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Waizmann et al.

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[45] **Aug. 14, 1973**

[54] **DIE APPARATUS FOR FINE BLANK STAMPING**

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[52] **U.S. Cl.** **83/685,** 83/700, 83/698

[51] **Int. Cl.** **B26f 1/14,** B26d 1/00

[58] **Field of Search** 83/698–700, 619, 684–691

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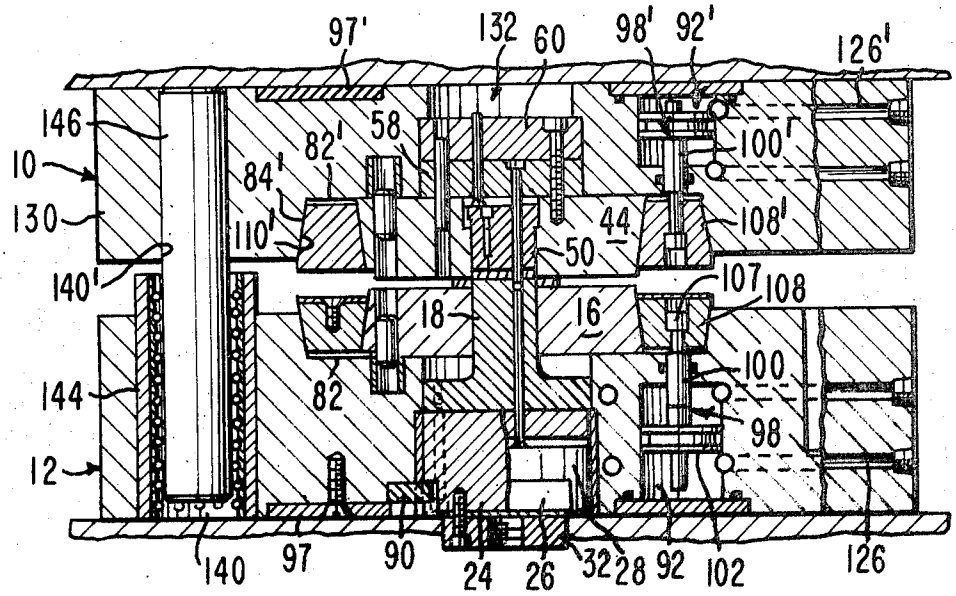
[57] **ABSTRACT**

Apparatus including a versatile die set particularly advantageous for fine blank stamping, featuring a quick functioning shroud ring for clamping and locating die components with extreme accuracy and precision guides.

21 Claims, 11 Drawing Figures



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2 Sheets-Sheet 1

FIG-1

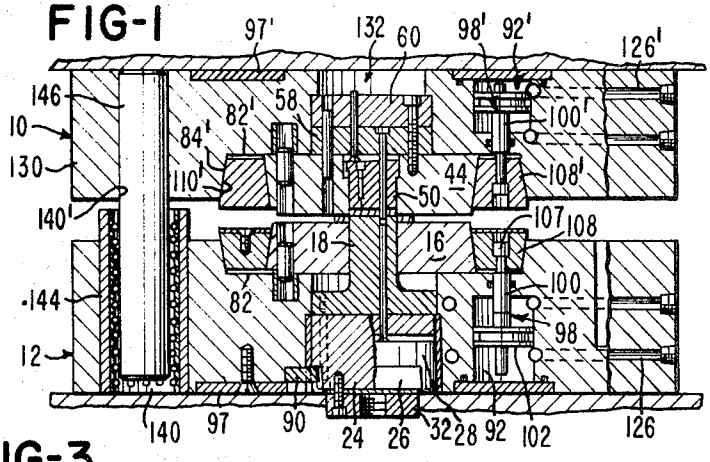


FIG-2

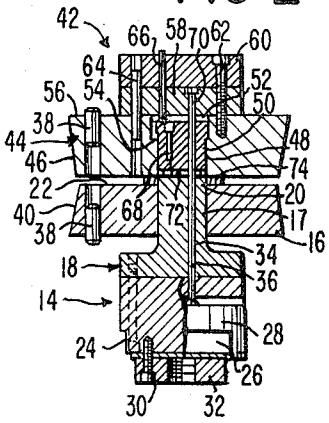


FIG-3

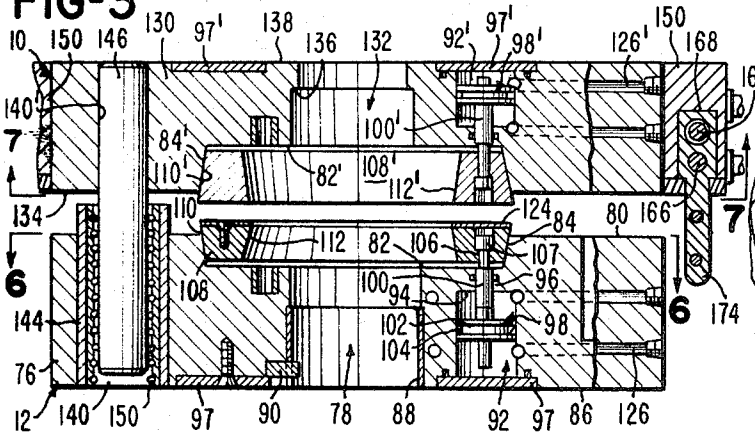


FIG-4

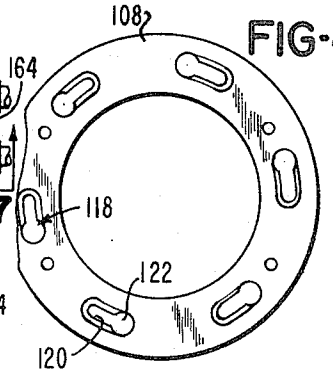
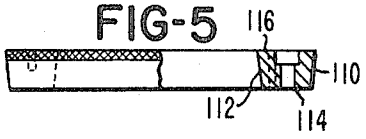


FIG-5



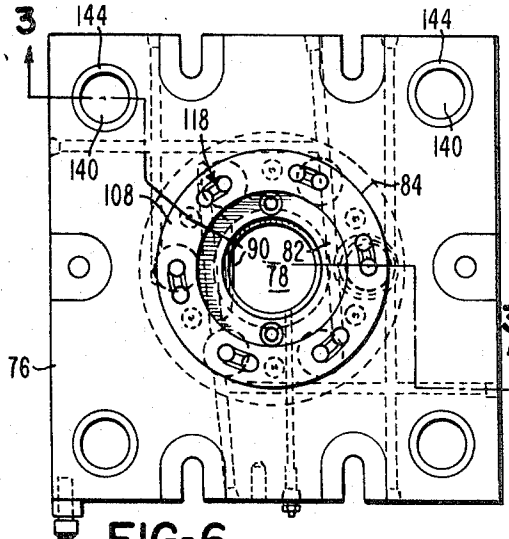


FIG-6

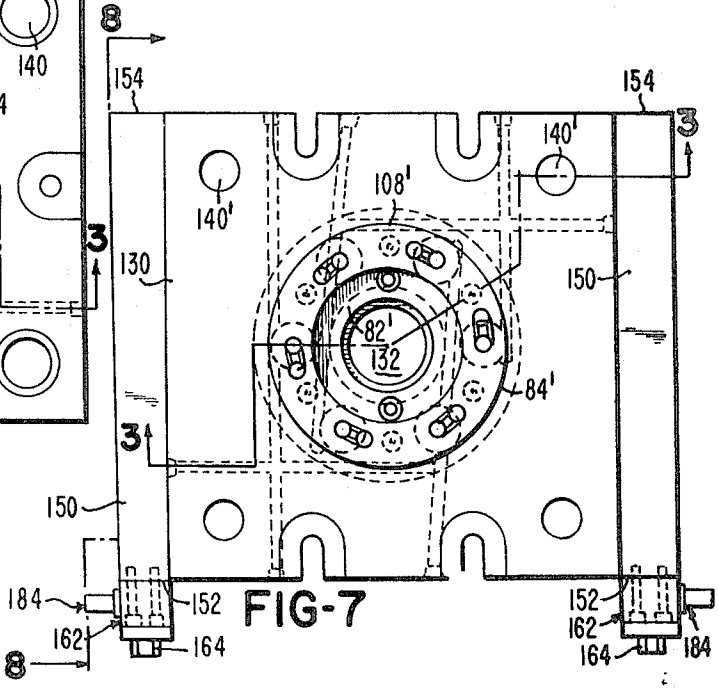


FIG-8

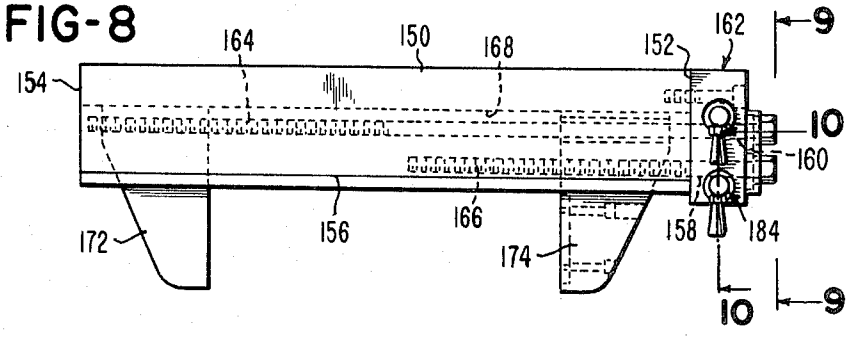


FIG-9

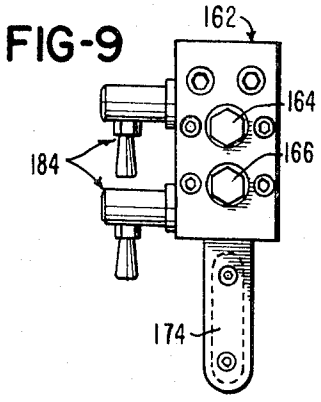
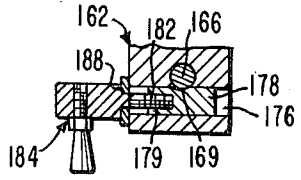


FIG-10



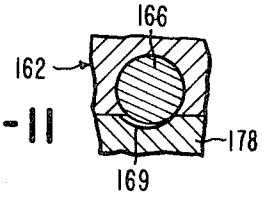


FIG-11

DIE APPARATUS FOR FINE BLANK STAMPING

BACKGROUND OF THE INVENTION

This invention relates to improvements in apparatus and procedures for fine blank stamping and more particularly to devices facilitating the necessary tooling and the maintenance and interchange thereof.

Fine blank stamping is a highly desirable method of producing parts for many articles. It minimizes handling and machining and provides better looking parts. However, it has had minimal application, particularly in the Western Hemisphere. This has been due to several factors including the following:

1. While fine blanking produces parts with relatively smooth cut edges in contrast to the broken jagged edges resulting in use of conventional stamping equipment and procedures, the necessary equipment and tooling therefor is quite costly and the same is highly specialized and limited in application.

2. The means normally employed for tool set up is that involved that it consumes a lot of time, effort and expense. For fine blanking, moreover, the cutting and forming tools in use must be sharpened quite frequently and each time this has heretofore required as much or more time and effort as that required for the original tool set up. As a matter of fact, tool maintenance for fine blanking is two to three times that of conventional stamping operations.

3. Heretofore there has been no means proposed which would facilitate the standardizing and simplifying of the tooling required for fine blanking.

4. An additional time loss and cost factor in conventional fine blanking has been due to the necessity of critical tool spacing and the adjustment of the closed press position on application of each and every tool. This involves several complete press cycles with shut height adjustments until proper penetration of all tools applied has been achieved.

The present invention is directed to overcoming the above mentioned problems which exists in the use of conventional fine blanking apparatus and procedures.

SUMMARY OF THE INVENTION

The present invention not only makes a more general acceptance and use of fine blank stamping feasible but it makes it most desirable for many applications. It provides a die set and method of mount thereof lending substantial versatility to available fine blank stamping machines, such as represented by the Osterwalder or Hydrel fine blanking presses. Its application enables, moreover, a substantial reduction in the cost of tool set up and change over in fine blanking operations.

Preferred invention embodiments feature unique locator means for included die components characterized by power actuated tapered locking shroud rings. Such rings can be quickly and easily applied to their control components and can be readily substituted to meet the needs of a particular installation. Preferred invention embodiments also feature highly utilitarian precision guide means for the materials being worked.

By use of the simple but effective apparatus provided by the invention there can be achieved a saving of as much as 40% in cost of tooling for fine blanking. Moreover; there can be a reduction in cost of production runs, depending on production volume, in a range from 10 to 50%.

Attention is directed to the fact that the invention apparatus and procedures are particularly applicable to the sliding punch type of tooling.

A primary object of the invention is to provide improvements in tooling for fine blanking rendering the same more economical to fabricate, more efficient and satisfactory in use, adaptable to a wide variety of application and unlikely to malfunction.

A further object of the invention is to provide an improved die set for fine blank stamping featuring quick and accurate positioning means for the die components, applied tools, and the materials being worked.

Another object of the invention is to provide improvements in die sets and their application to presses used for fine blank stamping facilitating the positioning of punch and/or die assemblies as units.

An additional object of the invention is to provide improvements in locator means for punch and die units particularly applicable to fine blank stamping facilitating their simple application and substitution.

A further object of the invention is to provide die sets and locator means therefor, and the materials worked thereby, particularly applicable to fine blank stamping presses and the like, possessing the advantageous structural features, the inherent meritorious characteristics and the means and mode of use herein described.

With the above and other incidental objects in view as will more fully appear in the specification the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing wherein is shown one but obviously not necessarily the only form of embodiment of the invention,

FIG. 1 is a fragmentary view, taken in cross section, illustrating the application of die sets and their locating means in accordance with the invention in a press applied to fine blank stamping;

FIG. 2 is a cross sectional view illustrating an operative association of the die sets per se of FIG. 1;

FIG. 3 is a cross sectional view illustrating the details of die set locating and clamping apparatus and material guide apparatus in accordance with the invention;

FIG. 4 is a plan view of a shroud ring featured by the invention, a cross section being shown in FIG. 5;

FIG. 6 is a view taken on line 6—6 of FIG. 3;

FIG. 7 is a view taken on line 7—7 of FIG. 3;

FIG. 8 is a view taken on line 8—8 of FIG. 7;

FIG. 9 is taken on line 9—9 of FIG. 8;

FIG. 10 is taken on line 10—10 of FIG. 8; and

FIG. 11 is a fragmentary detail of the invention structure.

Like parts are indicated by similar character of reference throughout the several views.

With particular reference to the illustrative but not limiting embodiments of the drawings, FIG. 2 thereof shows in detail a cross section of a typical die set in accordance with the present invention. As will be further described, the upper and lower halves of this die set are respectively applied to a die holder 10 and a punch holder 12, the latter of which are in turn secured to the backing plate surfaces afforded by the upper and lower operating elements of a press such as used in fine blank stamping operations.

It is to be understood that the elements of the invention embodiment as here disclosed are described with reference to their orientation shown in the drawings. Of course, the included tool elements may be appropriately provided in various manner to suit the particular application.

The lower half **14** of the punch and die assembly illustrated includes a stinger plate **16.** Bearing for reciprocation in a central aperture in the plate **16** is the shank **17** of a punch **18.** As shown, the operating end **20** of the punch is uppermost, being adapted to project through the upper material accommodating surface **22** of the stinger plate **16.** At its end remote from the plate surface **22** the punch **18** has an expanded body portion the head **24** of which includes a slot-like cavity **26** for a knock-out plate **28.** Secured to the head **24,** shown lowermost, by screws **30,** is a shank plate **32.** The latter is appropriately adapted to provide for connection of the punch operating component embodied in the fine blanking press to which the die set may be applied.

In the case illustrated the punch body includes a vertically orienting through passage **34** opening at one end to the cavity **26** and at its other end from the stinger plate surface **22.** The passage **34** accommodates an ejector pin **36** the one end of which bears, under the influence of gravity, on the upper edge of the knock-out plate **28** and the other or upper end of which is operable, under the influence of the knock-out plate, to serve a slug ejecting function.

Press fit in and projecting downwardly from suitably located apertures in the stinger plate **16** are dowel pins **38** which serve a locating function.

Particular attention is directed to the conically tapered peripheral surface **40** of the stinger plate **16.** As shown the surface **40** converges in an upward sense. The purpose of this will soon be obvious. The upper half **42** of the die set includes a die plate **44** the outer peripheral surface **46** of which is tapered similarly to the surface **40,** but in a reverse sense. Moreover, the plate **44** also has apertures accommodating projected dowel pins **38.** However, in this instance the pins project from and perpendicular to the surface of plate **44** remote from the stinger plate **16.**

The die plate **44** is provided with a central aperture **48** positioning in use, as shown in FIG. **2,** to align directly with the central aperture and the punch in the stinger plate **16.** Bearing in and on the wall defining the aperture **48,** is a shedder element **50.** The head or upper end of the shedder is expanded and lodged for movement within the limits of an expanded upper end portion **52** of the aperture **48.** This expansion of the upper end of the aperture **48** produces a shoulder **54** which limits the downward travel of the shedder in a manner believed obvious. The amount of shedder travel so provided is just sufficient to accommodate a part from the material being formed and to provide for its ejection from the die plate. Seated over the aperture **48** and in abutted relation to the uppermost surface **56** on the die plate **44** is a retainer plate **58** and superposed on the latter back up plate **60.** The plates **58** and **60** are jointly secured to the die plate **44** by socket head screws **62** and properly positioned in respect to the die plate by insertion of dowel pins **64** press fit in aligned openings thereof.

The shedder **50** is backed by an actuator pin **66** projected through and in bearing relation to the retainer plate **58** and back up plate **60.**

Merely for purposes of illustration in this instance, in the example of FIG. **2** the shedder **50** is shown to incorporate an oil seal breaking pin **68** and to have extendd therethrough in bearing relation thereto, a further punch **70,** the latter having its expanded head based in the retainer plate **58** and capped by the back up plate **60.**

As will be obvious, from the illustration of FIG. **2** showing a part **72** in process of being formed from sheet material **74,** the main punch **18** serves to determine the outline of the part while secondary punches such as **70** are operated to achieve required cut outs in the part. Of course, the number and character of the punches can be varied to suit the particular application.

FIG. **3** shows details of the holding and locating apparatus for the respective halves of the die set shown in FIG. **2.** The lower thereof, the punch holder **12,** comprises a relatively thick generally rectangular base plate **76,** which is suitably apertured for bolting and/or clamping to the arm portion of a fine blanking press. The plate **76** has a central aperture **78** substantially expanded by countersinking at its uppermost surface **80** to form inwardly thereof a circular recess the base of which is defined by a relatively wide annular shoulder **82.** The wall surface **84** which rims this recess is contoured to conically expand from the shoulder **82** to the plate surface **80.** The end of the aperture **78** which opens from the lowermost surface **86** of the plate **76** is slightly enlarged in diameter, by counterboring, to nest therein a thin sleeve type bushing **88** the inner diameter of which is slightly less than that of th immediately adjacent portion of aperture **78.**

As will be seen in FIG. **1,** the bushing **88** accommodates and provides a bearing surface for the periphery of the head end of the punch **18** and its reciprocating element (not shown). The latter of which, provided in connection with the ram in the associated press (not shown), is connected to the punch through the medium of the shank plate **32** in suitable manner well known to a mechanic in the art. The details of such connection are not per se necessary to an understanding of the present invention and are therefore not shown or further described.

The bushing **88,** as seen in FIG. **3,** is provided with a slot in its lower edge through which is thrust a key **90** anchoring in a mating recess in the punch head **24** to radially locate the punch assembly.

A series of cylindrically shaped recesses **92** are formed in the bottom surface **86** of the plate **76** on a circle concentric with its central aperture **78.** The uppermost or base surface **94** of each cylindrical recess **92** has formed therein a central aperture providing one end of a coaxial passage **96,** the other end of which opens from the shoulder **82.** At their lowermost open ends the recesses **92** are capped by an annular plate-like insert **97** which seats in nested relation in an accommodating recess in the plate surface **86.**

A piston unit **98** is housed in each cylindrical recess **92.** This unit includes a piston rod **100** mounting adjacent one end thereof an expanded plate like head **102** the periphery of which is circumferentially recessed to accommodate the inner peripheral portion of a projected resilient ring seal **104.** As will be seen from FIG. **3,** the periphery of the head **102** and the peripherally projected seal **104** will bear for movement on the surrounding recess wall. The seal **104** insures a division of the recess in which the piston unit is accommodated

into two chambers, one being defined between the piston head and the cap plate **98** and the other between the piston head and the base **94** of the pertaining recess. The piston rod **100** is shown to project upwardly through the passage **96** and to bear on the wall thereof and extend outwardly beyond the shoudler **82.** The extension of the rod **100,** shown uppermost in FIG. **3,** is reduced in diameter in the portion which projects upwardly immediately of the shoulder **82** and is thereby formed to include a necked portion **106** the upper projected extremity of which terminates in a relatively expanded disc shaped knob **107.** As will be further described, the upward and outwardly projected ends of the rods **100** mutually serve as a means for a quick release mounting of a shroud type locking ring **108.**

As seen in FIGS. **4** and **5,** the ring **108** has an annular form. Both its outer peripheral surface **110** and its inner peripheral surface **112** are formed as segments of a conical surface. The shape of the surfaces **110** and **112** is such to cause them to diverge upwardly and uniformly from a narrow base **114** of the ring **108** to its opposite surface **116** which is relatively expanded in a radial sense. It is noted that the surface **110** is formed on the same angle as the surface **84** and the surface **112** is formed on an angle ocmplementary to that of the stinger surface **40.** Formed in the ring **108,** of a uniform radius, is a circularly spaced series of arcuate slots **118,** opening from and perpendicular to the surfaces **114** and **116.** At the upper ends thereof, which open from the surface **116,** the slots are of uniform width in a radial sense. However, at a level spaced immediately below the surface **116** the major extent of the length of each slot is reduced in width by an inward projected wall segment forming a U-shaped shoulder **120** recessed immediately below the surface **116.** In this manner the slots **118** are so provided as to have the major extent thereof a width which in this instance is designed to accommodate a necked portion **106** of a piston rod **100** while one end **122** thereof is open sufficiently to accommodate the projection therethrough of the disc shaped knob **107** on the upper end of the applied rod.

As will be readily seen, the slots **118** provide a means whereby the shroud ring **108** may be readily applied, removed, and replaced. The ring may be positioned to dispose slot portions **122** in respective alignment with the heads **107** of the rods **100.** On positioning the ring thusly and on dropping the same over the knobs **107,** the ring may be freely applied to seat to the outer periphery of the shoulder **82.** Through the medium of a slight and quick rotation of the ring, the ring can then be releasably locked. The necked portions **106** of the rods move into the narrowed portions of the slots **118** and the knobs **107** wedge on the related shoulders **120.** In the example illustrated, the surface **116,** uppermost on the ring **106,** is capped by a suitably secured annular plate **124** of similar configuration. In the manner and with the construction described the ring **108** may be quickly connected for limited movement with the piston units **98,** to and from the shoulder **82** and the surrounding wall surface **84.**

As schematically illustrated in FIG. **3,** hydraulic lines **126** are suitably led to either side of each piston head **102,** the lines being incorporated in and forming part of a conventional hydraulic control system whereby on actuation of suitable conventional controls fluid may be moved to and from the chambers to either side of the heads in accordance with the need for selective projection and retraction of the piston rods in a manner and for purposes deemed obvious. As to the hydraulic control system, the details thereof are well within the skill of a mechanic versed in the hydraulic art and are therefore not further described.

FIG. **3** shows that the die holder unit **10** is almost identical in configuration and composition to the punch holder unit **12,** similarly embodying piston units **98'** identical with the units **98** and similarly functioning, though in a position inverted from that of the units **98** in the punch holder **12.** As shown, the die holder unit **10** comprises a relatively thick generally rectangular plate **130** essentially the same as the plate **76** except for the configuration of certain apertures therein. In further describing the die plate **130** and the related parts, where the elements are identical to those in the punch holder unit, the same numerals will be used but with a "prime" symbol.

The plate **130** has a central aperture **132** the end of which shown lowermost in FIG. **3** is expanded by a counter-sinking process to produce inwardly of the bottom plate surface **134** a recess defined by a shoulder **82'** rimmed by a peripheral wall **84'** conically convergent as the wall surface **84** but in a reverse sense. The convergence in this instance is directed upwardly to the base **82'.** The aperture **132** beyond the shoulder **82'** is stepped in diameter to provide its minimal diameter at its upper end, forming thereby, in spaced relation to the shoulder **82'** a further shoulder **136.** In the case of the plate **130** the cylindrical recesses **92'** accommodating the piston units **98'** are provided inwardly of its uppermost surface **138,** the open ends of the recesses being appropriately capped by an annular plate **97'** as described with reference to the punch holder.

Viewing FIGS. **6** and **7** of the drawings, it may be there seen that the plate **130** is provided with four rectangularly positioned apertures **140'** adapted to align with relatively larger apertures **140** formed in the plate **76.** The latter accommodate, the length thereof and projected upwardly therefrom, sleeve like bushings **144.** Projecting in the bushings **144** are guide posts **146** the uppermost ends of which are press fit or otherwise suitably fixed in the apertures **140'** in the plate **130.** As seen in FIG. **3,** bearing means **150** are provided between the sleeve **144** and the portions of the guide posts which move therein. Means are thus provided to correlate the relative and respective movement of the punch holder and the die holder. It will be also obvious from FIG. **3** that the projected ends of the piston rods **100'** are adapted to receive and releasably mount a locking ring **108'** in a manner as described with reference to the ring **108,** the rings being identical in configuration.

It will be obvious, looking to FIGS. **1, 2** and **3** of the drawings, that absent the ring **108'** the upper half of the die set shown in FIG. **2** may be inserted as a unit in the die holder. The die plate **44** thereof will seat on the inner peripheral portion of the shoulder **82',** the retainer plate **58** and the backup plate **60** nesting in the aperture **132** to have the latter abut the shoulder **136.** On application of the ring **108'** to the projected ends of the piston rods **100'** and retraction of the rods, the ring **108'** is pulled inwardly to the shoulder **82'** and the wall surface **84'** to contain and fix the position of the die plate, the retainer plate and the back up plate, and the contained operating parts in a manner believed clearly evident. The mating nature of surfaces **110'** and

84' insures smooth seating of the ring **108'** while the sloping surface **112'** will face, abut to and pull up on the complementary opposite facing peripheral surface **46** of the applied die plate for a centered and precise seating thereof.

Of course, the respective plates **130** and **76,** through the medium of slots and apertures indicated, are suitably secured to opposing plate portions in the fine blanking press to which they are applied in a conventional and obvious manner.

Thus, there is enabled, by the construction described, a simple and quick assembly of the die set to the punch and die holder units. Moreover, the machinery so provided in a fine blanking press can be quickly adjusted so that in operation of the punch and die unit supplied there will be sharp, clean and precise forming of parts. The illustration in FIG. **2,** as indicated previously, is merely by way of example and not to be constructed as limiting. The punches employed will depend upon the particular needs of a particular situation.

What is important is that the construction of the punch and die unit as here provided and the means for clamping the same is that simplified as to substantially reduce tooling requirements for fine blank stamping as well as to reduce the time in removing and replacing the respective halves of the die set and the applied tools, for whatever purpose required. It is believed clear that with the use of the invention concept the halves of the die sets may be assembled as units and simply inserted in their holding plates whereupon the clamping lock rings **108** and **108'** can be slip fit, turned and with a simple hydraulic actuation of the piston units **98** and **98'**, a firmly and precisely secured and the pertaining tool elements thereof will be precisely positioned. The invention lends itself to accommodating any variety of dimension of die or stinger plates, the locking rings being correspondingly dimensioned at their inner periphery. Moreover, in the use of a clamping device as described, of ring or other shape, the die and stinger plates may be standardized, it being required only that they be adapted to accommodate a number of tools at various positions thereof so to enable that the same plate may be utilized for various functions. Also, there may be a variety of interchangeable units made available which may be interchanged utilizing the same locking rings. In any event the whole lends itself to a highly versatile system for creating an expanded and economical usage of fine blank stamping procedures.

Effectively the invention has provided a unique approach to fine blank stamping in that it facilitates the use of a master die set for a given range of parts, requiring only essential standardized interchangeable components to produce a particular part. This taken together with the unique principle of using simply actuated tapered locking shroud rings to clamp and locate the die components enables the extreme accuracy in set up necessary for fine blank stamping. As mentioned previously, the unobvious but highly beneficial effect is that there results in the use of the invention for fine blank stamping a reduction of approximately 40% in the normally anticipated tooling costs. As to production costs, the savings enabled by the invention will vary in proportion to volume of created parts, the greatest advantages being associated in low volume part runs as the result of drastically reduced set up time enabled by the invention. Those versed in the art will readily comprehend this fact. This is extremely important in view of the substantial incidence of low volume part runs required for highly complicated mechanisms. The quick change capabilities enabled by the invention may be readily comprehended in that less than five minutes is normally required for set up. Economy thus achieved can reduce low volume production costs by as much as 50%. Where there is high volume production, the reduction in production costs is still significant since fine blanking requires tool maintenance at two to three times the rate of conventional stamping, each sharpening requiring a new set up. As to achieving more rapid shut height adjustments, the invention system enables standard tool height to be maintained within the tool, not the press. This enables a press adjustment in one closed press position, insuring complete stock penetration in the first press cycle.

Having set forth a primary aspect of the invention, attention is now directed to the improvements created by the direct addition to and integration with the die holder of simple but precision guide means for the material to be worked.

Guide means for the material being worked in the die set of the invention are in accordance with the invention fixedly attached to the material input side and the material output side of the die plate **130** forming part of the die holder **10.** In this respect reference is made to FIGS. **3, 7** and **8** of the drawings. As here seen, the stock guide units applied to the opposite sides of the plate **130,** which are identical, include an elongate generally rectangular body **150** of a length corresponding to the length of the side edge of the plate to which the same is to be secured. The body **150** includes parallel end faces **152** and **154** perpendicular to a planar bottom surface **156.** Fixed in abutted relation to the face **152** of the body **150** is a further rectangular body **162** which is relatively narrow in the sense of the length of the body **150** and forms a continuation thereof. Note in FIG. **8** that the body **162** has a portion which depends below the surface **156** fo the body **150.** The body **162** includes vertically spaced apertures **158** and **160.** Projected through aperture **160** is an elongate cylindrical screw **164** which extends through an aligned slot **168** formed inwardly of the bottom of the body **150,** the length thereof. Screw **164** has its head abutting a washer thereabout interposed between the head and the adjacent surface of the body **162.** Similarly a screw **166** is engaged through the aperture **158** in the body **162** to extend within the slot **168** spaced vertically below the screw **164.** The head of the screw **166** is disposed and spaced similarly from the body **162** by an appropriate washer type device affording a bearing surface.

Slots **168** opens at its bottom through the surface **156** of body **150** where its opening is reduced by parallel plate elements fixed to the surface **156.** The slot **168** accommodates the projection therein of the upper ends of jaw members **172** and **174.** The member **172** is at the end of the body remote from the surface **152** and at its upper innermost end has a threaded bore adapted to align with aperture **160** and have projected therethrough the operating extremity of the screw **164.** The jaw **174** has in the one case a threaded aperture adapted to align with aperture **158** and to receive therethrough, in threaded engagement therewith, the screw **166.** At its uppermost end the jaw **174** has a further aperture accommodating the projection there-

through of the screw **164**. The respective screws **164** and **166** are based in their respective accommodating apertures **160** and **158** so, that on rotation thereof, depending on the direction, the jaw **172** may be moved to and from the jaw **174**. Likewise, the jaw **174** can be caused to move to and from the jaw **172**.

It will be noted that the jaws **172** and **174** are so contained and their most adjacent faces are so shaped and positioned that such faces are precisely parallel in the areas which depend below the surface **156** of the body **150**. Suitable bearing inserts may be provided in the adjacent material guiding faces of the dependent portions of the jaws **172** and **174** in a manner believed obvious.

As seen in FIGS. **8, 9** and **10**, the body **162** has openings **176** from front to rear thereof respectively intersecting the aperture or passage therein constituting the aperture **160** on the one hand and the aperture **158** on the other. The one opening which is uppermost intersects the upper portion of the passage formed by the aperture **160** and the one lowermost intersects the lower portion of the passage formed by the aperture **158**. As seen in FIG. **10**, in this lowermost opening is positioned a pinlike element **178** having a cavity **169** defined by a recess in its surface portion which intersects the through pasage defined by the aperture **158**. In one end of the pin **178** is a counterbore forming a cylindrical recess **179** the wall of which is threaded to threadedly accommodate a screw extension **182** of a cylindrical body projecting outwardly of the aperture **162** and forming part of a control handle **184**. The body of the control handle of which the screw **182** forms an extension is relatively enlarged in diameter. This provides a shoulder **188** facing the outer face of the body **162** and there is a washer interposed between this shoulder and the face of the body **162** surrounding the opening **176**. The significant aspect of the cavity **169** transversely disposed in the outer surface of the pin **178** is that its base is arcuately formed and on a larger radius than that of the screw **166**, at the portion thereof which projects through the body **162**. On turning the handle **184** one way or the other, the same being fixed against longitudinal movement in appropriate manner, the connected screw will turn within the pin to move its cavity **169** in reference to the lower portion of the screw **166** which nests therein. As may be particularly seen in FIG. **11**, when one wishes to lock the screw in a particular position, one need only turn the control handle to move the pin into a position wherein one extremity of the cavity wall wedges against the screw **166**. By this means there is a simple and positive lock of the screw once it has been adjusted in an obvious manner to position the threadedly engaged jaw.

Of course, the upper control for locking the screw **164** is similarly formed and applied to an upper peripheral surface of the portion of the screw **164** which passes through the aligned opening of the upper passage or aperture in the body **162**.

From the foregoing, it will be seen that there is fixedly integrated to each of the respectively opposite input and output sides of the plate **180** a guide device affording a very simple construction wherein each dependent material guiding jaw may be precisely and individually positioned. Moreover, there is a very simple but effective expedient of locking a screw to prevent its rotation once the position of the jaws are established.

As may be seen, by the physical integration in the plate **130** of the dependent jaws **172** and **174** which may be precision oriented quickly and simply, one provides a means wherein material fed to and between the punch and die elements of the die set will be accurately and precisely guided. This enables optimal positioning of the material to be worked and a maximal usage of the material in creating the desired parts.

While the guide means may be independently employed in other areas, it is particularly significant when incorporated in the stationary plate **130** of the punch portion of the described die set. It enables that a complete and utilitarian unit may be achieved in a highly economical fashion. Moreover, the controls and manipulations provided enable those not versed in the art to readily handle the same. Of utmost importance, the stock guides are universal in application since they may function equally well with interchange of tooling. Changes in tooling do not necessitate specifically designed guides as normally required in each different fine blanking set up.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described our invention, we claim:

1. A die system, particularly advantageous for fine blank stamping, comprising a tool or die holder unit including a plate-like base, said base including a surface portion for application thereto of a tool or die plate, and means positioning peripherally of the applied tool or die plate arranged to releasably mount a device movable to and from a clamping relation to the tool or die plate to fix the same in a desired position on said base, said peripherally positioning means including reciprocable means, said device being relatively rotatively adjustable to utilize movement of said reciprocable means in one sense to apply a pressure seating said tool or die plate to said base.

2. A die system as in claim 1 characterized by said reciprocable means being arranged at spaced locations on said base.

3. Apparatus as in claim 2 characterized by said reciprocable means including rod-like elements which are arranged to be extensible and retractable in reference to said base, said rod-like elements having projected end portions providing means for the selective coupling thereto of the clamping device.

4. A die system as in claim 3 characterized in that said clamping device has a central opening and constitutes means for framing the applied tool or die plate, said clamping device having portions formed to be releasably engaged by said projected end portions of said

rod-like elements upon relative rotary adjustment of said device.

5. A die system, particularly advantageous for fine blank stamping, comprising a tool or die holder unit including a plate-like base, said base including a surface portion for application thereto of a tool or die plate, rod-like elements positioning peripherally of the applied tool or die plate at spaced locations on said base and arranged to releasably mount a device movable to and from a clamping relation to the tool or die plate to fix the same in a desired position on said base, said rod-like elements being arranged to be extensible and retractable in reference to said base and having projected end portions providing means for the selective coupling thereto of the clamping device, said clamping device having a central opening and constituting means for framing the applied tool or die plate, said clamping device and said projected end portions of said rod-like elements having means for interlock thereof by a rotating twist of one relative the other.

6. A die system as in claim 5 characterized by said clamping device having a ring form and a tool or die plate applied to said base surface having a circularly outlined periphery, and peripheral portions of each of said clamping device and said tool or die plate being complementary in configuration whereby, on retraction of said rod-like elements, said ring will firmly contain and center said tool or die plate.

7. A die system as in claim 6 characterized by said rod-like elements forming parts of piston means embodied in said base.

8. A die system as in claim 6 characterized by said surfaces of complementary configuration being sloped in opposite senses to provide for one to be contained by the other.

9. A die system as in claim 8 in which said base surface and said clamping device having surfaces adapting to mate in seating of said clamping device and said mating surface being sloped in the same sense.

10. A die system as in claim 9 characterized by said tool or die plate having in connection therewith cutting and/or shedder elements and the said being integrated to apply to said base as a unit whereupon said clamping device may be releasably connected to said rod-like elements and drawn thereby into a clamping, centering, relation to said unit.

11. A die system as in claim 1 characterized in that said clamping device has a continuous frame-like configuration and the tool or die plate applied to said base has an outer peripheral configuration complementary to the inner peripheral configuration of said clamping device, said configurations being formed so that, on draw down of one relative the other, said clamping device serves a centering function.

12. A die system as in claim 11 characterized by said base surface portion defining a recess the peripheral wall portion of which has an angular configuration and the outer periphery of said clamping device is similarly angular in configuration whereby on draw down of said clamping device a centering function is produced thereon.

13. A die system as in claim 12 wherein a die plate forms part of an integrated die unit including a tool holder, retainer and back up plate, and said base being formed for slip fit insert thereof whereupon the said clamping device may be releasably mounted to and positioned in a centering clamping relation to said die plate as applied to said base.

14. A die system as in claim 12 wherein a tool plate forms part of an integrated unit including tool elements and said base is formed for slip fit in said recess of the integrated unit, and said clamping device is formed to slip fit to said reciprocable means and to be moved thereby to a clamping relation to said tool plate.

15. In a die set including upper and lower holder halves, one of which serves as a tool holder and the other as a die holder, having work faces to dispose on opposite sides of work means fed therebetween, at least one of said holder halves having in its work face a circular insert cavity, insert means having a complementary circular periphery, said insert means being applicable in said cavity, reciprocable means having a sliding mount in said one holder half and movable in a fixed path therein, said reciprocable means and said insert means providing means for interlock thereof to utilize motion of said reciprocable means for fixing and centering said insert means in said cavity.

16. Apparatus as set forth in claim 15 characterized by said insert means including a tool or die plate.

17. Apparatus as set forth in claim 15 characterized in that said reciprocable means is fluid actuable.

18. Apparatus as set forth in claim 16 characterized by said tool or die plate being formed with a tapered peripheral edge portion and said portion of said insert means utilizing motion of said reciprocable means being complementary in configuration and arranged to clamp thereto.

19. Apparatus as set forth in claim 15 characterized by said insert means including plural elements each of which has a circular peripheral surface which bears upon the other to achieve an automatic centering of said insert means in the seating thereof in said cavity.

20. A die system according to claim 6 characterized by means on said rod-like elements utilizing an extending motion thereof to apply a lifting force to said ring.

21. In a die set including upper and lower halves having work faces to dispose on opposite sides of work means fed therebetween, at least one of said halves having in its work face a circular insert cavity, relatively rotatable insert means having a complementary circular configuration received in said cavity with freedom of axial withdrawing motion, means for locating said insert means in respect to said cavity in a rotary sense to position the same for lacking in respect to reciprocable means slidably mounted in connection with said one holder half and operable for releasably locking said insert means in said cavity against axial withdrawal.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,752,028 Dated August 14, 1973

Inventor(s) George H. Waizmann - Robert G. Cook, Sr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 4, line 3, "extendd" is amended to read -- extended --;

line 20, "arm" is amended to read -- ram --;

line 31, "th" is amended to read -- the --.

Col. 5, line 6, "shouldler" is amended to read -- shoulder --;

line 25, "ocmplementary" is amended to read -- complementary --;

line 26, "of" is amended to read -- on --;

Col. 7, line 18, "constructed" is amended to read -- construed --

Col. 8, line 40, "fo" is amended to read -- of --.

Col. 9, line 61, "180" is amended to read -- 130 --.

Claim 9, line 4, "surface" is amended to read -- surfaces --.

Claim 21, line 9 thereof, "lacking" is amended to read -- locking --.

Claim 10, line 3 "said" should read -- same --.

Signed and sealed this 30th day of April 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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