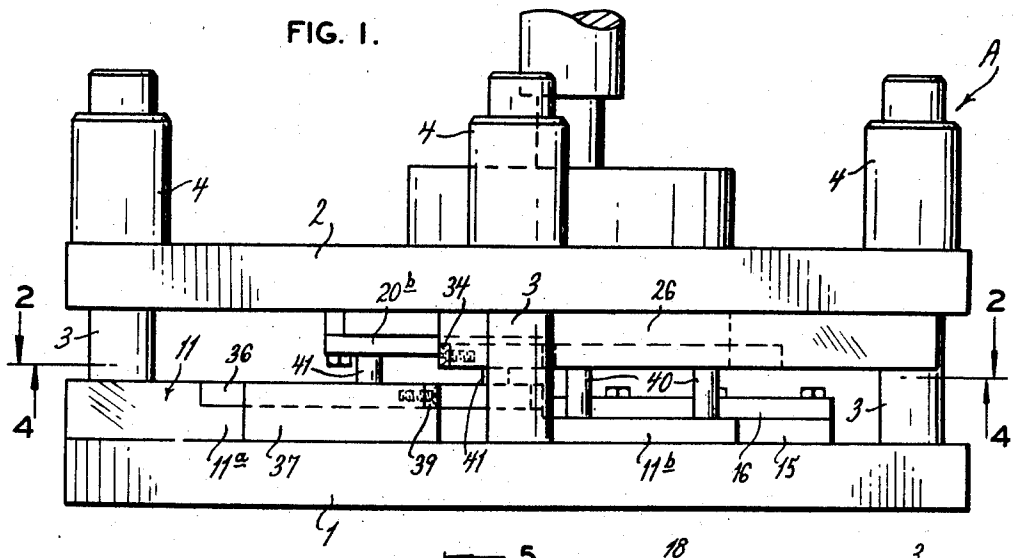
Aug. 4, 1959 C. G. DUENKE 2,897,892

ADJUSTABLE CUTTING DIES

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FIG. 1.



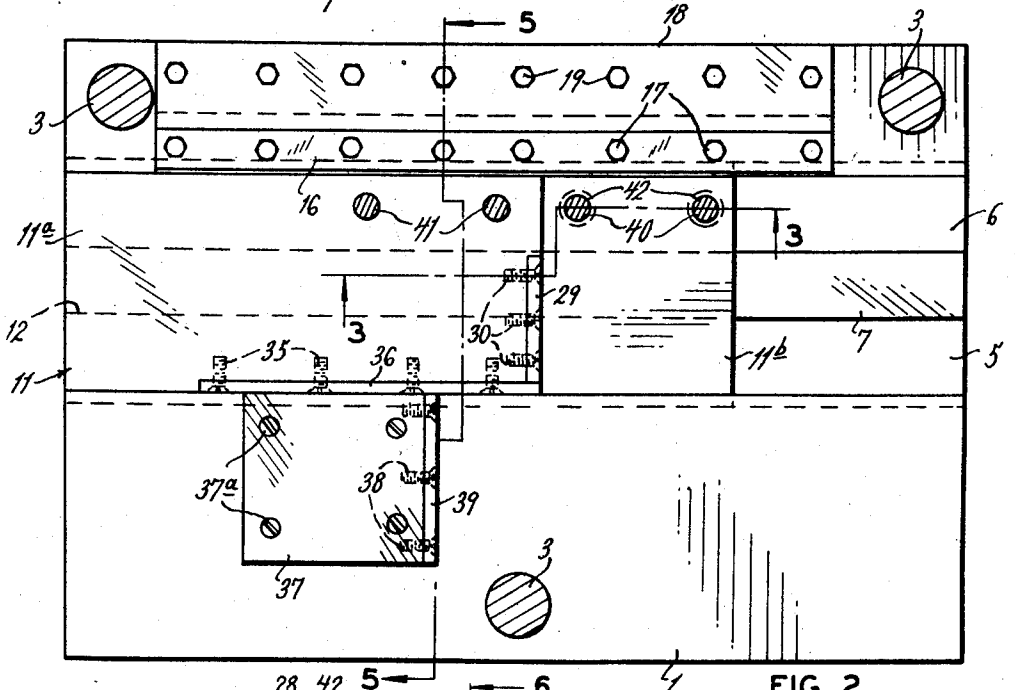


FIG. 2.

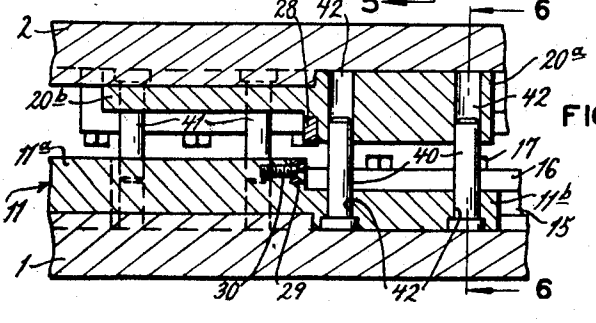


FIG. 3.

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FIG. 4.

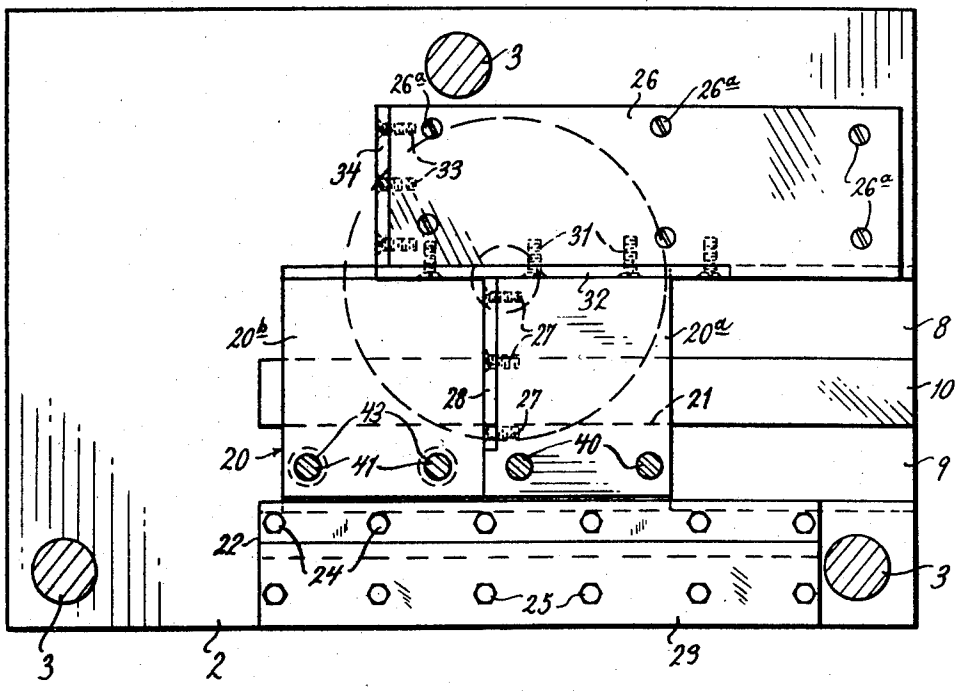


FIG. 5.

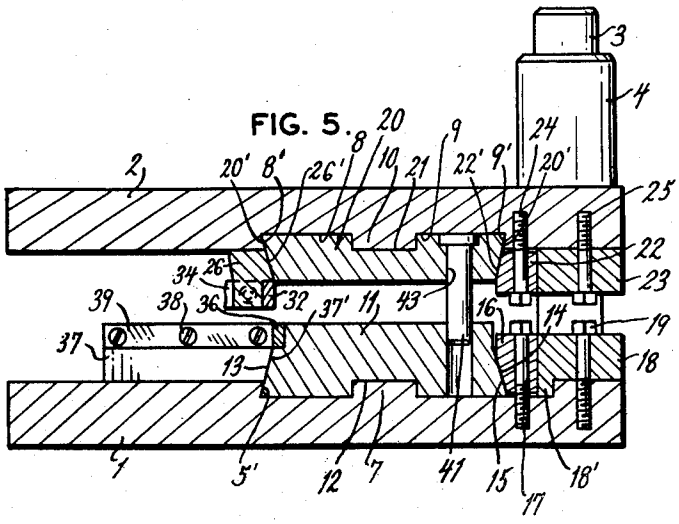
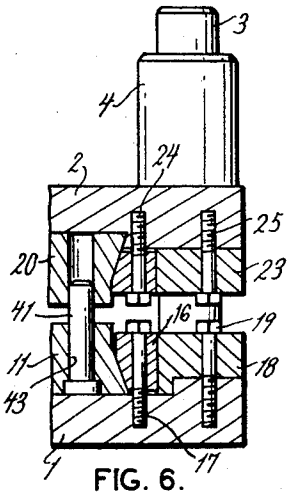


FIG. 6.



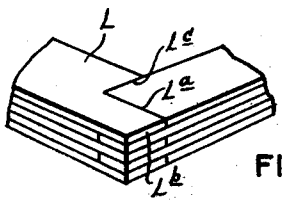


FIG. 7.

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2,897,892

ADJUSTABLE CUTTING DIES

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Continuation of application Serial No. 321,639, November 20, 1952. This application June 20, 1956, Serial No. 592,686

3 Claims. (Cl. 164—31)

This invention relates to cutting apparatus, and more particularly to apparatus for making a stepped cut across a strip.

This application is a continuation of my copending application Serial No. 321,639, filed November 20, 1952, for Adjustable Cutting Dies (now abandoned).

Among the several objects of the invention may be noted the provision of apparatus of the class described, particularly useful for making metal laminations intended for use in producing stacked cores for transformers, which is adjustable for making stepped cuts of different depth and capable of operating on strips of different width; the provision of apparatus of this class which enables making stepped cuts of different depth without waste of material; and the provision of apparatus of this class which, while being of rugged construction, is easy to adjust. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a front elevation of an apparatus constructed and arranged in accordance with this invention;

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1 and looking in the direction indicated by the arrows;

Fig. 3 is a fragmentary section taken on the staggered line 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 1 and looking in the direction indicated by the arrows;

Fig. 5 is a cross-section taken on line 5—5 of Fig. 2;

Fig. 6 is a fragmentary vertical section taken on line 6—6 of Fig. 3; and,

Fig. 7 is a fragmentary perspective showing a structure made up of parts formed with the aid of the apparatus of this invention.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, a cutting apparatus of this invention, designated in its entirety by the reference character A, is shown to comprise first and second press members 1 and 2 mounted for relative movement toward and away from one another. As shown, member 1 is a fixedly supported base member and member 2 is a movable head member. The movable member 2 is guided for vertical movement relative to the base member by guide elements 3 that extend through tubular elements 4 which project upwardly from the top face of the movable member 2. The base member 1 has formed therein at its top face a recess 5 having an inclined wall 5', and a relatively wider recess 6, said recesses 5 and 6 being separated by an upstanding web 7 whose opposed side walls are vertical and which extends longitudinally of the base member 1. In like manner, the movable member 2 is provided with a pair of parallel recesses 8 and 9 which extend longitudinally of said movable member and are separated by a downwardly projected and longitudinally extended web 10, the outer wall of each of said recesses being inclined as indicated by the reference character 8' and 9'.

Supported by the base member 1 is a block 11 which is shaped in plan as is shown to good advantage in Fig. 2. This block is formed with a main portion 11*a* which is of full height, and an end portion 11*b* which is of reduced height, as is shown in Fig. 3. The block 11 is slidable in the groove formed by recesses 5 and 6 and has formed longitudinally thereof a recess 12 which receives the web 7 formed on the base member 1, and said block is provided with an inclined wall 13, a lower portion of which slidingly contacts with the inclined wall 5' of the recess 5 formed in said base member 1 (Fig. 5). Also, the wall 14 of the block 11, opposite to the inclined wall 13, is similarly inclined and this inclined wall 14 receives in contact therewith an inclined wall 15 of a wedging strip 16, said wedging strip being secured to the base member 1 through the instrumentality of bolts 17. The face of the wedging strip 16 opposed to the inclined face 15 thereof engages a backing strip or abutment 18 which is secured to the base member 1 by bolts 19 and said backing strip or abutment is provided with a downwardly projected extension 18' which extends into the recess 6 of the base member 1 as is shown in Fig. 5.

Associated with the movable member 2 is a second block 20 which is provided with opposed side walls 20' that are inclined, as is shown in Fig. 5. This block is slidable in the groove formed by recesses 8 and 9 and has formed therein a recess 21 which receives the web 10 formed on said movable member 2. The second block 20 is of dove-tail cross-sectional shape, as is the first block 11, and portions of the inclined side walls 20' of said block 20 slidingly engage the inclined walls 8' and 9' of the recesses 8 and 9 of the movable member 2. At one side of the block 20 a wedging strip 22, which is provided with an inclined face 22', engages said block 20 with the inclined face 22' of said wedging strip in contact engagement with the adjacent inclined wall 20' of the block 20. Also, a backing strip or abutment 23 engages said wedging strip, with bolts 24 and 25 being provided for securing the wedging strip and the abutment, respectively, to the movable member 2. At the side of the block 20 opposite to the side thereof at which the wedging strip is located, a member 26 is fixed, by means of fastening devices 26*a*, to said movable member 2, this member 26 being provided with an inclined wall 26' which is disposed in contact engagement with the adjacent inclined wall 20' of the block 20.

The block 20 is formed with a relatively thick portion 20*a* and a portion 20*b* of reduced thickness (see Fig. 3), the recess 21, previously mentioned herein being extended longitudinally of said block through both of said portions, and said relatively thick portion 20*a* of said block 20 has secured thereto by means of screws 27, a transverse cutting blade 28. The blade 28 cooperates, in a manner to be hereinafter explained, with a similar transverse cutting blade 29 which is secured by means of screws 30 to the portion 11*a* of the block 11. Likewise, the member 26 has secured thereto, at a side thereof, by means of screws 31 a longitudinal cutting blade 32, and said member 26 also has secured thereto at an end thereof by means of screws 33 a transverse cutting blade 34. In like manner, the portion 11*a* of the block 11 has secured thereto at a side thereof by means of screws 35 a longitudinal cutting blade 36 which cooperates with the blade 32, while a member 37 which is secured to the base member 1 by fastening devices 37*a* has secured thereto by means of screws 38 a transverse cutting blade

39 which cooperates with the blade 34, said member 37 having an inclined wall 37' which is disposed in contact engagement with a portion of the inclined wall 13 of the block 11 (sse Fig. 5).

The first and second blocks 11 and 20 are connected together for adjustment as a unit longitudinally of the webs 7 and 10 by means of two pairs of pins, one pair of said pins being designated by the reference character 40 while the other pair of said pins is designated by the reference character 41. By referring to Fig. 3 of the drawings it will be noted that the pins 40 are disposed in aligned openings 42 formed in the blocks 11 and 20, the openings 42 formed in the portion 11*b* of the block 11 having enlarged portions at their lower ends which receive the heads of said pins 40, while the pins 41 are disposed in aligned openings 43 formed in portions of the blocks 11 and 20 and the openings formed in the portion 20*b* of the block 20 are provided at their upper ends with enlarged portions that receive the heads of said pins 41.

Fig. 7 illustrates a fragment of a stacked transformer core which is made up of lamination elements having end portions that are shaped with the aid of the apparatus of this invention. In shaping a lamination element said element is fed between the cutters of the base member 1 and the movable member 2, and on downward movement of said movable member 2 the lamination element L will be shaped as is shown in Fig. 7. In other words, the longitudinal cut L*a* in the end portion of the lamination element L will be made by cooperation of the blades 32 and 36, the transverse cut L*b* will be made by cooperation of the transverse blades 28 and 29, while the transverse cut L*c* will be made by cooperation of the blades 34 and 39. Now, in the event it is desired to adjust the apparatus so as to increase the length of the longitudinal cut L*a* it is necessary, merely, to back off the bolts associated with the wedge strips 16 and 22 so as to relax the pressure exerted against the blocks 11 and 20 by said wedge strips, whereupon said blocks may be subjected to sliding movement relative to the base member 1 and the movable member 2 so as to cause the cooperating blades 28 and 29 to be simultaneously shifted with respect to the blades 32 and 36 and with respect to the blades 34 and 39 to obtain the desired adjustment, after which the bolts of the wedge strips 16 and 22 are again drawn up tight to clamp the blocks 11 and 20 in the position to which they have been adjusted.

From the above, it will be apparent that the apparatus of this invention comprises the first and second press members 1 and 2 mounted for relative movement toward and away from one another. Blade 39 constitutes a first transverse cutting blade fixed to the first member 1. Blade 34 constitutes a second transverse cutting blade fixed to the second member 2 and cooperable with the first transverse blade 39 for making a first transverse cut (the cut L*c* shown in Fig. 7) extending partially across a strip from one edge of the strip. The first block 11 is mounted for adjustment on the first member 1 in the direction of the length of the strip at one end of the first transverse blade 39 (the right end of 39 as viewed in Fig. 5). Blade 36 constitutes a first longitudinal cutting blade fixed to and movable with the first block 1 across this end of the first transverse blade 39. Blade 36 is adapted to extend longitudinally in one direction (toward the right as viewed in Fig. 2) from this end of the first transverse blade 39 for different distances according to the adjustment of the first block 1. Blade 29 constitutes a third transverse cutting blade fixed to and movable with the first block 1. Blade 29 extends transversely from the right end of the first longitudinal blade 36 (as viewed in Fig. 2) in the opposite direction from the first transverse blade 39. Blade 32 constitutes a second longitudinal cutting blade fixed to the second member 2 and cooperable with the first longitudinal blade 36 in any position of the latter to make the longitudinal cut L*a* in the strip. This cut has one end coincident with the inner end of the first transverse cut L*c* and extends longitudinally in said one direction (toward the right as viewed in Fig. 2) from the inner end of said first transverse cut L*c*. The second longitudinal blade 32 extends longitudinally from that end of the second transverse blade 34 corresponding to said one end of the first transverse blade toward the right as viewed in Fig. 4 and extends past the right end of the first longitudinal blade 36. Blade 32 is adapted to overlap the first longitudinal blade 36 for different longitudinal cutting distances according to the adjustment of the first block 11. The second block 20 is mounted for adjustment on the second member 2 in the direction of the length of the strip. Blade 28 constitutes a fourth transverse cuting blade fixed to and movable with the second block 20 and cooperable with the third transverse blade 29 for making the second transverse cut L*b* extending across the strip from the other end of the longitudinal cut L*a* to the other edge of the strip.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Apparatus for making a stepped cut across a strip comprising a bed, a head movable toward and away from the bed, a first transverse cutting blade fixed to the bed, a second transverse cutting blade fixed to the head and cooperable with the first transverse blade for making a first transverse cut extending partially across the strip from one edge of the strip, a first block mounted for sliding movement on the bed in the direction of the length of the strip at one end of the first transverse blade, means for clamping said first block to the bed at various positions of adjustment on the bed, a first longitudinal cutting blade fixed to and movable with said first block across said one end of the first transverse blade and adapted to extend longitudinally in one direction from said one end of the first transverse blade for different distances according to the adjustment of said first block, a third transverse cutting blade fixed to and movable with said first block and extending transversely from one end of said first longitudinal blade in the opposite direction from said first transverse blade, a second longitudinal cutting blade fixed to the head and cooperable with the first longitudinal blade in any position of the latter to make a longitudinal cut in the strip having one end coincident with the inner end of said first transverse cut and extending longitudinally in said one direction from the inner end of said first transverse cut, said second longitudinal blade extending longitudinally from that end of said second transverse blade corresponding to said one end of the first transverse blade in said one direction and extending past said one end of said first longitudinal blade and adapted to overlap the first longitudinal blade for different longitudinal cutting distances according to the adjustment of said first block, a second block mounted for sliding movement on the head in the direction of the length of the strip, means for clamping said second block to the head at various positions of adjustment on the head, and a fourth transverse cutting blade fixed to and movable with said second block and cooperable with said third transverse blade for making a second transverse cut extending across the strip from the other end of said longitudinal cut to the other edge of the strip.

2. Apparatus as set forth in claim 1 wherein each block is of dovetail shape in cross section and slidable in a groove in the respective press member, and wherein the

clamping means for each block comprises an abutment fixed to the respective press member extending along one side of the respective groove, a wedging strip between the abutment and the respective side of the block, and means for releasably securing the wedging strip to the respective press member.

3. Apparatus as set forth in claim 1 wherein the first block has pins extending slidably into openings in the second block and wherein the second block has pins extending slidably into openings in the first block for connecting the blocks together for adjustment as a unit

while permitting movement of the head toward and away from the bed.

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