March 23, 1937. L. E. POOLE 2,074,705

METHOD AND DEVICE FOR FORMING PAPER

Original Filed April 11, 1934 4 Sheets-Sheet 1

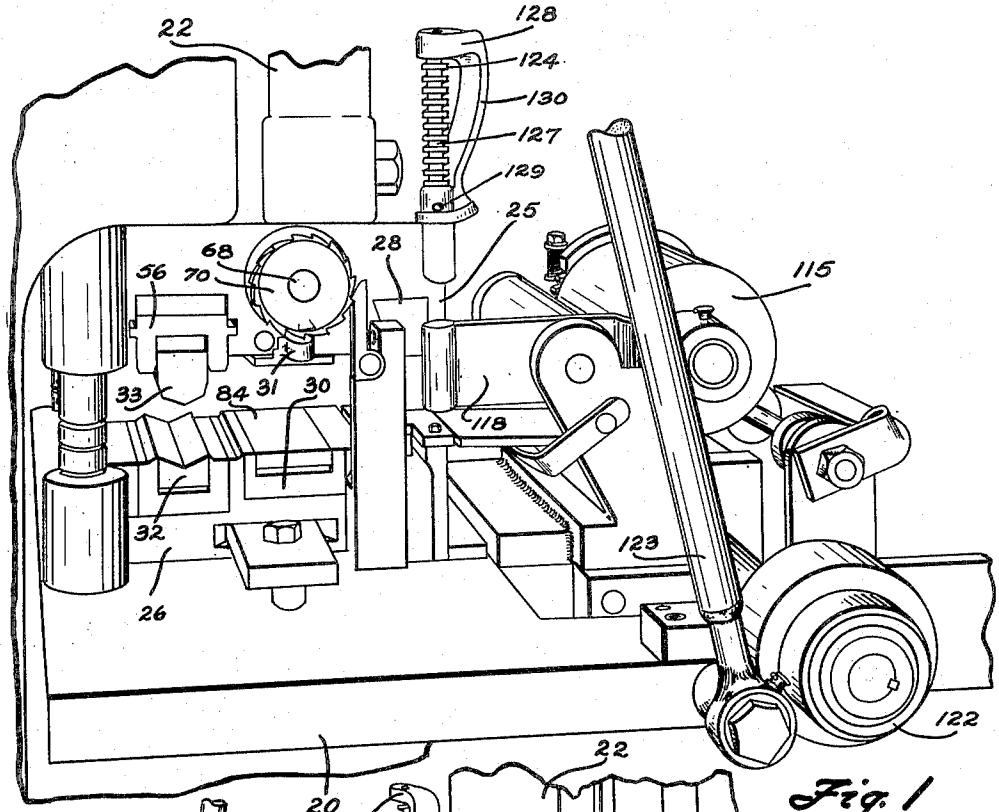


Fig. 1

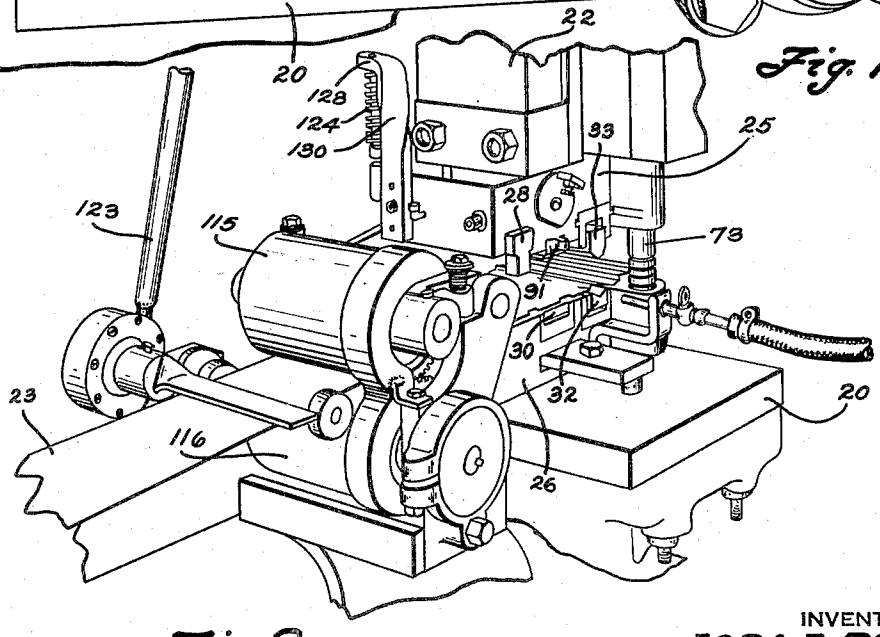


Fig. 2

INVENTOR
LORA E. POOLE
BY
Spencer Hardman & Fehr
his ATTORNEYS

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Original Filed April 11, 1934 4 Sheets-Sheet 2

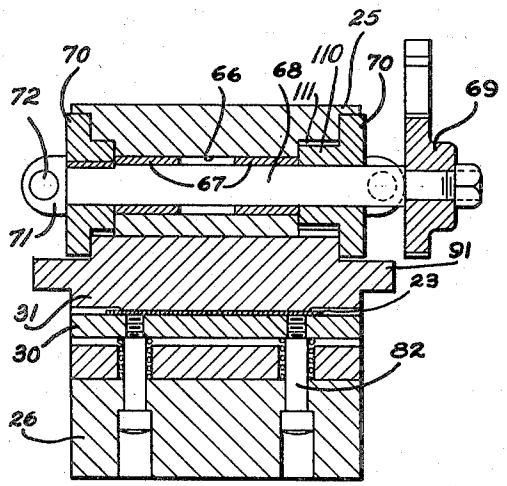


Fig. 10

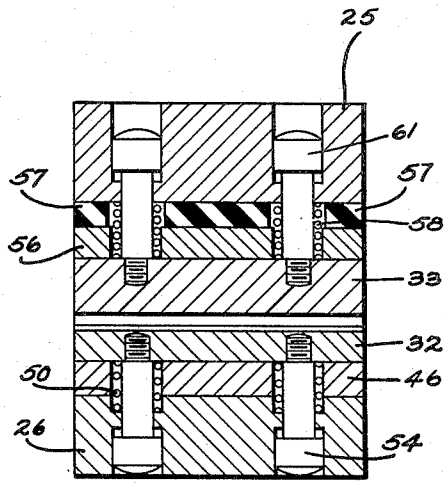


Fig. 11

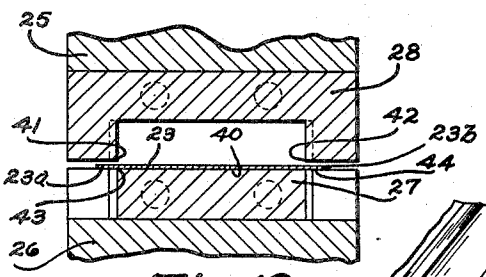


Fig. 12

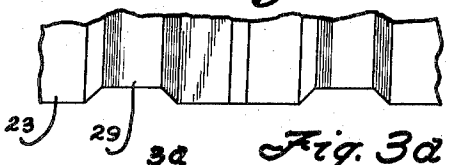


Fig. 3a

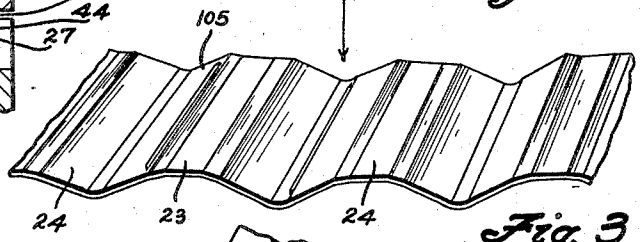


Fig. 3

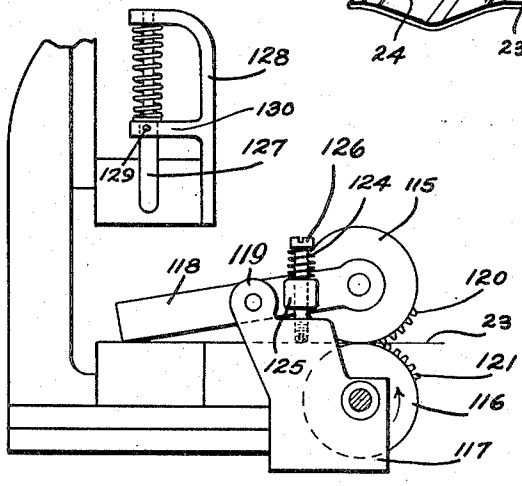


Fig. 13

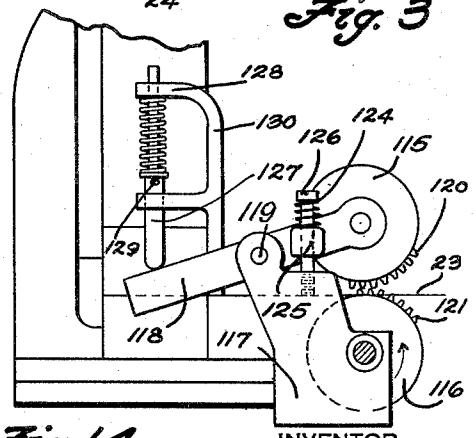


Fig. 14

INVENTOR
LORA E. POOLE
BY
Spencer Hardman & Fehr
his ATTORNEYS

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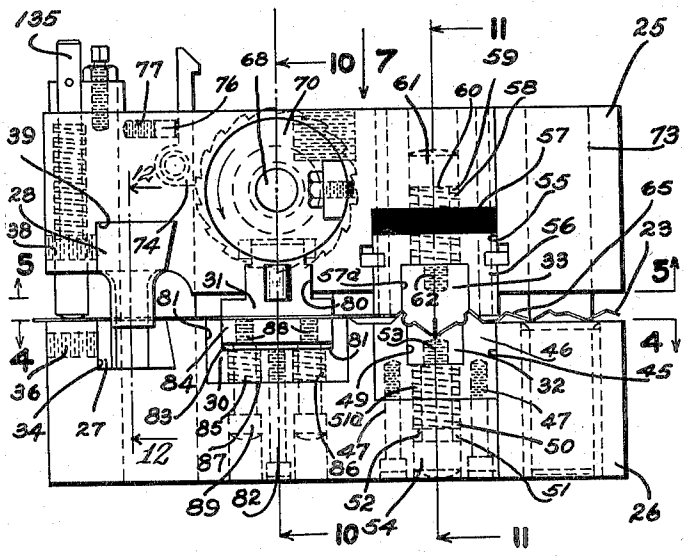


Fig. 4

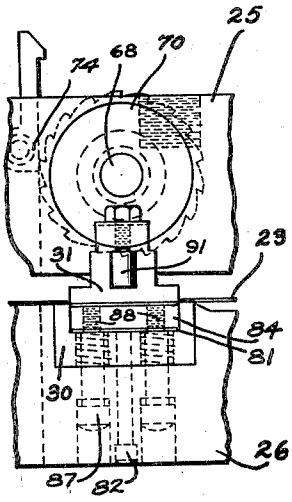


Fig. 6

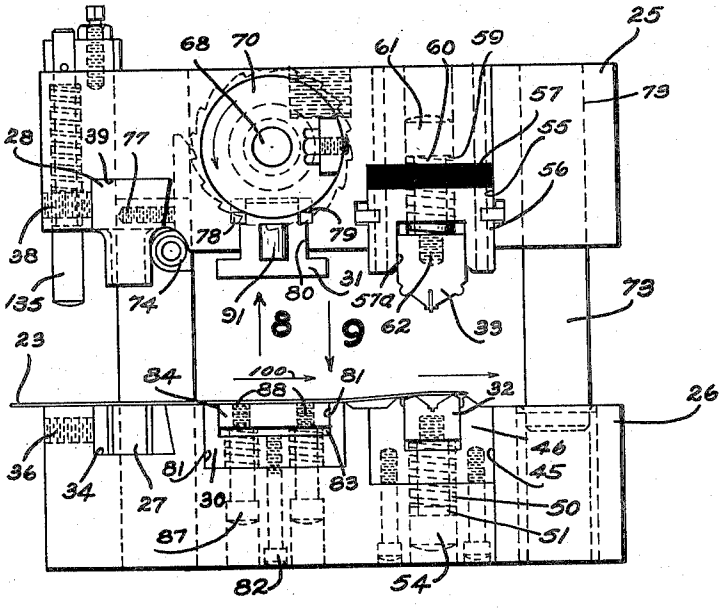


Fig. 5

INVENTOR
LORA E. POOLE
BY
Spencer Hardman & Fehr
his ATTORNEYS

March 23, 1937. L. E. POOLE 2,074,705

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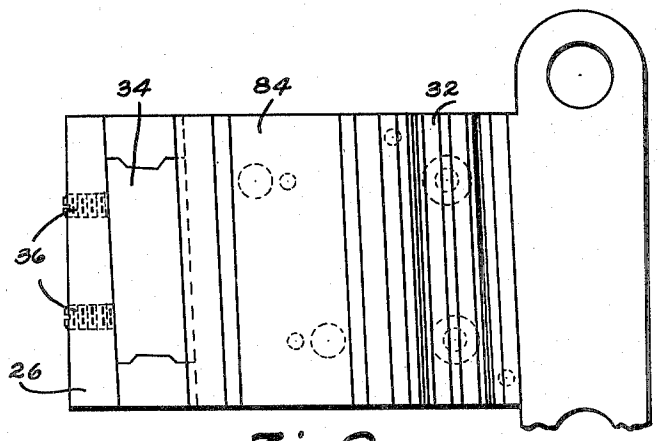


Fig. 9

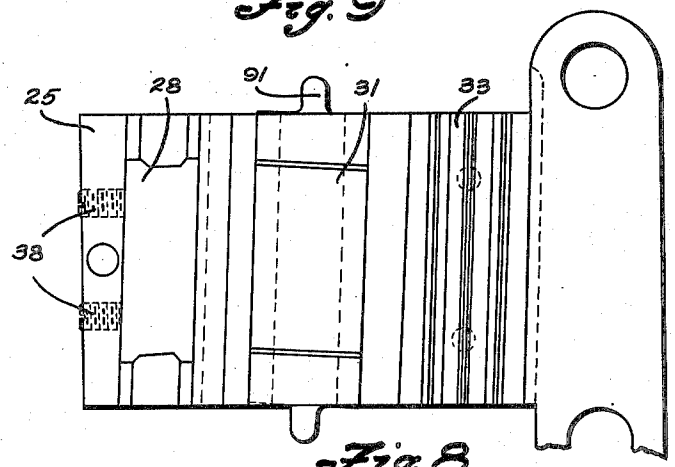


Fig. 8

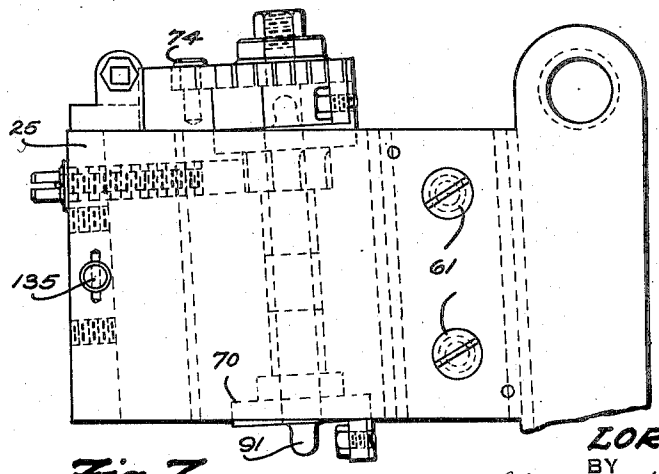


Fig. 7

INVENTOR
ZORA E. POOLE
BY
Spencer Hardman & Fehr
his ATTORNEYS

Patented Mar. 23, 1937 2,074,705

UNITED STATES PATENT OFFICE

2,074,705

METHOD AND DEVICE FOR FORMING PAPER

Lora E. Poole, Anderson, Ind., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application April 11, 1934, Serial No. 720,008
Renewed February 15, 1937

15 Claims. (Cl. 93—1)

This invention relates to strip forming devices and more particularly to a device for preforming insulating sheet material into strips for lining the slots of an armature core thereby to insulate the active sides of the armature coils from the core.

It is an object of the present invention to provide a device which continuously and automatically preforms a supply of insulating sheet material into loosely connected strips of a predetermined length, each strip being adapted to line all slots of an armature core and the peripheral portions of the core intermediate consecutive slots.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary perspective view of a device embodying the present invention.

Fig. 2 is another fragmentary perspective view of the device.

Fig. 3 is a perspective view showing a part of a strip shaped and ready for insertion into the slots of an armature core, and also its stub connection with consecutive strips.

Fig. 3*a* is a fragmentary view of a strip looking in the direction of arrow 3*a* in Fig. 3 and showing more particularly the notches in the sections of a strip.

Fig. 4 is a side elevation of two plates carrying various pre-forming members which cooperate to shape loosely connected strips from a supply of insulating sheet material.

Fig. 5 is a side elevation similar to Fig. 4, showing, however, the upper plate in raised position.

Fig. 6 discloses a portion of Fig. 4, and more particularly illustrates the partial severing of a strip from the supply of insulating sheet material so as to provide a stub between consecutive strips.

Fig. 7 is a view looking upon the upper plate in the direction of arrow 7 in Fig. 4.

Fig. 8 is a view looking upon the upper plate in the direction of arrow 8 in Fig. 5.

Fig. 9 is a view looking upon the lower plate in the direction of arrow 9 in Fig. 5.

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 4.

Fig. 11 is a sectional view taken on the line 11—11 of Fig. 4.

Fig. 12 is a fragmentary view taken on the line 12—12 of Fig. 4.

Figs. 13 and 14 illustrate in a diagrammatic manner different positions of a mechanism for feeding the supply material to the pre-forming members.

Referring to the drawings, the device is mounted on a bolster plate 20 of an ordinary punch press having a conventional ram 22 and a crankshaft (not shown) which through a suitable connection with the ram reciprocates the latter. This device, which forms a supply of insulating sheet material 23, such as paper for instance, into the loosely connected strips 24, includes an upper plate 25 which is attached to the ram 22 in any suitable manner, and a lower plate 26 which is mounted in any suitable manner on the bolster plate 20. Carried by the lower and upper plates are cooperating members, such as shear members 27 and 28 for cutting opposite notches 29 into the strip 24, such as shear members 30 and 31 for partially severing a complete strip from the supply material 23 thus providing a stub, and members 32 and 33 for ridging the strip so as to facilitate the placing of the same into all slots of an armature core and against the periphery of the core between consecutive core slots.

As best shown in Figs. 4 and 9, and lower shear member 27 is received in a groove 34 of plate 26 and secured therein by a plurality of set screws 36. The upper shear member 28 is secured by screws 38 in a groove 39 of plate 25. As best shown in Fig. 12, the supply material 23 is fed over the top surface 40 of shear member 27, and upon descent of plate 25, the two shearing edges 41 and 42 of shear member 28 will cooperate with the shearing edges 43 and 44, respectively, of shear member 27 and shear the opposite end portions 23*a* and 23*b* off the remaining portion of the supply material 23, thus providing the opposite notches 29 of the strip 24.

Located in a rectangular groove 45 of the lower die plate 26 is a block 46 which is secured therein by a plurality of screws 47. Guided for vertical movement in a rectangular groove 49 of block 46 is the ridging member 32 which is normally urged into the position shown in Fig. 5 by compression springs 50, received in annular recesses 51 of plate 26 and aligned bores 51*a* of block 46, and bearing with one end against said ridging member 32 and with the other end against an internal shoulder 52 of said lower plate 26 as best shown in Fig. 11. Screws 53 which are threadedly received by the ridging member 32 have heads 54 which limit movement of said ridging member under the compression of springs 50. Located in a rectangular groove 55 of plate 25 is a block 56 which bears against a block 57 of soft rubber. Block 56 provides a rectan-

gular groove 57a in which the companion ridging member 33 is vertically movable. This ridging member 33 normally assumes the position shown in Fig. 5 due to the compression of a plurality of springs 58 which are received in recesses 59 provided by plate 25 and rubber block 57, and which bear with one end against ridging member 33 and with the other end against the bottom surface 60 of groove 55. Movement of ridging member 33 under the compression of springs 58 is limited by the heads 61 of screws 62 which are threadedly received by said ridging member. Upon descent of plate 25 from the position shown in Fig. 5 to that shown in Fig. 4, the supply material 23, which rests on the lower block 46 and lower ridging member 32 in the manner illustrated in Fig. 5, is ridged due to the cooperation between companion members 32 and 33. It appears from a comparison between Figs. 4 and 5 that the two ridging members 32 and 33 yieldingly engage each other until they are completely depressed into engagement with their respective groove bottoms. Any further movement of plate 25 toward plate 26 results merely in a compression of the soft rubber cushion 57, so that during the latter part of the downward stroke of plate 25, the two ridging members 32 and 33 are merely in yielding engagement whereby no damage results to the supply material interposed between these ridging members.

It is to be understood that during one descent of the plate 25 only a section of a strip is ridged, such a section being of sufficient length to line one core slot and connect this single lining with the neighboring linings. Hence it is obvious that a loosely connected strip comprises as many ridged sections 65 as there are slots in an armature core. After the requisite number of ridging operations for one complete strip have been performed, the shear members 30 and 31 are adapted partially to sever such a strip from the supply material. For that purpose plate 25 is provided with a bore 66 (see Fig. 10) containing two bushings 67 in which is journaled a shaft 68, carrying at one end a ratchet disc 69. Also mounted on shaft 68 in any suitable manner are two discs 70, each one of which is provided with a laterally extending lug 71 which threadedly receives an adjustable screw 72, extending beyond said lug as clearly illustrated in Fig. 4. Mounted on plate 26 in any suitable manner is a bar 73 which pivotally supports a pawl 74. This pawl is normally urged into engagement with the teeth of the ratchet disc 69 by means of a spring urged plunger 76 which is received in a recess 77 of said bar 73. Referring to Figs. 4 and 5, the ratchet disc 69 and therewith the discs 70 are indexed counterclockwise during each ascent of plate 25. Fig. 5 which represents the uppermost position of plate 25 has been so selected that at the end of such upward stroke of said plate, the pawl 74 has indexed the ratchet disc 69 an angular distance which is equal to that between consecutive ratchet teeth. Shear member 31 normally assumes the position shown in Fig. 5 in which the two lateral extensions 78 thereof rest against the shoulders 79, provided by plate 25. Shear member 31 is movable vertically within prescribed limits in the guide groove 80 provided by the upper plate 25 as can be readily seen in Fig. 5. The lower shear member 30 is received in a rectangular groove 81, provided by plate 26, and is secured therein by a plurality of screws 82. Shear member 30 in turn provides a rectangular groove 83 in which is received for vertical movement within prescribed limits a retainer plate 84. This retainer plate is normally urged into the position shown in Fig. 5 by a plurality of compression springs 85, received in apertures 86 of shear member 30 and bearing with one end against the retainer plate 84 and with the other end against the bottom surface 87 of groove 81. A plurality of screws 88 are threadedly received by said retainer plate and their heads 89 limit movement of the retainer plate under the compression of the springs 85. While the adjustable screws 72 on the lugs 71 of the discs 70 are out of alignment with the laterally extending lugs 91 of shear member 31 (see Fig. 10) the latter member merely rests on top of the supply material toward the end of a down stroke of plate 25, and does not cooperate with the companion shear member 30 for a partial severing operation since shear member 31 is free to yield upwardly as appears clearly from Fig. 4. However, after the adjustable screws 72 are automatically registering with the laterally extending lugs 91 of shear member 31, they retain the latter in the position shown in Fig. 6, so that during the following descent of plate 25 shear member 31 is arrested by said screws 72 in a position in which it cooperates with shear member 30 and partially severs a strip from the supply material. Shear member 31 also cooperates with the retainer plate 84 for preventing a tearing of the supply material intermediate the two shearing edges 95 and 96 of shear member 30.

That almost a complete strip 24 is ridged when the shear members 30 and 31 cooperate and partially sever that strip from the supply material may be deducted from the fact that in Figs. 4 and 5 the shear members 30 and 31 are shown to be intermediate the notching members 27, 28 and the ridging members 32, 33 and the supply material is fed in the direction of arrow 100. The shear members 30 and 31 are so spaced from the ridging members 32 and 33 that after a partial severing of a strip from the supply material, the unridged end section which is part of a normal section of the partially severed strip is next fed into alignment with the ridging members 32 and 33 and ridged during the next following stroke of plate 25. The shear members 30 and 31, furthermore, shear twice with each stroke to form an intermediate stub 105 which loosely connects all completed strips and the last formed strip with the supply material. These stubs are mere waste and not included in the overall length of a strip. Since the present device, however, forms continuous strips loosely connected only by the mentioned stubs, it follows that the shear members 30 and 31 cooperate only after supply material of a complete strip length has been fed past these shear members. Due to that fact, the number of teeth of the ratchet disc 69 is one more than the number of slots of armature cores which are to be lined by one strip 24. It may be stated in advance that the feeding device to be described later feeds between strokes of plate 25 supply material of a length which is substantially equal to the length of a strip section which is ridged by one operation of the ridging members. In order that all strips start and end with the same relative shape, the two shearing edges 95 and 96 of shear member 30 are spaced from each other a distance equal to the length of an unridged section of a strip. The shape of the partially severed strips is not at all affected by the partial severing operations because the latter always take place upon a smooth portion immediately behind the unridged end section of each

strip. It is, therefore, obvious that the explained order of steps taken as well as the location of the shear and ridging members relative to each other are important factors for the success of the present device for they assure that the strips are all alike in shape as well as in length and the material wasted in form of stubs is nevertheless a minimum. As best shown in Figs. 7 and 10, the disc 70 adjacent the ratchet disc 69 is provided with a hub 110 the periphery of which is provided with as many equi-angularly spaced notches 111 as the ratchet disc 69 has teeth. Cooperating with these notches 111 is a spring urged plunger 112 which upon registry with a notch yieldingly prevents the discs 70 on shaft 68 as well as ratchet disc 69 from rotation except when the pawl 75 rotates said ratchet disc in the proper direction.

Referring particularly to Figs. 1, 2, 13 and 14, the earlier mentioned feeding device consists of two feed rolls 115 and 116, the latter being rotatably mounted in a bracket 117 which is secured in any suitable manner to the bolster plate 20 of the punchpress, and the former being rotatably mounted on a bracket 118 which is pivoted as at 119 to bracket 117. Both of these feed rolls 115, 116 are provided with gear teeth 120 and 121 which are in mesh with each other when the two feed rolls engage each other, whereby feed roll 115 is driven by feed roll 116. Feed roll 116 is rotated counterclockwise as viewed in Fig. 13 during an upward stroke of the ram by means of an overrunning clutch 122 or like device, which by a link 123 is connected in any suitable manner with the crankshaft of the punch press in such manner that rotation of said crankshaft causes rotation of the overrunning clutch 122. Feed roll 115 is normally urged into engagement with feed roll 116 by a compression spring 124 which is interposed between a lug 125, extending from the pivotally mounted bracket 118, and the head 126 of a screw which is threaded into bracket 117. As best shown in Figs. 1, 13 and 14, and a portion of bracket 118 is in axial alignment with a spring urged plunger 127 which is supported for vertical movement by a bracket 128, attached to the ram 22 of the punch press in any suitable manner. Downward movement of said spring urged plunger as viewed in Fig. 1 is limited by a pin 129, extending through said plunger and engaging with both projecting ends an arm 130 of bracket 128 when the plunger is free of bracket 118. During a downward stroke of the ram, this plunger 127 engages bracket 118 and yieldingly rocks the same counterclockwise as viewed in Fig. 13 into the position shown in Fig. 14 so as to relieve the supply material 23 from gripping engagement with the two engaging feed rolls 115, 116. Such relief of the supply material from gripping engagement with the feed rolls is essential because the ridging members 32 and 33 would otherwise unduly tension and possibly tear the supply material between the feed rolls and the ridging members during a ridging operation when said ridging members drag a slight length of supply material from a material supply roll (not shown) in front of the feed rolls as viewed in Fig. 2. Immediately after the ram starts on its up-stroke, the plunger 127 releases the bracket 118 which by gravity and by means of the compression spring 124 returns into the position shown in Fig. 13.

As best shown in Figs. 4 and 5, the upper plate 25 carries a spring urged plunger 135 which, in the position of the plates 25, 26 as shown in Fig. 4, bears against the supply material 23 in order to prevent supply material in the immediate neighborhood of the upper notching member 28 from following the same when moving into the up position shown in Fig. 5. The spring tension of plunger 135 is, however, so slight that it does not occasion a tearing of the supply material when the ridging members 32 and 33 drag a slight length of supply material from a supply roll (not shown) during a ridging operation as earlier explained.

The punch press is provided with a conventional one revolution clutch (not shown) which connects the flywheel (not shown) with the crankshaft. This one revolution clutch may be so set that the punch press operates continuously so that the preforming device turns out loosely connected strips 24 until the supply roll is exhausted.

It is apparent from Figs. 7 to 9 inclusive, that the present device is adapted to preform strips for lining armature core slots which are skewed. It is to be understood, however, that this device in all its essential details can be easily adapted to preform strips for lining armature core slots which extend parallel to the core axis. In the latter case, the various cooperating members carried by the plates 25 and 26, have to extend at right angles to the feeding direction of the supply material.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A device for forming loosely connected strips from a supply of sheet material, each strip having a pre-assigned number of identically shaped sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; means for forming each fed strip section into the required shape; and means operative upon a predetermined number of operations of the section forming means for partially severing the last section of a strip from the supply material before said section is formed into the required shape.

2. A device for forming loosely connected strips from a supply of sheet material, each strip having a pre-assigned number of identically shaped sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; means for forming each fed strip section into the required shape; and means operative upon a predetermined number of operations of the section forming means for partially severing a fed strip section from the adjacent last section of a strip being formed and from the supply material before said section to be partially severed is formed into the required shape.

3. A device for forming loosely connected strips from a supply of sheet material, each strip having a pre-assigned number of identically shaped and notched sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; means for notching the last fed strip section; means for forming a previously fed strip section into the required shape; and means operative upon a predetermined number of operations of the notching means for partially severing the notched last section of a strip being

formed from the supply material before said section is formed into the required shape.

4. A device for forming loosely connected strips from a supply of sheet material, each strip having a pre-assigned number of identically shaped and notched sections comprising, in combination means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; means for notching the last fed strip section; means for forming a previously fed strip section into the required shape; and means operative upon a predetermined number of operations of the notching means for partially severing a fed notched strip section from the adjacent last section of a strip being formed and from the supply material before said section to be partially severed is formed into the required shape.

5. A device for forming loosely connected strips from a supply of sheet material, each strip having a pre-assigned number of identically shaped and notched sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; means for simultaneously notching the last fed strip section and forming a previously fed strip section into the required shape; and means operative upon a predetermined number of operations of the notching and forming means for partially severing the notched last section of a strip being formed from the supply material before said section is formed into the required shape.

6. A device for forming loosely connected strips from a supply of sheet material, each strip having a pre-assigned number of identically shaped sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; two plates, one being stationary and the other reciprocable toward and away from the stationary plate; cooperating members carried by both plates for forming one fed strip section at a time into the required shape; and cooperating members carried by both plates intermediate the feeding means and the forming members for partially severing the last section only of a strip being formed from the supply material.

7. A device for forming loosely connected strips from a supply of sheet material, each strip having a pre-assigned number of identically shaped sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; two plates, one being stationary and the other reciprocable toward and away from the stationary plate; cooperating members carried by both plates for forming one fed strip section at a time into the required shape; and cooperating members carried by both plates intermediate the feeding means and the forming members for partially severing a strip section from the adjacent last section of a strip being formed and from the supply material.

8. A device for forming a strip of identically shaped sections from a supply of insulating sheet material comprising, in combination, cooperating rotatable rolls having gear teeth meshing with each other when said rolls normally engage each other, one of said rolls being movable out of engagement with the other roll and both rolls being adapted intermittently to feed the supply material a distance substantially equal to the length of a strip section; two plates, one being stationary and the other reciprocable toward and away from the stationary plate; cooperating members carried by said plates for ridging a fed strip section upon movement of the reciprocable plate toward the other plate; means for reciprocating the reciprocable plate; means actuated in response to operation of the plate reciprocating means whereby to cause movement of the reciprocable plate away from the other plate for rotating one of the feed rolls through a predetermined cycle; and means actuated in response to movement of the reciprocable plate toward the other plate for moving the movable feed roll out of engagement with the other feed roll.

9. A device for forming a strip of identically shaped sections from a supply of insulating sheet material comprising, in combination, cooperating rotatable rolls having gear teeth meshing with each other when said rolls normally engage each other, one of said rolls being movable out of engagement with the roll and both rolls being adapted intermittently to feed the supply material a distance substantially equal to the length of a strip section; two plates, one being stationary and the other reciprocable toward and away from the stationary plate; cooperating members carried by said plates for ridging a fed strip section upon movement of the reciprocable plate toward the other plate; means for reciprocating the reciprocable plate; means for rotating one of the feed rolls; and means actuated in response to movement of the reciprocable plate toward the other plate for moving the movable feed roll out of engagement with the other feed roll.

10. A device for forming loosely connected strips from a supply of sheet material, each strip consisting of a pre-assigned number of identically shaped sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; two plates, one being stationary and the other reciprocable toward and away from the stationary plate; cooperating members carried by said plates for ridging a fed strip section upon movement of the reciprocable plate toward the other plate; cooperating members carried by both plates and adapted partially to sever a strip being formed from the supply material upon movement of the reciprocable plate toward the other plate, the member carried by the reciprocable plate being floatingly mounted thereon, therefore, normally failing to cooperate with the other severing member; and means actuated in response to each pre-assigned number of completed reciprocations of the reciprocating plate for locking the floating severing member to the reciprocable plate for the next following reciprocation of said plate only, thus causing the floating severing member to cooperate with the other severing member.

11. A device for forming loosely connected strips from a supply of sheet material, each strip consisting of a pre-assigned number of identically shaped sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; two plates, one being stationary and the other reciprocable toward and away from the stationary plate; cooperating members carried by said plates for ridging a fed strip section upon movement of the reciprocable plate toward the other plate; cooperating members carried by both plates and adapted partially to sever a strip from the supply material upon

movement of the reciprocable plate toward the other plate, the member carried by the reciprocable plate being floatingly mounted thereon, therefore, normally failing to cooperate with the other severing member; and means including a disc having a projecting portion and indexing said disc in response to each reciprocation of the movable plate such an angular distance that after a pre-assigned number of reciprocations of the reciprocable plate the projecting portion of the disc is in alignment with the floating severing member thereby locking the same to said reciprocable plate and causing said severing member to cooperate with the other severing member on the next following reciprocation of the reciprocable plate.

12. A device for forming loosely connected strips from a supply of sheet materials, each strip consisting of a pre-assigned number of identically shaped sections comprising, in combination, means for intermittently feeding the supply material a distance substantially equal to the length of a strip section; two plates, one being stationary and the other reciprocable toward and away from the stationary plate; cooperating members carried by said plates for ridging a fed strip section upon movement of the reciprocable plate toward the other plate; cooperating members carried by both plates and adapted partially to sever a strip from the supply material upon movement of the reciprocable plate toward the other plate, the member carried by the reciprocable plate being floatingly mounted thereon, therefore, normally failing to cooperate with the other severing member; a shaft rotatably carried by the reciprocable plate; a ratchet disc on said shaft; a pawl pivotally mounted on the stationary plate, said pawl being normally urged toward the ratchet teeth and indexing the ratchet during each stroke of the movable plate away from the other plate; and a disc on the shaft, said disc having a projection aligning with the floating severing member and thus locking the same to said reciprocable plate after a pre-assigned number of completed indexing operations of the pawl so that said floating severing member cooperates with the other severing member on the next following reciprocation of the reciprocable plate.

13. In a device of the character described, the combination of a lower plate providing a groove; a ridging member yieldingly movable in said groove; a block having a groove; another ridging member yieldingly movable within certain limits in the groove of said block, said other ridging member being adapted to cooperate with the first mentioned ridging member; a reciprocable plate having a groove receiving said block for limited movement relative thereto; a rubber cushion interposed between the bottom of the groove of said reciprocable plate and the block; and means including an eccentric for reciprocating the reciprocable plate.

14. Method of forming loosely connected and laterally scored strips from a supply of sheet material, each strip to comprise a plurality of equally scored longitudinal sections, comprising the steps of bending at least one longitudinal portion of a section of the sheet material out of the normal plane thereof in order laterally to score said section and repeating this step on consecutive sections of the sheet material; and partially severing the last and unscored section of a strip from the supply material while the one longitudinal portion of the last scored section of said strip is held bent.

15. Method of forming laterally scored strips from a supply of sheet material, each strip to comprise a plurality of equally scored longitudinal sections and consecutive strips being loosely connected by intermediate stubs of section length, comprising the steps of bending at least one longitudinal portion of a section of the sheet material out of the normal plane thereon in order laterally to score said section and repeating this step on consecutive sections of the sheet material; and partially severing the unscored stub section from a strip being scored on the one side and from the sheet material on the other side while the one longitudinal portion of the last scored section of said strip is held bent.

LORA E. POOLE.