Jan. 15, 1924. **1,480,776**

C. A. MATSON

LACE TIPPING MACHINE

Filed May 8, 1920 4 Sheets-Sheet 1

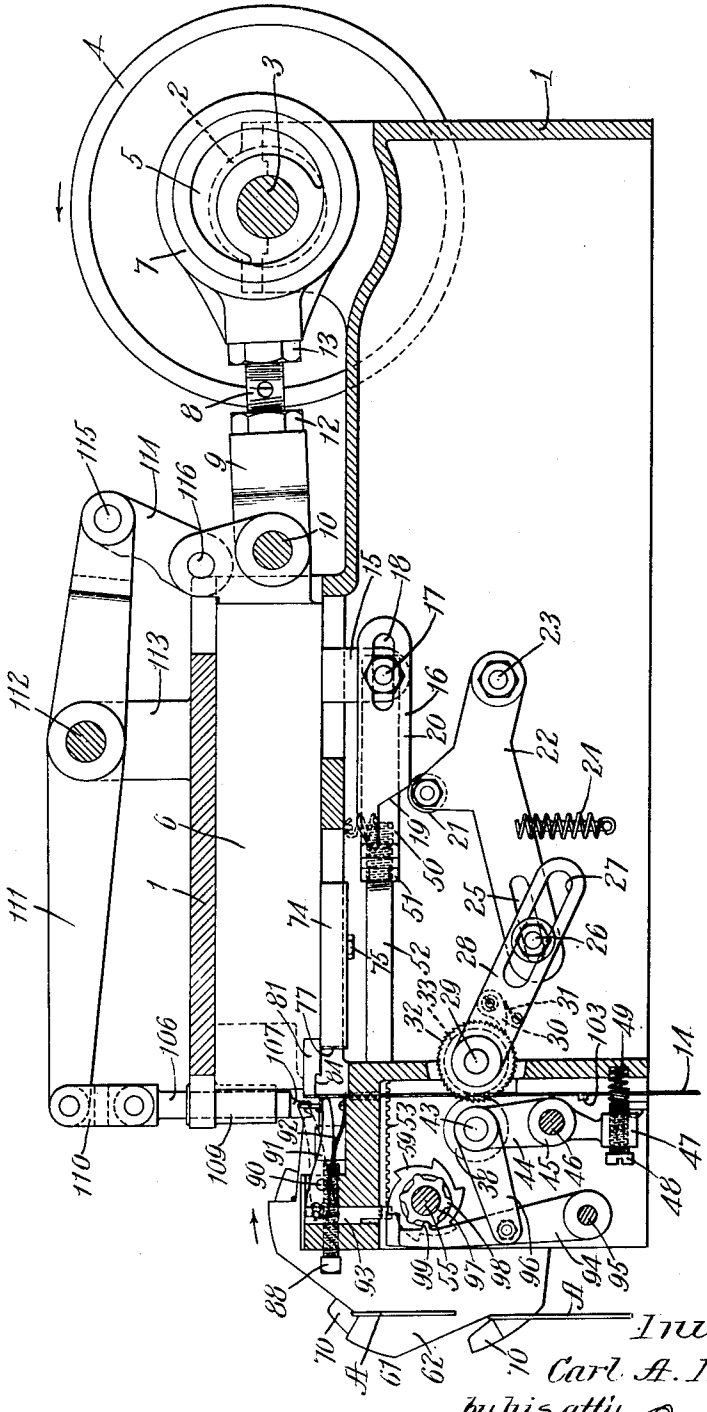


Fig. 1.

Inventor:
Carl A. Matson.
by his atty,
Charles V. Gooding.

Jan. 15, 1924. 1,480,776

C. A. MATSON

LACE TIPPING MACHINE

Filed May 8, 1920 4 Sheets-Sheet 2

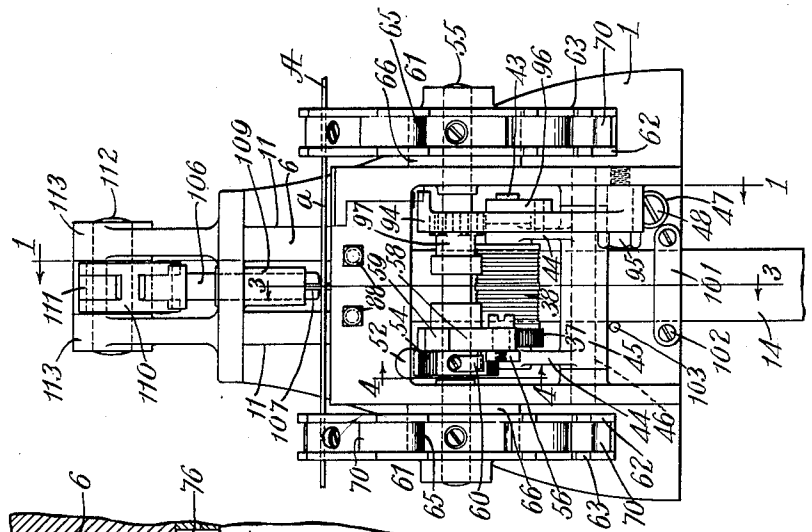


Fig. 2.

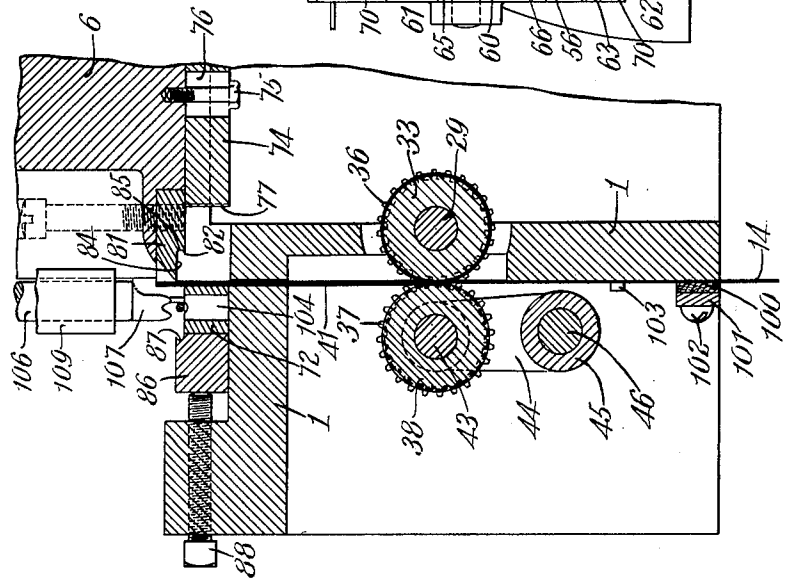


Fig. 3.

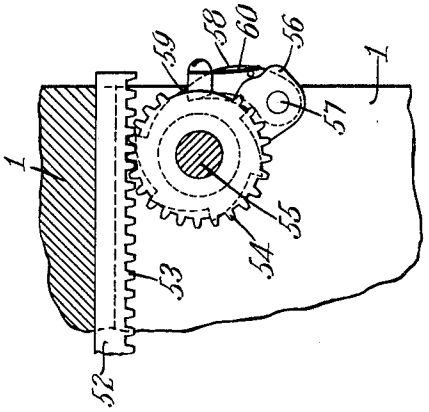


Fig. 4.

Inventor:
Carl A. Matson.
by his atty
Charles S. Goodwin.

Jan. 15, 1924. 1,480,776

C. A. MATSON

LACE TIPPING MACHINE

Filed May 8, 1920 4 Sheets-Sheet 3

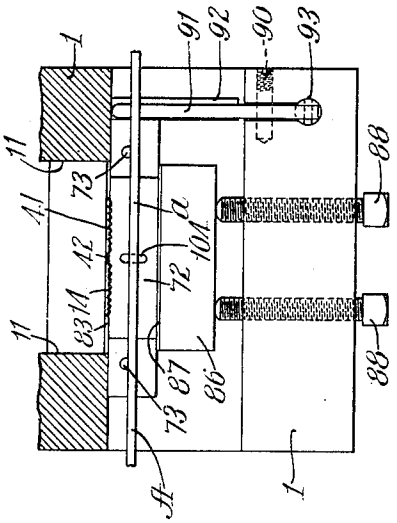


Fig. 6.

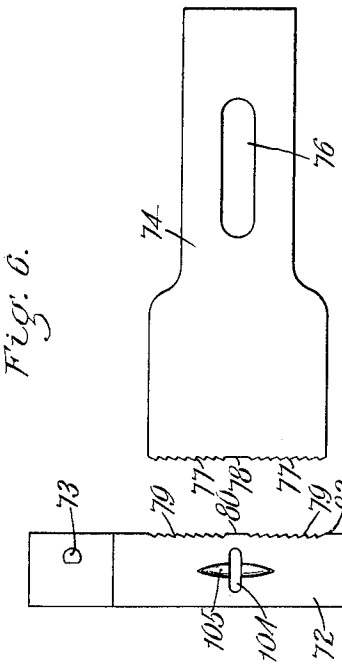


Fig. 9.

Fig. 8.

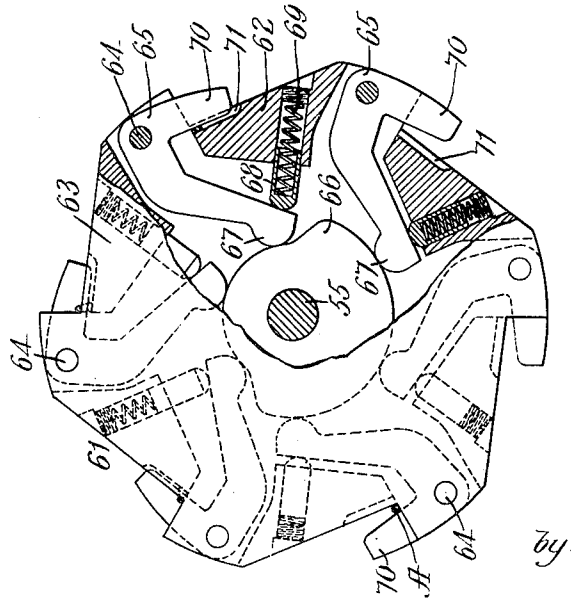


Fig. 5.

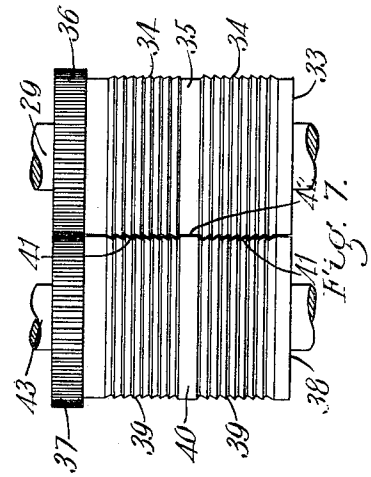


Fig. 7.

Inventor:
Carl A. Matson
by his atty,
Charles L. Gooding.

Jan. 15, 1924. **1,480,776**

C. A. MATSON

LACE TIPPING MACHINE

Filed May 8, 1920 4 Sheets-Sheet 4

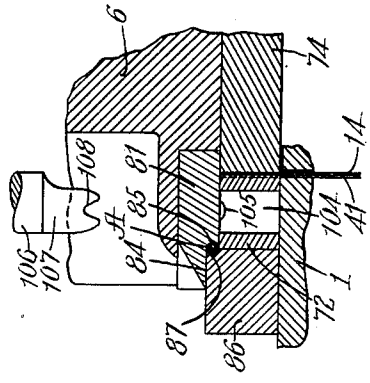


Fig. 12.

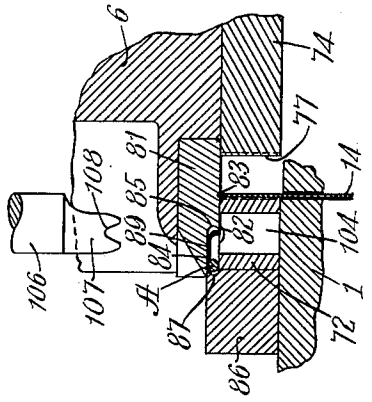


Fig. 11.

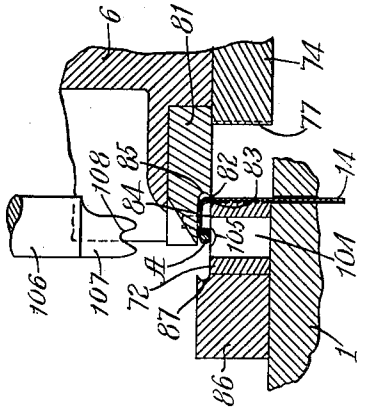


Fig. 10.

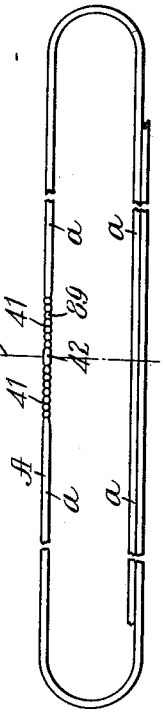


Fig. 14.

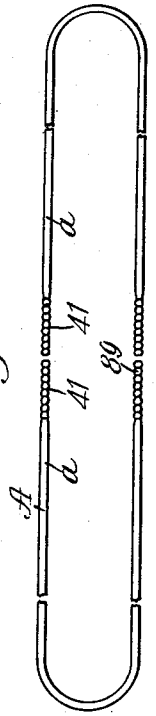


Fig. 15.

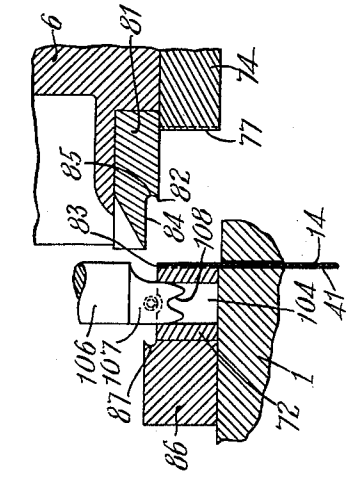


Fig. 13.

Inventor:
Carl A. Matson
by his atty,
Charles V. Gooding.

Patented Jan. 15, 1924. 1,480,776

UNITED STATES PATENT OFFICE.

CARL A. MATSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO MATSON LACE AND BRAID COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

LACE-TIPPING MACHINE.

Application filed May 8, 1920. Serial No. 379,734.

To all whom it may concern:

Be it known that I, CARL A. MATSON, a citizen of the United States, residing at Swampscott, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Lace-Tipping Machines, of which the following is a specification.

This invention relates to a lace tipping machine. The object of the invention is to provide a machine for forming metal tips upon shoe laces or the like and securely fastening said tips to said laces.

It is also an object of the invention to provide a novel mechanism for clamping the lacing, and while thus clamped feeding said lacing transversely into position to have the metal tip rolled therearound by the tip forming instrumentalities, provision being made for automatically preventing the strip of sheet metal, from which the tip is formed, from being fed and a piece cut therefrom if the lacing is not in position to receive the tip.

It is still further an object of the invention to provide means for simultaneously feeding and corrugating the strip of sheet material from which the tip is formed and for giving the corrugations thus formed a final pressing prior to the operation of forming the tip.

The invention consists in the combination and arrangement of parts whereby the above objects and certain other objects hereinafter appearing may be obtained as set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings:

Figure 1 represents a longitudinal sectional elevation through a machine embodying my invention, the said section being taken substantially on the line 1—1 of Fig. 2.

Fig. 2 is a front elevation of the machine.

Fig. 3 is a detail section taken on the line 3—3 of Fig. 2 as viewed from the right thereof.

Fig. 4 is a detail section taken on the line 4—4 of Fig. 2 as viewed from the left thereof.

Fig. 5 is a side elevation partly broken away and shown in section of the lacing clamping and feeding instrumentalities.

Fig. 6 is a plan view of the work-support and a portion of the tip forming instrumentalities.

Fig. 7 is a plan view of the rolls which simultaneously feed the strip of sheet material and form the corrugations therein.

Fig. 8 is a plan view of the work-support.

Fig. 9 is a plan view of the movable member of the auxiliary corrugating instrumentalities.

Figs. 10, 11 and 12 are detail sections illustrating the steps employed in forming the tip upon the lacing.

Fig. 13 is a detail section illustrating the method of severing the lacing with the tip formed thereon.

Fig. 14 is a view illustrating a coil of lacing arranged as it is presented to the tip forming instrumentalities with the tip formed therearound prior to being severed.

Fig. 15 is a view similar to Fig. 14 illustrating both ends of two completed laces.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings 1 represents the frame of the machine upon which is supported in suitable bearings 2 a driving shaft 3 which is driven by a pulley 4. Fast to the shaft 3 is an eccentric 5 which is adapted to impart a reciprocatory motion to a horizontal slide 6 to which it is operatively connected by an eccentric strap 7, rod 8 and member 9, the said member 9 being secured to the slide 6 by a pin 10. The slide 6 is arranged to slide in suitable ways 11 provided in the frame 1, and the position of said slide may be adjusted for purposes hereinafter appearing by means of the rod 8, which is provided with right and left hand screw-threaded portions having engagement with the member 9 and eccentric strap 7 respectively. The rod 8 when properly adjusted is locked to the member 9 and strap 6 by lock-nuts 12 and 13 respectively.

A strip of sheet material 14 from which the tips are formed is fed vertically into a

position to be engaged by the tip forming instrumentalities by mechanism as follows: Fast to a lug 15 projecting downwardly from the slide 6 is a cam 16 which is adjustably secured to said lug by a bolt 17 which passes through a slot 18 provided in the cam. The working cam surface is composed of an inclined edge 19 and a horizontally disposed edge 20, the said edge 20 constituting a rest. A cam roll 21 is rotatably mounted upon a cam arm 22, one end of which is pivotally attached to a stud 23 projecting from the frame 1. A spring 24 acts to always hold the cam roll 21 against the working surface of the cam 16. The outer end of the cam arm 22 is provided with a slot 25 through which extends a stud 26 which is adjustably mounted in a slot 27 provided in an arm 28 pivoted upon a shaft 29 adapted to rotate in the frame 1. A pawl 30 carried by the arm 28 is forced by a spring 31 into engagement with a ratchet 32 fast to the shaft 28 and the rocking movement imparted to the arm 28 by the arm 22 and cam 16 feeds the ratchet 32 a predetermined number of teeth with each forward movement of the reciprocatory slide 6. The number of teeth engaged by the pawl 30 with each rocking movement of the arm 28 may be varied by adjusting the location of the stud 26 upon the arm 28.

Fast to the shaft 29 and rotatable therewith is a feed roll 33 around the periphery of which extends two sets of equally spaced corrugations 34 between the sets of which is located an uncorrugated surface 35. Fast to the feed roll 33 is a spur gear 36 which meshes with and drives another spur gear 37 fast to another feed roll 38 around the periphery of which also extends two sets of corrugations 39, between the sets of which is located an uncorrugated surface 40. The corrugations 39 are adapted to co-operate with the corrugations 34 to form corrugations 41 in the sheet material 14 as it passes between the feed rolls 33 and 38 while the uncorrugated surfaces 35 and 40 will leave an uncorrugated surface 42 upon said strip as illustrated in Fig. 7. The feed roll 38 is rotatably mounted upon a shaft 43 supported in a pair of arms 44 forming a part of a lever 45 which is pivoted to rock upon a shaft 46 supported in the frame 1.

An arm 47 forming a part of the lever 45 is located upon the opposite side of the shaft 46 from the arms 44 and said arm 47 is provided with an adjusting screw 48 which extends therethrough having a shoulder formed thereon, and between said shoulder and a portion of the frame 1 is located a spring 49 which acts to force the feed roll 38 against the strip of sheet material 14 and press said material between the rolls 38 and 33 simultaneously with the feeding of said material by said rolls.

To facilitate the presentation of material A, which comprises the lacing, to the work-support where the tip is attached thereto, means are provided for clamping said material, and while thus clamped, feeding it transversely thereof into position upon the work-support as follows: Fastened by the bolt 17 to the opposite side of the lug 15 from that to which the cam 16 is attached is an angle-bar 50 to which is adjustably attached by nuts 51 a rod 52. The rod 52 has rack teeth 53 formed upon the outer portion thereof which mesh with and drive a gear 54 loosely mounted upon a shaft 55 supported in the frame 1, see Fig. 4. A lug 56 is formed integral with the gear 54 and to this lug is pivoted at 57 a pawl 58 which engages a ratchet 59 fast to the shaft 55. A spring 60 attached to the gear 54 holds the pawl 58 in engagement with the ratchet 59. The reciprocatory movement of the slide 6 imparts through the rod 52, gear 54, pawl 58 and ratchet 59 an intermittent rotary motion to the shaft 55.

Fastened to each end of the shaft 55 is a rotary lacing feeding member 61, see Figs. 2 and 5. Each rotary member 61 embodies therein a main body portion 62 and side plate 63 between which are pivotally mounted upon pins 64 a plurality of clamping members 65. A stationary cam 66 is located upon each side of the frame 1 being attached to said frame. The inner ends of the clamping members 65 are rounded at 67 and said ends are forced by plungers 68 and springs 69 against the working surface of the cam 66. The outer ends 70 of the clamping members 65 provide a means for first hooking the lacing A to the rotary member 61, and finally clamping said lacing to said rotary member, at which time the ends 70 co-operate with recesses 71 formed in the periphery of the main body portion 62 to securely grip the lacing A.

In preparing the lacing A for presentation to the lacing feeding instrumentalities, the said lacing which is of indefinite length is arranged in coils as illustrated in Fig. 14 in which one coil only is shown and portions *a* of said coils are placed manually by operatives one at a time upon the rotary feeding members 61 behind the outer ends 70 of the clamping members 65 as illustrated in Fig. 1. As the feeding members 61 are rotated, the lacing A is automatically clamped by the clamping members 65 and the lacing eventually is deposited upon a block which constitutes a work-support 72 in front of and against a pair of positioning pins 73 as illustrated in Figs. 2 and 6 which project upwardly from the work-support. During the interval that the lacing rests upon the work-support it is yieldingly held by the clamping means 65 upon opposite sides of the work-support.

In order that the sheet material 14 may be perfectly corrugated, auxiliary corrugating means are provided to press said material subsequently to its passage between the feed rolls 33 and 38. This final corrugating operation is accomplished as follows: Attached to the under surface of the reciprocatory slide 6 is a block 74 which constitutes the movable member of the auxiliary corrugating means. The block 74 is adjustably attached to the slide 6 by a screw 75 which passes through a slot 76 provided in said block. The forward edge of the block 74 is provided with two sets of equally spaced corrugations 77 between the sets of which is an uncorrugated surface 78, see Fig. 9. Formed upon the rear edge of the work-support 72 are two sets of corrugations 79 between the sets of which is an uncorrugated surface 80, see Fig. 8. The corrugations 77 and 79 are identical in formation with the corrugations 34 and 39 of the feed rolls 33 and 38. The block 74 is so positioned relatively to the work-support 72 that with each forward movement of the slide 6, the corrugations 77 of the auxiliary corrugating means will co-operate with the corrugations 79 of the work-support 72 as illustrated in Fig. 12 to perform a final pressing operation upon the corrugations 41 already formed in the strip of sheet material 14.

The instrumentalities for severing a piece of material from the strip 14 and rolling said piece around the lacing A are as follows: Fastened to the reciprocatory slide 6 is a member 81 which is provided with a cutting edge 82 which is adapted to co-operate with a cutting edge 83 provided upon the work-support 72. The member 81 is furthermore provided with a tip forming recess 84 having a semi-circular rear wall 85 which intersects the cutting edge 83. The member 81 constitutes a movable tip forming member. A stationary tip forming member 86 abuts against the work-support 72 and is provided with a semi-circular tip forming recess 87. The work-support 72 and stationary tip forming member 86 each rest upon a horizontal portion of the frame 1, and are simultaneously clamped against a vertical portion of said frame by a pair of clamping screws 88, see Figs. 3 and 6. As the reciprocatory slide 6 moves forward, the front edge of the tip forming member 81 first contacts with the upper end of the strip of sheet material 14 as illustrated in Fig. 3, bending said material and folding it so as to rest upon the lacing A as illustrated in Fig. 10. The cutting edges 82 and 83 then co-operate to sever a piece of material 89 from the strip 14 as illustrated in Fig. 11, and finally the upper wall of the recess 84, curved rear wall 85 of said recess, curved recess 87 and upper flat surface of the work-support 72 all co-operate to roll the piece of material 89 around the lacing A as illustrated in Fig. 12. When the piece 89 is rolled around the lacing A, the corrugations 41 formed in said piece will act to grip said lacing and prevent a longitudinal movement of the finished tip upon the finished lace, it being noted that the sets of corrugations are especially formed to prevent a longitudinal movement of the tip toward the end of the finished lace when the lacing is finally severed.

It is evident that if, for any reason, the rotary lacing feeding members 61 fail to deposit the lacing A upon the work-support 72 it is desirable that there shall not be a piece of material 89 severed from the strip 14, thereby preventing waste of said material 14 and also preventing an unused piece of said material from clogging the tip forming instrumentalities. Means are, therefore, provided for preventing the strip of sheet material 14 from being fed if the lacing is not clamped to the lacing feeding members 61. Pivotally mounted upon the frame 1 at 90 in a position to be engaged by the lacing A just prior to being deposited upon the work-support 72, is a lever 91, the normal position of which is illustrated in dotted lines in Fig. 1. A flat spring 92 engages the under side of the lever 91 and acts to always force said lever upwardly. The lever 91 is operatively connected with a vertical pin 93 which, when in its lowered position, projects in the path of an arm 94 which is pivoted at 95 to the frame 1. A link 96 connects the arm 94 with the shaft 43 upon which the feed roll 38 is mounted. Fast to the shaft 55 in vertical alignment with the arm 94 is a member 97 which is provided with a plurality of raised portions 98 formed upon the periphery thereof which are adapted to contact with a projection 99 formed upon the arm 94 and intermittently rock said arm a sufficient distance to allow the pin 93 to drop in the path of the upper end of the arm 94. The number of raised portions 98 correspond to the number of clamping members 65 and with each intermittent movement of the rotary lacing feeding members 61, the arm 94 will be rocked, thereby pulling the feed roll 38 out of engagement with the strip of sheet material 14 and permitting the pin 93 to fall behind the upper end of the arm 94 thereby relieving the pressure upon the material 14. As long as there is no lacing A present upon the lacing feeding members 61, the strip of material 14 will fail to feed, but when said lacing is clamped in position, the said lacing will engage the lever 91 forcing the long arm thereof downwardly and thereby raising the pin 93 from behind the arm 94 and again allowing the spring 49 to force the feed roll 38 against the strip of material 14 thereby allowing said material to feed.

During such times as the feed roll 38 is removed from engagement with the strip of sheet material 14, the said strip is prevented from dropping by a friction device consisting of a layer of compressible material 100, such as felt or the like, a plate 101 and screws 102, see Figs. 2 and 3, there being just enough pressure placed upon the strip of sheet material 14 by the screws 102 to prevent the said sheet material from dropping when not held by the feed rolls, yet allowing said sheet material to easily be fed between the material 100 and a flat surface provided upon the frame 1.

The strip of sheet material 14 is guided during its upward movement by a plurality of pins 103 which engage the opposite edges of said strip as illustrated in Figs. 2 and 3.

After the piece of sheet material 89 has been rolled around the lacing A means are provided which are actuated by the reciprocatory slide 6 for severing said lacing and the material located therearound as follows: Extending through the work-support 72 is an opening 104, the upper edge of which constitutes a stationary cutter. The upper surface of the work-support is also provided with a shallow recess 105 which intersects the opening 103 and is so located that the lacing A will align therewith when in position upon the work-support. Supported above the work-support in a vertical slide 106 is a cutter blade 107 which is provided with a V-shaped cutting edge 108. The cutter blade 107 constitutes the movable member of the lacing severing instrumentalities. The slide 106 is adapted to reciprocate in a vertical bearing 109 provided in the frame 1, and is connected by a link 110 with a lever 111 which is pivoted at 112 between a pair of ears 113. A link 114 is attached by pins 115 and 116 to the lever 111 and the reciprocatory slide 6 respectively. During the forward movement of the reciprocatory slide 6 and the operation of the tip forming instrumentalities, the movable cutter 107 is moving upwardly as illustrated in Figs. 10, 11 and 12. When, however, the slide 6 moves rearwardly, the movable cutter descends and the lacing A which at the completion of the operation of attaching the tip is positioned as illustrated in Fig. 12 also moves rearwardly because of its own elasticity until it is again positioned as illustrated in Fig. 3. The downward movement of the movable cutter is so timed that as soon as the tip forming member 81 is withdrawn, as illustrated in Fig. 13, the cutter 107 will contact with the piece of material 89 midway of the uncorrugated surface 42 and sever said material and the lacing therein upon the line *b* as illustrated in Fig. 14 and the material thus severed will constitute tips for one end of two separate laces.

The general operation of the machine briefly described is as follows: The lacing A rests upon a suitable table, not shown in the drawings, in front of the machine with the line *b*, Fig. 14, in alignment with the center line of the machine. The portions *a* of the coils of lacing are then placed one at a time by an operative upon the lacing feeding members 61 behind the outer end 70 of each clamping member 65 and as said lacing feeding members are intermittently rotated the lacing is clamped by the clamping members 65 to the members 61. The normal position of the lever 91 is as illustrated in dotted lines Fig. 1, at which time the feed roll 38 is held out of engagement with the strip of sheet material 14. As the lacing feeding members 61 rotate, the lacing clamped thereon will engage the lever 91 forcing the long arm thereof downwardly lifting the pin 93 and releasing the arm 94, whereupon the feed roll 38 will be forced against the strip of sheet material by the spring 49. The lacing A is deposited by the lacing feeding members upon the work-support 72 toward the end of the rearward movement of the reciprocatory slide 6 and immediately thereafter with the first portion of the next forward movement of the reciprocatory slide 6, the strip of sheet material 14 is fed upwardly by the feed wheels 33 and 38, which also act to corrugate said strip simultaneously with the feeding operation. If the operative neglects to place the lacing in position upon the lacing feeding members 61, when that portion of said members arrives in the position where the lever 91 should be engaged by the lacing if it were present, the lever 91 will not be moved and the feed roll 38 being out of contact with the strip of sheet material 14, will fail to feed said material. This will prevent any clogging of the tip forming instrumentalities by preventing a tip from being formed if there is no lacing present to receive said tip. Immediately following the feeding operation of the strip of sheet material 14, the member 81 of the tip forming instrumentalities will engage the upper end of the strip 14 bending it upon the lacing A which is resting upon the work-support and while thus bent, is severed from the rest of the strip and rolled around the lacing. Simultaneously with this operation at the very end of the forward movement of the slide 6 the auxiliary corrugating instrumentalities will perform a final corrugating operation upon the strip of material 14 which has previously been corrugated by the feed rolls 33 and 38. After the tip has been formed around the lacing, the material comprising said tip is severed midway of the uncorrugated surface 42 thereof and the severed portions of said material thereafter constitute tips for the ends of the completed lace as illustrated in Fig. 15.

The corrugations are so formed in the sheet material that they will securely grip the lacing and prevent the tips from being pulled from the ends of the completed lace. It is evident that the corrugations may be eliminated from the feed rolls and the corrugating operation performed entirely by the auxiliary corrugating means, or the auxiliary corrugating means may be eliminated and the corrugating operation entirely performed by the feed rolls if it is so desired. It is also evident that in place of the corrugations illustrated other forms of scoring the strip of sheet material may be employed without departing from the spirit of this invention as, for example, punching indentations therein in order that the said material may grip the lace to prevent the tip from accidentally slipping from the end thereof.

It should be distinctly understood that the term "lacing" as used in this specification and in the claims which follow designates the material of which the finished laces are composed.

While it is preferable to provide a mechanism for clamping the lacing and feeding the same upon the work-support, it will be evident that this feeding and clamping mechanism may be entirely eliminated and the lacing fed by hand upon the work-support 72 without departing from the spirit of this invention.

At such times the lacing A is grasped by the operator with both hands and while pulled tight is placed upon the work-support 72 against the pins 73, the said lacing engaging the lever 91 as the lacing approaches the work-support as previously described, and allowing the strip of sheet material 14 to feed in the usual manner. Aside from the elimination of the feeding members 61 and the clamping instrumentalities thereon, the entire mechanism and operation of the same is exactly the same as has previously been described.

My present machine is capable of applying any desired material in sheet form to laces, whether said tipping material is metal, metallic alloy, celluloid or other material, even though the material will afterward be capable of melting and fusing with the lace, so long as it can be handled by the feeding devices, cut by the die and be set about the lace, and irrespective of whether the laces be round, tubular or flat.

I claim:

1. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, means to clamp and feed lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means co-operating with the work-support to subsequently sever said lacing and the material located therearound.

2. A lace tipping machine having, in combination, means to feed and corrugate a strip of sheet material, a work-support, means to clamp lacing and feed it transversely thereof and deposit the same upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to subsequently sever said lacing and the material located therearound.

3. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, means to clamp and feed lacing transversely thereof and deposit the same upon said work-support, a pair of tip formers, one of said tip formers being adapted to co-operate with said work-support and the other tip former, to successively sever a piece of material from said strip and roll said piece around said lacing, and means co-operating with said work-support to subsequently sever said lacing and the material located therearound.

4. A lace tipping machine having, in combination, means to simultaneously feed and corrugate a strip of sheet material, a work-support, means to feed lacing transversely thereof and deposit the same upon said work-support, a pair of tip formers, one of said tip formers being adapted to co-operate with said work-support and the other tip former, to successively sever a piece of material from said strip and roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound.

5. A lace tipping machine having, in combination, means to feed and corrugate a strip of sheet material, a work-support, means to clamp lacing and feed it transversely thereof and deposit the same upon said work-support, a pair of tip formers, one of said tip formers being adapted to co-operate with said work-support and the other tip former, to successively sever a piece of material from said strip and roll said piece around said lacing, and means to subsequently sever said lacing and the material located therearound.

6. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, a pair of rotary members adapted to clamp and feed lacing transversely thereof and deposit the same upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing and means co-operating with said work-support to subsequently sever said lacing and the material located therearound.

7. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, a pair of rotary mem-

bers adapted to intermittently clamp and feed lacing transversely thereof and deposit the same upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound while said lacing is still resting upon said work-support.

8. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, a pair of lacing feeding members, means to yieldingly clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof and deposit the same upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing and means co-operating with said work-support to subsequently sever said lacing and the material located therearound.

9. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, a pair of lacing feeding members, means to yieldingly clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof and deposit the same upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing and means co-operating with said work-support to subsequently sever said lacing and the material located therearound, said lacing being held upon said work-support by said clamping means at opposite sides of said work-support while said piece is being attached to said lacing and during the subsequent severing operation.

10. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, a pair of lacing feeding members, means to yieldingly clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, means to subsequently sever said lacing and the material located therearound and means to prevent said strip of sheet material from being fed if said lacing is not delivered to said work-support.

11. A lace tipping machine having, in combination, means normally inoperative to feed a strip of sheet material, a work-support, a pair of lacing feeding members, means to yieldingly clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, said strip feeding means being rendered operative by the transverse feeding of said lacing upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound.

12. A lace tipping machine having, in combination, means normally inoperative to simultaneously feed and corrugate a strip of sheet material, a work-support, a pair of lacing feeding members, means to yieldingly clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, said strip feeding and corrugating means being rendered operative by the transverse feeding of said lacing upon said work-support, auxiliary means for corrugating said strip of sheet material, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound.

13. A lace tipping machine having, in combination, means to feed a strip of sheet material, a work-support, a pair of lacing feeding members, means to yieldingly clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof and deposit the same upon said work-support, means to position said lacing upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound while said lacing is resting upon said work-support.

14. A lace tipping machine having, in combination, means to simultaneously feed and corrugate a strip of sheet material, a work-support, auxiliary means for corrugating said strip of sheet material subsequently to the operation of said first mentioned means for feeding and corrugating said strip, means to clamp lacing and feed it transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to subsequently sever said lacing and the material located therearound.

15. A lace tipping machine having, in combination, means to simultaneously feed and corrugate a strip of sheet material, means to vary the length of said feed, a work-support, auxiliary means for corrugating said strip of sheet material subsequently to the operation of said first mentioned means for feeding and corrugating said strip, means

to clamp lacing and feed it transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to subsequently sever said lacing and the material located therearound.

16. A lace tipping machine having, in combination, means to intermittently feed a strip of sheet material and corrugate said material simultaneously with the feeding operation, a work-support, auxiliary means for corrugating said strip of sheet material subsequently to the operation of said first mentioned means for feeding and corrugating said strip, means to clamp lacing and feed it transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to subsequently sever said lacing and the material located therearound.

17. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, means to simultaneously rotate said rolls, a work-support, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

18. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said feed rolls, a work-support, a pair of lacing-feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

19. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said feed rolls, means to force one of said feed rolls against the material located between said feed rolls, a work-support, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

20. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to yieldingly force one of said rolls against the material located between said feed rolls, a work-support, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

21. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate each of said rolls in unison, means to vary the length of feed of said feed rolls, a work-support, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

22. A lace tipping machine having, in combination, a pair of rolls adapted to feed a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, a work-support, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

23. A lace tipping machine having, in combination, a pair of rolls adapted to feed a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory

slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a work-support, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

24. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, auxiliary means for corrugating said strip of sheet material subsequently to the operation of said first mentioned means for corrugating said strip, a work-support, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

25. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a work-support provided with corrugations thereon, a block attached to said reciprocatory slide and also provided with corrugations thereon adapted to co-operate with the corrugations upon said work-support to perform a final corrugating operation upon said strip of sheet material, a pair of lacing feeding members, means to automatically clamp lacing to each of said lacing feeding members, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

26. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a pair of lacing feeding members, a plurality of clamping members mounted upon said lacing feeding members adapted to clamp lacing thereto, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

27. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a pair of lacing feeding members, a plurality of clamping members pivotally mounted upon said lacing feeding members adapted to yieldingly clamp lacing thereto, means to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

28. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage

said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a pair of lacing feeding members, a plurality of clamping members pivotally mounted upon said lacing feeding members adapted to yieldingly clamp lacing thereto, means operated by said reciprocatory slide adapted to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound.

29. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a pair of lacing feeding members, a plurality of clamping members pivotally mounted upon said lacing feeding members adapted to yieldingly clamp lacing thereto, means operated by said reciprocatory slide adapted to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, said lacing being held upon opposite sides of said work-support by said lacing feeding members during the operation of attaching said piece of material to said lacing and means to sever said lacing and the material therearound.

30. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a pair of lacing feeding members, a plurality of clamping members pivotally mounted upon said lacing feeding members adapted to yieldingly clamp lacing thereto, means operated by said reciprocatory slide adapted to intermittently rotate said lacing feeding members in unison and feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound, said lacing being automatically released by said clamping members subsequently to the operation of said last named severing means.

31. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a reciprocatory slide, means operated by said reciprocatory slide adapted to intermittently rotate said rolls in unison, means to vary the length of feed of said feed rolls, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material and thereby prevent said sheet material from being fed, a pair of lacing feeding members, a plurality of clamping members pivotally mounted upon said lacing feeding members adapted to yieldingly clamp lacing thereto, means operated by said reciprocatory slide adapted to intermittently rotate said lacing feeding members in unison and feed said lace transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing, and means to sever said lacing and the material therearound, embodying therein a movable cutter and means operated by the movement of said reciprocatory slide adapted to force said movable cutter into co-operative relation with a cutting edge provided upon said work-support.

32. A lace tipping machine having, in combination, means to feed and corrugate a strip of sheet material, a work-support provided with a cutting edge upon the upper surface thereof, means to clamp lacing and feed it transversely thereof upon said work-support, a reciprocatory slide, means to sever a piece of material from said strip, means operated by said reciprocatory slide to roll said piece around said lacing and means to sever said lacing and the material located therearound embodying therein a movable cutting member adapted to co-operate with the cutting edge upon the upper surface of the work-support, and a lever operatively connected to said movable cutting member, said lever also being connected to said reciprocatory slide by which a rocking movement is imparted thereto.

33. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, a work-support, a pair of lacing feeding members, means to clamp lacing to each of said lacing feeding members, means to in-

termittently rotate said lacing feeding members in unison, means to disengage said yielding feed roll from said sheet material, means to lock said yielding feed roll out of engagement with said sheet material and thereby prevent said sheet material from being fed, means operated by the transverse feeding of said lacing upon said work-support, adapted to release said yielding feed roll and allow the same to again engage said sheet material, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound.

34. A lace tipping machine having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, a work-support, a pair of lacing feeding members, a plurality of spring actuated clamping members pivotally mounted upon said lacing feeding members, a pair of cams with which said clamping members are adapted to contact, means to intermittently rotate said lacing feeding members in unison and thereby clamp lacing to said lacing feeding members and also feed said lacing transversely thereof upon said work-support, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to sever said lacing and the material located therearound, said lacing being released by said clamping members through the medium of said cams subsequently to the operation of said last named severing means.

35. A lace tipping machine having, in combination, a work-support, means cooperating with said work-support adapted to corrugate a strip of sheet material, means normally inoperative to feed said strip of sheet material, means to lock said feeding means in its inoperative position said feeding means being rendered operative by the placing of lacing upon said work-support and in engagement with said locking means, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound.

36. A lace tipping machine having, in combination, a work-support, means normally inoperative to simultaneously feed and corrugate a strip of sheet material, means to lock said feeding and corrugating means in its inoperative position, said feeding and corrugating means being rendered operative by the placing of lacing upon said work-support and in engagement with said locking means, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound.

37. A lace tipping machine, having, in combination, a pair of rolls adapted to simultaneously feed and corrugate a strip of sheet material, means to yieldingly force one of said feed rolls against the sheet material located between said feed rolls, a work-support, means to disengage said yielding feed roll from said sheet material, means to lock said yielding feed roll out of engagement with said sheet material and thereby prevent said sheet material from being fed, means operated by the placing of said lacing upon said work-support, adapted to release said yielding feed roll and allow the same to again engage said sheet material, means to sever a piece of material from said strip, means to roll said piece around said lacing and means to subsequently sever said lacing and the material located therearound.

38. A machine for rolling sheet material around lacing, having, in combination, a work-support, means normally inoperative to feed a strip of sheet material, means to lock said feeding means in its inoperative position, said feeding means being rendered operative by the placing of lacing upon said work-support and in engagement with said locking means, means to sever a piece of material from said strip and means to roll said piece around said lacing.

39. A lace tipping machine having, in combination, a work-support, a pair of rolls adapted to feed a strip of sheet material, means to yieldingly force one of said feed rolls against sheet material located between said feed rolls, means to disengage said yielding feed roll from said sheet material, means to lock said yielding feed roll out of engagement with said sheet material and thereby prevent said sheet material from being fed, means operated by the placing of said lacing upon said work-support and in engagement with said locking means adapted to release said yielding feed roll and allow the same to again engage the sheet material, means to sever a piece of material from said strip and means to roll said piece around said lacing.

40. A machine of the class described having, in combination, mechanism to apply tipping material to lacing, means to supply said material and means controlled by a lacing to render said supplying means operative.

41. A machine of the class described having, in combination, means to apply tipping material to a lacing, means to supply said material, means to move the lacing to be tipped into operative position and means to control the supply of tipping material actuated by the movement of said lacing into said position.

42. A machine of the class described having, in combination, means to apply tipping

material to a lacing, means to supply said material, means to move the lacing to be tipped into operative position and means to automatically control the supply of tipping material actuated by the movement of said lacing into said position at a predetermined point.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CARL A. MATSON.

Witnesses:
FRANKLIN E. LOW,
HERMAN R. HOFFMAN.