

Jan. 10, 1956

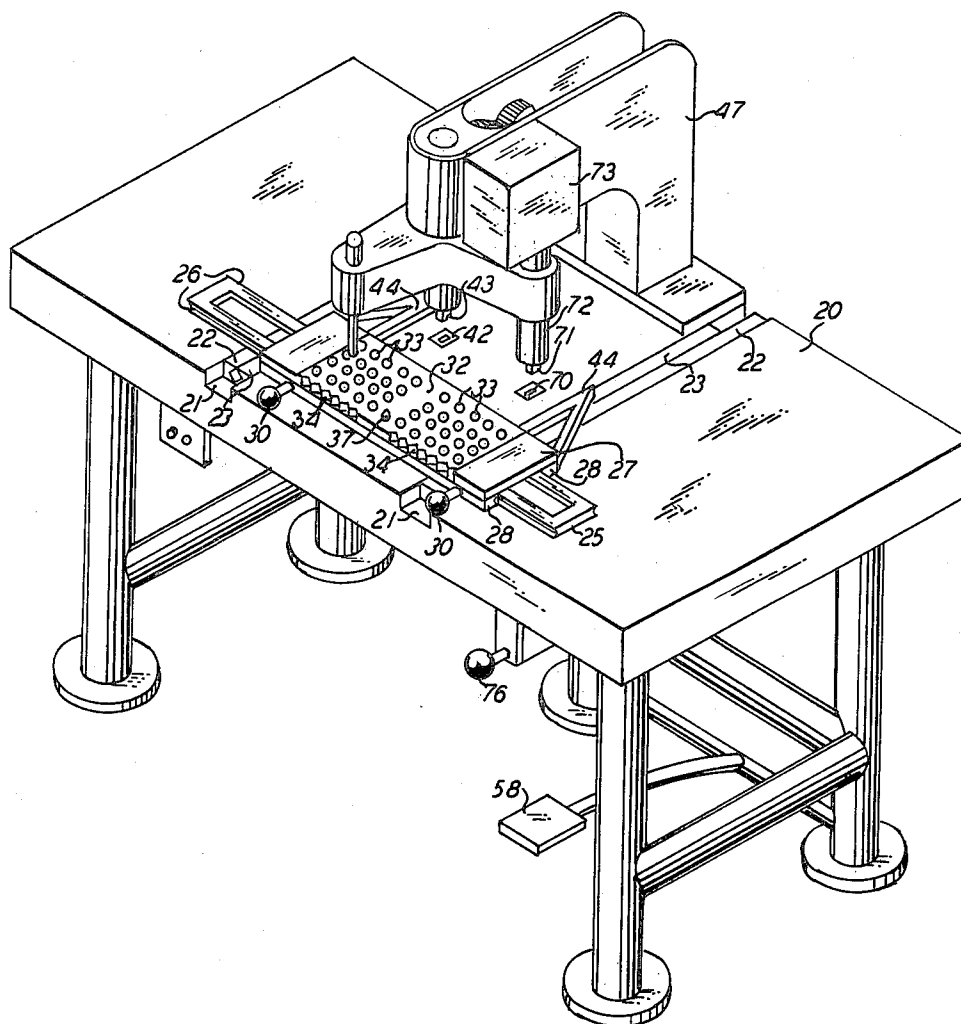
R. S. BRESCKA
PUNCHING APPARATUS

2,730,173

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FIG. 1



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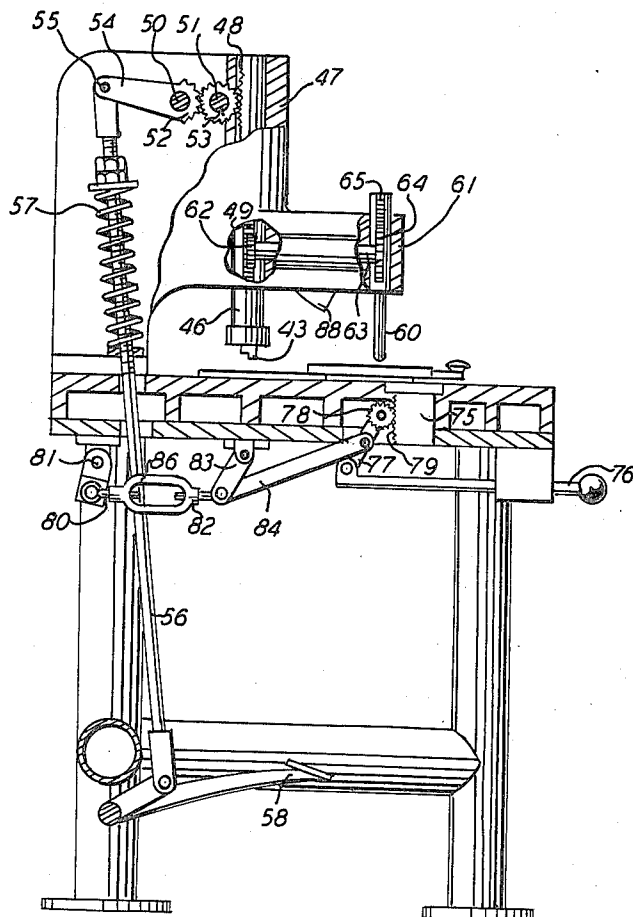
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FIG. 2



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FIG. 3

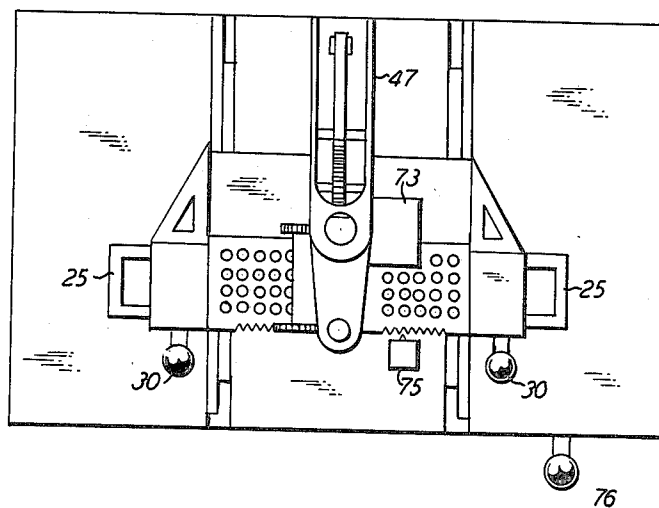


FIG. 4

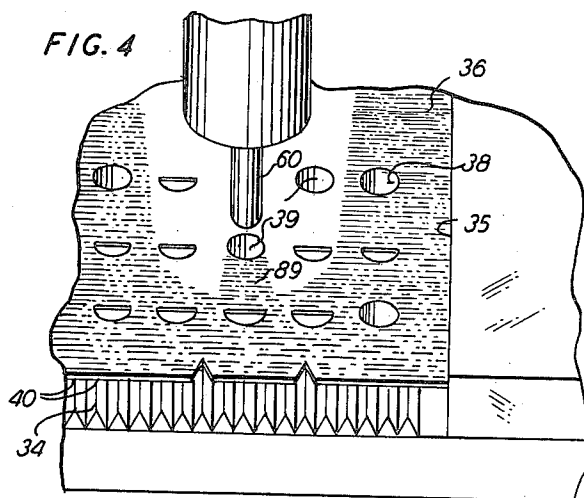
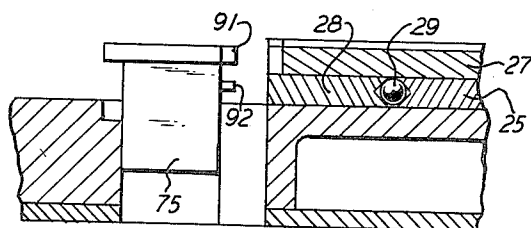


FIG. 5



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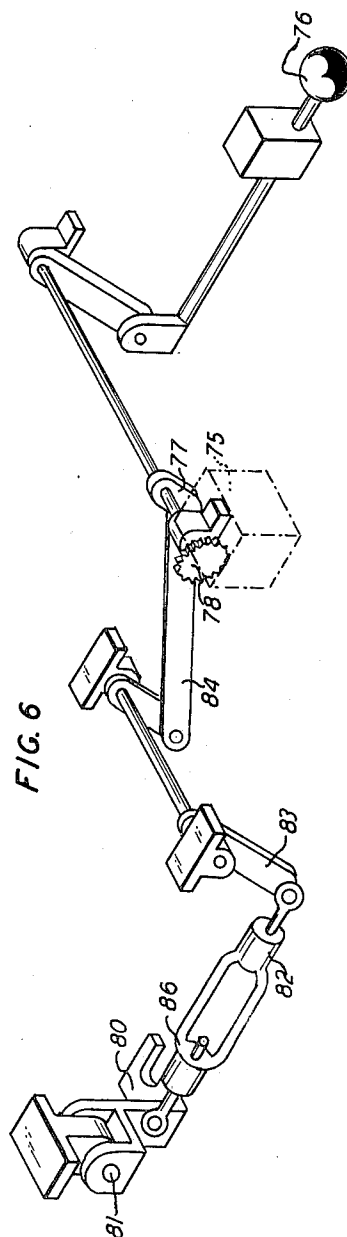
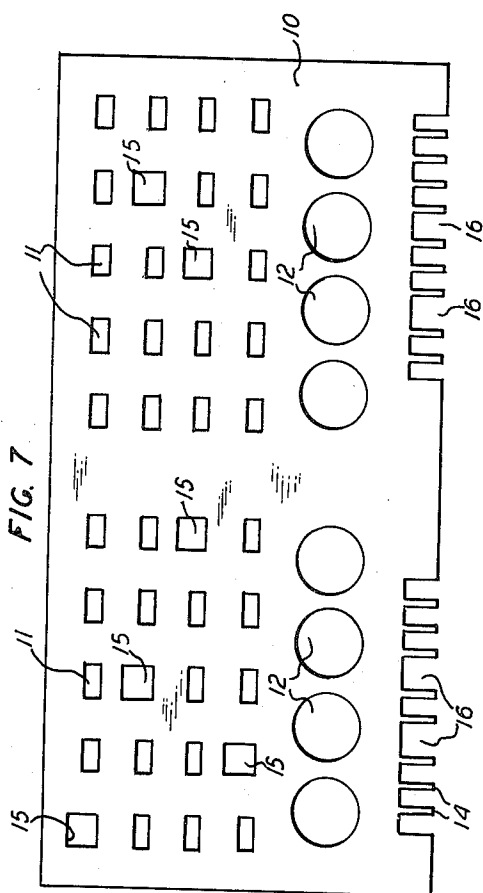
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PUNCHING APPARATUS

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6 Claims. (Cl. 164—15)

This invention relates to punching apparatus and more particularly to apparatus for punching portions from sheet metal articles.

In the telephone industry thin sheet metal blanks, to be used in translators in toll offices for automatically routing telephone calls, have groups of spaced rectangular apertures throughout given areas of the blank and parallel tabs along one edge of the blank. To cause the metal blanks to perform the functions desired, it is necessary that certain of the rectangular apertures be enlarged and that certain of the tabs be removed. To accomplish this result, by the aid of commercially known punches, would be extremely difficult due to the need for accurate alignment of the selected rectangular aperture with a punch to enlarge the aperture so as to produce a substantially square aperture with straight sides free of burrs. Furthermore, the accurate removal of the desired tabs is essential and difficult to produce with the conventional types of punches.

It is the object of the present invention to provide an apparatus for use in combination with a templet similar in contour to the article whereby portions may be accurately punched from an article.

With this and other objects in view, the invention comprises an apparatus for punching portions from an article wherein a carriage for a templet and the article may be moved to any preselected position relative to a locating element to accurately locate the article relative to a punch and die which, when operated, will punch a portion from the article at a pre-determined location.

The templet in the present embodiment of the invention has groups of apertures normally closed by partially perforated portions, any selected number of which may be removed manually to determine the particular rectangular apertures of the blank which are to be enlarged. Along one edge of the templet are groups of partially perforated tabs, any number of which may be removed to indicate the tabs of the blank or article to be removed. There is a separate punch and die for each of the two series of operations, one for enlarging the rectangular apertures of the blank and the other to remove selected tabs from the edge thereof. Although these operations are performed at different times, there is an interlocking means to prevent operation of one punch during operation of the other.

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

Fig. 1 is an isometric view of the apparatus;

Fig. 2 is a side elevational view of the apparatus, portions thereof being shown in section;

Fig. 3 is a top plan view of the apparatus;

Fig. 4 is a fragmentary isometric view of the carriage with the templet beneath the locating means;

Fig. 5 is a fragmentary sectional view of a part of the control means of the apparatus;

Fig. 6 is an isometric view of the interlocking means and its operating mechanism; and

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Fig. 7 is a top plan view of an article which has been punched.

Referring now to the drawings, attention is first directed to Fig. 7 which illustrates an article 10 formed of sheet metal and initially provided with two groups of spaced rectangular apertures 11, two groups of circular apertures 12 and two groups of tabs 14 along one edge of the article or blank. To condition blanks of this kind so that they may be used in the translator in toll offices, pre-determined apertures 11 must be enlarged so that they are substantially square in general contour, as indicated at 15, by the removal of portions from the blank producing edges which are free of burrs and irregularities. It is also necessary to condition the blanks that certain of the tabs 14 be removed, as indicated at 16, and in this instance it is important that the complete tab be removed leaving no irregular portions extending from the main body of the blank.

The apparatus for accomplishing these results includes a table 20 having parallel grooves 21 therein to receive fixed position guides 22 and movable guides 23. The guides 22 and 23 have V-shaped inner grooves to receive ball members to facilitate in the movement of the guide members 23 relative to the table. A member 25 rectangular in general contour is fixed to the movable guides 23 and has longitudinally extending V-grooves 26 in the sides thereof. A carriage 27 is supported on the member 25 and has downwardly extending portions 28 with V-grooves in their inner surfaces to receive ball members 29 to assist in the free movement of the carriage on the member 25. Spaced handles 30 may be gripped by the operator to bring about movement of the carriage in any direction made possible through its support on the member 25 and the support of the member on the guides 23.

The carriage 27 has a central member 32 with two groups of locating apertures 33 corresponding in number to the rectangular apertures 11 of the article 10 and positioned in the same manner throughout the area of the member. The forward surface of the member 32 has locating apertures or notches 34 corresponding in position and number to the tabs 14 of the article 10. The ends of the carriage 27 beyond the central member 32 extend above the central member to provide locating shoulders for a templet 36, Fig. 4. A locating pin 37, carried by the central member 32, is positioned to enter an aperture, not shown, of the templet 36 to cooperate with the locating edges 35 of the end members of the carriage to accurately locate the templet on the member.

The templet 36 is formed of a suitable material preferably a fibre board with groups of partially punched identifying members 38 corresponding in number and position to the apertures 33 of the member 32. The members 38, although being partially punched, normally close their apertures making it possible for any of the apertures of the templet to be opened by the removal of the members 38 as indicated at 39. Furthermore, partially punched tabs or portions 40, along one edge of the templet 36, are positioned to register with the locating notches 34 of the central member and the removal of any of these portions will readily identify certain of the notches 34.

A die 42, supported by the table 20 in alignment with a punch 43, operates to enlarge the apertures 11 of the article 10. The article 10 will be supported by the table 20 above the die 42 with one edge positioned in engagement with the central member 32 of the carriage with the ends engaging guide arms 44 supported by the carriage 27.

The punch 43 is supported by a ram 46 which is movable vertically in an aperture of a housing 47 and provided with two sets of rack-like teeth 48 and 49. The

housing 47 is mounted on the table 10 and supports shafts 50 and 51 for a gear segment 52 and a pinion 53, respectively. The pinion 53 is interposed between the gear segment 52 and the rack 48 forming a driving connection therebetween. A lever arm 54 of the gear segment 52 is pivotally connected at 55 to a pull-rod 56 which extends through a spring 57 which normally urges the rod upwardly to cause the driving means for the ram to normally urge the ram 46 upwardly. The rod 56 is operatively connected to a treadle 58 which, when moved downwardly, will move the punch 43 through the article and into the die 42.

A locating element 60 is reciprocally movable in a vertical aperture in an arm 61 of the housing 47, the lower portion of the element having a rounded leading end to enter any of the apertures 33 of the member 32 in advance of the punch entering the material and the die to accurately locate the carriage so as to locate the desired aperture 11 relative to the punch and die. The driving means for the locating element 60 includes a small gear 62 inter-engaging the teeth 49 on the ram 46 to be driven during movement of the ram. The gear 62 is mounted on one end of a shaft 63 which has a larger gear 64 mounted on the other end thereof adjacent the locating element 60 and inter-engaging rack-like teeth 65 of the element. This driving connection between the ram 46 and the locating element 60, with the particular ratio of the gears 62 and 64 brings about function of the locating element 60 in advance of the punching operation. Furthermore, the punch 43 has a stepped contour whereby the longer portion conforming to the rectangular aperture 11 will enter the aperture prior to the removal of the additional portion of the article by the offset portion of the punch to enlarge the aperture to the contour shown at 15 in Fig. 7.

The mechanism for removing selected tabs 14 includes a die 70 mounted in the table 20 in alignment with a punch 71 supported by a ram 72 which is normally held in its upper position by spring means not shown, and moved through an operating cycle through the energization of a solenoid 73 mounted on the housing 47. A control unit 75, Figs. 2, 3 and 5, for the punch and die, for removing the tabs is disposed in an inoperative position during the various operating cycles of the punch 43. However, when those operating cycles are completed, the unit 75 may be moved into position by the operator pulling outwardly on a handle 76 to rock a lever 77 and a gear 78 connected thereto. The gear 78 interengages teeth 79 of the unit 75 to move the unit from its lower position shown in Fig. 2 to its raised position shown in Fig. 5. When this is accomplished, it is important that the operating means for the punch 43 be rendered inoperative. To accomplish this result, a bifurcated latch 80 pivotally supported at 81 and connected to the lever 77 through links 82, 83 and 84 will move to straddle the rod 56 beneath a collar or adjustably positioned nuts 86 on the rod to lock the rod against downward movement. This interconnecting means between the operating means for the punches renders each ineffective to operate its punch as long as the operating means for the other punch is effective for operation.

Considering now the operation of the apparatus, let it be assumed that the article or blank shown in Fig. 7 is to be produced from a blank having all of the apertures 11 of the original size and contour and complete sets of tabs 14 along the forward edge thereof. The operator first selects a templet 36 and removes the portions 38 from the apertures 39 corresponding to the particular apertures 11 of the article 10 which are to be enlarged as shown at 15 in Fig. 7. Furthermore, the portions 40 corresponding to the tabs 14 of the article 10, which are to be removed, as illustrated at 16 in Fig. 7, are removed from the templet identifying the locating notches 34. The blank or article 10 is then placed on the table in the proper position where it will be controlled by the

carriage between the arms 44 thereof. The templet 36 is then placed on the central member 32 and accurately located through the assistance of the pin 37 and the shoulders of the end members of the carriage. The removed portions of the templet would readily indicate to the operator of the apparatus the number of operations which are to be performed and the locations to which the carriage is to be moved to carry out these operations.

Let it be presumed that the first operations will include enlarging the apertures 11. When this takes place, the unit 75 is in its lowered position shown in Fig. 2 freeing the carriage for movement to bring the open portions or apertures 39 of the templet in general alignment with the locating element 60.

To assist the operator in accurately locating the openings 39 of the templet in alignment with the locating element 60, a lamp 88 positioned beneath the arm 61 of the housing and having a reflector, not shown, positioned to direct rays of light toward the locating element and the adjacent portion of the templet 36. The locating element 60 will create a shadow 89 on the templet pointing to the aperture 39 or to a portion in direct alignment with the locating element. In this manner, through the assistance of the locating element and the shadow 89, the operator may readily move the carriage in any desired direction to bring about perfect alignment of the locating element with the selected locating aperture 33. As soon as this takes place, the operator may depress the treadle 58 moving the operating mechanism for the punch 43 causing it to enter the selected aperture 11 and remove a portion of the article adjacent the aperture. These punching operations are continued depending upon the movement of openings 39 made in the templet 36 by the removal of the portions 38 when all of these punching operations have been completed. The operator moves the carriage back a distance sufficient to clear the unit 75 and through the actuation of the handle 76, the unit may be raised into operating position at the same time locking the operating mechanism for the ram 46 against movement.

The unit 75 includes a V-shaped locating element 91 positioned to enter any one of the locating notches 34 along the forward surface of the member 32 to cooperate therewith in accurately locating the carriage with the work for the complete removal of a selected one of the tabs 14. The removed portions 40 of the templet indicate which notches should be brought singly into engagement with the locating element to accomplish this result. The unit 75 houses a micro-switch, the operating plunger 92 of which is positioned to be engaged by the forward portion 28 of the carriage, during movement of the carriage to move any of the notches 34 into registration with the projection 91. The micro-switch 92 is in a circuit, not shown, with the solenoid 73 so that when the switch is closed, the circuit will be closed to energize the solenoid moving the punch 71 through an operating cycle to punch the corresponding tab 14 from the article 10. This operation may be repeated depending upon the number of tabs 14 which are to be removed from the article.

When the two series of operations have been completed, the article may be removed from the carriage and the templet also removed therefrom to prepare the apparatus for a second series of operations. It was previously implied that a new templet would be conditioned for each article, but this is not necessarily the case in that a given number of articles may be produced through the use of the same templet and if desired, a series of templets previously conditioned may be kept in stock and identified to produce various conditions or arrangements of apertures and tabs in the articles.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art

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which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

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exposed apertures singly to cooperate therewith in locating the carriage in the given position to accurately locate the portion to be punched from the article in alignment with the punch and die prior to the operation of the punch by the closing of the switch.

1. An apparatus for punching various portions from articles singly in combination with like templets similar in contour to the articles and having numerous accurately spaced normally closed identifying portions any selected numbers of which may be opened to identify portions to be punched from the articles singly, the apparatus comprising a support, a die carried by the support, a punch supported for reciprocation relative to the die to cooperate therewith to punch aligned portions from the articles singly, a member to support the templets singly having apertures positioned for registration with all the identifying portions of each templet, a selected number of the apertures being exposed by the opened identifying portions of each templet, a carriage for the member mounted for movement in various directions on the support relative to the punch and die, means supported by the carriage to cause movement of each article with the carriage relative to the punch and die, and a locating element positioned for registration with the exposed apertures of the member singly to cooperate therewith in positioning the carriage to accurately locate the portion to be punched from each article in alignment with the punch and die.

2. An apparatus for punching various portions from articles singly in combination with like templets similar in contour to the articles and having numerous accurately spaced normally closed identifying portions any selected numbers of which may be opened to identify portions to be punched from the articles singly, the apparatus comprising a support, a die carried by the support, a punch supported for reciprocation relative to the die to cooperate therewith to punch aligned portions from the articles singly, a member to support the templets singly having apertures positioned for registration with all the identifying portions of each templet, a selected number of the apertures being exposed by the opened identifying portions of each templet, a carriage for the member mounted for movement in various directions on the support relative to the punch and die, means supported by the carriage to cause movement of each article with the carriage relative to the punch and die, and a locating element positioned for registration with the identified apertures singly to cooperate therewith in positioning the carriage to accurately locate the portion to be punched from each article in alignment with the punch and die, a lamp positioned to direct rays of light toward the templet on the member and the locating element whereby the locating element will create a shadow on the templet pointing to a portion of the templet directly beneath the locating element to facilitate alignment of the locating element with identifying portions of the templet.

3. An apparatus for punching various portions from articles singly, in combination with like templets similar in contour to the articles and having numerous accurately spaced normally closed identifying portions any selected numbers of which may be opened to identify portions to be punched from the articles singly, the apparatus comprising a support, a die carried by the support, a punch supported for reciprocation relative to the die to cooperate therewith to punch aligned portions from the articles singly, a member to support the templets singly having apertures positioned for registration with all the identifying portions of each templet, a selected number of the apertures being exposed by opened identifying portions of the templet, a carriage for the member mounted for movement in various directions on the support relative to the punch and die, means supported by the carriage to cause movement of each article with the carriage relative to the punch and die, a normally open switch operated into closed position by the carriage when disposed in a given position relative thereto, electrically energizable means under the control of the switch to operate the punch, and a locating element positioned to enter the

4. An apparatus for punching various portions from articles singly in combination with like templets similar in contour to the articles and having numerous accurately spaced normally closed identifying portions any selected numbers of which may be opened to identify portions to be punched from the articles singly, the apparatus comprising a support, a die carried by the support, a punch supported for reciprocation relative to the die to cooperate therewith to punch aligned portions from the articles singly, a member to support the templets singly having apertures positioned for registration with all the identifying portions of each templet, a selected number of the apertures being exposed by opened identifying portions of the templet, a carriage for the member mounted for movement in various directions on the support relative to the punch and die, means supported by the carriage to cause movement of each article with the carriage relative to the punch and die, a normally open switch operated into closed position by the carriage when disposed in a given position relative thereto, electrically energizable means under the control of the switch to operate the punch, and a locating element positioned to enter the exposed apertures singly to cooperate therewith in locating the carriage in the given position to accurately locate the portion to be punched from the article in alignment with the punch and die prior to the operation of the punch by the closing of the switch, and means to move the switch and locating element into and out of operative position relative to the carriage and locating member.

5. An apparatus for performing different punching operations on different portions of an article comprising spaced punches operable to perform the different punching operations, separate means actuatable to operate each punch, interconnecting means actuatable whereby only one punch may be operated at one time, a locating member having groups of apertures corresponding to portions to be punched from the article by the punches, a carriage for the locating member and the article movable relative to the punches, and locating elements positioned to enter any of the apertures of their respective groups singly to locate the portions to be punched from the article in alignment with their respective punches.

6. An apparatus for performing different punching operations on different portions of an article comprising spaced punches operable to perform the different punching operations, separate means actuatable to operate each punch, interconnecting means actuatable whereby only one punch may be operated at one time, a locating member having groups of apertures corresponding to portions to be punched from the article by the punches, a carriage for the locating member and the article movable relative to the punches, locating elements positioned to enter any of the apertures of their respective groups singly to locate the portions to be punched from the article in alignment with their respective punches, and means interconnecting the separate actuating means for the punches actuatable to render the punches operable only one at a time.

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