March 16, 1943. A. LEFERE 2,314,148

PRESS FIXTURE

Filed April 1, 1940 2 Sheets-Sheet 1

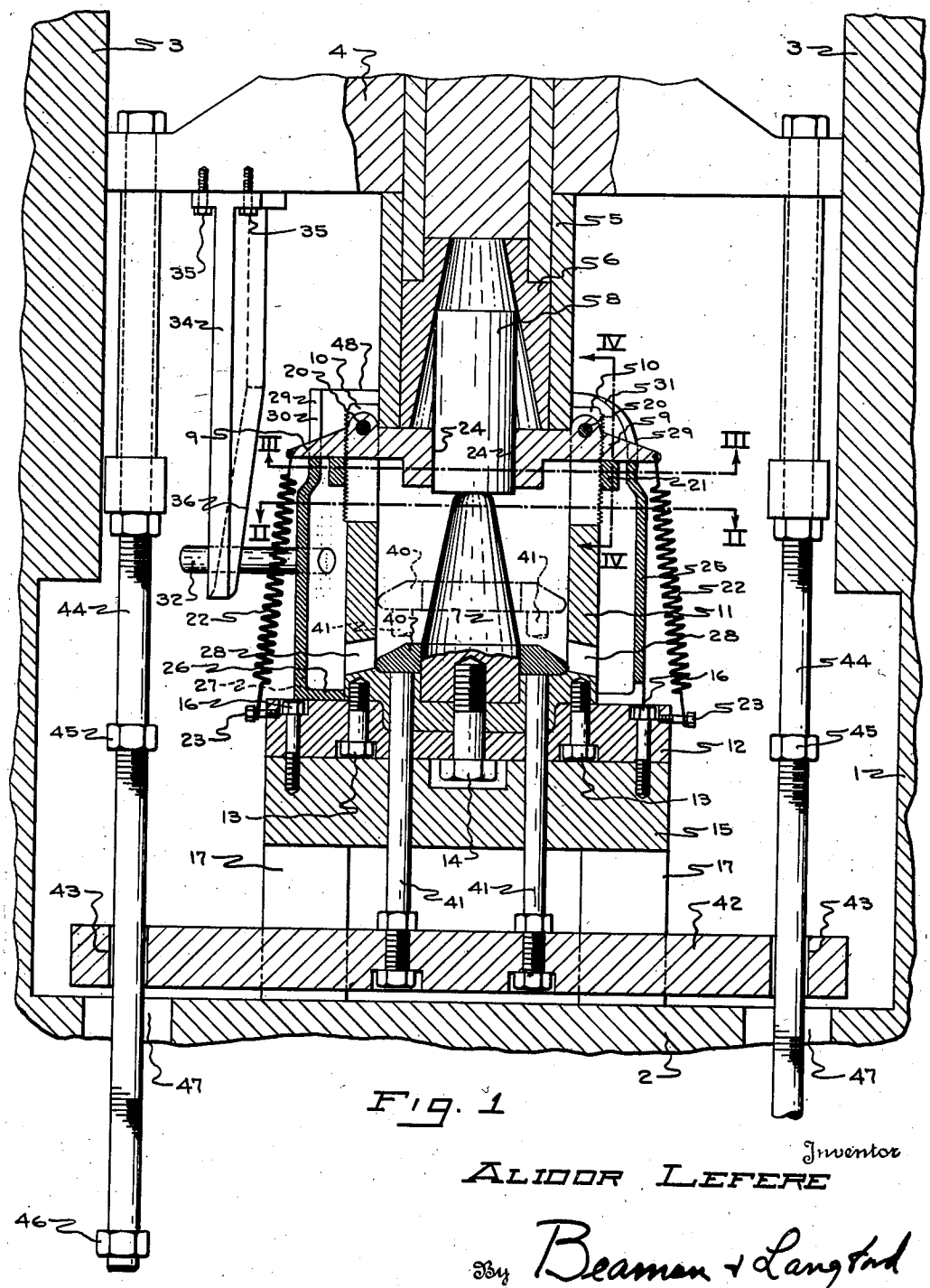


Fig. 1

Inventor

ALDOR LEFERE

By Beaman & Langford

Attorneys

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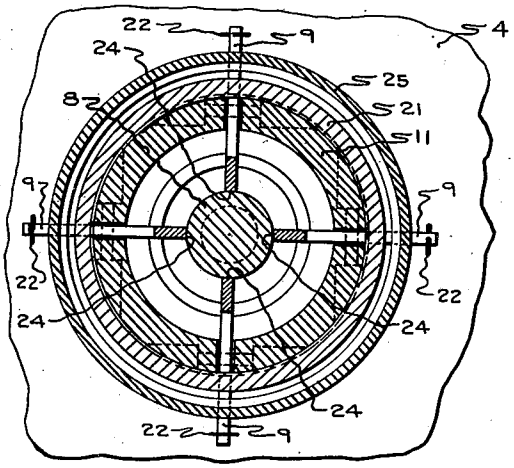


Fig. 3

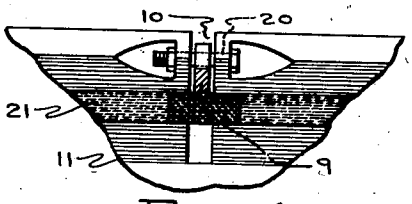


Fig. 4

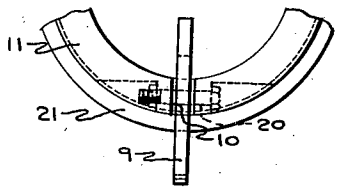


Fig. 5

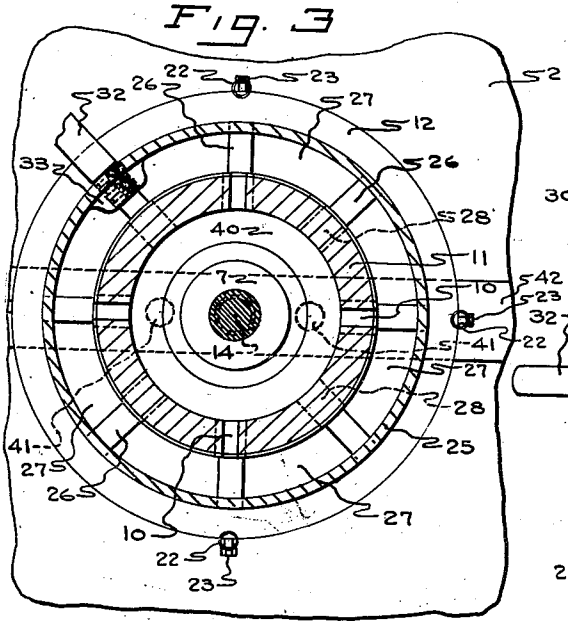


Fig. 2

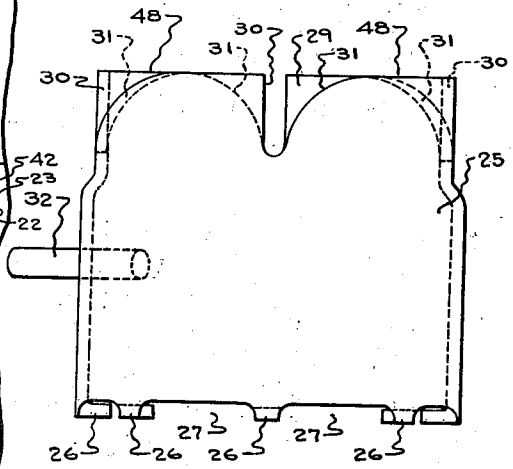


Fig. 6

Inventor

ALIDOR LEFERE

By Beaman & Langford

Attorneys

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UNITED STATES PATENT OFFICE

2,314,148

PRESS FIXTURE

Alidor Lefere, Jackson, Mich., assignor to Lefere Forge & Machine Company, Jackson, Mich., a corporation of Michigan

Application April 1, 1940, Serial No. 327,114

11 Claims. (Cl. 78—10)

The present invention relates to a press fixture and more particularly to a fixture for centering a slug about to be forced over a plug.

The present invention is particularly adapted to be used in the forming of hollow conical blanks from slugs by pressing. In forming such blanks on a press, a slug is forced over a conical plug by a hollow conical die. However, considerable difficulty is encountered in supporting the slugs in centered relation with respect to the plug immediately prior to engagement with the slugs by the hollow die. According to the present invention, slugs are quickly and readily centered by pivoted fingers, projecting radially in toward the slug into engagement therewith, the fingers being pivotable out of centering relation with the slugs by the hollow die as it moves downwardly into engagement therewith. Means are provided for automatically holding the fingers in inoperative position in order to permit the removal of the finished blank.

An object of the invention is to provide a centering fixture for presses.

Another object of the invention is to provide pivoted fingers for centering work about to be operated upon by a press.

Still another object of the invention is to provide centering means for centering work about to be operated upon by a press, the centering means being movable from operative position during the operation of the press and being automatically retained in inoperative position for permitting removal of work.

Still another object of the invention is to provide a centering fixture for presses comprising centering fingers arranged to be automatically removed from operative position and manually returned to operative position.

These and other objects will be apparent from the following specification when taken with the accompanying drawings in which:

Fig. 1 is a vertical section of a press disclosing the fixture according to the present invention in operative position,

Fig. 2 is a section on the line II—II of Fig. 1,

Fig. 3 is a section on the line III—III of Fig. 1,

Fig. 4 is a view taken in the direction of the arrows IV—IV of Fig. 1,

Fig. 5 is a plan view of the structure disclosed in Fig. 4, and

Fig. 6 is an elevation of the centering finger controlling cylinder.

Referring particularly to the drawings, the reference character 1 indicates a press of conventional construction, including a bed 2, and ways 3 for guiding a ram 4. Suitably secured to the ram 4 is a holder 5 supporting a conical upper die part 6 for cooperating with a tapered lower die part or plug 7.

As shown, a slug or work piece 8 is resting on the top of the plug 7 and has just been engaged by the downwardly moving die 6 under the action of the ram 4. Heretofore, at this stage of the operation of pressing the slug 8 over the plug 7 by the die 6, considerable difficulty has been encountered in maintaining the slug 8 in centered relation to the plug 7. This difficulty has been eliminated by the present invention by providing centering fingers 9 as shown particularly in Figs. 1 and 4. The fingers 9 are pivoted in vertical slots 10, in a centering support 11. The centering support 11, as shown in the drawings, is cylindrical in form and is secured to a base 12 by screws 13. The base 12 has secured to it the plug 7 by means of a screw 14 and is secured by screws 16 to a conventional stool 15 having legs 17 supporting it from the bed 2. The fingers 9 are secured to the centering member 11 by means of pins 20, disclosed particularly in Figs. 1, 4 and and 5.

Threaded to the outside surface of the centering member 11 is a ring 21 serving as an abutment to limit the pivotal movement of the fingers 9 under the action of springs 22, secured to the outer ends of the fingers 9 at one end and to the pins 23 in the base 12 at the other end. As will be clear from Fig. 1, the position of the ring 21 may be adjusted up and down the outside surface of the centering member 11 to adjust the position to which the fingers 9 are pivoted under the action of the springs 22.

The fingers 9 project radially inwardly into engagement with the slug 8 to center the same on the plug 7. Each of the fingers 9 is provided with a slug engaging surface 24 whereby a slug resting on the top of the plug 7 is maintained in a fixed predetermined relation thereto pending the initial downward movement of the die 6. For major changes in the size of the slugs 8, worked on by the dies, it will be necessary to substitute for the fingers 9 different sized fingers, while minor variations may be compensated for by adjusting the position of the ring 21.

Surrounding and radially spaced from the centering member 11 is a camming cylinder 25 shown in Figs. 1 and 6. The cylinder 25 is supported on the top of the base 12 for rotative movement with respect thereto and is provided at the lower edge thereof with bearing feet 26, between which are openings 27. The openings 27

and openings 28 in the centering member 11 are for the purpose of conducting away scale and dirt which falls into the enclosures defined by the cylinder 25 and the centering member 11 respectively.

The upper end of the cylinder 25 is necked inwardly, as shown in Figs. 1 and 6, and is provided with a slot 29 for each finger 9 and in each of which during predetermined portions of each cycle of operation, the outer end of one finger 9 projects. The slots 29 are each defined by one straight edge 30 and a curved camming edge 31.

Projecting radially from the cylinder 25 is a handle 32 in the form of a rod, threaded into a boss 33, shown particularly in Fig. 2. Cooperating with the handle 32 is a sword member 34, secured by screws 35 to the ram 4 and provided with an inclined camming surface 36.

The plug 7 has associated with it a conventional stripper 40 for stripping work from the plug 7 after it has been formed thereover by the upper die part 6. The stripper may be actuated in any conventional manner, but as shown, is connected by depending rods 41, projecting through the top surface of the stool 15 to a laterally extending bar 42. The bar 42 at opposite ends is provided with openings 43, through which project rods 44, connected respectively to opposite sides of the ram 4. Disposed on the rods 44 are nuts 45 and 46 on opposite sides of the openings 43, whereby as the rods 44 move up and down with the ram 4, a lost motion connection with the bar 42 is provided. The connection is such that the nuts 46 engage with the bottom of the bar 42 just prior to the ram 4 reaching its upper position to move the stripper 40 to the dotted position disclosed in Fig. 1. In the form of the stripper operating mechanism disclosed, openings 47 are provided in the press bed 2 through which the rods 44 and their nuts 46 project.

In operation of the structure according to the present invention, the fingers 9 of the correct size having been pivoted to the centering member 11, a slug or work piece 8 is disposed on the top of the plug 7 and is maintained there in centered relation by the fingers 9. The press is then actuated to move the top die part 6 downwardly into engagement with the slug 8 to force the same over the plug 7 to form a conical blank. The parts should be so proportioned that at substantially the same time that the upper die part 6 comes into engagement with the slug 8, the lower face of the upper die part 6 and its holder 5 come into engagement with the tops of the fingers 9, and pivot them about the pins 20 away from the slug 8 and into inoperative position. It will be observed that since there is a very small distance between the pins 20 and the portions of the die holder 5 which engage the fingers 9, only a slight downward movement of the die holder 5 and the upper die part 6 will be necessary to provide a substantial pivotal movement of the fingers 9. In this way, as the metal of the slug 8 starts to spread over the plug 7, the fingers 9 will have pivoted sufficiently to prevent them from being engaged by the expanding metal of the slug 8.

In view of the fact that the fingers 9 are pivoted about the pins 20 by the springs 22, it will appear that other things being equal, upon retraction of the upper die part 6 and the holder 5 therefore, the fingers 9 would resume their position disclosed in Fig. 1. This would result in preventing the removal of the conical blank from the plug 7. Accordingly, the sword member 34 has been provided to have its inclined camming surface 36 engage the handle 32 as the ram 4 moves downwardly to rotate the cylinder 25 so that when the die 6 has reached the bottom of its movement and the fingers 9 are in full inoperative position, each top flat edge 48 on the top of the cylinder 25, adjacent each slot 29, will be opposite a finger 9 and prevent its returning to the position shown in Fig. 1 under the action of the springs 22. After the blank has been removed from the press, the fingers 9 may be returned to the position shown in Fig. 1 by rotating the cylinder 25, in the opposite direction to that which it was moved by the sword member 34, through manual force applied to the handle 32. As the cylinder 25 is rotated, the fingers 97 being urged against the top flat edges 48 of the cylinder 25, will each slide therealong until they reach a slot 29 at which point they will drop over a curved edge 31 and into the bottom of a slot 29. The vertical edges 30 abutting against the fingers 9 serve as stops to limit the return rotation of the cylinder 25. For the purpose of making possible movement of the fingers 9 independently of the action of the upper die part 6 and its holder 5, the curved surfaces 31 of the slots 29 serve as cams so that when the handle 32 is actuated to rotate the cylinder 25 in the direction it would be rotated by the camming surface 36 of the sword member 34, the surfaces 31 will engage with the respective fingers 9 to rotate them into inoperative position. It will be understood that when the fingers 9 are rotated under the action of the upper die part 6 and its holder 5, and the cylinder 25 is rotated under the action of the camming surface 36 of the sword member 34, the camming edges 31 are inoperative.

It is to be understood that in the foregoing description, the specific form of the die members 7 and 8 are not essential to the invention, although the specific form of die members shown, which are for forming blanks for artillery projectiles, are particularly adapted to have employed therewith the centering means disclosed. Furthermore, it is to be understood that the press and stripper and the operating mechanism for the stripper are shown diagrammatically and only for the purpose of illustrating the invention. In the claims, the terms top and bottom as applied to the die parts are to be considered as designating the relation of the die parts to each other rather than as constituting a strict limitation as to position.

Having thus described my invention, what I desire to secure by Letters Patent and claim is:

1. The combination with a two part die including a male part and a female part for movement over said male part, of a centering frame, centering fingers pivoted to said frame and projectable radially toward the longitudinal axis of said male part for maintaining a slug in centered relation on the outer end of said male part, and means movable with said female part operative to maintain said fingers in inoperative position after the retraction of said female part and said means movable therewith.

2. The combination with a two part die including a bottom part and a top part, of a frame circumscribing said bottom part, means pivoted in a vertical plane and supported by said frame for maintaining a work piece in a predetermined relation to said bottom part, yieldable means for

pivoting said maintaining means into operative position, means to limit the pivotal movement of said maintaining means under the action of said yieldable means and thus to determine the operative position of said maintaining means, and means movable with said top part engageable with said maintaining means to move the same to inoperative position.

3. The combination with a two part die including a bottom part and a top part, of a circumscribing frame about said bottom part, fingers pivoted to said frame and circumferentially spaced thereabout, said fingers extending inwardly toward the longitudinal axis of said bottom part for maintaining a work piece in a predetermined relation to said bottom part, and means movable with said top part engageable with said fingers to pivot them into inoperative position.

4. The combination with a two part die including a bottom part and a top part, of a frame, fingers pivoted to said frame, said fingers extending inwardly toward the longitudinal axis of said bottom part for maintaining a work piece in a predetermined relation to said bottom part, means operative to move said fingers to inoperative position during downward movement of said top part, and means movable with said top part operative to maintain said fingers out of operative position after retraction of said top part and said means movable therewith.

5. The combination with a two part die including a bottom part and a top part, of a frame, fingers pivoted to said frame, said fingers extending inwardly toward the longitudinal axis of said bottom part for maintaining a work piece in a predetermined relation to said bottom part, means engageable with said fingers to move the same into inoperative position during downward movement of said top part, means engageable with said fingers for maintaining the same out of operative relation following the retraction of said top part and means movable therewith, and means operative upon downward movement of said top part to move said last named engaging means into said engaging relation with said fingers.

6. The combination with a top die part movable with a press ram and a bottom die part supported from a press bed, of means for maintaining a work piece in a predetermined relation to said bottom die part, means movable with said top die part engageable with said maintaining means to move the same into inoperative position, movable means to hold said maintaining means in inoperative position following retraction of said top die part, and a cam depending from said ram for actuating said last named means upon downward movement of said ram to move said last named means into operative position.

7. The combination with a top die part movable with a press ram and a bottom die part supported from a press bed, of fingers for maintaining a work piece in a predetermined relation to said bottom die part, means for pivotally supporting said fingers, means for moving said fingers into inoperative position during downward movement of said top die part, a finger engaging member supported with respect to said bottom die part and having portions for holding said fingers in inoperative position, said finger engaging member having a plurality of slots in each one of which one end of one of said fingers is disposed while it is in work piece maintaining position, and a cam movable downwardly with said ram for actuating said finger engaging member for moving said slots out of register with said fingers upon downward movement of said ram whereby said member supports said fingers in inoperative position following retraction of said top die part.

8. A fixture of the character described comprising a base, a centering support carried by said base, a plurality of work piece centering fingers pivoted to said centering support, a cylinder supported on said base surrounding said centering support, said cylinder having a plurality of slots in each one of which a portion of one of said centering fingers is disposed while in work piece centering position, and means for rotating said cylinder on said base with respect to said centering member for moving said slots out of register with said fingers under predetermined conditions whereby said cylinder maintains said fingers in inoperative position under predetermined conditions.

9. The combination with a top die part movable with a press ram and a bottom die part supported from a press bed, of a frame, means supported by said frame for maintaining a work piece in a predetermined relation to said bottom die part, means supported by said frame for adjusting said maintaining means for different sized work pieces, means movable with said top die part engageable with said maintaining means to move the same into inoperative position, movable means to hold said maintaining means in inoperative position following retraction of said top die part, and a cam depending from said ram for actuating said movable means upon downward movement of said ram to move said movable means into position to hold said maintaining means in inoperative position.

10. The combination with a two part die including a bottom part and a top part, of a frame circumscribing said bottom part, means pivoted in a vertical plane and supported by said frame for maintaining a work piece in a predetermined relation to said bottom part, yieldable means for pivoting said maintaining means into operative position, adjustable means to limit the pivotal movement of said maintaining means under the action of said yieldable means and thus to determine the operative position of said maintaining means, and means movable with said top part engageable with said maintaining means to move the same to inoperative position.

11. The combination with a two part die including a bottom part and a top part, of a circumscribing frame about said bottom part, fingers pivoted to said frame and circumferentially spaced thereabout, said fingers extending inwardly toward the longitudinal axis of said bottom part for maintaining a work piece in a predetermined relation to said bottom part, and means movable with said top part to pivot said fingers into inoperative position.

ALIDOR LEFERE.