

May 12, 1959

E. STANWYCK

2,885,679

APPARATUS FOR MAKING AND APPLYING TERMINALS TO COIL FORMS

Filed Dec. 13, 1954

5 Sheets-Sheet 1

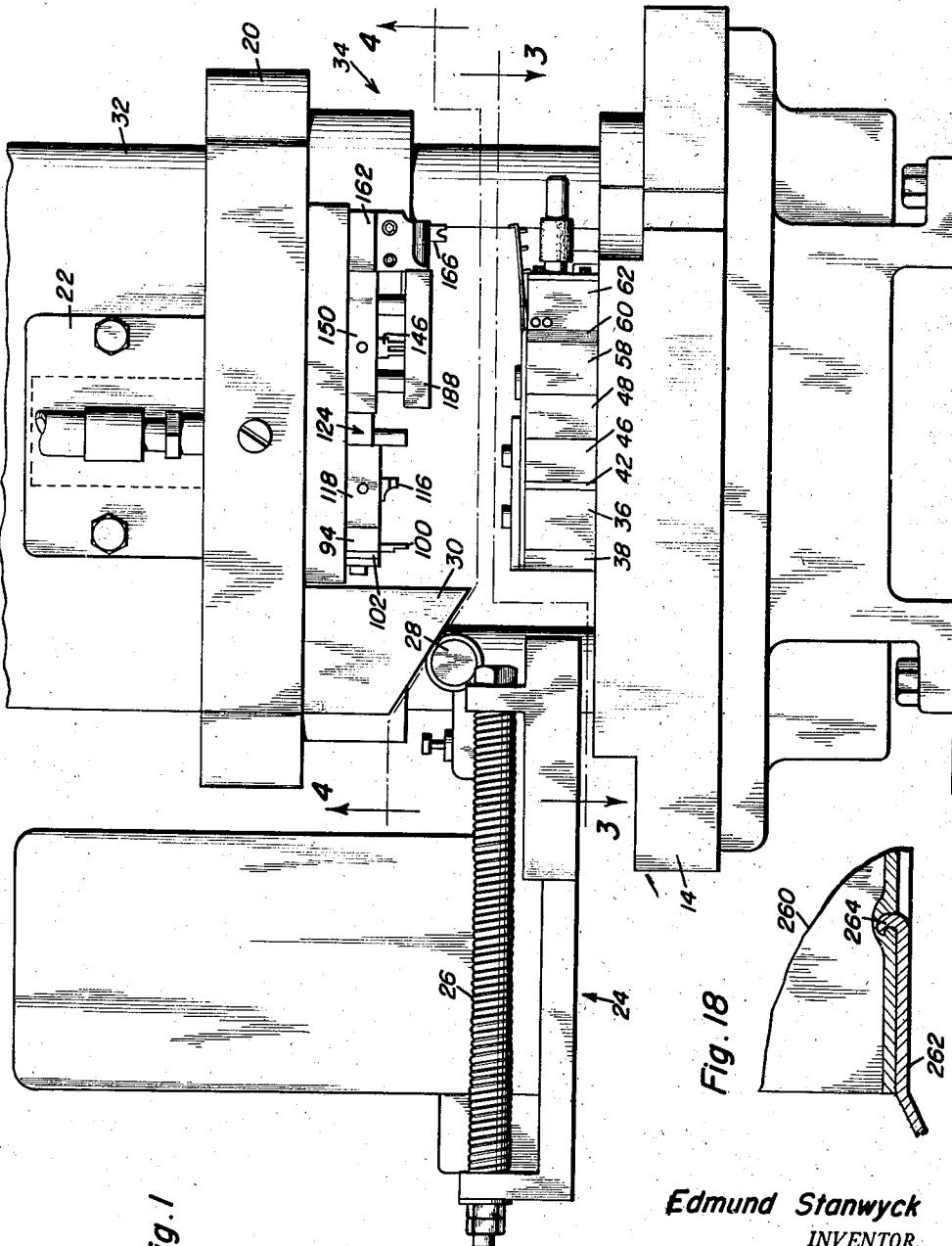


Fig. 1

Fig. 18

Edmund Stanwyck
INVENTOR.

BY *Alfonse A. O'Brien*
and Harvey B. Jackson
Attorneys

May 12, 1959

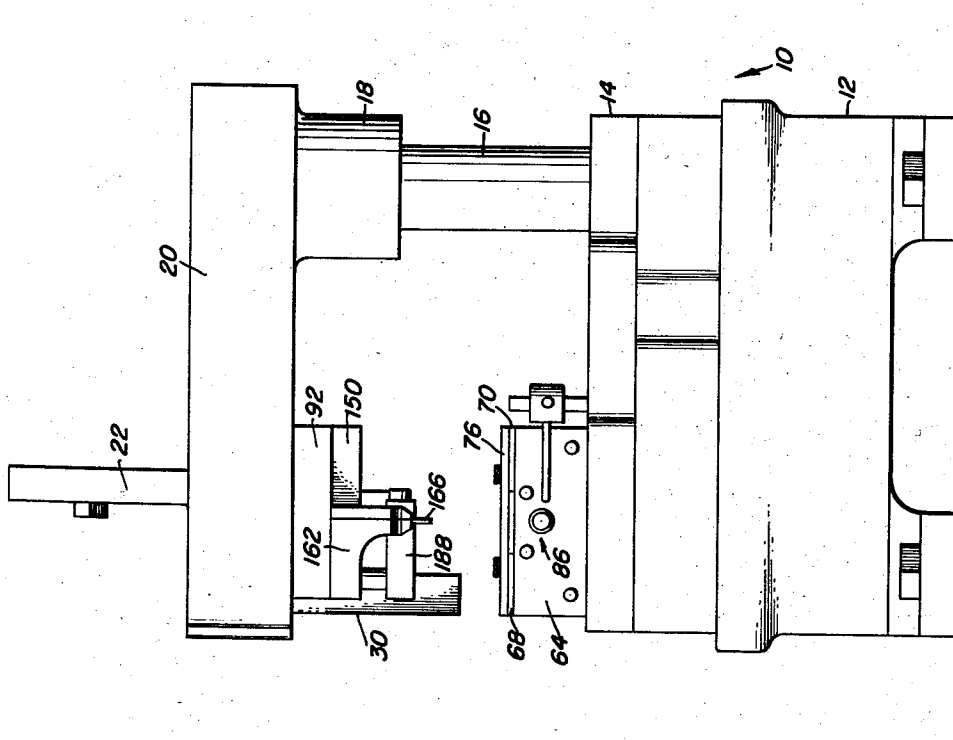
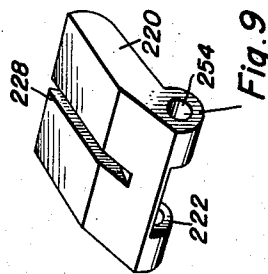
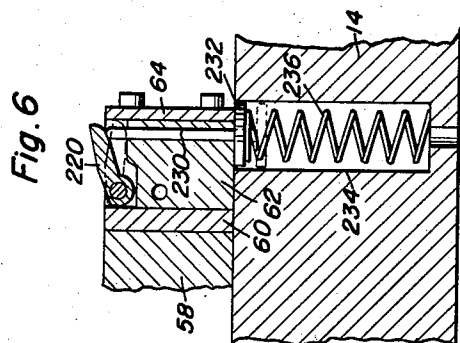
E. STANWYCK

2,885,679

APPARATUS FOR MAKING AND APPLYING TERMINALS TO COIL FORMS

Filed Dec. 13, 1954

5 Sheets-Sheet 2



Edmund Stanwyck
INVENTOR.

BY *Almonce A. O'Brien*
and *Harvey B. Jackson*
Attorneys

May 12, 1959

E. STANWYCK

2,885,679

APPARATUS FOR MAKING AND APPLYING TERMINALS TO COIL FORMS

Filed Dec. 13, 1954

5 Sheets-Sheet 3

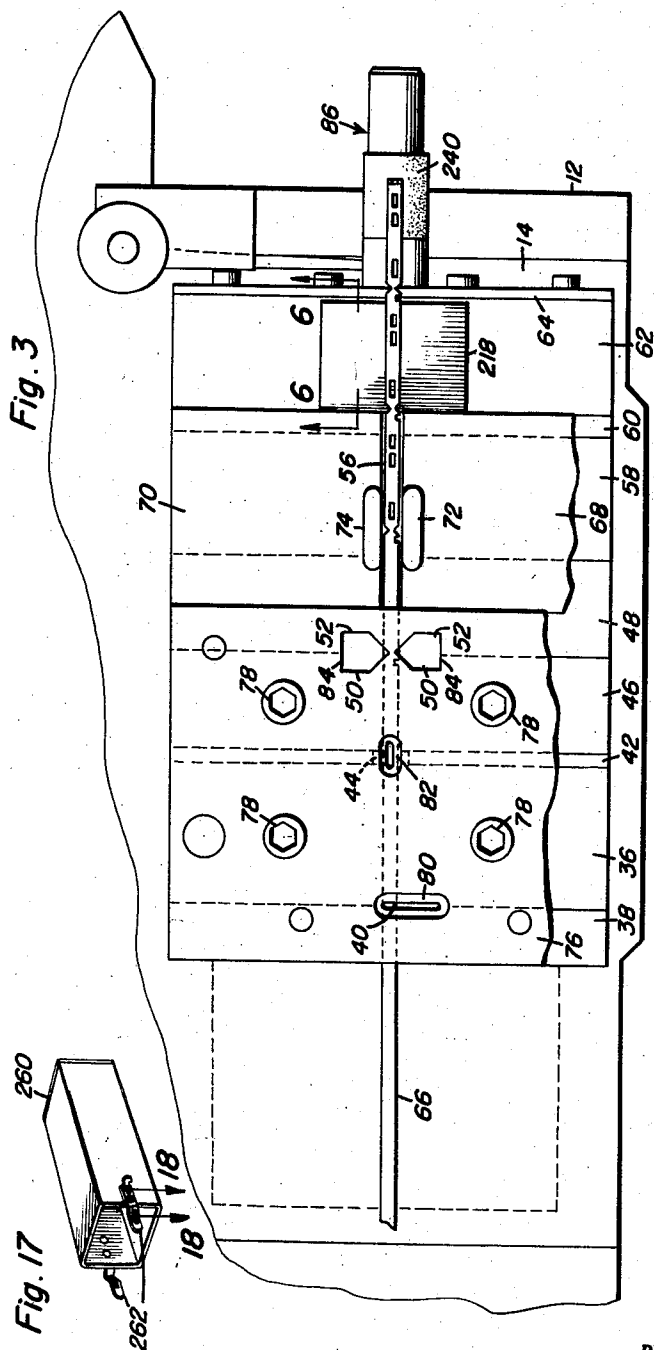


Fig. 3

Fig. 17

Fig. 7

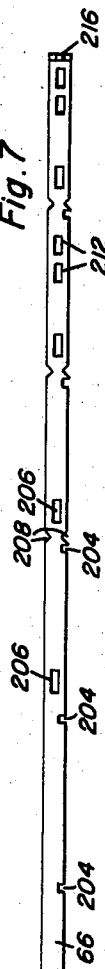
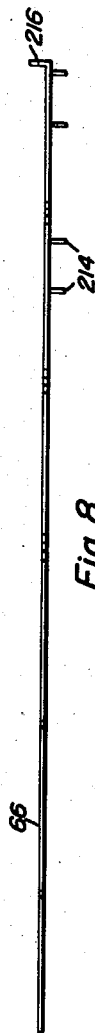


Fig. 8



Edmund Stanwyck
INVENTOR.

BY *Charles A. Wilson*
and *Harvey B. Jackson*
Attorneys

May 12, 1959

E. STANWYCK

2,885,679

APPARATUS FOR MAKING AND APPLYING TERMINALS TO COIL FORMS

Filed Dec. 13, 1954

5 Sheets-Sheet 4

Fig. 4

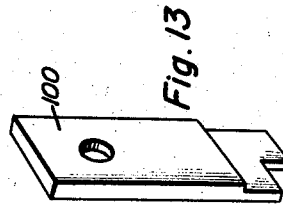
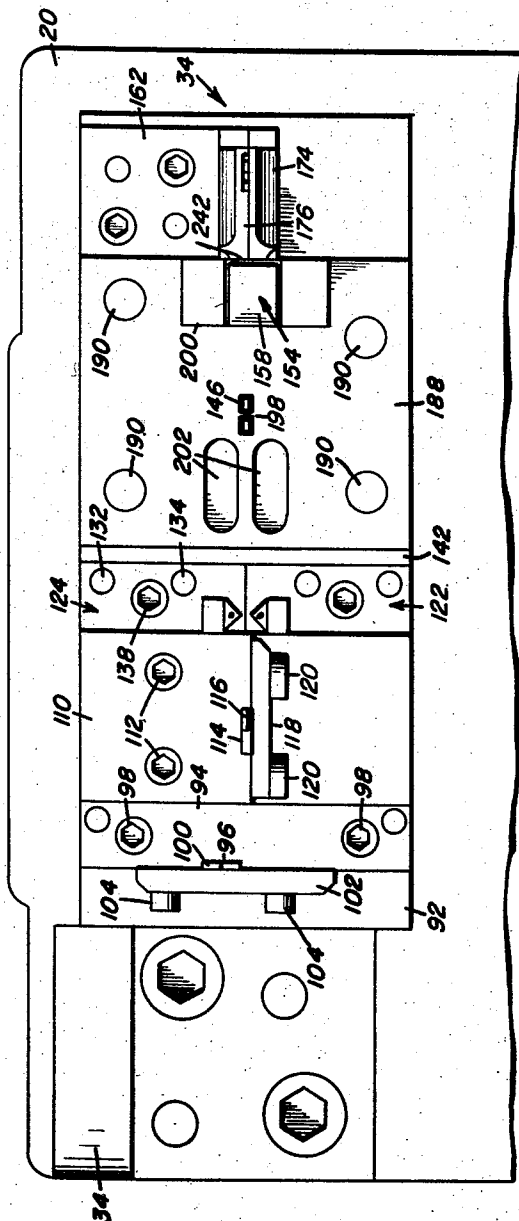


Fig. 13

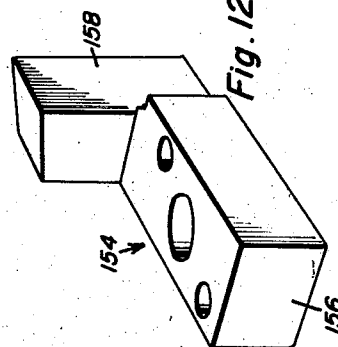


Fig. 12

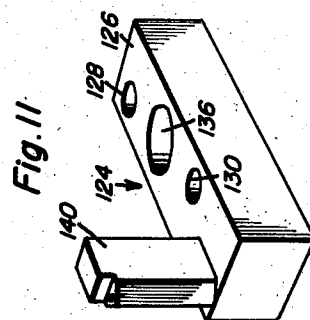


Fig. 11

Edmund Stanwyck
INVENTOR.

BY *Edmund Stanwyck*
and *Harvey R. Jordan*
Attorneys

May 12, 1959

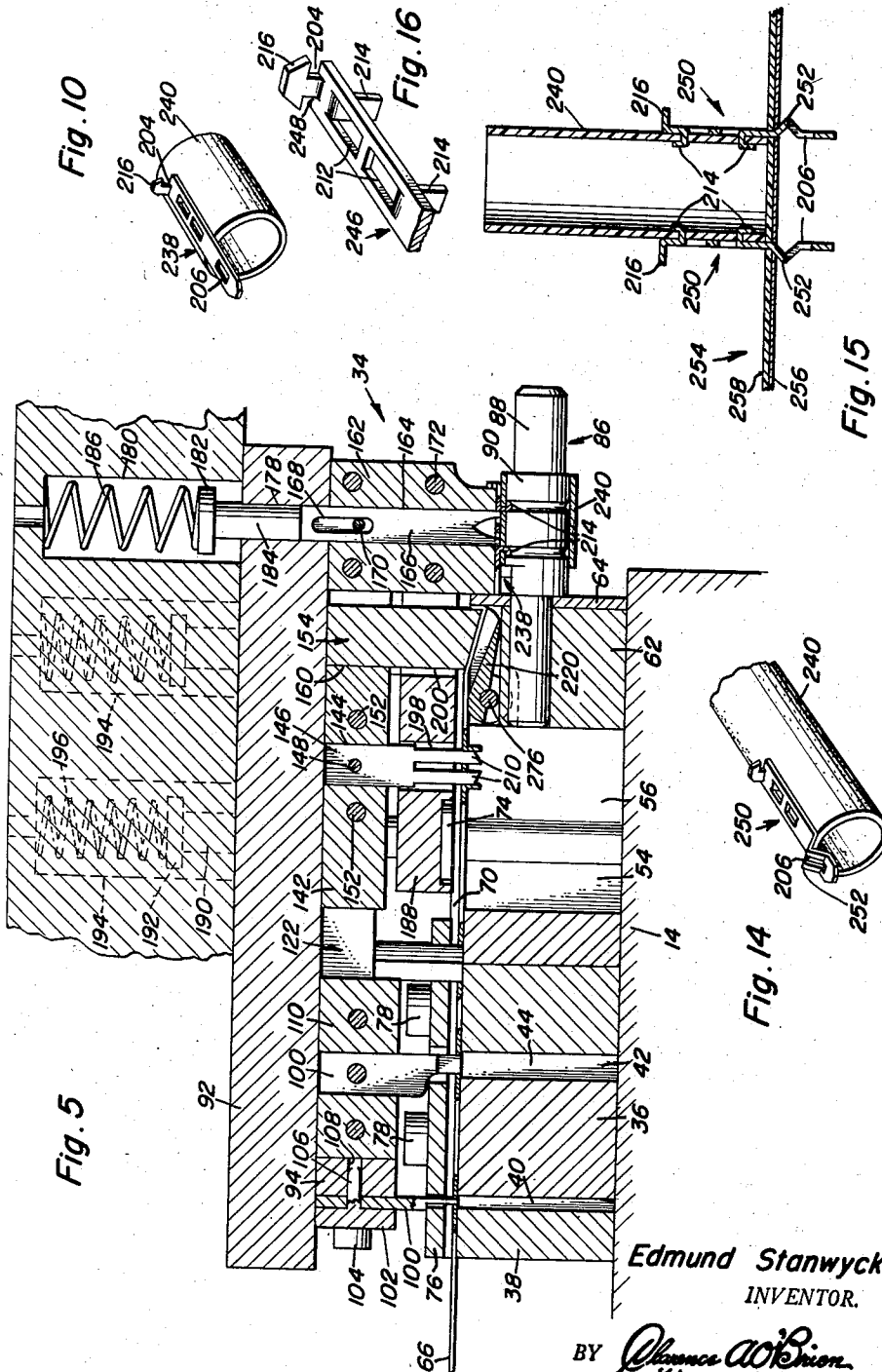
E. STANWYCK

2,885,679

APPARATUS FOR MAKING AND APPLYING TERMINALS TO COIL FORMS

Filed Dec. 13, 1954

5 Sheets-Sheet 5



Edmund Stanwyck
INVENTOR.
BY *Alvin W. Brown*
and *Harvey R. Jacobson*
Attorneys

1

2,885,679

APPARATUS FOR MAKING AND APPLYING TERMINALS TO COIL FORMS

Edmund Stanwyck, Newburgh, N.Y.

Application December 13, 1954, Serial No. 474,823

9 Claims. (Cl. 1—2)

This invention relates in general to new and useful improvements in punch press equipment, and more specifically to a punch press assembly for simultaneously punching terminals from elongated strips and applying such terminals to coil forms.

In the making of small coils and other electronic apparatus, it is necessary that the forms for such coils be provided with a plurality of terminals for securing the ends of the coil wires. In the electronic industry, hundreds of thousands of such coils are utilized every day, and the making and applying of such terminals has become a major problem. Heretofore, there has been devised means for forming such terminals in elongated strips in the same manner as staples with the individual terminals being bonded together by a suitable adhesive and then applied to the coil forms by a suitable gun, such as a modified form of stapling gun. However, such a process has proved to be relatively expensive considering the number of terminals which must be applied.

It is therefore the primary object of this invention to provide an improved apparatus which will simultaneously punch from an elongated strip of metal a terminal and apply such terminal in a single series of operations.

Another object of this invention is to provide an improved apparatus for making and applying terminals to coil forms, the apparatus being of such a nature whereby the making of the terminal and the application thereof is a continuous process.

Another object of this invention is to provide an improved apparatus for making and applying terminals, the apparatus being of such a construction whereby the terminals are applied simultaneous with their being cut off from the strip from which they are formed.

It is to be understood that the terminals with which the present invention deals are extremely small and are formed from extremely narrow strips of material. The terminals themselves are in the vicinity of $\frac{1}{16}$ " wide and must have required notches and slots cut therein. Of necessity, the dies and punches for forming the terminals are relatively small. Because of the relatively small size of the punches and dies, the punches and dies have a tendency to break, thereby impairing the operation of the apparatus.

It is therefore a further object of this invention to provide an improved punch press assembly which is constructed of a plurality of blocks which include mounting blocks, spacer blocks and die blocks, the spacer blocks being disposed between the die blocks and the mounting blocks, and the mounting blocks being so constructed whereby individual punches are releasably clamped in place so that dies and punches may be quickly and easily replaced as necessary.

A still further object of this invention is to provide an improved punch press assembly which is so constructed whereby a terminal is simultaneously sheared off from a strip from which the terminal is being formed, applied to a coil form or the like, and an offset flange is

2

formed on the end of the strip from which the terminal is formed.

A still further object of this invention is to provide an improved terminal for application to coil forms and the like, the terminal being provided with means for attachment to the coil form and having means at opposite ends thereof for securing of wires or making similar connections.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of the punch assembly which is the subject of this invention and shows the same associated with a conventional type punch press base and head and an automatic feeder for the strip from which terminals are being formed carried by the base and operated in conjunction with the vertical movement of the head with respect to the base;

Figure 2 is an end view of the punch press assembly of Figure 1 as viewed from the right in Figure 1 and shows the relationship of a coil form positioning member carried by the main drill of the punch press assembly;

Figure 3 is a fragmentary horizontal sectional view taken substantially on the plane indicated by the section line 3—3 of Fig. 1 and shows the arrangement of the lower parts of the punch press assembly including the dies;

Figure 4 is a fragmentary horizontal sectional view taken substantially upon the plane indicated by the section line 4—4 of Figure 1 and shows the details of the punches of the punch press assembly;

Figure 5 is an enlarged fragmentary longitudinal vertical sectional view taken through the center of the punch press assembly and shows the details of the punches and dies and the relationship thereof with respect to each other and to a strip passing therebetween;

Figure 6 is an enlarged fragmentary vertical sectional view taken substantially upon the plane indicated by the section line 6—6 of Figure 3 and shows the details of a depressor plate for guidingly supporting the strip in a flange forming operation and urging the strip upwardly after the flange has been formed;

Figure 7 is a top plan view of a strip illustrating the steps applied thereto as it passes through the punch press assembly;

Figure 8 is a side elevational view of the strip of Figure 7 and shows the direction in which various parts of the strip are punched;

Figure 9 is an enlarged perspective view of the depressor plate and shows the general details thereof;

Figure 10 is a perspective view of one of the terminals formed from the strip of Figure 7 and shows the same applied to a coil form, the coil form being illustrated with only one terminal;

Figure 11 is an enlarged perspective view of one of the punches for notching the strip during its passage through the punch press assembly and shows the general construction of the punch and the manner in which it may be removably mounted;

Figure 12 is an enlarged perspective view of a forming punch which cooperates with the shearing plate to form the offset flange on the end of the strip;

Figure 13 is an enlarged perspective view of another form of punch, the punch being intended for notching the strip in the first step performed thereon;

Figure 14 is a perspective view of another coil form

and shows a modified form of terminal secured thereto;

Figure 15 is an enlarged vertical sectional view taken through the coil form of Figure 14 and shows the same mounted to a printed circuit type chassis;

Figure 16 is an enlarged fragmentary perspective view of an upper end of still another modified form of terminal;

Figure 17 is a perspective view of a shield can for coils and the like which is provided at its lower end with a pair of the terminals which function as clips; and

Figure 18 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 18—18 of Figure 17 and shows the relationship between one of the clips and the shield can.

Referring now to the drawings in detail, it will be seen that there is illustrated, particularly in Figures 1 through 5, inclusive, a conventional type of punch press which is referred to in general by the reference numeral 10. The punch press 10 includes a base assembly 12 which may be suitably mounted on any desired support. The base assembly 12 is provided with an uppermost base plate 14. Extending upwardly from the base plate 14 is a pair of longitudinally spaced guide shafts 16 which are received in sleeve portions 18 of a movable head 20. The movable head 20 is provided with an attaching flange 22 which is secured to a suitable ram mechanism for automatically raising and lowering the head 12 with respect to the base plate 14 to perform a punching operation.

Secured to the base plate 14 is an automatic strip feeder which is referred to in general by the reference numeral 24. The strip feeder 24 is of a conventional type and need not be described in detail. However, the strip feeder 24 is spring actuated by a spring 26. The spring 26 has associated therewith a follower member 28 which is engageable with a cam 30 carried by the head 20. As the head 20 moves downwardly due to the urgency of the ram 32 to which the mounting plate 22 is attached, the cam 30 moves the follower 28 to compress the spring 26. Then, as the head 20 moves upwardly, the spring 26 moves to the right, as viewed in Figure 1, to feed a strip between the base plate 14 and the head 20.

It is to be understood that the foregoing parts are all conventional and in themselves do not form a part of the present invention. However, the present invention does consist of a punch press assembly which is referred to in general by the reference numeral 34, the punch press assembly 34 being secured to the base plate 14 and the head 20 and operated thereby. The punch press assembly 34 consists primarily of dies and punches which will perform the desired punching operations.

Although the illustration of fasteners has been limited in the drawings for purposes of clarity, it is to be understood that both the base plate 14 and the head 20 are provided with a plurality of threaded bores, as necessary, for retaining the individual elements of the punch press assembly 34 in place.

Referring now to Figures 1, 3 and 5 in particular, it will be seen that there is secured directly to the upper surface of the base plate 14 adjacent the strip feeder 24 a spacer block 36. The spacer block 36 has removably secured to the left surface thereof a die forming block 38. The die forming block 38 rests upon the base plate 14 and is provided with a centrally located, vertically extending recess 40 in opposed relation to the left side of the spacer block 36.

Secured to the right side of the spacer block 36 are a pair of transversely aligned and transversely spaced die forming blocks 42. The die forming blocks 42 have an opening 44 therebetween which is adapted to receive a punch, as is best illustrated in Figure 5.

Mounted on the base plate 14 immediately adjacent the die forming blocks 42 is a die forming block 46. The die forming block 46 has abutting the same a die forming block 48. The die forming blocks 46 and 48 have cooperating vertical recesses 50 and 52, respectively, formed

therein. It is to be understood that there is a recess 50 and a recess 52 on opposite sides of the longitudinal center line of the punch press assembly 34.

Disposed centrally of the die forming block 48 remote from the die forming block 46 is a longitudinally extending recess 54 which is aligned with a space 56 formed by a pair of transversely aligned and transversely spaced blocks 58 secured to the right of the die forming block 48. Secured against the right faces of the blocks 58 is a relatively narrow spacing block 60.

Secured to the right side of the spacer block 60 is a die forming block 62 whose details will be set forth hereinafter. Secured to the right of the die forming block 62 is a relatively narrow shearing plate 64.

In order that a strip being operated on, such as the strip 66, may be guided with respect to the die half of the punch press assembly 34, there is secured in overlying relation to the above mentioned blocks a pair of elongated guide plates 68 and 70. The guide plates 68 and 70 are longitudinally elongated and disposed in transversely spaced relation. It is to be understood that the guide plates 68 and 70 are of a thickness greater than the thickness of the strip 66. The spacing of the guide plates 68 and 70 is such as to provide adequate clearance for the strip 66. Carried by the guide plates 68 and 70 are opposed, longitudinally elongated projecting ears 72 and 74 whose operation will be set forth in more detail hereinafter.

Overlying the left hand portions of the guide plates 68 and 70 is a combined retaining plate and punch guide plate 76. The plate 76 is secured to the spacer block 36 and the die forming block 46 by suitable cap screws 78. The cap screws 78 also pass through the spacer plates 68 and 70 and retain them in position. It is to be noted that the plate 76 is provided with an elongated slot 80 which extends transversely of the punch press 10 and which is aligned with the recess 40. A similar longitudinally extending slot 82 is disposed along the center line of the plate 76 in overlying relation to the recess 44. Formed in the plate 76 adjacent its right end on opposite sides of the center line thereof are recesses 84 which overlie the combined recesses formed by the recesses 50 and 52 on opposite sides of the center line of the punch press assembly 34.

As is best illustrated in Figure 5, the die portion of the punch press assembly 34 also includes a longitudinally extending mandrel 86. The mandrel 86 is rotatably journaled in the die forming block 62 and passes through the shearing plate 64. The mandrel 86 includes a shaft portion 88 and a relatively short mandrel portion 90. It is to be understood that the mandrel 86 may either be mechanically or manually indexed.

Referring now to Figures 1, 4 and 5 in particular, it will be seen that the punch portion of the die press assembly 34 includes an upper elongated mounting block 92 which is actually in the form of a plate. The mounting block 92 is secured to the underside of the head 20 by suitable fasteners (not shown). The mounting block 92 is provided with a plurality of threaded bores (not shown) for receiving fasteners, which are also not illustrated, for securing the various elements of the die portion in place.

Secured to the underside of the mounting block 92 in vertical alignment with the spacer block 36 is a mounting block 94. The mounting block 94 is provided with a recess 96 in the left side thereof, the recess 96 being offset from the center line of the punch press assembly 34, as is best illustrated in Figure 4. It will be noted that the mounting block 94 is secured to the mounting block 92 by suitable cap screws 98.

Removably positioned in the recess 96 and depending downwardly therefrom is a first punch 100. The punch 100 is retained in the recess 96 by a clamp block 102 which is secured to the mounting block 94 by a pair of transversely spaced cap screws 104. The clamp block 102 includes a pin 106 which passes through an aperture

5

in the punch 100 and is received in a horizontal bore 108 in the mounting block 94.

As is best illustrated in Figure 4, disposed immediately adjacent the mounting block 94 and with the major portion thereof on one side of the center line of the punch press assembly 34 is a mounting block 110. The mounting block 110 is secured in place by a pair of longitudinally spaced cap screws 112 and is provided in the face thereof adjacent the center line of the punch press assembly with a vertical recess 114. Seated in the recess 114 is a punch 116. The punch 116 is clamped in place by a clamp plate 118 which is substantially identical with the clamp plate 102. The clamp plate 118 is secured to the mounting block 110 by suitable cap screws 120. Although it has not been specifically illustrated, it is to be understood that the clamp plate 118 is provided with a pin similar to the pin 106 which retains the punch 116 in place.

Disposed immediately adjacent the mounting plate 106 is a pair of punches 122 and 124. The punches 122 and 124 are identical with the exception that they are right and left hand punches and are disposed on opposite sides of the center line of the punch press assembly 34.

As is best illustrated in Figure 11, the punch 124 includes a mounting block 126. The mounting block 126 is provided with a pair of bores 128 and 130 for receiving pins 132 and 134 carried by the mounting block 92. The block 126 also includes an enlarged bore 136 for the reception of a cap screw 138 securing the block 126 to the mounting block 92. Extending downwardly from the block 126 is the punch proper which is referred to by the reference numeral 140.

Disposed immediately adjacent the punches 122 and 124 is an elongated mounting block 142. The mounting block 142 is offset to one side of the center line of the punch press assembly 34 in the same manner as the mounting block 110. Formed in a face of the mounting block 142 facing the center line and disposed along the center line is a vertical recess 144. Seated in the vertical recess 144 is a punch 146, as is best illustrated in Figure 5. The punch 146 is mounted on a pin 148 carried by the mounting block 142. The punch 146 is retained in place by a clamp plate 150 which is secured to the mounting block 142 by suitable fasteners 152.

Referring now to Figure 12 in particular, it will be seen that there is illustrated another form of punch which is referred to in general by the reference numeral 154. The punch 154 includes a mounting block portion 156 which is identical with the mounting block portion 126 of the punch 124. The punch 154 includes a punch proper 158 which is in the form of a forming punch. It is to be understood that the punch 154 is disposed in transverse alignment with the right end of the mounting block 142 and is received in a corner notch 160 formed therein. Thus, the punch proper 158 is disposed along the center line of the punch press assembly 34.

Secured to the right of the mounting block 142 in the punch 154 is a relatively large mounting block 162. The mounting block 162 is offset to one side of the center line of the punch press assembly 34 and is formed with a vertical recess 164 therein. The vertical recess 164 is aligned with the center line of the punch press assembly 34 and has mounted therein for vertical sliding movement a guide punch 166. The guide punch 166 is provided in the upper portion thereof with a vertical slot 168 guidingly receiving a pin 170 projecting inwardly into the recess 164 for the mounting block 162. Clamped against the face of the mounting block 162 by suitable cap screws 172 retaining the punch 166 in the recess 164 is a clamping plate 174. As is best illustrated in Figure 4, the clamping plate 174 together with the mounting plate 162 are so contoured to form the hammer 176 which extends longitudinally of the punch press assembly 34 along the longitudinal axis thereof.

Referring now to Figure 5 in particular, it will be seen

6

that the mounting block 92 is provided with a vertical bore 178 in alignment with the recess 164. Further, a relatively large vertical bore 180 is formed in the head 20 in alignment with the bore 178. Guidingly received in the bore 178 and having a head portion 182 disposed in the bore 180 is a pin 184. Overlying the pin 184 and engaging the head portion 182 is the coil spring 186 which is disposed in the bore 180. The coil spring 186 resiliently urges the guide punch 166 downwardly through the hammer portion 176 with the pin 170 functioning as a stop.

Underlying the mounting block 142 and the punch 154 is a stripper plate 188. The stripper plate 188 is carried by a plurality of pins 190 which extends downwardly through the mounting block 92 and have head portions 192 disposed in enlarged bores 194 formed in the head 20. Disposed in the bores 194 and engaging the heads 192 are springs 196 which resiliently urge the stripper plate 188 downwardly yet permit the resisted upward movement thereof. It is to be noted that the stripper plate 188 is provided with an opening 198 for the passage of the punch 146 and cut-out 200 for the passage of the punch 154. The underside of the stripper plate 188 also includes recesses 202 for receiving the projections 72 and 74, the projections 72 and 74 forming stops for the stripper plate 188.

Referring now to Figures 5 and 7 in particular, it will be seen that as the strip 66 is fed through the punch press assembly 34 by the strip feeding mechanism 24, the punch portion of the punch press assembly 34 moves downwardly with the punch 100 making the initial notch in the strip 66, the notch being referred to by the reference numeral 204. The strip 66 is then advanced until the notch 204 is disposed slightly to the left of the punch 100. At this time, the head 20 again moves downwardly and the punch 100 forms a longitudinal slot 206 in the strip 66. After the head 20 has moved upwardly, the strip 66 is again advanced until the notch 204 and the slot 206 are disposed on opposite sides of the punches 122 and 124. The head 20 again moves downwardly and forms triangular notches 208 in the opposite sides of the strip 66 between the notch 204 and the slot 206.

After these three steps have been made, the strip 66 is again advanced, but that section of the strip which has had the three operations performed thereon is not operated on. The strip 66 is again advanced and that portion previously operated on is aligned with the punch 146. The punch 146, which is provided with the pair of punch portions 210, as is best illustrated in Figure 5, moves downwardly to form two adjacent longitudinal slots 212 in the strip 66. At the same time, there is struck from the underside of the strip 66 a pair of mounting fingers or tabs 214.

The next operation results in the strip 66 being advanced through the punch press assembly 34 so that the extreme end of the strip is in alignment with the right hand edge of the shearing plate 64. Then, as the head 20 moves downwardly, the forming punch 154 engages that portion of the strip 66 underlying it and moves downwardly with respect to the shearing plate 64 to form an upstanding offset flange on the extreme end of the strip 66, the flange being referred to by the reference numeral 216.

Referring now to Figures 5 and 6 in particular, it will be seen that there is formed in the upper center portion of the die forming block 62 a recess 218, the general outline of the recess 218 being illustrated in Figure 3. Positioned in the recess 218 is a depressor plate 220 which is best illustrated in Figure 9. The depressor plate 220 is disposed along the left hand edge thereof with a pair of aligned mounting ears 222 having aligned bores 224 therethrough. The depressor plate 220 is pivotally mounted on a transverse shaft 226 which extends through the block 62. The depressor plate 220 is provided with an aligning groove 228 formed in the upper surface thereof,

the aligning groove 228 extending longitudinally along the center of the depressor plate 220.

As the strip 66 moves downwardly due to the urging of the forming punch 154 in the forming of the flange 216, the depressor plate 220 which underlies the strip at that point moves downwardly while still supporting that portion of the strip 66.

As is best illustrated in Figure 6, there is provided in the die forming block 62 a vertical pin 230 which extends down below the block 62 and has a head 232 disposed in an enlarged bore 234 in the base plate 14. Underlying the head 232 and disposed in the bore 234 is a coil spring 236 which urges the pin 230 upwardly. The pin 230 engages the underside of the depressor plate 220 and both resiliently resists the downward movement thereof in response to the urgency of the forming punch 154 and moves the strip 66 upwardly after the flange forming operation.

After the terminal has been completed as the part of the strip 66, the terminal, which is referred to in general by the reference numeral 238 and best illustrated in Figure 10, is secured to a coil form 240 carried by the mandrel portion 90.

The terminal 238 is secured to the coil form 240 by the hammer 176. In the downward movement of the hammer 176, the guide punch 166, having a lower end in the form of fingers, engages in the slots 212 and stiffens the fingers of tabs 214. The hammer 176 continues to drive the terminal 238 downwardly so as to effect bending of the fingers or tabs 214, as is best illustrated in Figure 5. Inasmuch as the guide punch 166 is resiliently mounted, when it engages the coil form 240, the downward movement thereof ceases and the hammer 176 moves downwardly with respect thereto.

Referring now to Figures 4 and 5 in particular, it will be seen that the left portion of the hammer 176 also forms a cut-off punch 242. The cut-off punch 242 cooperates with the shearing plate 64 to simultaneously shear the terminal 238 from the strip 66 when it is applied to the coil form 240. From the foregoing description of the formation of the flange 216, it will be readily apparent that not only is a terminal, such as the terminal 238, sheared from the strip 66 and applied to a coil form, but also, an upstanding wire mounting flange 216 is formed in the same operation.

Referring now to Figure 10 in particular, it will be seen that when the terminal 238 is secured to a coil form 240, the flange 216 projects outwardly from the coil form 240 and facilitates the securing of a coil wire thereto. By providing the notch 204 in the flange 216, the connection can be easily made. The slot 206 is provided for securing a suitable wire to the terminal 238, the wire not being illustrated.

Referring now to Figure 16 in particular, it will be seen that there is illustrated a slightly modified form of terminal which is referred to in general by the reference numeral 246. The terminal 246 is substantially identical with the terminal 238 and differs therefrom only in that the flange 216 thereof is provided with an additional notch 248 on the opposite side of the notch 204. The provision of this additional notch further facilitates the securing of the coil wire to the terminal 246. It is to be understood that the notch 248 can easily be formed by providing an additional punch 100 disposed on the opposite side of the center line of the punch press assembly 34 from the punch 100 shown.

Referring now to Figures 14 and 15 in particular, it will be seen that there is illustrated a modified form of terminal which is referred to in general by the reference numeral 250. The terminal 250 differs from the terminal 238 only in that the end portion thereof in which the slot 206 is formed is bent to form a resilient portion 252. The resilient offset portion 252 greatly facilitates the securing of the coil form 240 to a chassis, such as the chassis 254. When the resilient offset portion 252 is

provided, the terminal 250 will automatically engage a wiring portion of a printed wiring diagram 256 formed on the insulated chassis 254. The chassis 254 is primarily formed of a sheet of insulative material 256, such as Bakelite or the like.

Referring now to Figures 17 and 18, it will be seen that there is illustrated a conventional type of shield can 260. Secured to the bottom part of the can 260 at opposite sides thereof and partially projecting therebelow is a pair of clips 262. The clips 262 are identical with the terminals 250. However, inasmuch as the clips 262 serve no function other than to secure the shield can 260 to a chassis, the flanges 216, although illustrated, are not required.

The shield can 260 is preferably formed of a soft metal, such as aluminum, and the clips 262 may be formed and positioned by the punch press 10. In the positioning of one of the clips 262, a tab 264 thereof, corresponding to one of the tabs 214 of the terminal 250, will be punched into the side of the shield can 260. Depending upon the thickness of the material utilized in forming the shield can 260, the tab 264 will either pass all the way through and be bent over inside the shield can 260, in the manner illustrated in Figure 15 with respect to the coil form 240, or there will be a slight extrusion of the material of the shield can 260 with the result that the tab 264 will be entirely embedded within the material of the shield can 260, as is best illustrated in Figure 18.

From the foregoing alternate use of the terminals as clips, it will be readily apparent that although the term "terminal" has been applied to the articles made and installed by the punch press 10, the invention is not so limited. The terminals may be utilized with devices other than coil forms so as to function as terminals and also may be utilized as clips for retaining articles, such as the shield can 260, in position with respect to a chassis or other type of frame.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A punch press assembly for forming terminals comprising a plurality of die forming and spacer blocks securable to a base of a punch press, a plurality of mounting blocks and spaced plates secured to a head of a punch press, individual punches removably secured to said mounting blocks, a strip guide plate overlying said die forming and spacer blocks, a stripper plate carried by one of said mounting blocks, a shearing plate carried by one of said spacer blocks for engagement with a cut-off punch of said punches, a mandrel extending from said one spacer block in longitudinal alignment with said punches, a hammer carried by said one mounting block in overlying relation with said mandrel for applying a terminal to a member carried by said mandrel, said hammer including a terminal guide member mounted for vertical movement, said terminal guide member being resiliently urged downwardly and normally being disposed below said hammer, said terminal guide member including projecting fingers for passing through a terminal.

2. A punch press assembly for forming terminals comprising a plurality of die forming and spacer blocks securable to a base of a punch press, a plurality of mounting blocks and spacer plates secured to a head of a punch press, individual punches removably secured to said mounting blocks, a strip guide plate overlying said die forming and spacer blocks, a stripper plate carried by one of said mounting blocks, a shearing plate

carried by one of said spacer blocks for engagement with a cut-off punch of said punches, said shearing plate being of a width to form an offset flange at an end of a strip being operated on by said punch press assembly, one of said punches cooperating with said shearing plate to form said flange.

3. A punch press assembly for forming terminals comprising a plurality of die forming and spacer blocks securable to a base of a punch press, a plurality of mounting blocks and spacer plates secured to a head of a punch press, individual punches removably secured to said mounting blocks, a strip guide plate overlying said die forming and spacer blocks, a stripper plate carried by one of said mounting blocks, a shearing plate carried by one of said spacer blocks for engagement with a cut-off punch of said punches, said shearing plate being of a width to form an offset flange at an end of a strip being operated on by said punch press assembly, one of said punches cooperating with said shearing plate to form said flange, said one spacer block having a recess in the upper part thereof, a depressor plate in alignment with said one punch, said depressor plate being resiliently urged upwardly to guide a strip during the forming of one of said flanges.

4. A punch press assembly for forming terminals from a strip comprising a die assembly securable to a punch press base, said die assembly including a mandrel, and a punch assembly securable to a head of a punch press, said punch assembly including a hammer cooperating with said mandrel to apply a terminal, said die assembly including a shearing plate, said hammer having an edge portion forming a cut-off punch cooperating with said shearing plate to simultaneously cut off and apply a terminal, said punch assembly including a forming punch cooperable with said shearing plate to form an offset flange on a strip at an end of a strip from which a terminal has just been sheared.

5. A punch press assembly for forming terminals from a strip comprising a die assembly securable to a punch press base, said die assembly including a mandrel, and a punch assembly securable to a head of a punch press, said punch assembly including a hammer cooperating with said mandrel to apply a terminal, said die assembly including a shearing plate, said hammer having an edge portion forming a cut-off punch cooperating with said shearing plate to simultaneously cut off and apply a terminal, said punch assembly including a forming punch cooperable with said shearing plate to form an offset flange on a strip at an end of a strip from which a terminal has just been sheared, said shearing plate having a width equal to the length of said flange.

6. A punch press assembly for forming terminals from a strip comprising a die assembly securable to a punch press base, said die assembly including a mandrel, and a punch assembly securable to a head of a punch press, said punch assembly including a hammer cooperating with said mandrel to apply a terminal, said die assembly including a shearing plate, said hammer having an edge portion forming a cut-off punch cooperating with said

shearing plate to simultaneously cut off and apply a terminal, said punch assembly including a forming punch cooperable with said shearing plate to form an offset flange on a strip at an end of a strip from which a terminal has just been sheared, said shearing plate having a width equal to the length of said flange, a depressor plate resiliently mounted in alignment with said forming punch for guiding a strip during a flange forming operation.

7. A punch press assembly for forming terminals from a strip comprising a die assembly securable to a punch press base, said die assembly including a mandrel, and a punch assembly securable to a head of a punch press, said punch assembly including a hammer cooperating with said mandrel to apply a terminal, said die assembly including a shearing plate, said hammer having an edge portion forming a cut-off punch cooperating with said shearing plate to simultaneously cut-off a terminal from the strip at the time the terminal is being applied by said hammer, said punch assembly including a forming punch cooperating with said shearing plate to form an offset flange on a strip at the end of the strip from which the terminal has just been sheared, said hammer edge portion being closely aligned with an edge of said shearing plate to provide a shearing action, said forming punch being spaced from said shearing plate a distance equal to approximately the thickness of the strip to permit formation of the offset flange between said forming punch and said shearing strip.

8. The punch press assembly of claim 7 wherein said shearing plate has a width substantially equal to the length of said flange.

9. The punch press assembly of claim 4 wherein said die assembly includes a depressor plate resiliently mounted in alignment with said forming punch, said depressor plate having a central slot for receiving depending prongs punched from the strip in advance of said depressor plate.

References Cited in the file of this patent

UNITED STATES PATENTS

518,766	Plecker	Apr. 24, 1894
970,314	Grimes	Sept. 13, 1910
984,097	Lundgren	Feb. 14, 1911
1,011,439	Kaisling	Dec. 12, 1911
1,286,210	Beugler	Dec. 3, 1918
1,841,556	Figge	Nov. 10, 1931
1,873,125	Holmes	Aug. 23, 1932
2,030,071	Newhouse	Feb. 11, 1936
2,169,802	Keller	Aug. 15, 1939
2,324,982	Kuhn	July 20, 1943
2,404,180	King et al.	July 16, 1946
2,531,911	Johnson	Nov. 28, 1950
2,533,779	Ende	Dec. 12, 1950
2,705,797	Handel	Apr. 12, 1955

FOREIGN PATENTS

403,896	France	Nov. 16, 1909
---------	--------	---------------