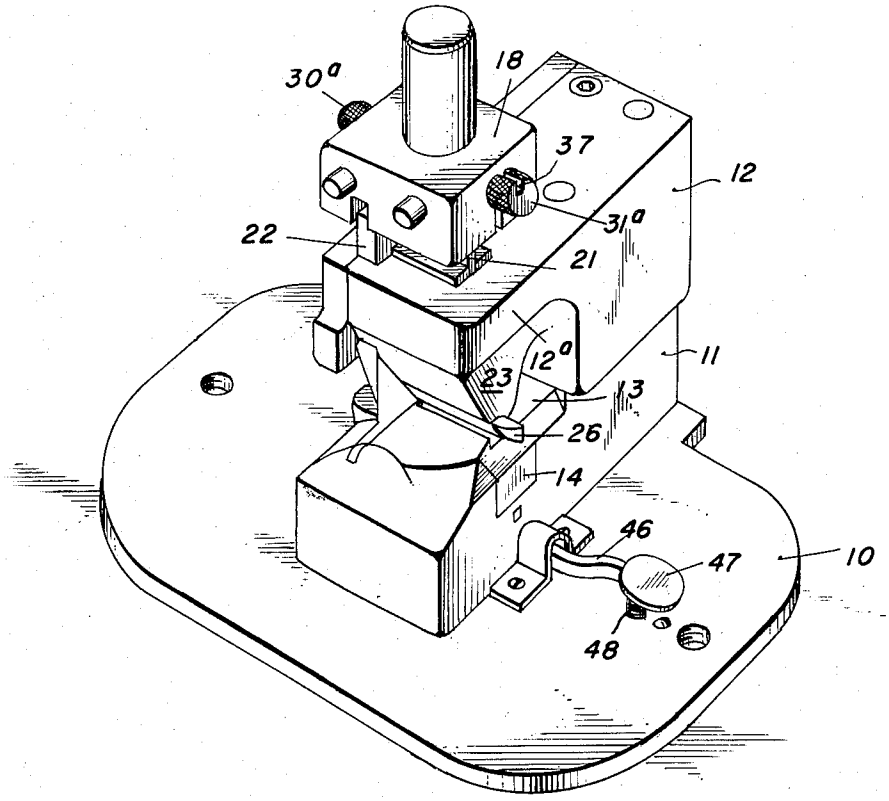
June 10, 1958 R. FEITL 2,838,112

PUNCH MEANS USEFUL IN SLIDE FASTENER MANUFACTURE

Filed Dec. 20, 1954 2 Sheets-Sheet 1

FIG. 1



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Filed Dec. 20, 1954 2 Sheets-Sheet 2

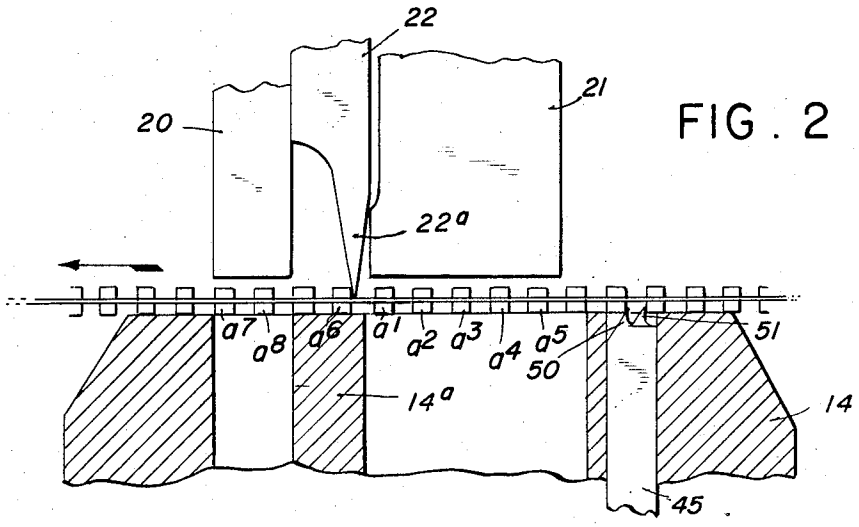


FIG. 2

FIG. 3

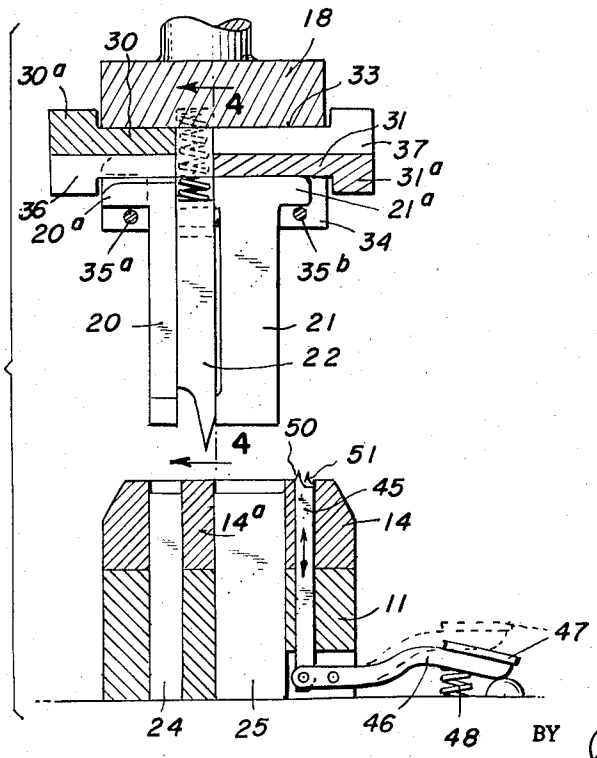
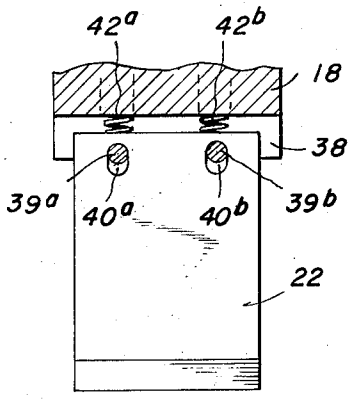


FIG. 4



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PUNCH MEANS USEFUL IN SLIDE FASTENER MANUFACTURE

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Application December 20, 1954, Serial No. 476,525

4 Claims. (Cl. 164—47)

This invention relates to improvements in punch means useful in slide fastener manufacture, and more particularly to a manually controlled punch and die mechanism for producing individual slide fasteners or zippers to any length required from a so-called continuous fastener chain and being also effective to provide an element-free extension at one or both ends and/or an element-free gap adjacent one end, usually the upper end, of the individual slide fastener elements being produced.

A punch and die mechanism of this general type may incorporate a plurality of punches, one being transversely arranged so as to cut off desired lengths of continuous fastener chain drawn from a drum or roll thereof, and the other being longitudinally arranged and functioning to sever a small number of the coupling elements struck thereby from the chain, thus to provide an element-free portion in the individual fastener chains as they are produced. A preferred punch arrangement as disclosed and claimed in my copending application Serial No. 439,112, filed June 24, 1954, now Patent No. 2,817,403 uses, in addition to the cutting-off punch, two such element-removing punches spaced from one another the small distance occupied by two or three fastener elements of the chain, one element-removing punch being sufficiently long as to remove five or six fastener elements, for example, and the other being substantially shorter so as to effect removal of but two elements, for example, the arrangement further contemplating the cut-off punch being located between the two element-removing punches as aforesaid and in position such that it cuts through the chain along a transverse line corresponding to the rear line of the small number of retained elements (which is also the front line of the longer element-free portion resulting from the action of the longer longitudinal punch).

The action of such a punch arrangement is to produce individual slide fasteners or zippers of length determined by the amount of chain drawn from the roll and advanced through the punch and die set, which are each invariably characterized by an element-free extension at one end (corresponding to such an extension conventionally formed at the bottom of slide fasteners or zippers), and a short-length element-free gap located near its other or upper end and spaced therefrom the distance occupied by two or three fastener elements, through which a line of stitching serving to secure the slide fastener tapes adjacent their upper ends in the fold of a garment or the like may be sewn, without danger to the needle as could otherwise result from the needle striking the elements if retained.

A general object of the invention is to render a punch and die mechanism as aforesaid more flexible as to the types of slide fasteners capable of being produced thereby, through the incorporation of means by which one or both of the element-removing punches may be rendered ineffective at the will of the operator, whereby to adapt the mechanism to the production of slide fasteners or zippers characterized by fastener elements extending in a continuous, uninterrupted row from end to end thereof, or by the conventional element-free extension at its bottom end and fastener elements running continuously to the top end, or by a needle gap near its top end and fastener elements running uninterruptedly to the bottom end, such in addition to a slide fastener or zipper characterized both by an element-free extension at its bottom end and an element-free gap near its upper end, for the production of which the prior mechanism was designed.

More particularly, an object of the invention is the provision, in a punch and die mechanism as described, of hand-controlled connections between the press ram and each of the element-removing punches, each of which is adapted in one position to provide a rigid abutment between the ram and its punch, and in another position to render its punch ineffective to remove fastener-elements disposed in the path of movement thereof.

Yet a further object of the invention is the provision, in a punch and die mechanism as aforesaid, of an improved construction of cut-off punch which enables said punch in its downward movement to serve as a pilot capable of imparting to the portion of the chain extending between itself and a rearwardly disposed chain-holding device a certain amount of tension, which is such as to insure that the fastener elements to be removed are in the proper position as to be cut completely, rather than partially, through by the action of said element-removing punches.

Another object of the invention is the provision, in a punch and die mechanism as described, of a novel hand-controlled chain stop or holding device which acts in collaboration with the cut-off punch to maintain the chain tensioned and in proper position lengthwise, such that the elements disposed beneath the element-removing punches are properly aligned therewith for complete removal.

A still further object of the invention is the provision, in a punch die mechanism as described, of a resilient connection between the ram and the cut-off punch which enables said punch to give upon accidentally striking a fastener element, thereby allowing for tensioning of the chain in direction as to shift said fastener element out of the path of said punch.

A still further object of the invention is the provision, in a punch and die mechanism as aforesaid, of a combined punch blade construction and resilient punch-to-ram connection, which together insure a smooth and proper functioning of the cut-off punch.

The above and other objects and advantages of a punch and die mechanism for the production of individual slide fasteners or zippers according to the invention will appear from the following detailed description thereof, taken with the accompanying drawings illustrating the same, in which—

Fig. 1 is a perspective view of one embodiment of a punch and die mechanism as herein proposed which is currently in use;

Fig. 2 is a diagrammatic view illustrating the action of the cut-off and element-removing punches, as well as of a chain stop, on a slide fastener chain moving through the die set incorporated in the punch and die mechanism shown in Fig. 1;

Fig. 3 is a longitudinal vertical section taken through the punch and die mechanism shown in Fig. 1, illustrating the manner in which the element-removing punches may be each selectively brought to either an idling or a working position; and

Fig. 4 is a section along line 4—4 of Fig. 3.

Referring to the drawings, such illustrate a punch and die mechanism comprising a base plate **10** mounting a die set illustratively consisting of lower and upper blocks **11, 12,** which are rigidly affixed to one another and to said

base plate. The lower block 11 has an upper face portion forming a horizontal working surface 13, which surface may be provided at least in part by the upper surface of a hardened wear block 14 set into said lower block 11 so as to extend front to rear thereof (left to right, Fig. 1). The upper block 12 may be formed roughly to the shape of an L, and it is so disposed that a leg portion 12*a* thereof extends horizontally so as to overhang the aforesaid working surface 13.

Disposed above the leg portion 12*a* of the upper die block is a reciprocating head 18 (hereinafter for convenience referred to as a ram) mounting the longitudinally disposed element-removing punches 20, 21 and a transversely disposed cut-off punch 22, said ram being reciprocated as by operator-controlled foot-pedal means (not shown). As best seen in Fig. 2, said element-removing punches 20, 21 are spaced from one another in the direction of chain travel a distance normally occupied by a small number, i. e. two or three, of the fastener elements of the chain. Also, it will be seen that element-removing punch 20 has length such as to remove but two or three of the fastener elements, and that element-removing punch 21 is longer by an amount such that it is capable of removing, say, five of the fastener elements. While not specifically illustrated, it will be understood that the length of the transversely disposed cut-off punch 22 is somewhat greater than the overall width of the fastener chain, whereby it is effective to cut off desired lengths of said chain.

As generally shown in Fig. 1, the punches 20, 21 and 22 operate through and have bearing in the horizontal leg portion 12*a* of the upper die block 12 and a front-to-rear rib 23 depending therefrom. The element-removing punches 20, 21 are adapted to be projected a small distance into openings 24, 25 (Fig. 3) provided therefor in the lower die block 11 (or wear insert 14), which openings receive the cuttings from the fastener elements severed by said punches. Fig. 2 also makes it clear that the cutting edge of the cut-off punch 22 is adapted to engage against an anvil surface designated 14*a*, shown to have front-to-rear dimension such that it accommodates with suitable clearance two fastener elements of the fastener chain being advanced through the mechanism.

Set into a recess provided in the rib 23 is a deflector bar which functions to deflect or fold trouser fly pieces, sometimes sewn to a continuous fastener chain in an operation preliminary to producing measured lengths thereof, out of the path of the aforesaid punch means. It may be added that the punch and die means so far described conforms generally to that disclosed in my aforesaid application, except as to the provision of element-removing punch 20, and that the use of the latter is disclosed in other applications which, with the present and my aforesaid prior applications, are commonly owned. Consequent to the fixed mounting of the element-removing punches 20, 21 in the ram 18, the action of the prior punch and die mechanism as described is of course to produce measured lengths of fastener chain (zippers) invariably characterized by an element-free extension at one end and a short-length element-free gap near the other end.

According to the present invention, means are provided for rendering either one or both of said element-removing punches 20, 21 ineffective to perform their element-removing function, i. e. of cutting through the coupling heads and thereby removing the fastener elements disposed in the respective paths of movement of said punches. For this purpose, two horizontally disposed cylindrical members 30, 31 (Figs. 1 and 3), to be hereinafter referred to as pins, are mounted to rotate in the ram 18. Said pins are coaxially disposed and are contained in a bore 33 extending front to rear of the ram, and which connects on its under side with a vertically aligned slot 34 opening through the under face of the ram, into which slot the upper ends of the punches 20, 21 extend.

Normally, the pins 30, 31 provide a rigid abutment or link interposed between the body of the ram 18 and the upper ends of said element-removing punches, which latter are held suspended in the ram slot 34 as by cross bolts 35*a*, 35*b* which bridge said slot and are engaged by laterally extending holding lugs 20*a*, 21*a* on the upper ends of said punches. However, it is a feature of invention that the pins 30, 31 are formed with radial slots 36, 37, respectively, having width slightly greater than the thickness of the upper ends of the punches 20, 21, and axial length greater than the length of said punches. Accordingly, when a pin 30 or 31 is turned in the ram 18 to a position such that its radial slot 36 or 37 opens to the ram slot 34, the punch associated with the turned pin is rendered ineffective since, upon striking a fastener element disposed below same consequent to lowering of the ram, said punch is free to move harmlessly into the slot of the said turned pin. It will be obvious also that, when both of the pins are turned as aforesaid from their normal position, both of the punches 20, 21 are rendered ineffective.

To enable the operator to turn the pins 30, 31 at will from and to their normal position, said pins are formed sufficiently long that their outer ends project from the front and rear side faces of the ram, and said projecting ends are enlarged to form knobs 30*a*, 31*a*, which may be readily grasped for turning. As seen in Fig. 1, the peripheral surfaces of the knobs are knurled to facilitate their being turned by hand, and the slots 36, 37 are continued axially through said knobs so that the operator may determine by simple inspection if the punches 20, 21 are in their effective or their ineffective positions. While not shown, means for indexing the pins 30, 31 for 180° turning movement from and to a position in which they render the punches ineffective may be provided.

The above-described mounting and connection of the element-removing punches 20 and 21 in and to the ram 18 by which they are reciprocated renders the mechanism highly flexible in respect to the types of slide fasteners or zippers capable of being produced therein. For example, by cutting both of said punches 20, 21 out of operation (by rendering them ineffective as above), the punch and die mechanism is readily adapted to the production of any desired length of slide fastener or zipper characterized by fastener elements running continuously from end to end thereof. By cutting the punch 20 out of operation, the resulting fastener is characterized by an element-free extension at one end and is devoid of the element-free gap near its other end. Finally, by cutting the punch 21 out of operation, a fastener or zipper characterized by an element-free gap near its top end but devoid of an element-free extension at its opposite end is provided. Additionally, the mechanism may be set up to function as the known mechanism and thereby to produce desired lengths of slide fasteners or zippers, each characterized by an element-free extension at its one (bottom) end and an element-free gap adjacent its other end.

Figs. 3 and 4 illustrate another feature of the invention, according to which the cut-off punch 22, rather than being rigid with the ram 18, is connected thereto by a lost-motion connection and is also backed by resilient means enabling the punch to "give," whereby in operation it partakes of what might be termed two-stage movement. Thus, by reference to Fig. 4, the upper end of the punch 22 extends into a cross slot 38 machined or otherwise cut into the under face of the ram 18 for its reception, and the punch is suspended in said slot on slot-bridging pins 39*a*, 39*b* which extend through vertically elongated holes 40*a*, 40*b* formed in the upper end of said punch. Said punch 22 is normally urged into its lowermost position (as determined by the upper edges of the holes 40*a*, 40*b* engaging against the aforesaid pins 39*a*, 39*b*) in which its upper edge is spaced from the bottom of the slot 38 as by means of coil springs 42*a*, 42*b*, illustratively shown to be seated in spring sockets provided in the body of the ram, which are disposed so as to

be reactive against the top edge of said punch. Accordingly, should the punch lower directly onto a fastener element, it may "give" and in so doing retract slightly into the cross slot **38** until it engages against the bottom of said slot, whereupon it moves positively with the ram.

As best seen in Fig. 2, the blade or cutting edge portion **22***a* of the cut-off punch **22** is relieved in such a manner that it tapers both forwardly-downwardly and rearwardly-downwardly towards its cutting edge proper, and said cutting edge is spaced forwardly of the front-end edge of the rearward element-removing punch **21** a predetermined distance which is slightly less than the normal spacing between any two adjacent fastener elements of the same longitudinal row thereof. Fig. 3 also shows that in the normal position of the cut-off punch **22**, to which it is urged by its backing springs **42***a*, **42***b*, its cutting edge is normally at a lower level than the cutting edges of the associated element-removing punches **20**, **21**. Thus, the cut-off punch **22**, in addition to its usual function of severing measured lengths of fastener or zipper chain from the continuous chain advanced to it, has the further function of a pilot serving to insure proper positioning of the elements to be removed beneath the element-removing punches **20**, **21**.

In its piloting function, the punch **22** works in collaboration with a fastener chain holding or stop means which, as shown in detail in Figs. 2 and 3, includes an upright rod **45** adapted to be vertically reciprocated in the lower die block **11** and its wear insert **14** by means of an operating lever **46**. Said lever, which is fulcrumed intermediate its ends to said die block, is connected at its inner end to the lower end of said rod, and its outer end, which may be formed as a thumb-piece **47**, is normally urged to raised position by a spring **48**, so that said rod has a normal lowered or retracted position. At its upper end, the rod **45** is formed with two points **50**, **51** which are adapted, upon the rod **45** being projected upwardly by finger pressure applied to the thumb-piece end **47** of the operating lever **46**, to extend into the space between two fastener elements of the chain in the manner illustrated in Fig. 2. When this occurs, movement of the fastener chain to the left or in advancing direction is positively prevented, since the points **50**, **51** act as stop pins.

The distance between the fastener stop rod **45** and the cutting edge of the punch **22**, in terms of the number of fastener elements provided on the length portion of chain extending between said rod and punch when said chain is under a more or less predetermined tension, is such that (for example) five of the fastener elements designated a^1–a^5 inclusive are in the required vertical alignment with the element-removing punch **21** as insures all said elements being completely removed, rather than any one of them, such as either of the endmost elements a^1 and a^5, being only partially cut through by said punch. The aforesaid special shaping of the cut-off punch **22** enables it to apply said predetermined tension to the aforesaid length portion of the chain which extends between the chain stop rod **45** and the cutting edge of the punch, because following initial contact of said cutting edge with a fastener element disposed therebelow (the fastener element designated a^6 in Fig. 2), continued lowering of the punch results in said element a^6 being cammed to the left by an amount which insures not only the required vertical alignment of the fastener elements a^1–a^5 inclusive with said element-removing punch **21**, but also renders the chain tapes carrying said elements taut, which is highly desirable as it facilitates element removal.

It should be understood that the element a^6, and hence the following elements a^1–a^5 inclusive may be roughly positioned laterally on the anvil **14** and with respect to the punch **21** by tension applied by the operator to the forward or advanced end of the chain (to the left of the punch **20**). However, the cut-off punch **22**, in partaking of its final lowering movement, in effect takes over and supervises the tensioning of the chain as aforesaid, and in addition applies the requisite amount of tension thereto. Of course, should the cutting edge of the punch **22** engage full on the upper surface of a fastener element corresponding to the element a^6, the springs **42***a*, **42***b*, which back said punch, enable it to give the limited amount necessary for said cutting edge to glide over the top surface of said fastener element and finally to lower into the space immediately to the right thereof, whereupon it exercises its element-camming and chain-tensioning function as aforesaid. It might be added that, upon the cutting edge of the punch **22** exercising its leftward camming action on a fastener element corresponding to that designated a^6, the two elements designated a^7, a^8 which are to be removed to provide the element-free gap near one end of the chain, are necessarily correctly located below the element-removing punch **22**, assuming of course that the operator maintains the forward end of the chain under tension, as he is supposed to do.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above descripion or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Punch and die mechanism for the production of individual slide fastener chains having one or more element-free spaces along the length thereof from a continuous chain comprising, in combination, a die set including a ram and a die, punch means operatively carried by said ram and coacting with the die and comprising at least one longitudinally disposed fastener-element removing punch, of length as to be effective to remove a predetermined small number of fastener elements from a length portion of the chain disposed on said die, and a transversely disposed cut-off punch for cutting off desired lengths of fastener chain from the continuous chain, said cut-off punch being disposed forwardly of said element-removing punch and tapering to a cutting edge which is spaced forwardly of the front-end edge of said element-removing punch a distance which is slightly less than the normal spacing between any two longitudinally related fastener elements of the chain, said cut-off punch being further mounted for limited retracting movement in a slot provided therefor in said ram, spring means in said slot urging said cut-off punch to a normal position in which its said cutting edge is disposed closer to the chain than is the cutting edge of said element-removing punch whereby, upon the ram being actuated on its working stroke, the cutting edge of the cut-off punch is adapted to cammingly engage with a fastener element of the chain disposed generally in the path of movement thereof prior to the cutting edge of the element-removing punch engaging said chain, and normally inactive chain-stop means operatively mounted in said die rearwardly of said element-removing punch and adapted when rendered active to move against the chain and anchor it at the point of its engagement therewith, the cutting edge of said cut-off punch and the chain-stop means being spaced apart in the direction of the length of the fastener chain a predetermined distance which is greater than the length portion of the chain occupied by the predetermined number of the fastener elements to be removed, the construction and arrangement being such that said cut-off punch, in addition to its fastener-chain cutting function, also serves preliminary to exercising said function as a pilot acting in collaboration with said stop means to tension the portion of the chain extending therefrom to said point of anchorage as required to position the predetermined number of fastener elements to be removed in the path of movement of said element-removing punch

whereby said punch effects complete removal of all said elements.

2. Punch and die mechanism as defined in claim 1, wherein said chain-stop means comprises a rod vertically reciprocable in and through the upper face of the die, said rod terminating at its upper end in at least one point adapted to enter the space between and lock with any two adjacent fastener elements of the chain disposed on said die then located above said rod, said rod being normally retracted in the die, and manual means for actuating said rod upwardly so as to project said point into locking relation as aforesaid.

3. Punch and die mechanism for the production of individual slide fastener chains from continuous fastener chain including, in combination, a reciprocating ram, two longitudinally aligned fastener-element removing punches spaced a small distance from one another, a transversely disposed individual fastener-chain cut-off punch located intermediate said two punches, said two longitudinally aligned punches being mounted for retracting movement in a longitudinally extending slot provided in the ram into which the upper ends of said two punches extend, operator-controlled means individual to each of said two longitudinally aligned punches for selectively controlling retracting movement of said longitudinally disposed punches in said slot, said operator-controlled means extending in substantial coaxial alignment with one another and being interposed between the closed end of said slot and the corresponding ends of said two longitudinally aligned punches and being each operative in at least one predetermined position to permit its associated one of said two punches to retract to an inoperative position within the slot, said transversely disposed cut-off punch being also mounted for retracting movement in a slot provided in said ram which intersects said

first-named slot and into which the upper end of said punch extends, and spring means operative between the closed end of the last-named slot and said upper end of the transversely disposed cut-off punch for resisting retracting movement of said punch but enabling it to give a limited amount upon striking a fastener element in its path.

4. Punch and die mechanism as set forth in claim 3, wherein said operator-controlled means comprises two coaxially disposed cylindrical members mounted for rotation in said ram in a common bore provided therefor which extends through said longitudinally extending slot, said members each normally providing a rigid abutment for the end of its associated one of said two longitudinally aligned punches but having a radial slot adapted in one angular position thereof to align with said longitudinally extending slot thereby to permit retraction of its said associated punch thereinto.

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