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PUNCH AND DIE RETAINER

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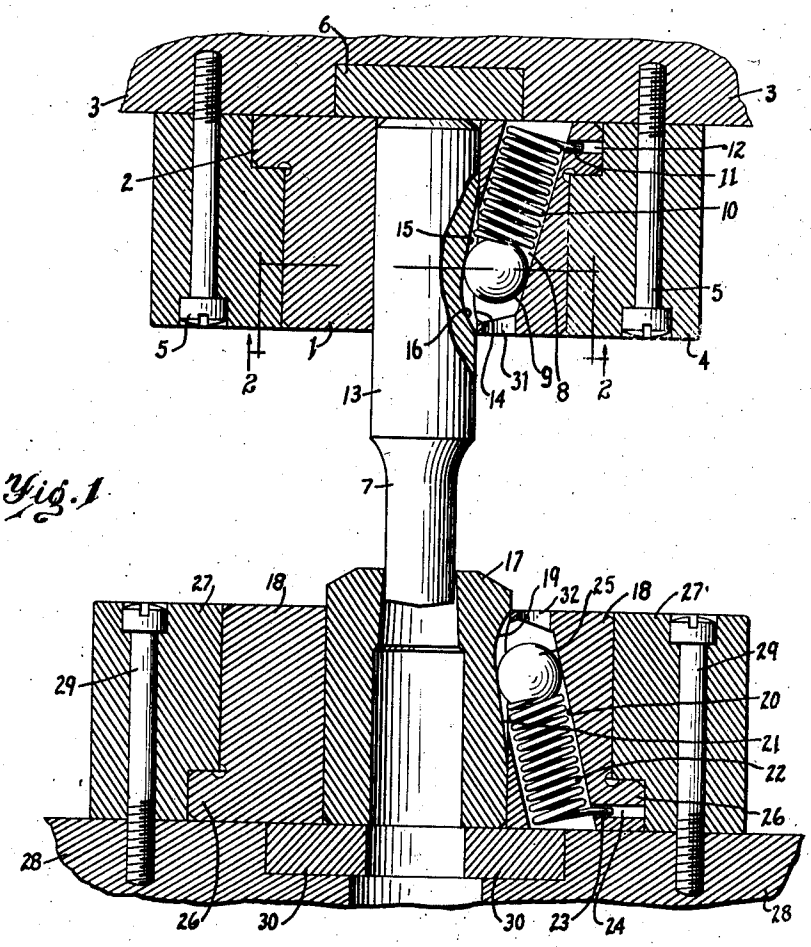


Fig. 1.

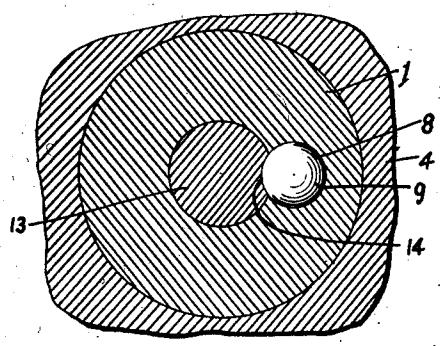


Fig. 2.

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UNITED STATES PATENT OFFICE.

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PUNCH AND DIE RETAINER.

Application filed August 24, 1922. Serial No. 583,989.

This invention relates to punch and die retainers and is an improvement on our former Patent No. 1,393,404, dated October 11, 1921. The principal objects of the invention is to provide a retainer for punches and dies in which the punch or die may be readily secured or removed and is rigidly held in position when secured therein. A further object of the invention is involved in the construction, the punch or die having a groove arcuate in cross section to receive a spring pressed ball carried by the retainer, the said groove extending in a plane at a slight angle to the longitudinal axis of the punch or die and also extending at a slightly less angle than the ball retaining aperture. Another object of the invention is to provide a punch and die retainer of the character above set forth in which the ball retaining aperture for the punch is positioned at an angle to the longitudinal axis of the punch and the ball retaining aperture for the die is positioned at an angle substantially opposite to that of the ball retaining aperture of the punch whereby the withdrawal movement of the punch from the die prevents longitudinal movement of either tool in its holder and prevents the die from following the punch or the punch from remaining in the die. These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is an enlarged section through a punch and die and retainers therefor illustrating the means for securing a punch or die in the respective retainer.

Fig. 2 is a section through the punch and retainer taken on line 2—2 of Fig. 1.

As shown in Fig. 1 a retainer is used with each punch and die and the retainer 1 is formed with an annular flange 2 at the upper end thereof which is secured against the punch plate 3 by means of a punch retainer plate 4 having an annular shoulder engaging the annular flange 2 and secured to the punch plate 3 by machine screws 5. The punch plate 3 is provided with a hardened steel backing plate 6 for the punch 7 which is inserted in the central aperture provided therefor in the retainer 1. The shank of the punch 7 is made about one-thousandth of an inch smaller in diameter than the aperture therefor in the retainer 1 so that the punch may be easily inserted or removed from the aperture and is a sliding fit therein. Within the wall of the retainer 1 is an angularly extending aperture 8 which extends preferably to an angle of about 15 degrees to the longitudinal axis of the punch. A ball 9 is supported in the aperture 8 on a coiled spring 10, the opposite end of the spring being provided with an end 11 secured in an aperture 12 provided therefor in the retainer 1. As will be seen from Fig. 1 the aperture 8 opens into the central aperture of the retainer but the opening through which the ball extends is less than the diameter of the ball 9 thereby preventing the ball from passing out of the aperture 8. The shank 13 of the punch is provided with a groove 14 for the ball 9 which is arcuate in cross section as shown in Fig. 2 and is of the same diameter as the ball 9. The portion 15 of the groove extends at an angle of approximately 12 degrees to the longitudinal axis of the punch and terminates at the lower end in an arcuate portion 16 as shown in Fig. 1. As will be seen from Figs. 1 and 2 the ball 9 extends into the groove 14 in the punch shank and is tightly held in engagement therein by the coiled spring 10, the opposite side of the ball at the same time engaging the angularly positioned wall of the aperture 8.

As shown in the lower half of Fig. 1 a die or die block 17 is provided which is held in a retainer 18 similar to the retainer 1 for the punch shank and this die is provided with a groove 19 which is exactly the same as the groove 14 in the punch shank. The retainer 18 is provided with an aperture 20 therethrough extending at an angle of 15 degrees to the longitudinal axis of the die block and the groove 19 is provided with a portion 21 extending at an angle of 12 degrees to the longitudinal axis of the die block, the die block being about one-thousandth of an inch smaller in diameter than the aperture therefor in the retainer 18. Within the aperture 20 is a coiled spring 22 which is provided with an end 23 secured in an aperture 24 provided therefor and a ball 25 is supported on the upper end of the spring 22. This construction of the retainer is exactly similar to the construction of the retainer 1 except that the construction is reversed. The spring 22 in like manner forces the ball 25 into the groove 19 of the die block 17 and prevents the same from withdrawal from the retainer 1 and acts as a key in preventing rotation of the

die block. The retainer 18 is provided with an annular flange 26 and a retainer plate 27 is provided having an annular shoulder adapted to engage the annular flange 26 and is secured to the base 28 by machine screws 29. A hardened plate 30 is set into the base 28 which provides a backing for the die block and aids in preventing breakage of the die block from the heavy blows delivered by the punch.

To assemble the device the punch 7 is slipped into the central recess in the retainer by hand which forces the ball 9 back into the aperture 8. The punch is then turned until the groove 14 therein is brought to registration with the aperture 8 at which time the coiled spring 10 will force the ball 9 into the groove 14, the ball engaging between the converging faces of the aperture 8 and groove 15. This engagement of the ball 9 in the groove 14 prevents rotation of the punch in relation to the retainer and also prevents withdrawal of the punch from the retainer by the binding action of the ball 9 between the angular wall 15 of the aperture 14 and the angular wall of the aperture 8, withdrawal of the punch tending to compress the ball between the two angular faces. The hardened plate 6 against which the upper end of the punch shank engages prevents upper movement of the punch and in this manner the punch is locked in the retainer and is held immovable therein. This is also true of the die or die block 17 the die being prevented from downward movement by the hardened plate 30 and prevented from rotation or upward movement by the spring pressed ball 25 engaging in the groove 19 in the die block. In order to remove either the punch or die from the respective retainer the operator may insert a rod or similar instrument through the aperture 31 or 32 in the outer face of either retainer and force the ball 9 or 25 as the case may be back into the aperture 8 or 20 away from and out of the groove 14 or 19 in the punch or the die block respectively whereupon either the punch or die block may be easily withdrawn from the respective groove by hand due to the diameter thereof being slightly less than the diameter of the respective aperture in the retainer. It will be noted that the retainers are not limited to use with any certain type of tool but may be used in different types of punch presses, drill presses, and other machines where a tool must necessarily be held from rotation and at the same time from longitudinal movement in relation to the retainer or chuck within which it is secured. Due to the punch or die block being very close in size to the aperture in which it is secured the action of the springs 10 or 22 forcing the ball 9 or 25 to locking position wedges the punch or die block into tight engagement with the sides of the aperture in the respective retainer. By positioning the angular apertures 8 and 20 at opposite angles as shown in Fig. 1 the tendency of the die block to travel with the punch is prevented and the tendency of the punch to remain in the die block is also prevented by the retainers as will be readily understood.

From the foregoing description it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, is composed of few parts and is of consequent low manufacturing cost and provides a device which accomplishes the objects described.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In a retainer for punches, dies, and similar tools, a base having a hardened plate set therein, a centrally apertured retainer detachably secured to the base over the plate, the tool having a shank adapted for insertion in the apertured retainer and being a sliding fit therein, the hardened plate providing a backing for the tool and the tool being provided with a groove in the side thereof extending at an angle to the longitudinal axis thereof, the retainer also having an aperture in the wall thereof extending at a slightly greater angle to the longitudinal axis of the tool than the said groove and opening into the central aperture, a ball in the annular aperture of the retainer and a coiled spring secured in the said aperture and adapted to force the ball into engagement in the groove of the tool shank.

2. In a retainer for punches, dies and similar tools, a base, a centrally apertured retainer detachably secured to the base, the tool having a shank adapted for insertion in the apertured retainer and being provided with a groove in the side thereof extending at an angle to the longitudinal axis of the tool, the retainer also having an aperture in the wall thereof extending at a slightly greater angle to the longitudinal axis of the tool than the said groove and opening into the central aperture, and a spring pressed ball in the angular aperture of the retainer adapted to engage in the groove of the tool shank, the said groove being arcuate in cross section and of a radius equal to that of the ball.

3. In a retainer for punches, dies, and similar tools, a base having a hardened plate set therein, a centrally apertured retainer detachably secured to the base over the plate, the tool having a shank adapted for insertion in the apertured retainer to engage the hardened plate and being provided with a groove in the side thereof extending at an angle to the longitudinal axis

of the tool, the retainer also having an aperture in the wall thereof extending at a slightly greater angle to the longitudinal axis of the tool than the said groove and opening into the contral aperture and a spring pressed ball in the angular aperture of the retainer adapted to engage in the groove of the tool shank.

4. In a retainer for punches, dies and similar tools, a base, a centrally apertured retainer secured to the base, the tool having a shank adapted for insertion in the apertured retainer and being provided with a groove in the side thereof extending at an angle of approximately 12 degrees to the longitudinal axis of the tool, the retainer also having an aperture in the wall thereof extending at an angle of approximately 15 degrees to the longitudinal axis of the tool and opening into the central aperture and a spring pressed ball in the angular aperture of the retainer adapted to engage in the groove of the tool shank.

5. In a retainer for punches, dies and similar tools, a base, a centrally apertured retainer detachably secured to the base, the tool having a shank slidably fitting the aperture of the retainer, said shank having a groove formed in one side thereof arcuate in form in cross section and extending into the shank on a straight line at an angle to the axis of the said shank, said retainer having an aperture in the wall thereof extending at a slightly greater angle to the axis of the shank than the angle of the said groove, the said aperture opening into the central aperture of the retainer, and a spring-pressed ball in the said aperture engaging in the groove of the tool shank.

6. In a retainer for punches, dies and similar tools a plate having an aperture for the tool shank or body and a second aperture opening thereinto and lying at an angle thereto, a spring-pressed member in said second aperture, the shank or body of the tool having a surface engaged by the spring-pressed member extending on a straight line at an angle to the axis of said shank or body whereby said member is in wedging relation between said surface and the wall of its aperture and prevents withdrawal of the tool from the plate.

7. In a retainer for punches, dies and similar tools a plate having an aperture for the tool shank or body and a second aperture opening thereinto and lying at an angle thereto, a spring-pressed ball in said second aperture, the shank or body of the tool having a groove formed therein of a shape in cross-section to fit the ball and the bottom of which extends into the shank for a distance on a straight line at an angle to the longitudinal axis of the shank, said ball being in wedging relation with the tool and preventing longitudinal movement thereof and holding the tool from rotative movement in the plate.

8. In a retainer for punches, dies and similar tools, a plate having an aperture in which the shank of the tool may be inserted longitudinally of its axis and a second aperture opening into the first aperture, said tool shank being provided with a surface extending thereinto on a straight line at an angle to the axis thereof, a releasable retainer member in the second aperture engaging the said surface, and a wall having a surface extending on a straight line at an angle to the said surface of the shank, the arrangement providing that the retainer normally lies in wedging relation between the two said surfaces preventing movement of the tool longitudinally in its aperture.

9. In a retainer for punches, dies and similar tools, a plate having an aperture for the tool shank or body and a second aperture opening thereinto, the said shank having a groove formed in one side only thereof arcuate in form in cross section and extending into the shank on a straight line at an angle to the axis thereof, a spring pressed ball in the second aperture normally engaging the groove, the radius of the ball being approximately equal to the radius of the groove in cross section preventing rotation of the tool in its aperture, and a surface on the opposite side of the ball extending at an angle to the angular surface of the groove whereby longitudinal movement of the shank in its aperture is prevented by the wedging relationship of the ball between the two surfaces.

10. In a retainer for punches, dies and similar tools, a plate having an aperture, the tool having a shank insertible therein longitudinally of its axis, said plate having a second aperture opening into the first aperture intermediate of its length, the plate and the tool each being provided with a surface extending on a straight line at an angle one to the other and to the axis of the tool, and a retainer member in the second aperture lying in wedging relation between the two said surfaces normally preventing longitudinal movement of the tool in its aperture.

In testimony whereof we sign this specification.

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