UNIVERSAL DIE SET WITH QUICK CHANGE DIE PLATES
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ABSTRACT OF THE DISCLOSURE
A press has an upper shoe and a lower shoe and there are oppositely-disposed air cylinders on each shoe which operate straight line clamps to move the latter horizontally toward and away from each other, each clamp having a tapered surface for coaction with similarly tapered surfaces on opposite sides of the die plate to move the latter vertically into operative position on its shoe and to hold it tightly clamped in said position, the plates being supported for sliding movement into and out of the shoe when the clamps are in non-clamping position.

BACKGROUND OF THE INVENTION
The present invention is particularly useful in the mounting and replacing of die plates in the shoes of a punch press. The invention is, however, suitable for use in clamping various tool-carrying plates or workpieces in position in various types of forming machinery.

DESCRIPTION OF THE PREFERRED EMBODIMENT
For purposes of illustration the device has been shown as it is used in a punch press which is suitable for blanking and piercing large washers, or for the deep drawing of cases up to eight inches in diameter. It is to be understood, however, that the invention is suitable for use in many other forming machines in holding plates, supported tools or workpieces in operative position in a manner permitting quick replacement.

The numeral 10 designates an upper shoe, the latter being supported for up and down reciprocal movement under the influence of a hydraulic actuator or by other means. Suitably connected to opposite sides of the shoe are fluid pressure operated devices such as air cylinders 12 which are identical in structure but which face toward one another. Each air cylinder has the usual piston therein from which a plunger 13, which is connected to a slidable clamp 14, projects. Each clamp is U-shaped in plan view as shown in FIG. 2, having legs 15 which are slidably on guides 16. Each guide 16 is secured by dowels and bolts 17 and 18 to the shoe. Springs 19 have one end received in recesses 20 of the legs 16 of the clamping members 14. The other ends of the springs are accommodated in pockets 21 in end blocks 22. The springs normally urge the clamping members to an extended position.

A replaceable tool or work-holding plate 23, which, in the case of the punch press illustrated, is a die-holding plate, has opposite surfaces of its underside equipped with wear plates 24 having tapers 25. In the case of a plate in a punch press it may be equipped with the usual stripper ring 26 which is mounted on the lower ends of slidable studs 27 having top heads 28 which limit downward movement of the stripper ring. Springs 29 surrounding the studs 26 between the ring and the lower face of the plate 23 normally urge the plate downward. The plate is also equipped with a central slidable pin 30 carrying a knockout member 31 on its lower end, as is customary in punch press plates. The plate 23 is also provided with a plurality of equally
The new die members are slid into position by a reverse procedure, and the compressed air is then directed into the other inlet ports 85 and 155 to act on the piston within the cylinders 12 and 112 to cause the clamping members 14 and 114 to be extended. In this case, the upper die plate 23, before extension of the clamping members 14, the plate is supported between the two guide bars 36 and on the overlapped portions of the tapered surfaces 39 of the retracted clamping members 14. With the plate pushed all the way in into engagement with the back pins 37, the locating holes 33 will be directly below the lower ends of the locating pins 34. Then when the clamping members 14 are extended they will act on the tapered faces 25 on opposite sides of the die plate 23 to cause movement of the die plate in a direction at right angles to the direction of the movement of the clamping members. During this movement the lower ends of the locating pins 34 enter the locating holes 33 accurately locate the die plate 23 on the upper shoe. When the clamping members 14 are fully extended to the position shown in full lines in FIG. 1, the upper die plate 23 is tightly clamped against the lower surface of the upper shoe 10.

In the case of the lower shoe assembly, when the clamping members 114 are in withdrawn position the spring loaded guide bars 136 are elevated so that when the new bottom die plate 123 is slid into position on the upper ends of the guide bars 136 it will be just at the upper ends of the locating pins 134 so that they will not interfere. When air pressure is directed into the inlets 155 of the bottom cylinders it will act on the pistons in the bottom cylinders to cause extension of the plungers 113 and extension of the clamping blocks 114. During such downward movement the guiding bars 136 will be pushed downward against the action of the springs 150 to the full line position shown in FIG. 1. During such movement the locating pins 134 will enter the locating openings 133 of the plate 123 to accurately position said die plate on the bottom shoe. When the clamps 114 are in full extended position the die plate 123 will be firmly clamped against the upper surface of the bottom shoe 110.

From the above it is apparent that the die plates 23 and 123 may be quickly replaced and accurately located for a new operation. With a conventional die press a setup of this type took between for FIG. 1 and the knock-out member 46 is operated to knock out the work 43.
Also, the floating pressure pad 48 will knock out the scrap ring 45, and the stripping ring 26 will knock out the scrap ring 44.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. In a forming machine having a support, a tool-carrying plate having oppositely-disposed tapered surfaces, guide means on said support for slidably guiding said plate into partially-assembled position, oppositely-disposed clamping members mounted for extensible and retractable movement toward and away from one another and having tapered surfaces disposed to engage the tapered surfaces of the plate, and means for forcibly moving said clamping members into engagement with said tapered surfaces of the plate to move the plate at right angles to the direction of movement of the clamping members, thereby clamping the plate in operative position on the support, the tapered surfaces being on opposite sides of the plate, and the guide means including spaced guide bars adjacent opposite sides of the plate between which the plate is received, said clamping members, when in retracted position, also serving to support the plate while it is being slid into position between the guide bars.

2. In a forming machine having a support, a tool-carrying plate having oppositely-disposed tapered surfaces, guide means on said support for slidably guiding said plate into partially-assembled position, oppositely-disposed clamping members mounted for extensible and retractable movement toward and away from one another and having tapered surfaces disposed to engage the tapered surfaces of the plate, and means for forcibly moving said clamping members into engagement with said tapered surfaces of the plate to move the plate at right angles to the direction of movement of the clamping members, thereby clamping the plate in operative position on the support, there being cooperating locating means on the support and plate which are aligned when the plate has been slid into partially-assembled position, and the clamping members, when being moved to clamping position, also acting to cause engagement of said locating means, the tapered surfaces being on opposite sides of the plate, and the guide means includes spaced guide bars adjacent opposite sides of the plate between which the plate is received, said clamping members, when in retracted position serve to support the plate while it is being slid into position between the guide bars.

3. A forming machine as claimed in claim 1 in which the support is the top shoe of a punch press, and in which the spaced guides are on the underside of said shoe, and in which the retracted clamping members have their tapered surfaces located to support a partially-assembled plate against the action of gravity.

4. A forming machine as claimed in claim 1 in which the support is the bottom shoe of the punch press and has upstanding locating pins, in which the tool-carrying plate is the bottom die plate of a punch press and has locating holes positioned to receive the locating pins, in which the spaced guides have body portions extensively recessed in the top surface of said shoe, which body portions have upper ends shaped to slidably support the plate, and in which there is spring means normally urging said spaced guides upwardly a sufficient distance so that the plate may be slid into position without interference from the locating pins.

5. A forming machine as claimed in claim 1 in which the engaging surface of each clamping member is shaped to embrace the adjacent guide bar when the clamping member is in clamping position.

6. In a forming machine having an upper support, a tool-carrying plate disposed below said support and having oppositely-disposed tapered surfaces, oppositely-disposed clamping members mounted for extensible and retractable movement toward and away from one another and having tapered surfaces disposed to engage the tapered surfaces of the plate, and means for forcibly moving the clamping members into engagement with said tapered surfaces of the plate to move the plate at right angles to the direction of movement of the clamping members, thereby clamping the plate in operative position below the support, the tapered surfaces being on opposite sides of the plate and the clamping members, when in retracted position, being in a position to support the plate against downward movement by gravity while it is being slid into preliminary position.

7. A forming machine as claimed in claim 6 in which the means for forcibly moving the clamping members comprises oppositely-disposed fluid pressure operated rams, and in which there is spring means disposed to normally urge said clamping members to fully-extended clamping position as a safety feature in case fluid pressure should be lost in the rams.

8. A forming machine as claimed in claim 6 in which there is a lower support positioned opposite said upper support and having upstanding locating pins, a lower tool-carrying plate supported on top of said lower support and having oppositely-disposed tapered surfaces and having locating holes positioned to receive the locating pins of the lower support, spaced guides extensively recessed in the top surface of said lower support having upper ends shaped to slidably support the bottom plate, spring means normally urging said spaced guides upwardly a sufficient distance so that the plate may be slid into position without interference from the locating pins, clamping members mounted on said lower support in retracted position and retractable movement toward and away from one another and having tapered surfaces disposed to engage the tapered surfaces of the plate, and means for forcibly moving the clamping members into engagement with said tapered surfaces of the plate to move the plate at right angles to the direction of movement of the clamping members and downwardly against the lower support, thereby clamping the plate in operative position on said support.

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