

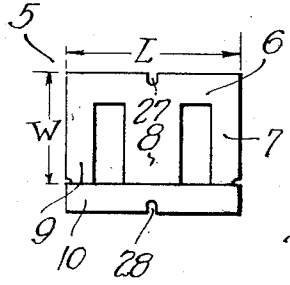
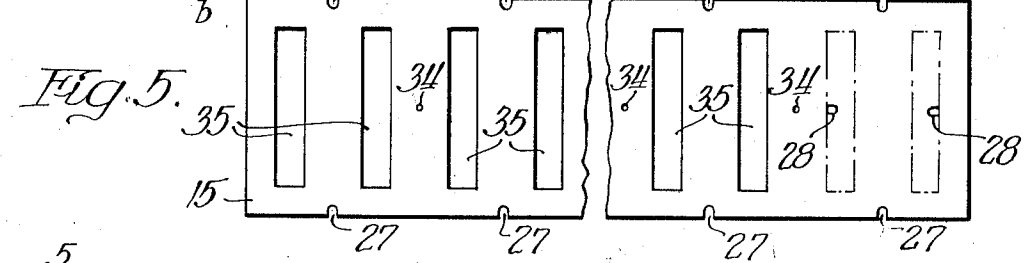
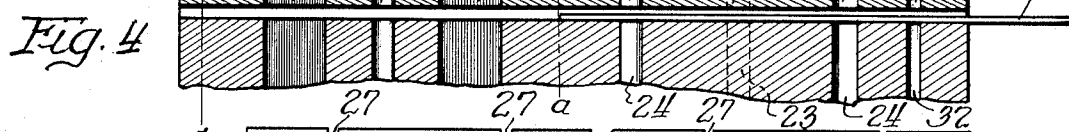
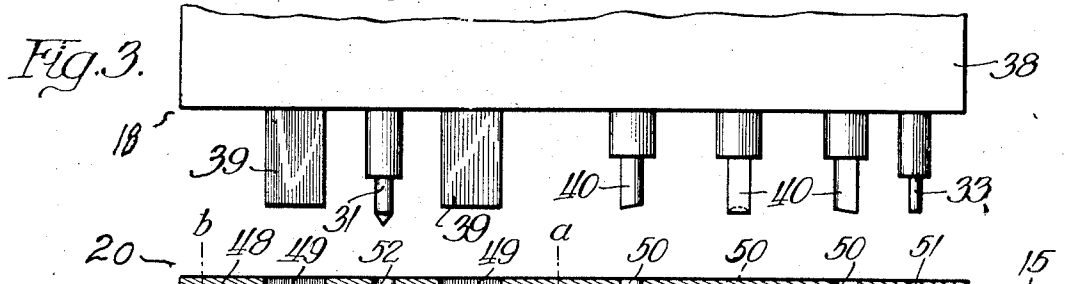
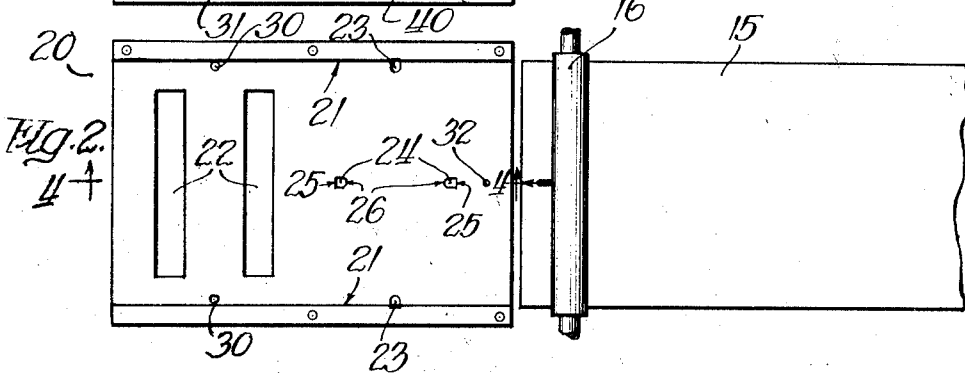
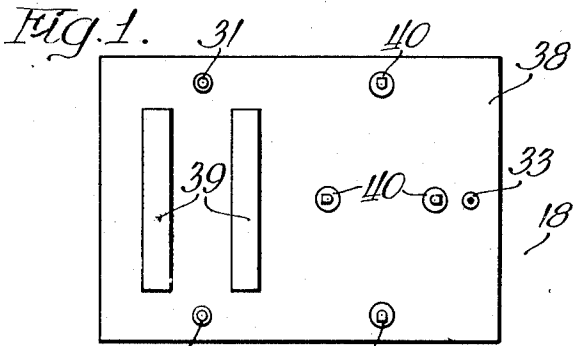
June 12, 1934.

J. C. DALEY

1,962,432

APPARATUS FOR FORMING CORE LAMINATIONS

Original Filed Aug. 18, 1930 2 Sheets-Sheet 1



Inventor:  
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By *Drum, Jackson, Dettcher + Wiener*  
Attorneys

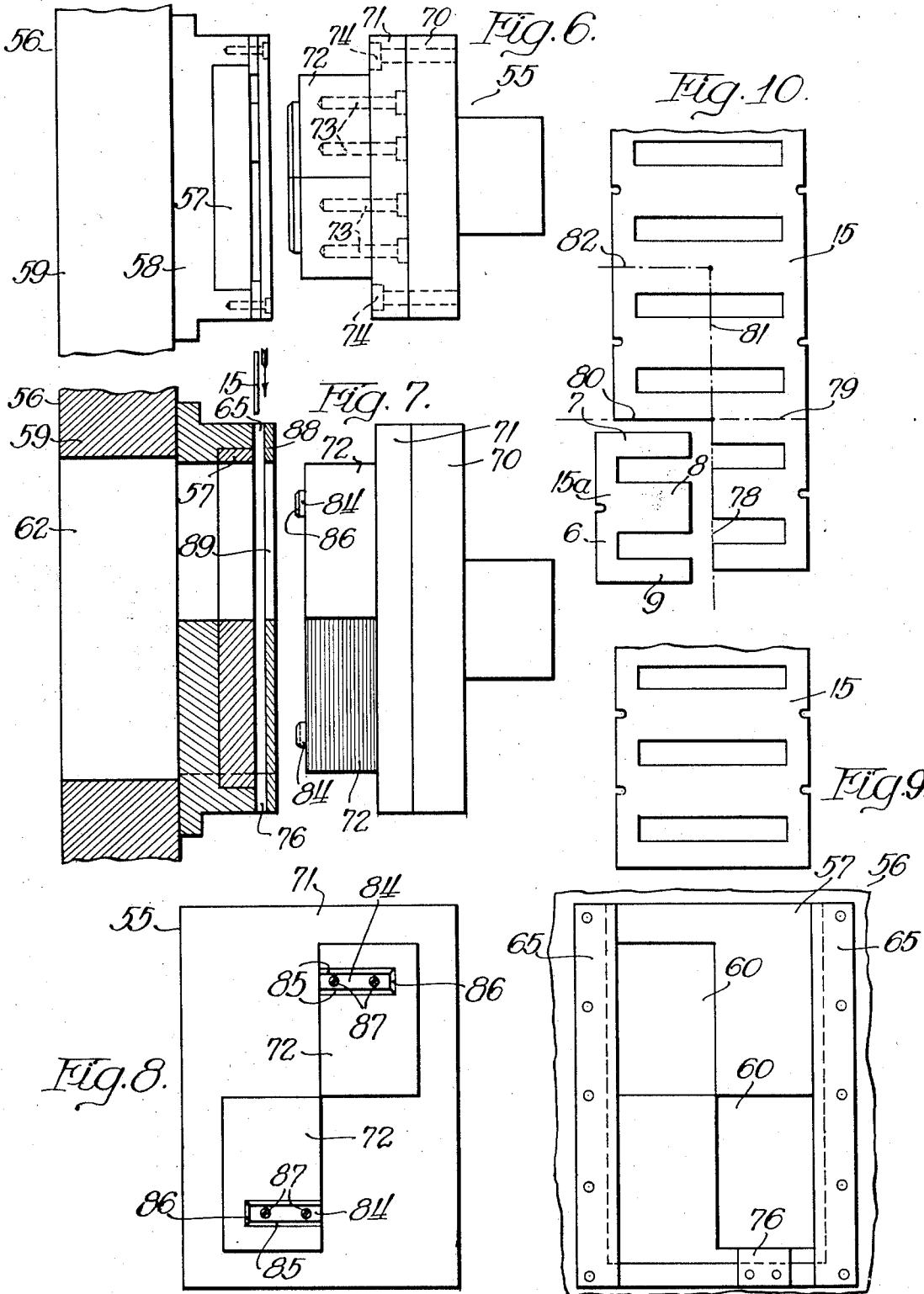
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Inventor: James C. Daley  
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# UNITED STATES PATENT OFFICE

1,962,432

## APPARATUS FOR FORMING CORE LAMINATIONS

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corporation of Illinois

Original application August 18, 1930, Serial No.  
476,231. Divided and this application Decem-  
ber 12, 1932, Serial No. 646,855

9 Claims. (Cl. 164—18)

My invention relates to apparatus for forming a strip of stock into predetermined shapes, and more particularly to apparatus for cutting from sheet metal laminations which are adapted to be afterward assembled to produce the core or magnetic circuit of a transformer or other electro-magnetic device.

The present invention is a division of my co-pending application Serial No. 476,231 filed August 18, 1930.

I am aware that various devices for producing predetermined shapes have been proposed before, but in such devices the means for removing the material from between the legs of the laminations and the means for cutting the laminations from the strip have been operable together or in one stroke.

The apparatus of my present invention comprises means for punching oblong openings throughout the length of the strip of stock for the purpose of removing the material from between the legs of the laminations and means operable independently of said first means for cutting the strip across the openings and between certain of said openings to form predetermined shapes after removal of the material from between the legs of the laminations throughout the length of the strip of stock.

By punching the openings between the legs of the laminations throughout the length of the strip first, and thereafter severing the strip across the openings and between certain of said openings the punch and die or cutting elements are simplified and the chance of discrepancy is reduced. The cost of maintenance of the punch and die elements is less because it is not necessary to grind these elements as frequently as it has been where the oblong openings are cut and the severing of the strip accomplished simultaneously. Where grinding is necessary, it may be accomplished more easily than before. The punch and die elements are less complicated to set up, their size is reduced, and the danger of shearing these elements in setting them up is reduced.

A further and important advantage of the present invention is that I am enabled to operate the means for cutting the strip across the openings and between certain of the openings at a speed different than the speed of operation of the means for punching the openings between the legs of the laminations. The means for punching the openings between the legs of the laminations may be used on one machine and the means for severing the strip

across the openings and between certain of the openings may be used on a different machine. One machine may be of the generally vertical type and the other of the generally horizontal type, or both may be of the vertical or horizontal types. Obviously, where one of the machines is faster than the other, one of the faster machines may be used with more than one of the slower machines.

I find that by cutting the oblong openings or windows on a vertical type of machine, and severing the strip across the openings and between certain of the openings on machines of the horizontal type, one or more machines of the vertical type may be combined with a greater number of machines of the horizontal type, and the lesser number of oblong opening cutting machines will be able to supply the strips, with the oblong openings all cut therein, at a rate sufficient to meet the demands of the rate at which they are handled with a greater number of machines for severing the strips across the openings and between the pairs of openings.

Another advantage resides in the ability of the punch and die elements for severing the strip across and between the openings to continue to operate in case of disability of the punch and die elements for cutting the oblong openings, and vice versa. If the severing punch or die means is disabled, the continued operation of the oblong opening cutting punch and die means will build up a reserve of strips from which the oblong openings have all been cut, which strips will be available when the severing die and punch means is rendered operative, whereas, if the oblong opening cutting means is disabled, the means for severing the strips across and between the openings may continue in operation with this reserve.

As illustrative of a particular practical application of the invention, I have combined one vertical machine for first cutting all of the oblong openings with two horizontal machines for thereafter severing the strip across the openings and between each pair of openings.

Other advantages will appear from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a bottom plan view of the upper movable punch means for cutting the oblong openings;

Figure 2 is a top plan view of the lower die means which cooperates with the punch means of Figure 1 in cutting the oblong openings;

Figure 3 is a fragmentary side elevational view of the upper punch means of Figure 1;

Figure 4 is a fragmentary longitudinal section through the lower die and stripper means taken on the line 4—4 of Figure 2, Figure 4 being positioned below Figure 3 to show the operative relation of the punch and die means for cutting the oblong openings;

Figure 5 is a plan view of the strip of sheet metal stock partially broken away and after completion of all except the last pair of generally oblong openings;

Figure 6 is a top plan view of the punch and die or cutting elements for severing the strip across and between the openings to form the laminations;

Figure 7 is a view of the punch and die means of Figure 6 partially in vertical section and partially in elevation;

Figure 8 is a front elevational view of the punch means shown in Figure 6;

Figure 9 is a front elevational view of the die means shown in Figure 6;

Figure 10 is a view similar to Figure 5 showing the manner of severing the strip across the openings and between certain of the openings after completion of said openings throughout the length of the strip; and

Figure 11 is a view illustrating one manner of making a core with the E-shaped laminations and rectangular strips formed by the present invention.

Only so much of the punch and die means is illustrated in the drawings as is necessary to explain the present invention, it being understood that any details not shown may be of any existing or suitable type and may vary widely within the scope of the present invention.

In the illustrated embodiment of the invention, each lamination 5 (Figures 10 and 11) is of E-shaped configuration having a base 6 and three legs 7, 8 and 9, parallel with respect to each other and at right angles to the base 6. The intermediate legs 8 which are disposed centrally between the outer legs 7 and 9 may be wider than the outer legs, as shown, and the bases 6 are shown as substantially the same width as the outer legs 7 and 9.

In making up a transformer core, the laminations 5 may be stacked with the legs 7, 8 and 9, upon each other and with the bases 6 disposed alternately at opposite ends. The rectangular strips 10 cut from the oblong openings which form the spaces between the legs 7, 8 and 9, may be of lengths equal to length L (Figure 11) of the E-shaped laminations and may be arranged across the outer ends of the legs 7, 8 and 9, as shown in Figure 11, to form the core. Where the straight strips are used, the bases 6 need not, of course, be disposed alternately at opposite ends, but may all be disposed at the same end, although the use of the straight strip may be combined with the arrangement of the bases of the laminations alternately at opposite ends.

As is well understood in the art, the coils may be wound around the intermediate legs 8 and through the spaces between the intermediate and outer legs, the intermediate leg extending through the coils and the outer legs, together with the bases 6, forming a magnetic envelope completely surrounding the coils.

The stock from which the laminations are made is in the form of continuous strips 15 of sheet metal. The strips 15 are preferably long, relatively narrow strips, and are substantially flat. They may be of any suitable or preferred gauge or thickness. Sheet iron is commonly em-

ployed and the laminations may be punched or stamped out cold.

For the purpose of punching or stamping out the oblong openings which form the spaces between the legs of the laminations, the strip 15 is first fed by suitable means illustrated diagrammatically at 16 in Figure 2 between the upper punch and lower die elements 18 and 20 of a vertical press, the strip 15 being suitably guided and fed over the lower die element 20. The feed means at 16 forms means for positively feeding the strip of metal between the punch and die elements, and the strip is advanced step by step, the steps of advance alternating with the strokes of the press so that after each stroke the strip will be advanced and positioned for the next stroke.

The lower die may be fastened down upon the bed of the press or other support. It comprises the die proper which may be secured by pressed fit or otherwise in an opening in a die block or plate which may, in turn, be fastened down upon the bed of the press in any suitable or preferred manner.

One means for guiding the strip 15 may comprise shoulders or flanges 21 formed along the opposite sides of the die element 20. This, of course, may vary. For example, the guide means may be formed on the guide block or plate, above referred to, or, as a matter of fact, may be separate from either of these members if found desirable.

The die element 20 is provided with two parallel oblong or generally rectangular die openings 22, the lengths of which are disposed transversely across the path of movement of the strip 15 between the punch and die elements, and with two pairs of relatively small die openings 23, 23 and 24, 24. The relatively small die openings 23 and 24 are preferably alike and each, preferably, has a flat inner side 25 and is rounded at its outer side at 26. The openings 24 are at the longitudinal median line of the strip 15 in its movement between the punch and die elements, and the openings 23 are at the outer edge of the strip to cut the notches 27 centrally between the ends of the outer edges of the bases 6 of the laminations 5, as shown in Figures 5 and 11. The relatively small die openings 24 are so arranged as to form holes or perforations along the longitudinal median line of the strip, which holes or perforations form the notches 28, one in the outer longitudinal edge of each of the straight pieces 10 which are stamped out by the die openings 22 and the cooperating punch elements 39.

The outer ends of the openings 23 preferably extend outwardly of the inner guide edges of the shoulders or flanges 21 to assure opening of the notches 27 formed thereby from the outer edges of the strip 15.

The oblong die openings 22 and the relatively small openings 23 and 24 are all bounded by relatively sharp cutting or shearing edges, as is well understood in the art. The die element 20 is for the purpose of clarity shown as made up in one or an integral piece, but it may, of course, in practice be made up of a plurality of straight strips and blocks arranged and suitably interlocked to form the desired die openings. It is usually desirable to avoid angular pieces in making up the die proper and to make the die element up at least as completely as possible of straight oblong pieces so that integral angular cutting edges and corners are avoided.

The die element 20 is also provided with a pair

of openings 30 for receiving aligning pins 31 on the punch element 18, and with an opening 32 for receiving a circular punch pin 33 on the punch element 18. The opening 32 is on the longitudinal median line of the strip of metal 15 in its passage between the punch and die elements and is disposed to form the relatively small openings 34 (Figures 5 and 10), one centrally between each pair of openings 35 from which the straight pieces 10 are punched. The purpose of forming the openings 34 will appear as this description proceeds. One of the openings 30 is disposed adjacent each of the inner guide edges of the guide 21, and these openings 30 are in transverse alignment along an imaginary line centrally between the die openings 22.

The cooperating punch element 18 is reciprocable up and down into and out of operation with the lower die element 20. It comprises a block 38 in which the upper ends of the punch members 39 and punch pins 40 are secured. This block 38 is mounted upon the vertically reciprocating carriage of the press. The punch members 39 are bounded by relatively sharp cutting edges and conform peripherally with the die openings 22, whereas the punch pins 40 are likewise bounded by relatively sharp cutting edges and conform peripherally with the die openings 23 and 24. The downward stroke of the punch carriage or block 38 moves the generally rectangular or oblong punch members 39 down into the mating die openings 22, and the punch pins 40 down into the mating die openings 23 and 24 and, upon the upward movement of the punch carriage, the punch elements are elevated from the die openings to substantially the positions shown in Figures 3 and 4. The aligning and positioning pins 31 are also secured to the block 38, as is the punch pin 33, and these pins move down into the openings 30 and 32 upon the downward stroke of the punch element and, upon the upward stroke of the press, are withdrawn and elevated from these openings, as shown in Figures 3 and 4.

The sheet metal strip 15 is fed between the punch and die element in the direction indicated by the arrow in Figure 2. The machine shown being of the vertical type, the path of feed is in a generally horizontal direction.

Assuming that the metal strip 15 is initially entered with its inner end to the right of the right hand opening 22 (Figure 3), a distance substantially equal to the width of one of the outer legs 7, 9 of the resulting laminations, the initial stroke of the press will move the punch pins 40 and the pins 33 down through the strip and into the mating openings 23, 24 and 32, cutting out the two openings 28 along the longitudinal median line of the strip, the two notches 27 at the outer sides or longitudinal edges of the strip and the opening 34. Upon the succeeding upward stroke of the press the punch pins 40 and the punch pin 33 are withdrawn from the die openings and the feeding mechanism 16 operates to feed positively the strip 15 forwardly sufficiently to dispose the notches 27 in substantial register with the die openings 30.

Then upon the succeeding downward stroke of the press, the punch members 39 pass through the strip 15 and down into the die openings 22 punching out the oblong straight pieces 10 and forming the parallel openings 35 transversely across the path of movement of the sheet metal strip. In the downward movement of the punch, the aligning and positioning pins 31 enter the

notches 27 first, and the lower ends of these pins, being tapered as shown in Figure 3, will align the stock and hold it in position so that the oblong openings 35 will be properly related to the next pair of oblong openings and so that these oblong openings will be punched in the desired relation with respect to the openings 28, notches 27 and openings 34.

Simultaneously with the punching of the openings 35 the punch pins 40 and punch pin 33, together with the die openings 23, 24 and 32, punch the openings 28, notches 27 and openings 34 in the next succeeding area of the metal strip, as indicated at the right hand end of the strip shown in Figure 5. It is understood that in succeeding operations, when the punch element is withdrawn from the die element, the feeding mechanism 16 feeds the strip 15 longitudinally a distance equal to the distance from a point centrally between one pair of openings 35 to a point centrally between the next succeeding pair of openings, or a distance equal to the distance from the dot and dash line *a* in Figure 4 to the dot and dash line *b*, the dot and dash line *b* being disposed to the left of the left hand die opening 22 (Figure 4) a distance substantially equal to the width of one of the outer legs of the resulting laminations.

The oblong opening punching operations are continued until the successive groups or pairs of oblong openings 35 are completed throughout the length of the strip 15 and then the strip is severed longitudinally, in this particular embodiment, across the openings 35 and also transversely, in this particular embodiment, between each pair of openings to form the E-shaped bodies or laminations as shown in Figure 10.

Suitable means may be provided for stripping the stock from the punch element. The stripper may be in the form of a stripper plate 48 (Figure 4) rigidly secured in spaced relation over the die element 20 and provided with openings 49, 50 and 51, corresponding with the die openings 22, 23, 24 and 32, respectively, so that the respective punch elements may pass through the stripper plate 48 and into the respective die openings. The stripper plate 48 also has openings 52 to permit the aligning and positioning pins 31 to pass through the plate and into the openings 30. The particular stripper means may vary widely. In the illustrated embodiment, the plate 48 is mounted upon the shoulders or flanges 21 and held in spaced relation over the die element thereby.

For the purpose of severing the strip across the oblong openings 35 and also between certain of said openings the strip 15, after completion of all of the oblong openings 35 throughout the length of the strip, is fed between punch and die elements 55 and 56 shown in Figures 6, 7, 8 and 9.

The punch and die elements 55 and 56 may constitute the punch and die elements of a generally horizontal type of press, it being understood that although this particular punch and die means is shown in Figures 6, 7, 8 and 9, as acting horizontally, the punch and die elements for severing the strip after completion of the openings forming the spaces between the legs of the laminations may be inclined to the horizontal as desired.

The die element 56 comprises the die proper 57 secured in the die block 58 which is, in turn, secured to the bolster 59 of the press. The die proper 57 is provided with two generally rectangular die openings 60 which correspond with the outer contours of the laminations 5, and are the

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openings for blocking out or forming the outer contours of the laminations. These openings 60 are bounded by relatively sharp cutting edges and are positioned in staggered relation, one at each side of the center of the generally vertical path of travel of the strip 15 between the punch and die elements 55 and 56. The openings 60 preferably extend on through the block 58, and the bolster of the press or other support is open at 62. The cutting edges of the openings 60 are aligned on a longitudinal median line along the path of travel of the strip 15 and the generally vertically disposed longitudinal dimensions of the openings 60 are equal to the lengths L of the laminations 5 (Figure 11), whereas the width of the openings 60 is substantially equal to the width W of the laminations 5. The strip 15 may be guided generally vertically between the punch and die elements 55 and 56 by guide shoulders or flanges 65 formed along the opposite sides of the die element 56. The inner guide edges of the guide 65 are preferably disposed at the outer vertical edges of the die openings 60, or the outer edges of these openings may extend outwardly slightly of the guide edges of the guides 65 to assure blocking out of the laminations through the opposite edges of the sheet metal strip.

The cooperating punch means 55 is reciprocable generally horizontally into and out of cooperation with the die element 56. It comprises a punch holder 70, a punch plate 71 and punch members proper 72. The punch members 72 are bounded by relatively sharp cutting edges and are of generally rectangular configuration conforming peripherally with the mating die openings 60. They may be secured to the plate 71 as indicated at 73, and the plate may, in turn, be secured to the punch holder 70 as indicated at 74. The generally horizontal stroke of the punch element toward the die element moves the punch members 72 into the mating die openings 60 and, upon the outward movement of the punch element, the punch members are withdrawn from the die openings as shown in Figures 6 and 7.

The strip of sheet metal stock 15 with all of the opening 35 punched therein is fed generally vertically between the punch and die elements 55 and 56 in the direction indicated by the arrow in Figure 7. The feed may be by gravity, or at least partially by gravity, the operator usually being depended upon to assist gravity by hand in feeding the strip between the punch and die elements 55 and 56. Stop means 76 is provided for stopping the end of the strip 15 at the lower cutting edge of the lower die opening 60, or just slightly ahead of said lower edge to assure complete blocking out of the lamination upon operation of the press. With the lower end of the metal strip thus positioned, the first stroke of the punch into engagement with the die element punches out two E-shaped laminations in staggered relation along the lines 78, 79, 80, 81 and 82 of Figure 10. At the same time the other lamination 15a is freed upon the initial blocking operation upon the strip and this lamination may drop out generally vertically from the face of the die element 57.

Upon completion of this blocking out operation, the lower end of the strip is formed by the cut edges 82, 81 and 79, and, after withdrawing the punch element from the die element, the strip is fed forward a distance substantially equal to the length L of the lamination whereupon the succeeding stroke blocks out two staggered E-shaped laminations similar to the two laminations blocked out in staggered relation upon the first stroke of

the press. Obviously the small openings 34 assure that the staggered E-shaped bodies will be separated at all times at the meeting inner corners of the punch member 72 and die openings 60. It is to be understood that the outer longitudinal edges of the metal strip may be cut to shape independently of the punching operations herein described. The blocking out punch and die elements sever the strip longitudinally along the median line of the strip and across the transverse oblong openings 35 centrally between the opposite ends of these openings, and also transversely between each pair of openings along the lines 79, 80 and 82.

For the purpose of assuring proper positioning of the metal strip with its oblong openings 35 with respect to the punch members 72 and die openings 60, each of the punch members 72 is provided with a generally rectangular pilot or positioning member 84. These members 84 are in the form of blocks disposed parallel and transversely elongated with widths substantially equal to the width of the oblong openings 35 and the opposite sides 85, and one end of each block at 86 is preferably tapered downwardly as shown in Figure 8 so that when the openings 35 are disposed between the punch and die elements 55 and 56 the outer narrow ends of the blocks will enter the openings 60 in movement of the punch element into cooperation with the die elements and in spite of lack of exact positioning of the strip 15. Then upon completion of the punching stroke, the tapered ends of the blocks will pilot the stock to proper position and these blocks 84, upon completely entering the openings 35, will assure such position and retain the same in the operation of the press, it being understood that the tapered edges 85 cooperate with the opposite longitudinal edges of the openings 35 and that the tapered ends 86 cooperate with the ends of the openings 35 in the positioning action. The blocks 84 may be rigidly secured to the face of the punch element 72 by means of screws 87.

Suitable means may be provided for stripping the stock from the punch element of the press. The stripper may be in the form of a stripper plate 88 rigidly secured in spaced relation over the die elements and provided with openings 89 corresponding with the die openings 60 to permit movement of the punch elements 72 through the stripper plate 88 into the respective die openings 60. In the illustrated embodiment, the stripper plate 88 is secured by any suitable means, such as the bolt shown in dotted lines in Figure 6, to the guide flanges or shoulders 65 and is spaced from the face of the die proper 57 by means of the flanges 65.

The notches 27 formed in the bases of the laminations 5 and the notches 28 formed in one edge of each of the straight pieces 10 are for purposes of assembly. When, for example, the laminations are assembled as shown in Figure 11, these notches 27 and 28 may be disposed to receive the posts or the shanks of the screws or other means used in binding the laminations together.

It is to be understood that the oblong openings 35 may be stamped out with their lengths disposed longitudinally of the strip instead of transversely of the strip and that, instead of punching only one pair of openings 35 with each stroke of the press, any desired number of pairs of such openings may be punched out upon each stroke of the press. Where more than one pair of such openings are stamped upon each stroke, the means for independently cutting the laminations from the strip will be modified to cut out a cor-

respondingly increased number of laminations upon each stroke of the severing or blanking out press. The number of laminations blanked out or formed upon each stroke may vary widely within the scope of the present invention, it being contemplated as entirely practicable to form from two to sixty-four laminations upon each stroke of the punch and die elements illustrated in Figures 6 and 7. In the application, of which the present application is a division, I have shown several illustrative manners of cutting more than one pair of oblong openings from the strip upon each stroke of the punch means for removing the material between the legs of the laminations and the manner of cutting out a relatively large number of laminations upon each operation of the means for cutting or blanking the laminations from the strip. It is to be understood that the apparatus of the present invention may be modified within the scope of the appended claims to carry out any of the methods disclosed in the parent application, and that other modifications of the present invention are contemplated.

The advantages of first forming all of the oblong openings throughout the length of the strip of stock and thereafter severing the strip across and between these openings to blank out the E-shaped body and the advantages of the other aspects of the present invention are fully set out at the outset of this specification.

I claim:

1. In combination, cooperating and relatively movable punch and die elements for punching by successive operations oblong openings throughout the length of a strip of stock, a pair of generally rectangular block punches operable independently of the operation of said punch and die elements and by successive operations cutting the strip across the oblong openings and between certain of said oblong openings to form predetermined shapes after completion of said openings throughout the length of the strip, said block punches being positioned in staggered relation, one at each side of a line through the centers of said openings, and means on the second independently operated punch members cooperating with certain of the openings made by the first punch members to align the material for the second independently operated punch members.

2. In combination, die means having a pair of oblong die openings, a pair of oblong punch elements cooperating with said die openings for punching pairs of oblong openings within a strip of stock and by successive operations throughout the length of said strip, a pair of generally rectangular block punches positioned in staggered relation and operable independently of said die means and said first punch elements for severing the strip by successive operations across the oblong openings and between pairs of oblong openings to form predetermined shapes after completion of the oblong openings throughout the length of strip, and means on the second independently operated punch members cooperating with certain of the openings made by the first punch members to align the material for the second independently operated punch members.

3. In combination, a die having parallel enclosed die openings, a punch having punch projections mating with said die openings, said punch and die being adapted for cutting successive oblong openings entirely within a continuous strip fed therebetween, a die independent of said first die and having rectangular die openings disposed in staggered relation, a punch having punch pro-

jections mating with the die openings of said last die for severing the strip across said oblong openings and between the successive openings after completion of all of said oblong openings throughout the length of the strip, and means on said last punch cooperating with certain of the openings made by said first punch to align the material for the second punch.

4. Die press means for cutting lamination bodies from a continuous strip comprising cooperating vertically acting punch and die members for cutting oblong openings entirely within the strip for the purpose of removing the material from between the legs of the lamination bodies, generally horizontally acting punch and die members for cutting the lamination bodies from the strip after completion of the cutting of all of the oblong openings throughout the length of the strip, said last punch and die members being of rectangular configuration disposed in staggered relation, one of said rectangular punch and die members operating upon the strip at each of the opposite ends of the oblong openings, and means on the generally horizontally acting punch cooperating with certain of the openings made by the vertically acting punch to align the material for said horizontally acting punch.

5. In combination, a die having parallel enclosed die openings, a punch having punch projections mating with said die openings, said punch and die being adapted for cutting successive groups of oblong openings entirely within the width of a continuous strip fed therebetween said die having additional relatively small openings and said punch having punch pin means for punching notches in the opposite longitudinal edges of the strip and notches in the edges of the straight pieces punched out in forming said oblong openings.

6. In combination, a pair of generally rectangular punch members disposed in staggered relation, mating die openings for said punch members, means for punching a hole in a strip of stock ahead of said punch members and die openings in the path of movement of the stock therebetween, and means for advancing the stock to position the hole punched by said last means in intersecting relation to the adjacent corners of said punch members whereby upon the punching operation of said members the laminations will be blocked out with their corners intersecting said hole.

7. In combination, die press means including a die having die openings, punch members cooperating therewith, means for feeding a continuous strip therebetween, said punch members forming an aligning hole in said strip and oblong pairs of openings transversely of said strip upon successive operations of said die press means, a second die having die openings, punch members cooperating therewith and actuated independently of said first-named punch members, and means on the second independently operated punch members cooperating with certain of the openings made by the first punch members to align the material for the second independently operated punch members, said strip being entirely converted into predetermined shapes upon operation of said second punch members.

8. In combination, die press means including a die having die openings, punch members cooperating therewith, means for feeding a continuous strip therebetween, said punch members forming an aligning hole in said strip and oblong pairs of openings transversely of said strip upon suc-

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cessive operations of said die press means, a second die having die openings, punch members co-operable therewith and actuated independently of said first-named punch members, stop means  
 5 for preventing passage of any portion of said strip through said die, said strip being entirely converted into predetermined shapes upon operation of said second punch members, and means on the second independently operated punch  
 10 members cooperating with certain openings made by the first punch members to align the material for the second independently operated punch members.

9. Die press means for operating upon a strip provided with oblong openings extending transversely of said strip, comprising a die member having die openings, punch members cooperable therewith upon horizontal movement, guide  
 80 means carried by said die member for laterally aligning said strip in said member, and stop means holding said strip against downward movement through said member, said strip being fed  
 85 into said press means by gravity and being entirely converted into predetermined shapes.

JAMES C. DALEY.

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