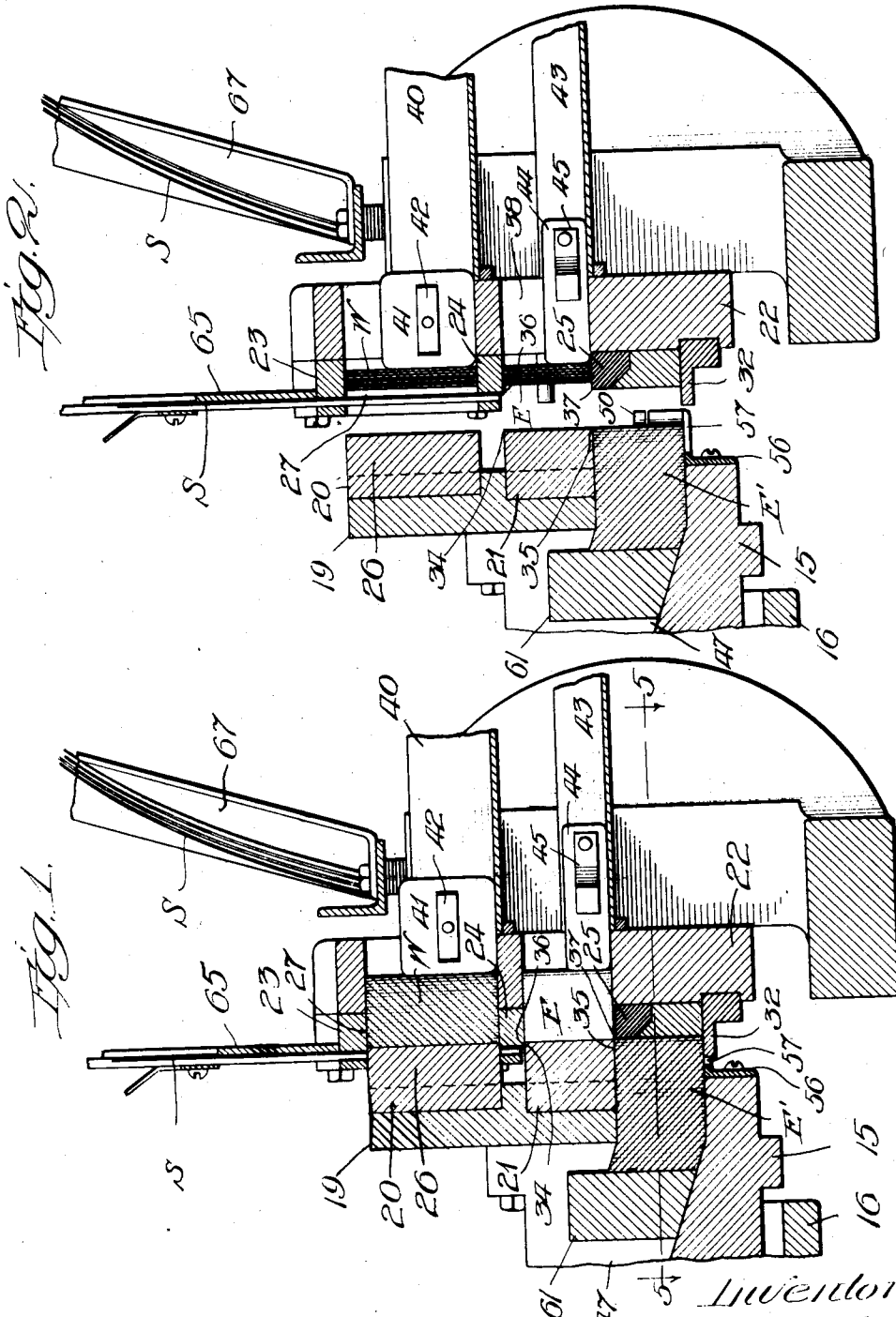


C. H. THORDARSON.
MACHINE FOR CUTTING MAGNETIC CIRCUIT LAMINÆ.
APPLICATION FILED APR. 26, 1919.

Patented Oct. 19, 1920.

3 SHEETS—SHEET 1.

1,356,178.



Inventor:
Chester H. Thordarson
By William B. Hall

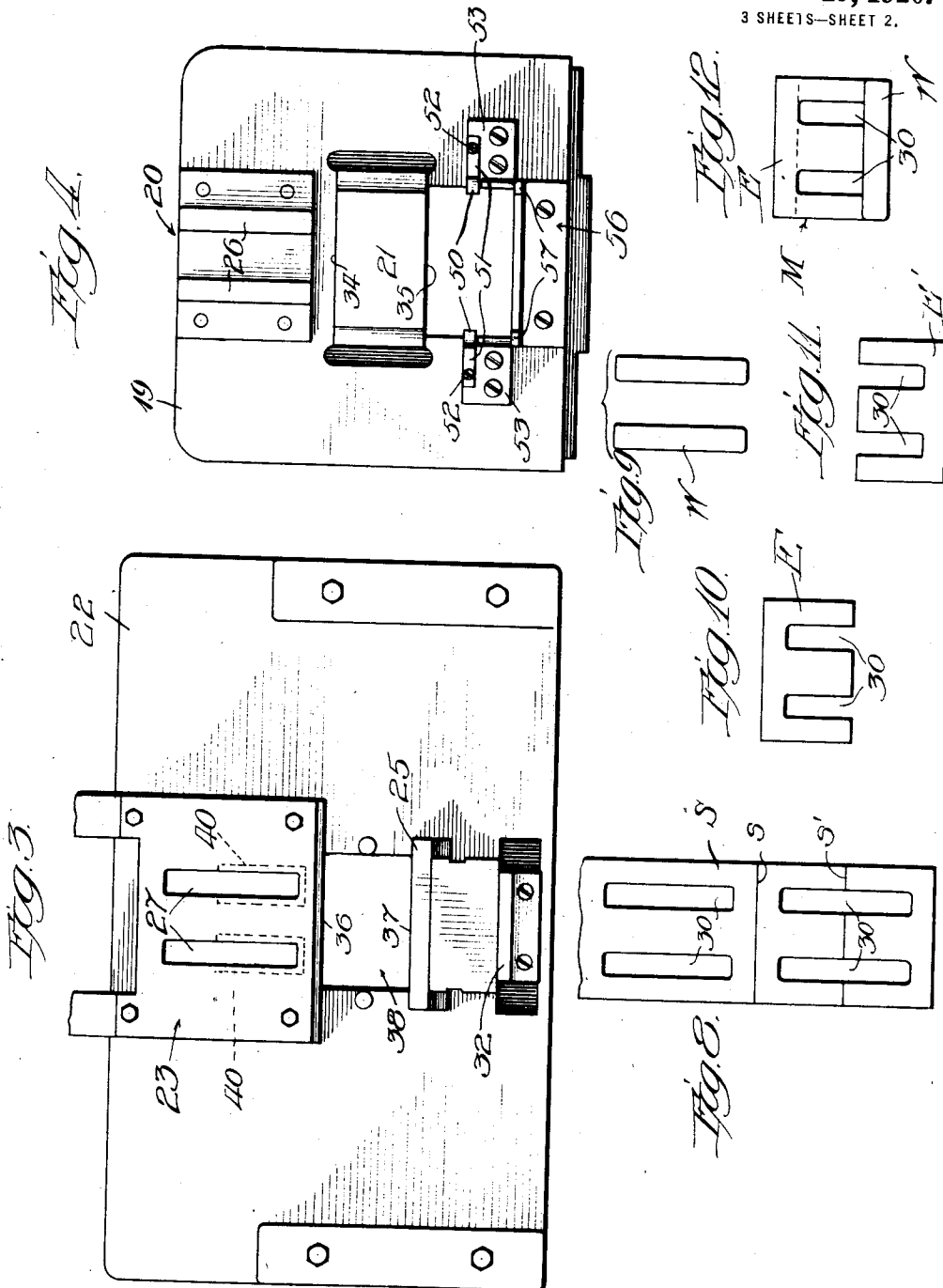
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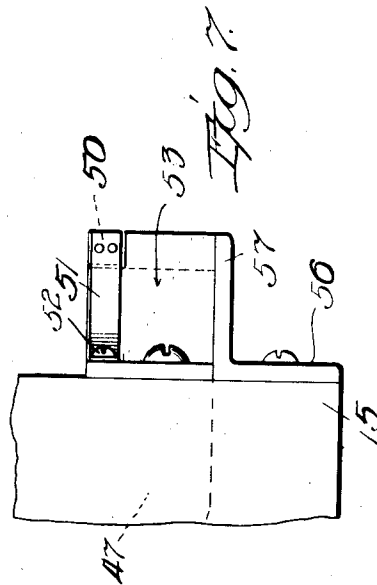
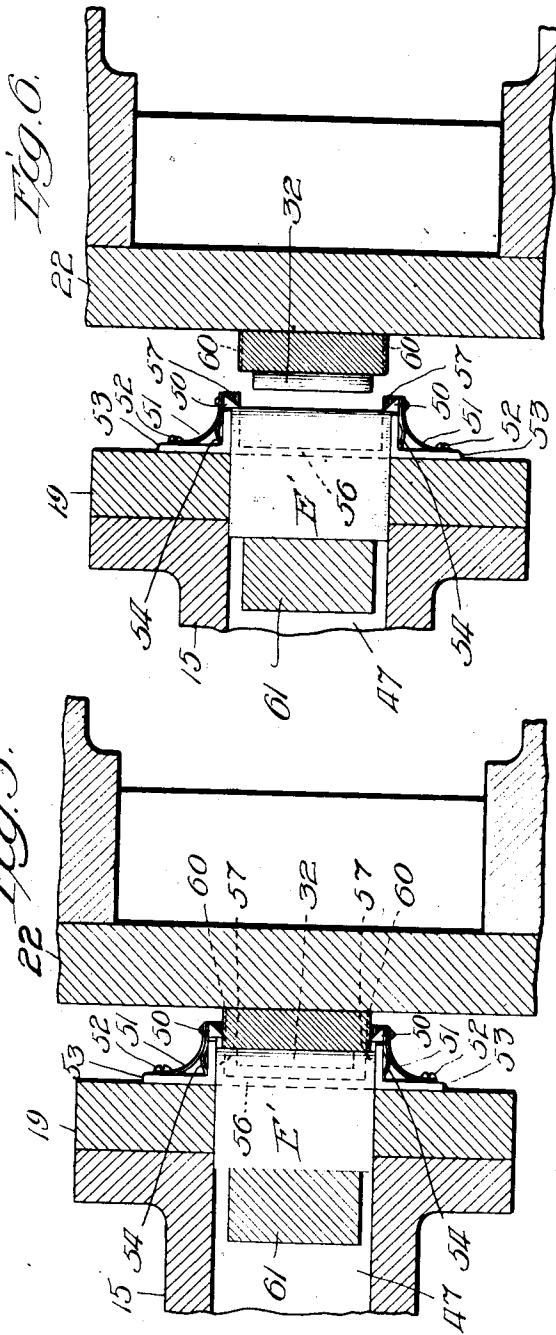


Inventor:
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UNITED STATES PATENT OFFICE.

CHESTER H. THORDARSON, OF CHICAGO, ILLINOIS.

MACHINE FOR CUTTING MAGNETIC-CIRCUIT LAMINÆ.

1,356,178.

Specification of Letters Patent.

Patented Oct. 19, 1920.

Application filed April 26, 1919. Serial No. 292,979.

To all whom it may concern:

Be it known that I, CHESTER H. THORDARSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Cutting Magnetic-Circuit Laminæ; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to a novel machine for cutting sheet metal in different predetermined shapes without waste, as for cutting from sheet-metal lamina elements which are afterward assembled to produce the magnetic circuit of a transformer or for other electro-magnetic apparatus. The machine is herein shown as constructed to cut from a continuous strip of sheet metal that is fed to the machine parallel, sidewise disposed strips at longitudinally spaced points along said strip to form the window spaces in the resultant laminæ, and to cut or divide said strips intermediate the ends of longitudinal openings and also between said openings to produce the E members of the lamina elements. While the machine has been designed for this particular purpose the combinative arrangement shown may be employed for cutting other forms of plates.

As shown in the drawings;

Figure 1 is a sectional view of the operative parts of the machine, showing only such portions of the punch machine as necessary to illustrate the cooperation of my improvements therewith.

Fig. 2 is a section, showing the operative parts in different positions.

Figs. 3 and 4 are face views, respectively, of the die and punch elements.

Figs. 5 and 6 are sections on the lines 5-5 of Fig. 1, showing the operative parts in different positions.

Fig. 7 is a detail of the plunger element hereinafter described.

Fig. 8 diagrammatically illustrates the manner of cutting a strip to produce the lamina elements.

Figs. 9, 10, and 11 show the three lamina elements cut from the strip.

Fig. 12 illustrates a magnetic circuit made of said lamina elements.

The improvements may be applied to any

suitable or preferred form of punch press, that shown in Fig. 1 being of a horizontal type. 15 designates the plunger or ram of the punch guided in suitable ways on the frame 16, and operated from any suitable source of power. To the head of the plunger is fitted a plate 19 that supports the punch elements 20, 21 of the machine, hereinafter to be described, and 22 designates an upstanding plate mounted on the frame opposite to the plunger plate 19 to support the die elements 23, 24, 25 of the strip cutting mechanism.

Referring, first, to Figs. 8 to 11 of the drawings S designates the strip of sheet metal from which the lamina elements W, E, and E' (Figs. 9, 10, and 11) are cut to produce, when assembled, the magnetic circuit structure M, shown in Fig. 12. The strip S is first operated upon by the parallel cutting projections 26, 26 of the punch element 20, (Fig. 4), the cutting edges of which projections coact with cutting edges of corresponding parallel openings 27 of a die element 23 to cut from the strip the two parallel lamina elements W shown in Fig. 9 to produce the window openings 30 in the ultimate lamina elements and magnetic circuit. Thereafter the strip is lowered against a stop 32 fixed to and projecting forwardly from the lower side of the plate 22 to bring the lower side of the strip in position to be acted upon by the punch element 21, coacting with the die elements 24 and 25 to transversely cut the strip along the lines s, s', (Fig. 8) the former between the pairs of window openings 30 and the latter intermediate the lengths of the window openings. The punch element 21 has upper and lower cutting edges 34 and 35, respectively, that cooperate with the cutting edges 36, 37, respectively, of the die elements 24, 25 that are separated by a clearance.

Located opposite to and in rear of the die openings 27 are two channel shaped trays 40, 40, to receive the strips W cut from the metal; said strips as they are successively cut being forced through the trays against the retarding action of weights 41 which are slidable in said trays and may be provided with springs 42 to bear against the side walls of the trays to increase the force necessary to move them outwardly through the trays and to thereby hold the strips W in close grouped relation in the trays.

Located in rear of the openings 38 in the

plate 22 between the cutting dies 24, 25 is a third, wider tray 43 to receive the lamina elements E and as they are severed from said strip. Said elements are forced outwardly through said tray 43 against the retarding action of a weight 44 that may have a spring pressed element 45 to bear against the side wall of the tray to increase the force necessary to move the weight outwardly, such as to hold the lamina elements in close grouped relation in said tray. The lamina elements W and E are forced into their respective trays 40, 43 in the cutting movement so that in said cutting movement of the plunger two specific lamina elements W and E are produced, and are stacked in the respective trays 40 and 43.

The lamina elements E', severed from the lower ends of the strips W in the cutting movement of the plunger, are carried backwardly in grouped relation during the restoring on non-cutting movement of the plunger and are stacked or grouped in a tray 47 formed in the plunger 15 (Figs. 1 and 2). To this end the said plunger is shown formed on its upper face with a longitudinally recessed tray 47 to receive the lamina elements E', and said tray is located in line with an opening in the head 19 of the plunger below the punch element 21.

Means are carried by the plunger to engage the lower lamina elements E' as they are cut from the strip in a manner to group said lamina elements and to withdraw said elements backwardly into the tray 47 during the restoring movement of the plunger. The means herein shown for effecting movement of the lamina elements E' into the tray 47 comprise dogs 50, 50 which are mounted on the free ends of springs 51, 51 (Figs. 5, 6, and 7) that are attached, as by screws 52 to angle brackets 53 which are carried by said mounting plate 19. Said springs 51 may be reinforced by other springs 54 that are attached at their ends to the dogs and are interposed between the intermediate portions of the springs 51 and said angle brackets.

In order to at all times bridge the space between the stop 32, which arrests the downward movement of the strip S and on which the lower lamina elements E' rest when cut from the strip and the end of the plunger 15, said plunger carries an angle bracket 56 that is provided at its ends with arms 57 that lie outside of and overlap the stop 32 when the plunger is in its most advanced position (Fig. 5). The said arms 57 of the bridging member 56 are sufficiently close together so that the lower lamina elements E' lie thereon and on the stop bracket 32 when said lamina elements are being cut from the strip (Figs. 1 and 5). The die element 22 is provided at its sides with clearance grooves 60,

indicated in dotted lines in Figs. 5 and 6, to receive said dogs 50 when the plunger is in its advanced position. The said dogs are formed with beveled rearward faces and with abrupt forward faces, the beveled faces engaging the lamina elements E' when the plunger is advanced so as to spread the dogs sufficiently to permit them to spring past the vertical edges of said lamina elements whereby, during the return movement of the plunger, the dogs interlock with the sides of the lamina elements to draw them backwardly into the tray 47 of the plunger. The said lamina elements are held grouped by being withdrawn against the action of a retarding block or element 61 that lies on the bottom of the recess or the tray portion of the plunger; and the bottom of the recess or tray portion of the plunger may be inclined to further retard grouping movement of the lamina elements E'.

The said strips S are fed into the space between the punches and dies through any suitable form of guide 65 (Figs. 1 and 2). To facilitate the directing of the strips into the guide the strips may be supported in a holder 67 that is fixed to and rises obliquely from the frame adjacent the guide 65 so as to be readily accessible to the guide for feeding the strip into the machine.

In operation, the strips S are supported in the holder 67 and are fed one at a time into the guide 65 to the punching and die mechanism. In the beginning the strip is held in the position shown in Fig. 2 to present the advance end thereof to the punch element projections 26 and die openings 27 to cut the first pairs of strips W to produce the first window openings 30. Thereafter the strip is lowered until arrested by the stop 32, whereupon it is acted upon by the cutting edges 34, 35 of the punch element 21 and die elements 24, 25 to sever the strip to produce the lamina elements E, E'. In each subsequent operation of the machine the advancing punch elements cooperate with the die elements to produce in a single advance movement of the punch elements two lamina elements W and one each of the lamina elements E, E'. It will be observed furthermore that the lamina elements E, E' are forced directly away from the cutting elements through the respective openings 27 and 38 into their respective trays 42, 43 and are grouped therein against the action of the weights 41, 44 and that when the plunger moves backwardly the dogs 50, which have theretofore engaged over the vertical edges of the lower lamina elements E', draw said element backwardly into the recessed plunger; the lamina elements E' being forced backwardly into the recess or tray of said plunger in each successive back movement of the plunger and the punch elements. The punch elements move past the cutting edges

36, 37 of the dies 24, 25 so as to force the lamina elements W, E past said cutting edges, and the strip S is fed downwardly in behind said lamina elements as soon as the plunger retires so as to prevent the rear-most lamina elements falling backwardly toward the retreating plunger.

I claim as my invention:

1. A machine for cutting predetermined shapes from a strip of material, comprising punch, die and cutting elements cooperating to produce a plurality of shapes of different configuration in one stroke, one shape grouped upon one side of the cutting plane, and a different shape grouped at the other side of said plane.

2. A machine for cutting predetermined shapes from a strip of material, comprising punch, die and cutting elements cooperating to produce a plurality of shapes of different configuration in one stroke, one shape grouped upon one side of the cutting plane, and a different shape grouped at the other side of said plane, and grouping trays located one on one side and the others on the other side of the cooperating punch and die elements to separately receive the different shapes.

3. A machine for cutting predetermined shapes from a strip of material without waste, comprising a series of spaced punch elements, a series of cooperating spaced die elements for cutting the shapes, means whereby said shapes are grouped, some at one side and the others at the other side of the mechanism, and means cooperating with the advance and return strokes of the punch element to separately group said shapes.

4. A machine for cutting predetermined shapes from a strip of material without waste, comprising a series of spaced punch elements, a series of cooperating spaced die elements for cutting said shapes, trays in position to receive certain of said shapes cut from the strip in the advance movement of the punch element, and another tray into which other shapes are grouped during the return stroke of the punch element.

5. A machine for cutting predetermined shapes from a strip of material without waste, comprising a series of spaced punch elements, a series of cooperating spaced die elements for cutting said shapes, trays in position to receive certain of said shapes cut from the strip in the advance stroke of the punch element, a tray on the punch side of the mechanism, and means carried by the punch element actuating device to grasp the shapes adjacent to the latter tray to group them therein.

6. A machine for cutting predetermined shapes from a strip of material without waste, comprising a series of spaced punch elements, a series of cooperating spaced die elements for cutting said shapes, grouping

trays, certain of which receive certain of said shapes cut from the strip in the advance stroke of the punch element, and spring-held dogs carried by the plunger and adapted in the advance stroke of the plunger to grasp certain of the shapes to draw them into an associated tray on the return stroke of the punch element.

7. A machine for the purpose set forth comprising a fixed die having parallel inclosed die openings and provided with two transverse cutting edges, a punch element having cutting projections to cooperate with said inclosed openings and provided with cutting edges to cooperate with the cutting edges of the die element, whereby in one stroke of the punch element two parallel strips are cut from a sheet fed between the die and punch elements and the sheet is cut transversely between two pairs of openings from which the strips are cut and intermediate the ends of one pair of said openings.

8. A machine for the purpose set forth, comprising a fixed die having parallel inclosed die openings and provided with two transverse cutting edges, a punch element having cutting projections to cooperate with said inclosed openings and provided with cutting edges to cooperate with the cutting edges of the die element, whereby in one stroke of the punch element two parallel strips are cut from a sheet fed between the die and punch elements and the sheet is cut transversely between two pairs of openings from which the strips are cut and intermediate the ends of a pair of said openings, and trays located to separately receive in grouped relation the elements cut from the sheet.

9. A machine for the purpose set forth, comprising a fixed die having parallel inclosed die openings and provided with two transverse cutting edges, a punch element having cutting projections to cooperate with said inclosed openings and provided with cutting edges to cooperate with the cutting edges of the die element, whereby in one stroke of the punch element two parallel strips are cut from a sheet fed between the die and punch elements and the sheet is cut transversely between two pairs of openings from which the strips are cut and intermediate the ends of a pair of openings, two trays located at the die side of the mechanism in position to receive the parallel strips cut from the sheet and the upper transverse section, and another tray located in position to receive the endmost section cut from the sheet, and means actuated through movement of the punch element for successively carrying the last-mentioned lamina elements into said tray.

10. A machine for the purpose set forth, comprising a fixed die having parallel inclosed die openings and provided with two transverse cutting edges, a punch element

having cutting projections to cooperate with
said inclosed openings and provided with
cutting edges to cooperate with the cutting
edges of the die element, whereby in one
5 stroke of the punch element two parallel
strips are cut from a sheet fed between the
die and punch elements and the sheet is cut
transversely between two pairs of openings
from which the strips are cut and intermedi-
10 ate the ends of a pair of said openings, two
trays located at the die side of the mecha-
nism in position to separately receive the
parallel elements cut from the strip and the

upper transverse section, another tray lo-
cated in position to receive the endmost 15
elements cut from the strip, and spring-
held dogs carried by the punch element
adapted to engage over the edges of the end-
most sections to draw said endmost sections
successively into the last-mentioned tray. 20

In testimony whereof I claim the forego-
ing as my invention, I hereunto append my
signature at Chicago, Illinois, this 15th day
of April, 1919.

CHESTER H. THORDARSON.