United States Patent

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[54] **UNIVERSAL DIE SET**
10 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** **83/67,** 83/637, 83/681, 83/699
[51] **Int. Cl.** **B26d 5/20,** B26f 1/40
[50] **Field of Search** 83/69, 637, 681, 699

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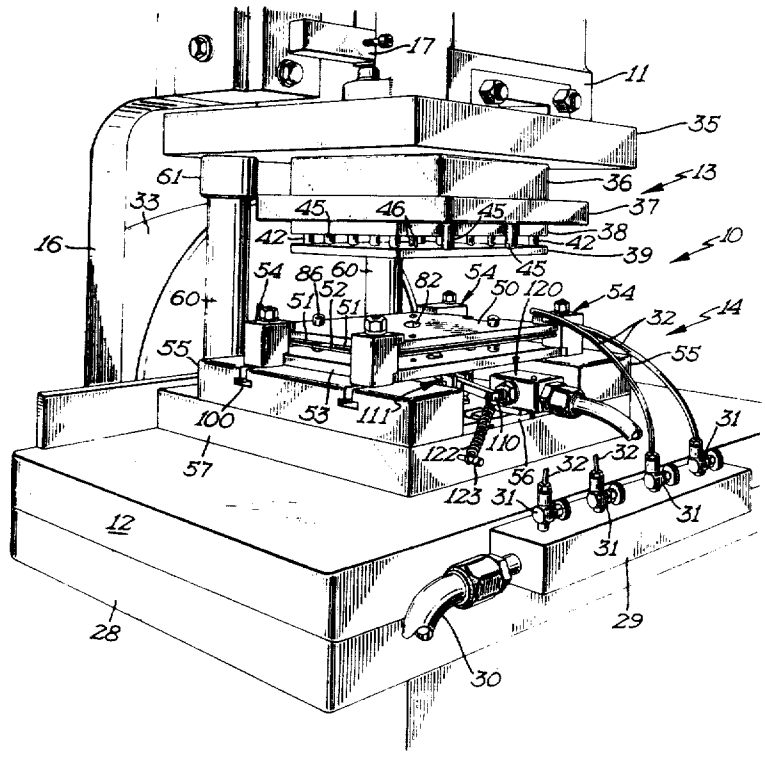
ABSTRACT: A die set for use in a temporary compound die which provides a high degree of flexiblity in placement of supports beneath the blanking punch and its mounting plate, and in placement of ejector pins above the stripper plate. The invention thereby makes changeover to produce different shaped and sized pieces a greatly simplified procedure. In addition means is provided for sensing the advance of material being fed into the die to prevent press actuation in the event that material is not properly fed.



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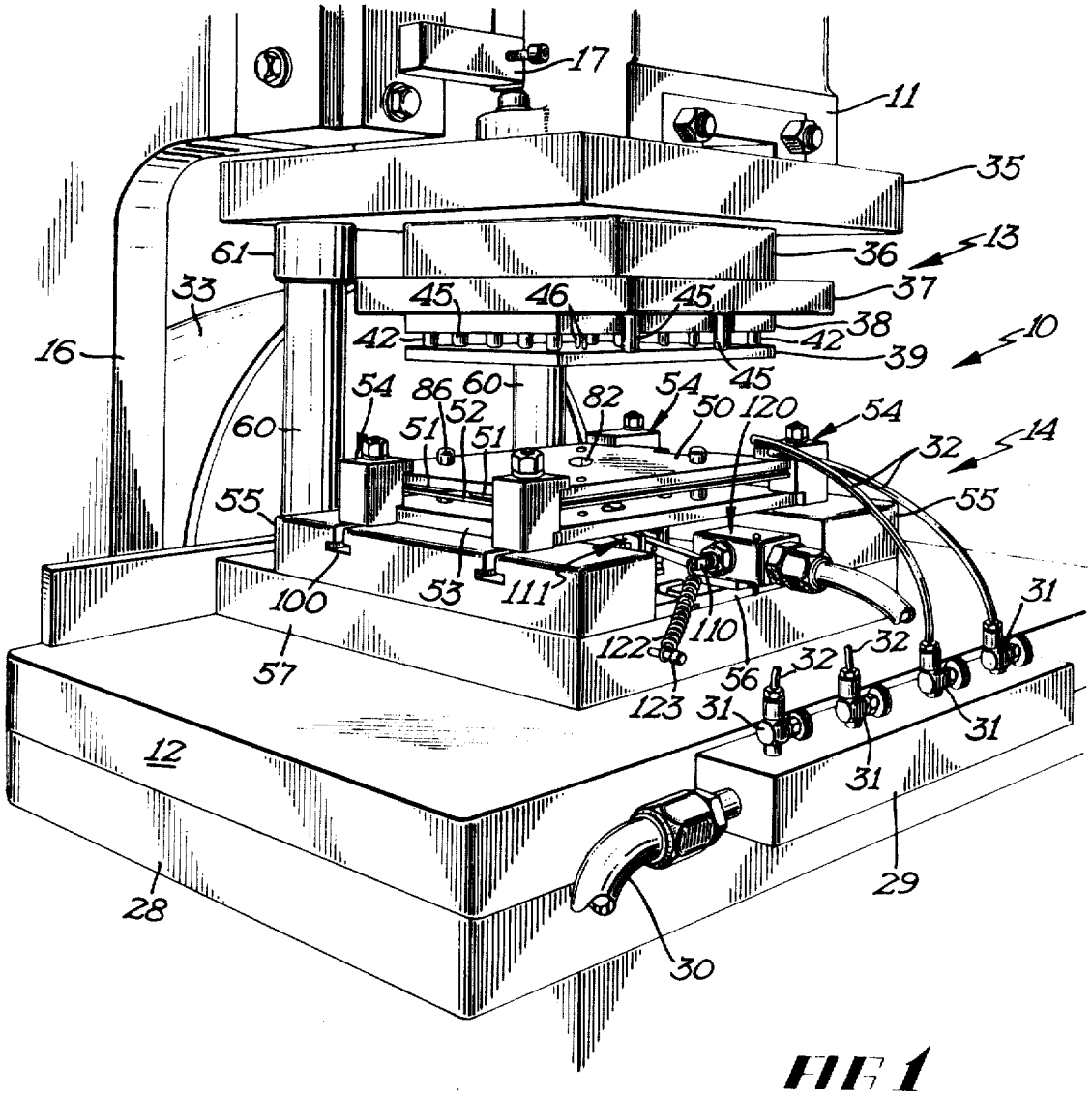

FIG 1

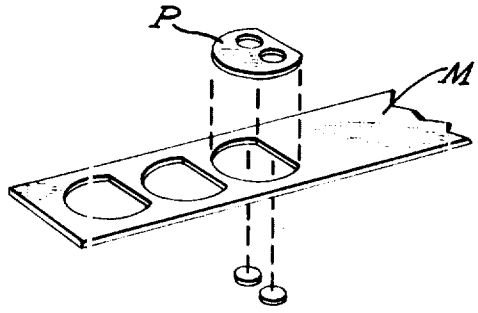

FIG 9

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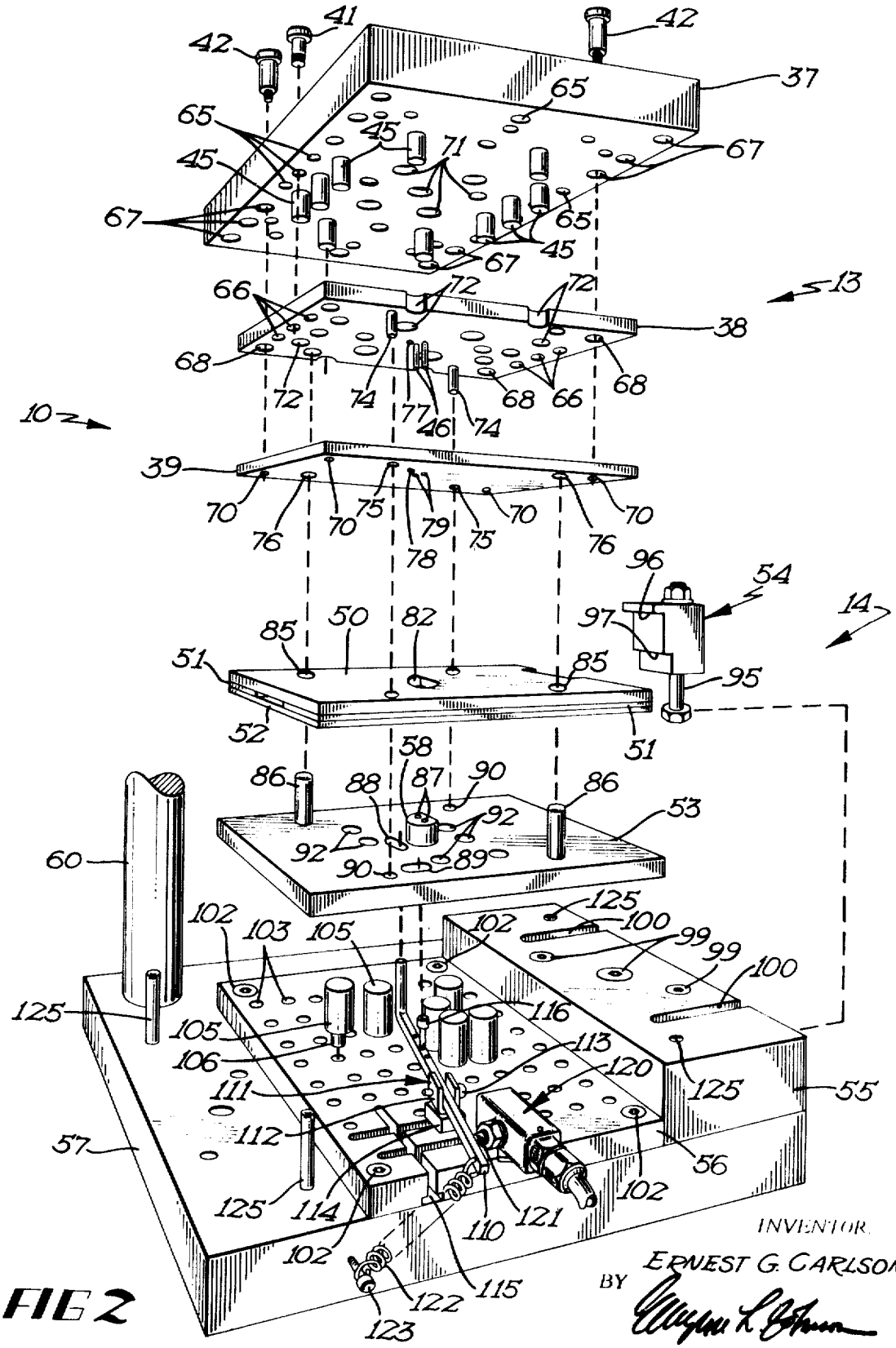

FIG 2

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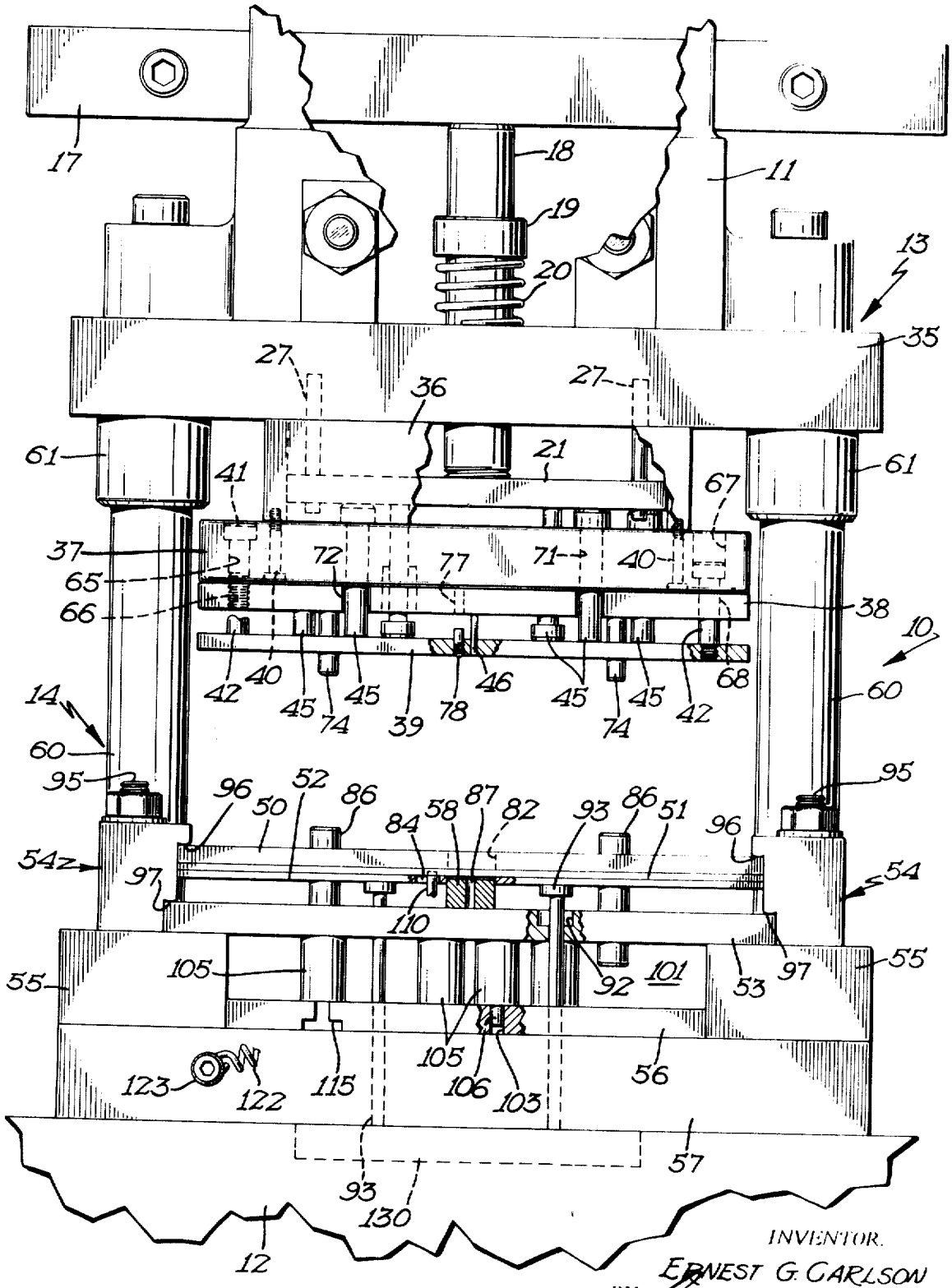

FIG 3

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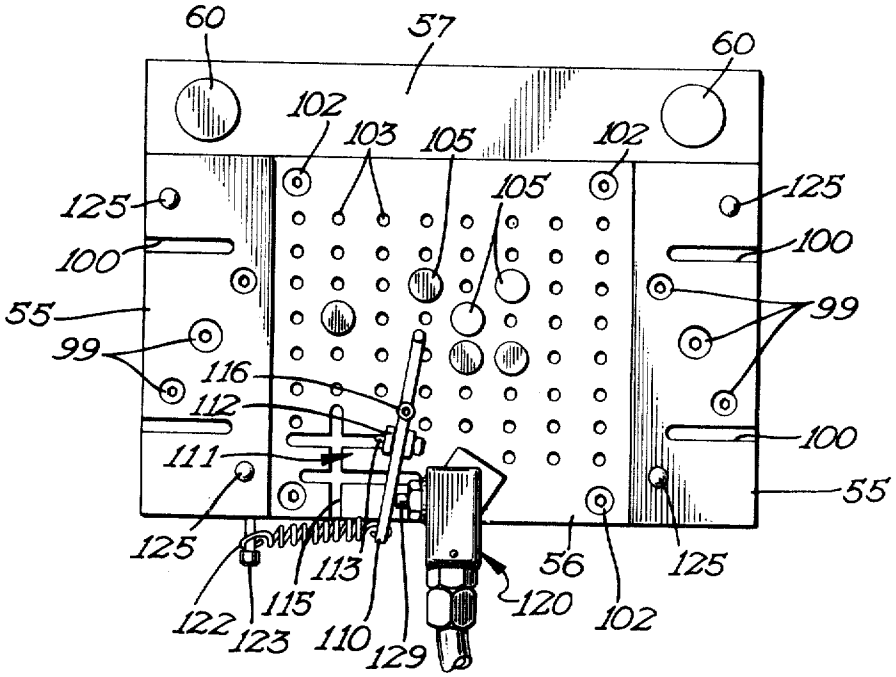

FIG 5

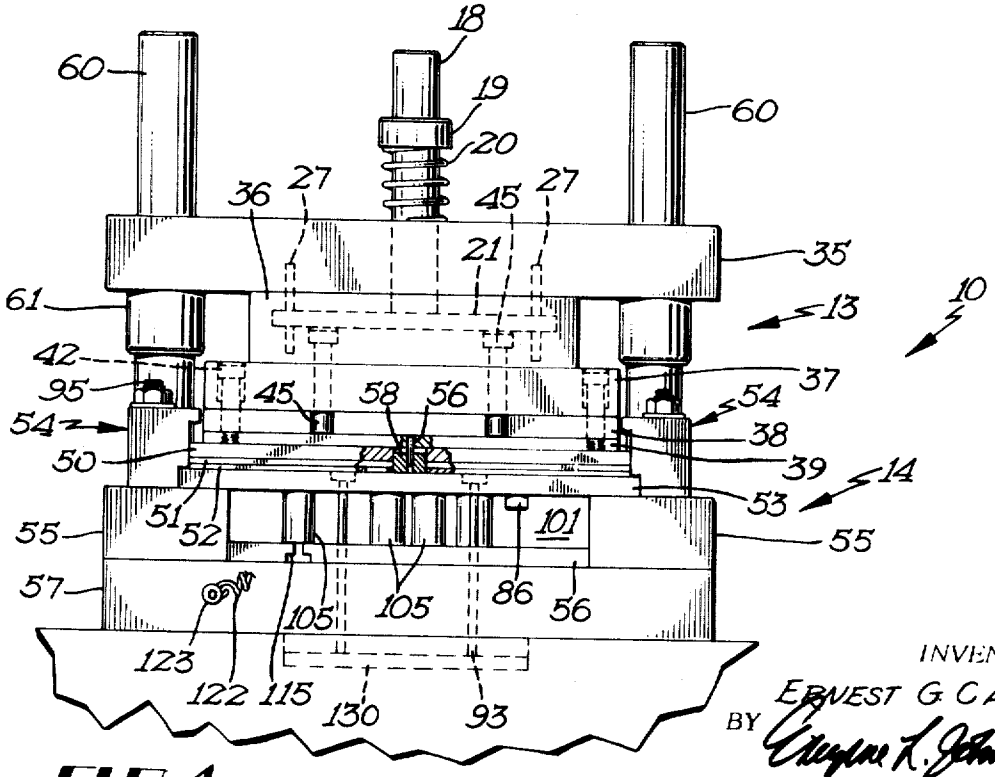

FIG 4

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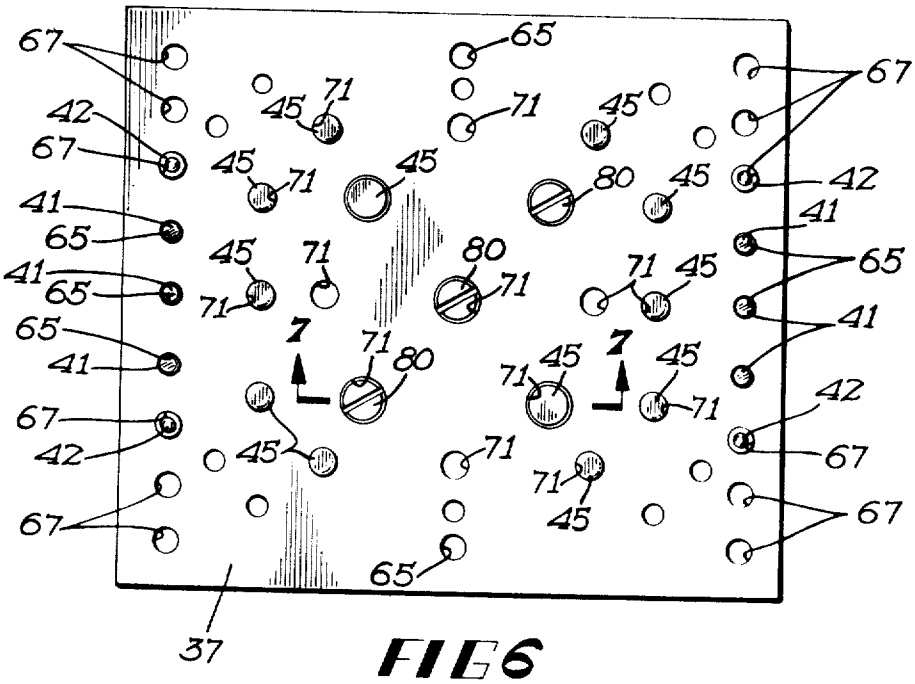

FIG 6

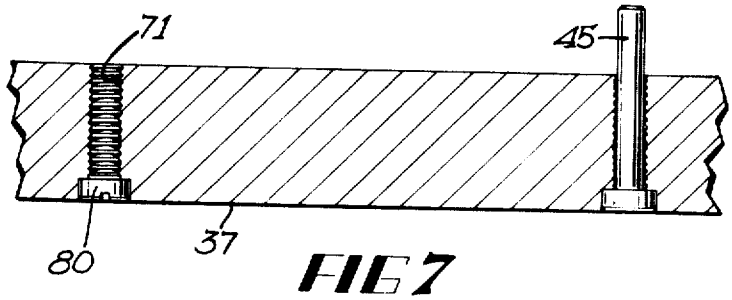

FIG 7

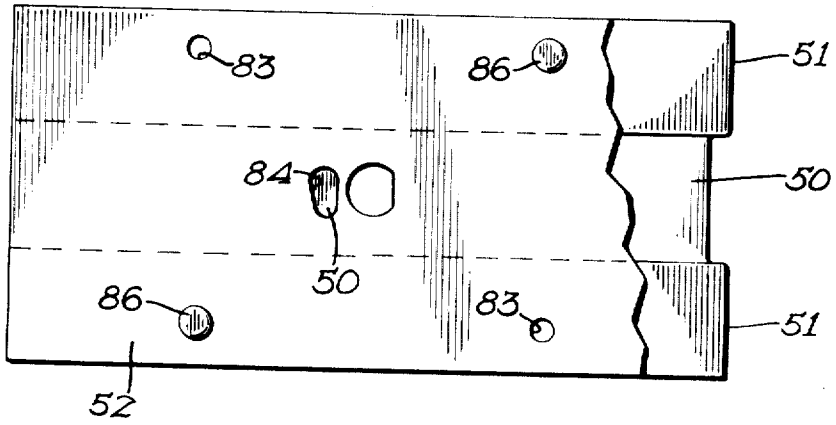

FIG 8

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UNIVERSAL DIE SET

BACKGROUND OF THE INVENTION

The invention resides in the field of temporary compound die sets for the production of metal stamped parts in a size range of one-quarter inch by one-quarter inch to 6 inches by 6 inches, at a rate of 4,000 to 6,500 parts per hour in a 45- to 100-ton punch press. A compound die produces a part which is stamped ro blanked from a metal strip and at the same time punched or pierced to provide an opening or series of openings in the metal part. On the down stroke the pierce punches pierce the metal part to provide an opening or series of openings therein, and on the return stroke, the stamped metal part is lifted on the pierce punches. In this manner the blanked and pierced part is lifted above the blanking die and removed from the path along which the material is fed. The part is stripped and air ejected at this elevated point above the blanking die and collected in a chute.

It is obvious that an infinite variety of configurations of parts may be demanded of the metal stamping art and it is also obvious that to provide each shape and size a uniquely shaped blanking die and blanking punch and a uniquely shaped and located set of pierce punches must be made. Thus a different die set must be manufactured to run each size and configuration required.

In the prior art, changeover to run different sized and shaped parts has been extremely time consuming and costly. Changeover has required providing a completely new die set, that is, a substantially new entire set of parts retaining only the upper die set or punch shoe, the lower die set of die shoe, and the two guide pins. More particularly, changeover in the prior art has required the manufacture of a new pierce-punch backup plate, new pierce-punch mounting plate, a new stripper plate, a new blanking die, a set of material guides and material stripper and a new blanking punch and blanking such mounting plate.

The high degree of new manufacture of die set elements required to changeover in the prior art is a consequence of the permanent location of ejector pins and the inflexible means of providing support beneath the blanking punch mounting plate. The permanent location of ejector pins in the prior art prevents flexible placement of the pins to accommodate various size and shaped parts. The inflexible means of supporting the blanking punch mounting plate is characterized in the prior art by elongated rectangular support bars or parallels beneath the blanking punch mounting plate. The parallels can not be adequately moved or placed to provide the articulate support necessary at critical points to accommodate each irregularly shaped part that must be run. Consequently, changeover, in the prior art has included manufacture of a new pierce-punch backup plate and a new pierce-punch mounting place with new ejector pin locations. Also a new blanking punch mounting plate is often required because of the lack of sensitivity in the support bars or parallels.

Prior art devices have also lacked an efficient means of sensing material advance to prevent press actuation in the event that material is not properly advanced into the blanking punch and blanking die area.

Prior art die sets are summarized and explained in a book entitled Techniques of Pressworking Sheet Metal An Engineering Approach to Die Design by Donald F. Eary and Edward A. Reed published by Prentice-Hall, Inc., Englewood Cliffs, N. J.

SUMMARY OF THE INVENTION

The invention comprises an improved die set characterized by the following conventional elements: a die shoe, a punch shoe, guide pins extending vertically between the punch shoe and the die shoe, a knockout plate, a pierce-punch backup plate, a pierce-punch mounting plate, a punch, a stripper punch, a blanking die, material guide means, a material stripper, a blanking punch and a blanking punch mounting plate. The improvement relates primarily to providing for convenient changeover to stamp parts of different sizes and shapes and is made possible by a plurality of movable support pillars which are located in a support pillar cavity beneath the blanking punch mounting plate. The die set of the present invention is also improved in the provision of means characterized by a plurality of space d openings in the punch backup plate for selectively locating the ejector pins in the punch backup plate. The ejector pins are selectively placed in the openings and extend from the knockout plate through the punch backup plate and punch mounting plate into engagement with the stripper plate. The invention also includes an improved means for sensing advance (or lack thereof) of material, which comprises an L-shaped sensor mounted in the support pillar cavity for pivotal movement about a horizontal axis and a vertical axis. The sensor extends transversely through the blanking punch mounting plate in proximity with the blanking punch to a point above the face thereof and substantially horizontally in the support pillar cavity to emerge therefrom. Switching means is provided sensitive to the pivotal movement of the sensor about the vertical axis and prevents actuation of the punch press in the event that the sensor is not so moved. Resilient means pivots one end of the sensor about the horizontal axis into a position above the face of the blanking die and pivots the other end of the sensor about a vertical axis out of engagement with the switching means.

The present invention solves the problems in the prior art referred to above in that changeover to accommodate various sizes and configurations of parts is greatly simplified. The flexibility and location of ejector pins and support pillars eliminates the need to provide a new punch backup plate, pierce-punch mounting plate and stripper plate in most instances of changeover. In addition the blanking punch mounting plate can be used except in the case of a large change in part size and/or shape. Thus, with the present invention only a new blanking die and material guides, blanking punch, and pierce punch and mounting must be manufactured to run a different sized and/or shaped part. This greatly reduces downtime on the punch press and greatly reduces the material and labor cost in changeover.

The primary object of the present invention is to provide a die set which can be conveniently changed to produce different size and shaped parts.

It is also an object to provide a die set in which a plurality of support pillars may be variably placed beneath the blanking punch mounting plate to thereby provide articulate support at critical points to accommodate a wide variety of part sizes and configurations.

It is also an object to provide a die set having a series of openings in the pierce punch backup plate for selective placement of the ejector pins to thereby accommodate a wide variety of part sizes and configurations.

It is also an object to provide means for sensing the advance or lack of advance of the material ribbon to prevent actuation of the punch press in the event that the material ribbon is not properly advanced.

DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective vie w of a portion of a punch press having the Universal Die Set, which comprises the present invention, mounted therein. FIG. 1 shows the upper die set elements and lower die set elements and the air ejection manifold and tubing.

FIG. 2 is an exploded perspective view of the present invention and includes the elements below (and not including) the punch shoe to (and including) the die shoe. More particularly, FIG. 2 shows the pierce-punch backup plate, the pierce-punch mounting plate, the stripper plate, the blanking die sandwich, the blanking punch and mounting plate, the blanking set mounting bars, the support pillar backup plate, and the die shoe.

FIG. 3 is a front view of a portion of a punch press (ram and knockout plate to press bed) and shows the Universal Die Set which comprises the present invention mounted therein, with certain parts cut away. In FIG. 3 the elements are shown in the open position, or at the beginning of the pierce and blank stroke.

FIG. 4 is a front view of a portion of a punch press having the present invention mounted therein and corresponds to the view of FIG. 3. In FIG. 4 the elements are in the closed position, or at the end of the pierce and blank stroke immediately prior to beginning the return stroke to the open position shown in FIG. 3.

FIG. 5 is a top view of the support pillar cavity and shows the support pillars, the support pillar backup plate, the blanking set mounting bars, the L-shaped sensor, and its associated switching means.

FIG. 6 is a bottom view of the pierce-punch backup plate and shows the pierce-punch mounting plate bolts, stripper plate mounting bolts, and ejector pin openings with certain of the openings plugged.

FIG. 7 is a partial sectional view taken on the line 7—7 of FIG. 6 and shows the ejector pin holes and an ejector hole plug and ejector pin. It should be noted that the upper surface of the pierce-punch backup plate is at the bottom as viewed in FIG. 7, and the bottom of the pierce-punch backup plate is shown at the top of FIG. 7.

FIG. 8 is a bottom view of the blanking die sandwich showing the material stripper with a portion broken away, the material guides, and the blanking die. FIG. 8 also shows the guide pin openings, the joining bolts in the blanking die sandwich, the blanking die opening, and the sensor port. The material ribbon is fed between the material guides and between the material stripper and blanking die from the right to the left as viewed in FIG. 8.

FIG. 9 is a perspective view of a portion of the stock or material ribbon showing a typical part blanked and pierced from the ribbon by the die configuration shown in the present invention. Both a scrap portion and an unstamped portion of the material ribbon are shown. The material ribbon is fed from the right to the left as viewed in FIG. 9.

DESCRIPTION OF PREFERRED EMBODIMENT

The general nature of the present invention may be readily understood by reference primarily to FIGS. 1 and 3. In FIG. 1 the Universal Die Set 10 which comprises the present invention is shown mounted in a partially shown conventional punch press. The Universal Die Set 10 is mounted between ram 11 and bolster plate 12 of the punch press and includes a group of upper die set elements 13 and a group of lower die set elements 14.

The punch press shown in FIGS. 1 and 3 is of conventional design and includes frame 16, knockout bar 17, knockout post 18, knockout post collar 19, knockout spring 20, knockout plate 21 threaded to knockout post 18 and a series of guide pins 27. The punch press also includes a press bed 28 beneath bolster plate 12. An air ejection manifold 29 serves to mount pressure line 30 and four valves 31 which control air passage through copper tubes 32. Tubing 32 directs air to the area between upper die set elements 13 and lower die set elements 14 to eject the finished part rearwardly to chute 33.

The upper die set elements 13 include punch shoe 35, knockout rail 36, pierce-punch backup plate 37, pierce-punch mounting plate 38, and stripper plate 39. Pierce-punch backup plate 37 is mounted to knockout rail 36 by means of bolts 41 best seen in FIG. 2. The stripper plate 39 is mounted to pierce-punch backup plate 37 by means of stripper bolts 42 which pass through pierce-punch mounting plate 38 and thread into pierce-punch backup plate 37. Pierce-punch mounting plate 38 is consequently mounted in contact with pierce-punch backup plate 37, while stripper plate 39 is movable from a position in contact with pierce-punch mounting plate 38 to a position spaced therefrom as shown in FIG. 1. A series of knockout or ejector pins 45 is located between knockout plate 21 and stripper plate 39 and pass through pierce-punch backup plate 37 and pierce-punch mounting plate 38. Pierce punches 46 are mounted to pierce-punch mounting plate 38 in registration with pierce-punch openings 47 in stripper plate 39.

The lower die set elements 14 include blanking die 50, material guides 51, material stripper 52, blanking punch mounting plate 53, keepers 54, blanking set mounting bars 55, support pillar backup plates 56 and die shoe 57.

Punch shoe 35, an upper die set element, and die shoe 57, a lower die set element, are mounted on guide pins 60 which are permanently secured to die shoe 57 and slideably mounted in collars 61 of punch shoe 35.

The material ribbon M, shown in FIG. 9 is fed from the right to the left through die set 10 as viewed in FIG. 1. Material ribbon, M, is fed beneath blanking die 50 above material stripper 52 between material guides 51 which parts, P, are pierced and blanked therefrom. Parts, P, are blanked from material ribbon, M, by blanking die 50 and blanking punch 58 (see FIG. 2) and pierced by pierce punches 46. The blanked and pierced part, P, is then lifted on pierce punches 46 and then stripped by the operation of ejector pins 45 and material stripper 39 to fall into the path of air from tubes 32. Air pressure from the tubes 32 ejects the finished part to chute 33.

With the foregoing general description of the design and operation of the present invention the following detailed description may be conveniently understood.

As indicated above, upper die set elements 13 include the plate layers form punch shoe 35 to and including stripper plate 39. The detailed construction of these elements can be best understood with reference to FIGS. 2, 3, 6 and 7. With reference to FIG. 2, pierce-punch backup plate 37 is provided with three punch holder bolt holes 65 on each side. Holes 65 accept punch holder bolts 41 which pass through pierce-punch backup plate 37 and are threaded into pierce-punch mounting plate 38 at threaded holes 66. Pierce-punch backup plate 37 is also provided with stripper bolt holes 37 (three at each corner). Only one stripper bolt hole 67 is used at each corner in the embodiment shown. Stripper bolts 42 pass through stripper bolt holes 67 in pierce-punch backup plate 37, through stripper bolt holes 68 in pierce-punch mounting plate 38 and are threaded into holes 70 in stripper plate 39, as best seen in FIG. 2. A series of knockout or ejector pin holes 71 is provided in pierce-punch backup plate 37 and corresponding ejector pin holes 72 are provided in pierce-punch mounting plate 38. Two of the knockout pin holes 72 on each side of pierce-punch mounting plate 38 consist of arcuate notches only. Knockout or ejector pins 45 abut knockout plate 21 at their upper end, pass through pierce-punch backup plate 37 and pierce-punch mounting plate 38, and abut stripper plate 39 at their lower end, as best seen in FIG. 3. Ejector pins 45 are placed as desired in ejector pin holes 71 and 72 to provide knockout force against stripper plate 39 at desired points with reference to the size and configuration of the part being run. Thus, the ejector pin location can be adapted to a change in part size and/or configuration with a minimum of effort.

Two guide pins 74 are threaded into and protrude downwardly from pierce-punch mounting plate 38 and two guide pin holes 75 are provided in stripper plate 39 in registration with guide pins 74. Two additional locator or guide pin holes 76 are provided in stripper plate 39 to register with locator pins (described below) in lower die set 14. Pierce-punch mounting plate 38 also includes oil seal break pin opening 77 which is located to register with oil seal break pin 78 threaded into stripper plate 39, best seen in FIG. 3. Pierce punches 46 extend downwardly from pierce-punch mounting plate 38 and two pierce-punch holes 79 are provided in stripper plate 39 in registration with pierce punches 46.

As shown in FIG. 7, if desired, certain ejector pin holes 71 of pierce-punch backup plate 37 may be plugged when not needed for use in mounting ejector pins 45. More particularly,

plug 80 may be threaded into certain ejector pin holes 71 while ejector pins 45 may be placed in others, as shown in FIG. 7.

The lower die set elements 14, as indicated above, extend from blanking die 50 downwardly to and including die shoe 57, and are best seen with reference to FIGS. 2, 3 and 8. Blanking die 50 includes blanking punch opening 82 which defines the shape of part P and corresponds in size and configuration to blanking punch 58. Material guides 51 and material stripper 52 are secured to blanking die 50 by bolts 83, best seen in FIG. 8. Material stripper 52 is provided with elongated sensor opening 84 which is located in proximity to blanking die opening 82, as shown in FIG. 8, for a purpose described below. Two guide pin openings 85 extend through blanking die 50, material guide 51 and material stripper 52 in registration with guide or locator pins 86 which are threaded into and extend upwardly from blanking punch mounting plate 53.

As best seen in FIG. 2, blanking punch mounting plate 53 serves to mount blanking punch 58 which is provided with two pierce-punch openings 87 which register with pierce punches 46. Blanking punch mounting plate 53 also includes an elongated sensor opening 88 and an elongated opening probe 89, which are both explained in greater detail below. Two guide pin openings 90 are provided in blanking punch mounting plate 53 in registration with guide pins 75 of pierce-punch mounting plate 38. A series of cushion pin openings 92 in blanking punch mounting plate 53 accept cushion pins 93, as shown in FIG. 3.

Blanking die 50, with its associated material guides and material stripper, along with blanking punch mounting plate 53, is mounted to blanking set mounting bars 55 by means of keepers 54. As best seen in FIG. 3, keeper bolts 95 extend through keepers 54 and, when tightened, secure blanking die 50 in contact with cushion pins 93 by means of blanking die shoulder ro flange 96, and blanking punch mounting plate 53 in engagement with blanking set mounting bars 55 by means of shoulder or flange 97.

Blanking set mounting bars 55 have a thickness substantially greater than the thickness of support pillar backup plate 56 and are mounted to die shoe 57 by means of bolts 99. Grooves 100 in blanking set mounting bars 55 serve to accept the head of keeper bolt 95 and prevent rotation, and withdrawal therefrom in a vertical direction. Together with blanking punch mounting plate 53 and support pillar backup plate 56, blanking set mounting bars 55 define support pillar cavity 101, best seen in FIG. 3. Support pillar backup plate 56, the lower surface of support pillar cavity 101, is mounted to die set 57 by means of support pillar backup plate mounting bolts 102, best seen in FIG. 2. A series of support pillar openings 103 is provided in support pillar backup plate 56 to provide means for securing support pillars 105 against lateral movement and to provide for the selective location thereof. Thus, support pillars 105 may be selectively placed at desired points beneath blanking die mounting plate 53 to provide articulate support at critical points depending upon the size and configuration of part being run.

Support pillars 105 may have a diameter of five-sixteenth to 1 inch and, as best seen in FIG. 2, include a smaller neck portion 106 which is chosen to fit support pillar openings 103. Support pillars 105 may therefore be selectively placed in support pillar backup plate 56 to provide support of blanking punch mounting plate 53 at critical pints, with neck portion 106 inserted into openings 103.

L-shaped sensor 110, best seen in FIGS. 2 and 5, is mounted in support pillar cavity 101 on mounting bracket 111 for pivotal movement about a horizontal axis and a vertical axis. Sensor 110 includes a vertical portion which extends upwardly through sensor opening 88 of blanking punch mounting plate 53 in proximity to blanking die 58, and through sensor opening 84 (See FIG. 8) of material stripper 51. Sensor 110 also includes a horizontal portion which extends to a point outside the periphery of support pillar cavity 101.

Sensor mounting bracket 111 includes a U-shaped element 112 which accepts pin 113 which extends through sensor 110 to define the horizontal pivot axis thereof. A second pin (not shown) extends downwardly through U-shaped bracket 112 into mounting block 114 to define the vertical pivot axis of L-shaped sensor 110. Support pillar backup plate 56 is provided with a maze of grooves 115 to provide for selective location of mounting bracket 111 and, as a result, the vertical and horizontal pivot axes of L-shaped sensor 110. Probe 116, mounted to sensor 110, extends upwardly through probe opening 89 of blanking punch mounting plate 53. Probe 116 may be selectively located on L-shaped sensor 110 to register with probe opening 89 to sensor mounting bracket 111 is moved in mounting grooves 115 to accommodate various sizes and/or shaped parts.

Switching means 120, which may be of conventional design, is mounted to support pillar backup plate 56 in operative association with L-shaped sensor 110 to control actuation of the punch press as described in more detail below. Switching means 120 is controlled by the action of sensor 110 in engagement with button 121. Spring 122 serves as resilient means for pivoting one end of sensor 110 about its horizontal axis into a position above the face of blanking die 58, and for pivoting the other end of sensor 110 about its vertical axis out of actuating engagement with button 121 of switching means 120. For this purpose spring 122 extends from sensor 110 downwardly and to the left, as viewed in FIG. 2, and is secured to pin 123. As described in detail below sensor 110 serves as means for sensing the advance of material ribbon, M, and prevents actuation of the punch press, through switching means 120, in the event that material, M, is not properly advanced.

Die shoe 57 is provided with blanking set mounting bar guide pins 125, best seen in FIG. 2. Guide pins 125 serve to accurately locate blanking set mounting bars 55. Die shoe 57 also includes cushion pin openings 129 which accept cushion pins 93 and communicate with air cushion chamber 130 for a purpose described in greater detail below.

The Universal Die Set described above is intended for use in a punch press having a 30- to 150-ton capacity. Depending upon the strokes per minute of the punch press, 4,000 to 6,500 parts per hour may be run. Approximately 10 to 50 pounds per square inch of air pressure may be used in air chamber 130 to act against cushion pints 93. While the die set shown and described above is intended for parts from one-fourth inch by one-fourth inch to 6 inches by 6 inches, larger parts in the range of 11 inches by 11 inches can be run with a larger die set made according to the present invention. Switch 120 may be the conventional type sold under the trademark MICROSWITCH. The majority of parts including pierce-punch mounting plate 38, blanking punch mounting plate 53, support pillars 105 and support pillar backup plate 56 are formed from oil-hardened tool steel. Blanking die 50, however, is preferably formed of an alloy steel as distinguished from oil hardened tool steel, which is but a fraction of the cost of oil hardened tool steel. In addition to being made from alloy steel, blanking die 50 may be made with a thickness of five-sixteenths inch which speeds up die making considerably as compared to the use of thicker steel material in conventional dies.

The operation of the present invention may be understood with reference primarily to FIGS. 1, 3 and 4. With reference first to FIG. 1, material ribbon, M, is fed by an operator from the right to left between blanking die 50 and material stripper 52, and between material guides 51. When the leading edge of material ribbon, M, contacts the upper end of the vertical portion of sensor 110, just above sensor opening 84 of material stripper 52, sensor 110 is caused to pivot about its vertical axis and actuate switching means 120. Actuation of switching means 120 begins the pierce and punch stroke of die set 10. With reference to FIG. 3, ram 11 begins its downward stroke and moves upper die set elements 13 toward lower die set elements 14. As stripper plate 39 approaches blanking die 50, locator pin openings 76 seat around locator pins 86 to insure proper registration between stripper plate 39 and blanking die

50. With stripper plate 39 contacts blanking die 50 further downward movement of ram 11 causes pierce-punch mounting plate 38 to move into contact with stripper plate 39 as stripper bolts 42 ride upwardly in pierce-punch backup plate 37. Simultaneously, pierce punches 46 move downwardly through pierce-punch openings 79 of stripper plate 39 in to engagement with material ribbon, M. Two holes are punched in material ribbon, M, and continued downward movement of ram 11 causes blanking die 50 to move downwardly past blanking punch 58 as cushion pins 93 are forced downwardly against the air pressure in air chamber 130. As blanking die 50 passes blanking punch 58, material ribbon, M, is cut or sheared to blank-out part, P. Material stripper 52, in the area directly above probe opening 89, contacts the upper end of probe 116. Sensor 110 is therefore pushed downwardly out of the path of material ribbon, M, to allow advance thereof by the operator. The upper end of sensor 110 obviously moves downward a greater distance than the downward movement of probe 16 due to its greater distance from the horizontal pivot axis. As ram 11 begins its return or upward stroke cushion pins 93 raise blanking die 50 above blanking punch 58 as a result of air pressure in chamber 130. On the return stroke part, P, is held on pierce punches 46 and lifted upwardly through blanking die opening 82. As ram 11 approaches the end of its upward stroke, ejector or knockout pins 45 are held in a raised position above pierce-punch backup plate 37 in contact with knockout plate 21 due to stripper plate 39 being in contact with mounting plate 38. As ram 11 continues to retract, knockout post 18 contacts stationary knockout bar 17 which forces knockout plate 21 downwardly on guide pins 27 to thereby push ejector pins 45 downwardly with respect to pierce-punch backup plate 37. Thus, stripper plate 39 is pushed downwardly with respect to pierce-punch mounting plate 38 by ejector pins 45 to push part, P, downwardly off of pierce punches 46. Oil seal break pin 78 serves to prevent complete surface contact between part, P, and stripper plate 39. Part, P, is therefore caused to fall downwardly into the stream of air directed between upper die set 13 and lower die set 14 by means of pressure line 30, values 31 and tubing 32. This airstream blows part, P, rearwardly into chute 33 where it is collected.

In the event that material ribbon, M, is not properly fed to contact and pivot sensor, 110 about is vertical axis, switching means 120 is not actuated and thereby prevents actuation of the punch press. Thus, considerable time and money can be saved by avoiding punch press actuation when material ribbon, M, is not properly advanced beneath blanking die 50. Operation of the punch press without proper material advance results in part fragments and may completely destroy blanking die 50 and require the installation of a new one at considerable loss of time and money.

In the event that changeover is desired, to run a different size and/or shaped part, support pillars 105 may be placed at different positions in support pillar cavity 101 or backup plate 56, and ejector pins 45 can be rearranged to provide proper support of blanking punch mounting plate 53 nd properly directed ejection force against stripper plate 39.

Various changes may be made in the present invention without departing from its scope which is to be directed only by the attached claims.

I claim:

1. In a die set for blanking and piercing sheet material characterized by an upper rigid plate; a lower rigid plate; blanking means including a blanking die, a blanking punch, and a blanking punch mounting plate located between said upper and lower plates for cutting a part from said sheet material to thereby form a blank; piercing means including a pierce punch and a piercing punch mounting plate located between said upper and lower plates for piercing said blank; and means for guiding said material through said die set in registration with said blanking die, blanking punch, and piercing punch; the improvement comprising:

means for mounting said blanking punch mounting plate in spaced relationship above said lower rigid plate to thereby define a support pillar cavity, and

a plurality of moveable support pillars in said cavity supporting said blanking punch mounting plate.

2. The die set of claim 1 and a support pillar backup plate disposed in said cavity in engagement with said punch shoe, and means defined by said backup plate for releasably securing said support pillars against lateral movement.

3. The die set of claim 2 wherein said support pillars are substantially cylindrical.

4. The die set of claim 3 wherein said support pillars include a neck portion and said means for releasably securing said support pillars against lateral movement includes a series of randomly spaced openings defined by said backup plate for accepting said neck portion of said support pillars.

5. The die set of claim 1 and an L-shaped sensor mounted in said support pillar cavity for pivotal movement about a horizontal axis and a vertical axis, said sensor extending transversely through said blanking punch mounting plate in proximity with said blanking punch to a point above the face thereof and substantially horizontally in said support pillar cavity, switching means sensitive to pivotal movement of said sensor about said vertical axis and operatively associated therewith, and resilient means for pivoting one end of said sensor about said horizontal axis into a position above said blanking die face and for pivoting said other end of said sensor about said vertical axis out of actuating engagement with said switching means.

6. The die set of claim 5 and probe means mounted on said sensor intermediate the interior end and the horizontal axis thereof and extending transversely through said blanking punch mounting plate for contact by said material stripper to thereby pivot said sensor about said horizontal axis to lower said interior end from said point above said blanking punch face to allow feeding of stock material.

7. The die set of claim 2 wherein said support pillar cavity is defined by a pair of raised blanking set mounting bars mounted to said punch shoe on opposite sides of said support pillar backup plate, and said blanking punch mounting plate is mounted to said blanking set mounting bars to bridge said support pillar backup plate.

8. The die set of claim 7 wherein said blanking punch mounting plate is mounted to said blanking set mounting bars by means of removable flanged keepers threadably secured to said mounting bars.

9. The die set of claim 1 wherein said punch mounting plate and said stripper plate are removably mounted to said punch backup plate by means of bolts passing through said punch mounting plate and threaded into said stripper plate.

10. The die set of claim 1 wherein said punch backup plate defines a spaced of spaced openings and a plurality of ejector pins randomly placed in said openings and extending from said knockout plate, through said punch backup plate and said punch mounting plate, and into engagement with said stripper plate.