Jan. 24, 1956 A. TOMASKA 2,731,729

DIE SET CENTER LOCATOR

Filed Oct. 26, 1954

2 Sheets-Sheet 1

FIG. 1

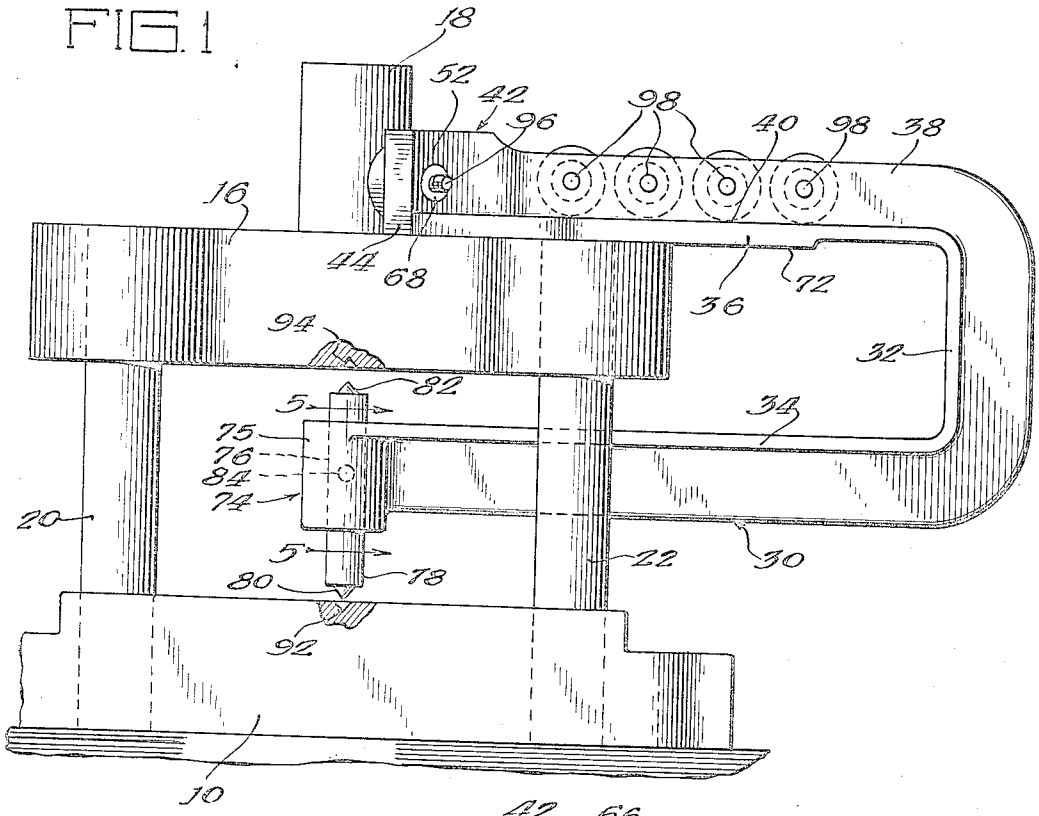
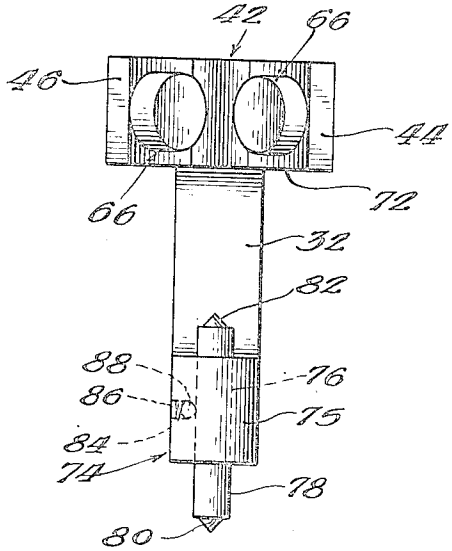


FIG. 2



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FIG. 3

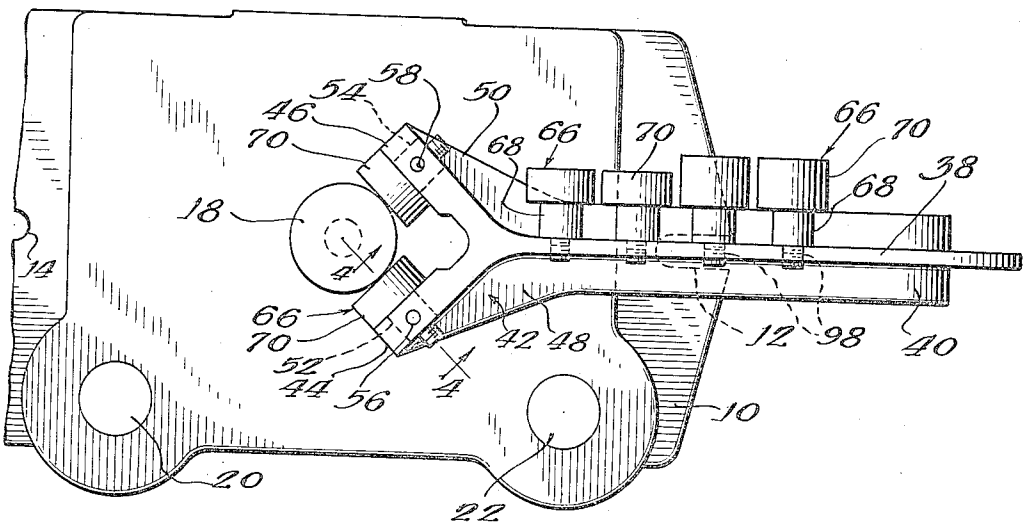


FIG. 5

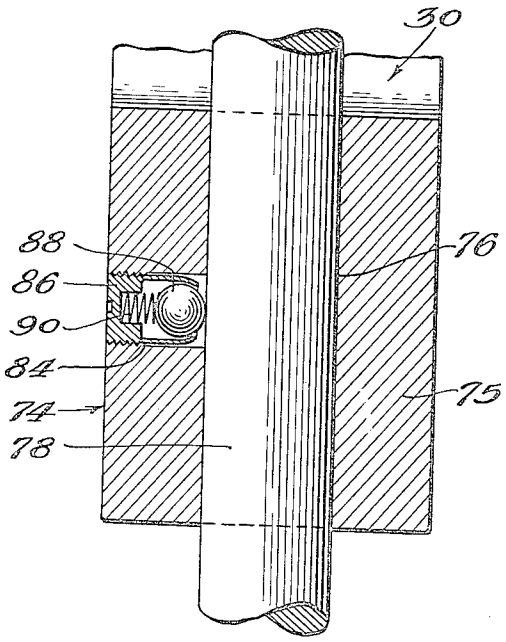
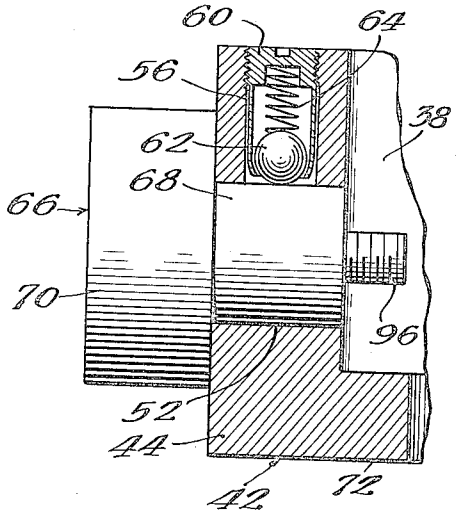


FIG. 4



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2,731,729

DIE SET CENTER LOCATOR

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9 Claims. (Cl. 33—189)

This invention relates to die set center locators, and more particularly to a device for quickly sinking a conical hole in the exact center of the bottom of a punch holder and in the exact center of the top of a die holder.

A leader pin die set is illustrated in Figures 1 and 3, and consists of a die holder 10 having recesses 12 and 14 to receive bolts for fastening the die holder to the bottom of a punch press and of a punch holder 16 having a shank 18 for mounting in the ram of a press. The top and bottom surfaces of the punch holder and of the die holder are flat and are maintained in exact parallel relationship by leader pins 20 and 22 journaled in the punch holder, which hold the punch holder 16 and die holder 10 in assembled relationship. While leader pin die sets vary in minor details, they are standard as to these described elements. The shank 18 of the punch holder comes in different sizes for different punch presses, the three sizes here disclosed being 1 9/16 inches, 2 inches and 2½ inches, although the invention may obviously be practiced with shanks of other sizes.

When mounting a punch and die on the bottom and top of the punch holder 16 and the die holder 10, respectively, as well as to position work strippers, it is desirable that the punch and die be based on the exact center of the shank 18 of the punch holder 16. Finding the exact center of the shank 18 on the lower side of the punch holder 16 is not too difficult, but does consume time. In the conventional method, the punch holder 16 is mounted in a three-jaw chuck of a lathe and the center determined. Transferring this center accurately to the die holder 10 is quite difficult. After the center has been located on the punch holder 16, the die holder 10 is mounted to the leader pins 20 and 22 with its upper surface facing the under side of the punch holder 16 which remains secured in the chuck of the lathe, and a series of corresponding marks are placed upon the two facing surfaces until the center is located. The operation may require as much as one-half hour.

It has heretofore been proposed to scribe the center point of the punch holder and of a die set by means of a U-shaped member, one arm of which engages the shank of the punch holder and the other arm of which carries oppositely directed conical points which will center on the shank of the punch holder. These devices have required set screws for obtaining exact registry and these have taken time.

The first object of this invention is to improve this U-shaped member by providing its upper arm with a flat surface to engage the top of the punch holder, which is also flat and which is at right angles to the axis of its shank.

A second object of this invention is to provide a simplified means for adapting applicant's center locator to punch holders having shanks of different sizes.

Other objects of the invention will become apparent to those skilled in the art from a further reading of the present disclosure, particularly when viewed in the light of the drawings, in which:

Figure 1 is an elevational view of a die set center locator constructed according to the teachings of the present invention in combination with a conventional leader pin die set;

Figure 2 is a side elevational view of the center locator illustrated in Figure 1;

Figure 3 is a plan view of the leader pin die set and center locator as illustrated in Figure 1;

Figure 4 is a sectional view taken along the line 4—4 of Figure 3; and

Figure 5 is a sectional view taken along the line 5—5 of Figure 1.

As illustrated in Figure 1, the center locator is provided with a U-shaped arm 30 which has a central portion 32 which is disposed essentially normal to two leg portions 34 and 36. The arm 30 is also provided with a stiffening web 38 along its outer surface 40 and hence has a T-shaped cross section.

One end 42 of the arm 30 divides into two portions 44 and 46 and flares outwardly normal to the plane of the U-shaped arm and becomes Y-shaped. The two portions 44 and 46 are essentially normal to each other and are supported by outwardly flaring ribs 48 and 50 which are an integral part of the arm 30. A pair of circular apertures 52 and 54 extend normally through the portions 44 and 46 of the end 42. A circular bore 56 extends inwardly from the surface of the arm 30 into the bore 52 as does a circular bore 58 extend normally into the circular aperture 54. Ball bearing housings 60 having protruding balls 62 and springs 64 biasing the balls into the protruding position are secured within the bores 56 and 58, so that the balls 62 are partially disposed within the apertures 52 and 54.

Removable shims 66 which are provided with annular shanks 68 having the same diameter as the orifices 52 and 54 are disposed with the shanks 68 in the orifices 52 and 54, the shims 66 abutting the normal surfaces of the Y-shaped end 42. The balls within the bores 56 and 58 contact the shanks 68 of the shims 66 and hold them in position. The shims 66 have a cylindrical contact portion 70 with a diameter greater than that of the orifices 52 or 54 disposed adjacent to the shank 68 thereof, the contact portions 70 abutting the normal surfaces of the outwardly flaring portions 44 and 46 of the end 42. The shims 66 are constructed of rigid material, namely hard steel, and are provided in identical pairs, the contact portions 70 of each pair having different cylindrical heights. In this manner, one pair of shims 66 may be replaced by another pair of shims to locate the center of a die set having a shank of a different diameter, as will be described in detail hereafter.

The arm 30 is provided with a flat inner surface 72 adjacent to the Y-shaped end 42. This flat surface 72 extends along the greater portion of the leg 40 of the arm 30 and is normal to the plane of the U-shaped arm 30. The flat surface 72 of the arm 30, as is illustrated in Figure 1, rests in contact with the upper surface of the punch holder 16 when the die set center locator is being used.

The end 74 of the arm 30 opposite to the end 42 thereof is provided with a hub 75 having an axial bore 76 which extends therethrough normal to the flat surface 72 on a plane bisecting the angle formed by portions 44 and 46 of the Y-shaped end 42. A pin 78 is slideably disposed within the bore 76 and is provided with conical protruding points 80 and 82 at its opposite ends. A channel 84 is disposed within the end 74 of the arm 30 normal to the bore 76, and a ball housing 86 including a ball 88 and a spring 90 are securely disposed within the bore 84.

When an operator desires to place center marks upon the die holder and punch holder of a die set, he first

spreads the die holder and the punch holder apart, these elements being slideable relative to each other on the leader pins of the die set. The center locator is then placed in contact with the die set, the Y-shaped end **42** of the arm **30** being placed to abut the shank **18** of the die set. If proper shims **66** for the diameter of the shank are disposed within the apertures **52** and **54** at the Y-shaped end **42** of the arm **30**, the pin **78** will be disposed with its axis aligned with the axis of the shank of the die set when the flat surface **72** of the center locator is engaged with the upper surface of the punch holder of the die set. When the arm **30** of the center locator is so disposed, the punch holder of the die set may then be slowly pushed toward the die holder of the die set to cause the centering pin **78** to abut the surfaces of both the punch holder and the die holder. The shank of the die set is then given a blow with a mallet, or some equivalent device, which impresses conical indentations, illustrated at **92** and **94**, in the confronting surfaces of the punch holder and die holder, thus indicating the exact center of the die set. Center points are determined on the punch and die for use with the die set, and hence the punch and die are readily aligned with the centering indentations **92** and **94** so that the punch and die and the die set may be quickly assembled and aligned to minimize wear upon the leader pins and bearings of the die set.

Die sets come with shanks **18** of different sizes, and for this reason pairs of shims **66** with different height contact portions **70** are provided, as stated above. As illustrated in Figure 1, three pairs of shims **66** are attached to the arm **30** of the center locator to accommodate shanks of 1 9/16 inches, 2 inches, and 2½ inches. The shims **66** are provided with threaded shafts **96** which extend axially from the shanks **68** thereof. Threaded bores **98** are provided in the web **38** of the arm **30** adjacent to the Y-shaped end **42** so that the threaded shafts **96** may be disposed in the threaded bores **98** for purposes of storing the shims **66** which are not in use. It is thus clear that the die set center locator which constitutes this invention may be used with a die set having virtually any diameter shank by merely providing shim **66** with proper height contact portions **70**.

From the foregoing disclosure, it will be apparent to those skilled in the art that the present invention has applications and modifications which have not been set forth herein. For example, it is clearly within the scope of the invention to provide modified shimming means between the Y-shaped end of the arm and the shank of the die set, such as a member which attaches to the shank of the die set rather than to the center locator. For these reasons, it is intended that the scope of the invention be not limited to the specific disclosure, but rather only by the appended claims.

The inventor claims the following:

1. A center locator for a die set that includes a punch holder having a protruding shank from one surface thereof, a die holder confronting the other surface of the punch holder, and leader pins disposed through the punch holder and die holder maintaining these elements in adjustable-spaced, parallel relationship, comprising a U-shaped arm having a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end and normal to the plane of the arm, a bore extending through the other end of the arm normal to the flat surface, said bore being disposed on an axis passing through the bisector of the angle formed by the Y-shaped end of the arm, said arm having a channel therein extending into the bore, a ball disposed within the channel, a spring disposed within the channel abutting the ball and biasing the ball toward the bore, and a pin disposed within the bore in contact with the ball.

2. A center locator for a die set that includes a punch holder having a protruding shank from one surface thereof, the die holder confronting the other surface of the punch holder, and leader pins disposed through the punch holder maintaining these elements in adjustable-spaced, parallel relationship, comprising a U-shaped arm having a pair of outwardly flaring portions forming a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end and normal to the plane of the arm, a removable shim attached to each of the outwardly flaring portions of the Y-shaped end of the arm, and a pin having a protruding point on opposite ends slideably disposed through the other end of the arm normal to the flat surface, the axis of said pin being disposed on a line passing through the bisector of the angle formed by the outwardly flaring portions of the Y-shaped end of the arm.

3. A center locator for a die set that includes a punch holder having a protruding shank from one surface thereof, a die holder confronting the other surface of the punch holder, and leader pins disposed through the punch holder and die holder maintaining these elements in adjustable-spaced, parallel relationship, comprising a U-shaped arm having a pair of outwardly flaring portions forming a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end and normal to the plane of the arm, said arm being provided with an aperture extending through each of the outwardly flaring portions of the Y-shaped end, a pair of shims having contact portions and shank portions adjacent thereto, one of said shims being disposed with its shank portion in each of the apertures in the outwardly flaring portions of the Y-shaped end of the arm, the contact portions of the shims having surfaces abutting the adjacent surfaces of the Y-shaped end of the arm and opposite surfaces adapted to abut the shank of the die set, and a pin having a protruding point on opposite ends slideably disposed through the other end of the arm normal to the flat surface of the arm, the axis of said pin being disposed on a line passing through the bisector of the angle formed by the Y-shaped end of the arm.

4. A center locator for a die set that includes a punch holder having a protruding shank from one surface thereof, a die holder confronting the other surface of the punch holder, and leader pins disposed through the punch holder and die holder maintaining these elements in adjustable-spaced, parallel relationship, comprising a U-shaped arm having a pair of outwardly flaring portions forming a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end and normal to the plane of the arm, said arm being provided with an aperture extending through each of the outwardly flaring portions of the Y-shaped end, a pair of shims having contact portions and shank portions adjacent thereto, one of said shims being disposed with its shank portion in each of the apertures in the outwardly flaring portions of the Y-shaped end of the arm, the contact portions of the shims having surfaces abutting the adjacent surfaces of the Y-shaped end of the arm and opposite surfaces adapted to abut the shank of the die set, each of the outwardly flaring portions of the Y-shaped end of the arm having a bore extending from the surface of the arm into the aperture therein, a ball disposed within each bore adjacent to the aperture, a spring mounted within each bore abutting the ball and biasing the ball toward the aperture, said ball contacting the shank of the shim disposed within each of the apertures, and a pin having a protruding point on opposite ends slideably disposed through the other end of the arm normal to the flat surface of the arm, the axis of said pin being disposed on a line passing through the bisector of the angle formed by the Y-shaped end of the arm.

5. A center locator for a die set that includes a punch holder having a protruding shank from one surface there-

of, a die holder confronting the other surface of the punch holder, and leader pins disposed through the punch holder and die holder maintaining these elements in adjustable-spaced, parallel relationship comprising a U-shaped arm having a pair of outwardly flaring portions forming a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end and normal to the plane of the arm, said arm being provided with an aperture extending through each of the outwardly flaring portions of the Y-shaped end, a pair of shims having contact portions and shank portions adjacent thereto, one of said shims being disposed with its shank portion in each of the apertures in the outwardly flaring portions of the Y-shaped end of the arm, the contact portions of the shims having surfaces abutting the adjacent surfaces of the Y-shaped end of the arm and opposite surfaces adapted to abut the shank of the die set, each of the outwardly flaring portions of the Y-shaped end of the arm having a bore extending from the surface of the arm into the aperture therein, a ball disposed within each bore adjacent to the aperture, a spring mounted within each bore abutting the ball and biasing the ball toward the aperture, said ball contacting the shank of the shim disposed within each of the apertures, the arm being provided with bores therein conforming to the shank portions to permit shims not in use to be attached to the center locator, and a pin having a protruding point on opposite ends slideably disposed through the other end of the arm normal to the flat surface of the arm, the axis of said pin being disposed on a line passing through the bisector of the angle formed by the Y-shaped end of the arm.

6. A center locator for a die set that includes a punch holder having a protruding shank from one surface thereof, a die holder confronting the other surface of the punch holder, and leader pins disposed through the punch holder and die holder maintaining these elements in adjustable-spaced, parallel relationship comprising a U-shaped arm having a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end and normal to the plane of the arm, removable shimming means adapted to be disposed in contact with the Y-shaped end of the arm and with the shank of the die set, and a pin having a protruding point on opposite ends slideably disposed through the other end of the arm normal to the flat surface, the axis of the pin being disposed on a line passing through the bisector of the angle formed by the Y-shaped end of the arm.

7. A center locator for a die set that includes a punch holder having a protruding shank from one surface thereof, a die holder confronting the other surface of the punch holder and leader pins disposed through the punch holder and die holder maintaining these elements in adjustable-spaced, parallel relationship comprising a U-shaped arm having a pair of essentially parallel legs, one

of said legs having a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end normal to the plane of the arm, said leg being shorter than the other leg of the arm and said other end of the arm being provided with a bore having an axis parallel to the plane of the U-shaped arm and normal to the flat inner surface thereof, the axis of said bore intersecting the bisector of the angle formed by the Y-shaped end of the arm, said arm being provided with a channel extending into the bore, a pin having a protruding point on opposite ends slideably disposed within the bore, a ball disposed within the channel, and a spring mounted in the channel abutting the ball and biasing the ball toward the pin.

8. A center locator for a die set that includes a punch holder having a flat surface with a shank protruding therefrom, a die holder confronting the surface of the punch holder opposite to the flat surface, and means to maintain the confronting surfaces of the die holder and punch holder in alignment comprising a pair of arms, means connecting the arms and maintaining them in essentially parallel relationship, means disposed on one of the arms to contact the flat surface of the die holder and the protruding shank to align said arm with the die holder, and means disposed on the other arm for simultaneously marking the confronting surfaces of the punch holder and die holder, said marking means being aligned with the axis of the protruding shank of the die holder when the center locator is engaged with the die set.

9. A center locator for a die set that includes a punch holder having a protruding shank from one surface thereof, a die holder confronting the other surface of the punch holder, and leader pins disposed through the punch holder and die holder maintaining these elements in adjustable-spaced, parallel relationship comprising a U-shaped arm having a Y-shaped end normal to the plane of the arm adapted to be disposed in contact with the shank of the punch holder and a flat inner surface adjacent to the Y-shaped end and normal to the plane of the arm, and a pin having a protruding point on opposite ends slideably disposed through the other end of the arm normal to the flat surface, the axis of said pin being disposed on a line passing through the bisector of the angle formed by the Y-shaped end of the arm.

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