April 24, 1945. D. C. EVERITT 2,374,529

ART OF MULTISTRAND BAND MANUFACTURE

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Fig. 4.

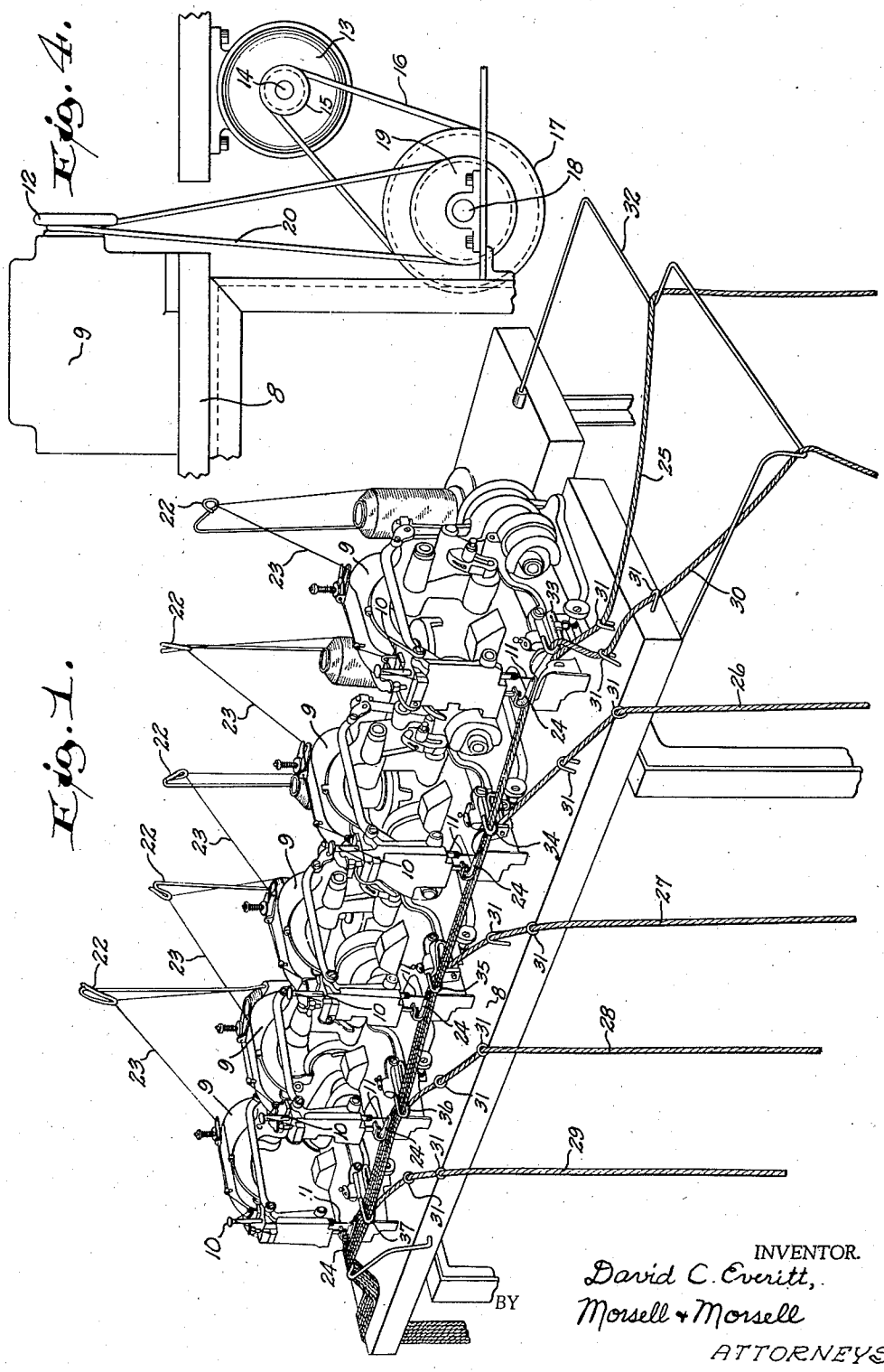


Fig. 1.

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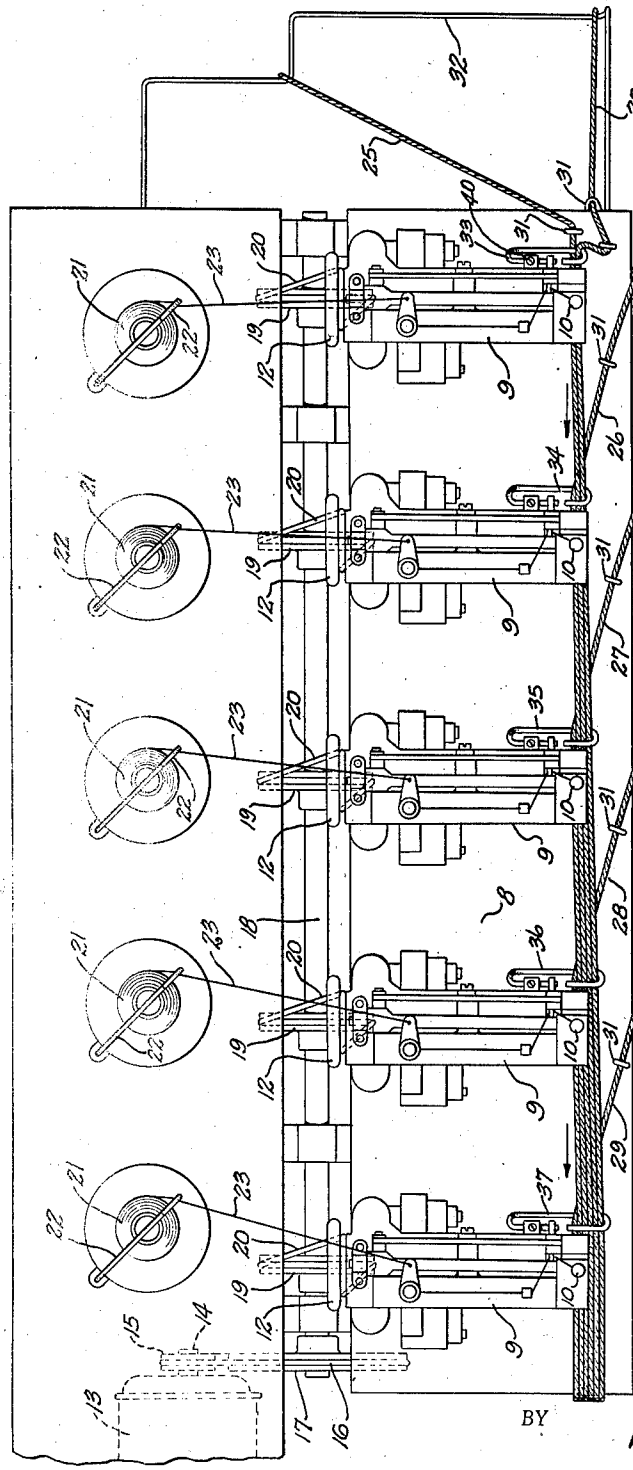


Fig. 2.

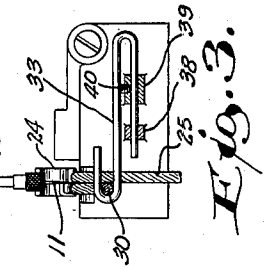


Fig. 3.

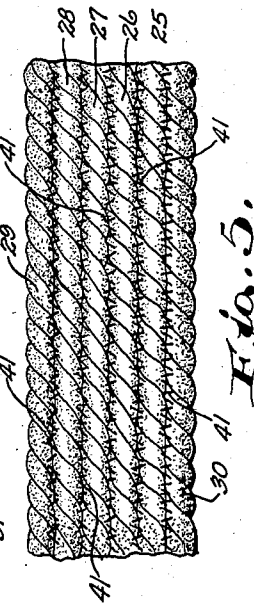


Fig. 5.

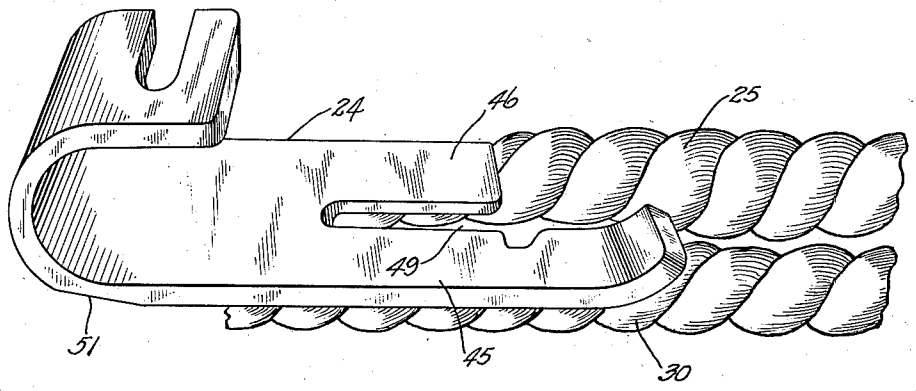
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Fig. 6.



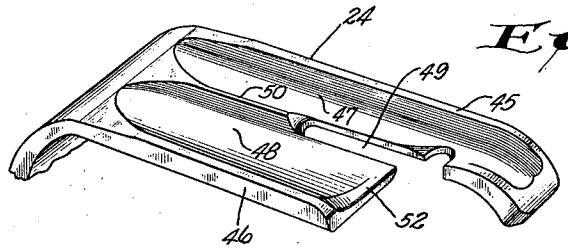


Fig. 8.

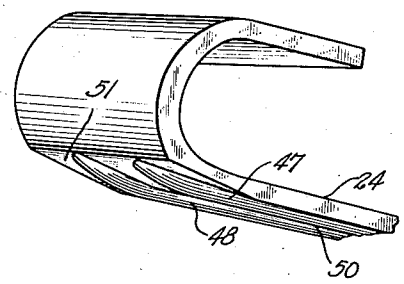


Fig. 7.

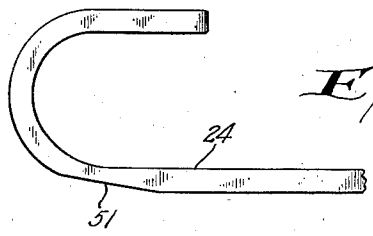


Fig. 9.

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Patented Apr. 24, 1945 2,374,529

UNITED STATES PATENT OFFICE

2,374,529

ART OF MULTISTRAND BAND MANUFACTURE

David C. Everitt, Milwaukee, Wis.

Application March 11, 1943, Serial No. 478,817

2 Claims. (Cl. 112—2)

This invention relates to improvements in the art of multi-strand band manufacture.

Bands formed of a plurality of laterally adjacent, secured together yarn braid strands have particular utility in the millinery, dress-making and drapery arts. Heretofore it was customary, in forming an elongated multi-strand band or length of fabric, to first join together by edge to edge stitching the total extents of two laterally adjacent strands. Then, for each additional strand required for the final width of the band, such strand would have to be sewed edge to edge to the composite band previously formed. The result was that for the production of a multi-strand band the entire length of material would have to be handled separately and independently with the addition of each strand thereto. Consequently the production of a multi-strand band by the prior practice was slow, tedious and costly as it necessitated many successive handlings of the band as its width progressed, it required many sewing machine operators, and required the successive operation of the machines.

With the above in mind it is, therefore, a primary object of the present invention to provide a method of forming multi-strand bands which is practical, economical, expeditious, and well suited for commercial and large scale operations.

A further object of the invention is to provide a method of forming multi-strand bands in which all of the laterally adjacent strands required to make up a band of a desired width are simultaneously sewed to their adjacent strands, so that upon a single handling of the length of material and in only the time required for the lateral connection of two strands, the multi-strand band of any convenient plural number of strands is produced.

With the above and other objects in view the invention consists of the improved art of multi-strand band manufacture, and all of the steps, parts, and combinations incident thereto, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a side and end perspective view of the improved multi-strand band sewing machine;

Fig. 2 is a plan view thereof;

Fig. 3 is a fragmentary, detail view, partly in vertical section, showing the adjustable band guide for one of the sewing machines of the apparatus;

Fig. 4 is a fragmentary, detail view of the motor and driving arrangement for the individual sewing machines of the apparatus;

Fig. 5 is a fragmentary plan view of a short length of a multi-strand band as produced by the improved apparatus;

Fig. 6 is an enlarged perspective view of a sewing machine pressure foot especially formed for the proper handling of a pair of yarn strands;

Fig. 7 is a fragmentary perspective view of an end of the same;

Fig. 8 is a fragmentary perspective view of the bottom grooved side of the pressure foot; and

Fig. 9 is an enlarged, fragmentary side view of the pressure foot.

Referring now more particularly to the drawings it will appear that the horizontal platform portion of an elevated table or support is indicated by the numeral 8. Rigidly mounted on said platform in line formation, and suitably spaced apart, are a plurality of edge to edge sewing machines 9. While the apparatus is illustrated as including five longitudinally alined edge to edge sewing machines, it should be understood that this is merely by way of illustration. The number of sewing machines incorporated in the apparatus, or put into service for a given strip of fabric band, is dependent upon the number of strands to be incorporated in the band, as will hereafter appear.

The mechanism of each edge to edge sewing machine 9 per se includes means for vertically reciprocating the needle bar 10 and needle 11 carried thereby in a slightly orbital path. Each sewing machine additionally has an operating shaft with an individual pulley wheel 12 thereon. In Figs. 2 and 4 there is illustrated the manner in which all of the sewing machines 9 may be simultaneously driven from a single electric motor 13. The electric motor is conveniently mounted on a support, and its motor shaft 14 carries a relatively small pulley 15 engaged by an endless belt 16. This belt also engages and drives a relatively large pulley 17 mounted fast on an elongated pulley shaft 18 which is mounted in suitable bearing brackets along one side edge portion of the support 8. At properly spaced intervals on the pulley shaft 18 are pulleys 19, there being one of such pulleys for each of the sewing machines 9 to be operated. Each pulley 19 is connected by a belt 20 with a sewing machine pulley 12.

There is suitably mounted for each sewing machine 9 a sewing thread spool 21 and an elevated sewing thread guide 22 from whence a strand of thread 23 is extended under tension to the needle

bar 10 and needle 11 of a sewing machine. Each sewing machine is adapted to have fed to it below its pressure foot 24 an individual yarn strand. In addition to said yarn strand the first sewing machine 9 in the series (referring to the machine at the right-hand end in Figs. 1 and 2) has fed thereto a second yarn strand 30, while the successive sewing machines in the series receive an individual yarn strand as previously mentioned and a width of composite band material formed by the strands previously longitudinally united. For the sake of clarity the yarn strand extended to the first machine of the series, other than the strand 30, will be designated 25, while the individual yarn strands fed to each successive machine will be designated by the numerals 26, 27, 28, and 29, inclusive. The individual yarn strands 25, 26, 27, 28, 29, and 30 are fed from supplies in boxes or bins (not shown), disposed conveniently close to and below the respective sewing machines 9 which they serve. On the platform or support 8 are eyelets or guides 31 through which the various individual strands are passed. The passage of the strands through the eyelets 31, together with the weight of the material of each strand depending from the table or support, imposes sufficient tension on each strand so that it is properly fed to its respective sewing machine. A frame-like guide bar 32 is provided at the righthand end of the table or support, over which the strands 25 and 30 are draped. It should be observed that the strands and the composite band in the process of formation, progress below the alined pressure feet 24 of the sewing machines 9 in a rectilineal path. However, as to each successive machine, toward the left (referring to Fig. 2) the new individual strand 26, 27, 28, or 29 is introduced and fed below the pressure foot of its machine in a position of longitudinal alinement with the new individual strand introduced at the previous machine, with the result that the composite band thus far formed is shifted slightly laterally.

For the last mentioned purpose each sewing machine 9 is equipped with a novel band guide, said guides for the successive machines being designated by the numerals 33, 34, 35, 36 and 37 respectively. Each guide is susceptible of adjustment so as to properly position it for the guidance of the composite band, it being appreciated that the guide 37 must extend more toward the front edge of the table 8 than the guide 33, with the other guides 34, 35, and 36 assuming proper intermediate positions of adjustment. A band guide 33 is shown in detail in Fig. 3. On a forward base portion of a sewing machine 9 there are secured bearing bosses 38 and 39 in which a shank portion of the guide 33 is slidable. A set screw 40 in one of the bosses retains the shank portion of the guide 33 in its adjusted position. The free end portion of the guide 33 is bent back upon itself to provide a yoke through which a portion of the band guidingly extends.

The manner in which a composite multi-yarn strand band is formed is clearly shown in Figs. 1 and 2. At the first machine 9 toward the right in Figs. 1 and 2 extents of the strands 25 and 30 are united by the operation of the first sewing machine 9 by so-called edge to edge or zigzag stitching. The composite band when it leaves the initial sewing machine, is of two strands and is guided by the band guide 34 of the second machine, and along the innermost strand is fed the individual strand 26 which, by the second sewing machine 9, is united by edge to edge stitching to the strand 25 of the two-ply band, thereby forming a three-ply band. The same operations take place at all of the subsequent sewing machines in the series, and the width of the ultimate composite multi-strand band is dependent upon the number of sewing machines 9 in the apparatus. Beyond the last machine in the series the completed strip of band material of the desired width continuously passes over the end of the table 8 and is received by a suitable receptacle. The process may be carried on for any desired length of time and of course an unbroken length of band material is produced, which may ultimately be severed into desired lengths.

A fragment of a multi-strand band as produced by the apparatus of Figs. 1 and 2 is shown in Fig. 5 of the drawings, wherein the strands 25 and 30 were first united and simultaneously with the in-feeding of new strands all of the sewing machines 9 were operating to simultaneously join strand 26 with previously joined strands 25 and 30, strand 27 with joined strands 26, 25, and 30; strand 28 with joined strands 27, 26, 25, and 30; and strand 29 with the strands previously mentioned. The lines of edge to edge stitching are indicated by the numerals 41.

Each of the sewing machines 9 in the apparatus is equipped with a novel form of pressure foot 24 which is particularly advantageous in the accomplishment of the invention and in the handling of the yarn strands which are to be connected in side by side relationship, said yarn strands being bulky and of relatively "squashy" materials. It should also be observed that for each sewing machine, the new strand led thereto, 25, 26, 27, 28, or 29, for connection with the composite braid thus far formed, is introduced from a position somewhat divergent from that of the path of travel of the braid strand to which it is to be attached.

An improved pressure foot 24 is shown in detail in Figs. 6 to 9 inclusive. The inner end of this pressure foot has the usual curved mounting means, and the free end portion is formed with a pair of adjacent legs 45 and 46, the leg 45 being somewhat longer than the leg 46 and terminating in a rounded upturned extremity. The under surfaces of the legs of the pressure foot are provided with braid receiving grooves 47 and 48 respectively which extend from the free ends of the legs toward the mounted end of the foot and are slightly reduced at the latter end. There is a slot 49 between the free end portions of the legs adjacent which the sewing machine needle reciprocates for edge to edge sewing operations. The extent of the grooves 47 and 48 toward the mounted end of the pressure foot are separated by a ridge 50 which is in longitudinal alinement with the slot 49 and terminates at its forward end at the slot. The ridge forms substantial innerside walls for the rearward portions of both of the grooves. The slot 49, however, in effect serves to reduce the width of the forward portions of the grooves thereadjacent and the elimination of the ridge at the slot results in the inner margins of the grooves adjacent the slot being substantially unobstructed.

The braid strands 25 and 30, for instance, to be joined by edge to edge stitching are lodged within the grooves 48 and 47 respectively of the pressure foot. However, in advance of the pressure foot these braid strands are divergent, as before mentioned. In the neighborhood of the slot 49 the groove construction is such that the strands are crowded into mutual contact. This

is permitted by virtue of the unobstructed inner margins of the grooves adjacent the slot 49. This lateral crowding together of the strands takes place where the needle reciprocates and the needle is, therefore, permitted to effectively engage the proper side edge portions of the strands for connection by edge to edge sewing. Thereafter the strands which are joined advance through the rearward extents of the grooves 47 and 48 and are firmly held therein, with the ridge 50 lodging in the line of connection between the braid strands.

It will be observed that at the rear end of the pressure foot, the work surface is beveled or inclined as at 51. This permits the composite braid to easily clear the pressure foot as it moves beyond the mounted end of the same. It will be noted that the free end portion of the leg 46 of the pressure foot has its leading edge eccentrically curved, rounded and beveled as at 52. This formation prevents the braid strand entering the groove 48 from being damaged and also is effective in directing the braid strand toward the inner edge of the groove and toward the slot 49 to effect the lateral crowding with the adjacent braid strand.

All of the sewing machines 9 operate simultaneously with the in-feeding of the strands 25 to 30 inclusive and with the progression of the band being fabricated through the apparatus. The result is that the production of a multi-strand band is accomplished very expeditiously and very economically. The finished band leaves the apparatus after the lapse of a time period commensurate with the time required for the edgewise stitching together of only a pair of strands. The apparatus is under the control of but a single operator and receives its power directly from a single motor. Obviously, any number of machines in the series may be utilized, depending upon the width of and number of strands required in the final band.

Various changes and modifications may be made in the method of forming multi-strand bands, without departing from the spirit of the invention, and all such changes are contemplated as may come within the scope of the claims.

What is claimed as the invention is:

1. The method of forming a multi-strand band comprising, continuously longitudinally sewing together a pair of elongated strands by edge to edge stitching, continuously progressing the strands thus united in an uninterrupted rectilineal path, continuously simultaneously in-feeding additional elongated strands at spaced points along the forward path of travel of the work supporting the work in taut formation at longitudinally spaced points therealong, mechanically guiding each of the in-fed strands adjacent its point of introduction to dispose it in side by side relation to the work thereadjacent, and continuously, simultaneously longitudinally sewing together by edge to edge stitching each additional in-fed strand and a strand of the work thereadjacent while the strands are progressing longitudinally and commencing immediately at the point of introduction of each additional in-fed strand

2. The method of forming a multi-strand band comprising, continuously longitudinally sewing together a pair of elongated strands by edge to edge stitching, continuously simultaneously in-feeding additional elongated strands at spaced points along the forward path of travel of the work, supporting the work in taut formation only at longitudianlly spaced points, engaging the work adjacent the points of support to advance it in a rectilineal path, biasing the work slightly laterally in one direction along its path of advancement, mechanically guiding each of the in-fed strands adjacent its point of introduction to dispose it adjacent the next rearward in-fed strand, and continuously, simultaneously longitudinally sewing together by edge to edge stitching each additional in-fed strand and the strand adjacent which it is disposed while the strands are progressing longitudinally and commencing immediately at the point of introduction of each additional in-fed strand.

DAVID C. EVERITT.