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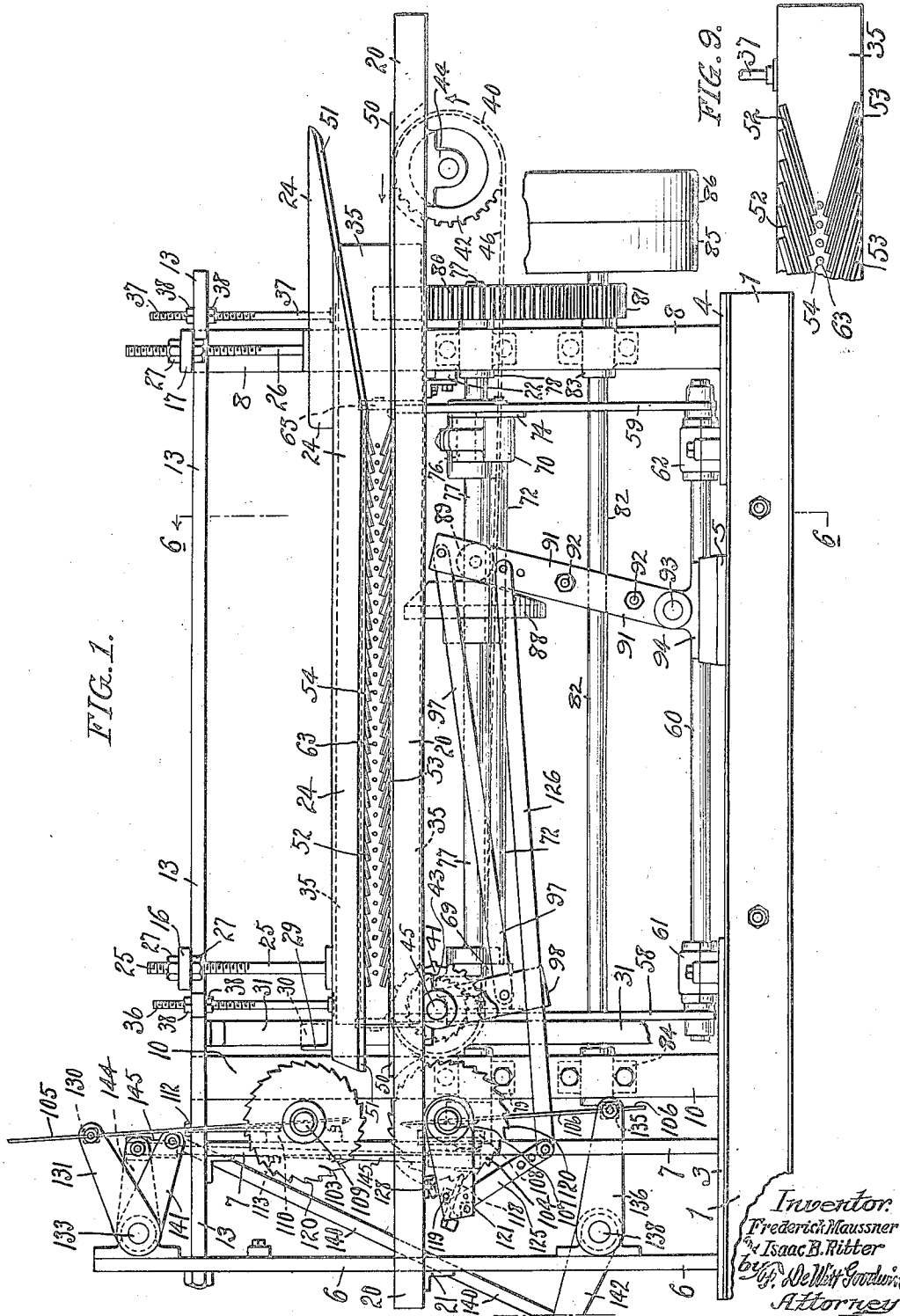
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F. MAUSSNER ET AL

EDGE FORMING MACHINE FOR SHEETS OF HAIR OR FIBER

Filed Dec. 22, 1921

4 sheets-sheet 1



Feb. 27, 1923.

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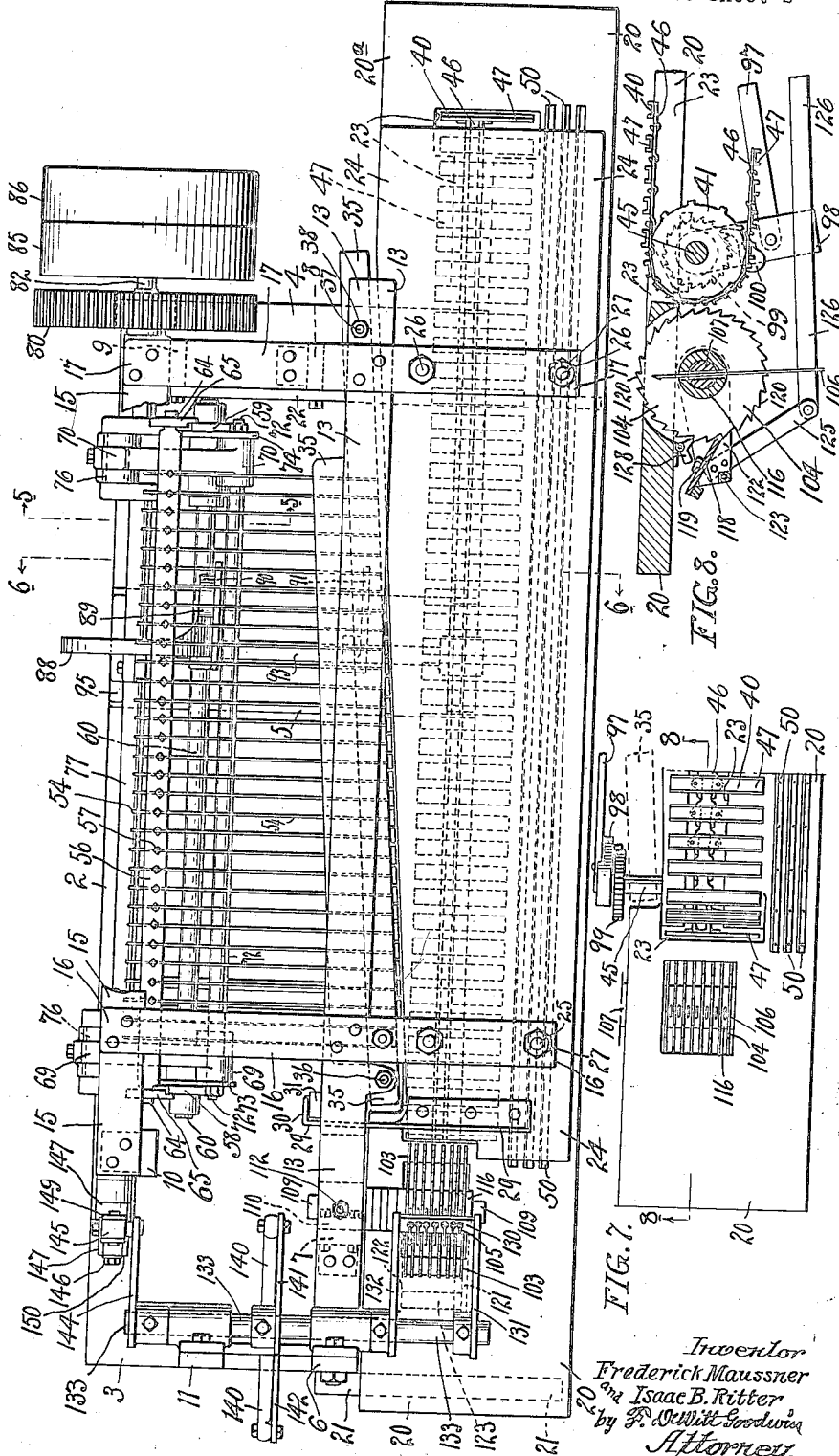
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EDGE FORMING MACHINE FOR SHEETS OF HAIR OR FIBER

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4 sheets-sheet 2

FIG. 2.



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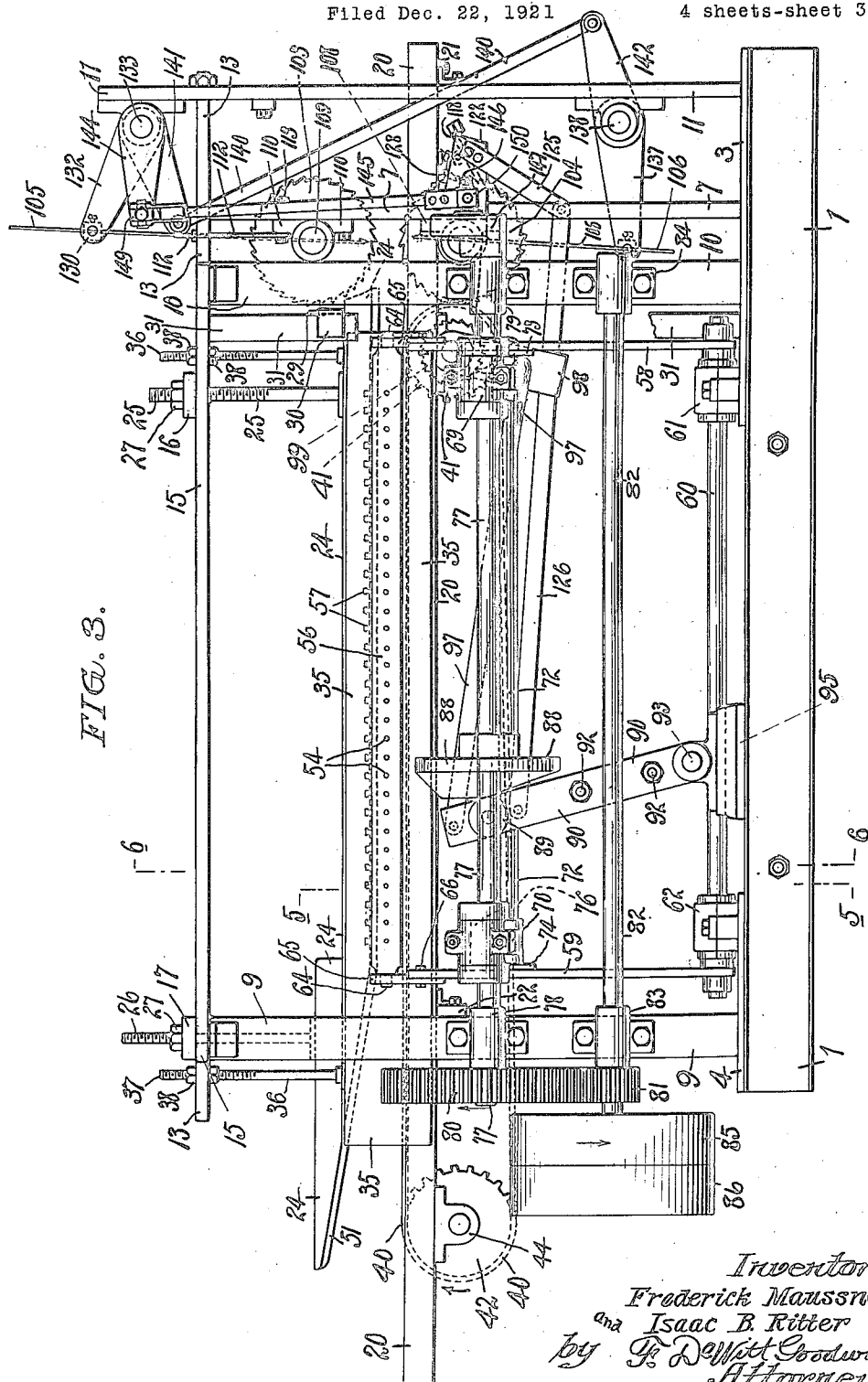
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EDGE FORMING MACHINE FOR SHEETS OF HAIR OR FIBER

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4 sheets-sheet 3



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EDGE FORMING MACHINE FOR SHEETS OF HAIR OR FIBER

Filed Dec. 22, 1921

4 sheets-sheet 4

FIG. 6.

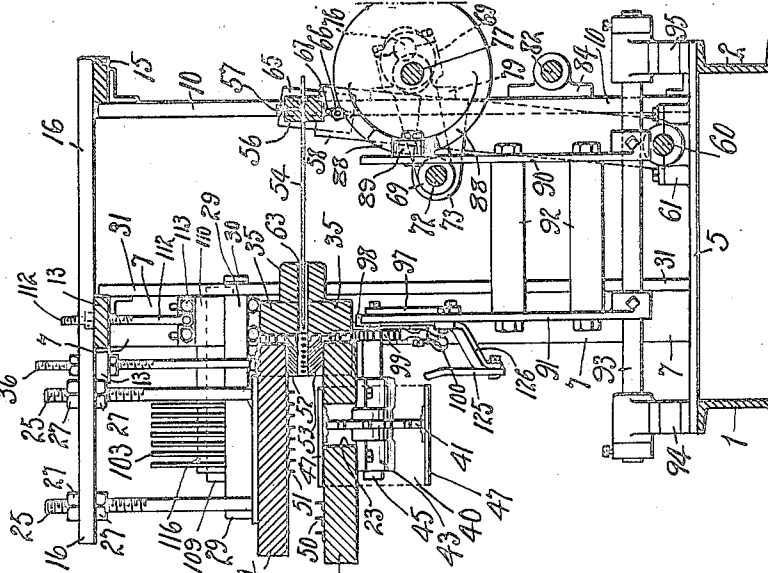


FIG. 5.

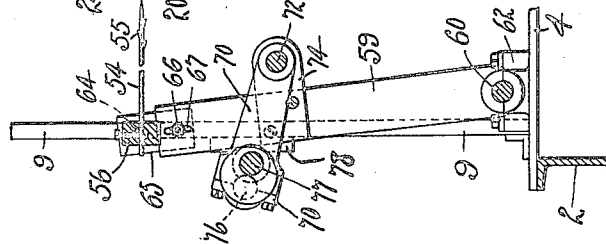
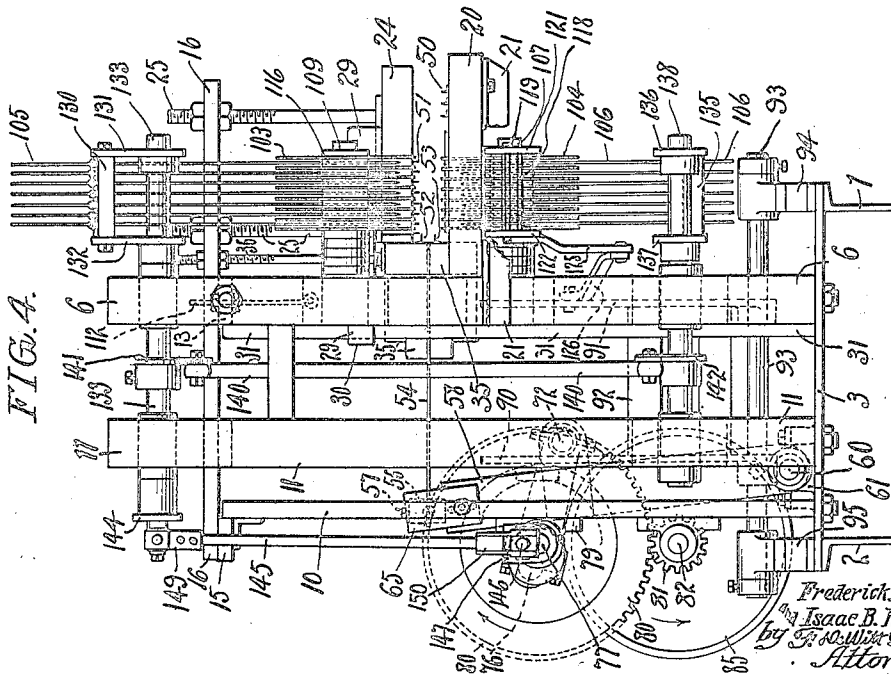


FIG. 4.



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UNITED STATES PATENT OFFICE.

FREDERICK MAUSSNER, OF COLLINGSWOOD, NEW JERSEY, AND ISAAC B. RITTER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO HENRY WILHELM COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

EDGE-FORMING MACHINE FOR SHEETS OF HAIR OR FIBER.

Application filed December 22, 1921. Serial No. 524,327.

To all whom it may concern:

Be it known that we, FREDERICK MAUSSNER, a subject of Germany, residing in the United States, at Collingswood, county of Camden, State of New Jersey, and ISAAC B. RITTER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in an Edge-Forming Machine for Sheets of Hair or Fiber, of which the following is a specification.

Our invention relates to a machine for forming a compact edge upon interlaced hair or vegetable fiber, which material has been formed into sheets, or into a continuous strip, upon a separate interlacing machine, through which machine the loose hair or fiber has been passed and interlaced by needles which are passed into the top or bottom surfaces of the material, to form it into a sheet of fabric having a sufficient strength of texture to adapt it to be used, when cut into blocks of the proper size, for fillings for mattresses and cushions. Interlacing machines for forming fabric of this character are well known in the art.

The present invention consists of a machine for interlacing the edges of interlaced goods. The edging machine is adapted to have the sheets of material placed therein and carried forward between guides by an endless conveyor belt.

The guides for the material comprise a table; a presser plate positioned above and parallel with the plane of the table; and a guide plate positioned vertically along the rear edge of the table. Both the table and the presser plate have guide ribs extending longitudinally therewith and parallel with the conveyor belt, which ribs prevent the sheet of material from being forced sidewise or at right angles to the conveyor belt, and insure the sheet or strip of material being carried in a straight line parallel with said conveyor belt when the edge, which is to be finished, is compressed against the vertical guide plate, which latter is positioned at an oblique angle to the length of travel of the conveyor belt, and which vertical guide plate gradually presses the edge of the goods more tightly as the goods pass through the machine and the fibers, of which the material is composed, are interlaced by needles ex-

tending horizontally through the vertical guide plate. Said needles reciprocate and pass into and out of the edge of the sheet or strip of material, interlacing the edge of the goods and giving the edge thereof a compact and smooth surface in place of the cut, or raw, edge, which the goods had before being passed through the edging machine; a further object of our invention is to provide the said vertical guide plate with converging strips or ribs secured upon the face of said guide plate, which strips direct the loose ends of hair, or fiber into the path of the row of horizontal needles, which latter push said ends of hair or fiber into the bulk of the material; a still further object of our invention is to provide vertical needles which enter the top and the bottom surfaces of the sheet of material after the said horizontal needles have operated upon the edge of the material. Said vertical needles have barbed ends which draw the strands of hair or fiber, as the vertical needles are withdrawn from the material and inter-lock the said strands with the strands which have been pushed into the edge of the material by the said horizontal needles. These together with various novel features of construction of the machine, and the operation thereof, constitute our invention which will be more fully hereinafter described and claimed.

Referring to the accompanying drawings:—Fig. 1, is a front elevation of edging machine; Fig. 2, is a plan view of Fig. 1; Fig. 3, is a rear elevation of the machine; Fig. 4, is an end elevation of the machine, looking towards the left hand end of the machine as shown in Fig. 1; Fig. 5 is a transverse vertical section, as on line 5—5 Fig. 2; Fig. 6, is a transverse vertical section as on line 6—6 Fig. 2; Fig. 7, is a plan view of a portion of the table upon which the material is carried through the machine; Fig. 8, is a vertical longitudinal section, as on line 8—8 Fig. 7, and Fig. 9, is a partial view in elevation of the vertical guide plate.

In the drawings, in which like reference characters refer to like parts, 1 and 2 are longitudinal frame members forming the base of the frame structure. Said frame members 1 and 2 are rigidly connected by cross-plates 3, 4 and 5. Upon the said cross-plates are secured posts, or upright frame

members 6, 7 and 8, shown in the front elevation Fig. 1; and posts 9, 10 and 11, shown in the rear elevation Fig. 3. The front posts 6—7 and 8 support a longitudinal brace member 13, and the rear posts 9 and 10 support a longitudinal brace member 15. Said brace members 13 and 15 are connected by top cross-pieces 16 and 17, all of which parts are rigidly connected and form the frame structure.

A table 20 is supported by a bracket 21 secured to the post 6 and by a bracket 22 secured to posts 8 and 9. A presser plate 24 is suspended above the table 20, and in spaced relation thereto, by bolts 25 and 26. The upper ends of said bolts pass freely through apertures formed in the top cross-pieces 16 and 17 and are adjustable, vertically, by the nuts 27 upon the threaded portions of said bolts. Said presser plate 24 is held against lateral movement, due to the side pressure upon the edge of the material as it passes through the machine, by a brace plate 29 having one end secured to the presser plate 24 and its opposite end which is provided with a turned end portion 30, extends around a vertical guide post 31, secured to the cross plate 3 at its lower end and to the longitudinal brace member 13 at its upper end, the brace plate 29 is free to move vertically to permit of vertical adjustment of the presser plate 24.

A vertical guide plate 35 is positioned at the rear edge of the table 20 and also of the presser plate 24. Said guide plate 35 extends at an oblique angle to the length of the table 20, and presser plate 24, which latter parts 20 and 24 have portions of their rear edges cut on lines extending parallel with the vertical guide plate 35.

Said vertical guide plate 35 is suspended by bolts 36 and 37 which freely pass through apertures formed through the longitudinal brace member 13, and are adjustably secured by nuts 38 upon the threaded portions of said bolts, whereby the guide plate 35 may be adjusted vertically.

A conveyor belt 40 is mounted upon the table 20. Said belt passes around sprocket wheels 41 and 42 mounted in bearings 43 and 44 secured to the under side of the table 20. The sprocket wheel 41 is rotated, by mechanism hereinafter described, which moves the belt 40 in the direction of the arrow Fig. 1. The conveyor belt is formed of a sprocket chain 46, having channel plates 47 secured thereon extending transversely of each link of the sprocket chain. The table 20 is provided with a longitudinal slot 23 for the sprocket chain to occupy. The ends of said channel plates 47 are adapted to extend beyond the edges of said slot 23 and rest upon the table 20, as shown in Figs. 6—7 and 8. The said slot 23 is extended in width immediately above the

sprocket wheels 41 and 42, so that the channel plates 47 may pass through the table 20 and thus permit the belt 40 to pass around said sprocket wheels.

The strip or sheet of material to be treated is laid upon the table 20 so that the conveyor belt 40 will carry the sheet of material over the table 20, in the direction of the arrow, Fig. 1, and compress the top and bottom surfaces thereof between the table 20 and the presser plate 24. The table 20 and the presser plate 24 are each provided with guide ribs 50 and 51, in the form of angle plates with up standing edges running parallel with the conveyor belt 40. The material is placed upon the table so that the edge of the sheet, to be finished, is adjacent to the inner edge 20^a of the table 20, (see Fig. 2), and as the material is carried along the table by the conveyor belt 40, the edge of the sheet of material will come in contact with the vertical guide plate 35, which latter will gradually press, or bank up the edge of the sheet into a firm and compact form, due to the fact that the sheet of material is held by the longitudinal guides 50 secured to the upper face of the table 20 and the guides 51 secured to the under face of the presser plate 24, which insure the bulk or sheet of material being carried through the machine in a line parallel with the conveyor belt 40 and it will not be forced out of its line of travel by the action of the obliquely positioned vertical guide plate 35, or by the action of the horizontal needles as they are forced into the edge of the sheet of material, as hereinafter described.

A row of needles 54 is provided for acting upon the edge of the sheet of material as it passes through the machine for interlacing the hairs or fibers of the material. Said needles are provided with triangular end portions having small projections 55 which tend to force the strands of material into the bulk of material (see Fig. 5). Said needles 54 extend through apertures 63 formed through the vertical guide plate 35 and are reciprocated by a needle bar 56 to which the rear end of each needle is secured by a set-screw 57.

The needle bar 56 is mounted between arms 58 and 59 secured to a shaft 60 mounted in bearings 61 and 62, secured to the frame of the machine. The needle bar 56 is provided at either end with stud shafts 64 which are loosely mounted in the arms 58 and 59 to allow the needle bar to rock on the stud shafts as the arms reciprocate, thus preventing the bending of the needles. The arms 58 and 59 are each provided with a plate 65, slidably mounted upon the said arms and secured by a bolt 66, extending through an elongated slot 67 in the arm, (see Fig. 5). This construction permits the arms to be adjusted to various lengths to

correspond with any adjustment made in the vertical guide plate 35, through which the needles freely pass.

The purpose of the vertical adjustment of the guide plate 35 is to bring the row of needles 54 in the center, or midway between the table 20 and the presser plate 24, which latter parts are adjusted in relation to each other to accommodate sheets of material of different thicknesses.

The arms 58 and 59, carrying the needle bar 56 are reciprocated by two connecting rods 69 and 70, each being pivotally connected to a shaft 72, secured to the bearing plates 73 and 74, which in turn are secured to the arms 58 and 59. The opposite ends of said connecting rods 69 and 70 embrace crank shafts 76 formed upon the shaft 77, which is mounted in the bearings 78 and 79 secured to the upright posts 9 and 10. This shaft 77 is rotated by a gear-wheel 80, secured thereon, which meshes with a pinion 81 on a drive shaft 82, mounted in bearings 83 and 84, also secured to said posts 9 and 10. The drive shaft 82 is provided with tight and loose belt wheels 85 and 86 for operating the machine.

The conveyor belt 40 is advanced intermittently by mechanism operated by a cam 88, secured upon the shaft 77, which cam 88 is so positioned upon said shaft that the conveyor belt 40 will be advanced when the row of needles 54 are withdrawn from the material and the conveyor belt will be at rest when the needles 54 are engaging the material. The mechanism for advancing the conveyor belt 40 consists of the said cam 88, which engages a roller 89, rotatably mounted on an arm 90, of a rock-frame consisting of said arm 90 and an arm 91 secured by a cross-piece 92. Said rock-frame is mounted on a shaft 93 rotatably mounted in bearings 94 and 95 secured to the frame structure. The arm 91 of said rock-frame has pivotally connected therewith a connecting rod or bar 97 having its opposite end pivotally connected with an arm 98, loosely mounted upon the shaft 45, carrying the sprocket wheel 41, over which wheel 41 the conveyor belt 40 passes. Upon the shaft 45 is secured a ratchet wheel 99, (see Figs. 6, 7 and 8). A pawl 100 is pivotally mounted on the arm 98 and engages the ratchet wheel 99 and imparts an intermittent motion to the conveyor belt 40 through the sprocket wheel 41, secured to the shaft 45.

The vertical guide plate 35 is provided with rows of ribs 52 and 53, in the form of angle plates secured to the front face of the guide plate 35. Said rows of ribs 52 and 53 are positioned upon the guide plate 35 above and below the row of horizontal needles 54. Said ribs 52 and 53 are inclined at opposite angles in relation to the line extending

through the horizontal row of needles 54. The ribs 52 of the upper row converge with the ribs 53 of the lower row, and said ribs terminate adjacent to the needles 54. As the material is carried through the machine by the conveyor belt 40, the edge of the sheet or strip of material comes in contact with the vertical guide plate 35, as above described, and the object of the rows of ribs 52 and 53 is to turn the projecting hairs and fibers inwardly or towards the line of the needles 54, so that the needles engage the turned hairs or fibers and force them into the bulk of the sheet or strip of material and thus form a smooth and even surface upon the edge of the material.

When the material has been thus treated by the horizontal needles 54, the material passes from under the presser plate 24 and passes between the disks 103 and 104 which come in contact with the upper and lower surfaces of the sheet or strip of material and hold the same compressed while the material is being further treated by the vertical needles 105 and 106 which pass into the material at right angles to the line of the horizontal row of needles 54. The vertically operating needles now draw the strands of hair or fiber vertically which have previously been pushed horizontally into the bulk of material, the result being to interlock the horizontal strands of hair or fiber by drawing them up or down by the vertically acting needles, thus forming a compact and finished edge upon the sheet of material which will retain its shape and compact formation.

The lower row of disks 104 are rotatably mounted upon a shaft 107, rigidly secured in a bearing 108, which in turn is secured to the upright post 7. The disks 103 of the upper row are rotatably mounted upon a shaft 109 rigidly secured in a bearing 110, which is adjustable vertically upon the post 7 by bolts 112 and 113. The said disks are held in spaced relation to each other by collars 116 provided with holes which align with holes formed through the shafts 107 and 109 for the free passage of the vertical needles 105 and 106. The upper disks 103 turn freely upon the shaft 109 as the material passes under said disks. The lower disks 104 are driven or rotated by a pawl 118, which engages the teeth 120 of the disks, for the purpose of feeding the material between the upper and lower rows of disks. The pawl 118 is in the form of a plate of sufficient width to engage all of the disks 104. Said pawl 118 is pivoted on the pivot shaft 119, carried by a frame consisting of side arms 121 and 122 loosely pivoted upon the shaft 107 and connected by a cross brace 123. An extension plate 125 is rigidly secured to the arm 122, having its outer end pivotally connected with a bar 126 which is

pivotally attached to the arm 91 of the reciprocating frame operated by the cam 88, above described. By this arrangement the disks 104 are rotated intermittently and in unison with the movements of the conveyor belt 40. The disks 104 are held against rotating in the reverse direction by pawls 128, pivotally mounted upon the underside of the table 20. There is a separate pawl 128 for each of the disks 104. The disks 103 and 104 are each provided with teeth 120 or projections upon their peripheries which enter the sheet or strip of material and insure the disks feeding the material properly by preventing the disks from slipping in relation to the material. The teeth in the lower disk also form places for the engagement of the pawls 118 and 128, above described. It has been found that better feeding of the material is obtained by having teeth formed in the disks 103 of the upper or pressure row of disks as well as in the lower row of disks 104, which latter are driven by the mechanism above described.

The vertical needles 105 and 106 are reciprocated and caused to pass into and be withdrawn from the material from above and below the latter in the following manner. The needles 105 are secured in a bar 130 having its ends pivotally mounted in arms 131 and 132 which project from a rock shaft 133 to which they are secured. The lower row of needles 106 is secured to a bar 135, pivotally mounted in arms 136 and 137, secured to a rock-shaft 138. The opposite ends of the needles are guided by the shafts 107 and 109 having holes formed there-through for the free passage of the needles. The rock-shafts 133 and 138, for actuating the upper and lower rows of needles, are connected by a connecting rod 140 having its ends pivotally attached to arms 141 and 142, secured upon said rock-shafts 133 and 138 respectively. Said arms 141 and 142 are positioned upon said shafts so as to project in opposite directions thereby reversing the direction of movement of said shafts, causing the upper and lower needles to enter the material simultaneously, and to be withdrawn simultaneously. The rock-shaft 133 is reciprocated by an arm 144 secured to the rear end thereof. A connecting rod 145 is pivotally connected with the free end of said arm 144 and the opposite end of the connecting rod is connected with a crank pin 146 on the crank arm 147, secured to the above mentioned shaft 77. The crank arm 147 is provided with a radial groove in which is slidably mounted a head carrying the said crank pin 146, whereby the stroke of the needles 105 and 106 may be lengthened or shortened by securing the crank pin 146 at various radial positions upon the crank arm 147. Universal joints 149 and 150 are provided at either end of the connecting rod

145 so that the latter will impart a reciprocatory motion to the rock-shaft 133 from the continuously rotating shaft 77, driven by the gear-wheels 80 and 81 from the drive shaft 82.

The rock-shaft 133 forces the upper row of needles 105 downwardly into the material at the same time that the rock-shaft 138 forces the lower row of needles 106 upwardly into the material. The needles are provided with barbs or hooks at their ends which draw the strands of hair or fiber out of the body of the material as the needles are withdrawn. The rows of disks 103 and 104 are located adjacent to the needles and exert pressure upon the upper and lower surface of the bulk of the material and thus hold the material so that the barbed needles may withdraw a few strands from the bulk of material, thus interlacing the strands with the strands which have been pushed horizontally into the edge of the bulk of material by the horizontally positioned needles 54 above described. The needles 54 and the needles 105 and 106 are withdrawn from the material simultaneously, and when in the withdrawn position the cam 88 actuates the conveyor belt 40 and also the lower row of disks 104 and thus advances the material a short distance; and when it comes to rest, the needles again enter the material, and the various operations are repeated as the material passes through the machine thus forming an edge upon the sheet or strip of material which will have a finished surface and the edge of the material will be firm and compact and will retain its shape, making the material suitable for fillings for mattresses, cushions and the like.

Having thus described our invention, we claim and desire to secure by Letters Patent:—

1. A frame structure, guide members mounted upon the frame structure forming a channel through which material to be treated may be passed, a needle operatively mounted upon said frame structure and positioned in the plane of the said channel formed between the said guide members, and mechanism for reciprocating the needle whereby it will enter the edge of the sheet of material as it is passed through the said channel.

2. A frame structure, parallel guide members, supported by the frame structure, feeding mechanism for feeding a sheet or strip of material through the channel formed between the said guide members, a needle positioned in the plane of the said channel formed between the said guide members and mechanism for reciprocating the needle whereby it will enter the edge surface of the sheet or strip of material.

3. A machine comprising feeding mechanism for advancing a sheet of material

through the machine, a needle mounted in the machine in a plane parallel with the sheet of material, and adapted to extend into the edge of the sheet of material, a needle

5 mounted in the machine and positioned at approximately right angles to the length of the first mentioned needle, and mechanism for reciprocating the needles.

4. A machine comprising feeding mechanism for advancing a sheet of material through the machine, a needle mounted in the machine in a plane parallel with the sheet of material and adapted to extend into the edge of the sheet of material and arrange strands of the material parallel with the length of the needle, a second needle mounted in the machine and positioned at approximately right angles to the first mentioned needle, and in alignment with the

20 line of travel of the portion of the sheet of material previously acted upon by the first mentioned needle, and mechanism for reciprocating the said needles.

5. A frame structure, guide members mounted upon the frame structure forming a channel through which material to be treated may be passed, adjusting devices by which the position of the guide members may be varied in relation to each other to

30 accommodate sheets of material of different thicknesses, a needle operatively mounted upon said frame structure and adapted to enter the edge of the sheet of material, and mechanism for reciprocating the needle.

6. A frame structure, guide members mounted upon the frame structure forming a channel through which material to be treated may be passed, a row of needles operatively mounted upon said frame structure, said row of needles positioned in a

40 plane parallel with the line of travel of the material through said channel, said needles arranged so that the points of the needles will terminate in an oblique line in relation to the line of travel of the material whereby each successive needle will be in advance of the first needles to act upon the material as the latter advances through the channel formed between the guide members, and

50 mechanism for reciprocating the row of needles.

7. A frame structure, guide members mounted upon the frame structure forming a channel through which material to be treated may be passed, mechanism for advancing the sheet of material through the said channel in a line parallel with the length of the guide members, a plate positioned at an oblique angle with the length

60 of the said guide members, and forming an oblique surface against which one edge of the sheet of material is gradually pressed into compact form as said sheet of material is advanced through the said channel, needles operatively mounted upon the frame

structure adapted to enter and interlace the material and form an edge of compact form upon the sheet of material, and mechanism for reciprocating the said needles.

8. A frame structure, a table supported upon said frame structure upon which a sheet of material to be treated is placed and advanced lengthwise of the table, a needle operatively mounted upon the frame structure and positioned in a plane approximately parallel with the top surface of the table, and mechanism for reciprocating the needle whereby it will enter the edge of the sheet of material.

9. A frame structure, a table supported upon said frame structure upon which a sheet of material to be treated is placed and advanced lengthwise of the table, a presser plate mounted upon the frame structure and positioned above the table forming a guide for the sheet of material, a needle operatively mounted upon the frame structure and adapted to enter the edge of the sheet of material as it passes between the table and the presser plate, and mechanism for reciprocating the needle.

10. A frame structure, a table supported upon the frame structure, conveyor mechanism for advancing a sheet of material lengthwise of the table, a presser member mounted upon the frame structure above the table for compressing the material as it is advanced over the table, a vertical guide plate mounted upon the frame structure, said guide plate extending at an oblique angle to the length of the table and against which the edge of the sheet of material is compressed as it is advanced lengthwise of the table, a needle positioned horizontally and adapted to enter the edge of the sheet of material, and mechanism for operating the needle.

11. A frame structure, a table supported upon the frame structure, conveyor mechanism for advancing a sheet of material lengthwise of the table, a presser member mounted upon the frame structure above the table for compressing the material as it is advanced over the table, said table and said presser member having their rear edges extending at an oblique angle in relation to the line through which the material is advanced by the conveyor mechanism a vertical guide plate mounted upon the frame structure and positioned parallel with the said rear edges of the table and the presser member and against the face of which vertical guide member the edge of the sheet of material will be gradually compressed as it is advanced over the table, a needle operatively positioned upon the frame structure and adapted to enter the edge of the sheet of material, and mechanism for operating the needle.

12. A frame structure, a table supported

thereon, a conveyor belt having a portion thereof passing over the table, a presser plate suspended above the table, a longitudinal rib secured to the under side of the presser plate adapted to engage the top surface of a sheet of material as it is carried by the conveyor belt and hold the material against movement at right angles to the line of travel with the conveyor belt, a vertical guide plate positioned obliquely in relation to the length of the conveyor belt and adapted to compress the edge of the sheet of material as it is advanced, and reciprocating needles mounted upon the frame structure adapted to operate upon the material while compressed and form a compact edge upon the sheet of material.

13. A frame structure, a table supported thereon, a conveyor belt having a portion thereof passing over the table, a presser plate suspended above the table, a vertical guide plate positioned obliquely in relation to the length of the conveyor belt and adapted to compress the edge of the sheet of material as it is advanced, a needle adapted to extend into the edge of the sheet of material, said guide plate having an aperture formed through the same for the free passage of the needle and in which the needle is guided, and mechanism for reciprocating the needle.

14. A frame structure, a table supported thereon over which a sheet of material is advanced, a presser plate adjustably suspended above the table for compressing the sheet of material, a vertical guide plate mounted upon the frame structure and positioned adjacent to the table to form a guide for the edge of the sheet of material, said guide plate having an aperture formed through the same, a needle extending through the said aperture formed in the vertical guide plate and adapted to enter the edge of the sheet of material, an adjusting device for raising and lowering the said vertical guide plate to bring the needle midway between the table and the presser plate, and means for reciprocating the needle.

15. A frame structure, mechanism arranged upon the frame structure for supporting and advancing a sheet of material, a guide plate mounted upon the frame structure and positioned adjacent to the middle edge of the sheet of material, a needle extending through the guide plate and adapted to enter the edge of the sheet of material, ribs projecting from the face of the guide plate and positioned upon the guide plate so as to direct the material towards the point of entry of the said needle, and means for reciprocating the needle.

16. A frame structure, mechanism arranged upon the frame structure for supporting and advancing a sheet of material,

a guide plate mounted upon the frame structure and positioned adjacent to the edge of the sheet of material, said guide plate having apertures formed through the same, a row of needles mounted in alignment with the length of the sheet of material and adapted to extend through the said apertures formed through the guide plate and enter the edge of the sheet of material, ribs projecting from the face of the guide plate, said ribs arranged in two rows, the ribs of one row forming angles with the ribs of the other row and having the apices of the angles on the line of the said row of needles whereby the material passing along the face of the guide plate will be directed towards the point of entry of the needles into the edge of the material, and mechanism for reciprocating the needles.

17. A frame structure, mechanism arranged upon the frame structure for supporting and advancing a sheet of material, a guide plate mounted upon the frame structure and positioned adjacent to the edge of the sheet of material, a row of needles extending through said guide plate and adapted to extend into the edge of the sheet of material, angle-plates secured upon the face of the guide plate forming ribs, said ribs arranged upon the guide plate in V-shaped formation with the apices of the angles formed by said ribs located adjacent to the said row of needles whereby the material will be directed towards the needles, as it passes along the face of the guide plate, and mechanism for operating the needles.

18. A machine for interlacing material comprising mechanism for advancing the material through the machine, a member having converging guide ribs positioned so as to engage the edge of the sheet of material and turn the strands of said material into the apex of the angle formed by the said guide ribs, a needle adapted to extend into the edge of the sheet of material adjacent to the apex of the angle formed by said ribs and interlace the strands of the material as it is advanced through the machine, and mechanism for reciprocating the needle.

19. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle, a needle bar in which the shank of the needle is secured, a guide mounted upon the frame structure through which said needle passes and is directed into the edge of the sheet of material, and mechanism for reciprocating the needle bar.

20. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle, a needle bar in which the shank of the needle is secured, a guide mounted upon the frame structure through which said needle passes

and is directed into the edge of the sheet of material, arms in which the needle bar is pivotally mounted, bearings upon the frame structure in which the arms are pivoted and mechanism for reciprocating the said arms.

21. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle, a needle bar in which the shank of the needle is secured, a guide mounted upon the frame structure through which said needle passes and is directed into the edge of the sheet of material, arms pivotally mounted upon the frame structure, bearing plates upon said arms in which the needle bar is mounted, adjusting devices for securing said bearing plates upon said arms for varying the length of said arms, and mechanism for reciprocating said arms.

22. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle, a needle bar in which the shank of the needle is secured, a guide mounted upon the frame structure through which said needle passes and is directed into the edge of the sheet of material, adjusting devices for varying the position of the said guide in relation to the sheet of material, and mechanism for reciprocating the needle.

23. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle, a needle bar in which the shank of the needle is secured, a guide mounted upon the frame structure through which said needle passes and is directed into the edge of the sheet of material, rods secured to said guide, fastening devices for adjustably supporting the rods upon the frame structure for varying the position of the guide in relation to the sheet of material, and mechanism for operating the said needle-bar.

24. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle positioned so as to enter the edge of the sheet of material, a needle bar in which said needle is secured, arms carrying the needle bar, a rock-shaft to which said arms are secured, bearings upon the frame structure in which said rock-shaft is mounted, and mechanism for reciprocating said arms.

25. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle positioned so as to enter the edge of the sheet of material, a needle bar in which said needle is secured, arms carrying the needle bar, a rock shaft to which said arms are secured, bearings upon the frame structure in which said rock-shaft is mounted, a shaft rotatably mounted in the frame structure, mechanism

operated by the last mentioned shaft for imparting a reciprocating motion to the said arms, and driving mechanism for rotating the last mentioned shaft.

26. A machine comprising a frame structure, mechanism for carrying and advancing a sheet of material, a needle positioned so as to enter the edge of the sheet of material, a needle bar in which said needle is secured, arms carrying the needle bar, a rock-shaft to which said arms are secured, bearings upon the frame structure in which said rock-shaft is mounted, a shaft rotatably mounted in the frame structure, a crank-shaft formed upon said last mentioned shaft, a connecting-rod actuated by the said crank shaft and pivotally connected with one of said arms for imparting a reciprocating motion to said needle-bar, and mechanism for rotating the said shaft carrying the crank-shaft.

27. A frame structure, a table supported upon the frame structure, a conveyor belt having a portion thereof passing lengthwise over the table for advancing a sheet of material lengthwise of the table, wheels around which the conveyor belt passes, a shaft to which one of said wheels is secured, a ratchet-wheel secured to said shaft, an arm loosely mounted upon said shaft, a pawl upon said arm for engaging the ratchet wheel, a shaft rotatably mounted in the frame structure, a cam upon said last mentioned shaft for imparting a reciprocating motion to the arm carrying the pawl for advancing the conveyor belt, a needle operatively mounted upon the frame structure and adapted to enter the edge of the sheet of material upon the table, mechanism for reciprocating the said needle actuated by the shaft carrying the said cam for advancing the conveyor belt, and said cam being positioned upon the shaft so as to advance the conveyor belt when the needle is withdrawn from the material.

28. A frame structure, a table supported upon the frame structure, an endless sprocket chain, said table having a longitudinal recess formed therein along which a portion of the length of the sprocket chain is adapted to pass, cross-pieces secured to the sprocket chain adapted to slide upon the table, mechanism for intermittently advancing the sprocket chain for carrying a sheet of material along the table, needles operatively mounted upon the frame structure adapted to enter the sheet of material and mechanism for operating the needles.

29. A frame structure, a table supported upon the frame structure, an endless sprocket chain, said table having a longitudinal recess formed therein along which a portion of the length of the sprocket chain is adapted to pass, cross-pieces secured to the

sprocket chain adapted to slide upon the table, said cross-pieces having ribs formed upon their upper surfaces for engaging material adapted to be advanced along the table by the sprocket chain, mechanism for advancing the sprocket chain, a presser plate mounted upon the frame structure adapted to hold the material upon the table and the said cross-pieces of the sprocket chain, needles operatively mounted upon the frame structure, and mechanism for operating the needles.

30. A frame structure, a table supported upon the frame structure, an endless conveyor belt having a portion thereof adapted to pass lengthwise over the table, a presser plate mounted upon the frame structure and adapted to form a channel in relation to the surface of the table through which a sheet of material is advanced by the conveyor belt, a series of longitudinally positioned ribs secured upon the under side of the presser plate for engaging the top surface of the material as it is advanced by the conveyor belt and hold the material against sidewise movement, a needle adapted to enter the edge of the sheet of material as the material is advanced by the conveyor belt and mechanism for operating the said needle.

31. A frame structure, shafts mounted upon the frame structure, disks mounted upon each of said shafts, mechanism for rotating the disks of one of said shafts for advancing a sheet of material between the last mentioned disks and the disks mounted upon the other one of said shafts, needles positioned upon opposite sides of the sheet of material adapted to extend between said disks and enter opposite surfaces of the sheet of material, and mechanism for reciprocating the needles.

32. A frame structure, shafts mounted upon the frame structure, disks mounted upon each of said shafts, mechanism for rotating the disks of one of said shafts for advancing a sheet of material between the last mentioned disks and the disks mounted upon the other one of said shafts, adjusting means for varying the distance between said shafts to accommodate sheets of material of various thicknesses, needles positioned upon opposite sides of the sheet of material adapted to extend between said disks and enter the sheet of material from opposite sides thereof, and mechanism for reciprocating the needles.

33. A frame structure, a shaft mounted upon the frame structure, disks mounted upon the shaft, projections formed upon the peripheries of said disks, a pawl adapted to engage the projections upon the disks and rotate the latter for feeding material, mechanism for imparting an intermittent motion to said pawl, a device for pressing the ma-

terial against the periphery of said disks, needles adapted to enter the material as it passes adjacent to the disks, and mechanism for reciprocating the needles.

34. A frame structure, a table mounted upon the frame structure, said table having an opening through the same, disks mounted upon the frame structure with their peripheries extending through the opening formed through the table for engaging and feeding material along the table, mechanism for imparting an intermittent motion to said disks, a device for pressing the material against the periphery of the disks, needles positioned in alignment with the spaces formed between said disks, and mechanism for reciprocating the needles whereby they will enter the material adjacent to the periphery of the disks.

35. A frame structure, a table mounted upon the frame structure, said table having an opening through the same, disks mounted upon the frame structure with their peripheries extending through the opening formed through the table for engaging and feeding material along the table, mechanism for imparting an intermittent motion to said disks, disks rotatably mounted upon the frame structure above the first mentioned disks for pressing the material upon the lower disks, needles positioned above and below the material and adapted to enter the same from opposite sides thereof adjacent to the points of contact of the said disks and mechanism for reciprocating the needles.

36. A frame structure comprising upright posts, brackets extending from said posts, a table having its opposite ends secured upon said brackets, a presser plate mounted upon the frame structure and immediately above the table forming with the table a channel open along the front edges of the table and of the presser plate whereby one edge of a wide sheet of material may be inserted and compressed between the table and the presser plate, mechanism for advancing the sheet of material longitudinally of the table and the presser plate, a guide plate mounted upon the frame structure adapted to form the rear wall of the said channel and against which the rear edge of the material may be compressed, needles positioned in a plane parallel with the surface of the table, and mechanism for reciprocating the needles for interlacing the edge of the sheet of material.

37. A frame structure, a table mounted upon the frame structure, a presser plate mounted upon the frame structure, a guide plate mounted upon the frame structure forming the rear vertical wall of a channel formed between the table and the presser plate, said channel being open along the front edge of the table, a conveyor belt for advancing a sheet of material through the

said channel lengthwise of the table, needles positioned horizontally and adapted to entering the edge of the sheet of material, needles positioned vertically and adapted to enter the sheet of material at right angles to the plane of the first mentioned needles, and mechanism for reciprocating the needles.

38. A frame structure, a table mounted upon the frame structure, a presser plate mounted upon the frame structure, a guide plate mounted upon the frame structure forming the rear vertical wall of a channel formed between the table and the presser plate, said channel being open along the front edge of the table, a conveyor belt for advancing a sheet of material through the said channel lengthwise of the table, said guide plate positioned at an oblique angle in relation to the line of advancement of the material by the conveyor belt for gradually increasing the pressure against the edge of the sheet of material as it is advanced, needles positioned horizontally and adapted to enter the edge of the sheet of material, needles positioned vertically and adapted to enter the sheet of material at right angles to the plane of the first mentioned needles, and mechanism for reciprocating the said needles.

39. A frame structure, a table mounted upon the frame structure, a presser plate mounted upon the frame structure, a guide plate mounted upon the frame structure forming the rear vertical wall of a channel formed between the table and the presser plate, said channel being open along the front edge of the table, a conveyor belt for advancing a sheet of material through the said channel lengthwise of the table, said guide plate positioned at an oblique angle in relation to the line of advancement of the material by the conveyor belt for gradually increasing the pressure against the edge of the sheet of material as it is advanced, needles positioned horizontally, and adapted to extend through apertures formed in the said guide plate and enter the edge of the sheet of material a needle bar in which the shank of each needle is secured, said needle bar extending parallel with the length of the said conveyor belt, said needles being positioned in the needle bar so that the points of the needles will terminate in a line parallel with the face of the said guide-plate, mechanism for reciprocating the needle bar, needles positioned vertically and adapted to enter the sheet of material at right angles to the plane of the first mentioned needles, and mechanism for reciprocating the vertically positioned needles.

40. A frame structure, a table mounted

upon the frame structure, a presser plate mounted upon the frame structure, a guide plate mounted upon the frame structure forming the rear vertical wall of a channel formed between the table and the presser plate, said channel being open along the front edge of the table, a conveyor belt for advancing a sheet of material through the said channel lengthwise of the table, needles positioned horizontally and adapted to enter the edge of the sheet of material, rows of disks mounted upon the frame structure between which rows of disks the sheet of material passes, said disks being located at the end of the conveyor belt and adapted to receive the material as it is delivered by the conveyor belt, vertically positioned needles adapted to enter the top and bottom surfaces of the sheet of material as it passes between the said disks, and mechanism for reciprocating the said needles.

41. A frame structure, a table mounted upon the frame structure, a presser plate mounted upon the frame structure, a guide plate mounted upon the frame structure forming the rear vertical wall of a channel formed between the table and the presser plate, said channel being open along the front edge of the table, a conveyor belt for advancing a sheet of material through the said channel lengthwise of the table, needles positioned horizontally and adapted to enter the edge of the sheet of material, a needle bar in which said needles are secured, a drive shaft rotatably mounted in the frame structure, mechanism for imparting a reciprocating motion from the said drive shaft to the needle bar, a cam upon said shaft, mechanism operated by the cam for advancing the conveyor belt, rows of disks mounted upon the frame structure between which the sheet of material passes when discharged from the conveyor belt, mechanism operated by said drive shaft for rotating the disks of one of the rows of disks, vertically positioned needles adapted to enter the top and bottom surfaces of the sheet of material as it passes between the rows of disks, upper and lower needle bars in which said vertical needles are secured, arms pivotally mounted in the frame structure carrying the upper and lower needle bars, a connecting rod operatively connecting the upper and lower needle bars, a crank arm upon the drive shaft operatively connected with the said upper and lower needle bars for reciprocating the vertically positioned needles.

In testimony whereof we affix our signatures.

FREDERICK MAUSSNER.
ISAAC B. RITTER,