successive operations.

The principal object of the present invention is to provide template equipment which is so designed that perforations too close to be produced in a single operation may be produced by a series of operations in such a manner that each work-piece of a run will be accurately perforated, or otherwise deformed, in exactly the same manner.

Another object is to provide template equipment of the character generally described wherein a master template is formed with pilot holes for locating all of the punch and die holders which may be required to punch out a complex pattern of openings in a work-piece regardless of the spacing of such openings and wherein provision is made for masking all of such pilot holes except those employed in each punching operation.

A related object is to provide a novel master template by which punch and die holders may

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be accurately located for use without attachment of the holders thereto.

A further object is to provide a master template having pilot pin holes therein by which punch and die holders may be accurately oriented when punches having "shaped" punching portions, or portions other than of circular outline, are to be used.

A related object is to provide an individual punch and die holder for use with such a master template wherein a plurality of pilot pins on the holder enter a corresponding number of pilot pin holes in the template so that such a holder may extend in a specified direction only and not otherwise.

Another object is to provide a plurality of individual and different secondary or locating templates for use with the master template in locating a group, or several groups, of punch and die holders for operation in sequentially punching selected holes or apertures of a desired pattern.

A further object is to provide secondary or locating templates for use with a master template, one after another in succession, for locating punch and die holders in selected and different groups in accordance with different groups of pilot pin holes in a set of holes in a master template pattern.

A related object of the invention is to form such secondary or locating templates so that, when one of them is mounted on the master template, the holes in said secondary or locating template will register with only the corresponding holes in said master template, to enable selected holders, and no others to be mounted for use in producing perforations corresponding to a part of the pattern of pilot holes in said last mentioned template.

A further object of the invention is to provide a novel base or support for use in a punch press to which punch and die holders may be secured for employment with the master template and one or more secondary or locating templates.

Another object is to provide a secondary or locating template which may be placed upon and retained in operative relation to the master template by the pilot pins of the punch and die holders.

Another object is to provide, for use with the template locating means, a base support on which the punch and die holders used for punching work-pieces can be secured by attaching devices engageable in T-slots in said support arranged in a novel manner.

A related object is to provide a base support or member having T-slots arranged in a novel

manner, whereby to attain greater latitude and capacity in the arrangement of the punch and die holders mounted thereon than has heretofore been possible.

A further object is to provide, in a base member for supporting a master template and a secondary locating template, means for positioning the work-pieces in operative relation with respect to the punches and dies of the holders in such a manner that a work-piece having marginal irregularities may be so held that it will be formed, in the sequential punching operations, with holes which accurately coincide with the pilot holes of the master template and a locating template operatively associated therewith.

Other objects and advantages attained incident to the use of the invention hereinafter described will be apparent.

In the accompanying drawings which illustrate one practical embodiment of the invention:

Figure 1 is a plan view of an assembly for use in a punch press, showing a base support having mounted thereon a master template, a locating template and a group of punch and die holders disposed for punching holes in a work-piece corresponding in pattern to the pilot holes in the pattern of the locating template;

Figure 2 is a transverse vertical section taken along line 2—2 of Figure 1 and showing the assembly supported upon the bed of a press under the ram of the latter;

Figure 3 is a longitudinal sectional elevation of a punch and die holder in operative relation to the base member, master template, a locating template and associated parts;

Figure 4 is a similar view, partially in elevation, illustrating a punch and die holder having a modified pilot pin arrangement comprising a plurality of pilot pins, for the purpose of locating a shaped punch angularly with respect to the workpiece;

Figure 5 is a plan view of a television, radar or radio chassis produced by the apparatus of the invention;

Figure 6 is a plan view of a master template having a pilot hole pattern corresponding to the pattern of holes in the chassis illustrated in Figure 5;

Figure 7 is a plan view of a secondary or locating template used with the master template of Figure 6 and having pilot holes therein corresponding to a selected portion of the pilot hole pattern of the master template;

Figure 8 is a plan view of a similar secondary or locating template having pilot holes therein corresponding to the locations of certain of the remaining pilot holes in the master template of Figure 6; and

Figure 9 is a fragmentary sectional view taken along line 9—9 of Figure 1.

The template equipment of the present invention may be employed in connection with a press having a lower stationary bed 10 (Figure 2) and an upper, reciprocatory ram R.

The template equipment and the perforating apparatus to be positioned thereby are arranged upon the bed 10 so that during down strokes the ram R will actuate the punches P to punch holes in the metal sheets or work-pieces W inserted into the holders which carry the punches.

The holders, in one form of the apparatus, may be mounted by clamping means operable in T-slots in the bed, or in members attached thereto, enabling the holders to be arranged in different positions relatively to the work-piece.

While such T-slots have heretofore been disposed to extend parallel to each other in one direction only, they are, in the present instance otherwise disposed, as seen in Figure 1. This feature will be first described and the advantages resulting therefrom will be later set forth.

For this purpose I provide, see Figure 2, a base support or mounting B including a rectangular, horizontal bottom plate 20 of substantial thickness having front and rear edges 22 and 24 and opposite side edges or margins 26.

Extending from and between the margins 26 and coincident with the rear edge 24 is a relatively thick transverse rear bar 30 (Figure 1) of rectangular cross section secured to the top face of bottom plate 20 by screws or fastenings 32.

Rails 36 of similar cross section coincide with the side margins 26 of bottom plate 20 with their front ends flush with the front edge 22 of said bottom plate and their rear ends abutting the vertical front face 38 of the cross rail 30. The rails 36 are likewise secured to the top face of plate 20 by other screws or fastenings 32. The rails 30 and 36, the top faces 39 of which are in the same horizontal plane, define a recess or depression 40, open at the front.

The rear rail 30 has extending lengthwise thereof, or transversely of the mounting plate B, T-slots 42, two being shown, which run parallel with the longitudinal edges of the rail 30.

The side rails 36 are provided with similar T-slots 44 which extend at right angles to the T-slots in the rail 30.

The member B, as thus described, may be mounted on and fastened to the press bed 10 in any suitable manner.

While sheet metal plates requiring perforated punched patterns for widely different uses may be produced in punch presses in accordance with this invention, sheet metal plates known as chassis for use in mounting electrical elements in the art of television, radar and radio are particularly adapted to be operated upon by the present equipment.

An example of a chassis of the type generally described is shown in Figure 5.

It will be noted that a considerable number of holes or apertures of various sizes and shapes are provided. Included are relatively small circular holes 50, used as single receiving apertures for certain elements, or grouped so that they may together support other elements.

Larger circular holes 52 are also provided for similar purposes.

For other needs substantially circular holes 54 are used having spaced marginal offset notches or the like 56. Again still other shapes of openings may be needed, such as the rectangular apertures 58, used singly or in groups and of the same or of different sizes.

Small holes 60, disposed in closely arranged groups of four, may also be required for the reception of the pins of a radio tube socket.

As has been noted, a punch and die holder of the kind adapted to be employed in groups for punching holes in a predetermined pattern is disclosed in the Wales Patent 1,955,860. A similar holder is shown in Figure 3.

The holder is of elongated U-shape, having a base or shoe 64 and an overhanging arm 66 spaced therefrom to provide a throat 68 for entry of the work-pieces.

The arm 66 is apertured at 70 for the reception of the vertically reciprocable punch P which is guided in a sleeve 72, the lower end of which rests in a guide button 74. The punch P, as

illustrated, is cylindrical throughout its length but its lower end P^1 may be shaped to produce openings of various shapes. The upper end of the guide sleeve **72** is movably supported in a cavity in an upper lifter member **76** upon the upper end of which the head of the punch P rests so that it may be engaged and the punch actuated by the reciprocable ram R.

In the cavity **76** and surrounding the guide sleeve **72**, there is a strong compressible pre-loaded stripper spring **78**, the lower end of which rests upon the guide button **74** and the upper end of which abuts the bottom of a lifter member **76**.

Outwardly beyond the stripper spring **78**, lifter springs **80** are disposed in cavities in the arm **66** and at their upper ends act against an outwardly extending flange of a member **82**. The member **82** extends downwardly around the stripper spring **78** and has an inwardly extending flange which provides a stop for the guide button **74**. The lifter springs **80** thus normally support the punch assembly in the normally elevated, or retracted, position shown in Figure 3.

At the outer end of the base **64** of the holder, there is a seat supporting a die **84** having an opening therethrough in axial alignment with the axis of the punch P to slidably receive the lower end P^1 thereof. The die opening **85** corresponds in cross section to the end P^1 of the punch.

When the punch part P^1 is of other than cylindrical cross section, it and its guide sleeve **72** may be keyed against rotation, as would be the die **84** in a manner such as shown, for instance, in Fig. 23 of the U. S. patent to Wales No. 1,955,866, granted April 24, 1934, so that the punch may produce shaped holes properly oriented in respect to the axis of the holder. Punched out slugs are discharged through the passage **86** at the front end of base **64**.

To assure holes properly oriented in respect to the work-piece, a dowel **88A** is utilized in addition to a pilot pin or stud **88** arranged in axial alignment with the punch P and with the opening in the die **84**. The studs **88** and **88A** project from the lower face of the base **64** to fit in pilot or guide holes in a template. This arrangement enables punches, mounted in holders as described, to be accurately positioned for punching holes where desired when the holders are clamped in such association with the template.

The base **64** of each holder is slotted vertically and lengthwise, as at **90**, for the reception of a bolt or other fastening member **92** by which the holder may, after being located in a pilot hole of a template, be clamped to the mounting base B by engaging the bolt head in a T-slot **44** and tightening a nut **94** upon the bolt against a washer on the top of the base **64**, as shown.

A novel master template M to be used in accordance with the invention, and apertured for positioning punch and die holders to perforate a sheet metal member W corresponding to a chassis, is shown in Figure 6.

This master template M comprises a plate, preferably of metal, of a thickness sufficient to enable it to be of sturdy, rugged construction. It is of rectangular outline, preferably of a size such that it may be placed in the recess or well **40** of the mounting base B with its rear edge abutting the face **38** of the cross rail **30** and its side edges engaging the inner walls of the side rails **36** of the base. Its front edge may, if desired, be set back rearwardly of the front edge **22** of the bottom plate **20** of the mounting base, as shown.

It will be observed that the master template M has a plurality of pilot holes H formed therethrough. Each hole H is of the same diameter, say one-half an inch, and is adapted to snugly accommodate a pilot pin **88** carried by a punch and die holder of the sort described.

The axes of the pilot holes H correspond with the axes, or centers, of the holes **50—58** in the work-piece, or chassis, W.

While the punch and die holders illustrated are of minimum transverse width commensurate with the sizes of the punches P, it will be noted that, owing to the close spacing of many of the holes **50—58** of the work-piece, holders sufficient for punching all of these holes in one operatoin cannot be mounted for use at one time owing to interference and obstruction of one or more of the holders with others.

It is under such circumstances that the secondary set-up or pilot pin locating templates, such as those shown in Figure 1, 7 and 8 are employed. It will be noted, upon comparison of the pilot holes H^1 of a pilot pin locating template M^1 with the holes H of the master template M, the holes H^1 will register only woth certain of the holes H which are spaced apart far enough to enable holders, with their associated punches Pand dies **84**, to be mounted and used in positions clear of each other to perforate the work-piece W.

Likewise, the pilot holes H^2 in the locating or set-up template M^2 will similarly register with other holes H in template M, so that other punch and die holders may be mounted after removal of the holders employed in connection with the locating or set-up template M^1 to punch additional holes in the work-piece.

The pilot pin locating templates M^1, M^2, and any other locating templates required to be sequentially employed for guidance in placing punch and die holders in correct positions for use, are preferably relatively thin sheet metal plates or members. Each is successively mounted upon the top of the master template within the recess **40**.

It will be apparent from the foregoing that the master template M is provided with a pilot hole for each of the punch and die holders which are to be employed in punching, perforating or otherwise deforming a work-piece.

As has been illustrated, the perforations to be formed in a work-piece may be so closely spaced that they must be formed in a series of operations. The pilot holes in each locating or set-up template register only with such pilot holes in the master template as will permit the use of punch and die holders which may be operated simultanously by the ram of the press. All other pilot holes in the master template are masked by the locating or set-up template so that there will be no possibility of an operator accidently attempting to mount a punch and die holder in a location such as to interfere with any other punch and die holder to be employed in the same operation.

For each pilot hole in the master template there will, of course, be a pilot hole in one of the locating or set-up templates which will register with it, it being understood in this connection that although two locating or set-up templates are illustrated, there may be circumstances under which three or more of such secondary locating or set-up templates may be required.

For supporting a master template M and a secondary template M^1, M^2 and so on in the manner described, a filler plate or member **99** (Figure 2) of metal or suitable fiber or other compo-

sition, and of required thickness, is placed in the recess or well 40 to rest flat upon the top of the bottom plate 20 with its rear and side edges engaging the inner side faces of the rails 30 and 36. Screws 100, with their heads engaging in sockets in the bottom of plate 20, may pass through holes in filler plate 99 and screw into threaded holes in the master template M. Other fastenings may be used, if needed.

In the arrangement shown, the combined thickness of the filler plate or block 99 and the master template M is such that, one of the locating or pilot pin templates, for example, template M^2, when placed upon the top of template M, will have its top face in the plane of the top faces 39 of the rails 30 and 36.

To produce a number of like perforated sheet metal members, such as the chassis illustrated in Figure 5, a master template M is first made by accurately locating the centers of a plurality of pilot holes H on a plate of the size of the recess 40 of supporting base B, and forming the pilot holes on those centers. These holes H are positioned to align with the centers of the openings 50—58 and 60.

Thereafter the required number of secondary set-up or locating templates M^1, M^2 and so on are formed, each having pilot holes selected to correspond with certain different sets of holes in the master template, so that together, these locating templates will provide a complete set of such holes one of which will register with each pilot hole in the template M.

In order to properly proceed, using the required number of pilot locating, or secondary templates in the desired sequence, or subsequent repeat operations, the templates may be each stamped with the same job number and serial number to indicate its order of use, as shown at 110, Figures 7 and 8.

Numbers or other means for identifying the punch to be used at each pilot hole, and also the unit number of the holder for that punch, may also be stamped on each secondary template, as at 112.

A supporting base B having been provided, the master template M is mounted thereon over the filler block or member 99, and both secured thereto as shown and described.

The first pilot locating template M^1 may then be placed flat upon master template M and manipulated so that the pilot holes therein match or register with corresponding holes H in template M. It will be found, as noted, that all other holes in template M will be masked by the template M^1.

The properly identified punch and die holders may then be positioned, one after another by causing their pilot studs 88 to enter the matching holes in the templates M^1 and M. Since the top face of the template M^1 is co-planar with the top faces of the rails 30 and 36, the punch and die holders extend from their respective pilot pin locations across the rails 30 and 36 with their slotted portions 90 crossing one or more of the T-slots 44 in said rails. The holders, of course, vary in length so that the above requirements obtain regardless of the distance of the matching pilot holes of the templates from the side or rear margins thereof.

In cases where the holes to be punched in a work-piece are circular, holders with only one pilot stud 88, axially aligned with respect to the axis of the corresponding punch and die, are employed since the holders may be rotated about their engaged studs to the points at which it is found convenient to secure them by their clamping bolts 92. In this manner, the holders may be adjusted until all of them are properly spaced apart. They may be then tightly secured in place. However, as pointed out, certain holes to be formed in the work-piece may not be circular such as the holes 54 and 58 (Figure 5). In such cases it is necessary to position the punch and die holders in a precise location so that the apertures which are formed will be correctly oriented. Under such circumstances, the holders are preferably provided with an additional pilot pin 88*a* (Figure 4) which is spaced from the pin 88 and inwardly along the holder base 64. Pilot pin holes 88*b* (Figure 6) are provided in the master template M, and in such locating templates M^2 (Figure 8) as are employed in connection with punching of non-circular holes such as 54 and 58. The holes 88*b* are formed in the templates in such relation to the pilot holes which accommodate the pins 88 that when the two pilot pins occupy their respective aligned holes, the holder will be accurately located in the desired position. The holder is then secured in place by clamping it to the adjacent rail 30 or 36, as before described.

It will be noted that the secondary or locating templates are secured in their proper position by the holders which clamp these templates to the master template M when the holders are located and tightened in the manner described and thereby prevent shifting or lateral displacement of the templates during use of the equipment.

In order to facilitate locating the punch and die holders upon the secondary or locating templates, the latter may, if desired, have delineated upon them the outlines of the holders as properly positioned.

When a number of work-pieces requiring a similar hole pattern are to be produced in the manner herein described, the required number of work-pieces, preferably of the same dimensions, are cut from stock material.

In punching work-pieces, assuming the template equipment and the punch and die holders have been set up in the press in the manner described, the work-piece blanks are inserted laterally between the punches and the dies of the various holders preparatory to the operation of the press to actuate the punches.

Means are preferably provided so that each work-piece blank of any similar series of blanks will be located in the same relation with respect to the punch and die elements of the holders. The said means, as illustrated, comprises two locators 120 (Figures 1 and 9). Each locator 120 is in the form of an arm and, as in the case of the punch and die holders, is formed or provided on its under side and at its inner end with a pilot pin or stud 88*c*, it being understood that the master template and each of the secondary, or locating, templates are formed with pilot holes which will align to accommodate the pilot pins or studs 88*c*. At their inner ends, above and in axial alignment with the pilot pins 88*c* (Figure 9), the locators 120 are formed with shoulders 121 having substantially the same elevation as the tops of the dies and pins 124 which extend above said shoulder. The pins 124 are adapted to be accommodated in holes 125 (Figure 5) formed in the work-piece blanks so that each blank will be held in the same relation with respect to the punch and die holders. The outer ends of the locators are slotted and are adapted to be secured in position by bolts 122 having heads which occupy the T-slots 44 in the rail members 36.

Stops may be employed in connection with the locators 120, if desired, to facilitate alignment of the pins 124 with the pilot holes 125 in the work-piece blanks. The said stops, indicated at 126 in Figures 3 and 4, may be in the form of axially adjustable pins, which are supported in a horizontal position in suitable guide bores in the shank portions of the punch and die holders and the leading ends of which are located in the plane of the work-piece blanks so that when a blank is introduced between the punches and dies of the holders, the leading end will abut the ends of the stops 126 as the holes 125 in the work-piece come abreast of the pins 124. If the latter do not immediately enter the holes 125, then it is only necessary to move the work-pieces blank sidewise, one way or the other, to accomplish this. The stops 126 may be secured in various positions of adjustment by a suitable set-screw, as illustrated in Figure 3.

The equipment described has the advantage that the ultimate position of each work-piece blank with respect to the punch and die holders is determined by the pins 125 which cooperate with the pilot holes in the work-piece blank. Consequently each blank will occupy the same position each time that it is inserted between the punches and the dies of the holders after it has been removed to enable the removal of a secondary or locating template and the substitution therefor of the succeeding template. Such accuracy is in no way impaired by deformation of the edges of the work-piece blank.

In the hole pattern for the work-piece shown, the templates M^1 and M^2 each designate the locations of certain required holes, the majority being designated in these two templates. However, many work-pieces may, as noted, require a larger number of such secondary templates. For example, the socket pin holes shown in groups of four in Figure 5, will require the use of four locating templates since the close spacing of the holes enables only one to be punched at a time.

In the drawings, template M^1 provides for one hole 60 of each of the two groups and template M^2 provides for another hole 60, as shown.

Two further secondary or locating templates, not shown, would each provide the location of a punch for one of the two remaining holes 60, and for any other combination of holes requiring more than two punching operations.

If the requirements of the work-piece call for two small holes unusually close together, the pilot holes H for locating a holder for each such hole may overlap as indicated at 61, Figure 6. This is permissible so long as the overlapping holes each have more than one-half its circumferential edge to engage a pilot pin.

The template equipment described has the advantage that it permits the use of a master template wherein pilot holes for all of the punch and die holders are formed and are made available as required. The secondary or locating templates serve only to indicate which of the pilot holes in the master template are to be utilized in each of the successive punching operations. As a result of the use of a master template in the manner described, each work-piece will be accurately perforated, or otherwise deformed, in exactly the same manner.

While in the description of the template equipment reference is made to sequential punching operations with respect to an individual work-piece blank, the usual method of procedure, assuming a run of similar blanks are to be punched, will be to punch each blank of such run when a secondary or locating template has been assembled in operative relation with respect to the master template before replacing the secondary or locating template with the succeeding template.

Reference has been made to the punching of work-pieces incident to the formation of chassis such as are employed as mounts for television, radar and radio parts. It is to be understood, of course, that this is intended by way of example only as illustrating types of work-pieces in which closely spaced perforations must be formed. It will also be understood that this problem is present in numerous other operations and that the advantages of the invention may be obtained in such cases by the use of the template equipment herein described and claimed.

I claim as my invention:

1. Apparatus for forming a predetermined pattern of holes in a workpiece with a plurality of perforating devices, said apparatus comprising a master template having a plurality of locating means positioned thereon in accordance with said pattern, and a secondary template, having a plurality of locating means positioned thereon, adapted to register with certain only of the locating means of said master template, each of said perforating devices having means thereon which must be registered and engaged with both a locating means on said master template and a locating means on said secondary template in order to secure it in perforating position.

2. Apparatus for punching a predetermined pattern of holes in a work-piece with individual perforating devices which, although adapted to be assembled and actuated in groups, cannot be spaced close enough together to form all of said holes in a single operation, a group of perforating devices, each of said devices having a pilot pin, said apparatus including a master template having pilot holes with which said pilot pins cooperate for locating all of said devices in accordance with said pattern, and a secondary template having pilot holes which are registerable with certain only of the pilot holes of said master template and being adapted to mask all other of the pilot holes of said master template, the registering holes in said master and secondary templates accommodating the pilot pins of only of such of said devices as may be mounted in an assembly without interfering with one another.

3. Equipment for forming perforations in a work-piece including a group of perforating devices, a master template formed with a pattern of pilot holes, the centers of which correspond to the centers of said perforations, a locating template which rests upon said master template and which is formed with pilot holes registerable with a selected group only of the holes in said master template while the remaining holes in said master template are covered by said locating template, and means which may enter registering holes in said two templates for positioning perforating devices in axial alignment with said registering holes for punching perforations in a work sheet.

4. Equipment for use in a punch press for forming in a work-piece with a plurality of perforating devices a selected pattern of perforations, each of said devices having a holder and a punch, die and pilot pin which are carried in axial alignment, said equipment including a base support mountable in said press and having a bottom plate, a plurality of T-slotted rails fixed

thereto and defining a depression, a master template fitting in said depression and being formed with a pattern of pilot holes corresponding to said pattern of perforations, a locating template adapted to rest on said master template and having pilot holes formed therein corresponding to and registerable with certain only of the holes in said master template, whereby pilot pins on said holders may be caused to enter registering pilot holes in said locating and master templates, and means including said T-slots for clamping said holders in positions about said depression on said base support.

5. Equipment for use in a punch press for forming in a work-piece with a plurality of perforating devices a selected pattern of perforations, each of said devices having a holder and a punch, die and pilot pin which are carried in axial alignment, said equipment comprising a base support mountable in said press and having a bottom plate, a plurality of T-slotted rails fixed thereto and defining a depression, a master template fitting in said depression and having a pattern of pilot holes formed therein corresponding to the pattern of perforations, a locating template adapted to rest on said master template and having formed therein pilot holes corresponding to and registerable with certain only of the holes in said master template, whereby pilot pins on said holders may be caused to enter registering holes in said locating and master templates, said holders extending from their pilot pins over said locating template and upon said rails, and means including said T-slots for clamping said holders to said base support.

6. Equipment for use in a punch press for forming a selected pattern of perforations in a work-piece with a plurality of holders, each having a punch, a die and a pilot pin in axial alignment, said equipment including a base support mountable in said press and having a bottom plate, a plurality of T-slotted rails fixed to said plate and defining a depression, a master template fitting in said depression and having a pattern of pilot holes formed therein for said pilot pins, a locating template adapted to rest on said master template and having pilot holes formed therein corresponding to and registerable with certain only of the holes in said master template, a spacer in said depression upon which said master template is supported to position the top face of a locating template resting on said master template flush with the tops of said T-slotted rails, whereby holders having their pilot pins in registering holes in said templates will rest on said locating template and extend over the T-slots in said rails, and securing devices engageable in said T-slots and with said holders for securing the holders in fixed position for punching a work-piece.

7. Equipment for use in a punch press for forming a selected pattern of perforations in a work-piece with a plurality of holders, each having a punch, a die and a pilot pin in axial alignment, said equipment including a base support mountable in said press and having a bottom plate, a plurality of T-slotted rails fixed to said plate and defining a depression, a master template fitting in said depression and having a pattern of pilot holes formed therein for said pilot pins, a locating template adapted to rest on said master template and having pilot holes formed therein corresponding to and registerable with certain only of the holes in said master template, a spacer in said depression upon which said master template is supported to position the top face of a locating template resting on said master template flush with the tops of said T-slotted rails, means for securing said holders to said rails, and means extending from said bottom plate through holes in said spacer for attachment to said master template for securing the latter to said base supporting member.

8. Equipment for use in a punch press for forming a selected pattern of perforations in a work-piece with a plurality of holders, each having a punch, a die and a pilot pin in axial alignment, said equipment including a base support mountable in said press and having a substantially rectangular bottom plate, rails secured on said plate along three edges thereof to define a depression, T-slots formed in said rails, a master template fitting in said depression, a locating template also fitting in said depression and resting upon said master template flush with the top faces of said rails, said locating and master templates having pilot holes certain only of which register for the reception of pilot pins on said holders for locating said holders on said locating template, and means engageable in said T-slots for securing said holders on said locating template.

9. Equipment for use in a punch press for forming a selected pattern of perforations in a work-piece with a plurality of holders, each having a punch, a die and a pilot pin in axial alignment, said equipment including a base support mountable in said press and having a bottom plate, rails secured on said plate along three edges thereof to form a depression defined by a U-shaped wall, a pair of superposed templates fitting in said depression and being formed with pilot holes, certain of which register for the reception of the pilot pins on said holders to position the punches and aligned dies for punching said work-piece, said rails having T-slots which are parallel with the side and end edges of said pair of templates, and securing devices arranged in said T-slots for engaging and holding said holders in position.

10. Equipment for use in a punch press for forming a selected pattern of perforations in a work-piece with a plurality of holders, each having a punch, a die and a pair of pilot pins, said equipment including a base support having a bottom plate, rails secured on said plate around three edges thereof to provide a U-shaped wall which defines a depression, said rails having T-slots formed therein, a pair of superimposed templates fitting in said depression and having pilot holes certain of which register for the reception of said pairs of pilot pins to position the punches and dies of said holders for punching, and means for detachably securing said holders to said rails as located by said pilot holes and pins.

11. Equipment for use in a punch press for forming a pattern of perforations in a work-piece with a plurality of punch and die holders, a group of perforating devices, each having a pilot pin, said equipment including a master template having pilot holes formed therein, a plurality of locating templates each having pilot holes formed in a different pattern and corresponding to selected groups of holes in said master template, each of said locating templates being separately mountable on said master template to register its pilot holes with certain of the holes in the master template for the reception of the pilot pins of a group of said holders, said master template and each of said locating templates having a pair of

guide holes formed therein and which are in register when said templates are in use, a pair of positioning devices engageable in said registered guide holes and with said work-pieces to similarly position all of said work-pieces with respect to said master pattern, a base plate, rails mounted on said base plate which define a depression in which said master and locating templates are accommodated, and means for removably securing said holders and positioning devices to said rails.

12. Equipment for use in a punch press for forming a pattern of perforations in a work-piece with a plurality of punch and die holders, a group of perforating devices, each having a pilot pin, said equipment including a master template having pilot holes formed therein, a plurality of locating templates each having pilot holes formed in a different pattern and corresponding to selected groups of holes in said master template, each of said locating templates being separately mountable on said master template to register its pilot holes with certain of the holes in the master template for the reception of the pilot pins of a group of said holders, said master template and each of said locating templates having a pair

of guide holes which are in register when said templates are in use, a pair of positioning devices engageable in said registered guide holes and with said work-pieces to similarly position all of said work-pieces with respect to said master pattern, a base plate, rails mounted on said base plate which define a depression in which said master and locating templates are accommodated, means for mounting said punch and die holders and said positioning devices on said rails in operative relation to said templates, and other positioning means carried by said holders and engageable by the edges of said work-pieces.

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