April 18, 1950 W. D. BURGESS 2,504,642

METHOD FOR PUNCH PRESS SET UPS

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Fig. 2.

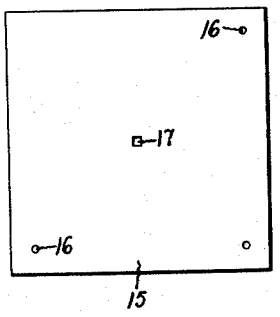


Fig. 1.

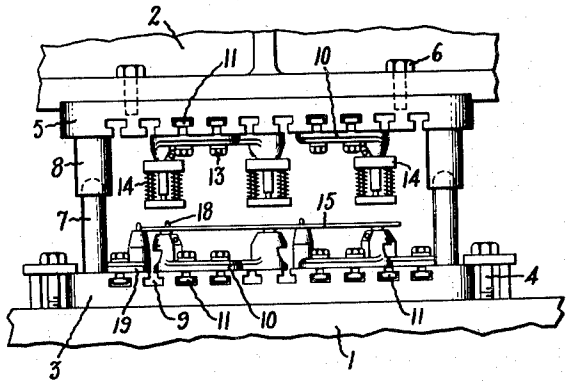


Fig. 4.

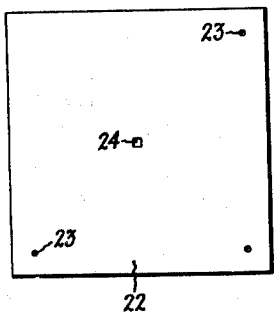
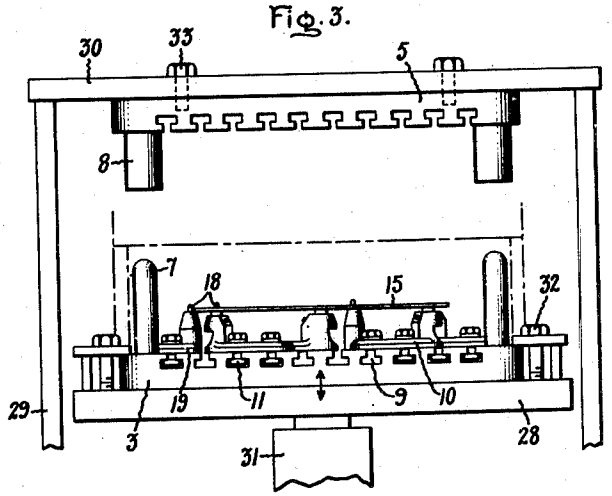


Fig. 3.



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Fig. 5.

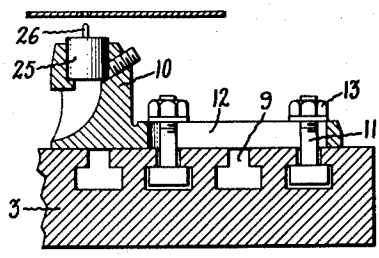


Fig. 6.

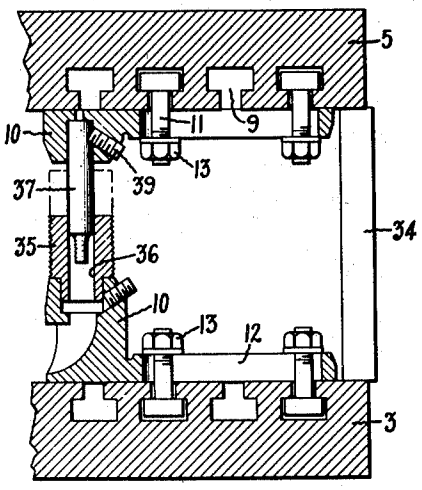


Fig. 7.

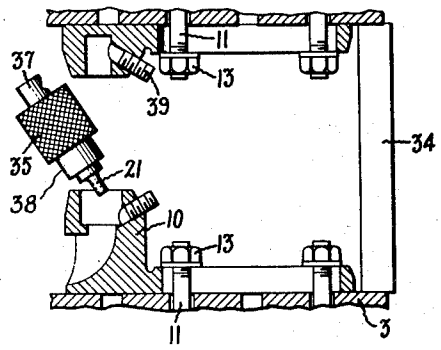


Fig. 8.

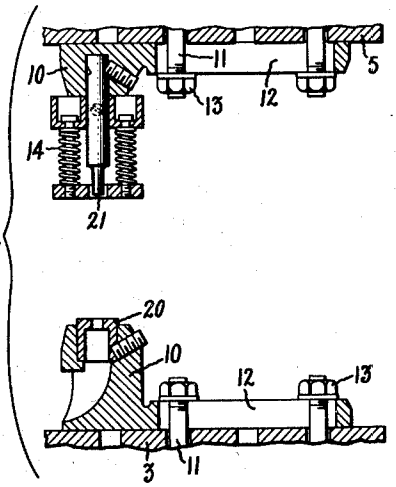


Fig. 9.

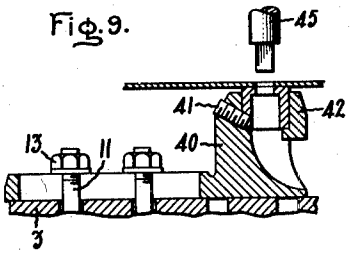
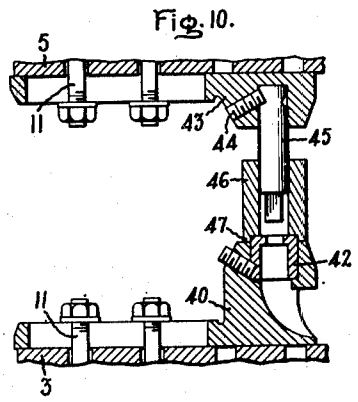


Fig. 10.



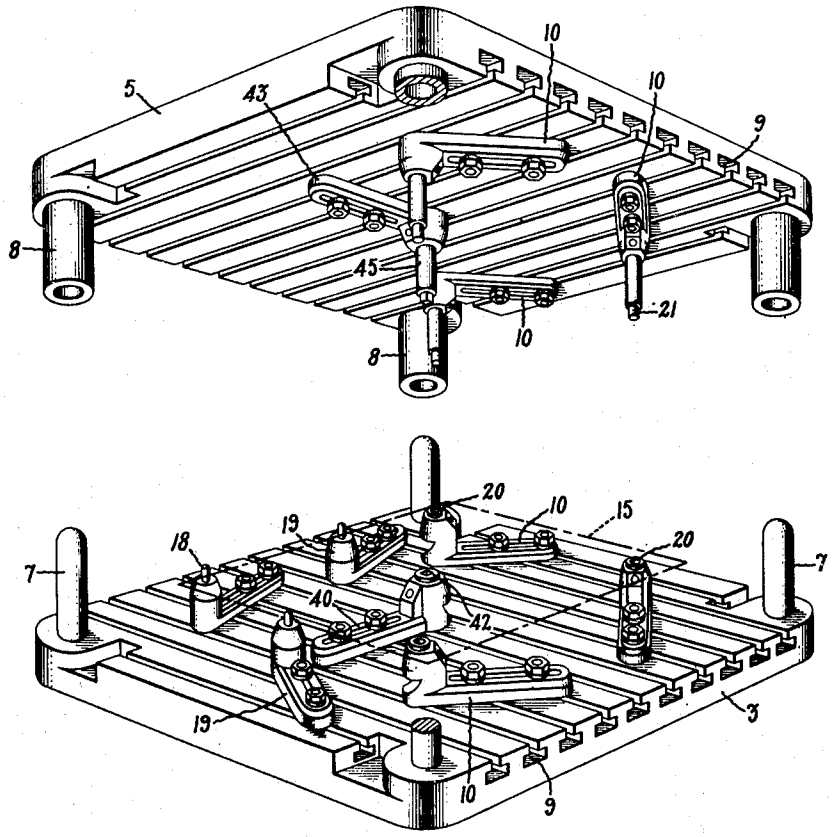
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Fig. 11.



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UNITED STATES PATENT OFFICE

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METHOD FOR PUNCH PRESS SET UPS

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Application July 23, 1945, Serial No. 606,575

1 Claim. (Cl. 29—148)

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In connection with the manufacture on punch presses of metal plates having a number of spaced openings therein, it is known to utilize top and bottom shoes provided with slots in which punch and die holders are assembled and adjusted relatively to each other so that each punch is positioned correctly with respect to its cooperating die and the cooperating punches and dies are correctly positioned relatively to each other. Very accurate adjustment of each punch with respect to its cooperating die is required; also very accurate adjustment of punches and dies with respect to each other.

The object of my invention is to provide an improved method for setting up punch and die holders on punch and die shoes which enables the setup to be made more expeditiously than heretofore, and for a consideration of what I believe to be novel and my invention, attention is directed to the following specification and to the claim appended thereto.

In the drawing, Fig. 1 is a side elevation of a punch press with a die setup thereon; Fig. 2 is a plan view of a metal plate in which have been punched openings in accordance with the die setup of Fig. 1; Fig. 3 is a side elevation of parts utilized in carrying out my invention; Fig. 4 is a plan view of a template utilized in carrying out my invention; Figs. 5 to 10 inclusive are detail views illustrating steps utilized in carrying out my invention; and Fig. 11 is a perspective view of cooperating punch and die shoes with locating pilots and punch and die members positioned thereon to manufacture the plate shown in Fig. 2.

Referring to Fig. 1, 1 indicates the support and 2 indicates the ram of a punch press. These two parts are to be taken as illustrating a punch press of any suitable construction. Attached to the support is a die shoe 3 held in place by clamping bolts 4, and attached to the press ram is a punch shoe 5 attached to the ram by bolts 6. The die shoe is provided with pillar guide posts 7 which operate in guide bushing sockets 8 carried by the punch shoe. Four guide posts and sockets may be provided, located at the four corners of the shoes as shown particularly in Fig. 11. The shoes are provided with transversely extending undercut slots 9 in which are fastened the punch and die holders 10. The punch and die holders are fastened in place by bolts 11, the heads of which are positioned in the undercut grooves 9. The bolts 11 extend through slots 12 in the holders and receive on their ends nuts 13. Two bolts are provided for each holder and when the holder is correctly positioned, the nuts are tightened to

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fix it firmly in place. A known form of stripper 14 is shown in connection with each punch. Figs. 1 and 11 show a punch and die setup for producing a completed part as shown in Fig. 2, it being a metal plate 15 provided with three round openings 16 and one rectangular opening 17. For the sake of simplicity in illustrating my invention, I have shown the plate provided with only four openings which means a setup of four dies and punches. Ordinarily, however, there may be many more openings than this required and other shapes may be required. In instances, twenty or more openings may be required in a plate, all accurately sized and accurately spaced relatively to each other.

Referring particularly to Fig. 11, there is on the die shoe three locating pilots 18 carried by holders 19 and four holders 10, each carrying a die 20. On the punch shoe, there are four holders 10, each carrying a punch 21. In Fig. 11, the strippers for the punches have been omitted in the interest of clearness.

A punch and die setup as so far described is a known one. My invention has to do particularly with an improved method and improved apparatus for positioning the die holders and dies on the die shoe and the punch holders and punches on the punch shoe whereby they may be quickly and accurately assembled before the shoes are fastened into the punch press.

Prior to making a setup, a template 22 (Fig. 4) of the part to be manufactured is made. The template is carefully laid out with round openings 23 which correspond to the centers of the round openings to be punched in the finished plate. For openings which are other than round that are to be punched in the plate, openings corresponding to the other than round openings are made in the template. In the present instance, it has been assumed that there is to be one square opening 17 in the plate. Accordingly, the template is provided with one square opening 24 of the exact size of the opening 17. The openings 23 may be of a size of the order of .01" or less and, as has been stated, represent the centers of the round openings to be punched in the finished part.

In the first instance, the die shoe 3 may be placed on a suitable table or support and the setup as shown in Fig. 11 may be made thereon, using the template to position the holders 10. In performing this operation several of the holders 10 may have placed in them plugs 25 (see Fig. 5) provided with pilot pins 26 of a size to fit the template openings 23. The holders 10 may be

placed loosely on the die shoe and positioned relatively to each other by fitting the pilot pins 26 into openings 23 in the template. After being correctly positioned, holders 10 are fastened in place by tightening the nuts 13. Following this, holders 19 for the locating pilots 18 are positioned with the pilots against the edge of the template, and tightened into place. The locating pilots 18 thereafter serve to locate the plate when it is to be punched. In Fig. 11, an unpunched plate 15 is indicated in dot and dash lines as being positioned by the locating pilots, ready for punching. By the use of the template, it is a relatively easy matter to set up accurately the die holders and the dies and the locating pilots on the die shoe. The difficulty comes in setting up the punch holders on the punch shoe so that the punches are correctly located with respect to the dies. The punches are of slightly smaller size than the die openings and must be located so that the center of the punch is absolutely in line with the center of the die opening.

After the die holders and locating pilots have been positioned, the plugs 25 are removed from the die holders and the die shoe is transferred to the die setup table 28 of a setup machine shown in Fig. 3. The setup machine comprises a suitable framework 29 which supports from the floor a top plate 30. The die setup table 28 is supported on a suitable hydraulic ram 31 so that the table can be raised and lowered relatively to plate 30. The die setup machine is shown only diagrammatically as its specific construction forms no part of my present invention. Any suitable structure which provides a fixed support 30 and a table 28 which may be raised and lowered relatively thereto may be utilized in carrying out my invention. The die shoe 3 with the setup thereon, as shown in Fig. 11, is transferred to the die setup machine and is fastened to the die setup table 28 by bolts 32. Next, the punch shoe 5 is attached to top support 30 by means of bolts 33. It is correctly positioned relatively to the die shoe 3 by means of the guide posts 7, the setup table 28 being elevated to bring the guide posts 7 into the guide sockets 8 before the bolts 33 are tightened.

The die setup table 28 and top support 30 are now positioned a definite distance apart so that the die shoe and punch shoe are in exact parallel relation to each other. If the setup machine is sufficiently accurate, the plate 28 may be lowered until it occupies the desired position with respect to top support 30. Otherwise, I preferably position the die shoe with respect to the punch shoe by means of blocks 34 as shown in Fig. 6, four accurately dimensioned blocks being used and the die holder 3 being brought up tightly against them. The essential thing is that the punch shoe and die shoe be positioned relatively to each other in exact parallel relationship, the relationship they will occupy in the punch press.

After the die shoe and punch shoe are correctly positioned relatively to each other in the setup machine, the punch holders are loosely mounted on the punch plate by means of clamping bolts 11, the nuts 13 being loosely applied to the bolts. Or, if desired, the punch holders may have been assembled on the punch shoe before fastening it to the top support 30.

For positioning the punch holders with respect to the die holders, I provide setup plugs 35. These are accurately made plugs having openings 36 of the exact diameter of the bodies 37 of the punches and provided with necks 38 of an outside diameter the same as that of the dies so that they fit accurately in the die receiving openings of the die holders. A punch which is to be positioned in the punch holder is inserted into a setup plug, being extended part way through it after which the upper end of the punch is inserted into the punch holder and fastened by means of the set screws 39. At this time, the punch will occupy the position shown in Fig. 6 and the setup plug will occupy the position shown in dot and dash lines in Fig. 6. After the punch has been fixed in the punch holder, the setup plug is lowered to bring its neck 38 into the opening in the die holder 10 in which the die is later to be positioned. Since the punch holder is loosely held on the punch shoe, it may move readily to permit of the setup plug being positioned in the die holder. The parts now occupy the positions shown in full lines in Fig. 6 and in this position of the parts, the punch and punch holder are correctly located with respect to the die holder. The punch holder is now fixed in position by tightening nuts 13. This completes the operation of locating the one die holder with respect to the corresponding punch holder. Following this, the punch is released by means of loosening the set screw 39, the punch is lowered into the setup plug so that its upper end is free of the punch holder and the punch and setup plug are removed from the die holder after the manner illustrated in Fig. 7. The same operation is now repeated for the other punch holders which are to hold the punches for punching round holes. Now, or at a later time, the dies may be positioned in the die holders and fastened by means of the set screws, the punches may be positioned in the punch holders and fastened by means of the set screws and the strippers may be positioned on the punches all as shown in Fig. 8.

The procedure for positioning a die and punch for an opening other than a round opening will now be described, reference being had particularly to Figs. 9 and 10. In these figures, 40 indicates a die holder provided with a set screw 41 for holding in place a die 42, and 43 indicates a punch holder having a set screw 44 for holding in position a punch 45. In the present instance, the punch and die are shown as shaped to punch rectangular opening 17. In the first instance, the die 42, which is circular in cross section, is positioned in die holder 40, the template is put in place and the end of the punch 45 is passed through the template opening 24 to correctly position the die 42 circumferentially in the die holder after which it is fastened by means of set screw 41. This operation may be performed initially before the die shoe is positioned on the setup table, i. e. at the same time die holders 10 are positioned on shoe 3. For use with an other than round punch and die, I provide a setup plug 46 which is in the form of a cylinder having an opening of a diameter equal to that of the body of the punch and a neck 47 which fits over the outside of the die 42 as shown particularly in Fig. 10. The setup plug is positioned around the punch after which the punch is inserted into its holder and fixed in place by the set screw 44. The setup plug is then lowered into position over the die, as shown in Fig. 10. This serves to accurately locate the punch holder 43 after which it is fastened in place by tightening the nuts on the holding bolts 11. The punch and setup plug is then removed by loosening the set screw 44, lowering the punch from its holder into the setup plug, and then removing the punch and setup plug after the manner illustrated in Fig. 7 for

the round punch and setup plug. The punch 45 may be then replaced in its holder and fastened in position and stripper 14 assembled to punch 45.

The setup is now complete and the die shoe and punch shoe may be removed from the setup machine, positioned one on the other and set to one side until they are to be used. When they are to be used, they are positioned in the punch press in the usual way.

By means of my invention, I am enabled to set up quickly and accurately the dies and punches for manufacturing a plate having any desired arrangement of openings and I consider the use of the setup plugs for carrying out the assembly as being an important feature of my invention. My invention has the advantage that the setup can be made entirely apart from the punch press in which the setup is to be used. Accordingly, the punch press need not be idle while a setup is being made. In fact, a setup may be made several days before it is to be used and any number of setups may be made in advance for use in the same punch press. In changing the press over for a new operation, it is necessary merely to remove the setup which is in the press and replace it by a new setup. All that is required for the new setup is to fasten the die shoe and punch shoe in the punch press.

What I claim as new and desire to secure by Letters Patent of the United States, is:

The method of positioning die and punch holders in correct positions relatively to each other on die and punch shoes on which they may be adjusted and fastened which comprises positioning the die holders by means of a template and positioning the punch holders by means of setup plugs which fit in the die holders and have a bore equal to the diameter of the punch body, a punch with a setup plug thereon being first attached to a punch holder after which the setup plug is moved into position on a die holder to correctly position the punch holder relatively to the die holder.

WESLEY D. BURGESS.

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