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STRIPPER SPRING UNIT FOR PRESSES

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Fig. 1.

Fig. 2.

Fig. 5.

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This invention relates to a stripper spring unit for supporting and actuating the stripper plate of a press to strip the workpiece from the punches following the punching operation.

An important object of the invention is to provide such stripper spring units which permit complete removal of the stripper plate without change in adjustment or without change in position of those parts of the stripper spring units which remain attached to the shoe carrying the stripper spring units. Accordingly, in the event of a broken punch or any required resharpining, dressing or alteration in the number or position of the punches, all that is required is to remove the stripper plate, perform the necessary operations on the punch or punches and replace the stripper plate, there being no necessity for readjusting or repositioning any of the parts of the stripper spring units which remain attached to the shoe carrying the punches.

Another important object of the invention is to provide such a stripper spring unit in which spring breakage is reduced to a minimum, it being a feature of the invention that the springs can be selected or tailored to the exact requirement of any particular operation.

Another important object of the invention is to provide such a stripper spring unit which is composed of standard parts commercially available in quantity on the open market.

Another object is to provide such a stripper spring unit which is of simple and strong construction and in which the stripper plate can be removed by the removal of one attaching screw of each stripper spring unit, this attaching screw screwing into the same threaded bore as the stripper bolt.

Other objects and advantages of the invention will be apparent from the following description and drawings in which:

FIG. 1 is a fragmentary vertical section, partly in elevation, of a stripper spring unit embodying the present invention, and showing the same operatively associated with the stripper plate, top shoe, a punch, a workpiece to be formed, and a die.

FIG. 2 is a fragmentary view similar to FIG. 1 but showing the stripper plate and parts of the stripper spring unit in exploded relation to illustrate the manner in which the stripper plate can be removed without disturbing the adjustment of the stripper spring and without disturbing the position of those parts of the spring unit which remain attached to the top shoe.

FIG. 3 is a fragmentary horizontal section taken generally on line 3—3, FIG. 1.

The stripper spring unit forming the subject of the present invention is shown in conjunction with a conventional stripper plate 10 and a conventional top shoe 11, the latter being secured to the underside of a ram 12 of the press in any conventional manner. The top shoe is illustrated as carrying a punch 13 which is shown as secured to the underside of the shoe by means of a conventional attaching block 14. While the punch 13 is shown as being in the form of a perforating punch, it will be understood that it could also be any other form of punch such as a blanking punch, forming punch, notching punch or any other form of punch.

The punch 13 is shown as working through a hole 15 in the stripper plate 10 against the workpiece 16 shown as being in the form of a metal sheet. This workpiece is supported on a die 17 supported on the lower shoe 18 of the press. The die 17 is shown as having a die opening 19 conforming to and coating with the punch 13.

Each stripper spring unit of the present invention includes a stripper bolt 20 having an enlarged cylindrical shank 21 fitted in a bore 22 through the top shoe 11, this bore being provided with a counterbore 23 in the top side of the top shoe 11 to house and form an enlarged head 24 of the stripper bolt 20. The depth of the counterbore 23 is sufficient to provide the requisite movement of the stripper bolt 20, with the stripper plate 10, to permit the punch 13 to pass through the workpiece 16 and this head is provided with an out-of-round socket 25 by means of which a wrench can be applied to the head 24 to turn the stripper bolt 20.

The lower end of the enlarged shank 21 of the stripper bolt 20 terminates in an annular shoulder 28 and a threaded downward extension 29 of reduced diameter.

On this threaded reduced downward extension 29 is screwed the upper end of a cylindrical nut in the form of a sleeve 30 having an internally threaded bore 31 of uniform diameter throughout and this sleeve having an enlarged hexagon head 34 at its bottom. The threaded downward extension 29 of the stripper bolt 20 is screwed into the upper end of this cylinder and is internally threaded through bore 31 of the nut 30 with the upper end of this nut in firm engagement with the annular shoulder 28. A helical compression spring 35 surrounds the lower end of the stripper bolt 20 and the upper end of the nut 30 and is compressively interposed between the bottom of the top shoe 11 and the hexagon head 34 of the nut 30. This spring is under precompression.

At one side the head 34 of the nut 30 is made out-of-round as by the provision of a notch or flat 36. This notch receives an anchoring pin 38 having a press fit in a bore 39 in the stripper plate adjacent each stripper spring unit.

Concentric with the stripper bolt 20 and nut 30 the stripper plate 10 is provided with a through bore 40 having an enlarged counterbore 41 in the bottom of the stripper plate. The bore receives the threads of the shank 42 of a retaining screw 43, this retaining screw having a head 44 fitting in the counterbore 41 and this head being provided with an out-of-round socket 45 which permits a wrench to be applied thereto for the purpose of turning this screw. A feature of the invention is that the threads of the retaining screw 43 and the downward extension of the stripper bolt 20 are of the same pitch and size and both fit the threaded uniform diameter cylindrical through bore 31 of the nut 30, this permitting standard parts to be used for these parts of the stripper spring unit.

The pins 38 and springs 35 are likewise available as standard parts and a feature of the invention is that these springs 35 can be selected or tailored to the exact requirement of the particular job with the result that spring breakage with the stripper spring units of the present invention has been non-existent.

With the stripper plate 10 supported and biased downwardly by the precompressed springs 35 of a plurality of spring stripper units as above described, with the descent of the ram 12 the stripper plate 10 is brought downwardly into contact with the workpiece 16 on the die 17, this being the position of the parts illustrated in FIG. 1. Further downward movement of the ram 12 and top shoe 11 causes the various punches 13 to pierce the workpiece 16. The punch 13 is illustrated as being a perforating punch and the piece struck downwardly from the workpiece 16 by the punch is discharged through the die opening 19. The invention is not concerned with the type of punch used, however. During this continued downward movement of the ram 12 and top shoe 11, the nuts 30 and stripper bolts 20 are moved upwardly against increas-
ing resistance of the helical springs 35. Accordingly, during this movement, the heads 24 of the stripper bolts 29 rise in the counterbores 23, it being essential that these counterbores be deep enough to permit the punching operation.

Upon completion of the punching operation, the ram 12, together with the top shoe 11 and punches 13, rises. The plate 16 tends to cling to the rising punches 13 but upward movement of the workpiece under the influence of the rising punches 13 is prevented by the stripper plate 10 which at this time is held down by the compressed helical springs 35. These springs, through the heads 34 of the nuts 30, hold the stripper plate 10 down in engagement with the workpiece 16 until the punches 13 leave the workpiece 16 and until the heads 24 of the stripper bolts 20 seat on the bottom of the counterbores 23. Thereafter, further upward movement of the ram 12 and top shoe 11 elevates the stripper plate 10, punches 13 and the parts of the stripper unit in unison, thereby freeing the workpiece 16 for removal and replacement.

Each of the helical compression springs 35 has been selected so as to be under precompression in order to provide the required strength in holding the workpiece 16 down on the die 17 while the punch is being withdrawn, and it is a feature of the invention that the stripper plate 10 can be removed without disturbing this precompression of the springs 35 and also without disturbing the position of the major parts of the spring stripper units which are retained on the top shoe 11 during such removal of the stripper plate 10.

For example, if any punch 13 should break and require replacement, sharpening, removal or altering in position, all that is necessary to change or dress the punch is to remove the several retaining screws 43 which secure the stripper plate 10 to the nuts 30, then when this is done, the stripper plate 10 on the die 17 can be removed to expose the punches 13 so that any one can be replaced, sharpened or removed as may be required. It will be noted that during such removal of the coaxial retaining screws 43, the nuts 30 are prevented from turning by the pins 38 and hence the parts of the spring stripper units, namely, the stripper bolts 29, nuts 30 and helical compression springs 35, which remain attached to the top shoe 11 are not altered in position. Accordingly, after the defective punch 13 has been replaced or replaced, all that is required is to fill the stripper plate 10 with the several pins 38 to enter the notches 36 in the heads 34 of these nuts 30, following which the coaxial retaining screws 43 can be screwed upwardly through the bores 40 into the single internally threaded bore 31 of each nut 30.

The illustrated and described manner of locking the nut 34 from turning namely the pin 38 and recess 36, is only one of various means of accomplishing this end. It will therefore be seen that the present invention not only facilitates replacement or repair of broken or worn punches but also provides a stripper spring unit composed of standard, commercially available parts which has the feature of retaining the properly adjusted position of its parts during the necessary removal and replacement of the stripper plate in order to provide access to the punches.

What is claimed is:

1. A stripper spring unit forming one of a plurality supporting a stripper plate from the shoe of a press and actuating the stripper plate to strip the workpiece from the tools on the shoe following each operation of the press, comprising a stripper bolt mounted on said shoe for limited longitudinal movement relative to所述 shoe in the direction toward said stripper plate, a nut on the end of said bolt projecting toward said stripper plate, a spring under compression interposed between said nut and shoe and biasing said nut and stripper bolt toward said stripper plate, said stripper plate being provided with a through bore coaxial with said stripper bolt and nut, a retaining screw in said through bore anchored in said nut and securing said nut to the face of said stripper plate opposing said shoe, and means on said stripper plate preventing said nut from turning, whereby said stripper plate can be removed by merely removing said retaining screws without disturbing the position of any said springs.

2. A stripper spring unit as set forth in claim 1 wherein said last means comprises a flange projecting radially outwardly from said nut and provided with an axially extending shoulder, and a member on said stripper plate engaging said flange.

3. A stripper spring unit forming one of a plurality supporting a stripper plate from the shoe of a press and actuating the stripper plate to strip the workpiece from the tools on the shoe following each operation of the press, comprising a stripper bolt slidably mounted on said shoe for limited longitudinal movement relative to said shoe in the direction toward said stripper plate, the end of said stripper bolt projecting toward said stripper plate being threaded, a nut having an internally threaded bore through the threads of which mate with and secure said nut to said stripper plate, said nut also being provided with a retaining screw in said screw bored coaxial with said screw bolt and nut, the retaining screw in said bore having a threaded end removably screwed into said thread of said nut and having an enlarged head engaging a side of said stripper plate opposite from said nut to secure said nut to the face of said stripper plate opposing said shoe, and means projecting into said stripper plate and nut to prevent said nut from turning, whereby said stripper plate can be removed by merely removing said retaining screws without disturbing the compression or position of any of said springs.

4. A stripper spring unit as set forth in claim 1 wherein said last means comprises a flange projecting radially outwardly from said nut and provided with an axially extending shoulder, and a member on said stripper plate engaging said shoulder.

5. A stripper spring unit forming one of a plurality supporting a stripper plate from the shoe of a press and actuating the stripper plate to strip the workpiece from the tools on the shoe following each operation of the press, comprising a stripper bolt having an enlarged head at one end and being externally threaded at its opposite end slidingly arranged in a through bore in said shoe with its threaded end projecting toward said stripper plate and with its head arranged in a counterbore of said bore to limit the longitudinal movement of said stripper bolt relative to said shoe in the direction of said stripper plate, a nut having an internally threaded bore through the threads of which mate with and secure the nut on the threaded end of said stripper bolt, a helical compression spring under compression surrounding said stripper bolt and interposed between said nut and shoe and biasing said nut and stripper bolt toward said stripper plate whereby the force of each compression spring can be individually adjusted by turning its nut with reference to its stripper bolt, said stripper plate being provided with a through bore coaxial with said stripper bolt and nut, a retaining screw in said last mentioned through bore having an enlarged head at one end and being externally threaded at its opposite end removably screwed into said threads of said nut and with its head arranged in a counterbore of said last mentioned through bore to secure said nut to the bore of said stripper plate opposing said shoe, and means on said stripper plate preventing said nut from turning, whereby said stripper plate can be removed by merely removing
said retaining screws without disturbing the adjustment of any stripper spring unit or altering the compression or position of any of said springs.

6. A stripper spring unit as set forth in claim 1 wherein said last means comprises an integral flange projecting radially outwardly from said nut and provided with an axially extending shoulder, and a member on said stripper plate engaging said shoulder.

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