Dec. 24, 1968 E. D. BENNETT 3,417,643

PUNCHING APPARATUS

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FIG. 1

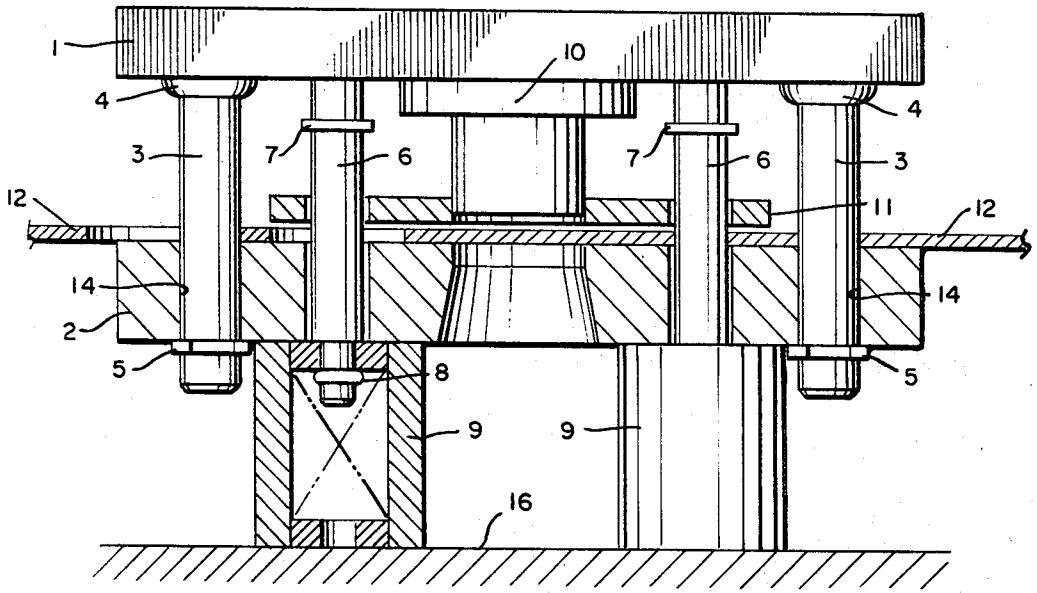
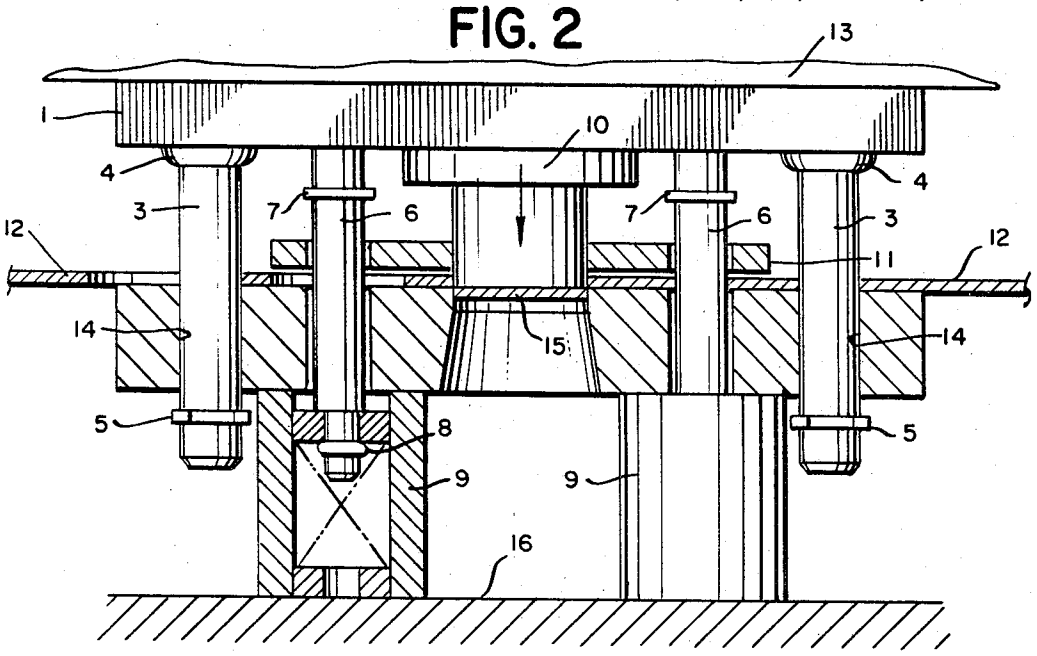


FIG. 2



INVENTOR
EDWARD D. BENNETT

BY Charles D. Johnson Jr.
ATTORNEY

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PUNCHING APPARATUS

Edward D. Bennett, 1053 Coolidge Ave., Union, N.J. 07083

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ABSTRACT OF THE DISCLOSURE

A parallel plate die set unit is provided in which a die opening is formed directly in one of the plates and a stripper is provided for separating a punch member on the punch plate from the material punched.

This invention relates generally to a punching apparatus and more particularly to an improved die unit for piercing holes and blanking stampings from material, such as metal.

A conventional die is a large, expensive, heavy tool which requires much skilled labor in the manufacture and use of the tool. The high expense associated with the class A or conventional die is not desired for short term tooling. It is therefore a continuing problem to provide accurate, economical dies for short or intermediate piercing and stamping operations.

Die designers in the past have attempted to eliminate the building of a die on a die set unit because of the expense of storage problems, die design and fabrication required to utilize a conventional die set unit. Attempts to overcome the above problems resulted in using one die set unit which is generally referred to as a master die set, the cutting die sections of many different shaped piece parts were designed to fit in this unit. However, by using a master die set it was necessary to rely on a press operator to do the job of a die maker in aligning the punch with the die. If this were not done properly the punch or die section would be broken or sheared. During storage loose die cutting sections are apt to be misplaced or damaged because they were not permanently fastened to a die set.

Proper guiding and alignment of the punch and die cutting sections, during setup and use is a problem of extreme importance. Another problem is stripping of the material web from the punch. This must always be accomplished to provide accurate, rapid operation of the die.

It is therefore a broad object of the invention to provide an improved punching apparatus.

It is a further object of the invention to provide an improved punching apparatus having fewer parts with improved convenience of alignment and operation.

It is a feature of the invention that a parallel plate die set is formed in which the cutting die section and lower plate are of one-piece construction.

It is another feature of the invention that the cutting die section is formed from prehardened steel.

An important feature is that the die set may be assembled and aligned before the die cutting section is formed in the die plate.

It is another feature of the invention that the guide pins are secured to the punch plate and are guided by openings in the die plate.

Still another feature of the invention is the use of die opening pins and a stripper plate for opening the die set to strip the web material from the punch detail.

These and other objects and features of the invention will become apparent from the following description of the invention and the drawings which are hereby made a part of the application and in which:

FIG. 1 is a partial cross sectional elevation view of the invention in an open position;

FIG. 2 is a partial cross sectional elevation view of the invention in the closed or punching position.

All conventional die sets are building platforms for the cutting die sections. In the present invention the cutting die section is an integral part of the die set.

The invention relates generally to a punching apparatus in which the cutting die section is formed with the lower plate in a one-piece construction. Use of prehardened steel aids die set accuracy and allows for assembly and alignment of the punch plate prior to forming the die cutting section in the die plate. Guide pins fixed to the punch plate which move through the die plate and die opening pins which abut the punch plate to open the die and aid in stripping are important aspects of the invention.

Referring now to the details of the invention the apparatus of the invention and its operation may be seen from FIGS. 1 and 2 in which like numerals designate like numerals. FIG. 1 illustrates the open position of the die set while FIG. 2 shows the closed or punching position.

The die set of the invention comprises a punch plate **1** to which the blanking punch **10** and the guide pins **3** are secured. The guide pins **3** are secured to the punch plate **1** by the lock ring **4**.

The die plate **2** is a one-piece construction which acts as lower die plate or shoe and also as the cutting die section, as well as having openings formed therein for receiving the guide pins.

In one important embodiment of the invention the die plate is formed from prehardened steel. In this manner the forming of the cutting die section and the guide pin openings do not lose the accuracy of their position since the die plate **2** does not need further heat treating.

A prehardened steel, for use as cutting die members, is of a hardness and wearability to resist deformation during a stamping operation and yet is soft enough to allow machining by high speed steel cutting tools.

Although various guide pin arrangements may be envisioned, the proven accuracy of the present invention points out the importance of the one-piece construction in which the cutting die section and guide pin apertures are formed in a single die plate **2**.

Punch plate retaining rings **5** prevent the punch plate from rising past the point where the extended guide pins **3** cause the rings **5** to press against the die plate **2**.

A fixed stripper plate **11** is secured to the die plate **2** by securing members, such as bolts, not shown.

Support strippers **9** support the die plate **2**. Stripper pins **6** pass through the fixed stripper plate **11** and the die plate **2** and are press fit secured to the support stripper **9** by the stripper pin O-ring **8** while the stripper pin retaining ring **7** prevents the stripper pins **6** from being lost in storage or otherwise.

In operation the punch press ram **13** acts against the die set to punch a piece part from stock material **12**. Downward movement of the punch plate **1**, guided by the guide area **14** of the die block **2** guide pin apertures cause the blanking punch **10** to descend against the stock material **12** to punch the piece part **15** which falls between the support strippers **9**. The die plate **2** is secured by clamp means, not shown, to the bolster **16**.

The springs in the support strippers **9** press the stripper pins **6** up against the inside surface of the punch plate **1** so that, when the punch press ram **13** is removed, the stripper pins press the punch plate away from the die plate. This movement causes the blanking punch **10** to move up from the web of the stock material **12** so as to remove the punching tool **10** from the material **12**. The fixed stripper plate **11**, secured to the die plate, prevents unnecessary upward movement of the stock material **12**.

It should be realized that the die set may be assembled and aligned with the latter forming of the die cutting section in the one piece die plate not disturbing

the alignment. This is possible because of the use of prehardened steel as the die plate material.

It is thus seen that all of the objects and features of the invention have been accomplished by the invention as described. It should be understood that variations may be envisioned without departing from the invention.

What is claimed is:

1. Material punching apparatus comprising a die set unit including a first plate having a punch member associated therewith and a second plate having a cutting die section formed therein so the cutting die section and the lower plate of the die set are of a one piece construction, and guide pins for aligning the first and second plates, the die set including a stripper plate fixed to the said second plate, at least one die opening pin which normally abuts the inside of the said first plate and passes through openings in the second plate and stripper plate and support stripper means proximate the die opening pin and second plate for supporting the die set and providing pressure when the die set opens after a punch operation for the die opening pin to press against the first plate so as to strip the punch member from the material punched, the fixed stripper plate preventing excessive movement of the web of unpunched material.

2. Material punching apparatus comprising a die set unit including a first plate having a punch member associated therewith and a second plate having a cutting die section formed therein so the cutting die section and the lower plate of the die set are of a one piece construction, and guide pins for aligning the first and second plates wherein the second plate is formed from prehardened steel and wherein guide pins are secured to the said first plate and move and are guided by openings in the second plate so as to align the punch member with the cutting die section when the first and second plates move toward each other and wherein the die set includes a stripper plate fixed to the said second plate, at least one die opening pin which normally abuts the inside of the said first plate and passes through openings in the second plate and stripper plate and support stripper means proximate the die opening pin and second plate for supporting the dae set and providing pressure when the die set opens after a punch operation for the die opening pin to press against the first plate so as to strip the punch member from the material punched, the fixed stripper plate preventing excessive movement of the web of unpunched material.

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WILLIAM S. LAWSON, *Primary Examiner.*

U.S. Cl. X.R.

83—637, 698