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MATERIAL WORKING APPARATUS

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FIG. 1

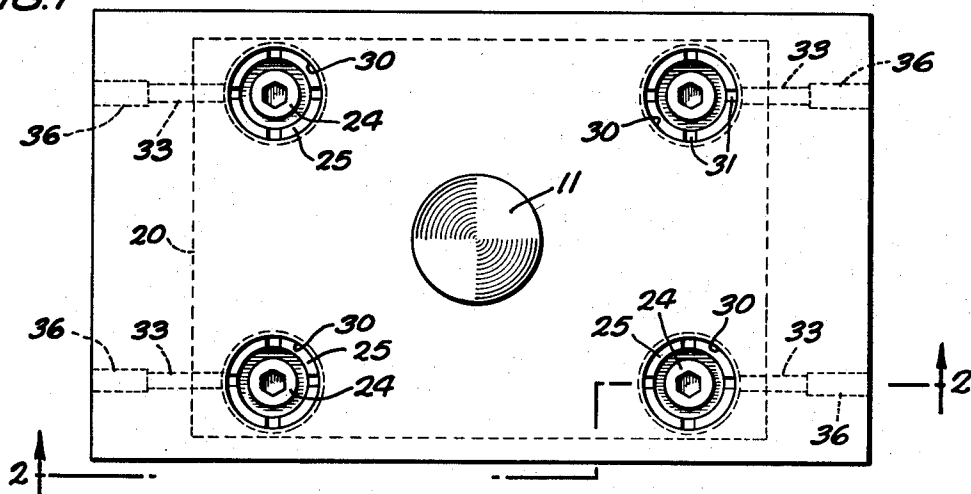
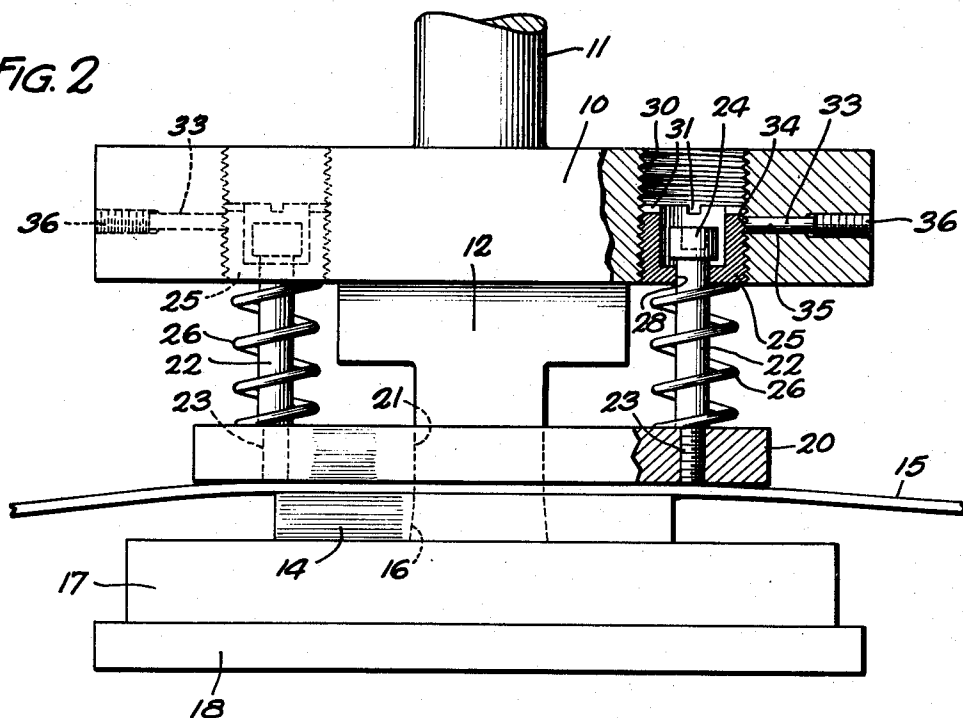


FIG. 2



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MATERIAL WORKING APPARATUS

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6 Claims. (Cl. 164—118)

This invention relates to material working apparatus, and more particularly to punch presses and material stripping means therefor.

In certain types of punch presses, after the blank or article is punched from the material the latter is stripped from the punch by strippers actuated by compression springs. In such instances stripper bolts are used for fixing the position of the stripper relative to the face of the punch. In maintaining tools of this type, that is, the sharpening of the punch and die, the stripper is usually dismantled, involving removal of the stripper bolts and springs. Furthermore, after each grinding of the punch, similar variations must be made on the stripper bolts to maintain the relationship of the stripper to the face of the punch, such as the forming of additional threads thereon. In tools of this type, the tension in the springs is usually fixed at a given value so as to apply a given pressure to the material at the end of the downward travel of the punch, and to adapt the springs for compression thereof given distances. However, as the punch is ground for sharpening and as the distance between the stripper and the punch holder decreases, the tension in the spring may be increased until the safe stress in the spring is exceeded, so that when the tool is in use, the spring may break.

An object of the invention is to provide a material working apparatus having a stripping means which is simple in structure, efficient in operation, and highly variable for variations in the punch associated therewith.

With this and other objects in view, the invention comprises a material working apparatus including a relatively movable punch and die, the former carried by a punch holder which supports, through the aid of stripper bolts, a stripper element, springs normally urging the element toward the die, and variable means disposed in the holder for supporting the bolts and the stripper at varied positions relative to the punch.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawing, wherein

Fig. 1 is a top plan view of the apparatus, and Fig. 2 is a vertical sectional view taken substantially along the line 2—2 of Fig. 1.

Referring now to the drawing, reference numeral 10 designates a punch holder having a shank 11 which may be mounted in a reciprocable head of a punch press (not shown). A punch 12 is removably mounted upon the punch holder

10 by any suitable means (not shown). The punch 12 cooperates with a die 14, during the operation of the press, to punch portions or articles from a material 15, the die having an aperture 16 therein conforming to the cross-sectional contour of the punch 12. The die 14 is mounted upon a die shoe 17 in any suitable manner (not shown), the latter having flanges 18 thereon for use in mounting on the punch press (not shown).

A stripper element 20 is, in the present embodiment, centrally apertured, as at 21, to receive the punch 12 and to move relative to the punch during the punching operation. In the present embodiment there are four stripper bolts 22, which have their lower ends threadedly connected, as at 23, with the stripper element 20. The upper ends of the bolts, including their heads 24, are disposed in cup-shaped supporting elements or sleeves 25 of the cross-sectional contour illustrated in Fig. 2. Compression springs 26 are disposed concentric with their respective stripper bolts 22 between the stripper element 20 and their respective sleeves 25. The bolts 22 are free to move in apertures 28 in the bottom walls of the sleeves 25, these walls or portions of the sleeves functioning in cooperation with the heads 24 to limit the downward movement of the bolts 22 to position the element 20 relative to the punch 12. The sleeves 25 are externally threaded and are disposed in threaded apertures 30 of the punch holder 10, tool receiving slots 31 being formed in the upper edges of the sleeves so that, through the aid of a suitable tool, the sleeves may be adjusted vertically.

Means is provided to lock each of the sleeves 25 in any desired adjusted position. This means includes rods 33, which are formed of suitable material, preferably brass, and are provided with thread portions 34 in their inner ends to conform to the adjacent threads of their apertures 30. The rods 33 are disposed in apertures 35 and are engaged by set screws 36 threadedly disposed in the punch holder in alignment with their respective rods to serve in forcing the rods into intimate engagement with their respective sleeves 25.

Considering now the operation of the apparatus, let it be assumed that the die 14 is disposed at a fixed position and that the punch is reciprocated through repeated cycles during intermittent advancement of the material 15. In following one complete cycle of the apparatus, starting with the punch in the upper position and the material 15 advanced, the punch holder 10 with the punch 12 and the stripping mechanism are moved downwardly a sufficient dis-

tance for the stripper element 20 to first engage the material and cooperate with the die in holding the material against displacement, immediately after which the punch cooperates with the die in punching a portion or article from the material. This completes one half of the operating cycle. The upper structure is then moved upwardly, first removing the punch from the die, the force of the springs 26 on the stripper element 20 functioning to hold the material 15 until the punch has been removed therefrom, after which the heads 24 of the stripper bolts will be engaged by the sleeves 25 to raise the stripper element upwardly with the punch. This operation continues, but eventually the punch will need to be reconditioned, that is, sharpened by a grinding operation.

In other structures of this type, it is necessary that the stripper plate, together with the stripper bolts and springs supporting it, be removed from the punch to allow sufficient room about the punch for the grinding wheel during the grinding or reconditioning process. In the present embodiment this is not necessary. To condition the punch for grinding, the set screws 36 are loosened, to remove the holding force of their rods 33 upon their associated sleeves 25. The sleeves 25 are then rotated in their threaded aperture, to draw the stripper element upwardly on the punch to expose a sufficient portion of the working end of the punch for the grinding operation.

After the completion of the grinding operation, the stripper element 20 and its associated parts, which have retained their connection with the punch holder, may be moved downwardly or toward the working end of the punch to locate the element in its new position. A new position is required for the stripping element due to the fact that a portion of the material at the working end of the punch has been removed during the grinding operation. Thus it is possible to locate the stripping element at a new position through the aid of the sleeves 25 in their threaded apertures. When this has been accomplished, the rods 33 are forced into intimate engagement with their sleeves 25 through the aid of the set screws 36 and the apparatus is again in condition for use. During this reconditioning process, all of the parts have been retained in assembly, eliminating any possibility of loss of or damage to any of these parts, which might occur if they should be removed entirely from the punch holder and separately laid to one side. Furthermore, due to the maintaining of the various parts in assembly, the time required to recondition the punch is reduced considerably. One of the main advantages, however, lies in the fact that wide and numerous variations may be made in the position of the stripper element relative to the punch without varying the associated springs or the desired tensions or forces created therein. Furthermore, if desired the entire stripper mechanism may be removed from the punch and punch holder without separating any of the parts therefrom. This is due to the fact that it is not necessary to remove the bolts 22 from the stripper element, and due to their structures, the springs 26 as well as the sleeves 25 are maintained in assembly. Whether removed entirely or varied relative to the punch holder and punch, the springs in the stripping mechanism maintain their uniform tension throughout the life of the punch, this being of great importance in the accurate production of

the work, particularly the production of numerous like parts from the material without variations which might result from variations in the tension of the springs or the force of the stripper element.

Although specific improvements of the invention have been shown and described, it will be understood that they are but illustrative and that various modifications may be made therein without departing from the scope and spirit of this invention as defined by the appended claims.

What is claimed is:

1. In a material working apparatus, a punch, a holder therefor, a stripper element movable relative to the punch from a normal position, a spring to normally apply a given force to the stripper element to urge it toward its normal position, a reciprocal member secured to the stripper element, a support for the member carried by the holder and movable relative thereto to vary the position of the element relative to the punch free of causing any variations in the force of the spring, a member laterally movable in the holder, and means to move the member into intimate engagement with the support to lock the support in any desired position relative to the holder.

2. In a material working apparatus, a punch, a holder therefor having a threaded aperture therein, a stripper element movable relative to the punch from a normal position, a spring to normally apply a given force to the stripper element to urge it toward its normal position, a reciprocal member having a reduced threaded end disposed in a threaded aperture of the stripper element and a shoulder resting thereon, and a threaded support for the member movable in the threaded aperture to vary the normal position of the element and maintain the said given force of the spring.

3. In a material working apparatus, a punch, a holder therefor having a threaded aperture therein, a stripper element movable relative to the punch from a normal position, a spring to normally apply a given force to the stripper element to urge it toward its normal position, a reciprocal member secured to the stripper element, a threaded support for the member movable in the threaded aperture to vary the normal position of the element and maintain the said given force of the spring, and a pin carried by the holder and movable into engagement with the support to lock the support in any selected position in the aperture.

4. In a material working apparatus, a punch, a holder therefor having spaced threaded apertures therein, and a stripper unit including a stripper element, reciprocable members having reduced threaded ends disposed in threaded apertures of the stripper element and adjacent shoulders resting thereon, springs disposed on the stripper element concentric with the members, and threaded supports for the members receivable in the said threaded apertures and movable therein to locate the stripper element at any desired position relative to the punch.

5. In a material working apparatus, a punch, a holder therefor having spaced threaded apertures therein, reciprocable members secured at spaced positions to the stripper element, springs disposed on the stripper element concentric with the members, threaded supports for the members receivable in the said threaded apertures and movable therein to locate the stripper element at any desired position relative to the

punch, and locking members carried by the holder and having thread portions formed at their inner ends to interengage and lock the supports in any of the desired positions.

6. In a material working apparatus, a punch, 5
a holder therefor having spaced threaded apertures therein, and a stripper unit including a stripper element, reciprocable members secured at spaced positions to the stripper element, 10
springs disposed on the stripper element concentric with the members, threaded supports

for the members receivable in the threaded apertures for connection of the unit to the holder and for normally positioning the stripper element at any desired location relative to the punch and cooperating with the element to maintain a given normal force in each spring, and means formed for interfitting engagement with each of the threaded supports to lock it in any desired location.

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