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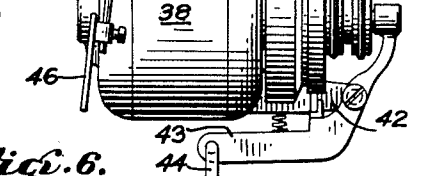
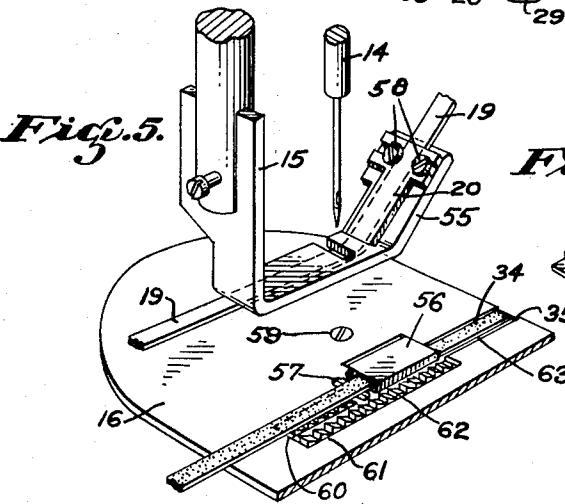
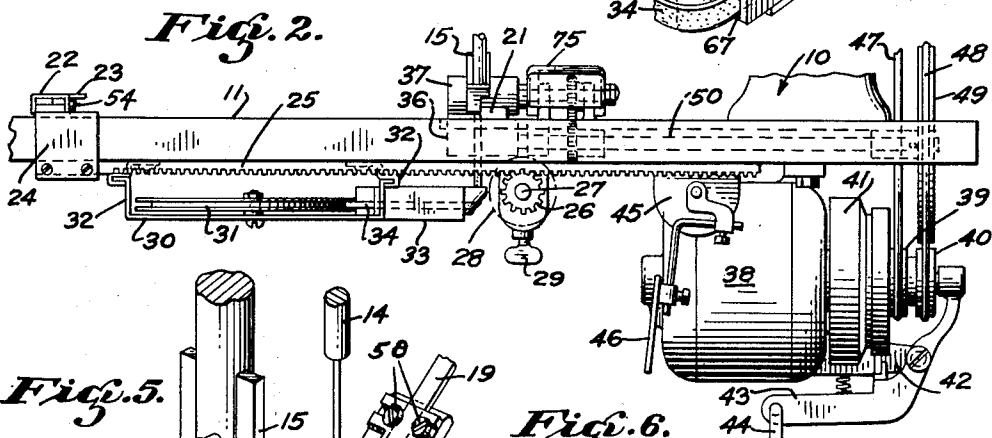
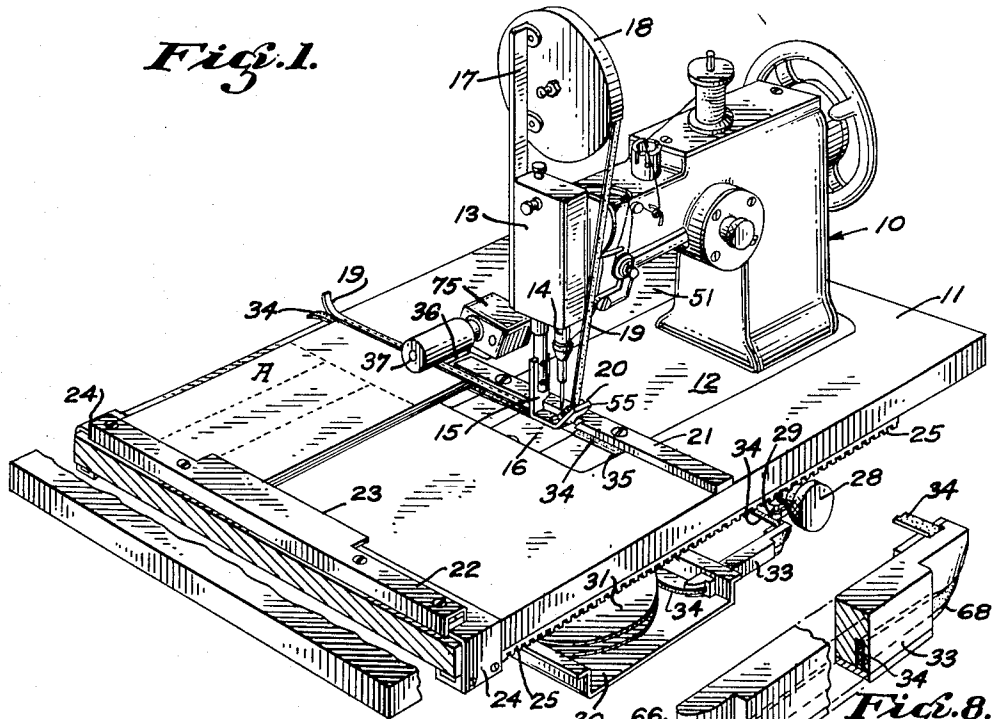
J. E. PITTS ET AL

2,125,459

BOOK SEWING MACHINE

Filed Feb. 17, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

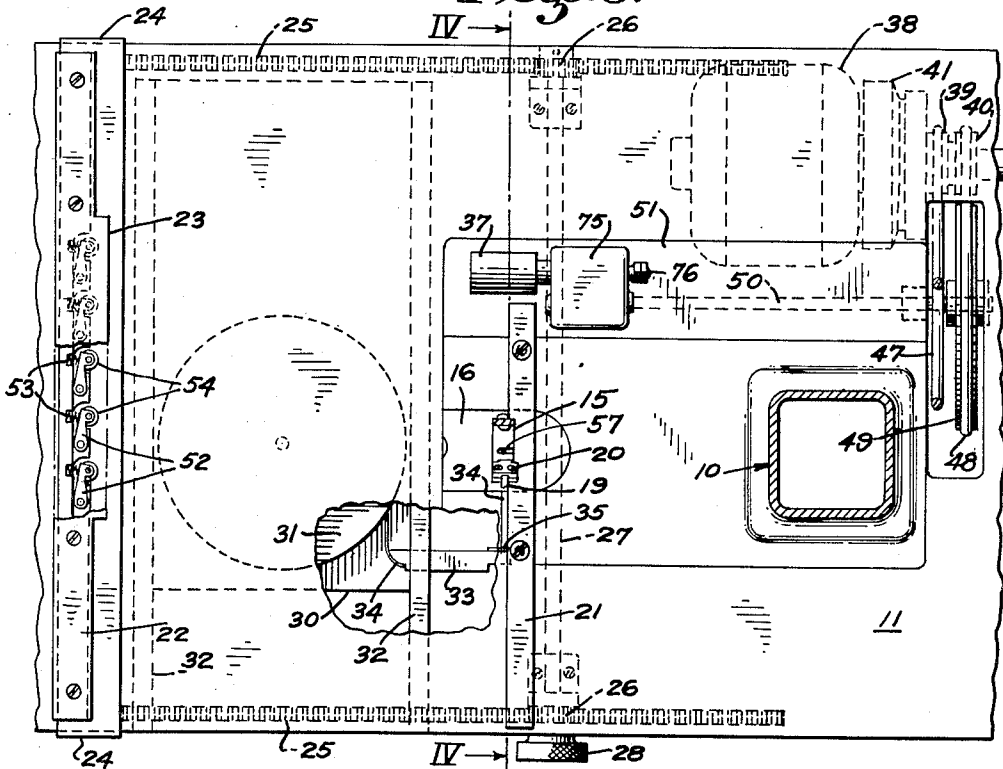


Fig. 4.

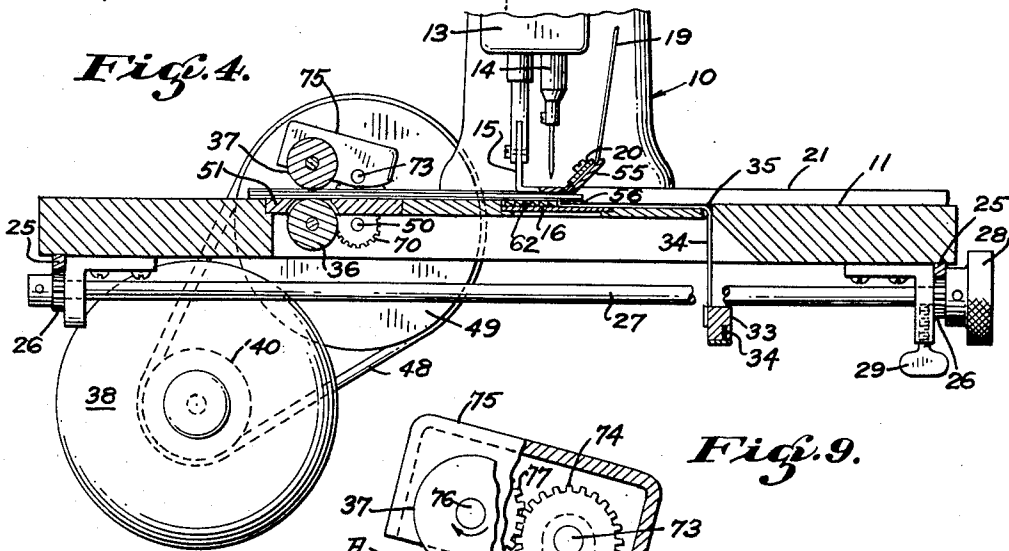
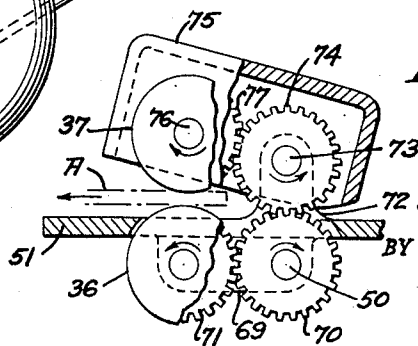


Fig. 9.



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# UNITED STATES PATENT OFFICE

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## BOOK SEWING MACHINE

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4 Claims. (Cl. 112—21)

The present invention relates generally to an improvement in sewing machines for applying a tape to opposite sides of a stitched seam, and more particularly to an improvement which will facilitate the application of a binding tape to book sections in accordance with the teachings of United States Patents No. 1,585,076, issued May 18, 1926, to Carl F. Brenne, and No. 1,989,290, issued January 29, 1935, to Joseph E. Pitts.

An object of the present invention is to provide an improvement for sewing machines, which will apply a tape to each side of the work and in line with the stitching produced by the machine.

Another object of the invention is to provide a simple, novel and convenient form of adjustable tape guiding means for aligning a tape with the stitching produced by a sewing machine.

Another object of the invention is to provide, in combination with a tape applying and stitching machine of the character described, means which will maintain said tape under tension as it is stitched to the work.

A further and more specific object of the present invention is to provide a machine upon which the methods of binding disclosed in the above referred to Letters Patent may be conveniently and efficiently carried out.

Other objects and advantages of the invention will be in part evident to those skilled in the art and in part pointed out hereinafter as the description thereof proceeds.

For the purpose of illustrating this invention there is shown in the accompanying drawings, by way of illustration and not of limitation, preferred embodiments of the several details thereof.

In the drawings wherein like numerals refer to like parts throughout the several views:

Figure 1 is a perspective view of a machine embodying the invention,

Figure 2 is a fragmentary front elevation of the apparatus illustrated in Figure 1 of the drawings,

Figure 3 is a fragmentary plan view of the apparatus illustrated in Figure 1 with the sewing machine head omitted,

Figure 4 is a slightly enlarged sectional view taken along line IV—IV of Figure 3, looking in direction of arrows,

Figure 5 is a fragmentary perspective view showing details at the needle station of the sewing machine,

Figures 6 and 7 are perspective views of the

tape feeding guides illustrated in Figure 5 of the drawings,

Figure 8 is a detailed perspective view of the tape twisting device through which one of the tapes is passed, and

Figure 9 is a fragmentary view partially in section showing details of a tape tensioning device constructed in accordance with the invention.

For the purpose of describing the invention there is shown in the accompanying drawings a sewing machine, designated by the numeral 10, which is of a standard make. The particular machine illustrated is of the type in which the needle moves laterally to produce a zigzag line of stitching. However, it is to be understood that the present invention is also applicable to sewing machines of the type which produce a straight line of stitching.

The sewing machine is preferably mounted upon a table or work bench 11, so that its bedplate 12 will lie flush with the top surface of the table 11. The sewing machine 10 has an overhanging head 13 that carries a needle bar 14 and a presser foot 15 through which a needle upon the needle bar 14 is adapted to pass. Below the presser foot 15 and beneath a removable work supporting plate 16 upon the bedplate 12 of the sewing machine, there is the usual thread shuttle. Secured to the overhanging head 13 of the sewing machine, there is a vertically extending bracket 17 that carries a tape reel housing 18, in which a reel of plain or glued tape 19 may be supported and drawn therefrom.

In Figure 1 of the drawings the tape 19 is shown as extending from the housing 18 downwardly and as passing through a guide means 20, to be hereinafter described, which is carried by the presser foot 15. This guide means is adapted to direct the tape 19 to the top surface of the work, which, as illustrated in this figure of the drawings, comprises a section of book-leaves, designated by the letter A, that is adapted to be bound with other similar sections of book-leaves to form a complete book, in accordance with the teachings of one or the other of the above referred to Letters Patent. For this purpose the tape 19 is provided with a suitable adhesive upon its top surface, which can be moistened when the book sections are finally placed together to complete a book. Disposed slightly inwardly from the presser foot 15 there is a transversely extending guide means 21, against which the edge of the book section A is adapted to be held during the stitching operation. Cooperating with the guide means 21, there is a second and adjustable guide

means 22 that is adapted to engage the opposite edge of the book section A and hold the book section firmly against the guide member 21, so that the spacing of the stitching from the edge of the book section will be uniform throughout its length. The guide means 22 has an overhanging portion 23, under which the adjacent edge of the book section is adapted to pass, and immediately under this overhanging portion 23, the guide means 22 has a plurality of resilient pressure exerting elements which serve to equalize the pressure upon the book section as it passes between the guide means 21 and 22 during the stitching operation. This latter means is to be described in more detail hereinafter.

The guide means 22 is slidably supported upon the top of the table 11 by means of overhanging brackets 24, each of which carry an underslung rack 25 that extends toward the machine head 13 and along the underside of the table 11. These racks 25 are supported at their free ends by means of cooperating gears 26, which are secured upon a transversely extending shaft 27 carried by the table 11. The shaft 27 has a hand-operating knob 28, by means of which rotation may be imparted to the gears 26 for the purpose of moving the guide means 22 toward and away from the stationary guide means 21. A set screw 29 is also provided adjacent the knob 28 for locking the shaft 27 against rotation after the guide means 22 has been properly positioned upon the table 11. Suspended below the table or work bench 11 there is a drawer-like member 30 which is adapted to support a second tape containing spool 31 in a horizontal position where it will not interfere with the legs of a seated operator. The drawer-like member 30 is mounted in spaced relation with the bottom of the table 11 by means of brackets 32, so that it will clear the rack 25 when it is drawn out for the purpose of placing a spool 31 thereupon. The tape reel supporting drawer 30 also has a suitable tape twisting guide mounted in one side thereof, which is adapted to take a tape, designated by the numeral 34, from the reel 31, in a vertical edgewise position and deliver it to the top surface of the bedplate 12 in a horizontal edgewise position. In Figure 1 of the drawings this twisting guide 33 is shown as pulled out, with the drawer 30 beyond the near edge of the work table 11, but it will be understood that when the machine is in operation, the discharge end of this twisting guide 33 will be disposed immediately below a notch 35 formed in the edge of the bedplate 12 adjacent the stationary guide means 21. From this latter point the tape 34 will progress over the bedplate 12 and through a suitable guide means which is adjustably secured upon the movable cover plate 16, as will be hereinafter described. Then as the work is passed through the sewing machine it will be superimposed upon the tape 34, and the latter will be stitched to the underside of the work simultaneously with a stitching of the tape 19 to the upper side of the work. The tape 34, like the tape 19, will be provided with an adhesive when the tape is to be used for the purpose of binding a plurality of book sections together. In this latter instance the tape 34 will pass through the machine with its adhesively treated side disposed away from the book sections to which it is stitched.

In addition to the above described expedients, the present invention also contemplates an auxiliary work feeding and tape tensioning means, which comprises cooperating rollers 36 and 37

that extend transversely across the line of the stitching produced by the sewing machine. These rollers 36 and 37 are driven in a novel manner and rotate in a direction which will produce a pull upon the tapes 19 and 34 as the work progresses through the sewing machine. This auxiliary work feeding aspect of the present invention and its mode of operation is to be described in greater detail hereinafter, in connection with other figures of the drawings.

With the arrangement above described, it will be seen that after the book sections have been made up to a proper thickness, and the tapes 19 and 34 have been started through their respective guides upon the sewing machine, the book sections may be successively fed between the guide means 21 and 22, and under the sewing machine head 13, so that the tapes 19 and 34 will be simultaneously sewed respectively to the top and bottom sides of the book sections A in a continuous manner. Then as a final operation, the book sections may be separated by cutting the tapes therebetween, and finally arranged in proper order, moistened and pressed into complete book units.

Upon again referring to Figure 2 of the drawings, it will be seen that the work supporting table or bench 11 also carries a suitable driving motor 38 having pulleys 39 and 40 that are adapted to be connected to the motor by means of a clutch 41. The frame of the motor 38 carries a bracket 42 upon which there is pivoted a clutch operating lever that is adapted to be operated through a connecting rod 44 by a foot pedal, not shown. Adjacent the motor 38, the table 11 also supports a suitable motor speed controller 45, which is adapted to be operated by a knee engaging plate 46. As here shown, the pulley 39 operates through a belt 47 to drive the sewing machine, and the pulley 40 operates through a belt 48 to drive a pulley 49 that is secured upon the end of a shaft 50, and which, as will hereinafter appear, serves to drive the rollers 36 and 37 of the work advancing and tape tensioning mechanism.

As shown in Figure 3 of the drawings, the shaft 50 is journaled upon the underside of a plate 51, which is recessed in the top of the table 11 so that its upper surface is flush with the top of the table. In this figure of the drawings, the tape reel supporting drawer 30 is shown as positioned in its proper operating position, with the outwardly extending tape twisting guide 33 disposed, with its discharge end, immediately below the notch 35 formed in the edge of the bedplate 12 of the sewing machine. This figure of the drawings also shows the details of a preferred form of the yielding pressure producing means, previously referred to, as carried by the adjustable guide means 22, to distribute the pressure upon the edge of a book section when it passes through the sewing machine. This yielding pressure means comprises a plurality of pivotally mounted arms 52, which swing in a horizontal plane in response to the action of suitable springs 53, and at their outer ends these pivotally mounted arms 52 each carry a vertically disposed roller 54 which is adapted to roll against the edge of the book section as it passes through the machine.

Figure 4, like Figure 3, also shows the tape twisting guide 33, through which the tape 34 is guided to the needle station of the sewing machine, as in its operative position. This figure of the drawings also illustrates how the shaft 27 and the gears 26 are mounted upon the underside

of the table 11 in cooperating relation with racks 25 which control the movable guide 22. The location of the tape pulling and tensioning rollers 36 and 37 and the path taken by the tapes 19 and 34 are also clearly illustrated in this figure of the drawings.

Reference is now made to Figures 5, 6 and 7 of the drawings, for a detailed description of the tape guiding means previously referred to as carried by the presser foot 15 and the shuttle covering plate 16 of the sewing machine 10. As shown in Figure 5 of the drawings, the presser foot 15 has an upwardly extending end 55 upon which the tape guiding means 20, illustrated in detail in Figure 6, is adjustably secured, and the cover plate 16 is shown as having a tape guiding means 56, which is adjustable for alignment with a needle aperture 57 in the cover plate 16. This adjustable guide 56 is illustrated in detail in Figure 7 of the drawings. The tape guide 20 is held upon the presser foot 15 by means of screws 58, and is adjustable laterally, so that it will center the tape 19 with respect to the needle bar 14 of the sewing machine. The guide 56 has an underhanging extension 56<sup>a</sup> which is recessed into the bottom of the cover plate 16, and where it is adjustably secured by means of a screw 59, so that it may be moved laterally upon the cover plate to center the tape 34 over the needle aperture 57. The cover plate 16 also has apertures 60 and 61 through which the usual work feeding elements 62 of the sewing machine project. Extending from the notch 35 in the side of the bedplate 12, and over the top surface of the cover plate 16, there is a recessed groove 63 through which the tape 34 may freely move in its travel to the adjustable guide member 56 upon the cover plate 16. This groove 63 prevents the tape 34 from contacting the underside of the work until it reaches a point immediately in advance of the needle station of the sewing machine, and the disposition of the tape guide 20 upon the presser foot 15 is such that it also provides against the tape 19 contacting the work until it reaches a point immediately in advance of the needle station of the sewing machine. Upon referring to Figure 6, it will be seen that the guide 20 has a narrow aperture 64 extending therethrough, which is substantially equal to the dimensions of the tape 19, and upon referring to Figure 7 of the drawings, it will be seen that the adjustable guide 56 has an aperture 65 which corresponds to the dimensions of the tape 34. The guide means 20 and 56 above described, are made readily detachable from their respective supports so that other and similar guides may be substituted therefor when tapes of different widths are to be used upon the sewing machine.

Reference is now made to Figure 8 of the drawings for a detailed description of the tape twisting guide 33, which serves, as previously stated, to turn the tape 34, as it is taken from its horizontally disposed reel 31, into a horizontal edge-wise position for introduction into the aperture 65 of the guide means 56. As here shown, the twisting guide 33 has a rounded end 66 which directs the tape 34 from the reel 31 into a narrow slot 67 that extends through the guide 33. At the other end of the guide 33 there is a rounded or curved surface which is disposed at an angle of 45°, so that as the tape 34 is carried therearound in a spiral path, it can be brought out through a vertical slot 68 at the end of guide 33, with its surfaces in a plane at right angles to the surfaces of the tape as it is taken from the reel 31. This

twisting guide 33 is shown in the drawings as secured upon the drawer-like reel supporting member 30, so that it may be pulled out with the supporting member 30 to facilitate a threading of the tape therethrough, and then pushed back into an operative position in line with the notch 35, previously described as formed in the bedplate 12 of the sewing machine.

The details of the tape pulling and tensioning device previously referred to, will now be described in connection with Figure 9 of the drawings. As here shown, the shaft 50 is journaled at its end upon a downwardly extending bearing bracket 69, which also provides a bearing support for the roller 36. The shaft 50 has a gear 70 that meshes with and drives a similar gear 71 carried by the roller 36. Extending upwardly from the plate 51 there is also a pair of axially spaced bearing brackets 72, upon which a countershaft 73 having an idling gear 74 is supported. Pivotaly mounted upon the shaft 73 there is also a supporting housing 75 in which there is journaled a shaft 76 which carries the roller 37. This shaft 76 also carries a gear 77 which is constantly in mesh with the idling gear 74 upon the countershaft 73. With this arrangement it will be seen that when the shaft 50 is rotated in the direction indicated by the arrow, the other gears and the rollers 36 and 37 will also rotate in the directions indicated by arrows, and as a result the idling gear 74 will exert a downward pressure upon the teeth of the gear 77, which will increase in proportion to any resistance offered to a rotation of the roller 37, and consequently the roller 37 will be constantly urged downwardly toward the roller 36, so as to exert a pinching force upon the edge of the book section A as it passes therebetween. In order to produce this downward or pinching action in the roller 37, it is necessary for the surfaces of the rollers 36 and 37 to move at a relatively greater linear speed than the work. Therefore the shaft 50 is rotated at a speed which will produce a linear speed at the periphery of the rollers 36 and 37 which is greater than the speed of the book section passing therebetween. This produces a pinching action between the rollers 36 and 37 which may also be said to be dependent upon the coefficient of friction between the tapes at the edge of the book section and the rollers 36 and 37. If the rollers are slightly roughened, this pinching action will, of course, be greater than when the rollers have a polished surface. In practice it has been found that the rollers 36 and 37 operate satisfactorily when they have a smooth but unpolished surface.

With the above arrangement it will be readily seen that when the tapes 19 and 34 have been threaded through the guides at the needle station of the sewing machine 10 as above described, the book sections A may be conveniently passed therethrough in substantially the same manner as would be the case in a simple stitching operation. It will also be seen that when a series of book sections have progressed through the machine to a point where the rollers 36 and 37 engage the tapes 19 and 34, a pulling force will be constantly exerted upon these tapes which will pull them from their supply reels and through the machine with the work, independently of the work advancing mechanism 62 of the sewing machine. A further advantage obtained by the rollers 36 and 37, which results from the fact that they rotate faster than the work progresses there-through, is that the tapes are stitched and ironed

out or smoothed upon the book sections in a desirable manner.

While we have, for the sake of clearness and in order to disclose the invention so that the same can be readily understood, described and illustrated specific devices and arrangements, we desire to have it understood that this invention is not limited to the specific means disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and it is desired to claim it so that all such changes as come within the scope of the appended claims are to be considered as part of this invention.

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

1. In a sewing machine of the character described, the combination of a work supporting table having an overhanging presser foot and needle beneath which the edge of a book section to be stitched may pass, a guide upon said work supporting table adjacent said presser foot for guiding the book section over said table with one edge beneath said presser foot and needle, a second guide means extending across the work supporting table in spaced parallel relation with said first guide adapted to engage the opposite edge of the book section and hold the stitched edge of the book section against said first guide as the stitching proceeds, a rack secured to each end of said second guide and extending toward said first guide, and a manually rotatable shaft extending parallel to said first guide having gears engaging said racks, whereby said second guide may be adjusted while maintaining a parallel relation between said guides by a rotation of said shaft.

2. In a sewing machine of the character described, the combination of a fixed horizontally disposed roller disposed with its axis extending transverse to the direction of the work passing through the sewing machine over which the work is adapted to pass, a driving shaft having a geared driving connection with said roller, an idling gear adapted to be driven by said driving shaft, a support mounted to move about the axis of said idling gear, and a second roller disposed above said first roller with its axis parallel thereto adapted to be driven in a direction complementary to said first roller by said idling gear to produce a pulling action upon the work passing between said rollers, the peripheral speed of said rollers being slightly greater than the speed of

the work passing therethrough, whereby the work will exert a retarding force upon the rollers and cause said second roller to move with its support about the axis of said idling gear and produce a pinching smoothing action upon the work as it advances therebetween.

3. In a sewing machine of the character described, the combination of a sewing machine of conventional type, means associated with said sewing machine for directing a tape to each side of the work in line with the stitching produced by said machine, a roller disposed in the path of the work after being stitched having a driving gear and adapted to be positively rotated in a work feeding direction, a second roller disposed above said first roller mounted upon a floating shaft extending parallel with the axis of said first roller, said floating shaft having a gear mounted thereupon and being adapted to move about the axis of a countershaft, a gear upon said countershaft associated with the gear upon said floating shaft, and a driving gear meshing with the gear upon said countershaft and the driving gear upon said first roller adapted to impart a complementary work pulling rotation to said rollers and cause said floating shaft with said second roller to be moved downwardly and into pressure producing relation with the work as the pulling force exerted upon the work by said rollers is resisted.

4. In a work pulling device for a machine of the character described, the combination of a fixed roller having its axis disposed transverse to the direction of travel of work thereover, a driving shaft disposed in spaced horizontal relation with said roller, a gear drive between said roller and said driving shaft, a countershaft disposed vertically above said driving shaft having a gear meshing with the gear upon said driving shaft, a movable roller supporting member pivotally mounted upon said countershaft, a roller mounted upon said roller supporting member having a geared driving connection with the gear upon said countershaft, the meshing point of said latter gears being disposed along the downwardly moving side of the gear upon said countershaft, whereby a downward pressure will be exerted by the roller upon said movable supporting member when rotation of said roller is retarded by the work passing between said rollers.

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