June 8, 1965 R. M. PETERSON 3,188,078

MICROMETER WORKPIECES GUIDE MEANS FOR DIE PRESSES

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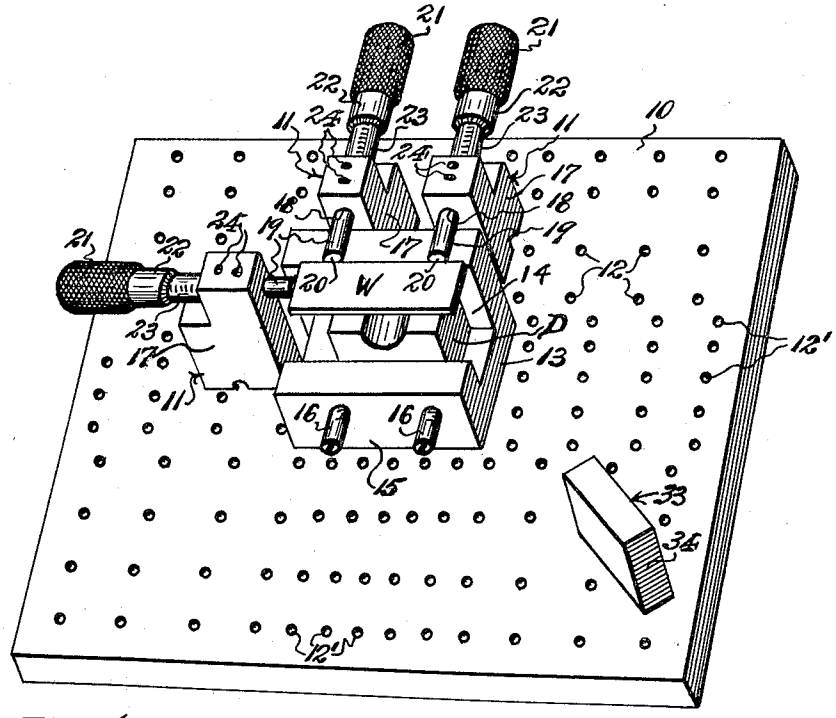


Fig. 1

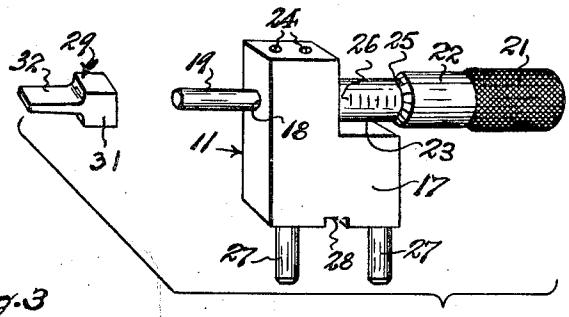


Fig. 2

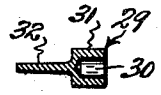


Fig. 3

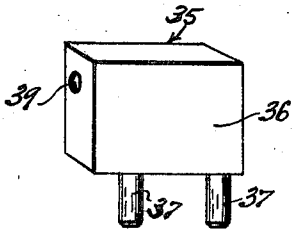


Fig. 4

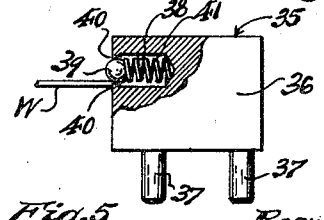


Fig. 5

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MICROMETER WORKPIECE GUIDE MEANS FOR DIE PRESSES

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This invention relates in general to die-presses for production of small stampings, and has particular reference to guide means to aid the press operator in positioning each workpiece in accurate registration with the lower forming die of a press.

In the die stamping art, workpiece-positioning guide means have been employed prior to my present invention but they have not been satisfactory for production of small part stampings in custom work because of the time required for adjustment to the workpiece and the lack of precision adjustment. The result has been greatly slowed production.

It, therefore, is the primary object of the invention to provide workpiece-positioning guide means for a die-stamping press that may be set up quickly for a workpiece blank of any size, may be adjusted with micrometric precision, and may be dismantled just as quickly for application to a workpiece blank of a different size.

To be more explicit, I provide the usual set of three workpiece-positioning guide stops to be mounted on the bolster plate of a die-stamping press in appropriate relation to the die holder, i.e. two of them in rear (opposite to the press operator) and one at one side of the die holder. Anchoring means are provided to permit setting up the guide stops initially in approximately oriented relation to a workpiece blank when laid upon the die. To these means there are added micrometer screws for the respective guide stops, by use of which the measuring or abutment faces thereof may be adjusted to the workpiece blank with greatest precision.

Because I have chosen to employ a micrometer of substantially conventional construction as a component part of each guide stop of my invention, it sometimes happens that the customarily cylindrical extension rod of the micrometer is too thick vertically to permit insertion between the upper and lower dies of a press, due to the danger of interference. Therefore, it is another object of the invention to supplement the conventional micrometer structure with an adaptive blade-type tip device which has a socket to fit the protruding end of the extension rod temporarily. The blade of this tip device is vertically thin so that, when in use, it will have safe clearances when projected into the die space.

A further object is to provide a block-like build-up member having anchoring means similar to that of each workpiece-positioning guide stop and which can be mounted on the bolster plate in a position to support the marginal portion of any abnormally extensive workpiece blank. The height of this build-up member is such that it will be flush with the top faces of a die installed in the die holder.

It is also an object to provide a block-like workpiece locking device, similar in construction to the build-up member just described, which has a spring-pressed snap-lock detent adapted to overlie a selected corner of an applied workpiece blank when said device has been anchored to the bolster plate in an appropriate position. This locking device holds the workpiece blank securely in operative position until completion of the stamping action of the dies. Therefore, lifting of the blank will cause the detent to become retracted and thereby release the said blank.

Still further objects, advantages and features of the

invention will become apparent as the following specific description is read in connection with the accompanying drawings, in which:

FIG. 1 is an overlooking perspective view of the bolster plate and a normal set of guide stops constructed in accordance with the invention, showing the latter arranged in operative relation to a workpiece blank which is resting upon a die installed in a die holder secured to the said bolster plate;

FIG. 2 is an exploded side elevational view of one of the guide stop members and a blade-type tip therefor;

FIG. 3 is an axial section of the tip member;

FIG. 4 is a perspective view of a workpiece locking device having anchoring means adapted for application to the perforated bolster plate of the invention; and

FIG. 5 is a vertical section of the locking device.

Referring now in detail to the drawings, wherein like reference characters designate corresponding parts in the several views, it will be observed that I have modified a standard bolster plate 10 of a die-stamping press for incorporation with the micrometer workpiece-positioning guide stops 11 of my invention. Bolster plate 10 is rectangular in shape and preferably square.

Bolster plate 10 is drilled to provide plural uniformly spaced rows of vertical main anchoring holes 12, of which there are two sets. One set of rows parallels two opposite side edges of bolster plate 10 and the other set parallels the other intervening side edges of said plate. In other words, the rows of anchoring holes 12 of one set of rows are arranged at right-angles to the rows of the other set.

There are areas of bolster plate 10 midway between opposite side edges thereof where there are auxiliary anchoring holes 12' which are narrowly spaced and staggered in relation to the rows of more widely spaced holes. The purpose of these auxiliary anchoring holes will be described later herein.

Substantially at the center of bolster plate 10, a die holder 13 of conventional form is removably secured by the usual means, such as screws and stabilizing dowel pins, which are concealed by the said holder and thus do not appear in the drawings. Die holder 13 is rectangular in shape and preferably square. It is arranged on bolster plate 10 with its side edges parallel to corresponding side edges of the latter. A transverse recess 14 is provided in die holder 13 for reception of any one of the dies D required for use in a particular die-stamping operation. The front wall 15 of die holder 13, i.e. the wall faced by an operator standing in front of the press, is pierced by conventional Allen set screws 16 employed to secure a die D in adjusted position in said holder. A typical "U-die" D is shown installed in die holder 13 with a sheet metal workpiece blank W of appropriate length, width and thickness resting thereon.

The novel means which I have provided to guide the operator in positioning each workpiece blank W in precisely the desired position upon die D comprises at least three micrometer workpiece-positioning guide stops 11. In accordance with usual practice, a pair of guide stops 11, arranged side-by-side, are positioned in rear of die holder 13 and a single guide stop 11 is positioned at one side, either left or right depending upon such influences as the handedness of the press operator, or the side of the press toward which finished workpieces will be ejected.

Each micrometer guide stop 11 is designed to utilize the fundamental operational features of a conventional internal micrometer and includes a block-like body 17 having a horizontal through bore 18 for axial sliding movement of extension rod 19, which has a flat exposed terminal abutment face 20 for contact with an appropriate edge of each workpiece blank fed to the press. Exten-

sion rod 19 is adjusted axially by manipulation of the knurled head 21 of thimble 22, which coaxially encloses barrel 23 to varying degrees of visual exposure and drives said extension rod by the usual screw means (not shown because concealed inside the mechanism). Thimble 22, as usual, is coaxial with extension rod 19 as well as barrel 23. Locking screws 24 are provided in the top of body 17 for engagement with extension rod 19 following precise axial adjustment of the latter in said body.

Cooperative scales of measurement 26 and 25, respectively, are provided on barrel 23 and thimble 22 for observation by the press operator in making precision axial adjustments of extension rod 19 with respect to body 17.

For approximately accurate positioning of each guide stop 11 with respct to a workpiece blank W that has been tentatively placed on a die D installed in die holder 13, at least two horizontally spaced vertical anchor pins 27 depend from the bottom face of body 17 of each guide stop 11 (FIG. 2) for engagement with any two appropriately spaced anchoring holes 12 or 12' of bolster plate 10. The clearances between anchor pins 27 and anchoring holes 12 or 12' should be such that there will be no wobbling, but that said pins may be inserted in said holes and extracted therefrom manually with ease. A straight downward pressure with a thumb on the middle of body 17 should serve to seat both anchor pins. To facilitate safe detachment of each guide stop from any installed position on bolster plate 10, a transverse groove 28 has been milled in the underneath face of body 17 of said stop intermediate with respect to both anchor pins 27—27. By inserting a screwdriver or other suitable lifting tool (not shown) into groove 28 of an installed guide stop 11, the latter may be levered gently upward from engagement with the anchoring holes 12 or 12'.

It sometimes happens that the closing clearance between dies of a press is so close that there will be likelihood of interference by the terminal portions of extension rods 19 of the micrometer guide stops 11 if permitted to enter the space between dies. To provide for these situations, I utilize a blade-type tip member 29 which has a horizontal socket 30 in its comparatively thick base portion 31 to fit removably on the extremity of extension rod 19. Tip member 29 has a blade 32 that is square-cut at its workpiece-abutting end, i.e. at right-angles to the axis of extension rod 19. As the upper die or punch (not shown) closes on lower die D, both dies will serve to insure that blade 32 of tip member 29 will be horizontal at the moment of die impact so as to lie in the plane of the workpiece for abutment against the same.

FIG. 1 shows a block-like object in the lower right-hand corner of bolster plate 10. This is a build-up member 33 for use to support the marginal edge portion of any abnormally horizontally extensive workpiece blank that may be encountered. Build-up member 23 includes a block-like body 34 of the same height as lower die D and a pair of suitably spaced depending anchor pins (not shown) for engagement with correspondingly spaced anchoring holes 12 or 12' of bolster plate 10. One or more build-up members 33 may be stored in reserve in out-of-the-way areas of bolster plate 10. When required for a large workpiece blank, a selected build-up member 33 is moved from its storage position up closer to die holder 13 so that an edge of the workpiece may be supported by it.

For cooperation with the normal three micrometer guide stops 11 employed for each die-stamping operation, I have provided the workpiece locking device 35 illustrated in FIGS. 4 and 5. Like each guide stop 11 and build-up member 33, this locking device 35 includes a block-like body 36 and a pair of suitably spaced depending anchor pins 37 for engagement with selected anchoring holes 12 or 12' of bolster plate 10. In one end of body 36, a horizontal recess 38 is provided for movable reception of a ball detent 39 that is pressed outward against a burr 40, or equivalent constriction, in the mouth of recess 38 by compression spring 41.

In use, locking device 35 is installed on bolster plate 10 in a position facing die holder 13 and sufficiently close to the latter so that one edge of a workpiece blank W, such as a corner thereof diagonally opposite to the two edges abutted by the three micrometric guide stops (see FIG. 1), can be pressed down past locking detent 39 as each workpiece blank is fed to the press. Upon completion of each stamping operation, manual or other means may be employed to snap the workpiece blank upward out of engagement with detent 39.

Operation

After the dies have been lined up in the press for a particular operation, one of the workpiece blanks to be die-stamped is rested upon lower forming die D in approximately proper registration with the latter. Then, three micrometer guide stops 11 are selected and have their extension rods 19 retracted by manual rotation of thimbles 22. These guide stops 11 have their anchor pins 27 plugged into anchoring holes 12 so located that the respective stops will be nearly close enough to the rear and one side of die holder 13 for the extension rods 19 thereof to reach the correspondingly located rear and side edges of workpiece blank W. Now, the thimbles 22 of the micrometer guide stops 11 are manipulated in a manner to press extension rods 19 against the edges of workpiece blank W and move the latter into the precisely required registation with lower die D and hold it there by use of locking screws 24.

Use of the three micrometer guide stops may be supplemented by additional use of locking device 35 (FIGS. 4 and 5) if necessary.

The micrometer guide stops must not be located so that they will receive pressure from the punch press operation being performed. Considering that many of the stamping dies are made in 1 inch, 1½ inch or 2 inch heights, the height of the micrometer guide stops 11 is made 1 inch and the use of build-up shims must be used for the other heights. The actual height of the center of the micrometer to the base is 1.618 inches. This would mean that no micrometer extension rod 19 would go over the die to stop the stamping. If the location of the extension rod 19 would be on, or over, the die D, one of the blade-type tips 29 must be applied to the extension rod 19 of each guide stop. This blade tip has a height of plus .118 inch, or to the center line of the micrometer shaft, and will clear the die height for stopping parts on top of the die. The die will halt the tip from rotating as it is being adjusted.

A micrometer is a precision instrument and must be handled with care. Also extreme care must be taken to lift the micrometer guide stop 11 straight up with the aid of a screwdriver when removing the stops or re-locating them. The same care must be exercised when inserting the anchor pins 27 in the anchoring holes 12 or 12' of bolster plate 10 in the different locations of guide stops 11. A straight downward pressure with the thumb in the middle of the body 17 of each guide stop, or between the anchor pins 27—27, will make them go straight in their holes 12—12.

The reading on scales 25 and 26 of each micrometer guide stop 11 should be noted so that the press operator may check his work and thereby insure consistent measurements on all parts stamped.

The use of micrometer guide stops for locating the stamping on the die should make a one-piece spoilage for setups. That is, after positioning and running one part, the operator would measure its location, make its adjustment on each guide stop, and the second stamping run should be correct.

Whenever it becomes desirable to position more than two micrometer guide stops 11 in rear of the die holder

13 (as when an especially wide workpiece blank is to be stamped), the chosen number of stops may have their anchor pins 27 inserted in the narrowly spaced auxiliary anchoring holes 12'. The same procedure may be employed when more than one micrometer guide stop 11 is required at the side of die holder 13.

I desire to have it understood that I do not intend to be restricted to the specific form of die holder 13 illustrated in FIG. 1 of the drawings. Instead of being rectangular in general horizontal cross-section and having a rectangular recess 14 for reception of a forming die of corresponding shape, die holder 13 may be of any other alternative form. For example, die holder 13 may have a recess of circular horizontal cross-section to hold a cylindrical piercing die, or punch. Recesses of triangular, hexagonal, or various other non-circular shapes may be chosen within the scope of the invention.

It should now be apparent that I have provided an extremely versatile workpiece guide means for die presses which is adapted to meet all of the exigencies of practice, particularly with the addition of the auxiliary build-up member and workpiece locking device.

While the invention has been illustrated and described with respect to a few particular embodiments thereof, it will be understood that it is intended to cover all changes and modifications of the embodiments shown which do not constitute departures from the spirit of the invention and scope of the appended claims.

I claim:

1. Micrometer workpiece guide means for die-stamping presses comprising:

a rectangular bolster plate having plural uniformly spaced vertical anchoring holes in its upper face arranged in rows paralleling the respective side edges of said plate;

a rectangular die holder mounted on the bolster plate in an interior area thereof with its side edges paralleling those of the bolster plate;

means to secure the die holder removably in a position wherein its side edges parallel the corresponding side edges of the bolster plate; and

at least three workpiece positioning stops detachably engageable with seleceted anchoring holes of the bolster plate with two of them abreast at the rear of the die holder and one facing an adjoining side thereof;

each of said stops including:

a block-like body having a horizontal through bore;

a conventional micrometer having an extension rod mounted for axial movement in the said body bore and projecting therefrom with a measuring face for positioning abutment against a side edge of a workpiece operatively supported by a die installed in the die-holder; and

at least two vertical anchor pins depending from the bottom face of said body in the plane of its horizontal bore, said pins being spaced apart the same distance as the spacing between adjacent rows of the positioning sockets of the bolster plate and being dimensioned to fit removably in selected sockets.

2. The invention defined in claim 1, wherein the body of each workpiece positioning stop has a transverse groove in its bottom face intermediate of the anchor pins thereof for engagement by a lifting tool.

3. The invention defined in claim 1, with the addition of a blade-type tip member having a socket constructed and arranged to fit the extension rod of each micrometer and hold the blade in a horizontal plane when projecting into the space between dies, whereby there will be no interference with proper closing of the dies.

4. The invention defined in claim 1, with the addition of a build-up block including:

a body substantially equal in height to the top face of a die installed in the die-holder; and

at least two vertical anchor pins depending from the bottom face of said body for engagement with selected anchoring sockets in the bolster plate to support the projecting end of an unusually extensive workpiece.

5. The invention defined in claim 1, with the addition of a workpiece locking device including:

a block-type body having a lateral recess in one vertical face thereof at a height slightly above that of a workpiece supported by a die installed in the die-holder;

a spring-pressed snap-lock detent movably secured in the recess of said body; and

at least two vertical anchor pins depending from the bottom face of said body for engagement with selected anchoring sockets in the bolster plate, whereby the snap-lock detent may be engaged with each workpiece immediately above one corner thereof to resist vertical displacement.

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