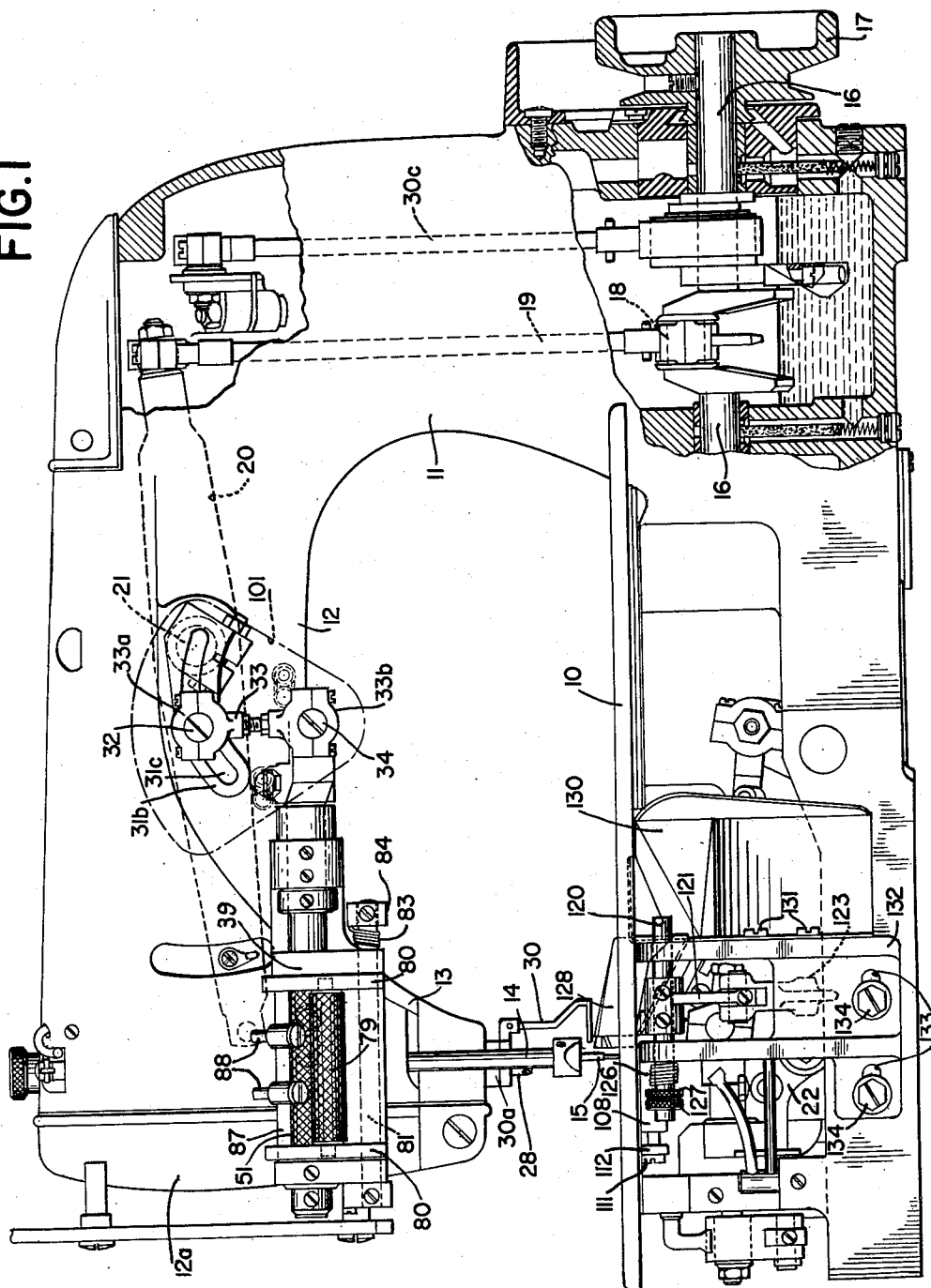


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SEWING MACHINES

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FIG. 1



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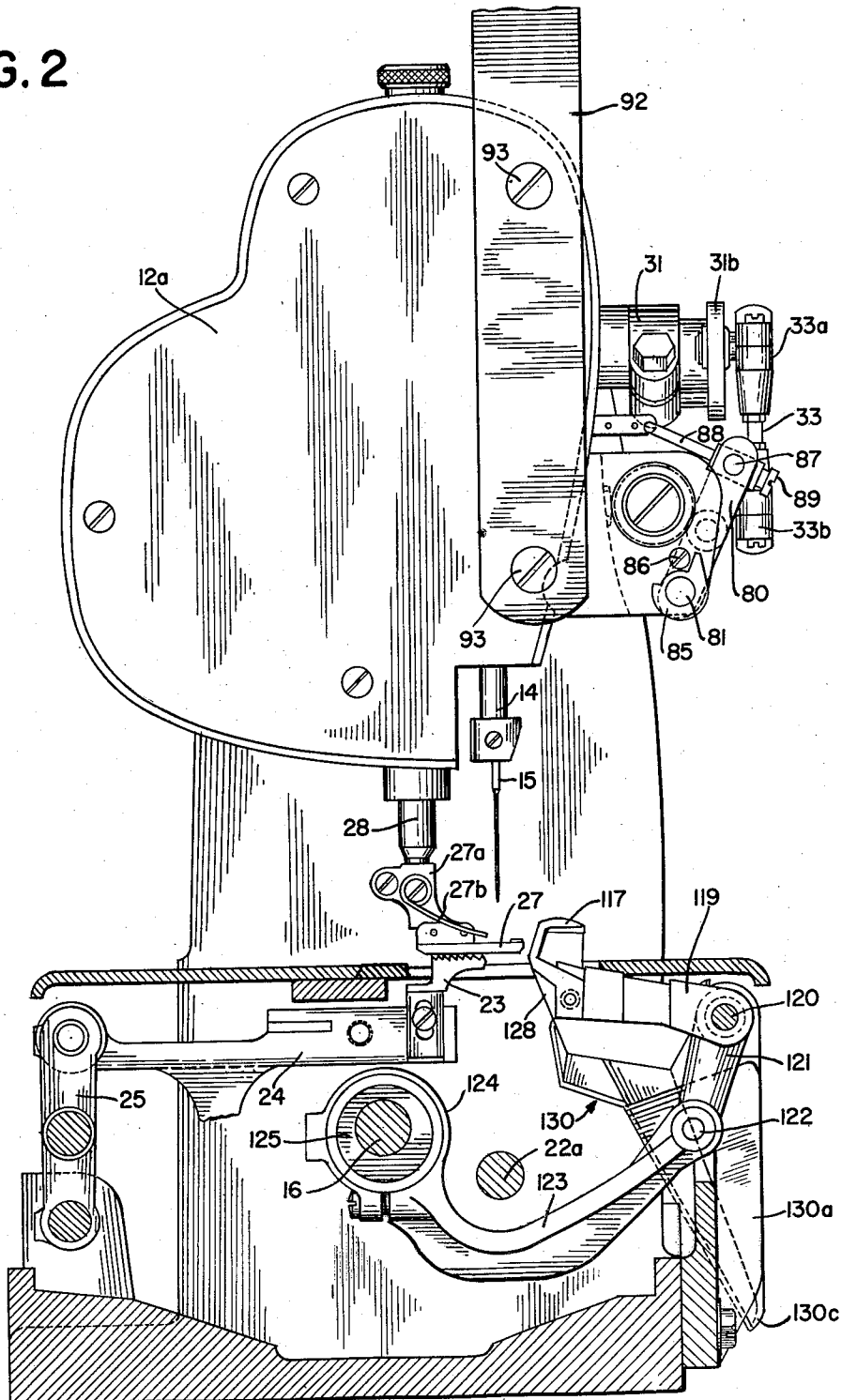
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FIG. 2



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FIG. 4

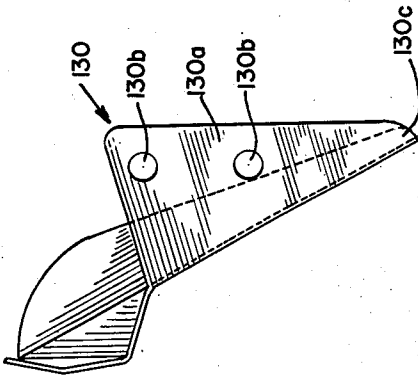


FIG. 5

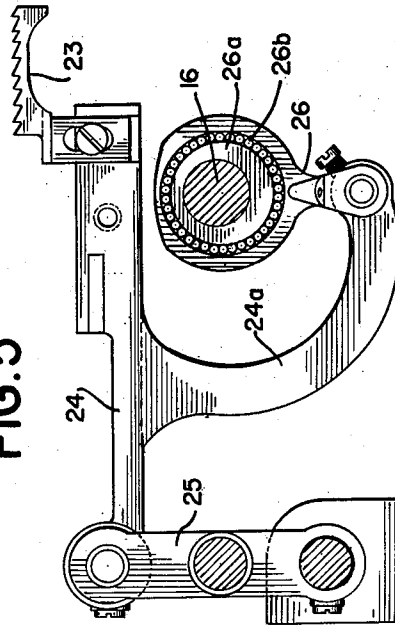
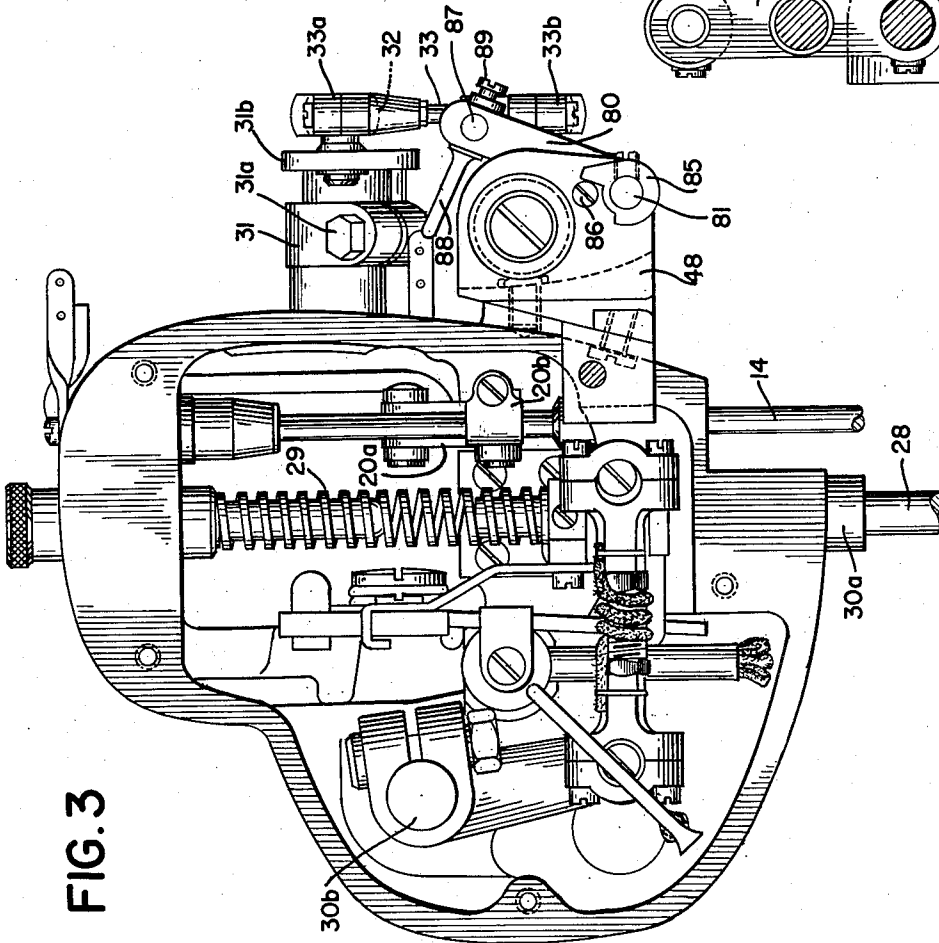


FIG. 3



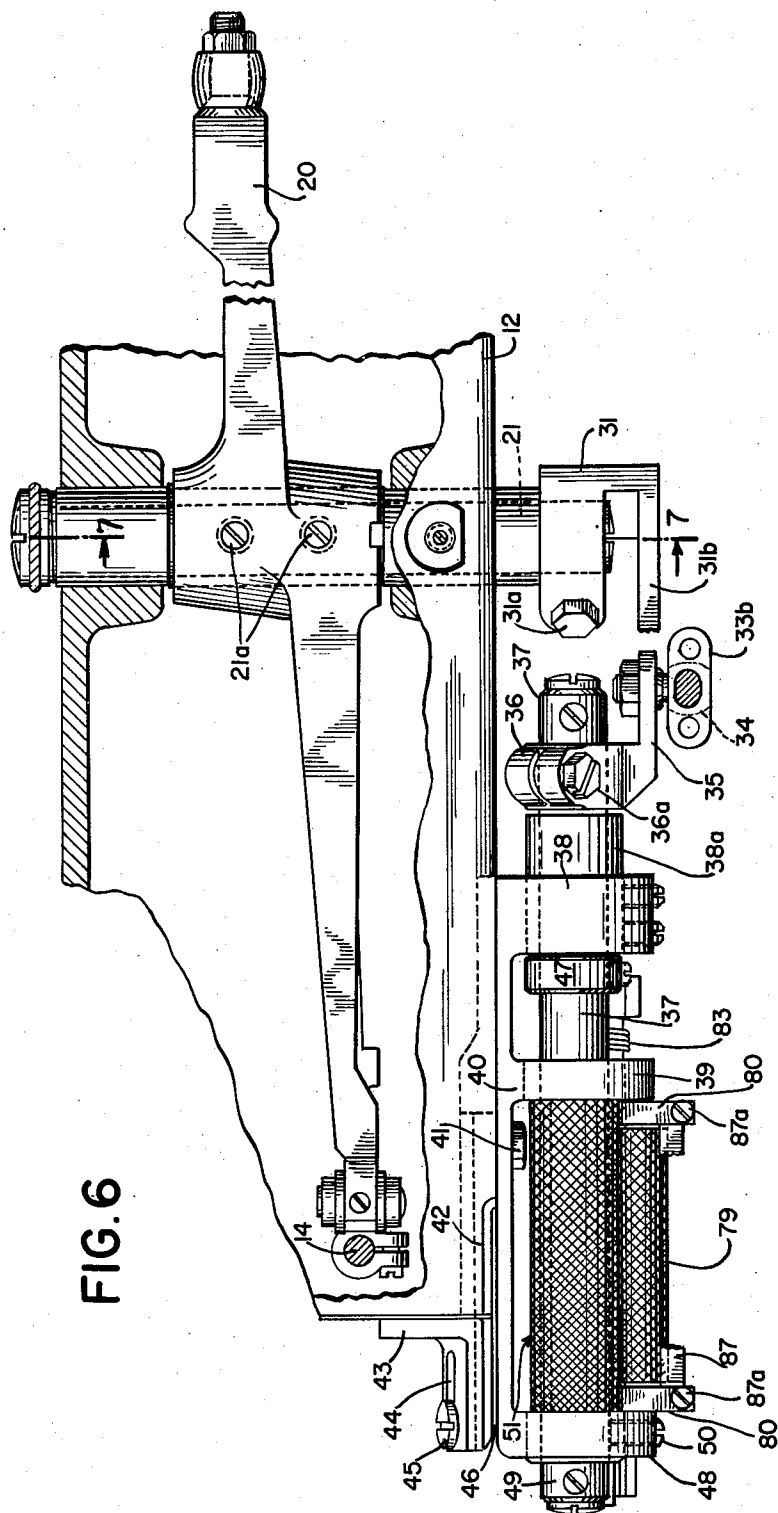
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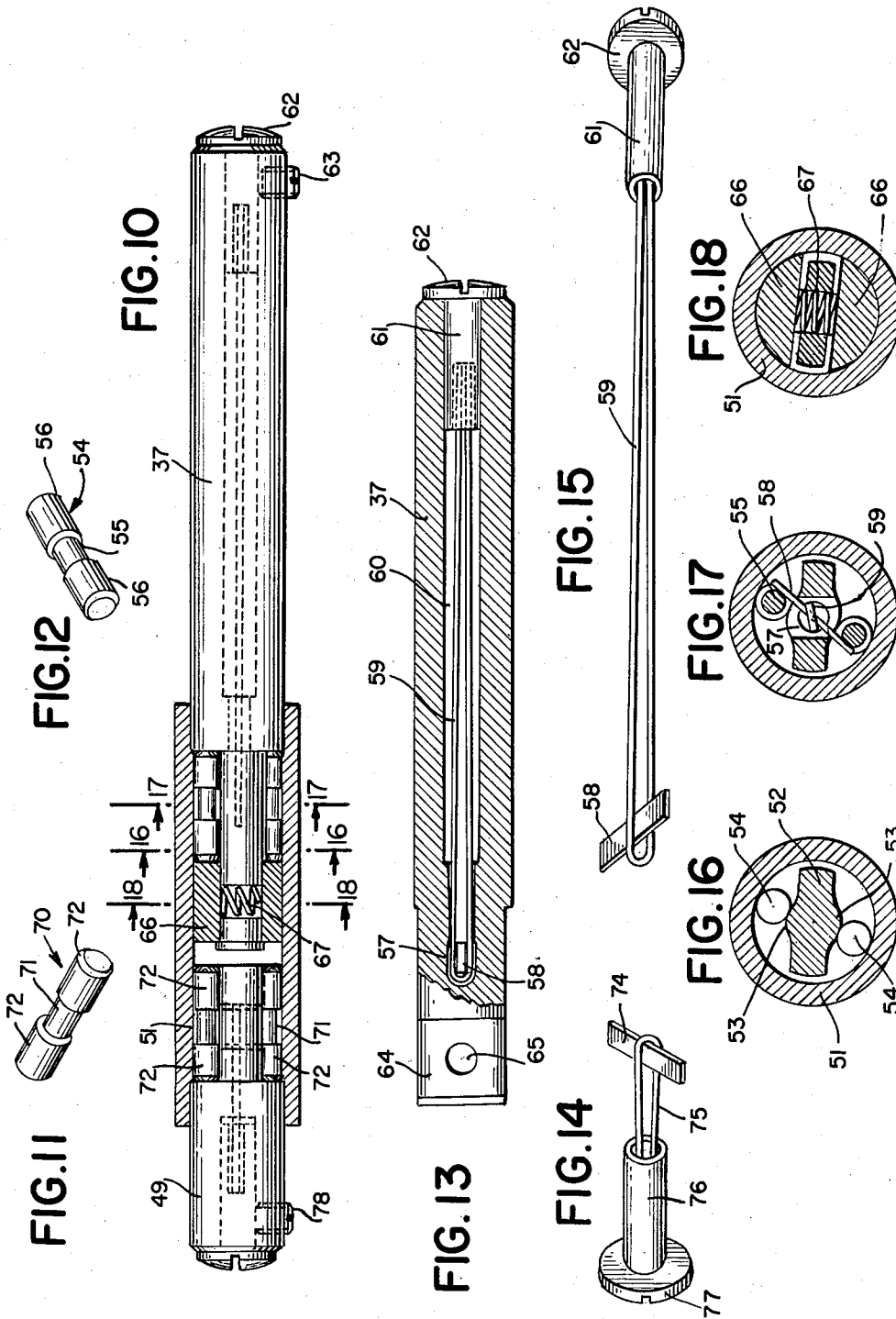
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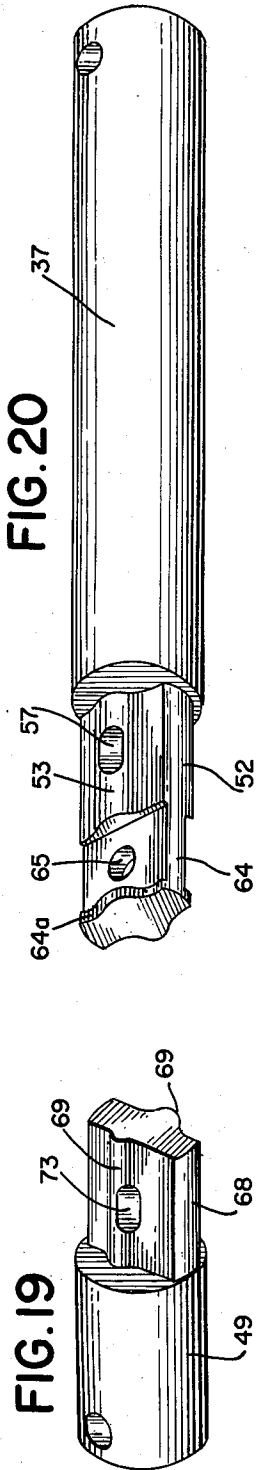
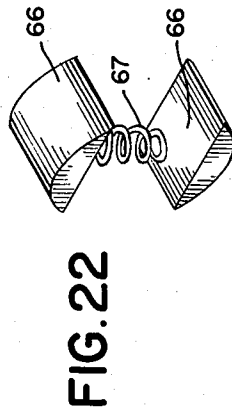
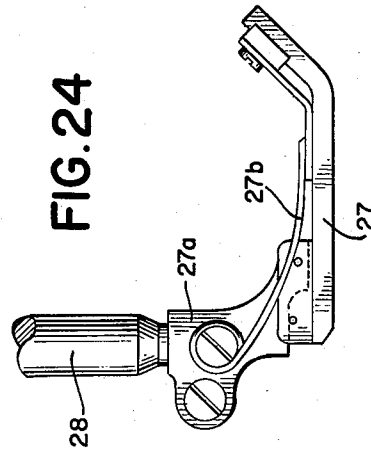
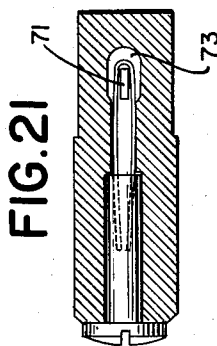
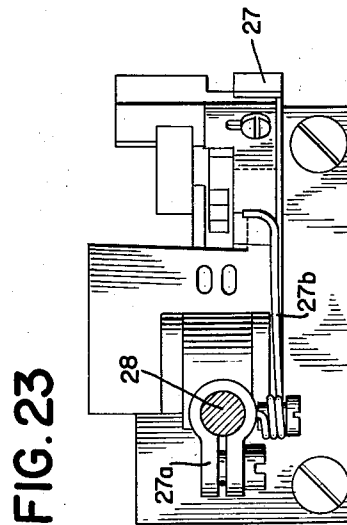
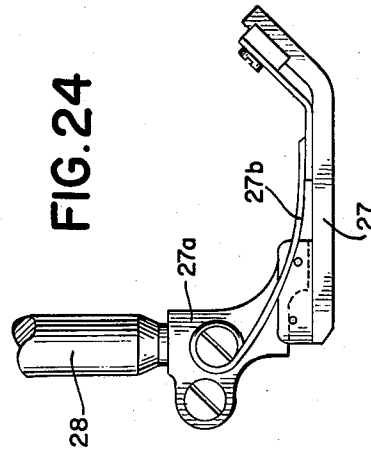


FIG. 24



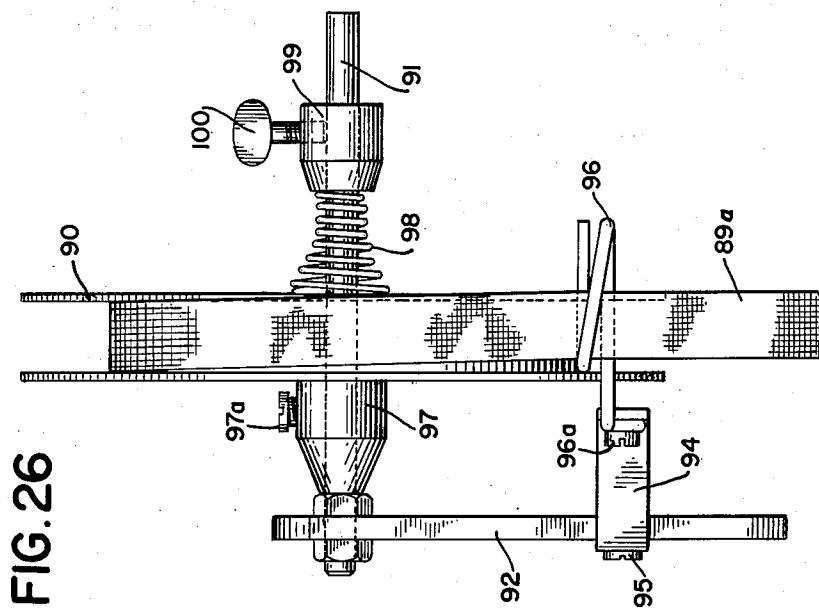
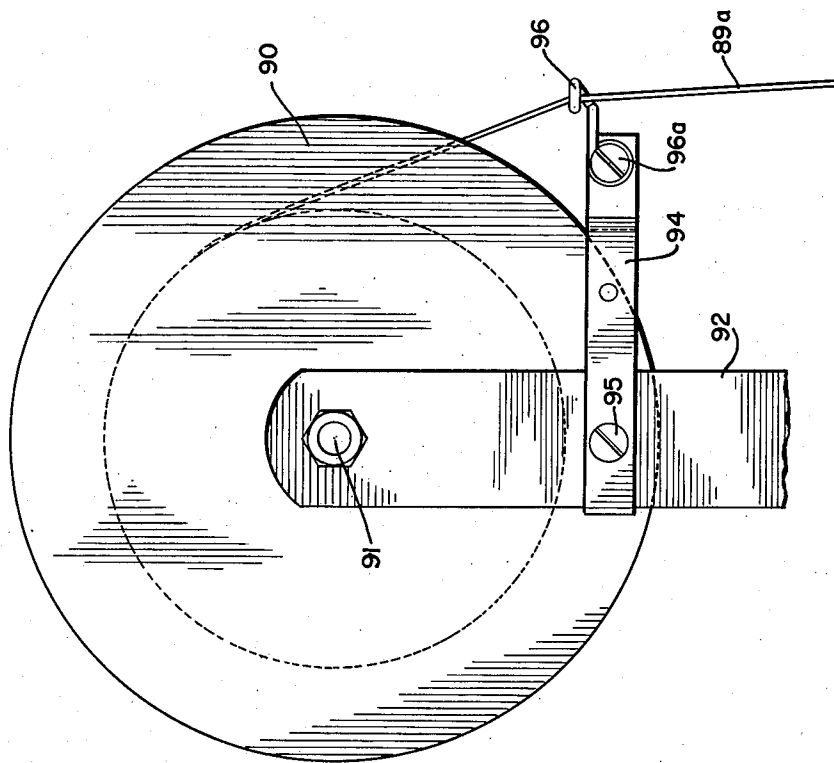
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FIG. 27

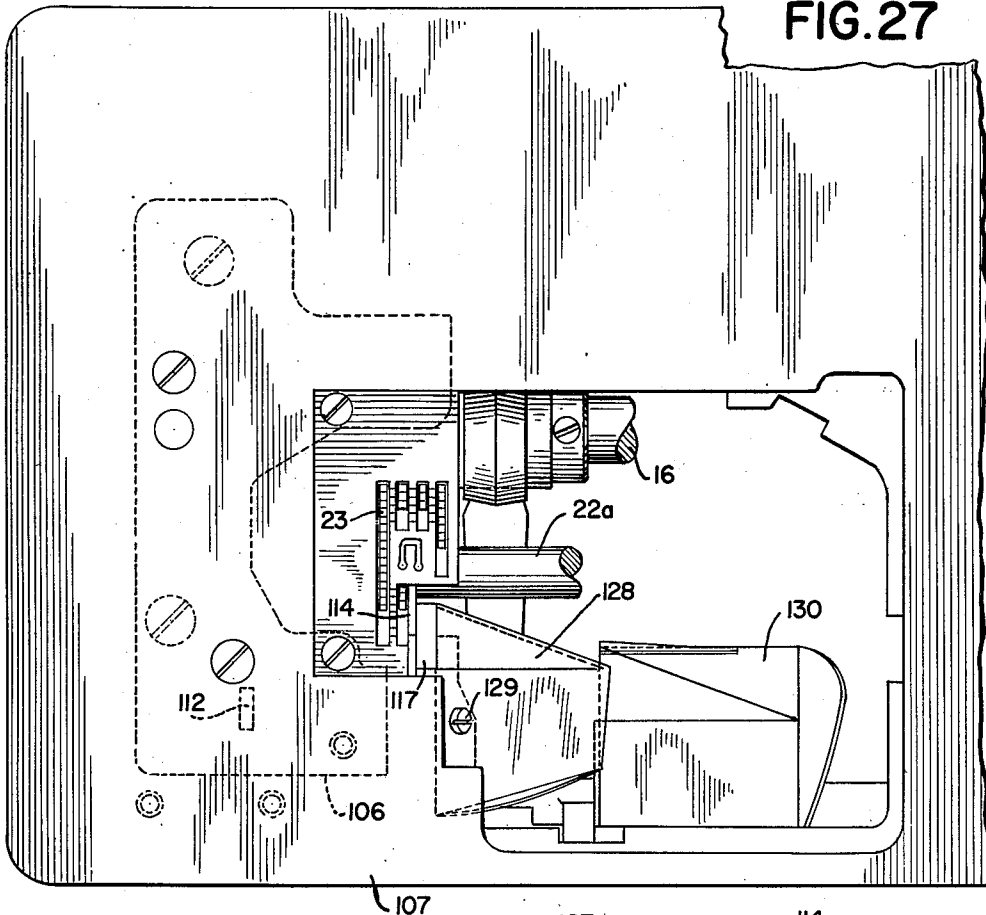


FIG. 28

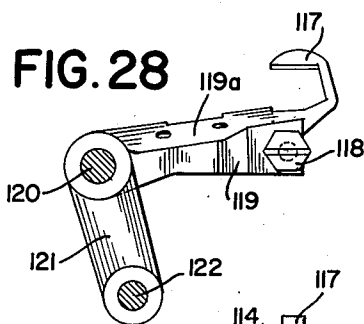


FIG. 29

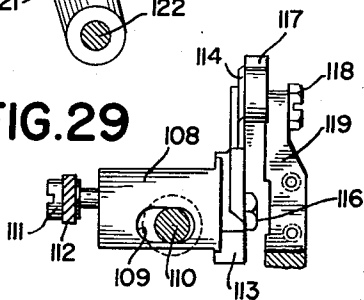
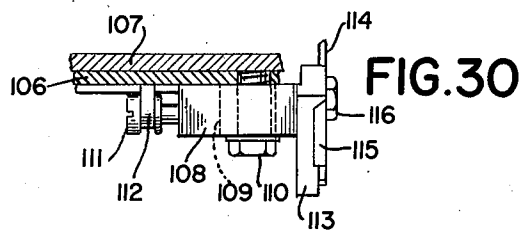
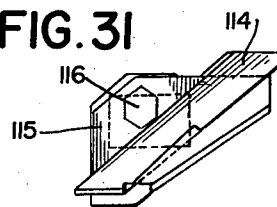


FIG. 30

FIG. 31



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George M. Reimer, Elmwood Park, Ill., assignor to Union Special Machine Company, Chicago, Ill., a corporation of Illinois

Application January 29, 1957, Serial No. 637,005

19 Claims. (Cl. 112—2)

This invention relates to sewing machines adapted for use in attaching elastic bands to garments and the like. It is concerned particularly with the provision of improved means for metering an elastic tape or band to supply a measured length of it to the stitching point for application to the non-elastic fabric of the article.

A primary object of the invention has been to provide simple, compact and reliable means for delivering an elastic tape to the stitch forming devices in an accurately measured amount to insure a uniform relationship between the lengths of the elastic and non-elastic fabrics entering into the seam. Related to the foregoing, it has been a further purpose of the invention to provide means of the character indicated which may be readily adjusted to feed the elastic tape or band to the stitch forming point at a rate bearing any desired relationship to the rate of feed of the non-elastic fabrics, while insuring the same relationship at all times, in accordance with the adjustment, regardless of variations in the speed of operation of the machine.

In achieving the foregoing purposes of the invention, various expedients or features have been adopted for the performance of the several correlated operations of the mechanisms involved and simpler and more compact means than have heretofore been employed have been devised for insuring proper operation of the several mechanisms.

An important feature of the invention is the provision of a simple, compact and reliable one-way clutch unit of novel construction for controlling the supply of an elastic tape or band at a regulated rate. This unit is of simpler construction and more compact than devices heretofore employed for the same general purposes. Also it embodies readily adjustable means for insuring its proper operation under varying conditions. The arrangement is such as to make possible a variation of the spring force applied to rollers employed in the one-way clutch for transmitting intermittent turning movements to a driven element in one direction and to prevent reverse rotation of said element. A special form of spring means is utilized for the purpose. The rollers employed are of novel form and the number of rollers employed has been reduced. Only two rollers are provided in each set, as compared with the greater number heretofore conventionally employed, and the arrangement is such as to reduce to a minimum the wear on certain surfaces engaged by the rollers incident to the operation of the unit. Novel devices are also provided for preventing overthrow of the driven element of the clutch during high speed operation and to prevent turning of the driven element by the force constantly being applied to it by the tensioned elastic tape.

Another feature of the invention is the provision of simple connections from the machine for driving the one-way clutch unit in proper coordination with the other driven elements of the machine. Toward this end a simple connection is provided from the needle bar actuating mechanism for driving the clutch unit in properly

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timed relation to the operation of the stitch forming devices. A rock lever, provided in an overhanging arm of the machine frame for driving the needle bar, is secured to a shaft which extends outwardly at the front face of the arm and has secured thereto a member for driving the metering device. The connections from said member to said device incorporate means for readily varying the extent of operation of the device upon each stitch forming cycle of the machine. A snap-on cover is provided over certain oscillating and reciprocating parts of said connections, for the protection of the operator and to prevent entanglement of threads.

Other objects, features and advantages of the invention will appear from the detailed description of an illustrative form of the same which will now be given in conjunction with the accompanying drawings, in which:

Fig. 1 is a view, largely in front elevation but with parts broken away and shown in section, of a sewing machine embodying the invention;

Fig. 2 is a view of the machine partly in elevation, as seen from the left in Fig. 1, and partly in vertical section through the base of the machine;

Fig. 3 is an end view, in elevation, of the head at the end of the overhanging arm of the machine, with the cover plate removed;

Fig. 4 is a detail view, in perspective, of a stationary chip guard embodied in the machine;

Fig. 5 is a detail view, in transverse vertical section through the base of the machine, showing the feed dog and certain operating connections;

Fig. 6 is a view, partly in plan and partly in horizontal section, of a portion of the overhanging arm of the machine;

Fig. 7 is a transverse vertical section through the overhanging arm of the machine, taken along the line 7—7 of Fig. 6;

Fig. 8 is a detail view illustrating a detachable cover applied over portions of the operating connections for the metering device carried by the overhanging arm;

Fig. 9 is a view, partly in end elevation and partly, in vertical section, showing the tape metering device embodied in the machine;

Fig. 10 is a longitudinal sectional view through a one-way clutch drive forming part of the metering device;

Figs. 11 and 12 are perspective views of rollers embodied in the one-way clutch;

Fig. 13 is a view, largely in longitudinal section but partly in plan, showing a portion of the one-way clutch;

Fig. 14 is a perspective view of a spring construction which may be embodied in the one-way clutch adjacent its left end;

Fig. 15 is a similar view of a spring construction which may be employed at the right end of the one-way clutch;

Fig. 16 is a transverse sectional view taken along the line 16—16 of Fig. 10;

Fig. 17 is a transverse section taken along the line 17—17 of Fig. 10;

Fig. 18 is a transverse section taken along the line 18—18 of Fig. 10;

Fig. 19 is a perspective view of a stationary shaft at the left end of the one-way clutch;

Fig. 20 is a similar view of a rock shaft provided at the right end of the one-way clutch;

Fig. 21 is a longitudinal section view through the stationary shaft;

Fig. 22 is a detail view in perspective showing friction means provided in the one-way clutch for preventing overthrow and for resisting turning forces due to the tensioning of the elastic tape;

Fig. 23 is a view showing in plan the throat plate and presser foot embodied in the machine;

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Fig. 24 is a side elevational view of the presser foot and its supporting means;

Fig. 25 is a side elevational view of a tape supporting reel and its supporting means;

Fig. 26 is a front elevational view of the parts shown in Fig. 25;

Fig. 27 is a plan view of the work supporting base of the machine with a removable portion of the cloth plate removed;

Fig. 28 is a side view of a movable trimming blade embodied in the machine;

Fig. 29 is a plan view of the trimming blade assembly;

Fig. 30 is a view partly in section and partly in elevation, as seen from the front of the machine, showing a stationary blade embodied in the trimming mechanism;

Fig. 31 is a perspective view of the stationary blade and its supporting means;

Fig. 32 is a perspective view showing a modified form of spring which may be employed for the clutch rollers that drive the metering roller;

Fig. 33 is a perspective view of a modified form of spring means that may be used in the portion of the clutch which prevents reverse rotation of the metering roller; and

Fig. 34 is a perspective view of a spring element in the unit of Fig. 33.

For the purposes of illustration the invention has been shown as applied to a flat bed sewing machine of the general character disclosed in the patent to Peterson et al., No. 2,598,426 granted May 27, 1952. The machine has a main hollow frame comprising a work supporting base 10, a vertical standard 11 and an overhanging arm 12 terminating in a needle head 13. Within the head there is mounted, for vertical reciprocation, a needle bar 14 arranged to carry one or more needles 15. The number of needles provided will be determined by the character of the seam desired to be produced by the machine. Extending longitudinally of the base is a main drive shaft 16 which projects outwardly from the frame at its right end (Fig. 1) and has secured thereto a combined hand wheel and pulley 17 through which power may be supplied to the machine. A crank 18 carried by the shaft 16 is connected by a pitman 19 with the right end of a needle lever 20 rockably mounted in the overhanging arm of the machine. The needle lever is secured to a rock shaft 21 by means of set screws 21a. Shaft 21 is suitably journaled in bearing sleeves provided in the front and rear walls of the overhanging arm and extends outwardly through the front wall of the arm. At its left end the needle lever is connected by a link 20a (Fig. 3) with a block 20b clamped upon the needle bar 14. Through the connections described, the needle bar is reciprocated to carry the needle or needles from a point above the work supporting base through the later into cooperation with a suitable looper. This looper, as disclosed in said Peterson et al. patent, is carried by a rock member, designated 22 in Fig. 1, secured to a rock shaft 22a (Figs. 2 and 27). It is arranged, through suitable connections, to be given loop-seizing and shedding movements and also needle-avoid movements. The loop-seizing and shedding movements are in a direction across the line of feed while the needle-avoid movements are in the line of feed.

For the purpose of advancing the work in the region of the stitch forming devices, a feed dog 23 (Figs. 2 and 5) is provided, this being carried by a feed bar 24 pivotally connected at its left end with a frame or feed rocker 25. Through connections of the character shown in said Peterson, et al. patent, the frame 25 is rocked to impart feed and return movements to the feed dog. A downwardly extending arm 24a carried by the feed bar 24 is pivotally connected with a link 26 having a strap cooperating with an eccentric 26a carried by the shaft 16. Preferably, as shown, needle bearings 26b are provided between the strap 26 and the eccentric 26a. Rotation of the latter serves to lift and lower the feed dog in the course of its

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feed and return movements. Cooperating with the feed dog 23 in advancing the work is a presser foot 27 (Fig. 2) pivotally mounted on a shank member 27a secured to the lower end of a presser bar 28. A spring 27b urges the presser foot in a clockwise direction (Fig. 2) against the work passing between the feed dog and the presser foot. A spring 29 (Fig. 3) urges the presser bar downwardly to provide the desired pressure against the work.

If the machine is desired to form a plurality of lines of stitching with a cover thread interengaged with a plurality of needle threads, a cover thread-lying finger 30 (Fig. 1) is provided. This finger is secured to and extends downwardly from a sleeve 30a which surrounds the presser bar 28 and is adapted to be oscillated by connections from a rock shaft 30b (Fig. 3). This shaft is given its rocking movements by connections from the shaft 16 including a link or pitman 30c (Fig. 1) extending upwardly through the vertical standard. The connections for this purpose are disclosed in the above-mentioned Peterson et al. patent and need not be described in detail here.

Turning now to the metering device for insuring the delivery of accurately measured lengths of an elastic tape to the above-described regular work feeding devices of the sewing machine, this is shown in assembled relation in Figs. 1, 3 and 6. Secured to the end of the shaft 21, which extends outwardly from the front wall of the overhanging arm, is a bracket 31 having a split portion adapted to be clamped upon the shaft by means of a screw or bolt 31a. Spaced outwardly from the clamping portion is an arm 31b which extends parallel with the front face of the overhanging arm and is provided with an arcuate slot 31c. Arranged for adjustment along this slot, to vary the feed stroke to be imparted to the driven metering roll to be hereinafter described, is a ball pin 32 with which cooperates a strap 33a at the upper end of a link or pitman 33. The lower end of the latter is provided with a strap 33b which cooperates with a ball pin 34 carried by an arm 35 of a member having a clamping portion 36 secured by means of a clamping screw 36a upon a shaft 37. This shaft is journaled in bushings carried by arms 38 and 39 of a bracket 40 secured to the frame of the machine. The arrangement is preferably such that the bracket 40 may be adjusted horizontally to vary the position of the metering device for most advantageous cooperation with the stitch forming and work feeding devices of the machine. For this purpose the bracket 40 is secured to the frame of the machine by means of a screw 41 suitably threaded into the frame and having a portion of its shank cooperating with a horizontally elongated opening (not shown) in the bracket. An extension 42 of the bracket, spaced slightly from the main body of the latter, is also secured to an angle member 43 carried by the frame. This angle member has an arm, parallel with the extension 42, provided with an elongated opening 44 to receive the shank of a screw 45 the inner end of which is threaded into the extension 42. A small space 46 (Figs. 6 and 9) provided between the main body of the bracket 40 and the extension 42 allows for the passage of the needle thread from the source of supply to the needle. Shaft 37 is held against axial movement by means of a collar 47, secured to the shaft at one side of the arm 38 of the bracket, and by the clamp 36 cooperating with the right end of the bearing sleeve 38a for the shaft (Fig. 6).

Another forwardly extending arm 48 of the bracket 40 carries a bushing in which is mounted a fixed shaft 49. This is held against rotation by a set screw 50. Journaled on the two shafts 37 and 49 is a hollow feed roller 51 having a knurled surface, preferably of a diamond-shaped configuration. This feed roller is journaled upon the inner ends of the cylindrical portions of the two shafts 37 and 49 (Fig. 10) and the bores of the roller which are so journaled are preferably slightly eccentric to the axis of the main bore through the roller. This, as will appear

more clearly later, is for the purpose of distributing the wear on certain surfaces of the clutch unit.

Shaft 37 has a reduced and flattened portion 52 extending into the interior of the roller 51 and this portion is provided with camming or wedging surfaces 53, as best shown in Figs. 16 and 20. Between the camming surfaces 53 and the inner wall of the roller 51 there is provided a pair of clutch rollers 54. Each clutch roller has a reduced central portion 55 and enlarged end portions 56, the latter serving to transmit the driving force from the portion 52 of the rock shaft to the feed roller 51. In the central portion of the extension 52 there is provided an opening 57 (Figs. 13, 17 and 20) through which may be freely inserted a flat plate-like element 58 which may either be rigid or of spring construction. Element 58 is retained by a loop or spring wire 59. It may simply be held frictionally by the latter, or it may be secured more positively thereto if desired. The spring wire 59 extends through an axial bore 60 in the shaft 37 and has its outer end secured, as by soldering or the like, to a sleeve 61 fitting snugly in the bore 60. Sleeve 61 has an enlarged head 62 provided with a key slot enabling it to be turned readily by a screw driver or the like. When properly adjusted the sleeve is clamped in set position by means of a set screw 63. It will be apparent that turning of the sleeve 61 will vary the spring force of the wire element 59 and hence the force imparted by the element 58 to the rollers 54. By appropriate adjustment of the spring force the desired operation of the clutch unit may be insured.

Inwardly of the extension 52 is a further extension 64 of the shaft 37, this having flat top and bottom surfaces and having a slightly enlarged head 64a at its inner end. An opening 65 is formed through the extension 64. A shoe 66 mounted on each surface of extension 64 is arranged to be urged outwardly into engagement with the inner surface of the feed roller 51 by means of a spring 67. The shoes 66 thus have a certain amount of friction in relation to the feed roller and serve to prevent overthrow of the latter in the course of its operation. They also prevent undesired movement of the feed roller, at times when the latter is free to turn, in response to the pull on the elastic tape. As will be understood, when the part 52 of the shaft 37 is rocked in a clockwise direction (Fig. 16) the camming surfaces 53 will wedge the rollers 54 against the inner surface of the feed roller 51 and thus turn the latter. On the other hand, counterclockwise movement of the extension 52 will relieve the pressure between the rollers 54 and the inner surface of the feed roller so that little turning effort will be applied to the latter. In this respect the improved clutch is similar in operation to that disclosed in the patent to Schoij, No. 2,494,006, granted January 10, 1950. Also, the eccentric mounting of the feed roller in relation to the rock shaft 37 will distribute the wear of the clutch rollers over a substantial arc of the cam surfaces 53 in the manner disclosed in said Schoij patent.

To prevent rotation of the feed roller 51 in the reverse direction, as the rock shaft 37 is moved counterclockwise, the fixed shaft 49 is provided with clutch rollers operating in reverse relation to the clutch rollers 54. Thus, the shaft 49 is provided with an inward extension 68 (Fig. 19) having relatively flat top and bottom faces but provided with cam formations 69 which are reversely positioned in relation to the clutch rollers from the surfaces 53 of the rock shaft. Clutch rollers 70 are provided for cooperation between the cam surfaces 69 and the inner surface of the feed roller. Each of these clutch rollers has a reduced central portion 71 and enlarged end portions 72. Cooperating with the reduced portion 71 is a thin, plate-like element 74 which may be either rigid or spring-like and which is retained by a spring wire 75 the ends of which are secured by solder or the like within a sleeve 76 having an enlarged head 77. The latter may be turned to vary the spring force imparted by the wire

75 and it may be locked in set position by a set screw 78.

It will be apparent from the foregoing that during operation of the machine the feed roller 51 will be given step by step movements, as the rock shaft 37 is rocked in a clockwise direction, and the feed roller will be held against movement in the reverse direction by the action of the fixed shaft 49 and its cooperating clutch rollers, as the shaft 37 is rocked in a counterclockwise direction. The extent of each increment of movement of the feed roller may be varied by adjustment of the ball pin 32 along the slot 31c of arm 31b.

Cooperating with the metering roller 51 is a smaller presser roller 79 (Figs. 1 and 6) which serves to hold the tape against roller 51 and grip it to prevent slippage. As shown, roller 79 is preferably provided with a knurled surface of diamond configuration. Other forms of knurling may, however, be provided on either or both of the rollers 51 and 79. Roller 79 is carried by a pair of arms 80 (Figs. 2, 6 and 9) secured to a shaft 81 journaled in the forwardly extending arms 39 and 48 of the bracket 40. A set screw 82 provided for each of the arms 80 serves to secure the latter to the shaft 81 for rocking movement with the shaft. A torsion spring 83, surrounding the shaft 81 (Figs. 1 and 6), has one end inserted in an aperture in the arm 39 and its other end engaged with a collar 84 secured to the outer end of the shaft. The arrangement is such that the spring tends to urge the shaft 81 in a counterclockwise direction (Fig. 9) and thus retain the roller 79 in frictional engagement with the roller 51. On its outer end the shaft 81 has secured thereto a member 85 (Fig. 3) having an upwardly extending arm arranged to cooperate with a screw or pin 86 extending from the arm 48. This serves to limit the inward movement of the arms 80 and roller 79 so as to prevent actual engagement of the roller 79 with the roller 51 but to permit the roller 79 to grip a tape fed between the two rollers. A rod 87 extending between the two arms 80, and secured to each of the latter by set screw 87a, provides a support for guide fingers 88 (Figs. 1 and 3). These fingers may be adjusted longitudinally of the rod 87 to any desired position for properly guiding the elastic tape 89a to the bite of the rollers 51 and 79. Clamping screws 89 (Fig. 3) are provided to secure the fingers in set position.

The tape is carried by a spool or reel 90 (Figs. 25 and 26) suitably mounted on the frame of the machine, above the metering device, for free rotation upon a rod 91 carried by an arm 92 secured by screws 93 (Fig. 2) to a cover plate 12a for the head of the overhanging arm of the machine. A bracket 94 extending forwardly from the arm 92, and which is secured to the latter by a screw 95, has mounted on its forward end a tape guide 96. The latter is secured to the bracket by a screw 96a. While the reel 90 is free to turn upon the rod 91 it is prevented from turning too freely by friction means shown in Fig. 26. One face the reel bears against a radially extending face or shoulder of a collar 97 secured to the rod 91 by a set screw 97a. The opposite face of the reel is engaged by a spring 98 surrounding the rod 91. At its opposite end the spring 98 bears against a shoulder or face on a collar 99 secured to the rod 91 by a set screw 100. By adjusting the position of the collar 99 the pressure of the spring 98 on the reel 90 may be varied to provide the desired extent of friction.

As will be apparent, the tape 89a from the reel, after passing through the guide 96, extends downwardly between the guide fingers 88 and then into the bite of the rollers 51 and 79. From these the tape extends downwardly to the presser foot and then rearwardly beneath the latter to the point of stitch formation. In a conventional operation, in which the tape is to be stitched to the non-elastic fabric of the garment or the like while the tape is stretched to the extent of 100 percent of its original length, the feed dog 23 and presser foot 27 will serve to advance the tape and the fabric at double the speed at

which the tape is supplied from the reel by the metering feed roller 51. The extent to which the tape is stretched prior to incorporation in the seam may be varied as desired by appropriate adjustment of the ball pin 32 along the slot 31c of arm 31b in relation to the adjustment of the feed movement of the feed dog 23.

As best shown in Fig. 8, a cover 101 is preferably provided over the link or pitman 33 and other parts of the driving connections from the shaft 21 to the feed roller 51. This cover is adapted to be readily removed and replaced whenever desired. It has a rearwardly extending stem 102 arranged to be inserted in a cup 103 carried by a plate 104 secured to the bushing in the front wall of the overhanging arm 12 in which the shaft 21 is journaled. A spring ring 105, surrounding the cup 103 adjacent its mid-point, has a portion arranged to extend inwardly through the wall of the cup by virtue of an arcuate opening provided in a region of said wall. This spring ring cooperates with an inclined, frusto-conical surface 102b provided by an annular depression or recess extending around the stem 102 adjacent its inner end. The extreme end of the stem is preferably of conical formation as shown at 102a. This enables the stem to be readily inserted within the cup and then locked by the spring ring 105. It may readily be removed, however, by an appropriate outward pull on the cap 101.

Suitable means are provided on the machine for trimming the inner edge of the work as it approaches the stitching point. This means will be briefly described. As best shown in Figs. 27-31, there is provided a throat plate support 106 beneath the cloth plate 107, the support being secured to the cloth plate by suitable screws. To the undersurface of the support 106 there is adjustably secured a block 108 having an opening 109 therethrough which is elongated in a direction transverse to the line of stitch formation. This opening allows adjustment of the block in such direction in relation to a clamping screw 110. To facilitate accurate adjustment of the block 108 in accordance with the desired distance between the trimmed edge of the work and the line of stitch formation, a screw 111 is provided. This has threaded engagement with an opening in the block 108 and is held against longitudinal movement by a fork 112 carried by and extending downwardly from the support 106. At the right end of the block 108 there is provided a knife blade retaining head 113. This is provided with an inclined channel or guideway to receive a knife blade 114. The knife blade has its longitudinal edges beveled and a clamping block 115 is provided to cooperate with one of these beveled edges. Block 115 is secured to the head 113 by a screw 116. It will be apparent that the position of the upper, active end of the knife blade 114 may thus be varied to place it in proper relation to the top of the cloth plate and throat plate.

Cooperating with the fixed knife blade 114, to trim the edge of the work, is a movable knife blade 117 secured by a screw 118 to an arm 119. The latter is secured to a rock shaft 120 carried by the frame of the machine (Figs. 1 and 2). A downwardly extending arm 121 secured to the shaft 120 and, if desired, made integral with the arm 119, is pivotally connected at 122 with a pitman 123 having a strap 124 cooperating, preferably through needle bearings, with an eccentric 125 secured to the main shaft 16 of the machine. The arrangement is such that upon each revolution of the shaft 16 the knife 117 will be carried downwardly, through the rocking of the arm 119, and will cooperate with the fixed blade 114 to trim the edge of the work. A compression spring 126 (Fig. 1), surrounding the shaft 120 and cooperating at one end with a fixed portion of the frame and at its other end with the innermost of a pair of knurled nuts 127, serves to urge the shaft 120 toward the left to maintain the movable cutter blade in proper cutting relation to the fixed blade 114.

Cooperating with the trimming mechanism there is provided suitable means for directing the trimmed material toward the front of the machine. For this purpose there is provided a movable chip guard 128 (Figs. 2 and 27) mounted upon the arm 119 which carries the movable cutter 117. The top surface 119a of the arm 119 (Fig. 28) slopes downwardly toward the right (Fig. 27) so that the chip guard 128 will slope generally in that direction. This chip guard is secured by one or more screws 129 to the arm 119. It has an upwardly and forwardly curled portion at its rearward end following generally the contour of the movable cutter blade 117. At its forward end it has a slight upwardly extending wall and thus forms a trough arranged to direct the chips or trimmed material toward the right where it is discharged into a stationary chip guard 130. This is shown in detail in Fig. 4. It is secured to a portion of the frame of the machine by means of screws 131 (Fig. 1) cooperating with holes 130b in a forwardly extending side wall 130a of the chip guard. The upper end of the stationary chip guard communicates with the movable chip guard 128 and receives the trimmed material from the latter. The trimmings are then discharged at the lower end 130c of the chip guard 130 which projects outwardly to a limited extent from the forward face of the base of the frame.

As shown in Fig. 1, the movable trimmer blade and its supporting means and also the two chip guards mentioned are preferably mounted on a bracket 132 secured to the base of the frame in a manner to permit adjustment to a limited extent longitudinally thereof. For this purpose the bracket is provided with elongated openings 133 through which extend fastening screws 134 having threaded engagement with the base of the frame. This enables adjustment of the parts carried by the bracket to conform with the adjustment of the stationary blade 114 in providing the desired spacing of the line of stitching from the trimmed edge of the work.

It will be understood that the machine is provided with various devices, in addition to those described, for insuring proper functioning of the machine. Thus, suitable thread guides, take up means and tensioning devices are provided. Also, means are provided for insuring effective lubrication of the wear receiving parts of the machine. If desired, a puller roller may be provided in the rear of the point of stitch formation to insure proper advance of the material through the stitching zone. Such a puller roller may, if desired, be driven from the shaft 30b through a one-way clutch of known construction.

While an illustrative machine embodying the present invention has been disclosed in considerable detail, it will be understood that various changes may be made in the construction and arrangement of the several parts without departing from the principles and scope of the invention as defined by the appended claims.

For example, the spring wire 59 of Fig. 15 could take the form of a thin, broad, flat spring strip 135 (Fig. 32) formed of spring steel having one end inserted in, and provided with a press fit in relation to, a reduced stem portion of a retaining member 136. At its opposite end the strip 135 is apertured to receive and retain a short plate 137 adapted to engage the rollers of the clutch in the manner explained in relation to the plate 58. To vary the force applied to the rollers, the member 136 may be turned in relation to the shaft 37 and held in any adjusted position by means of a set screw, such as the set screw 63 (Fig. 10).

In Figs. 33 and 34 a modified spring arrangement is shown to replace that illustrated in Fig. 14 for the stationary shaft. This comprises a coiled wire spring element 138 having one end 139 of L-shaped configuration, this being inserted in a slot in the stem of a member 140. Preferably the portion 139 of the spring element is soldered in place within the member 140. At its opposite end the spring element is looped, as indicated at 141, and adapted to retain a small plate 142. The spring force

applied by the spring element may be varied by turning the member 140 in relation to the shaft 49 and locking it in set position by a set screw such as shown at 78 in Fig. 10.

What I claim is:

1. A sewing machine adapted to apply an elastic tape under tension to a fabric which comprises a frame having a work supporting base and an overhanging arm, a rotary drive shaft in said frame, stitch forming devices including a reciprocable needle, means for reciprocating said needle comprising a rock lever mounted in said arm, a rock shaft extending transversely of said arm and having said rock lever secured thereto, connections from said drive shaft to said lever for rocking the latter and said rock shaft, work feeding devices for advancing fabric and an elastic tape on said work supporting base in the region of stitch formation at a predetermined rate, means for supplying said elastic tape to said work feeding devices at a rate less than the rate of feed of said devices, said last mentioned means comprising a feed roller having its axis at right angles to said rock shaft, and connections from said rock shaft for driving said roller.

2. A sewing machine adapted to apply an elastic tape under tension to a fabric which comprises a frame having a work supporting base and an overhanging arm, a rotary drive shaft in said base, stitch forming devices including a reciprocable needle, means for reciprocating said needle comprising a rock lever mounted in said arm, a rock shaft extending transversely of said arm and having said rock lever secured thereto, connections from said drive shaft to said lever for rocking the latter and said rock shaft, work feeding devices for advancing fabric and an elastic tape on said work supporting base in the region of stitch formation at a predetermined rate, means for supplying said elastic tape to said work feeding devices at a rate less than the rate of feed of said devices, said last mentioned means comprising a feed roller having its axis at right angles to said rock shaft, and connections from said rock shaft for driving said roller, said connections comprising an arm secured to said rock shaft and provided with an elongated slot, and a member adjustable along said slot to vary the rate of feed of said feed roller.

3. A sewing machine adapted to apply an elastic tape under tension to a fabric which comprises a frame having a work supporting base and an overhanging arm, a rotary drive shaft in said frame, stitch forming devices including a reciprocable needle, means for reciprocating said needle comprising a rock lever mounted in said arm, a rock shaft extending transversely of said arm and projecting outwardly therefrom, and having said rock lever secured thereto, connections from said drive shaft to said lever for rocking the latter and said rock shaft, work feeding devices for advancing fabric and an elastic tape on said work supporting base in the region of stitch formation at a predetermined rate, means for supplying said elastic tape to said work feeding devices at a rate less than the rate of feed of said devices, said last mentioned means comprising a feed roller having its axis at right angles to said rock shaft, connections from said rock shaft for driving said roller, said connections comprising an arm secured to said rock shaft outwardly of said arm and provided with an elongated slot, and a member adjustable along said slot to vary the rate of feed of said feed roller, and a readily removable cover concealing said slotted arm and said member.

4. In a sewing machine adapted to apply an elastic tape to a fabric which comprises a frame having a work supporting base and an overhanging arm, stitch forming devices including a needle carrying bar reciprocable in said arm, and work feeding devices for advancing a fabric and an elastic tape at a predetermined rate on said work supporting base in the region of stitch formation, the combination which comprises means for supplying said elastic tape to said work feeding devices at a rate less than the rate of feed of said devices, said means comprising

a hollow feed roller, a rock shaft and a stationary shaft in axial alignment for supporting said roller, means for rocking said rock shaft back and forth through a predetermined angle, said rock shaft having a flattened portion of reduced cross-sectional area with cam formations on the opposite faces thereof, clutch rollers coacting between said cam formations and the interior surface of said feed roller for driving the latter upon one direction of movement of said rock shaft, said stationary shaft having a flattened portion of reduced cross-sectional area with cam formations on the opposite faces thereof, and clutch rollers coacting between said cam formations on said flattened portion of the stationary shaft and the inner surface of said feed roller to prevent rotation of the latter in a direction opposite to that in which said feed roller is driven by said rock shaft.

5. In a sewing machine of the character set forth in claim 4, said means for supplying elastic tape to the work feeding devices including spring means for urging the several clutch rollers in a direction counter to their direction of action of said feed roller, and readily accessible means for varying the force of said springs.

6. In a sewing machine of the character set forth in claim 5, said shafts being provided with axial bores and said spring means comprising a bent wire spring element secured to each of said shafts and disposed within the bore thereof, and a member carried by each of said spring elements arranged to engage certain of said clutch rollers.

7. In a sewing machine of the character set forth in claim 5, said shafts being provided with axial bores and said spring means comprising a slender elongated spring element within the bore of each of said shafts, each spring element having one end thereof secured to its related shaft, and a member carried by each of said spring elements adjacent its opposite end arranged to engage certain of said clutch rollers.

8. In a sewing machine of the character set forth in claim 7, at least one of the spring elements comprising an elongated flat strip of spring material.

9. In a sewing machine of the character set forth in claim 7, at least one of the spring elements comprising an at least partially coiled spring wire.

10. In a sewing machine adapted to apply an elastic tape to a fabric which comprises a frame having a work supporting base and an overhanging arm, stitch forming devices including a needle carrying bar reciprocable in said arm, and work feeding devices for advancing a fabric and an elastic tape at a predetermined rate on said work supporting base in the region of stitch formation, the combination which comprises means for supplying said elastic tape to said work feeding devices at a rate less than the rate of feed of said devices, said means comprising a hollow feed roller, a rock shaft and a stationary shaft in axial alignment for supporting said roller, means for rocking said rock shaft back and forth through a predetermined angle, clutch means comprising rollers coacting between surfaces integral with said rock shaft and said feed roller for driving the latter upon movement of said rock shaft in one direction, spring urged friction means carried by said rock shaft cooperating with the inner surface of said feed roller to prevent overthrow thereof in the direction of feed, and clutch means comprising rollers coacting between surfaces integral with said stationary shaft and said feed roller for preventing rotation of the latter in a direction opposite to its direction of feed.

11. In a sewing machine a hollow feed roller for advancing material to be stitched, a rock shaft inserted in and supporting one end of said feed roller, a stationary shaft axially aligned with said rock shaft and inserted in and supporting the opposite end of said roller, means for rocking said rock shaft, clutch means comprising a set of rollers coacting between surfaces integral with said rock shaft and the inner surface of said feed roller

for driving the latter upon one direction of movement of said rock shaft, and means for preventing turning of the feed roller in the opposite direction which comprises a set of rollers coacting between surfaces integral with said stationary shaft and the inner surface of said feed roller.

12. In a sewing machine a hollow feed roller for advancing material to be stitched, a rock shaft inserted in and supporting one end of said feed roller, a stationary shaft axially aligned with said rock shaft and inserted in and supporting the opposite end of said roller, means for rocking said rock shaft, clutch means comprising a set of rollers coacting between surfaces integral with said rock shaft and the inner surface of said feed roller for driving the latter upon one direction of movement of said rock shaft, means for preventing turning of the feed roller in the opposite direction which comprises a set of rollers coacting between surfaces integral with said stationary shaft and the inner surface of said feed roller, and adjustable spring means cooperating with at least one of said sets of rollers for urging the same into active engagement with the inner surface of said feed roller under a variable force.

13. In a sewing machine a hollow feed roller for advancing material to be stitched, a rock shaft inserted in and supporting one end of said feed roller, a stationary shaft axially aligned with said rock shaft and inserted in and supporting the opposite end of said roller, means for rocking said rock shaft, clutch means comprising a set of rollers coacting between surfaces integral with said rock shaft and the inner surface of said feed roller for driving the latter upon one direction of movement of said rock shaft, means for preventing turning of the feed roller in the opposite direction which comprises a set of rollers coacting between surfaces integral with said stationary shaft and the inner surface of said feed roller, and adjustable spring means cooperating with at least one of said sets of rollers for urging the same into active engagement with the inner surface of said feed roller, said spring means extending along the axis of one of said shafts and being adjustable at one end of said one of said shafts to vary the force with which the related set of rollers is urged into active engagement with the inner surface of said feed roller.

14. In a sewing machine a hollow feed roller for advancing material to be stitched, a rock shaft inserted in and supporting one end of said feed roller, a stationary shaft axially aligned with said rock shaft and inserted in and supporting the opposite end of said roller, means for rocking said rock shaft, clutch means comprising a set of rollers coacting between surfaces integral with said rock shaft and the inner surface of said feed roller for driving the latter upon one direction of movement of said rock shaft, means for preventing turning of the feed roller in the opposite direction which comprises a set of rollers coacting between surfaces integral with said stationary shaft and the inner surface of said feed roller, and a brake shoe within said feed roller urged outwardly into engagement with the inner surface of the latter to prevent overthrow of the feed roller as it is advanced.

15. In a sewing machine a hollow feed roller for advancing material to be stitched, a rock shaft inserted in and supporting one end of said feed roller, a stationary shaft axially aligned with said rock shaft and inserted in and supporting the opposite end of said roller, means for rocking said rock shaft, clutch means comprising a set of rollers coacting between surfaces integral with said rock shaft and the inner surface of said feed roller for driving the latter upon one direction of movement of said rock shaft, means for preventing turning of the feed roller in the opposite direction which comprises a set of rollers coacting between surfaces integral with said stationary shaft and the inner surface of said feed roller, a pair of brake shoes mounted in said feed roller for sliding movement in a direction transverse to the axis

thereof, and spring means for urging said brake shoes outwardly into engagement with the inner surface of said feed roller to resist turning of the latter.

16. In a sewing machine a feed roller for advancing material to be stitched, said roller having a large main bore intermediate its ends and having enlarged extensions of said main bore at the ends thereof, said extensions having their axes slightly eccentric to the axis of the main bore, a rock shaft inserted in one of said extensions and providing a journal for one end of said roller, a stationary shaft inserted in the other of said extensions and providing a journal for the other end of said roller, each of said shafts having portions extending into the main bore of said roller, means for rocking said rock shaft, clutch means comprising a set of rollers coacting between surfaces on said rock shaft and the inner surface of said feed roller surrounding the main bore thereof for driving said feed roller upon one direction of movement of said rock shaft, and means for preventing turning of the feed roller in the opposite direction which comprises a set of rollers coacting between surfaces on said stationary shaft and said inner surface of the feed roller, said surface on said rock shaft and on said stationary shaft being at a smaller distance from the axes of said shafts than the radius of the journal portion of the respective shaft.

17. In a sewing machine having a frame providing a work supporting base, a vertical standard and an overhanging arm, stitch forming devices for seaming work advanced across said base, work feeding devices for advancing work across said base, the combination which comprises means for supplying an elastic tape under tension to the work in the region of stitch formation including a bracket mounted on the front face of said overhanging arm and adjustable longitudinally thereof, a tape feeding roller carried by said bracket, a stationary shaft and a rock shaft carried by said bracket in axial alignment and providing journals for the opposite ends of said feed roller, means for imparting variable rocking movements to said rock shaft, clutch rollers interposed between the inner surface of said feed roller and surfaces integral with said rock shaft and stationary shaft to effect a one-way driving connection between said rock shaft and said feed roller, and an idler roller carried by said bracket and spring urged toward said feed roller to grip the tape against the latter.

18. In a sewing machine having a frame providing a work supporting base, a vertical standard and an overhanging arm, stitch forming devices for seaming work advanced across said base, work feeding devices for advancing work across said base, the combination which comprises means for supplying an elastic tape under tension to the work in the region of stitch formation which comprises a bracket mounted on the front face of said overhanging arm and adjustable longitudinally thereof, said bracket being formed and arranged to provide a channel for the supply of thread to said stitch forming devices along the front face of said overhanging arm, a tape feeding roller carried by said bracket, a stationary shaft and a rock shaft carried by said bracket in axial alignment and providing journals for the opposite ends of said feed roller, means for imparting variable rocking movements to said rock shaft, said last-mentioned means comprising a rock shaft journaled in said overhanging arm transversely thereof and projecting from the forward face thereof, clutch rollers interposed between the inner surface of said feed roller and surfaces on said rock shaft and stationary shaft to effect a one-way driving connection between said rock shaft and said feed roller, and an idler roller carried by said bracket and spring urged toward said feed roller to grip the tape against the latter.

19. In a sewing machine having a frame providing a work supporting base, a vertical standard and an over-

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hanging arm, stitch forming devices for seaming work advanced across said base, work feeding devices for advancing work across said base, the combination which comprises means for supplying an elastic tape under tension to the work in the region of stitch formation 5 which comprises a vertically extending bracket secured to the end of said arm, a tape carrying reel rotatably mounted on said bracket, adjustable friction providing means for resisting rotation of said reel, a second bracket mounted on the front face of said overhanging arm and adjustable longitudinally thereof, a tape feeding roller carried by said second bracket, a stationary shaft and a rock shaft carried by said second bracket in axial alignment and providing journals for the opposite ends of said feed roller, means for imparting variable rocking 10 15

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movements to said rock shaft, clutch rollers interposed between the inner surface of said feed roller and surfaces on said rock shaft and stationary shaft to effect a one-way driving connection between said rock shaft and said feed roller, and an idler roller carried by said second bracket and spring urged toward said feed roller to grip the tape against the latter.

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