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RESILIENT PUNCHING DIE ACCESSORY TO GUIDE, STOP OR EJECT MATERIAL

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FIG 3

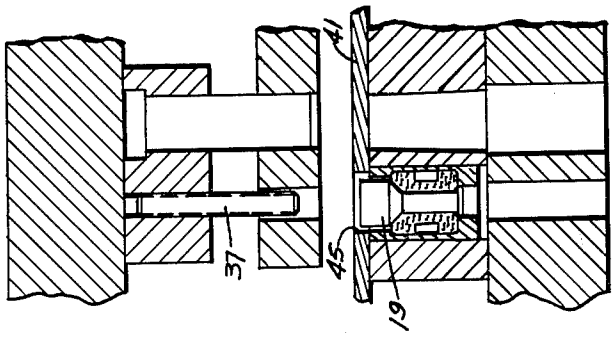

FIG 2

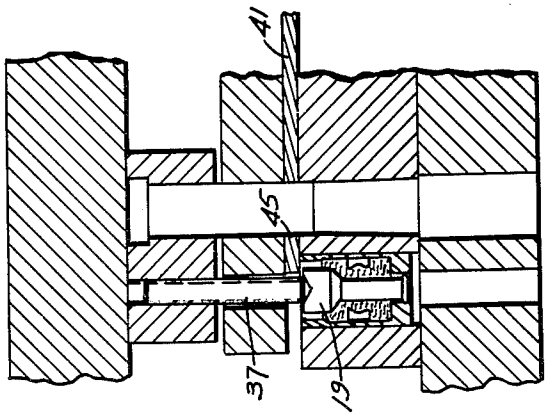

FIG 1

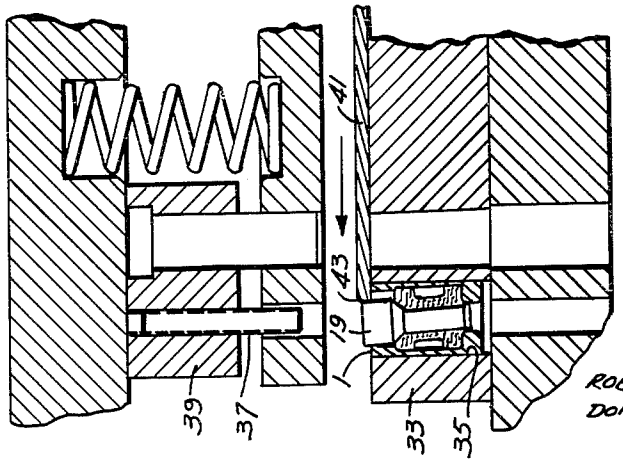

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FIG 4

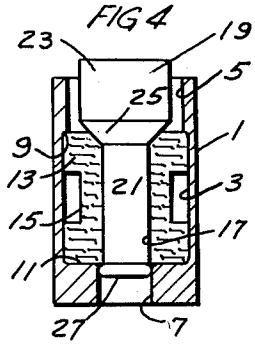


FIG 5

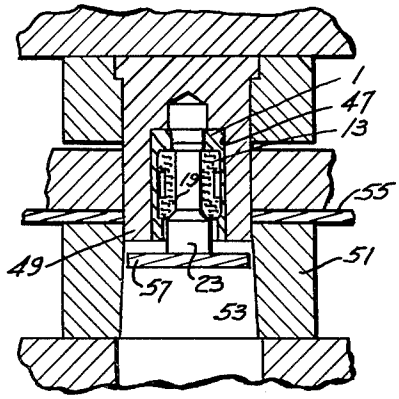
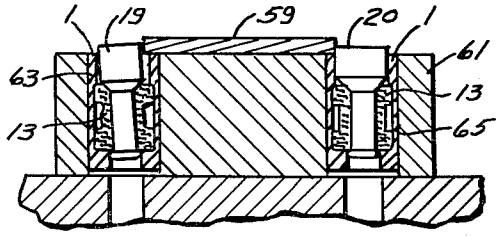
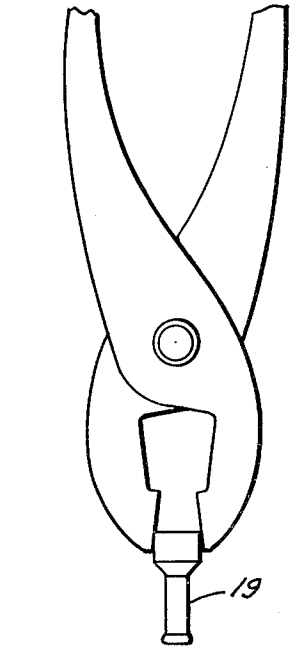


FIG 6





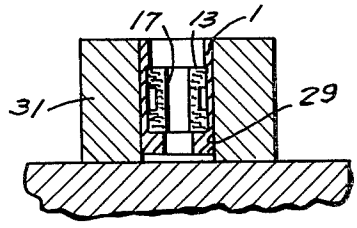


FIG 7

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RESILIENT PUNCHING DIE ACCESSORY TO GUIDE, STOP OR EJECT MATERIAL

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8 Claims. (Cl. 83—129)

This invention relates to an accessory for guiding or stopping material which is being fed to a machine such as a punch press, or for ejecting punchings from a die.

It is an object of the invention to provide a device which is simple but effective.

Another object is to provide a device which can be easily and quickly installed in a die.

A further object is to provide a device which is inexpensive and maintenance free.

Another object is to provide an accessory which can be used to successively locate the portions of a strip of material ot be punched, under the punch.

Still another object is to provide an accessory for guiding a strip of material to a punch and die.

Yet another object is to provide an accessory for ejecting punchings from a die.

These and other objects will become apparent from a study of this specification and the drawings which are attached hereto, made a part hereof and in which:

FIGURE 1 is an elevation with parts in section showing the device mounted in a die for use as a stop.

FIGURE 2 is a view similar to FIGURE 1 showing the stop depressed.

FIGURE 3 is a view similar to FIGURE 1 showing the stop entered in a succeeding punched opening.

FIGURE 4 is an enlarged sectional view of the device.

FIGURE 5 is a sectional view showing the device used in a punch as a punching ejector.

FIGURE 6 is a sectional view showing two forms of the device mounted in a die to serve as lateral guides for the stock.

FIGURE 7 is a sectional view showing the manner of removing the movable element of the device from the holder.

Referring first to FIGURE 4, numeral 1 indicates generally the body or holder which is tubular in form and defines a central chamber 3 having a relatively large axial top entrance 5 and a smaller axial bottom bore 7 forming annular shoulders 9 and 11 respectively.

A spool like member 13 of resilient material such as rubber, having a relatively high durometer, is forced into the chamber and is retained therein by the shoulders. A rubber having a durometer of from 40 to 50 is preferred. The groove 15 in this member provides space into which rubber, which is displaced as the device operates, can move. The member is provided with a central, cylindrical through hole 17.

The core element 19 has a cylindrical shank 21 adapted to fit snugly in hole 17, a cylindrical head 23 on one end of the shank, which is preferably larger in diameter than the shank and joined therewith by a chamfer or conical portion 25 and a guide bead 27 on the lower end which fits slidably in the hole 7. Since hole 7 and bead 27 are larger than hole 17 in the member 13, the bead must be forced through the hole 17 and the chamfer must also be seated partly within the spool before the bead will project through the spool. Thus the rubber will be expanded somewhat at the upper end to insure that it will be retained by the shoulder 9. The head 23 has an axial length such that it will project a predetermined distance above the level of the body 1.

The removal and insertion of the element 19 can be readily effected by means of pliers as shown in FIGURE 7. This view also shows the stop inserted in a bore 29 in a die 31.

Referring to FIGURES 1 to 3 which show the application of the device to a die 33 for use as a material stop. The body or holder 1 is press fitted vertically in a hole 35 in the die with the head 23 up.

A pin 37 is fixed in the punch holder 39 in axial alignment with stop element 19. Strip material 41 is fed into the die in the direction of the arrow so that the leading edge 43 thereof will engage the head 23 of the stop and tilt or deflect it into contact with the body 1 as shown in FIGURE 1, against the action of the rubber spool 13 which resists such displacement.

When the die is closed, as shown in FIGURE 2, to punch a hole 45 in the material, the pin 37 depresses the stop below the level of the lower surface of the material against the action of the rubber, and the rubber returns the stop to its initial condition, coaxial with the body, so that the stop moves under the leading end of the material. Thus when the material is advanced after the die is opened, the stop 19 will be projected up through the hole 45 just punched and will thereafter be engaged by the material and be forced to the tilted, stop position of FIGURE 1 to position the material for the next punching operation. This completes the cycle which is repeated each time the die closes and opens.

FIGURE 5 shows the body 1 of the device mounted in a coaxial hole 47 in a punch 49 with the head 23 of the stop directed downwardly. The die 51 is provided with the usual tapered hole 53 which receives the punch as it passes through the material 55 and assists it in shearing the metal. The punching 57 should fall freely through the hole 53 but because of oil, burrs etc., the punching may fail to drop and clog the die.

By inserting the device in the end of the punch as described, the member 19, which serves in the case as an ejector, will first strike the material as the punch descends and be stopped. As the punch continues to descend, the ejector will be forced into the body 1 against the action of the rubber spool. When the punching 57 has been sheared free of the material, the rubber will again project the member 19 from the body and eject the punching from the die.

FIGURE 6 shows the device used for guiding strip material 59 to the punch, the material moving toward or from the plane of the drawing. The die indicated by 61 has two holes 63 and 65 therein, one adjacent each edge of the strip and the body 1 having a rubber spool is inserted in each hole. One spool contains an element 19 such as described above while the other, which determines the position which the stock should occupy is provided with an element 20, which is the same as element 19 except that the head 23 is made larger in diameter so that it fits slidably in the bore 5 of the body.

When the elements 19 and 20 occupy their normal positions, the distance between the heads thereof is slightly less than the width of the material so that when the material is forced between them, the element 19 will yield and tilt as shown in FIGURE 6. This stresses the rubber spool which urges the element 19 toward element 20 and thus acts as a "crowding" device to maintain the matterial against the fixed element 20 despite variations in the width of the strip.

While I have set forth a specific embodiment of my invention for purposes of illustration, it is obvious that various changes and alterations can be made therein without departing from the spirit of the invention. I do not, therefore, wish to be limited to the specific form of the invention disclosed but desire protection falling fairly within the scope of the appended claims.

We claim:

1. A punching die accessory comprising a cylindrical

body defining a substantially central, cylindrical, coaxial chamber, a first coaxial bore of less diameter than said chamber, intersecting one end thereof, a second coaxial bore of less diameter than said first bore, intersecting the other end of said chamber, a tubular member of resilient, yieldable material mounted in said chamber and filling at least both end portions of said chamber, said member defining a coaxial, through hole of less diameter than said second bore, a core element comprising a cylindrical shank disposed in and filling said hole, a fulcrum means circumferentially disposed on and about said sank at one end thereof, coaxial therewith, said fulcrum means abutting one end of said member and slidably fitting said second bore, a cylindrical head on the other end of said shank, coaxial therewith, abutting the other end of said member and having a diameter greater than that of said shank but less than that of said first bore, said head being disposed within said first bore and extending a short distance beyond the end of said body, said element being tiltable, about said fulcrum means, from its normal coaxial position relative to said body, against the action of said resilient member, by a radially applied force, said head and said body constituting stop means for limiting the tilting of said element.

2. The structure defined by claim 1 wherein said tubular member and body define a void to receive portions of said member displaced by the element when said element is displaced from said normal position.

3. The structure defined by claim 2 wherein said tubular member is provided with a circumferential groove intermediate its ends to provide said void.

4. The structure defined by claim 1 wherein said fulcrum means comprises a bead having a curved cross-section.

5. The structure defined by claim 1 wherein said shank is joined to said cylindrical head by a flaring section and wherein the length of said shank between said fulcrum means and the start of said flaring section is less than the free length of said tubular member so that a portion of said member will be displaced when said fulcrum means is pushed through the hole in said member, to force said member into the adjacent end of said chamber.

6. The structure defined by claim 1 wherein the length of the second bore, from the line of its engagement with said fulcrum means to its outer end is greater than the distance by which said head extends beyond the end of said body, so that when said head is depressed by axially applied forces, to the level of said end of the body, the fulcrum means will remain engaged with said second bore.

7. A punch and die for punching strip stock including a tubular body set in said die in the path of said stock, but below the level thereof, a tubular member of resilient, yieldable material fitted within said body, a stop element mounted within said member and having one end normally projected by said member above the body into the path of said stock, said projecting end having a lateral clearance in respect to said body and being displaceable into contact therewith by the advancing stock, to stop said stock, a pin mounted on said punch in alignment with said stop element and adapted to depress said element below the level of the stock when the die is closed, said resilient member serving thereupon to move said stop element beneath said stock and to project it through the punched hole when said stock is again advanced.

8. A punch and die for punching strip stock including a fixed guide disposed in said die on one side of said stock, a tubular body set in said die, on the other side of said stock, but below the level thereof, a tubular member of resilient, yieldable material, fitted within said body, a stop element mounted within said member and having one end projected normally above the body, said projecting end having a normal position in which it has lateral clearance with respect to said body and being held in said normal position by said tubular member, said body being disposed so as to space the end of said element from said guide, a distance less than the width of said stock so that said end will be displaced away from said guide, said member and element serving to resiliently urge said stock toward said guide.

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