Aug. 7, 1962 E. J. BOHABOY ETAL 3,048,328

APPARATUS FOR WORKING SELECTED PORTIONS OF ARTICLES

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FIG. 1

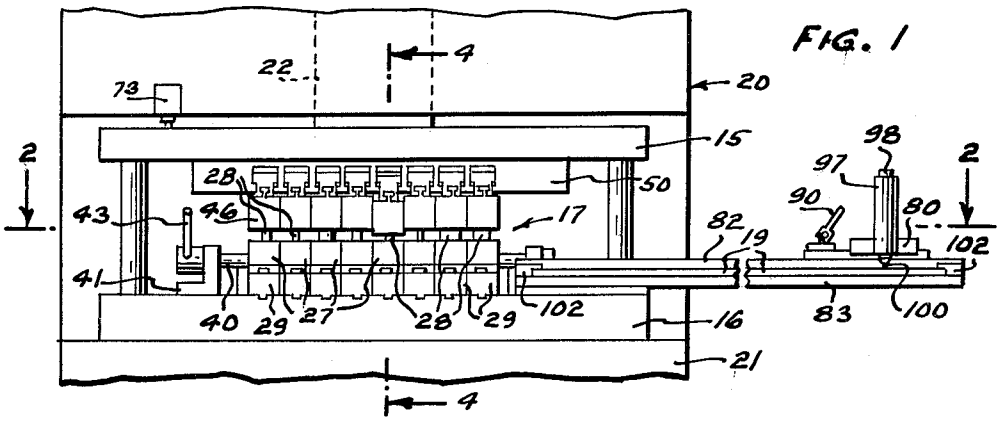
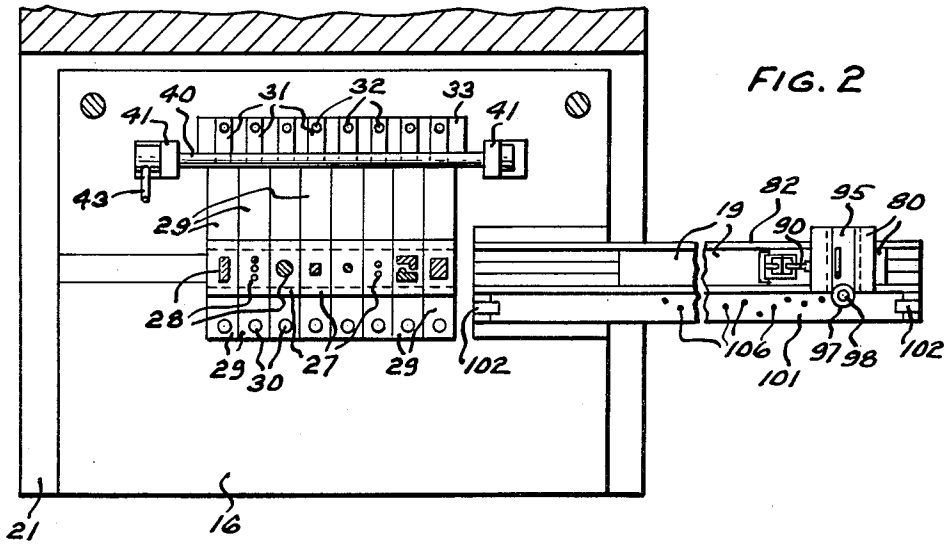


FIG. 2



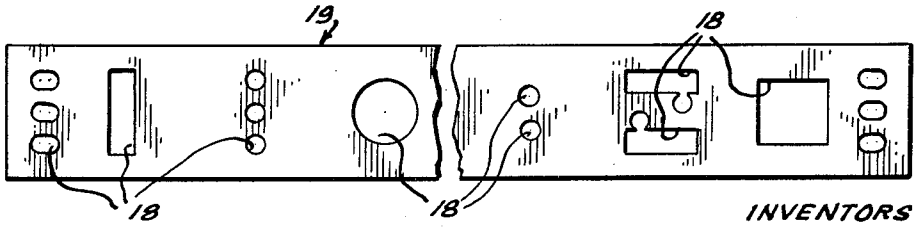


FIG. 3

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FIG. 5

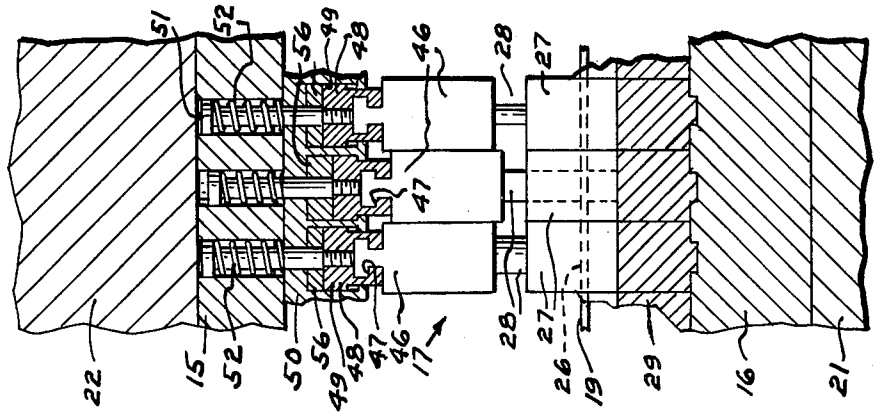
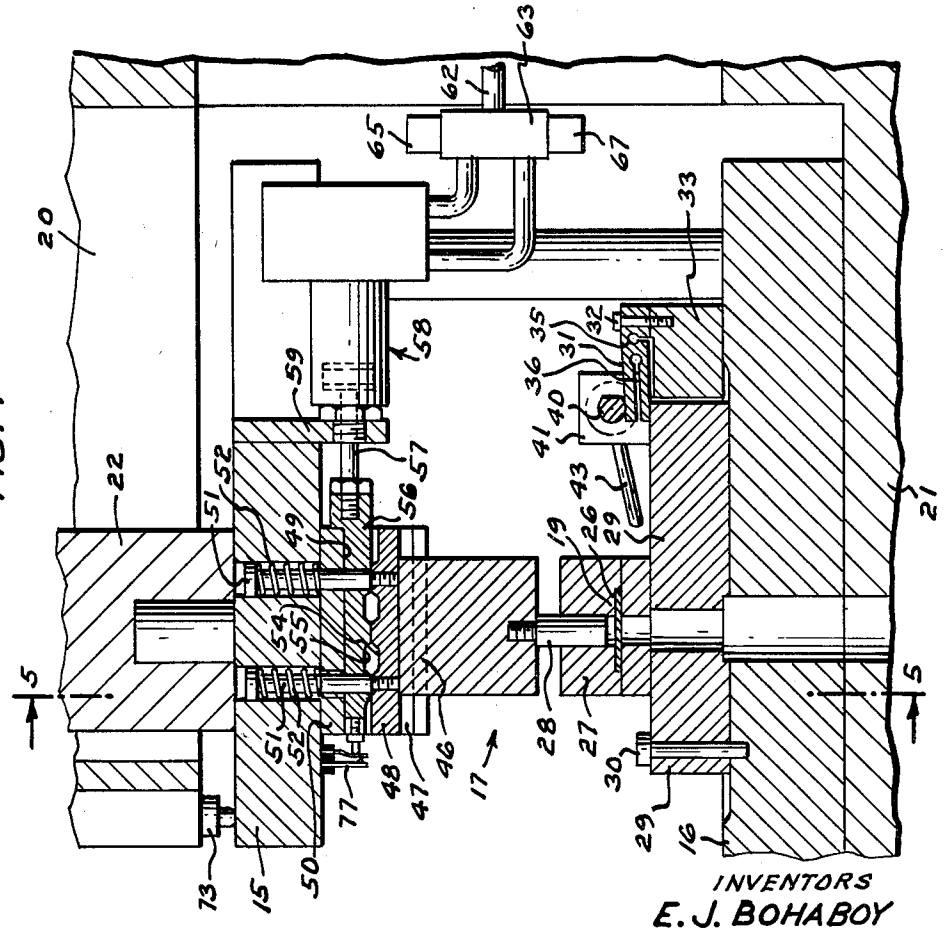


FIG. 4



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FIG. 6

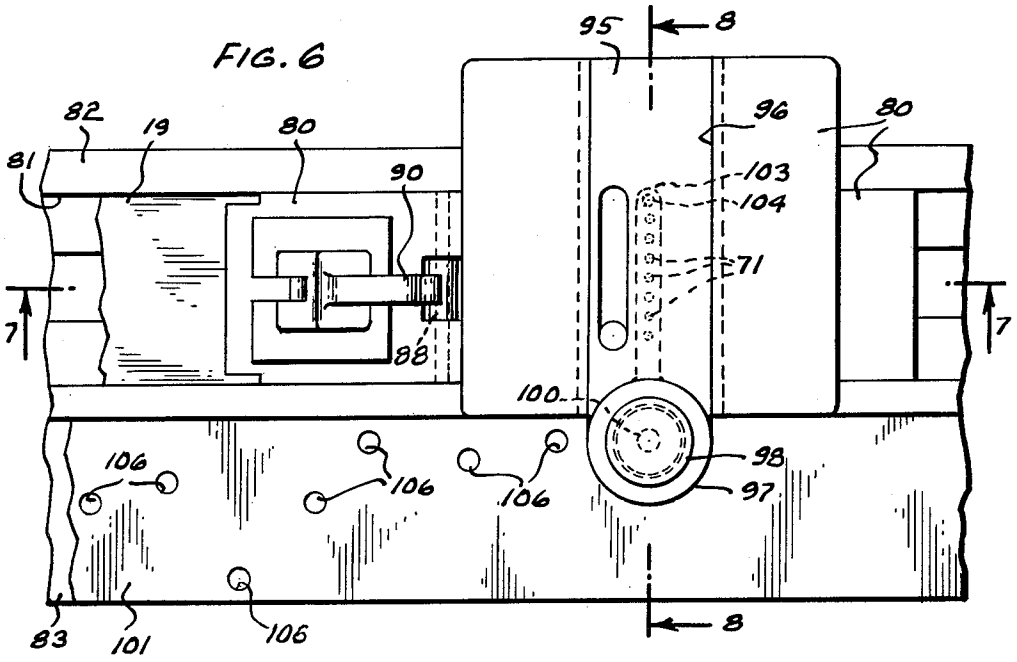
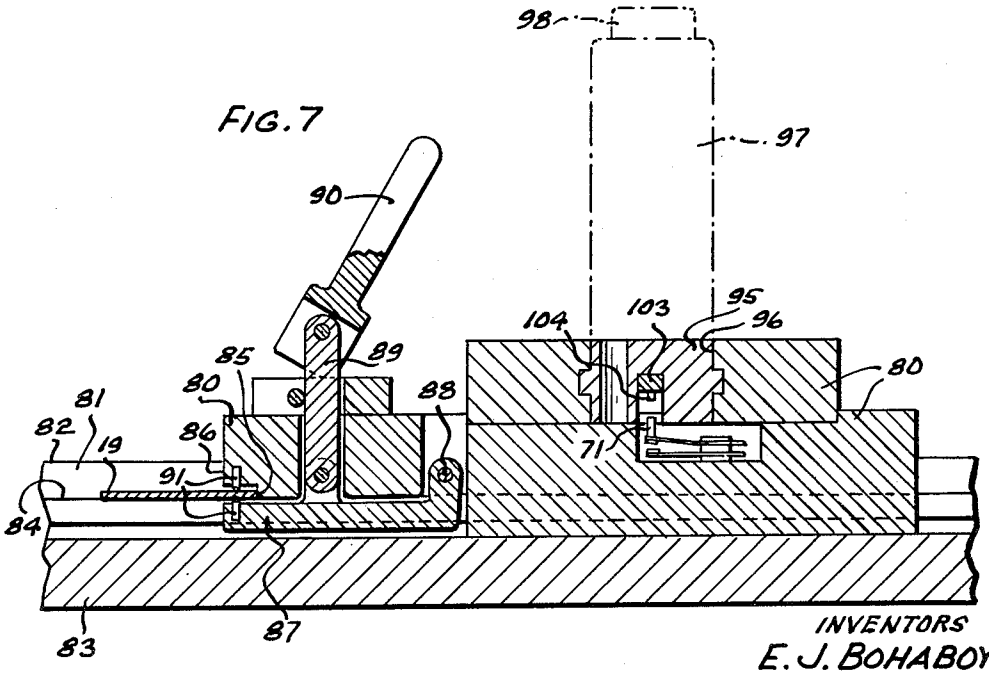


FIG. 7



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APPARATUS FOR WORKING SELECTED PORTIONS OF ARTICLES

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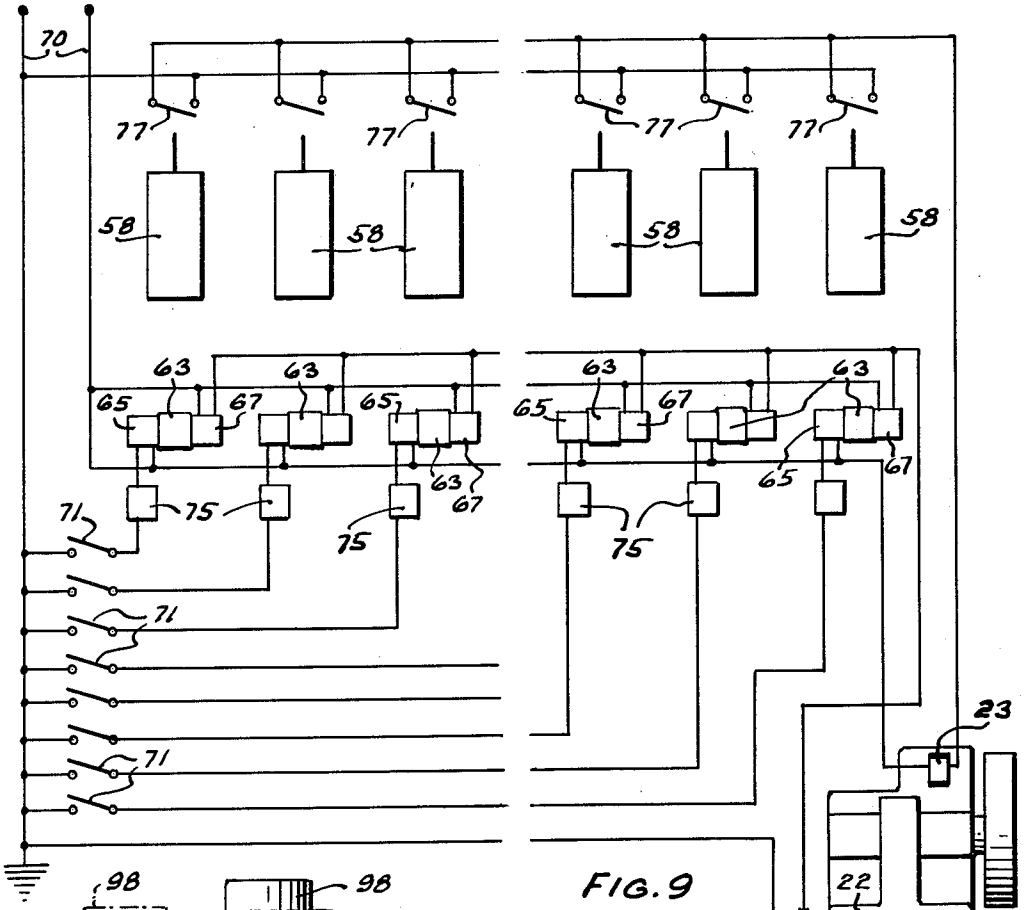


FIG. 9

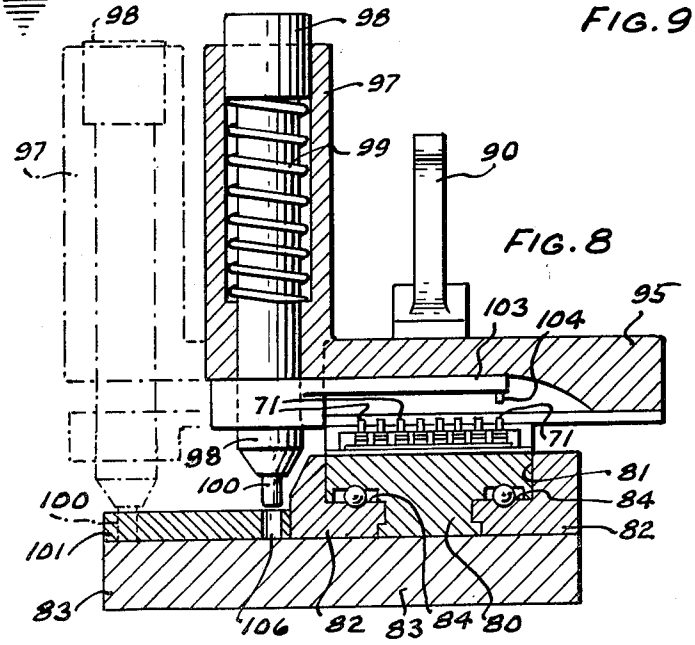


FIG. 8

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APPARATUS FOR WORKING SELECTED PORTIONS OF ARTICLES

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Filed Sept. 2, 1960, Ser. No. 53,838
5 Claims. (Cl. 234—87)

This invention relates to an article working apparatus, and more particularly to selectively operable article working apparatus.

An object of the present invention is to provide an improved apparatus for working selected portions of articles.

Another object of the invention is the provision in an apparatus having a plurality of tools, of mechanism for selectively positioning an article relative to the tools and for selectively actuating the tools.

With these and other objects in view, the invention contemplates the provision of a plurality of punch and die sets of different configurations arranged in a row in a punch press. The dies are mounted on a stationary plate that also supports a carriage to which an elongated article to be perforated is clamped for movement therewith in a first direction through the punch and dies. The punches are mounted for reciprocation with the ram of the press and are urged upwardly against cam plates which are reciprocable individually selectively by actuating means including control switches to shift the punches from normally inoperative positions on the ram to operative positions for rendering the punches effective to perforate the article when the press is actuated. The control switches are mounted on the carriage in a row disposed transversely of said first direction.

A slide is mounted on the carriage for movement in a second direction above and parallel to the switches and has a hollow handle by means of which the carriage and the slide may be actuated in said first direction and the slide actuated in the second direction. A feeler is mounted for vertical movement in the handle and is urged upwardly to a normal position above a gage plate which is removably mounted on the stationary plate and provided with a plurality of apertures for receiving the end of the feeler in response to manual depression thereof. The apertures are disposed in the gage plate in a predetermined coded arrangement in spaced relation to each other in the first and the second directions. A switch actuating member mounted on the feeler above the row of switches actuates the switches individually in response to vertical actuation of the feeler.

With an article clamped to the carriage, an operator may engage the handle of the carriage and move it in the first and the second directions to align the feeler with successive apertures in the gage plate and the switch actuating member with selected control switches and then successively depress the feeler, thereby effecting the movement of the article to selected positions relative to the punch and dies and the selective actuation of the punches.

Other objects and advantages of the invention will become apparent by reference to the following detailed description thereof and the accompanying drawings illustrating a preferred embodiment of the invention, wherein:

FIG. 1 is a fragmentary front view of an apparatus for working successive portions of an elongated article;

FIG. 2 is a plan sectional view of the apparatus taken on the line 2—2 of FIG. 1;

FIG. 3 is a plan view of an elongated article showing the perforations formed therein with the present apparatus;

FIG. 4 is an enlarged fragmentary cross-sectional view through the apparatus taken on the line 4—4 of FIG. 1 and showing the punch and dies for perforating the article;

FIG. 5 is a fragmentary longitudinal vertical sectional view through the apparatus taken on the line 5—5 of FIG. 4;

FIG. 6 is an enlarged fragmentary plan view of a portion of the apparatus;

FIG. 7 is a fragmentary vertical longitudinal section of the apparatus taken on the line 7—7 of FIG. 6;

FIG. 8 is a vertical cross-sectional view of the apparatus taken on the line 8—8 of FIG. 6; and

FIG. 8 is a diagrammatic view of the control mechanism of the apparatus.

Referring to the drawings, the present apparatus includes a punch and die set having a punch holding plate **15** (FIG. 1) and a die holding plate **16** with a row of perforating punch and die units **17** therebetween for punching apertures **18** (FIG. 3) of predetermined different configurations into articles in the form of flat plates **19** onto which electrical components are to be mounted. The punch and die set is mounted in a press **20** with the die holding plate **16** secured to the bed **21** of the press and with the punch holding plate **15** secured to the ram **22** of the press for reciprocation therewith. The ram **22** is reciprocated through successive cycles by conventional drive means under control of a press starting solenoid **23** (FIG. 9). Aligned horizontal apertures **26** in the dies **27** of the punch and die units **17** form a horizontal passageway for guiding the mounting plate **19** therethrough into the path of the punches **28** of the punch and die units **17**. The dies **27** have bases **29** thereon which are secured to the plate **16** at their forward end by screws **30** and at their other end by quick acting clamping members **31** to permit ready replacement of the punch and die units.

Each of the clamping members **31** is secured at one end by a screw **32** to a mounting block **33** fixed to the plate **16** and has an upwardly directed vertical slot **35** cut therein to provide for the flexing of the free end thereof. A horizontal slot **36** is also formed in one end portion to provide a pair of parallel fingers capable of flexing slightly relative to each other. A round rod **40** having a flat surface engageable with the clamping members **31** is oscillatably supported in bearing blocks **41** and is provided with a handle **43** by means of which the rod may be rotated to actuate the clamping members **31** and effect the clamping of the other ends of the bases **29** of the dies against the plate **16**.

The punches **28** of the perforating units **17** (FIGS. 4 and 5) have T-heads **46** removably supported in T-slots **47** in holder members **48** which are mounted for vertical movement in guideways **49** in a member **50** secured to the punch supporting plate **15**. The holder members **48** are guided for vertical movement by headed guide rods **51** secured thereto slidable in the plate **15**, and the holder members **48** are stressed upwardly by springs **52**. Cam surfaces **54** formed on the upper portions of the holder members **48** cooperate with cam surfaces **55** on cam bars **56** which are slidably mounted for horizontal movement in the guideways **49** in the member **50**. The cam bars **56** are connected to and reciprocated by pistons **57** of air-operated actuators **58** secured to a plate **59** fixed to the punch supporting plate **15**.

Compressed air is admitted to one end of each of the actuators **58** individually from a supply line **62** through valves **63** to advance the cam bar **56** to effect the shifting of the punch **28** to its lower operative position (FIG. 4) and render it effective to perforate the mounting plate **19** when the press is actuated. Each of the valves **63** is shifted to one position by the energization of a solenoid **65** to effect the forward movement of the cam bar **56**, and the valve **63** is shifted to another position in response to energization of a solenoid **67** to effect the return movement of the cam bar **56**. The solenoids **65** are connected individually to a source of current **70** (FIG. 9) in series

with normally open switches 71 for selective energization of the solenoids. If desired an auxiliary pulse generating unit 75 may be connected in series with each of the solenoids 65 to supply a pulse for momentarily energizing the solenoid 65.

Normally open switches 77 mounted on the punch holding plate 15 in the path of movement of the cam bars 56 are connected to the source of current 70 in series with the press starting solenoid 23 and serve to complete a circuit and effect the energization of the solenoid 23 and the actuation of the press in response to forward movement of a cam bar 56. The valve actuating return solenoids 67 are connected to the source of current 70 in parallel with each other and in series with a normally open switch 73 which is mounted on the press 20 and actuated to closed position at the end of the return stroke of the ram 22 to effect the energization of the solenoids 67 and the return movement of all of the cam bars 56 subsequent to the punching of an aperture in the mounting plate 19.

The switches 71 are mounted in a row on a carriage 80 (FIGS. 7 and 8), which carriage is provided to support and move the article 19 into the horizontal guideway 26 of the dies 27 and to locate the article is selected positions relative thereto. The carriage 80 is in the form of a rectangular block mounted for sliding movement in a guideway 81 formed by a pair of L-shaped guide members 82. The guide members 82 are secured to a plate 83 which is fixedly attached to the die supporting plate 16 with the guide members 82 extending laterally from and in substantial alignment with the dies 27.

The article 19 to be perforated is placed in the guideway 81 and supported on the ledges 84 of the guide members 82 in alignment with the horizontal passageway 26 in the dies 27. One end of the article 19 is positioned against a vertical surface 85 on the carriage 80 (FIG. 7) and below an overhanging portion 86 which forms a fixed jaw against which the end of the mounting plate is clamped by a movable jaw 87 on the carriage 80. The jaw is pivotally supported at one end thereof on a pin 88 and is connected intermediate its ends to one end of a link 89, the other end of which is connected to a handle 90 movable between two predetermined positions to effect the clamping and release of the article 19 relative to the carriage 80. A plurality of pins 91 having pointed ends projecting from the jaws 86 and 87 may be provided for gripping the article 19.

A slide 95 is mounted on the carriage 80 in a slideway 96 for movement above and parallel to the row of switches 71 and transversely of the longitudinal movement of the carriage. At one end thereof the slide 95 (FIG. 9) is provided with an upstanding hollow handle 97 by means of which the slide 95 and the carriage 80 may be moved in a first direction to advance the article 19 longitudinally of the row of punches 28 and by means of which the slide 95 may be moved relative to the carriage 80 in a second direction transversely of the first direction. A feeler 98 in the form of a rod is mounted for vertical movement in the handle 97 and is maintained by a spring 99 in a normal upper position with the reduced lower end 100 of the feeler disposed above and adjacent to a gage plate 101. The gage plate 101 is releasably secured to the supporting plate 83 adajcent to the path of movement of the carriage 80 by a pair of clamping members 102 (FIGS. 1 and 2) engageable with the ends of the plate.

An arm 103 (FIG. 8) fixed to the feeler 98 for vertical movement therewith extends horizontally from the feeler over the row of springs 71 and has a downwardly directed switch actuating element 104 on the end thereof for closing the switches 71 individually in response to downward movement of the feeler. As shown in FIG. 8, the lower end 100 of the feeler 98 is normally disposed slightly above the top surface of the gage plate 101 and is prevented thereby from being moved downwardly except when the feeler has been moved horizontally to predetermined positions into alignment with one of a plurality of

recesses 106 formed in the gage plate. The recesses 106 are arranged in predetermined locations relative to each other in accordance with a predetermined pattern or code of apertures 18 to be punched in the article 19, to permit the alignment of the portion of an article 19 to be punched, with the selected punch and die, and to position the switch actuating element 104 of the feeler 98 over the switch 71 assocaited with the selected punch and die.

When it is desired to punch perforations 18 into the article 19 in accordance with a selected code determined by the gage plate 101, the article 19 is first placed in the guideway 81 and clamped to the carriage 80 between the jaws 86 and 87. The operator then moves the handle 97 to align the end 100 of the feeler 98 with the first recess 106 in the gage plate 101 to cause the movement of the article 19 to a predetermined position with the portion thereof to be perforated located between a selected punch and die and to cause the switch actuating element 104 of the feeler 98 to be positioned above and in alignment with the switch 71 associated with the selected punch and die.

The operator then depresses the feeler into the recess 106 which movement closes the selected switch 71 to effect the energization of the selected solenoid 65, the reversing of the valve 63 associated with the selected punch and die, the movement of the piston 57 and the cam bar 56 by the actuator 58 from the normal retracted position to the advanced position, the movement of the punch 28 from its normal upper unoperative position to its lower operative position. The forward movement of the cam bar 56 also closes the switch 77 in its path resulting in the energization of the press starting solenoid 23, the reciprocation of the ram 22 and the punching of an aperture 18 in the article 19. At the end of the return movement of the ram 22 the switch 73 is actuated to effect the energization of the valve actuating solenoid 67 and the reversing of the valve 63, resulting in the retraction of the cam bar 56 and the return of the punch 28 to its normal upper unoperative position.

The operator then moves the handle 97 to align the feeler 98 with the next desired recess 106 in the gage plate 101 and again depresses the feeler 98 to initiate another cycle of operation on completion of which this operation is repeated until all of the desired perforations 18 have been punched in the article 19. The carriage 80 is then returned to its starting position and the perforated article 19 is removed therefrom.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In an apparatus having a supporting member, a plurality of movable tools arranged in a row for working on an article, and means including control elements individual to said tools for effecting the selective actuation of said tools, the combination therewith of a carriage mounted on said supporting member for moving the article in a first direction longitudinally of the row of tools and into the paths of movement of the tools, means on said carriage for supporting said control elements in a row disposed transversely of said first direction, a slide mounted on said carriage for movement therewith and for movement relative thereto in a second direction parallel to said row of control elements and adjacent thereto, a gage plate mounted on said supporting member adjacent the path of movement of said carriage and having recesses therein in predetermined spaced relation to one another in said first and said second directions, a feeler mounted on said slide for movement therewith and for movement relative thereto into the recesses of said gage plate, means for moving said slide and said carriage to align the feeler with successive recesses in said gage plate, and means movable with said feeler along said second direction into

alignment with individual ones of said control elements as the feeler is aligned with said recesses and for selectively actuating said control elements in response to movement of said feeler selectively into said recesses.

2. In an apparatus having a supporting member, a plurality of movable tools arranged in a row for working on an article, and means including control switches individual to said tools for effecting the selective actuation of said tools, the combination therewith of a carriage mounted on said supporting member for moving the article longitudinally along the row of tools and into the path of movement thereof, means on said carriage for supporting said control switches in a row disposed transversely of said row of tools, a slide mounted on said carriage for movement therewith and for movement relative thereto parallel to said row of control switches and adjacent thereto, a gage plate mounted on said supporting member adjacent the path of movement of said carriage and having recesses therein in predetermined spaced relation to one another in directions parallel to said row of tools and said row of control switches, a feeler mounted on said slide for movement therewith and for movement relative thereto into the recesses of said gage plate, a member movable with said feeler for actuating said control switches individually in response to actuation of said feeler into said recesses, and means on said slide for moving said slide and said carriage to align the feeler with selected recesses in said gage plate.

3. In an apparatus of the type described, a stationary supporting member, a movable supporting member, a plurality of tools mounted on said movable member for movement therewith along a first path, a carriage mounted on said stationary member for moving an article along a second path into the path of said tools, means including switches individual to said tools for effecting the selective movement of said tools from normal inoperative positions on said movable member to operative positions thereon effective to act on said article in response to actuation of said movable member, means responsive to the movement of a tool to operative position for advancing and returning said movable member along said first path to effect the engagement of said operative tool with said article, means responsive to the return of said movable member to effect the movement of said tool to its inoperative position, means on said carriage for supporting said switches in a row disposed transversely of said second path, a gage plate mounted on said stationary member adjacent the path of movement of said carriage and having a plurality of recesses therein arranged in spaced relation to each other in the direction of movement of said carriage and in the direction of said row of switches, a slide mounted on said carriage for movement therewith and for movement relative thereto above said row of switches and said gage plate and parallel to said row of switches, a handle on said slide for imparting movement to said carriage and said slide, a feeler mounted on said slide for movement therewith and for movement relative thereto into the recesses in said gage plate, and a member mounted on said feeler for actuating said switches individually in response to movement of said feeler into said recesses.

4. In an apparatus of the type described, a frame, a reciprocatory ram, a plurality of tools for acting on an elongated article, means for mounting said tools on said ram in a normally ineffective condition for movement with the ram, means including switches individual to said tools for selectively rendering said tools effective for acting on the article in response to reciprocation of said ram, a carriage for advancing the article, a gage plate, means on said frame for supporting the carriage

for movement in a first direction for guiding the article along the row of tools and into the path of movement thereof and for supporting said gage plate adjacent the path of movement of said carriage, means operable in response to the movement of a tool to operative position for effecting the reciprocation of said ram, means on said carriage for supporting said switches in a row disposed transversely of said first direction, a slide mounted on said carriage above said row of switches and said gage plate for movement with said carriage along said first direction and for movement relative thereto in a second direction parallel to said row of switches, a feeler member mounted on said slide for movement therewith and for vertical movement relative thereto and having a switch actuating member mounted thereon for movement therewith over said row of switches, means for stressing said feeler to a normal upper position disposed above said gage plate and with said switch actuating member spaced above said switches, said gage plate having a plurality of recesses therein for receiving the end of said feeler and disposed in predetermined spaced relation to each other in said first and said second directions, and a handle on said slide for moving said slide and said carriage so that said feeler may be moved into registration with successive recesses to effect the selective positioning of the article relative to said tools and so that said feeler may be depressed into said recesses to effect the selective actuation of said switches and said tools.

5. In an apparatus of the type described, a stationary supporting member, a movable supporting member, a plurality of tools mounted on said movable member for movement therewith along a first path, a carriage mounted on said stationary member for moving an elongated article along a second path into the path of said tools, means for changing the condition of said tools individually from a normal unoperative condition on said movable member to an operative condition effective to act on the article in response to actuation of said movable member, means including circuit controlling elements individual to said tools for effecting actuation of said condition changing means, means responsive to the changing of a tool to operative condition for advancing and returning said movable member along said first path to effect the engagement of the operative tool with the article, means responsive to the return of said movable member to effect the movement of said tool to the unoperative condition, means on said carriage for supporting said circuit controlling elements in a row disposed transversely of said second path, a gage plate mounted on said stationary supporting member adjacent the path of movement of said carriage and having a plurality of recesses therein arranged in spaced relation to each other in the direction of movement of said carriage and in the direction of said row of circuit controlling elements, a slide mounted on said carriage for movement therewith and for movement relative thereto above said row of circuit controlling elements and said gage plate and parallel to said row of elements, means on said slide for moving said carriage and said slide, a feeler member mounted on said slide for movement therewith and for movement relative thereto into the recesses in said gage plate, and means movable with said feeler for selectively actuating said controlling elements.

References Cited in the file of this patent

UNITED STATES PATENTS

1,650,748 Thomas ---------- Nov. 29, 1927