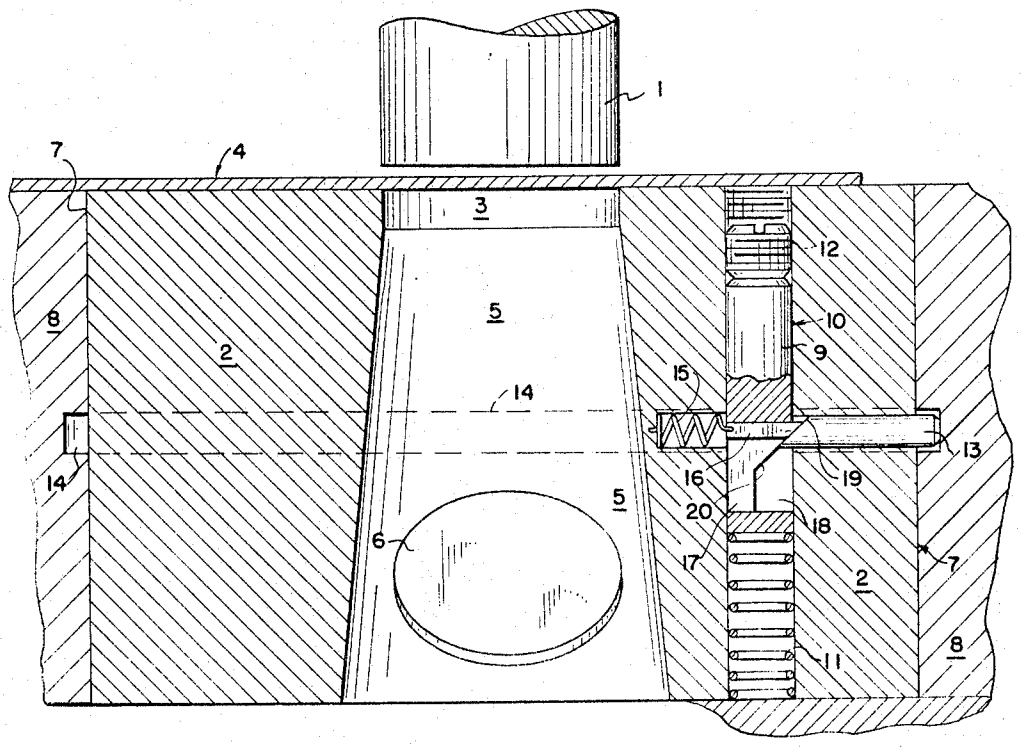
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LATCH MECHANISM FOR DIE BLOCK OF PUNCH PRESS

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FIG. 1



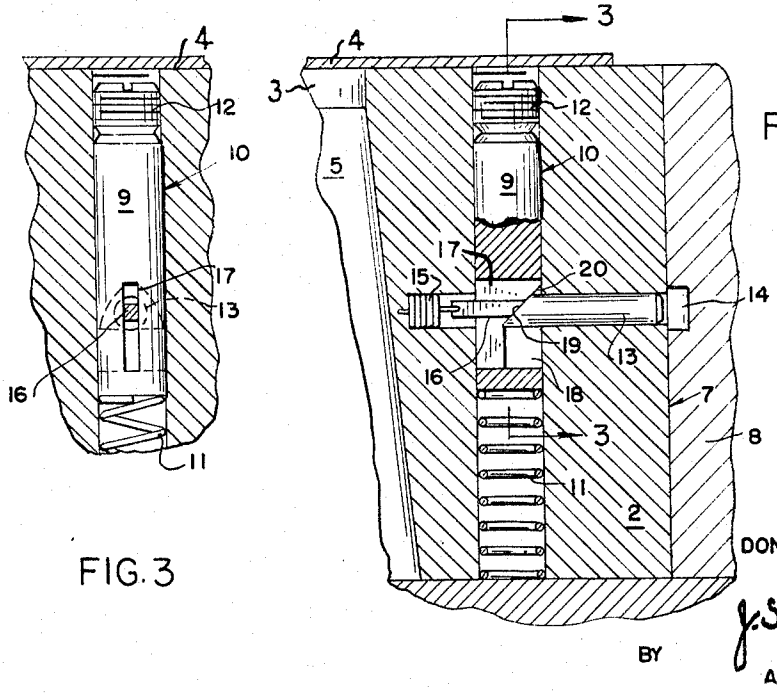


FIG. 2

FIG. 3

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FIG. 4

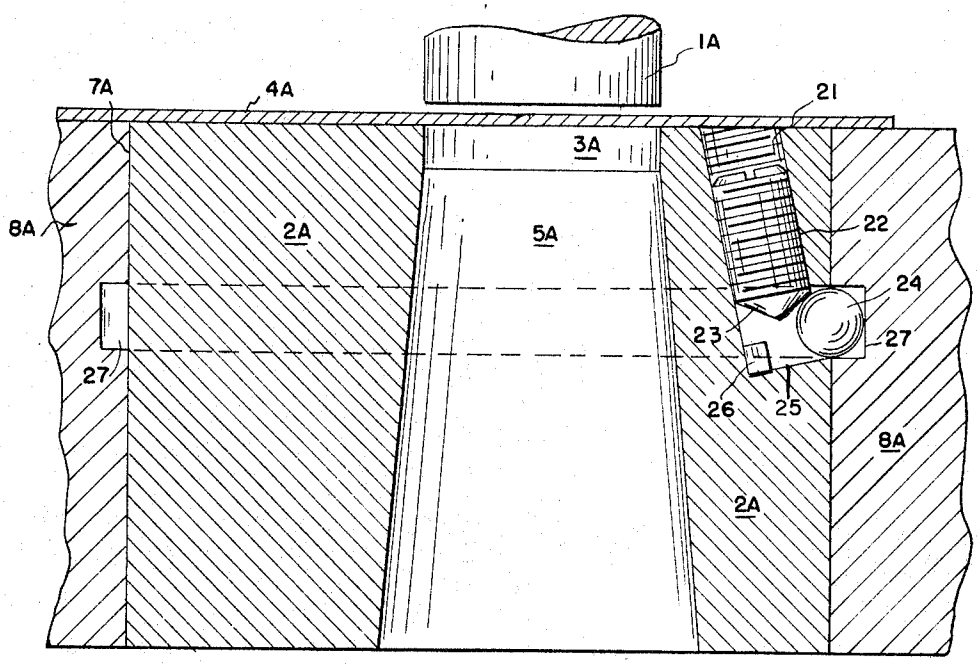
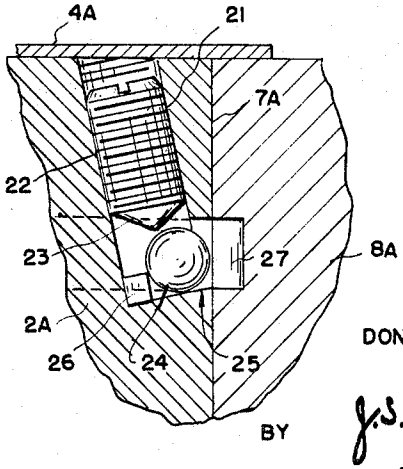


FIG. 5



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United States Patent Office 3,289,519 Patented Dec. 6, 1966

3,289,519

LATCH MECHANISM FOR DIE BLOCK OF PUNCH PRESS

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Filed Dec. 14, 1964, Ser. No. 418,018
5 Claims. (Cl. 83—685)

This invention relates to punch and die mechanisms, particularly as used in punch presses.

Operation of a punch press commonly imposes heavy wear on the punch and die, thus necessitating unduly frequent replacement of said parts to assure accurate shearing. Changes in shape and size of openings to be formed in different types of work also occasionally require replacements of dies and punches. Such replacements have been laborious and time-consuming and hence a source of considerable expense.

A primary object of the invention is to provide a simple and inexpensive mechanism whereby a die coacting with a punch may be readily and firmly latched to or released from its retainer.

Another object is to provide a bolt for latching a die in a retainer by means of a plunger actuable in the die to establish and maintain the effective position of said bolt, coacting cam faces being formed on the plunger and bolt for effecting such actuation.

Another object is to employ a metal ball as a latch bolt for either securing a die in its use position or releasing it to afford its ready removal.

These and various other objects are attained as appears in the accompanying drawings, wherein:

FIG. 1 is a fragmentary vertical axial sectional view of my improved latch mechanism as applied to a punch press, the latching position of such mechanism being shown.

FIG. 2 is a similar sectional view of the latch mechanism, but showing its released position.

FIG. 3 is a vertical sectional detail of the latch mechanism, taken on the line 3—3 of FIG. 2.

FIG. 4 is a view similar to FIG. 1, but illustrates another embodiment of the invention.

FIG. 5 is an enlarged fragmentary vertical sectional detail of the modification appearing in FIG. 4, and shows a released position of the mechanism.

Describing first the invention as illustrated by FIGS. 1–3, the reference character **1** designates the usual punch of a punch-press, said punch being vertically reciprocatory to and from a cylindrical die **2**. Adjoining its top face, the die **2** is formed with a circular aperture **3** proportioned for shearing coaction with the punch. A workpiece exemplified at **4** and usually of sheet-metal is disposed across the die for perforation by the punch. The die is formed with a frustoconical passage **5**, downwardly extended from the aperture **3** and opening in the bottom face of the die to accommodate disks **6** struck out of the work by a punching operation. The die is proportioned to slide vertically with no material lateral motion in a cylindrical socket **7** formed in the die retainer **8**.

At one side of the passage **5** and aperture **3**, a plunger **9** is vertically slidable in a bore **10** formed in the die **2**, and is upwardly urged by a coiled spring **11**, occupying the bore beneath the plunger. A vertical adjusting screw **12**, coaxial with the plunger, is threaded in the top portion of the bore **10**, and has its lower end seated on the upper end of the plunger, such screw coacting with the spring **11** to regulate the up-and-down position of the plunger. Slidable in the die **2** radially thereof is a latch bolt **13**, the outer end of which is adapted to enter a circular groove **14** formed in and opening from the inner face of the socket **7**. A tensional coiled spring **15** is mounted on a stem **16** extending rigidly inward from the bolt **13**, said spring tending to establish the inner limiting position of the bolt, in

which position the bolt is clear of the retainer **8**. The circular form of the groove **14** serves to permit the bolt to take effect regardless of any particular rotative relation between the die and retainer. The plunger **9** is diametrically slotted at **17** to accommodate the stem **16**, whereby the plunger may undergo the desired up-and-down travel without impediment by said stem and is held by the latter from rotation. The plunger **9** has a notch **18** in its lower portion, and the upper end of said notch forms an inclined cam **19** coacting with a similarly inclined cam **20** on the inner end of the bolt **13**.

When the screw **12** downwardly actuates the plunger, as in FIG. 1, the cam faces interengage to shift the bolt outwardly to its latching position by insertion of the bolt in the groove **14**. Because of the mechanical advantage afforded by the screw, a considerable pressure may be readily applied to the bolt to maintain its latching position. When the screw **12** permits the plunger to assume its raised position, as in FIG. 2, the spring **15** shifts the bolt **13** inwardly, disengaging the cams **19** and **20** and permits ready upward removal of the die from its socket **7**. Prevention of rotation of the plunger **9** is of importance in maintaining the proper opposed and coacting relation between the cams **19** and **20**.

Describing now the modification illustrated by FIGS. 4 and 5, the reference characters **1*a*–8*a*** correspond to the characters **1–8**, as applied to the first-described modification. Formed in the die **2*a***, at one side of the passage **5*a***, is a bore **21** downwardly extended from the top face of the die and having its upper portion threaded to mesh with an adjusting screw **22**. Said screw is engageable at its upper end by a screw-driver (not shown), or is otherwise adapted for rotative actuation. At its lower end, said screw is integrally formed with a cam **23** of inverted conical form, said cam having point contact with a metal ball **24**, rotatively set into a runway **25** formed in the die **2*a*** and opening in the peripheral wall of said die. From such wall, the runway extends to and opens into the lower end of the bore **21**. The runway has a slight downward inclination in extending inwardly, so that the ball tends to roll of its own weight toward the inner end of the runway. Set rigidly into the intercommunicating ends of the bore **21** and runway **25**, is an abutment **26** which limits inward travel of the ball **24**, positioning the latter fully within the die and so avoiding any latching effect. Thus, at its inner limit of travel, the ball allows free up-and-down actuation of the die, and the latter is readily removable from its socket **7*a***. If the screw is downwardly adjusted to its lowermost position, as per FIG. 4, the cam **23** displaces the ball up the inclined runway and at least partially into a circular groove **27** formed in the retainer **8*a*** peripherally of the socket **7*a***. Thus, an adjustment of the screw to its lower limit may apply a considerable outward force to the ball to establish and maintain its latching position, as best appears in FIG. 4.

What I claim is:

1. A punch and die mechanism comprising a punch reciprocatory up and down, a die formed with a passage accommodating the punch and adapted for shearing coaction with the punch, a retainer having a socket wherein the die is removably received, the peripheral face of the socket having a recess formed in the peripheral face of the socket, a plunger slidable in substantially up and down travel in the die at one side of said passage, a bolt slidable in the die to have releasable engagement in said recess to resist withdrawal of said die from said socket, the plunger and bolt having interengageable cam faces, retractable drive means to actuate the plunger in downward sliding travel whereby said cam faces urge said bolt into said releasable engagement, means yieldable urging said plunger in upward travel responsive to retraction of said drive

means, and means to urge said bolt to slidably disengage from said recess consequent to said upward travel to afford withdrawal of said die from said socket.

2. A punch and die mechanism as set forth in claim **1**, said yieldable means being a coiled spring applying upthrust to the plunger.

3. A punch and die mechanism as set forth in claim **1**, said recess being a substantially circular groove substantially concentric with the socket.

4. A punch and die mechanism as set forth in claim **1**, the plunger having a slot elongated along the plunger axis, and a stem on the bolt extending through said slot and resisting rotation of the plunger.

5. A punch and die mechanism comprising a reciprocatory punch, a die formed with a passage accommodating the punch and adapted for shearing coaction with the punch, a retainer having a socket wherein the die is removably received, the peripheral face of the socket having a recess, a plunger movable in substantially up and down travel in the die, said plunger forming at its lower end

a cam of inverted conical form, a ball set into a runway formed in the die and opening from said recess to the lower end of the plunger at a downward inclination, and means on the die for actuating the plunger up and down and thereby disengaging or engaging the ball to shift the ball up or down the inclination of its runway to engage it in or disengage it from said recess, said runway being formed with an abutment at its inner end limiting travel of the ball down the runway, and thus maintaining proper engagement of the ball with said cam.

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