Dec. 19, 1950 A. R. HEDBERG 2,534,672

WORK SUPPORTING DEVICE

Filed July 14, 1945 2 Sheets-Sheet 1

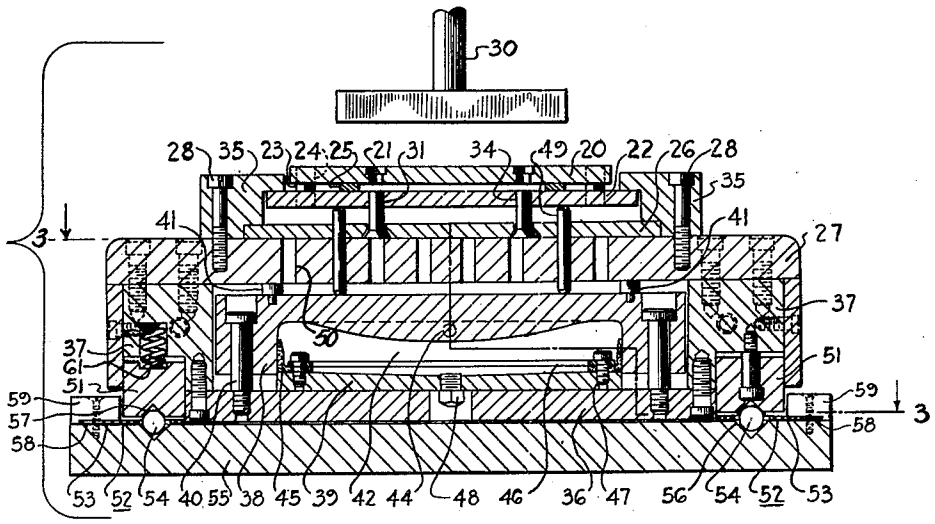


Fig. 1

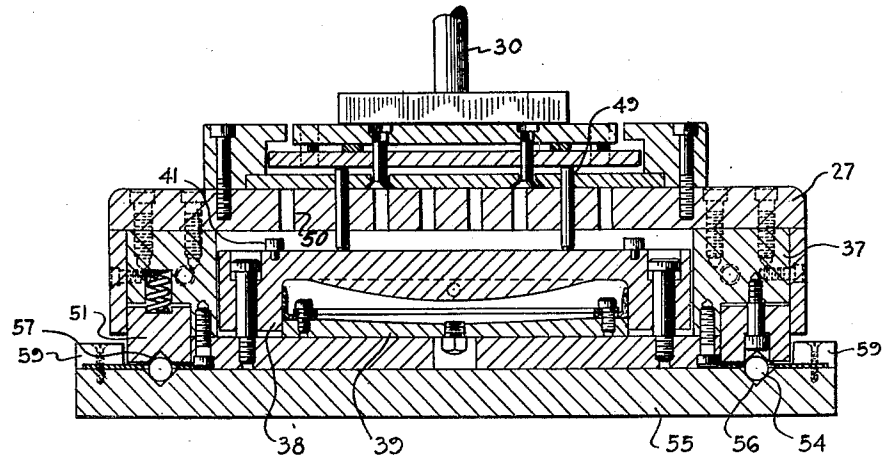


Fig. 2

INVENTOR.
Aldrich R. Hedberg
BY
Wendling and Trost,
Attorneys

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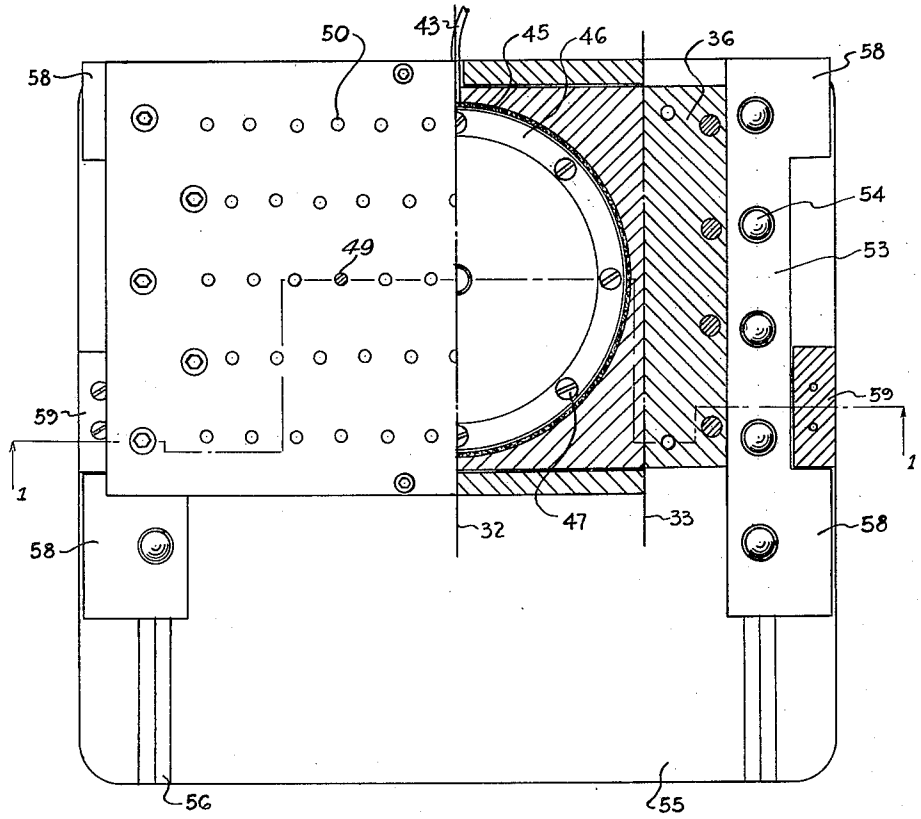


Fig. 3

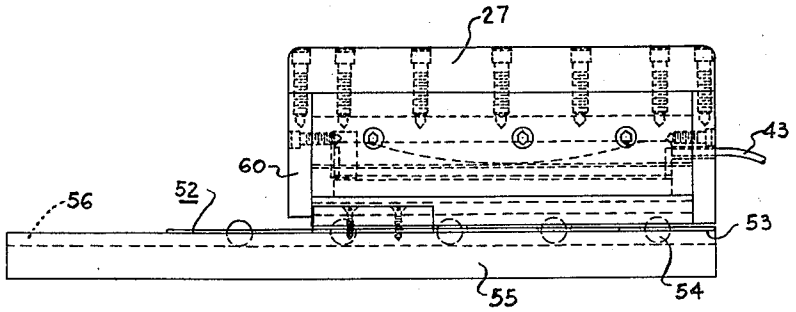


Fig. 4

INVENTOR.
Aldrich R. Hedberg
BY
Woodling and Krost,
Attorneys

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UNITED STATES PATENT OFFICE

2,534,672

WORK SUPPORTING DEVICE

Aldrich R. Hedberg, Cleveland, Ohio, assignor, by direct and mesne assignments, of one-half to Melvin E. Lorentz

Application July 14, 1945, Serial No. 605,105

7 Claims. (Cl. 164—110)

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My invention relates in general to mobile die assembly devices, and more particularly to a self-contained stripper actuating work support device.

An object of my invention is to provide a self-contained actuating device which is bodily shiftable to a first position removed from a machine, and to a second position in operating relationship with respect to the machine.

Another object of my invention is to provide a new and improved mobile stripping and work supporting device for moving a die unit under a press without introducing the hands of the operator into the danger area under the press platen.

Another object of my invention is the provision of a work supporting and actuating device having a work supporting plate that will permit force to be exerted therethrough from the actuating device to the work in any one of a multitude of possible paths or positions.

Another object of my invention is the provision of a work supporting actuating device for a machine capable of being withdrawn from the active area of the machine for ease of loading and safety of operation.

Another object of my invention is the provision of a mobile work supporting and stripping actuating device for a die assembly, in which a portion of the die assembly is adapted to be withdrawn from the press after each operation, wherein the stripping device remains always aligned with the dies when in place for operation and when removed therefrom.

Other objects and a fuller understanding of my invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings, in which:

Figure 1 is a cross-sectional view of my improved device as it appears in rest position taken along the line 1—1 of Figure 3, and is illustrated in use with a die assembly illustrated in cross-section through its centerline; the press platen being diagrammatical;

Figure 2 is a view similar to the Figure 1 showing the diagrammatical press platen in its downward position operating the assembly;

Figure 3 is a plan view of my device and a track bed therefor shown partially in section along the line 3—3 of Figure 1; and

Figure 4 is a side view of the device and a track bed therefor.

With reference to the Figure 1 of the drawings, I illustrate a device employing the principles of my invention as it may be used in con-

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junction with a die assembly described in my Patent No. 2,379,003 dated June 26, 1945. The die assembly is illustrated as comprising a die 20 with openings 21 therethrough. The reference character 22 indicates a stripper plate with openings 24 therein and with guide pins 23 fastened thereto, the guide pins 23 extending therefrom into openings 24 of the die 20. A workpiece which is to be punched or otherwise formed may be positioned between the die 20 and the stripper plate 22, and is then held against lateral movement by fitting into a nest 25 comprising a member which perimetrically surrounds the workpiece, the opposite sides of the nest 25 being shown in cross-section in the Figure 1 of the drawing. A base plate 26 is shown resting on a work supporting top plate 27 of my improved device. Piercing punches 31 are illustrated with this particular die assembly. The punches 31, in either case, are provided with a suitable engaging surface in order that they may be securely held against endwise movement during the operation of the die assembly. Clamps 35 are provided to hold the die assembly in the proper location upon the top 27, and may be provided with holding bolts 28 as illustrated, or may be held in any one of several well-known ways. Although I have illustrated this die assembly for the purpose of describing the operation of my improved movable work supporting and actuating device, neither the die assembly nor the improved work supporting and actuating device is dependent upon the other for utility. The die assembly may be used with other types of stripping devices, and the improved supporting and actuating device may be used for other forming and actuating purposes.

My invention embraces the conception of floatingly mounting a body upon a mobile carriage means in order to provide a fully self-contained work supporting and actuating means for use with a punch press or similar piece of machinery. The device, as illustrated, provides complete safety for the operator of the machinery, and facilitates the placing of work pieces in position for working and forming operations. The preferred form of my invention, as illustrated in the drawings, includes a pressure plate support base 36 and the top member 27 rigidly held and spaced from one another by means of blocks 37. Thus, a space is provided between the pressure plate base 36 and the work supporting top 27 in which an actuating force exerting means may be located. In the illustrated embodiment, the actuating force exerting means comprises a ram 38

which is in the form of a cylinder operatively mounted for endwise movement upon a ram base 39 which is in the form of a piston. The movement of the ram is guided by bolts 40, and the endwise movement is limited by means of limit stops 41. The ram and base provide an expansion chamber 42 which is supplied with a compressed fluid such as compressed air by means of a duct 43 entering the chamber 42 through an inlet 44. The expansion chamber 42 is sealed against leakage by means of a leather or other suitable packing 45 secured in place within the expansion chamber 42 and to the ram base 39 by means of a holder ring 46. Bolts 47 are used to secure the holder ring 46 tightly in place upon the ram base 39. The floor of the expansion chamber is provided by the ram base 39, and is preferably sloped somewhat towards the center and provided with a drain opening and plug 48. This drain and plug is provided to drain the expansion chamber 42 of any unwanted condensate, such as moisture precipitating from compressed air. Thus, it will be seen, compressed fluid may be supplied to the expansion chamber 42 through the inlet 44 to urge the ram 38 towards the work supporting top 27.

Force transmitting extension pins 49 are provided to transfer motive power from the ram 38 to the exterior of the device, and in the illustrations, are utilized in operating the die assembly as a stripping actuating means. However, as formerly pointed out, the power transferred thereby may be used for other purposes if desired. The top 27, as best illustrated in Figure 3, is perforated to provide a plurality of openings 50 therethrough in order to accommodate the extension pins 49 and therefore is referred to as the perforated plate of this supporting and actuating device. That is, the extension pins 49 are preferably unconnected to the ram 38 in order that they may be moved from place to place as best suited for the particular die assembly or other operating conditions under which they are to serve. Thus, one or more of the extension pins 49 may be used with any particular set-up, and they may be placed in any suitable opening of the plurality of openings 50. Great utility is thus accomplished by using the top member 27 provided with the plurality of openings 50. It is seldom found that a special top member 27 is required, because the plurality of openings 50 provide substantially an infinite variety of combinations through which the extension pins 49 may extend. Thus, much labor and a large stock of work supporting top plates is avoided.

Although the device as described may be used as a permanent fixture to stand in only one fixed position, I have found that the service and the utility of the device is greatly increased by placing it upon a mobile carriage means. In the preferred embodiment of this feature I employ runner blocks 51 at opposite sides of the body base. These runner blocks 51 are supported upon a ball carriage 52 comprising a ball plate 53 employing balls 54 therein. A track base 55 is provided with ball tracks 56, and the runner blocks 51 are provided with similar ball tracks 57. The balls 54 are interposed between the ball tracks 56 and 57, and are held in position and prevented from "walking" by means of the ball positioning plate 53. Thus, the runner blocks 51 may move upon the balls 54 upon the track base 55 to reciprocably carry the device and the die assembly under and away from the influence of a punch platen diagrammatically illustrated by the reference character 30. The ball plate 53 is in no way secured to the members of the body base or the runner block 51, but is constrained against accidental misplacement or excessive "walking" by the provision of cleats 58 and stop blocks 59, as best illustrated in the Figures 3 and 4. It will be seen from the illustrations, that the stop block 59 is so disposed that the device will be held against accidental overrunning of the track base by the provision of front and rear skirts 60 to contact the stop block 59. That is, if the device were moved an excessive distance forward or backward upon the track 55, either the front or back skirt 60 would strike the stop block 59 and thus prevent the device from moving further. Of course, as previously explained, the same stop block 59 prevents accidental misplacement of the ball carriage 52. To better illustrate this preferred embodiment of my invention, I have shown the Figure 3 half in plan and half in section for the Figure 1 with the die assembly removed. The first vertical portion of the line 3—3 is indicated in the Figure 3 by the reference numeral 32. The first vertical portion extends into the chamber 42. The second vertical section of the line is indicated by the reference numeral 33.

Although the device may be supported directly upon the runner blocks 51 as described, I have found that a firmer base and better operation may be provided by floatingly mounting the device upon the runner blocks 51. That is, I have found that providing springs 61 interposed between the spacer blocks 37 and the runner blocks 51 will permit the device to be seated upon the track base 55 during the interval of operation by the punch platen 30. The springs 61 will be compressed during the period of downward pressure and permit the pressure plate support base 35 to move down upon the track base 55 and provide the resisting support to the action of the platen 30. Thereafter, of course, the springs 61 will return the device to its former floating condition with the pressure plate positioned a distance away from the track base in order that the mobile carriage means may freely carry the device.

In operation, for use with the die assembly as illustrated, the work supporting actuating device may be rolled upon a punch press bed to position the die assembly under the press platen and to withdraw the die assembly therefrom. For example, the device may be pulled from under the platen 30 towards the operator to become accessible for loading and unloading the die assembly. That is when the device is pulled from under the platen 30, the die 20 may be removed and a work piece placed in position for operation within the nest part 25. The die 20 may then be replaced. Thereafter, the work supporting actuating device may be moved back under the press platen 30 and the platen 30 caused to move down upon the die assembly as illustrated in the Figure 2. The press may be either automatically or hand controlled as desired. Fluid pressure is supplied constantly to the chamber 42 as described, and therefore constantly urges the ram 38 upwardly to keep the die 20 off of the punches 31. When the platen 30 is moved downwardly as described, the fluid within the chamber 42 is compressed and strongly urges the force transmitting pins 49 and the die assembly against the action of the platen 30. After the platen 30 is moved to its upward position, as illustrated in the Figure 1, the fluid in the chamber 42 is then free to expand and push the ram 38 and the pins 49 up-

wardly to strip the punches 31 off of the work piece positioned between the die 20 and the stripper plate 22. Thereafter, the mobile work supporting actuating device and the die assembly may be withdrawn from under the platen 39 and the described cycle may then be repeated.

Although I have described my invention with a certain degree of particularity in its preferred form, and it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A work supporting device, comprising in combination, a pressure plate, force exerting means mounted on said pressure plate, a perforated plate mounted a distance above said pressure plate, said force exerting means exerting a force in the direction of said perforated plate, and force transmission means extending from said force exerting means through said perforated plate to transmit force therethrough, mobile carriage means to carry said device relative to said work base, said mobile carriage means including runner block means having a ball race therein, said work base comprising a track base to carry said carriage means, said track base having a ball race therein, a plurality of balls positioned between said runner block means and said track base in said ball races, a ball positioning plate having a plurality of spaced openings therethrough, said plate being positioned between said runner block means and said track base with said balls positioned in said plate openings, and resilient mounting means positioned to support said device on the runner block means and to urge said device and the block means a distance apart, whereby said mobile carriage means is free to carry the device relative to the base, said resilient mounting means being compressible to permit said pressure plate to move toward and rest upon said base.

2. A work supporting device adapted to be mounted upon a base, said work supporting device comprising, in combination, a body including a perforated plate and a pressure plate, spacer blocks securing said perforated plate and said pressure plate as a unit and spacing said perforated plate and said pressure plate apart, mobile carriage means to carry said body upon said base, force exerting means carried by said pressure plate to exert a force in the direction of said perforated plate, force transmission means extending from said force exerting means through said perforated plate to the exterior of said movable work supporting device, and resilient means supporting said body on said mobile carriage means with the said body pressure plate held away from said base, whereby said mobile carriage means is free to carry the device relative to the base, said resilient means being compressible to permit said pressure plate to move toward and rest upon said base and support the work, said device being immobile when said pressure plate is resting on the base, and said resilient means urging said pressure plate away from said base while the said pressure plate is seated upon said base.

3. A work supporting device adapted for support upon a work base, comprising in combination, a pressure plate, force exerting means mounted on said pressure plate, a perforated plate mounted a distance above said pressure plate, said force exerting means exerting a force in the direction of said perforated plate, and force transmission means extending from said force exerting means through said perforated plate to transmit force therethrough, mobile carriage means to carry said device relative to said work base, and resilient means to urge said pressure plate away from said work base, whereby said mobile carriage means is free to carry the device relative to the work base, said resilient means being compressible to permit said pressure plate to move toward and rest upon said base and support the work, said device being immobile when said pressure plate is resting on the base.

4. In a die assembly for use in a press, including dies to hold a work piece therebetween, a base plate and punch means having means therebetween to oppose axial movement of the punch means, one of said dies serving as a punch guide and the other of said dies providing forming surfaces in combination with said punch means, the said dies being disposed to reciprocally move as a unit upon the punch means under the action of the press, the provision of an improved stripping actuating means, comprising a mobile work supporting actuating device, a carriage means to carry said device, a track base, said carriage means being movable upon said track base, resilient elements to floatingly support said mobile work supporting actuating device upon said carriage means, fluid actuating means carried by said mobile work supporting actuating device, and force transmission means extending from said fluid actuating means to said die assembly, the combination of dies and actuating means being movable toward said track base by the action of the press to force the dies upon the punch means, and said resilient element being compressible by the action of the press to allow the mobile work supporting actuating means to rest upon the track base, the said device thereafter returning the dies to their original position as the influence of the press is removed, and the resilient elements returning the work supporting actuating device to a floating position as the influence of the press is removed.

5. In a die set of the type in which a first die assembly and a second die assembly are mounted for relative motion to bring the dies together to work a sheet of material disposed therebetween and in which one of the said dies is supported by a relatively thin backup plate and is provided with a stripper plate for ejection of the worked sheet from the said one die, a universal stripping arrangement adapted for actuation of stripper plates of various shapes and sizes which may be mounted in said die set, comprising a plurality of stripping pins received within closely spaced chambers formed in a die shoe, said chambers terminating in the surface of said die shoe which receives said backup plate, said chambers constituting a major portion of the stripping area of the die shoe and spaced by walls which are adapted to support the one die assembly, and means for yieldingly urging said stripper pins in unison toward said one die assembly engaging surface of the die shoe.

6. A supporting and actuating device for a material forming means of a nature to become frictionally engaged with a workpiece in the performance of work thereon, said supporting and actuating device comprising, a work unit and a carriage, said work unit including a die shoe plate having a support surface and a plurality of openings extending from said surface transversely

through said die shoe plate, a fluid actuated primary mover means having a table surface mounted for movement toward the die shoe plate on the side thereof opposite said support surface, force transmission pin members dimensioned to be insertable through said openings in the die shoe plate to contact said table surface, and resilient mounting means normally holding said work unit supported by said carriage above a surface for transport movement relative to said surface, said work unit being movable by force against said resilient mounting means to seat said work unit upon the surface supporting the carriage to thereby immovably support the work unit directly upon said surface.

7. A supporting and actuating device for material forming means of a nature to become frictionally engaged with a workpiece in the performance of work thereon, said supporting and actuating device comprising, a die shoe plate having a support surface and a plurality of openings extending from said surface transversely through said die shoe plate, said openings forming a pattern covering the major portion of the support surface, primary mover means having a table surface mounted for movement toward the die shoe plate on the side thereof opposite said support surface, and force transmission pin members dimensioned to be insertable through said openings in the die shoe plate and extend from said die plate to contact said table surface, a plurality of said force transmission pin members extending through selected ones of said openings and contacting said table surface, said plurality of pins being fewer than the number of said openings and in such a ratio to the number of openings that a wide variety of pin patterns can be arranged, said dimensioning of the pin members thereby rendering the pin members selectively positionable in any selected opening, without dismantling said support and actuating device, by withdrawing the pin members from the support surface side of the die shoe plate and dropping said pin members into another selected opening.

ALDRICH R. HEDBERG.

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