

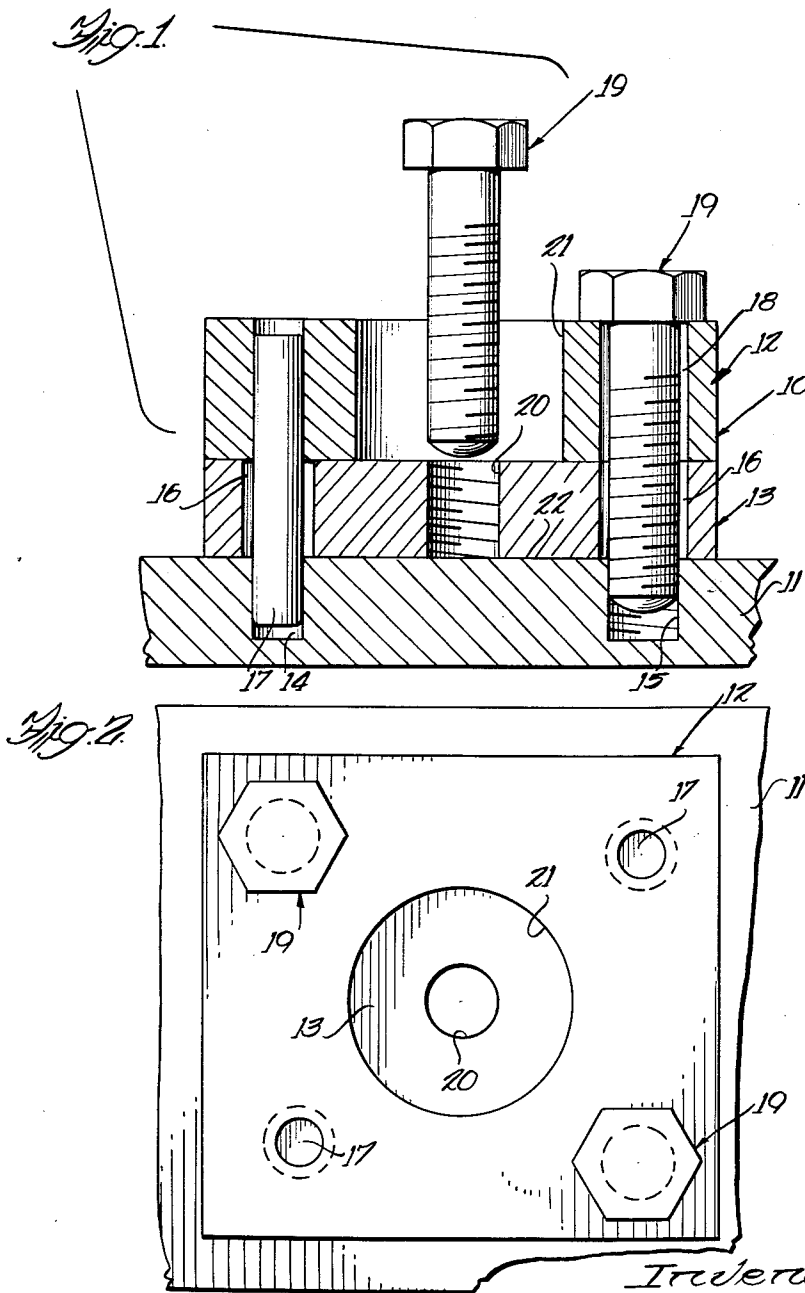
May 15, 1962

C. J. HRABAL

3,034,464

DIE-SET CONSTRUCTION

Filed July 30, 1958



1

3,034,464

## DIE-SET CONSTRUCTION

Charles J. Hrabal, 429 Suwanee, Park Forest, Ill.

Filed July 30, 1958, Ser. No. 752,087

4 Claims. (Cl. 113-49)

This invention relates to a die-set construction of the type utilized in metal stamping and forming operations, and more particularly to new and improved means incorporated in a die-set assembly for quickly and easily disassembling or removing a punch retainer or the like from a supporting plate without the need of any special tools and without damaging or injuring any of the components of the die-set assembly.

It is generally the practice in the metal stamping and forming art to provide a die-set assembly which includes a punch retainer. The punch retainer is rigidly attached to and accurately located upon a surface of a supporting plate by means of a pair of pins and a pair of bolts. The pins are fixedly carried by the punch retainer and are adapted to be tightly pressed into blind holes accurately reamed and located in the supporting plate. Of necessity the holes are blind holes and do not extend completely through the supporting plate. In a similar manner the bolts are engageable with threaded blind holes in the supporting plate to secure the punch retainer in place on the supporting plate.

Oftentimes, for various reasons, the punch retainer must be removed from and/or relocated on the supporting plate. Heretofore, there was no quick and easy way to remove the punch retainer from the supporting plate. It was necessary to first remove the two attaching bolts and then carefully and simultaneously apply a force tending to separate the punch retainer from the supporting plate while tapping the punch retainer with a hammer or like. Inasmuch as the pins are disposed in blind holes, the punch retainer cannot be removed by applying a force to the pin ends from the under or back side of the supporting plate. Since the supporting plate having the pin-receiving holes therein is made of relatively soft material and the pins are hardened, the precision reamed holes often were enlarged and rendered inaccurate and useless for subsequent employment during the punch retainer removal operation. Furthermore, a pin occasionally broke in the reamed hole which necessitated the additional difficult task of removing the broken pin portion from the supporting plate which difficult task was rendered extremely difficult if the broken pin portion did not project sufficiently from the supporting plate to provide a grippable surface. While there are several methods commonly employed for removing broken pin portions from the blind holes, all of them result in the destruction of the usefulness of the reamed holes since the holes no longer are capable of accurately locating the punch retainer. It is therefore, an important object of the present invention to obviate the above noted disadvantages and shortcomings of prior die-set assemblies and to provide a die-set construction wherein the punch retainer may be quickly and easily removed from the supporting plate without the need of any special tools, fixtures or the like and without damaging or injuring any of the components of the die-set assembly including the locating pins and the pin-receiving holes of the supporting plate.

A still further object is to provide a simple and inexpensive constructional modification of a conventional die-set assembly whereby the punch retainer may be readily removed from the supporting plate with a minimum of effort.

Another object is to provide means for removing a punch retainer from a supporting plate whereby the possibility of pin breakage and the enlargement of the pin-

2

receiving holes during the removal operation, is mitigated considerably.

The foregoing and other important objects and desirable features inherent in and encompassed by the invention, together with the many purposes and uses thereof, will become readily apparent from a reading of the ensuing description in conjunction with the annexed drawing, in which,

FIGURE 1 is a vertical sectional view of a portion of a die-set assembly embodying the invention; and

FIGURE 2 is a plan view of the structure shown in FIGURE 1.

Referring to the drawing in detail, wherein like reference characters represent like elements throughout the various views, a portion of a die-set assembly, designated generally by reference character 10, is shown. The die-set assembly includes a supporting plate 11, partially shown, and a punch retainer 12 adapted to support a punch (not shown) in a conventional manner. When assembled, a back up plate 13 is interposed between the supporting plate 11 and the punch retainer 12.

As best shown in FIGURE 1, the supporting plate 11 is provided with a pair of blind recesses or holes 14 therein which are employed for accurately locating the punch retainer 12 on the supporting plate 11. The supporting plate 11 is also provided with a pair of internally threaded blind holes or recesses 15. The blind holes 14 and 15 are arranged in a circle with each of the holes 14 being circumferentially spaced between the threaded blind holes 15.

The back up plate 13 which is sandwiched between the supporting plate 11 and the punch retainer 12 has a plurality of spaced openings 16 extending therethrough. The openings 16 have a diameter greater than the holes 14 and 15 and each opening is registerable with a respective hole 14, 15 when the punch retainer 12, back up plate 13 and supporting plate 11 are assembled together and in condition for use.

The punch retainer 12, which is adapted to support a punch element (not shown), has a pair of locating pins 17 secured thereto. The pins 17 project from the normally bottom side of the punch retainer 12 and each pin 17 is adapted to extend through an opening 16 of the back up plate 13. When the punch retainer 12 is in its assembled condition the portion of each pin 17 projecting from the back up plate 13 is tightly pressed into a respective blind hole 14, as shown in FIGURE 1. The punch retainer 12 is also provided with a pair of spaced holes 18 therethrough which are registerable with a respective pair of holes 16 of the back up plate 13 aligned with the internally threaded blind holes 15 of the supporting plate 11. The die-set assembly includes a pair of attaching bolts 19, each of which is adapted to extend through a pair of registering holes 18, 16 and into threading engagement with the screw threads of a respective blind hole 15 of the supporting plate 11.

When it is desired to remove the punch retainer 12 from the supporting plate 11 or to disassemble the die-set assembly, the attaching bolts 19 are first unthreaded from the threaded holes 15 of the supporting plate 11 and withdrawn from the holes 16 and 18 of the back up plate 13 and punch retainer 12, respectively. Thereafter, one of the attaching bolts 19 is inserted through an enlarged, central opening 21 formed through the punch retainer 12. When assembled, the enlarged, central hole 21 is in alignment with a threaded hole 20 in the back up plate 13. The diameter of the hole 20 is the same as the diameters of the blind holes 15 formed in the supporting plate 11 and the screw thread size and pitch formed in the hole 20 is the same as that provided on the attaching bolts 19. The attaching bolt 19 is then

threaded into the hole 20 until the tip portion thereof engages the flat surface 22 of the supporting plate 11 which is in abutting engagement with the back up plate 13 when the die-set assembly is in its assembled condition, as shown in FIGURE 1. Continued rotation of the bolt 19 causes an axially directed, separation force to be exerted between the back up plate 13 (and the punch retainer 12) and the supporting plate 11 and withdrawal of the pins 17 from the blind holes 14. Inasmuch as the pins 17 are spaced the same distance from the longitudinal axis of the aligned holes 20 and 21 it will be appreciated that the punch retainer 12 will be moved away from the supporting plate 11 along the longitudinal axis of the aligned holes 20 and 21. Thus, neither the accurately positioned locating blind holes 14 nor the pins 17 are damaged during the disassembly operation. Furthermore, no special tools or the like are necessary to effect the disassembly operation quickly and efficiently.

The embodiment of the invention chosen for the purposes of illustration and description herein is that preferred for achieving the objects of the invention and developing the utility thereof in the most desirable manner, due regard being had to existing factors of simplicity of design and construction, production methods, and the improvements sought to be effected. It will be appreciated therefore, that the particular structural and functional aspects emphasized herein are not intended to exclude, but rather to suggest, such other adaptations and modifications of the invention as fall within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. In a die-set including a supporting member having a flat surface and a plurality of spaced blind holes opening into said flat surface, certain of said blind holes serving as locating blind holes and the other blind holes having internal screw threads formed therein, said blind holes being arranged in a circle with each of said locating blind holes being circumferentially spaced between a pair of blind holes having screw threads formed therein; a back up plate overlying and abutting said flat surface, said back up plate having a plurality of spaced openings therethrough, each of said openings being alignable with a respective blind hole of said supporting member, said back up plate further having a central aperture therethrough said central aperture being of the same diameter as said internally threaded blind holes and having an internal screw thread of the same size as the screw thread formed in said threaded blind holes; a punch retainer overlying and abutting the surface of said back up plate opposite the surface thereof abutting said supporting member, said punch retainer having a central opening alignable with said threaded aperture of said back up plate, the diameter of said central opening being larger than the threaded aperture of said back up plate, said punch retainer further having a plurality of spaced apertures, each of said apertures being alignable with a respective opening of said back up plate, said punch retainer further having a plurality of locating pins fixed thereto, each of said pins extending loosely through a respective opening in said back up plate and tightly into a respective locating blind hole in said supporting member, and means for selectively clamping said punch retainer to said supporting member or for moving said punch retainer away from said supporting member and withdrawing said pins from said locating blind holes including a threaded member, said threaded member being alternatively insertable through a respective aperture of said punch retainer and the back up plate opening aligned therewith and into engagement with the threaded blind hole of said supporting member aligned with such opening or said central opening of said punch retainer and threaded aperture of said back up plate and into engagement with said flat surface.

2. In a die-set including a supporting member having

a flat surface and two pairs of circularly spaced blind holes opening into said flat surface, one pair of blind holes serving as locating blind holes and the other pair of blind holes having internal screw threads formed therein, each blind hole of one pair of blind holes being circumferentially spaced between the blind holes of the other pair; a back up plate overlying and abutting said flat surface, said back up plate having openings therethrough, each of said openings being alignable with a respective blind hole of said supporting member, said back up plate having a central aperture therethrough of the same diameter as said threaded blind holes and having internal screw threads of the same size as the screw threads of said threaded blind holes; a punch retainer overlying and abutting the surface of said back up plate opposite the surface thereof abutting said supporting member, and having a central opening therethrough of larger diameter than and alignable with said threaded opening of said back up plate, said punch retainer having a pair of apertures therethrough, each of said apertures being alignable with a respective opening of said back up plate, said punch retainer further having a pair of locating pins fixed thereto, each of said pins extending loosely through a respective opening in said back up plate and tightly into a respective locating blind hole of said supporting member; and means for selectively clamping said punch retainer to said supporting member or for moving said punch retainer away from said supporting member and withdrawing said pins from said locating blind holes including a threaded member, said threaded member being alternately insertable through a respective punch retainer aperture and the back up plate opening aligned therewith and into the threaded blind hole of said supporting member aligned with such opening or said central opening of said punch retainer and central threaded aperture of said back up plate and into engagement with said flat surface.

3. In a die-set including a supporting member provided with two pairs of circularly spaced blind holes therein, one pair of blind holes serving as locating blind holes and the other pair of blind holes having internal screw threads formed therein, each blind hole of one pair of blind holes being circumferentially spaced between the blind holes of the other pair; a back up plate overlying and abutting said supporting member and having a central opening therethrough of the same diameter as said threaded blind holes and having internal screw threads formed therein of the same size as the screw threads of said threaded blind holes; a punch retainer overlying and abutting said back up plate and having a central opening therethrough of larger diameter than and alignable with said threaded aperture, said punch retainer having a pair of locating pins fixed thereto, each of said pins extending loosely through said back up plate and tightly into a respective locating blind hole of said supporting member; and means for selectively clamping said punch retainer to said supporting member or for moving said punch retainer away from said supporting member and withdrawing said pins from said locating blind holes including a threaded member, said threaded member being alternately insertable through said punch retainer and back up plate and into engagement with a respective threaded blind hole of said supporting member or through said punch retainer central opening and into threading engagement with said back plate central threaded aperture and into abutting engagement with said supporting member.

4. In a die-set including a supporting member having a flat surface, said member having a plurality of circularly spaced locating blind holes and threaded blind holes therethrough opening into said flat surface, each of said threaded blind holes being circumferentially spaced between a pair of locating blind holes; a back up plate overlying and abutting said flat surface having a plurality of spaced openings therethrough, each of said open-

5

ings being registerable with a respective blind hole of said supporting member, said back up plate having a central threaded opening therethrough; a punch retainer having a surface abutting a surface of said back up plate opposite the surface thereof abutting said flat surface, said punch retainer having a central opening of larger diameter than said back up plate central opening and a plurality of spaced attaching bolt-receiving openings there-through, said central opening being registerable with said back up plate threaded opening and each of said attaching bolt-receiving openings being registerable with a respective back up plate opening and the supporting member threaded blind hole registering therewith, said punch retainer having a plurality of locating pins fixed thereto, each of said pins being adapted to extend loosely through a respective opening in said back up plate and tightly into a respective locating blind hole of said supporting member; and a plurality of attaching bolts, each of said attaching bolts extending through a respective bolt-receiving opening and registering back up plate opening into threading engagement with a respective threaded

6

blind hole of said support member, the thread size and diameter of said back up plate central threaded opening being the same as the thread sizes and diameters of said supporting member blind holes, whereby any one of said attaching bolts is capable of being inserted through said punch retainer central opening and screwed into said back up plate threaded opening and forced against said flat surface of said supporting member to move said punch retainer away from said supporting member and withdraw said pins from said locating blind holes when all the other attaching bolts are removed from said threaded blind holes of said supporting member.

## References Cited in the file of this patent

## UNITED STATES PATENTS

|           |            |               |
|-----------|------------|---------------|
| 1,753,780 | Fisher     | Apr. 8, 1930  |
| 1,804,935 | Jacobus    | May 12, 1931  |
| 2,299,703 | Schwabe    | Oct. 20, 1942 |
| 2,305,076 | Graham     | Dec. 15, 1942 |
| 2,635,338 | Dallenbach | Apr. 21, 1953 |
| 2,684,527 | Hedlund    | July 27, 1954 |