Feb. 25, 1936. F. N. ROSS ET AL 2,031,905

SEWING MACHINE MECHANISM

Filed Dec. 3, 1931 9 Sheets-Sheet 1

Fig. 1

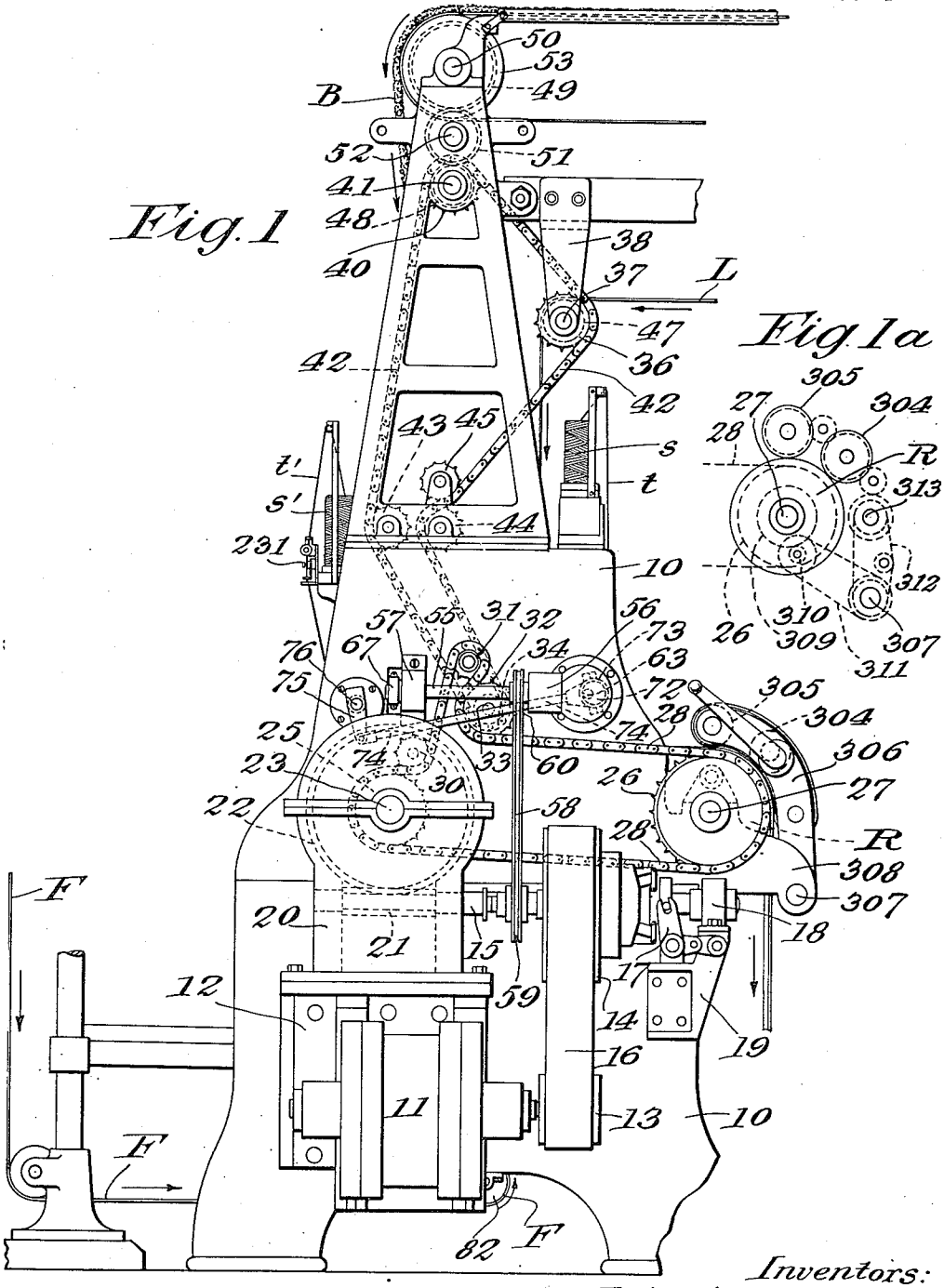

Fig. 1a

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Feb. 25, 1936. F. N. ROSS ET AL 2,031,905

SEWING MACHINE MECHANISM

Filed Dec. 3, 1931 9 Sheets-Sheet 2

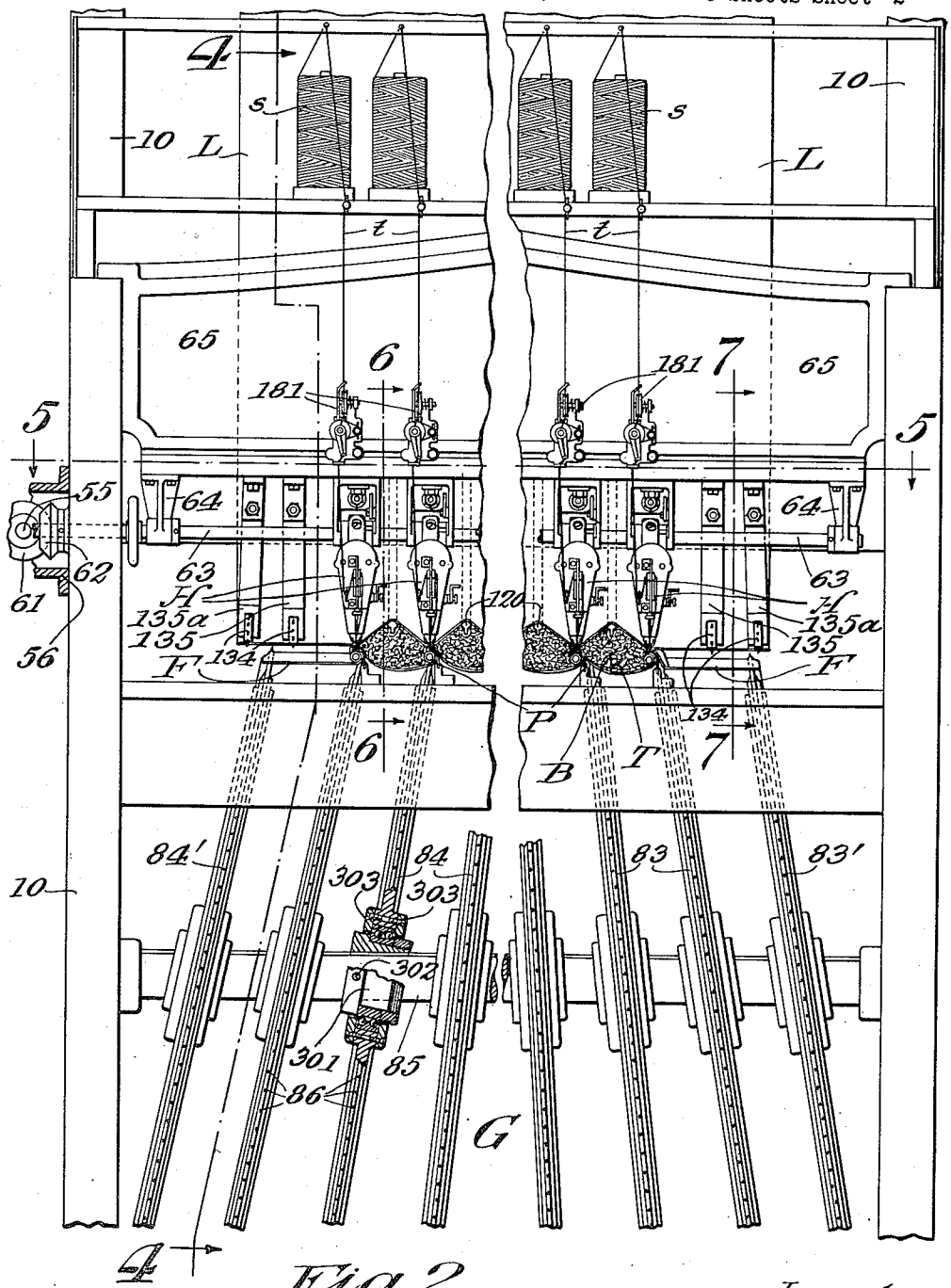

Fig. 2

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SEWING MACHINE MECHANISM

Filed Dec. 3, 1931 9 Sheets-Sheet 3

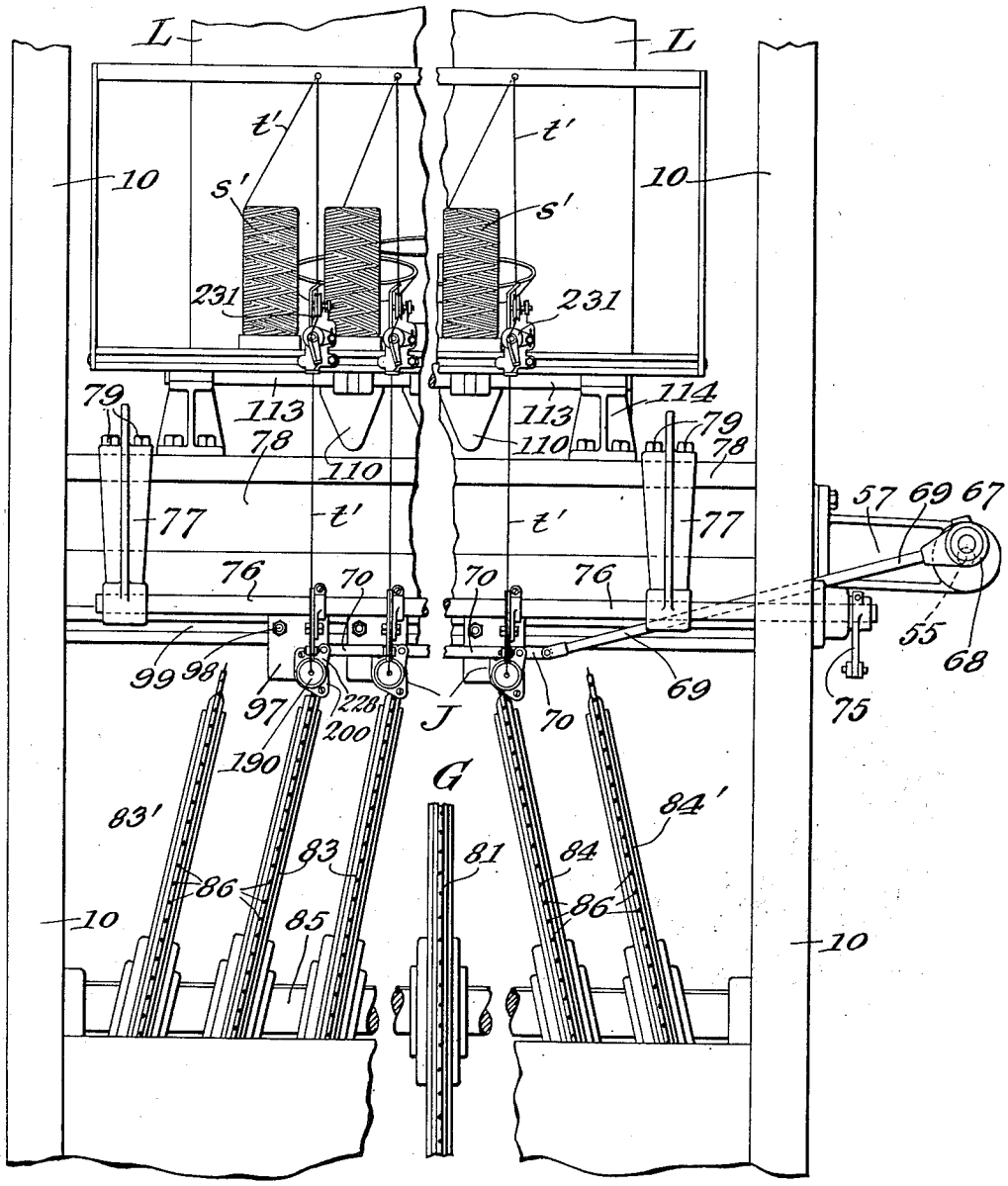

Fig. 3

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SEWING MACHINE MECHANISM

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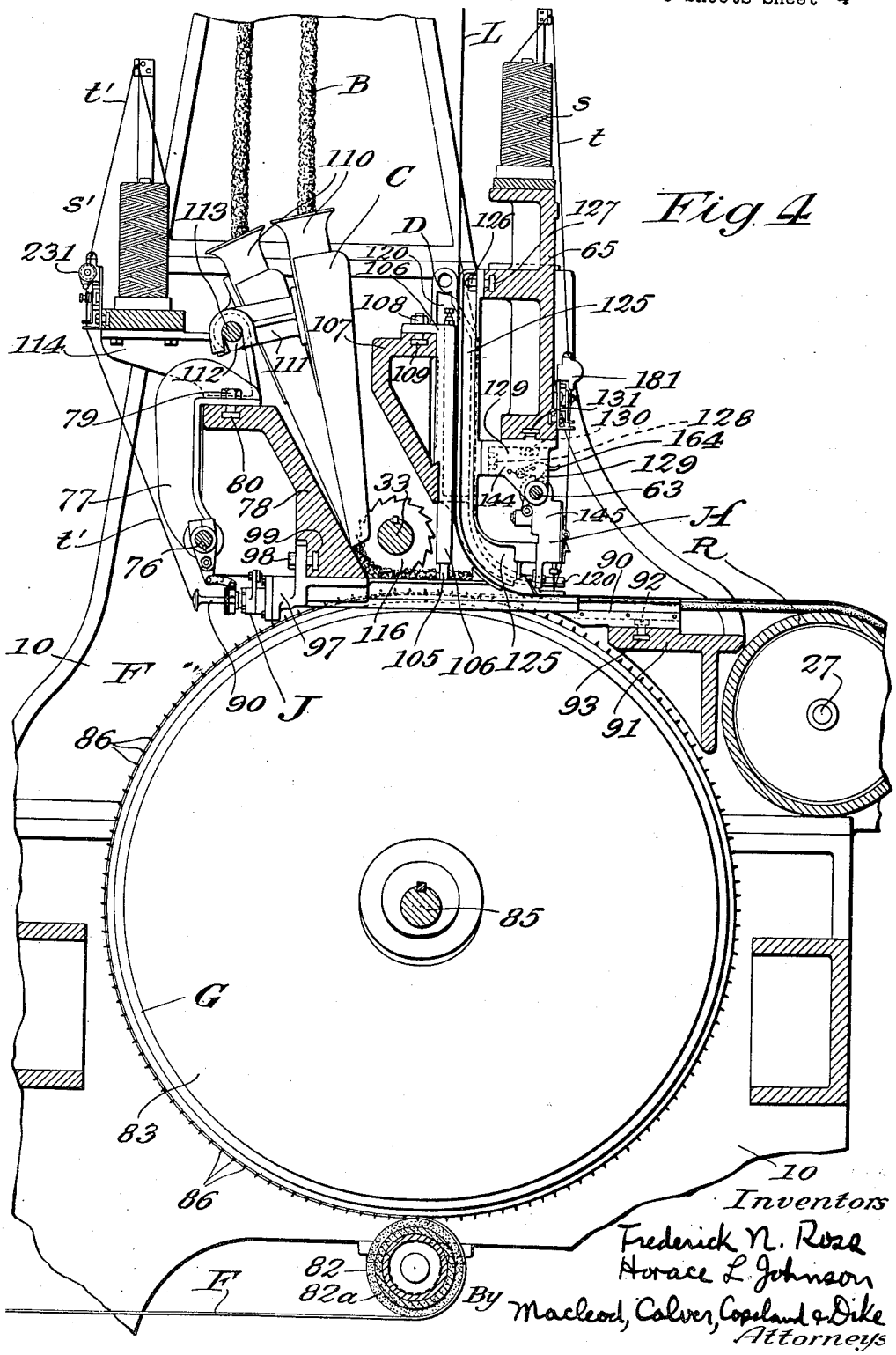

Fig. 4

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SEWING MACHINE MECHANISM

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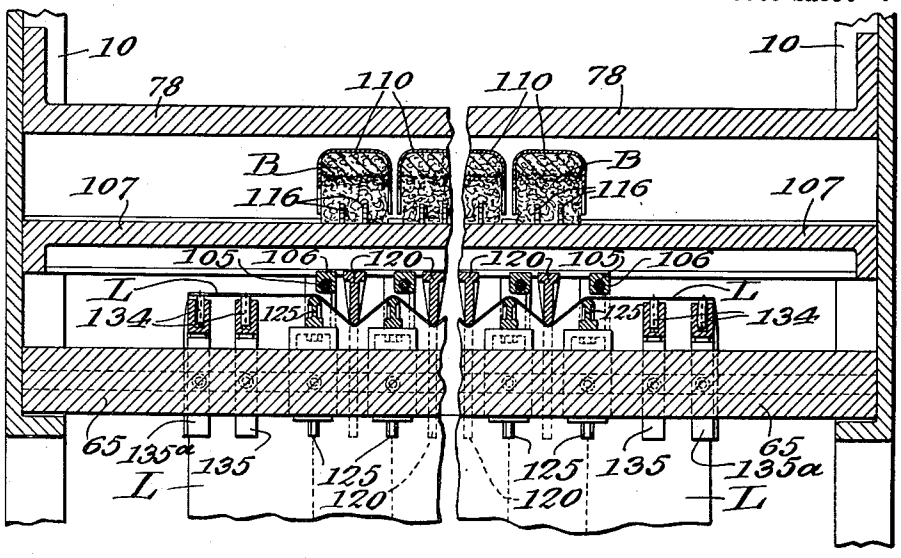

Fig. 5

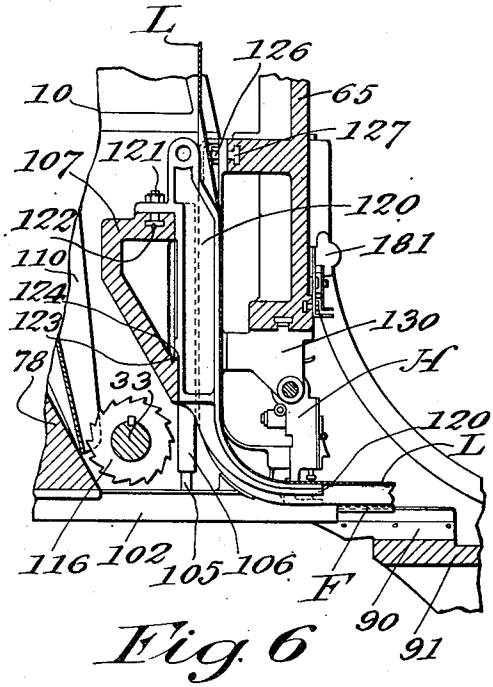

Fig. 6

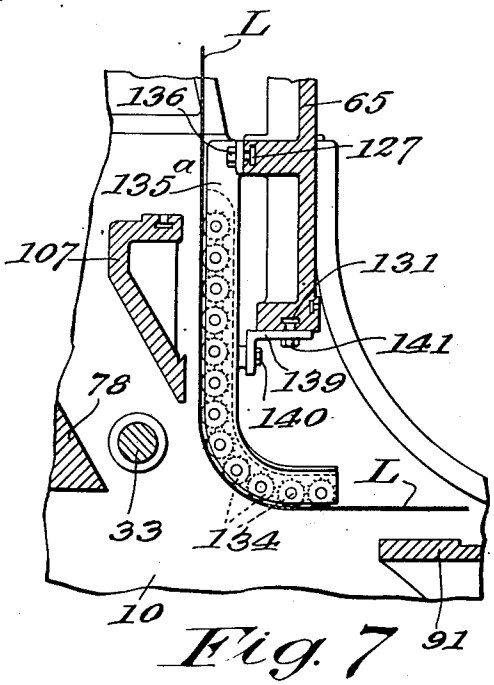

Fig. 7

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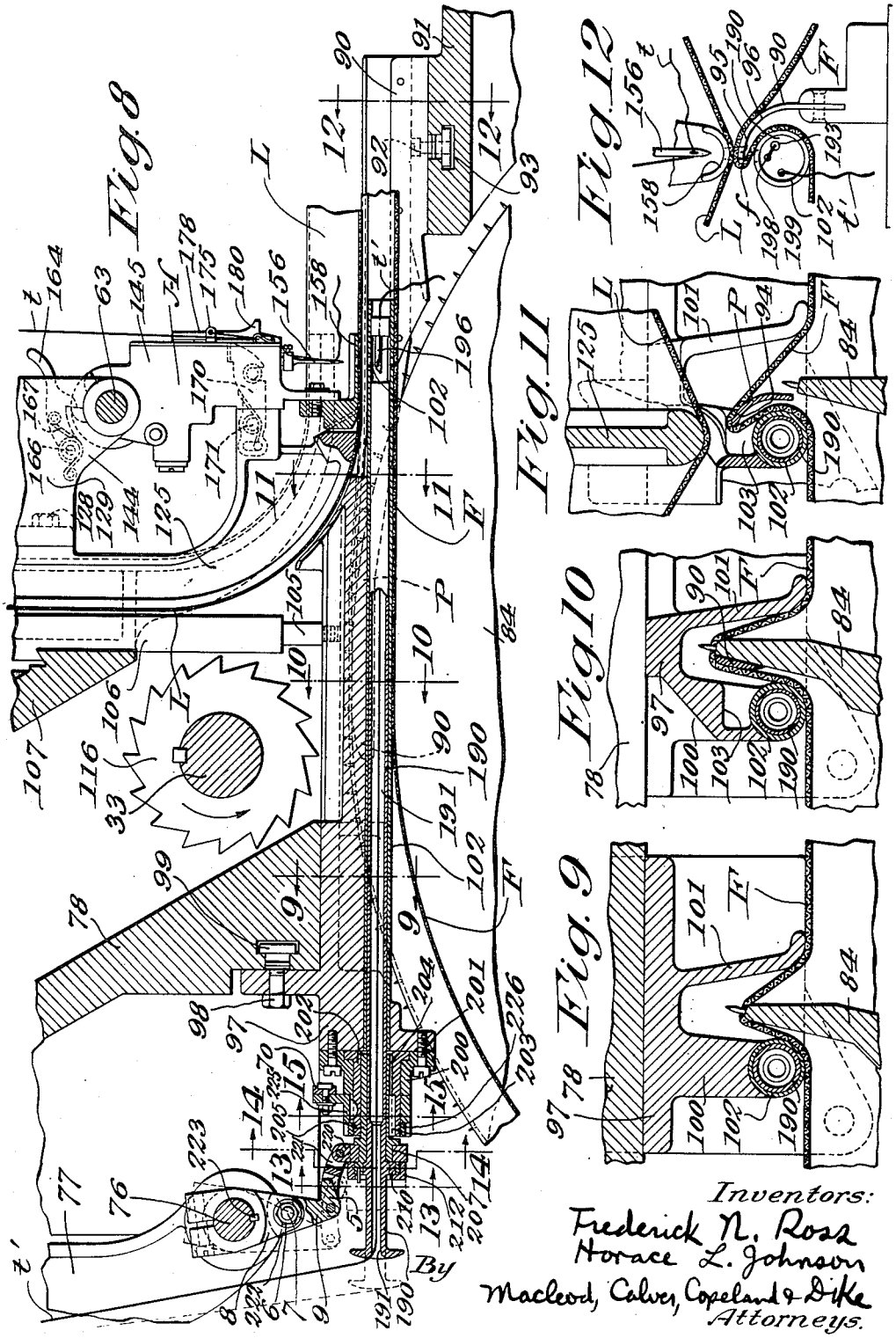
Feb. 25, 1936. F. N. ROSS ET AL 2,031,905

SEWING MACHINE MECHANISM

Filed Dec. 3, 1931 9 Sheets-Sheet 6



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SEWING MACHINE MECHANISM

Filed Dec. 3, 1931 9 Sheets-Sheet 7

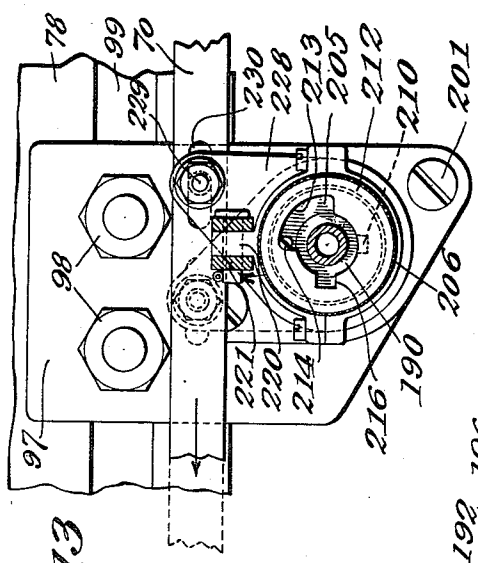


Fig. 13

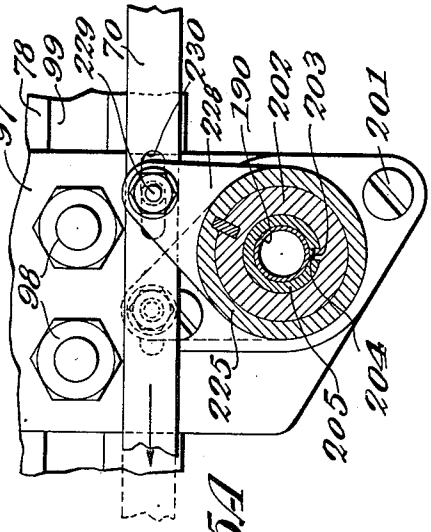
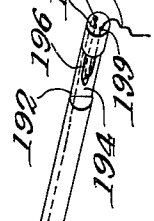


Fig. 15



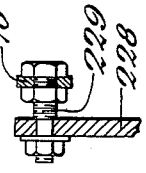


Fig. 15A

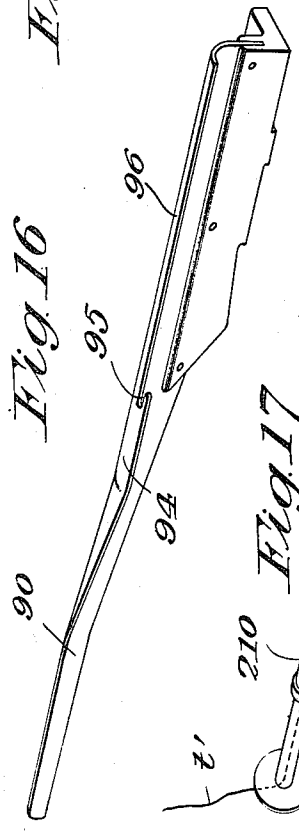


Fig. 16

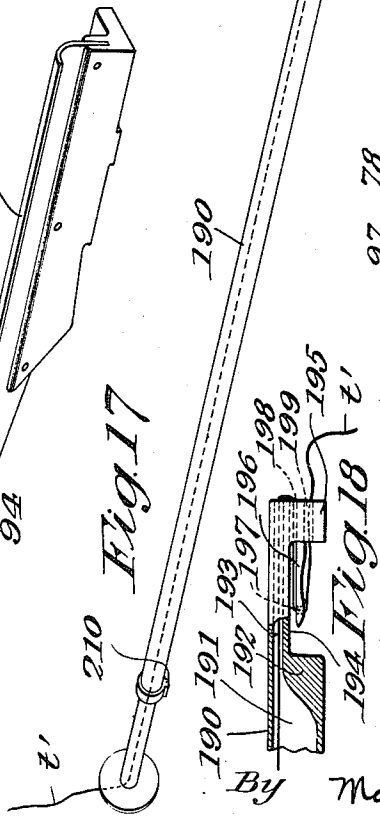


Fig. 17

Fig. 18

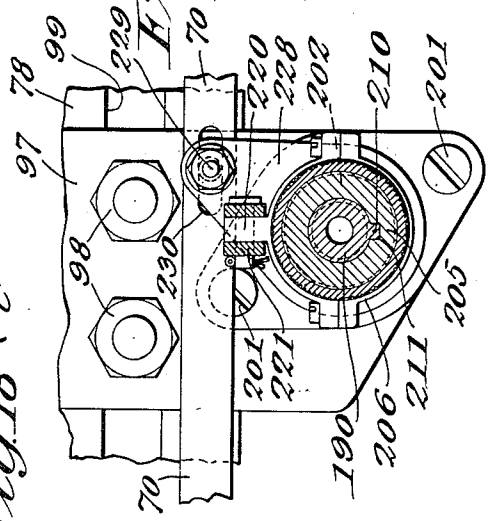


Fig. 14

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Feb. 25, 1936. F. N. ROSS ET AL 2,031,905

SEWING MACHINE MECHANISM

Filed Dec. 3, 1931 9 Sheets-Sheet 8

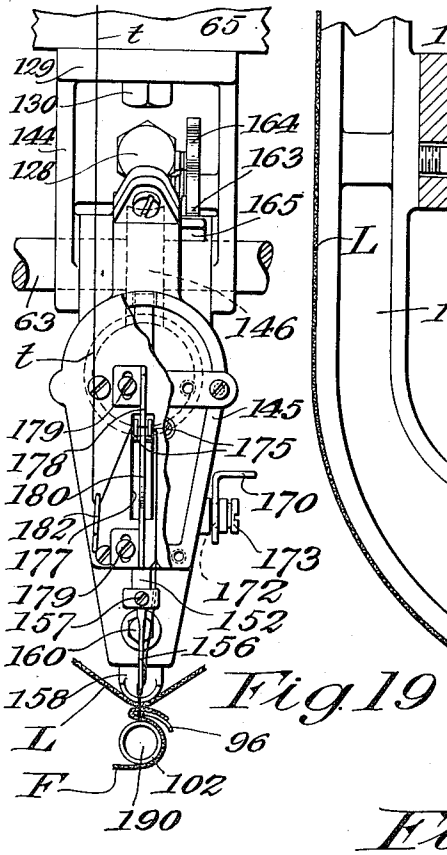

Fig. 19

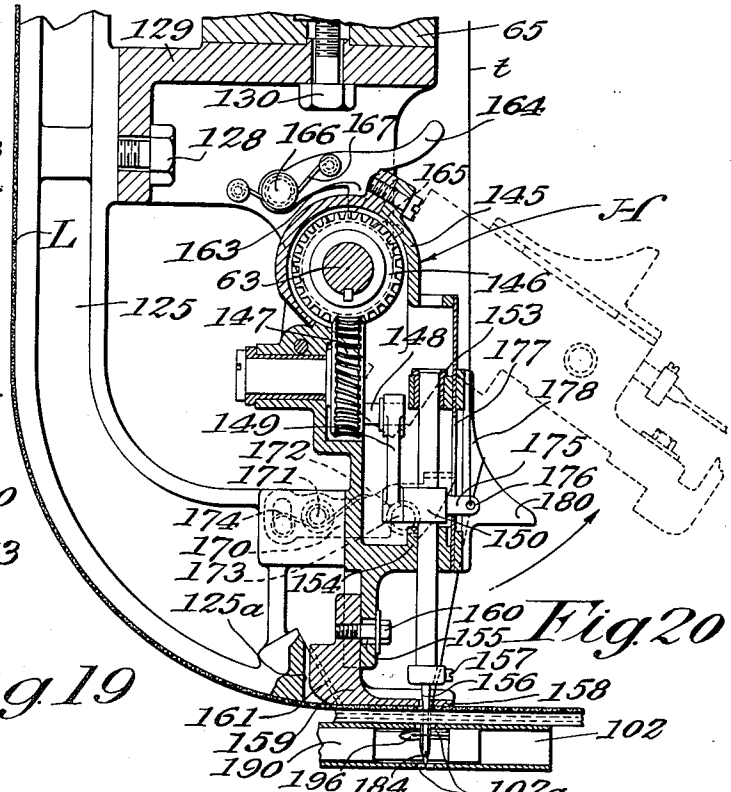

Fig. 20

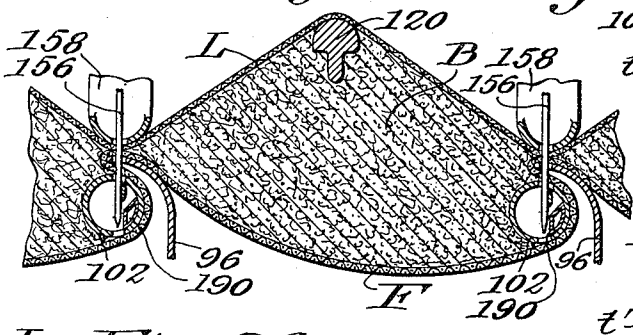

Fig. 23

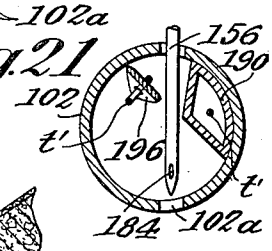

Fig. 21

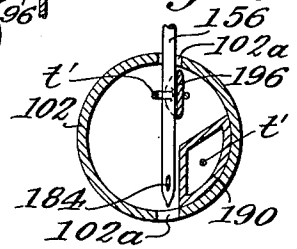

Fig. 22

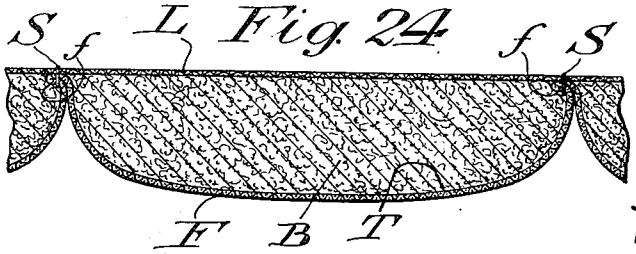

Fig. 24

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Feb. 25, 1936. F. N. ROSS ET AL 2,031,905

SEWING MACHINE MECHANISM

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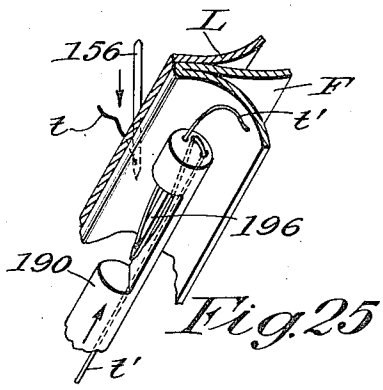

Fig. 25

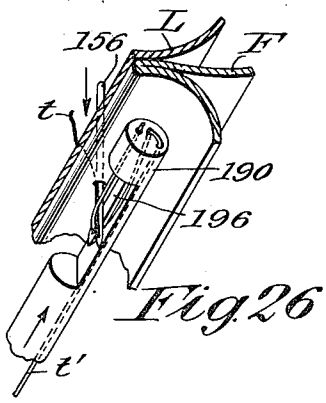

Fig. 26

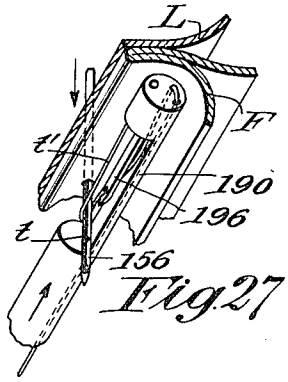

Fig. 27

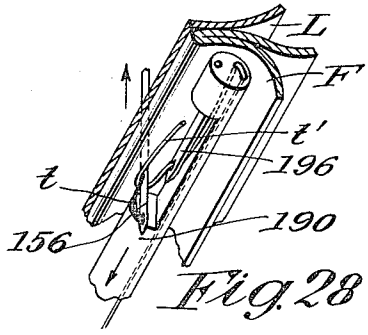

Fig. 28

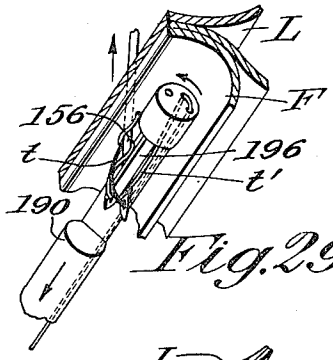

Fig. 29

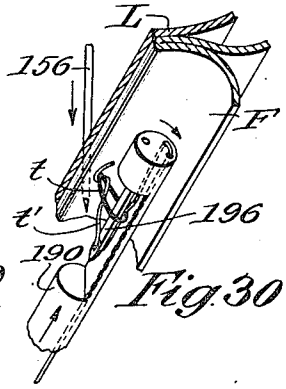

Fig. 30

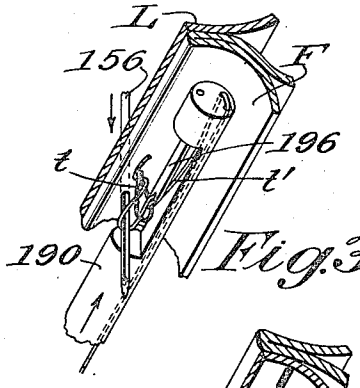

Fig. 31

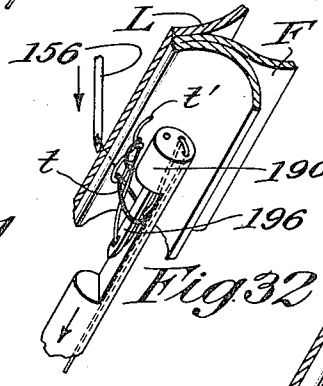

Fig. 32

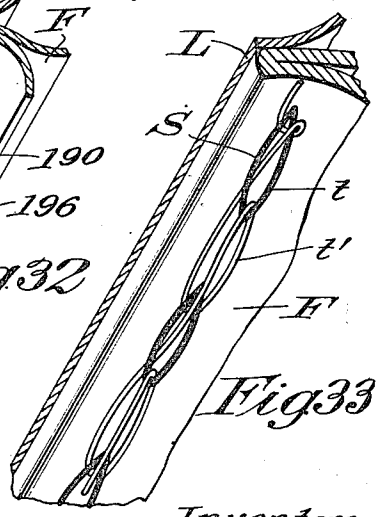

Fig. 33

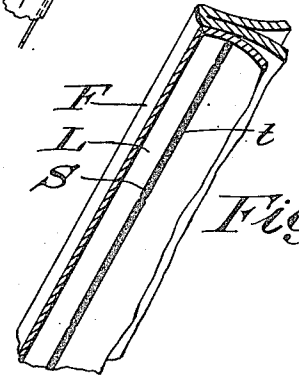

Fig. 34

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Patented Feb. 25, 1936

2,031,905

UNITED STATES PATENT OFFICE

2,031,905

SEWING MACHINE MECHANISM

Frederick N. Ross, Grosse Pointe Park, and Horace L. Johnson, Detroit, Mich., assignors to Briggs Manufacturing Company, Detroit, Mich., a corporation of Michigan

Application December 3, 1931, Serial No. 578,630

28 Claims. (Cl. 112—2)

This invention relates to the manufacture of upholstery, such as is commonly known as tubular upholstery for use in making vehicle seat cushions, and has for its object the provision of an efficient machine for producing a product of this general character. The present application is a continuation in part, and with respect to certain subject matter, of a prior application filed February 12, 1931, Serial No. 515,333.

The invention will be more clearly understood from the following description in conjunction with the accompanying drawings, in which,

Fig. 1 is a side elevational view of a machine embodying the invention;

Fig. 1*a* is a diagrammatic detail view of a portion of the machine;

Fig. 2 is an end elevational view as viewed from the right of Fig. 1;

Fig. 3 is an end elevational view as viewed from the left of Fig. 1;

Figs. 4, 5, 6 and 7 are sectional views taken upon the lines 4—4, 5—5, 6—6 and 7—7 respectively of Fig. 2;

Fig. 8 is an enlarged detail sectional view of a portion of the machine;

Figs. 9 to 15 inclusive are sectional views taken upon the lines 9—9, 10—10, 11—11, 12—12, 13—13, 14—14 and 15—15 of Fig. 8;

Fig. 15A is a sectional elevational detail view of a portion of the machine;

Figs. 16 and 17 are each detail perspective views of one of the parts of the machine;

Fig. 18 is a detail view partly in section of a portion of the looper;

Fig. 19 is a fragmentary end elevational view of a portion of the machine;

Fig. 20 is a side elevational view partly in section of the portion of the machine shown in Fig. 19;

Figs. 21 and 22 are sectional detail views showing the relation of the needle and looper at different stitches in the operation of the machine;

Fig. 23 is a fragmentary detail sectional view showing the relation of the parts of the product being produced as the seams are being stitched;

Fig. 24 is a detail sectional view of the finished product; and

Figs. 25 to 34 inclusive are diagrammatic views illustrating the formation of the stitch.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention beyond the terms of the several claims hereto appended as considered in view of the prior art and the requirements thereof.

One embodiment of the invention is illustrated in the accompanying drawings which show a machine for making a tubular upholstery having a top or finish fabric F (Fig. 24) which is gathered laterally or transversely of the strip, web, or sheet of fabric to provide a series of longitudinally extending channels or tubes T secured at their edges to a flat strip, web, or sheet of lining fabric L by parallel lines of stitching S. For this purpose, the edges of the top fabric F are folded and the resulting ribs or folds *f* are turned over so that one face thereof is parallel to the lining fabric and extends laterally or transversely of the latter. Each of the tubes T is padded and in the present instance a strip of cotton batt B is inserted therein. The product is illustrated in Fig. 24 with the top fabric below the lining fabric, this being the relative positions of these fabrics as they pass through the machine and are being assembled to produce the final product.

The machine comprises a frame 10 which carries the various cooperating instrumentalities for producing the desired product. These instrumentalities, in general, include a gathering mechanism, generally indicated by the reference character G (Figs. 2, 3 and 4) adapted to gather in the top fabric F transversely thereof to produce the tubes T. The fabric F passes from the gathering mechanism G to a forming mechanism, generally indicated by the reference character P (Figs. 8 and 11), adapted to form and turn the folds *f*. At the same time suitable padding, such as a strip of cotton batt B, is fed and guided into each tube T by suitable mechanism, generally indicated by the reference character C (Fig. 4), and the lining fabric L is fed and guided upon the top fabric F, having the batts B assembled in the tubes T thereof, by mechanism generally indicated at D (Fig. 4). The materials thus assembled are fed by suitable mechanism, including a knurled feed roll R, between a cooperating series of sewing heads and loopers, generally indicated by the reference characters H and J respectively (Fig. 4), which cooperate to form the parallel lines of stitching S passing through the lining fabric L and the folds or turned over ribs *f*.

The instrumentalities above referred to are

actuated from any suitable source of power such as a motor 11 (Fig. 1) mounted upon a bracket 12 carried by the frame 10. A pulley 13 is fixed upon the armature shaft of the motor and is connected to a pulley 14 rotatably mounted upon a shaft 15, as by a belt 16. The pulley 14 may be operatively connected with the shaft 15 by suitable clutch mechanism, generally indicated by the reference character 17. The shaft 15 is mounted for rotation at one end in suitable bearings 18 carried by a bracket 19 fixed upon the frame 10. The other end of the shaft 15 is rotatably mounted in suitable bearings within a casing 20 carried by the bracket 12. A worm 21 fixed upon the shaft 15 is adapted to engage a worm wheel 22 carried by a shaft 23 rotatably mounted in suitable bearings in the casing 20. The shaft 23 extends through the inner wall of the casing 20 and is provided with a sprocket wheel 25 between the casing 20 and the frame 10. The sprocket wheel 25 is connected with a sprocket wheel 26 on a shaft 27 by a chain 28. The shaft 27 is mounted for rotation in suitable bearings in the frame 10 and carries the feed roll R. The chain 28 passes under an idler sprocket wheel 30 and over an idler sprocket wheel 31 and drives a sprocket wheel 32 carried by a shaft 33 rotatably mounted in the frame. A second sprocket wheel 34 carried by the shaft 33 inside the frame 10 is operatively connected with a sprocket wheel 36 carried by a shaft 37 rotatably mounted in a suitable bracket 38 by a drive chain 42 which passes over the idler sprocket wheel 43 and between the idler sprocket wheels 44 and 45. A sprocket wheel 40 carried by a shaft 41 mounted for rotation in suitable bearings in the frame also is driven by the chain 42. A roll 47, preferably, having a perforated metal covering, is mounted upon the shaft 37 for feeding the lining fabric L to the guide mechanism D. The shaft 41 is provided with a gear 48 which is operatively connected with a gear 49 carried by a shaft 50 by an idler gear 51. The shaft 50 is mounted for rotation in suitable bearings in the frame 10 and carries a roll 53 adapted to feed the strips of cotton batt B to the feeding and guiding mechanism C.

A shaft 55 (Figs. 1, 2 and 3) is mounted for rotation in suitable bearings in a casing 56 and in a bracket 57, each of which is secured upon the exterior of the frame 10. The shaft 55 is driven by the shaft 15 through a chain 58 connecting sprocket wheels 59 and 60 carried by the shafts 15 and 55 respectively. A bevel gear 61 (Fig. 2) is mounted upon the shaft 55 within the casing 56 and is adapted to engage a bevel gear 62 carried by a shaft 63 mounted for rotation in suitable bearings carried by brackets 64 secured to a cross member 65 of the frame. The shaft 63 serves to actuate the needle heads H as will be described hereinafter. The shaft 55 also is provided with an eccentric 67 adapted to be engaged by an eccentric ring 68 carried by one end of a rod 69, the other end of which is pivotally connected to a rod 70 which is operatively connected to the looper mechanism J as will be described hereinafter.

The shaft 63 is provided with an eccentric 72 which engages an eccentric ring 73 carried by one end of a rod 74, the other end of which is pivotally connected to an arm 75 fixed upon a shaft 76 mounted for rotation in suitable bearings carried by brackets 77. The brackets 77 (Figs. 3 and 4) depend from and are adjustably secured in a cross member 78 of the frame as by T-headed bolts 79 engaging similarly shaped slots 80 in the cross member 78. The shaft 76 is operatively connected with the looper mechanism J as will be described hereinafter.

A flat strip or web of finish fabric F passes into the machine over a felt coated roll 82 having peripheral grooves 82*a* and suitably mounted for rotation in the frame and extending transversely of the machine. The fabric F is transferred from the roll 82 to the gathering mechanism G. The gathering mechanism comprises a plurality of gathering disks or wheels 81, 83 and 84 and outer wheels 83′ and 84′ all of which are suitably mounted for rotation upon a shaft 85 fixed in the frame 10. For this purpose, each of these wheels is mounted to rotate freely by means of a ball bearing which is arranged to be adjustably positioned on the shaft 85 to permit adjustment of each wheel. This bearing, as shown in Fig. 2, comprises a ball bearing race one member of which is secured to a bushing 301 keyed to the shaft 85 for longitudinal adjustment and held in adjusted position by a set screw 302. The outer member of each ball bearing race is fixed to the hub of a wheel 84 by means of suitable clamping rings 303. The periphery of each of the wheels 81, 83, 83′, 84 and 84′ is provided with a plurality of prongs 86 adapted to pass into and grip the fabric F and enter the peripheral grooves 82*a* in the roll 82. The set of wheels 83 and 83′ is positioned upon one side of the wheel 81, which in the construction illustrated is perpendicular to the shaft 85 and is inclined upwardly toward the same, while the set of wheels 84 and 84′ is positioned upon the other side of the wheel 81 and is inclined upwardly towards the same. The inclination of the wheels 83 and 84 relative to the wheel 81 is greater than that of the adjacent wheel which is closer to the wheel 81 and consequently the peripheries of adjacent wheels 83 and 84 converge toward the upper side of the series. The wheels 83′ and 84′, preferably, are parallel to the outer wheels 83 and 84 respectively. As the web of finish fabric F is drawn about the series of disks, laterally spaced portions thereof are caused to follow the peripheries of the several disks in an arcuate path or paths from the lower side of the series, where the peripheries are widely spaced, to the upper side thereof, where said peripheries are relatively closely spaced, thereby gathering the web laterally or transversely and forming therein a lateral series of longitudinal fulnesses sufficient to permit the formation of the tubes T and the ribs *f*.

The forming mechanism is arranged to remove and receive the fabric F from the gathering mechanism, hold the same in gathered position, and fold it to form the ribs *f*. This mechanism comprises a plurality of forming plates 90 (Figs. 8, 9, 10, 11, 12 and 16) adjustably secured upon a cross member 91 of the frame, as by T-headed bolts 92 adapted to be received in a similarly shaped slot 93 in the cross member 91. One of the plates 90 extends rearwardly adjacent to and cooperates with each of the wheels 81, 83 and 84 to remove the fabric F therefrom. For this purpose the top edge of each plate 90 is positioned at approximately the upper limit of the periphery of the wheels 83 and 84 and curves downward slightly at its free end. The rear and intermediate portions of the plates 90 curve upwardly and laterally to provide a laterally projecting forming member 94 having an open-ended slot 95 at its rear end and positioning member 96 (Fig. 16). A plurality of brackets 97 are adjustably secured to the cross member 78, as by T-headed bolts 98 adapted to engage a similarly shaped

slot 99 in the cross member 78. Each of the brackets 97 is provided with spaced parallel depending ribs 100 and 101 adapted to receive therebetween one of the forming plates 90 and the upper portion of one of the wheels 81, 83 and 84. A hollow tubular looper housing 102 is secured to the bottom of each rib 100 and is provided with openings 102a to permit the entry of a sewing needle as described hereinafter. The inner face of the forward end of each of the ribs 100 is provided with a longitudinal slot 103 into which the forming member 94 extends. A rod 105 (Figs. 4 and 8) is secured at its lower end to the forward end of each of the brackets 97 and is carried by a tubular bracket 106 adjustably mounted in a cross member 107 of the frame, as by T-headed bolts 108 adapted to engage a similarly shaped slot 109 in the cross member 107.

The strips of cotton batt B are received from the feed roll 53 in guide funnels 110 (Figs. 3 and 4) each of which is provided with a rearwardly extending bracket 111 having a U-shaped recess 112 adapted to rest upon a rod 113 extending between and carried by brackets 114 suitably secured upon the cross member 78. The front face of the cross member 78 is inclined downwardly and forwardly and is adapted to support the lower ends of the guide funnels 110. A pair of toothed feed members 116 are suitably keyed upon the shaft 33 adjacent the lower end of each of the guide funnels 110 so as to assist in feeding and guiding the cotton batt strips B into the tubes T formed in the finish fabric F.

Suitable means is provided for guiding the lining fabric from the roll 47 upon the assembled finish fabric and cotton batts and comprises a plurality of vertically positioned guide arms 120 (Figs. 5 and 6) each adjustably secured upon the cross member 107, as by a T-headed bolt 121 adapted to be received in a similarly shaped slot 122 in the cross member 107. The cross member 107 also is provided with a transversely extending inclined shoulder 123 adapted to receive a similarly shaped shoulder 124 upon each guide member 120. The lower end of each of the guide members 120 depends and is curved downwardly and forwardly from the cross member 107 between the sewing heads H and between the finish fabric and the lining fabric. Vertical guide members 125 extend downwardly from the cross frame 65 (Figs. 4, 5, 6, 8 and 20) and are suitably secured thereto, as by T-headed bolts 126 adapted to engage a similarly shaped slot 127 in the cross member 65. Each of the guide members 125 also is secured by a bolt 128 to a bracket 129 which is adjustably mounted in the cross member 65, as by a T-headed bolt 130 adapted to engage a similarly shaped slot 131 in the cross member 65. At each end of the cross frame member 65 are a pair of substantially vertically extending channel shaped members 135 and 135a (Figs. 2, 5 and 7) which are adjustably secured near their upper ends to the cross member 65 at each side of the guide members 125, as by T-headed bolts 136 adapted to engage the similarly shaped slot 127 in the cross member 65. Each of the members 135 and 135a also is secured to a bracket 139, as by a bolt 140, and extends downwardly and forwardly therefrom to a point approximately opposite the front of the sewing heads H. The brackets 139 are adjustably secured to the cross member 65, as by T-headed bolts 141 adapted to engage the similarly shaped slot 131 in the cross member 65. A plurality of aligned pronged wheels 134 are rotatably mounted in each of the members 135 (see Fig. 7). The outer channel member 135a of each pair is outwardly inclined in order to gradually stretch the lining L and prevent its wrinkling.

Each of the brackets 129 is provided with spaced depending arms 144, (Figs. 2, 4, 19 and 20) the lower end of each of which is provided with a bearing adapted to rotatably receive the shaft 63. One of the sewing heads H is supported upon the shaft 63 between the arms 144 of each of the brackets 129 and comprises a casing 145 enclosing a worm 146 fixed upon the shaft 63 and adapted to engage a worm wheel 147 suitably mounted for rotation in the casing 145. A crank pin 148 is eccentrically positioned on and secured to the front face of the worm wheel 147. One end of a link 149 is pivotally mounted upon the pin 148 and its other end is pivotally connected to a boss 150 fixed upon a needle shaft 152 slidably mounted in suitable bearings 153 and 154 in the casing 145. A needle 156 having an eye or opening 184 is suitably secured in the lower end of the shaft 152, as by a set screw 157, and is adapted to be reciprocated vertically by the shaft 152 into the openings 102a in the looper housing 102 and through a hole 158 in a foot 159 depending from and adjustably secured to the lower end of the casing 145, as by bolts 160, engaging the foot 159 and passing through slot 155 in the casing. The foot 159 is provided with a rearwardly extending fin 161 adapted to be received in a vertically extending slot 125a in the lower forward face of the guide member 125.

Each sewing head H may be moved about the shaft 63 to an inoperative position, as shown in dotted lines in Fig. 20, for threading the needle 156 and may be held in such position by a locking finger 163 adapted to engage a lug 165 on the casing 145. The finger 163 is carried by an arm 164 pivotally mounted upon a pin 166 carried by the bracket 129. A spring 167 normally urges the arm 164 in a clockwise direction as viewed in Fig. 20. Each sewing head H is locked in its operative position abutting the lower forward end of a guide member 125 by an arm 170 pivotally carried by a pin 171 on the guide member 125. The arm 170 is provided with a notch 172 which is normally maintained in engagement with a pin 173 on the casing 145 by a spring 174.

Each boss 150 is provided with a pair of spaced ears 175 each having an opening 176. The ears 175 extend forwardly through a slot 177 in a cover plate on the front of the casing 145. A bracket 178 is suitably secured to the casing 145, as by screws 179, and is provided with a nose 180 extending downwardly and forwardly between the ears 175. A thread t is supplied from a suitable source such as spools s, and passes downwardly therefrom through a combined safety and tensioning device, generally indicated by the reference character 181, and thence downwardly through an eyelet 182 carried by the casing 145 and then through the opening 176 in one of the ears 175 and over the nose 180 and thence through the opening 176 in the other ear 175 and then downwardlly through the needle opening 184.

Each of the looper mechanism J which cooperate with the sewing heads H comprises a hollow looper in the form of a tube 190 (Figs, 2, 4, 13, 14, 15, 17, 18, 20, 21, 22 and 23) providing a passage 191 for receiving the looper thread t'. The thread t' is supplied to the tube 190 from any suitable source, such as spools s', through a combined safety and tensioning device 231. The inner end of the looper 190 is closed by a solid end

portion 192 (Fig. 18) having a thread passage 193 connecting with the passage 191. The solid end portion 192 is provided with a lateral slot 194 forming a portion 195 carrying a needle 196 eccentrically positioned thereon with respect to the axis of the looper 190 and extending inwardly into the slot 194 and having an eye or needle opening 197. The portion 195 is provided with thread passages 198 and 199. The looper tube 190 is slidably and rotatably mounted in the looper housing 102.

A tubular bearing 200 (Fig. 8) is suitably secured to the bracket 97, as by screws 201 in alignment with the looper housing 102. A bushing 202 is rotatably mounted within the bearing 200 and is provided with a key 203 (Fig. 15) adapted to be received in a longitudinal slot 204 in a sleeve 205 surrounding the tube 190 and slidably mounted within the bushing 202. A ring 206 is suitably clamped on the sleeve 205 in an annular groove 207 on its outer surface. The looper tube 190 is provided with a longitudinally extending key 210 adapted to be received in a longitudinally extending groove 211 in the sleeve 205. The tube 190 is suitably secured to the sleeve 205 by a cap 212 threaded upon the sleeve 205 and adapted to abut the key 210. The cap 212 is provided with a central opening providing a cam surface 213 adapted to engage a pin 214 on the sleeve 205 and also providing a groove 216 adapted to be turned to aline with the key 210 to permit the tube 190 to be withdrawn from its housing 102.

The clamping ring 206 is provided with a lug 220 to which one end of a forked link 221 is pivotally connected. The other end of the link 221 is pivotally connected to one end of an arm 222 which is suitably secured to the shaft 76, as by a key 223. The arm 222, preferably, comprises two sections 8 and 9 which are adjustably connected by a pin 7 having an eccentric portion engaging one of the sections and which are clamped in adjusted position by nuts 6 threaded on the pin 7 and engaging the sections 8 and 9. The section 9 is provided with a nose 5 extending between the two legs of the forked link 221. A collar 225 is keyed upon the bushing 202 and is secured between the end of the bearing 200 and a ring 226 threaded upon the end of the bushing 202. The collar 225 is provided with an ear 228 which is pivotally mounted upon a stud 229 adjustably mounted in a slot 230 in the rod 70.

The finish fabric F, strips of cotton batt B and lining fabric L are drawn simultaneously through the machine between the sewing heads H and looper mechanism J by the feed roll R. Cooperating with the roll R (Figs. 1 and 1*a*) are a pair of presser rolls 304 and 305 extending across the front of the machine. These rolls are driven at the required peripheral speed to coact with the roll R in producing an even pulling action on the materials. These presser rolls are carried at opposite ends by swinging arms 306 pivoted at 307 to brackets 308 extending from the side frames 10. Fixed to the shaft 27 is a gear 309 meshing with a pinion 310 on a stud which carries a sprocket adapted to drive by means of a chain 311 a sprocket mounted on the stud 307. The stud 307 also carries a second sprocket driving through chain 312 a sprocket mounted on a stud 313. The latter carries a gear which, through a series of meshing gears, drives the presser rolls 304 and 305 in the same direction as will be readily understood from Fig. 1*a*.

The finish fabric F in the form of a flat strip first passes around the felt covered roll 82 and is engaged by the prongs 86 upon the wheels 81, 83, 84, 83′ and 84′ which guide it from the lowest points to the highest points in the paths of travel of these wheels. In so doing the corresponding points on the wheels 81, 83 and 84 move relatively toward one another due to their inclined relation and consequently cause the portions of the fabric F therebetween to be gathered in to form the tubes or channels T. At this time the portion between the wheel 83′ and the outer wheel 83 and the portion between the wheel 84′ and the outer wheel 84 are held in a horizontal position (as shown in Fig. 2). As the fabric F reaches the top of the path of the wheels 81, 83, 84, 83′ and 84′ it is engaged by the former plates 90 which remove the fabric from the wheels as it is being drawn toward the space between the sewing heads and looper mechanism. As the fabric F passes along the former plates 90 it is forced upwardly and turned over the looper casing 102 by the forming members 94 to form the ribs *f* as the fabric passes beneath the sewing needles 156. About the time that the fabric F begins to engage the former plates 90 the strips of cotton batt B are guided into the channels or tubes T by the toothed wheels 116. The lining fabric L is then positioned and guided over the strips of cotton batt and in engagement with the folded or turned over portions of the ribs *f* by the guide members 120 and 125. The edges of the fabric L are held tight by the pronged wheels 134 thereby permitting the guides 120 to stretch the portions of the lining fabric L between the guides 125 (as best illustrated in Figs. 2, 5 and 23). As the finished fabric, cotton batt and lining fabric pass between the sewing heads and the looper mechanisms parallel lines of stitching *s* are formed to unite the turned over portions of the ribs *f* with the lining fabric L. Inasmuch as the finish fabric F is gathered in it must be slightly wider than the lining fabric L to allow for the formation of the tubes T and the ribs *f*. The tubes T may be made of any desired width by suitably adjusting the gathering wheels 83 and 84 and the wheels 83′ and 84′, the looper housing 102 and sewing heads H, the forming plates 90, the lining fabric guides and stretchers 120, 125, 135 and 135*a*, and the cotton batt guides 110 and 116.

In producing the lines of stitching *s*, the sewing needles 156 are reciprocated axially to pass through the lining fabric L, the ribs *f* and into the interior of the looper housing 102 through the openings 102*a*. This reciprocation is caused by the rotation of the shaft 63 and worm gears 146 thereon which is translated to a reciprocating movement through the worm wheels 147 and the pins 148 eccentrically carried thereby and operatively connected to the needle shafts 152 by the link 149. At the same time the looper tubes 190 are reciprocated axially and rotatively in a predetermined timed relation to the reciprocation of the sewing needles 156. The axial reciprocation of the looper tubes 190 is imparted thereto by the reciprocation of the shaft 76 which is operatively connected to the shaft 63 through the arm 75, rod 74 and eccentric strap 73 carried thereby and engaging the eccentric 72 mounted on the shaft 63. The rotative reciprocation of the looper tubes 190 is imparted by the rod 70 which is connected to the ears 228 and is reciprocated by the rod 69 carrying the eccentric strap 68 engaging the eccentric 67 on the shaft 55. Thus, it will be noted that as the looper needle reciprocates axially it is caused to pass

first at one side of the sewing needle and then at the other side as shown diagrammatically in Figs. 21 and 22.

The formation of each line of stitching is illustrated in Figs. 25 to 34. As the sewing needle advances between the looper needle and looper thread the looper needle is retracting (Fig. 26). This causes the sewing needle to pull a loop in the looper thread (Fig. 27). Before the looper needle has completed its retraction, the sewing needle starts to retract to produce a loop in the sewing needle thread (Fig. 28). The looper needle then advances and at the same time rotates so as to pass into the loop in the needle thread and pull the same as the sewing needle retracts (Fig. 29). When the sewing needle has passed out of the work, the latter advances a distance of one stitch before the sewing needle again enters it (Fig. 30). During this time the looper needle has rotated in the reverse direction to its previous rotation so as to be in a position to permit the sewing needle to pass between it and its thread and pull a loop therein as the looper needle retracts (Fig. 31). The looper needle then retracts a sufficient distance to free the first needle thread loop from the looper needle. About this time the sewing needle has advanced to near the limit of its stroke and is pulling its thread over the nose 180 which applies tension to the thread sufficient to tighten the stitch. This sequence of operations is continuously repeated (as shown in Fig. 32) to produce the line of stitching as shown in Figs. 33 and 34, the former illustrating the stitching as viewed from the interior of the tubes T while the latter illustrates the stitching as viewed from the exterior of the lining L.

What we claim is:

1. In a machine of the character described, in combination, a sewing needle, a tube positioned in a plane substantially perpendicular to said needle, a looper needle carried by said tube in parallel spaced relation to the axis of the tube, a tubular housing in which said tube is freely movable and having an opening to receive said sewing needle, means for reciprocating said sewing needle and tube axially, and means for rotatively reciprocating said tube during the reciprocation of the sewing needle.

2. In an upholstery machine, means for bringing covering and lining materials together along longitudinal lines and forming up said covering material along said lines to provide ribs projecting parallel to the plane of said lines with tubular portions between said ribs, and means for sewing said materials along each of said lines simultaneously by stitching extending through said lining material and the ribs of said covering material.

3. In an upholstery machine, means for bringing covering and lining materials together along longitudinal lines and forming up said covering material along said lines to provide ribs projecting parallel to the plane of said lines with tubular portions between the ribs, means for supplying filling material into the open ends of the tubular portions between the materials as they are brought together, and means for sewing said materials along each of said lines simultaneously by stitching extending through said lining material and the ribs of said covering material.

4. In an upholstering machine, means for feeding a fabric and providing the same with ribs, means for projecting said ribs horizontally transversely of the fabric to present one longitudinal side of each rib upwardly, means for superposing a second fabric on the upwardly presented side of each rib, and means for sewing said materials along each of said lines simultaneously by stitching extending through the second fabric and the ribs of said first fabric.

5. In an upholstery forming machine, means for forming one of the fabrics into ribs providing pleats therebetween, means for bending over each of said ribs simultaneously, means for conducting another fabric to and superposing the same on said ribs, and means for uniting said fabrics by stitching extending through said second fabric and the ribs of said first fabric.

6. In an upholstery forming machine, means for forming one of the fabrics into ribs and providing pleats therebetween, means for bending over each of said ribs simultaneously, means for conducting another fabric to and superposing the same on said ribs, and means for uniting said fabrics by stitching extending from the exterior of the pleats through the second fabric and the ribs of the first fabric into the interior of the pleats and completed within the pleats by a looper.

7. In an upholstery forming machine of the character described, means for gathering a material to form ribs with a fullness therebetween, means for holding said ribs to form laterally extending seam ridges, means for bringing a second material together with said first material along the lines of said ribs to form tubes therebetween, and means for uniting said fabrics along each of said lines simultaneously by stitching extending through said second material and the ribs of said first material and completed within said tubes.

8. In an upholstery forming machine, gathering means including rotatable devices for ingathering a flat material to form ribs with fullness therebetween, means for laterally bending said ribs to project the same transversely, means for bringing another material into a position parallel with said first material along the lines of said ribs, and means for uniting said materials thereafter by stitching extending through said second material and the ribs of said first material.

9. In an upholstery forming machine, gathering means including rotatable circular elements for transversely in-gathering a flat strip of material to form longitudinally extending ribs with fullness therebetween, means for laterally bending said ribs to project the same transversely of said strip, means for bringing another material into a position parallel with said first material along the lines of said ribs, and means for uniting said materials by stitching extending through said second material and the ribs of said first material.

10. In an upholstery forming machine, rotatable gathering devices working in converging planes to in-gather a strip of material to form longitudinal ribs with fullness therebetween, means for bringing a strip of second material parallel with said first material along the lines of said ribs, and means to sew said ribs and second material to secure them in their final condition.

11. In an upholstery forming machine, a plurality of rotatable gathering disks working in converging planes to transversely in-gather a strip of material to form longitudinal ribs with fullness therebetween, means for bringing a second strip of material in substantially flat condi-

tion parallel with said first material along the lines of said ribs, and means to sew said ribs and second material to secure them in their final condition.

12. In an upholstery forming machine, a plurality of rotatable gathering disks working in converging planes to transversely in-gather a strip of material to form longitudinal ribs with fullness therebetween, means for bringing a second strip of material in substantially flat condition parallel with said first material along the lines of said ribs, and means to unite said materials along said lines by stitching extending from one side of said second material therethrough and through said ribs and completed between said materials.

13. In an upholstery forming machine, means for transversely in-gathering a strip of material to form ribs with fullness therebetween including rotatable gathering disks working in converging planes and peripherally engageable with said material, means for bringing a second strip of material parallel with said first material along the lines of said ribs, and means to sew said ribs and said second material to secure them in their final condition.

14. In an upholstery forming machine, means for transversely in-gathering a strip of material to form ribs with fullness therebetween including rotatable gathering disks working in converging planes and peripherally engageable with said material, means for laterally bending over said ribs, means for bringing a second strip of material parallel with said first material along the lines of said ribs, and means to sew said ribs and said second material to secure them in their final condition.

15. In an upholstery forming machine, gathering means including rotatable gathereing devices working in converging planes and peripherally engaging a web of material to transversely ingather the same to form longitudinal ribs with fullness therebetween to produce pleats, other devices engaging the opposite edges of said material to guide the same, means for bringing another material into a position parallel with the first material along the lines of said ribs, and means for sewing said ribs and second material to secure them in their final condition.

16. In an upholstery forming machine, gathering means including rotatable gathering devices working in converging planes and peripherally engaging a web of material to transversely ingather the same to form longitudinal ribs with fullness therebetween to produce pleats, other devices engaging the opposite edges of said material to guide the same, means for laterally bending said ribs to project the same substantially horizontally transversely of the material, means for bringing another material into a position parallel with the first material along the lines of said ribs, and means for sewing said ribs and second material to secure them in their final condition.

17. In the process of forming tubular upholstery, the steps of transversely gathering a strip of material to form longitudinal ribs with fullness therebetween to provide pleats, simultaneously bending each of said ribs laterally to present one longitudinal side of each rib upwardly, bringing a second strip of material into engagement with said first strip along the longitudinal lines of said upwardly presented rib sides, and uniting the materials by stitching extending through the longitudinal lines of said second material and the ribs of said first material.

18. In an upholstering machine, means for feeding two sheets of material into superimposed relation, means for forming in one of said sheets a series of upstanding parallel ribs with a fullness therebetween and for turning the free edges of said ribs over laterally into a position substantially parallel to said sheets, and means for uniting said sheets by stitching passing through one thickness only of said other sheet and through both layers of the laterally turned edges of said ribs so that the ends of said ribs are positioned in the space bounded by said sheets and adjacent stitchings.

19. In a machine of the character described, in combination, a plurality of spaced sewing needles, means for feeding two sheets of fabric into superimposed relation, a plurality of looper needles positioned in a plane substantially perpendicular to the plane of the sewing needles and between said sheets and adapted to cooperate with the sewing needles, means for forming a series of parallel ribs in one of said sheets extending parallel to the plane of the looper needles, means for reciprocating said sewing needles axially through said ribs and said other fabric, means for reciprocating said looper needles axially, and means for reciprocating said looper needles laterally.

20. In a machine of the character described, in combination, a plurality of spaced sewing needles, means for feeding a sheet of fabric past said sewing needles, a plurality of tubes positioned in a plane substantially perpendicular to said needles and between the same and said sheet of fabric, a looper needle carried by each of said tubes and positioned parallel to and spaced from the axis of the tube, a tubular housing for each of said tubes having an opening to receive one of the sewing needles, means for reciprocating the sewing needles and tubes axially, means for rotatively reciprocating said tubes during the reciprocation of the sewing needles, means for folding saidd fabric around said housing to form a series of longitudinal ribs extending parallel to the plane of said tubes and between said sewing and looper needles, and means for superimposing a strip of fabric upon said ribs and between the same and said sewing needles.

21. In a machine of the character described, in combination, a plurality of sewing heads, means for feeding two strips of fabric past the sewing heads with one of said strips in engagement therewith, means adapted to engage opposite edges of said last named strip to hold it tight transversely as it is fed, and a guide member between adjacent sewing heads adapted to stretch said last named strip therebetween in a direction away from the other strip.

22. In a machine of the character described, in combination, a plurality of sewing heads, means for feeding a strip of fabric past the sewing heads and in engagement therewith, means adapted to engage opposite edges of said strip to hold it tight transversely as it is fed, means for feeding a wider strip of fabric, means for gathering in said wider strip of fabric to form tubes opposite said guides, means for forming ribs at the edges of said tubes opposite said heads, guide members between adjacent sewing heads adapted to stretch said first named strip therebetween in a direction away from said last named strip, and means for feeding strips of padding into said tubes opposite said guides.

23. Mechanism for laterally gathering a web of material and forming a lateral series of longitudinal fullnesses therein, which includes a series of spaced rotating members whose peripheries converge toward one side of the series, and means for passing said web in an arcuate path about the peripheries of said members and engaged therewith from a side of the series where said peripheries are relatively widely spaced to a side where they are relatively closely spaced.

24. Mechanism for laterally gathering a web of material and forming a lateral series of longitudinal fullness therein, which includes a series of spaced rotating members whose peripheries converge toward one side of the series, means on said peripheries for holding said web in engagement therewith, and means for passing said web in an arcuate path about the peripheries of said members from a side of the series where said peripheries are relatively widely spaced to a side where they are relatively closely spaced.

25. Mechanism for laterally gathering a web of material and forming a lateral series of longitudinal fullnesses therein, which includes a series of spaced, freely rotating disks whose peripheries converge toward one side of the series, said peripheries being provided with points adapted to pierce the fabric, and means for drawing said web about said series of disks from a side thereof where said peripheries are relatively widely spaced to a side where they are relatively closely spaced.

26. Mechanism for laterally gathering a web of material and forming a lateral series of longitudinal fullnesses therein, which includes a series of spaced rotating members whose peripheries converge toward one side of the series, means for passing said web in an arcuate path about the peripheries of said members and engaged therewith from a side of the series where said peripheries are relatively widely spaced to a side where they are relatively closely spaced, and means for receiving said web from said members and retaining the same in gathered condition.

27. Mechanism for laterally gathering a web of material, which includes a series of rotating members whose peripheries are spaced apart from each other but converge towards each other at one side of the series, and feeding and guiding means for causing laterally spaced portions of said web to follow the peripheries of said members through arcuate paths from a side of the series where said peripheries are relatively widely spaced to a side where they are relatively closely spaced to gather said web inwardly and form fullnesses therein between said laterally spaced portions.

28. In a machine of the character described, in combination, a sewing needle, a tube disposed transverse to the path of movement of said needle, a looper needle carried by said tube in parallel spaced relation to the axis of the tube, means for reciprocating said sewing needle and tube axially, and means for rotatively reciprocating said tube during the reciprocation of the sewing needle.

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