APPARATUS FOR THE FORMATION AND ASSEMBLY OF SLIDE-FASTENER-CARRYING GARMENT FLY PIECES

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This invention relates to improvements in a method and apparatus for continuously feeding slide fastener stringers and/or backing tapes together with successive garment fly pieces laid in end-to-end relation for the combined stitching together of, same, and to an improved technique in the formation and assembly of garment pieces intended to be secured together by slide fasteners, particularly fly pieces, known in the trade as the "black fly" and the "white fly" pieces, in matched relationship.

More particularly, the invention constitutes a further development of a technique first devised by me for continuously feeding a strip of material from a roll, simultaneously with successive fly pieces in endwise relation to be stitched together throughout the length of the strip of material, as set forth in my Canadian Patent No. 457,295, dated October 8, 1946.

A further development of this technique is illustrated in the U. S. Patent No. 2,574,351 of Michael K. and Joan E. Rohrlick, dated November 6, 1951, and Patent No. 2,667,849, dated February 2, 1954, a division of said U. S. Patent No. 2,574,351, providing a method and apparatus for continuous feeding of length of a slide fastener stringer from a reel simultaneously with the feeding of successive strips of garment fly pieces laid in end-to-end relation in a manner which permitted the continuous feeding together of the stringer and successive fly pieces for the length of the stringer.

A further development of the apparatus has been described in co-pending U. S. application Serial No. 262,512 to Michael K. and Joan E. Rohrlick, filed December 18, 1951, including a multi-compartment reel for selection of slide fastener stringers, an alternative feed arrangement for the stringers of "black" and "white" fly pieces, and a dual control mechanism selectively operable for the release of a reel for free rotation thereof in conjunction with the motor starting mechanism or the presser-foot release mechanism.

In my present invention I have provided a still further development of my technique and the apparatus employed therein.

A particular object in the formation of separable fly pieces for garments is to provide a novel method of separately uniting successive strips of "black fly" pieces in end-to-end relation with a continuous length of slide fastener stringer and successive strips of "white fly" pieces in end-to-end relation with a second continuous length of slide fastener stringer so that each "black fly" piece will be successively paired in matched relationship with the corresponding "white fly" piece by uniting the complementary stringers along their length, and then conditioning the terminal portions of the united fly pieces for their assembly with a garment.

Another object is to provide a novel portable attachment for a sewing machine for selectively feeding the "black" and "white" fly stringer tapes to a presser-foot simultaneously with successive fly pieces for uniting of the successive fly pieces with the selected stringer in a novel manner which will permit pairing of successive "black" and "white" fly pieces by uniting the stringers complementary thereto.

Another object is to provide a portable attachment of the character described with novel control means selectively operable, in conjunction with the motor and presser-foot actuating mechanisms, for controlling the feed of a slide fastener stringer to be stitched to successive garment fly pieces.

Another object is to provide a portable attachment of the character described with a novel multiple compartment reel of a light weight construction to which a plurality of slide fastener strings are attached for selective feeding to a working bed for simultaneous uniting with a plurality of garment fly pieces in end-to-end relation.

The above and further objects of my invention and the characteristic features thereof will be understood more readily from the following detailed description taken in connection with the accompanying drawings, in which—

Fig. 1 is a perspective view of an apparatus embodying my invention.

Fig. 2 is a side elevation of the apparatus shown in Fig. 1.

Fig. 3 is an enlarged detail in section of my portable attachment taken along the lines 3—3 of Fig. 1.

Fig. 4 is a sectional view taken along the lines 4—4 of Fig. 3.

Fig. 5 is a detail view of the reel shown in Fig. 3.

Fig. 6 is a perspective view of a preferred type of presser-foot employed in my invention.

Fig. 7 is a sectional view taken along the lines 7—7 of Fig. 6.

Fig. 8 is a rear view showing the connections for operating the switch and the presser foot.

Referring more particularly to Figs. 1 and 2 of the drawings, 5 designates a working bed having a sewing machine mounted thereon, including a sewing head 7 having a needle arm 8 and a presser foot 9 over said bed and a treadle 10 below said bed pivotally mounted to rock about a horizontal axis 11. The treadle 10 is linked by arm 12 to a switch of a motor 13 to start the motor by depressing the rear of the treadle. Link 12 has on its upper end a yoke 12a, opposite sides of which are connected by springs 12b to the operating lever of switch 13a. A second treadle 15 pivoted at 16 about a horizontal axis has an arm 17 linked to a conventional presser-foot lift mechanism, the operating pin of which is shown at 17d, through a lever 17b pivotally on the sewing arm at 17c and to link 17a. Depression of the rear of treadle 15 actuates the presser-foot mechanism to raise the presser-foot 9 and elevation of the treadle 15 serves to lower the presser-foot.

A portable reel stand (see also Figs. 3 and 4), generally indicated at 20, and comprising a vertically disposed tubular post 21, upon which a reel 22 is supported for rotation about a spindle 23, is provided with a recess 24 in the side wall of post 21 to receive a marginal portion of the working bed 5. Clamps 25, carried by flanges 26 projecting from post 21, bear against the under side of bed 5 to secure the reel stand thereto. Laterally extending wings 26a from the inner end of recess 24 may be provided through which screws 25a project into the bed 5 for securing the stand to the bed.

The upper section of post 21 contains a guide and supporting block 27 which is fitted into the post for a substantial depth. Block 27 is centrally bored to receive and maintain spindle 23 in a vertical position for sliding movement in said bore. Spindle 23 projects above and below said block. The upper extension of said spindle is provided with a collar 28, secured thereto by set screw 29, said collar being receivable in a central recess 30 in the upper end of the block so as to lie below the upper edge of the recess. One or more reels are mounted on the upper end of spindle 23 for rotation thereabout with
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The lower extension of spindle 23 projects below block 27 and terminates within post 21 slightly above the upper plane of side wall recess 24. An L-shaped lever, having a horizontal arm 32 and a vertical arm 33, is pivoted at the juncture of its arms to rotate about a horizontal axis 34 carried by post 21. Horizontal arm 32 is secured to the lower end of spindle 23, as indicated at 35, for raising the spindle. A spring 36, anchored at one end to post 21 and having its other end connected to the lower free end of vertical lever arm 33, normally biases the lever to extend spindle 23 to its lowered position, as shown in Fig. 3, with the collar 28 within recess 30. A link 37, connected at one end to the free end of lever arm 33, extends through a horizontally disposed passage 38 in a block 39 carried by post 21 below the bed 5. The other end of link 37 is connected to the rear of treadle 10, as indicated at 40. Depression of the rear of treadle 10 tensions link 37 to rotate lever arm 33 about its axis 34. This action exerts lifting force of arm 32 on the end of spindle 23, raising collar 28 which lifts reel 22 on spindle 23 to free said reel from its frictional contact with the upper end of block 27. At the same time, arm 12 actuates the switch of motor 13. Thus the reel 22 is free to rotate as the motor is started.

A second link 41 is connected at one end to lever arm 33 and extends through a similar horizontal passage 38 in block 39, then around a pulley 42 on the underside of bed 5, and has its other end connected to the rear of treadle 15, as indicated at 43. Depression of treadle 15 also serves to raise spindle 23 and the reel thereon through link 41 in a similar manner as previously described, when raising the presser-foot.

When the motor switch is off, reel 22 is normally in frictional contact with the block 27. It is sometimes desirable to have some play for adjustment of a stringer tape when raising the presser-foot 9. However, if friction pressure is on the reel and the tape is taut, the operator must exert a force sufficient to overcome this friction pressure in order to obtain the desired play in the stringer tape. With the dual control spindle actuating mechanism as above described, depression of treadle 15 to raise the presser-foot automatically tensions link 41 to release the frictional pressure of the reel against block 27. Thus the operator may readily obtain the desired play in the tape from the reel which is free to rotate about spindle 23.

As will be seen more particularly in Figs. 3 and 5, reel 22 has upper and lower compartments 45 and 46 defined by top, centre and bottom discs 47, 48 and 49, respectively, secured about a hub 50. The hub is composed of upper and lower sections 51 and 52 having flanges 53 and 54 at their outer ends. To assemble, discs 47 and 49 are respectively secured about the hub sections 51 and 52 against the flanges 53 and 54 for rotation with the hub sections. A spacer sleeve 55 is then secured about upper hub section 51 with its lower marginal portion projecting beyond the inner end of the hub section. A second spacer 56 is secured about lower hub section 52 and then centre disc 48 is mounted thereon and secured about hub section 52 for rotation therewith with a marginal portion of hub section projecting beyond disc 48. Said marginal portion of hub section 52 is then secured in the projecting portion of sleeve 55 with the adjacent surfaces of sleeve 55 and centre disc 48 in abutting engagement. The core sections may be made of wood or any suitable material and the damper and spacer sleeve of any light weight material. In the preferred embodiment I have shown the discs and spacer sleeves to be of a non-metallic substance and I prefer to secure the engaging surfaces of the discs, sleeves and hub sections with any suitable bonding agent. In the case of the opposed surfaces of the hub sections, any gap therebetween will be filled with a bonding agent.

The reel compartments each have wound thereabout 4 a slide fastener-stringer, the inner end of which is secured to the outer end of a tape 58 which is prewound about the hub of the reel compartment. For example a "black fly" stringer tape 59 having the male portions of the interlocking elements directed toward the outer end of the stringer tape may be wound about compartment 46 and a reversely arranged "white fly" stringer tape 60 may be wound about compartment 46.

For illustration purposes, in Figs. 1 and 2 I have shown how the "black fly" stringer 59 is unwound from a reel compartment and is fed through a guide loop 61 at the outer end of an arm 62, carried by reel strand 20, so as to be directed to a presser-foot feed guide 63 and thence beneath the presser-foot 9 (see also Figs. 6 and 7). Presser-foot 9 has vertical guide members 64 which override the stringer tape in a manner which forces the fastener interlocking elements to lie outside of the space between said members 64 according to the side on which these elements are disposed when fed to the presser-foot.

The tapes 58 at the inner ends of stringer tapes 59 and 60 are of a sufficient length to allow their extension to approximately the presser-foot feed guide 63. These tapes may be suitably coloured, or otherwise devised to attract an operator's attention to the fact that the stringer is at an end. In addition to providing a warning they also facilitate the attachment of a stringer tape to the reel for winding about a reel compartment.

A backing tape 65 arranged on a reel, as indicated at 66, beneath the working bed 5 is fed through a guide loop 67 to and beneath the presser-foot 9 from the forward edge of the bed. This backing tape, the purpose of which will be described hereinafter, is continuously fed beneath the presser-foot without the requirement of special manipulation by an operator.

The apparatus above described is employed in the initial operational steps of forming the component parts of garment fly pieces. This step comprises separately uniting the pluralities of the component "black" and "white" flies to corresponding stringers. For convenience I have placed the formation of the "white" flies before the formation of the "black" flies but the order does not matter.

Having now described the preferred embodiment of my invention it will be understood that improvements and modifications thereof may be resorted to without departing from the scope and spirit of the invention as defined in the annexed claims.

What I claim is:

1. A sewing machine which includes a working bed and a sewing head over said bed, a portable reel carrying stand removably mounted on the working bed, a presser-foot carried by said head and operable for releasing pressure engagement with said bed, a treadle beneath said bed for actuating said machine and a second treadle operable to release said pressure engagement of the presser-foot, said reel carrying stand comprising a vertical housing supported by said bed, a spindle arranged in said housing for vertical sliding movement relative thereto, and having its upper end projecting beyond the upper end of said housing, multiple compartment stringer tape reel mounted for rotation about the projecting upper end of said spindle, said reel being normally in frictional engagement with the upper end of said housing, and said operable connecting said spindle with both said treads for elevating said spindle to engage the reel to move the same out of its frictional engagement with the housing in response to selective manipulation of the machine actuating treadle and the presser-foot release actuating treadle.

2. Apparatus as set forth in claim 1, in which said spindle elevating means comprises a reel engaging member secured to said spindle so as to be selectively shiftable below and above the frictional surface of said housing, a lever mechanism pivoted to said housing and having an arm engageable with said spindle and a second arm separately linked to said first and second mentioned
treadles, said lever being swingable about its pivotal axis in response to said selective manipulation of the first and second treadles to engage said spindle in a lifting operation.

3. Apparatus as set forth in claim 2, including a flexible linking member connecting said second lever arm to said first mentioned treadle for swinging said lever and a second flexible linking member separately connecting said second lever arm to said second mentioned treadle for swinging said lever.

4. Apparatus as set forth in claim 1, in which said multi-component reel comprises a pair of hub members unlatticed at their inner ends and provided with laterally projecting flanges at their outer ends, a disc mounted on each hub member and secured thereto against the hub member flange, a spacer sleeve secured about one of said hub members against the disc carried thereby and having its outer marginal portion projecting beyond the inner end of said hub member, a second spacer sleeve secured about the other of said hub members against the disc carried thereby with the inner marginal portion of said hub member projecting therebeyond, and a second disc secured about the inner marginal portion of said second hub member against the said spacer sleeve, so that a substantial portion of the inner marginal projection of said second hub member is telescopically receivable within the inner marginal projection of the sleeve secured about said first mentioned hub member, and means for bonding together the inner ends of said hub members in their telescopic relationship.

5. A sewing machine having a working bed and a presser foot movable towards and from the working bed, means to drive the machine, a first control member movable to start and stop said driving means, a second control member for raising and lowering the presser foot operatively connected thereto, a reel mounted on the machine, means to brake said reel, means operatively connecting said braking means to both said control members and responsive both to movement of the first control member to start the driving means and to movement of the second control member to raise said presser foot, whereby to release the reel.

6. In a machine as claimed in claim 5, means to guide a tape from said reel to said presser foot, a source of tape separate from said reel, and means to guide tape from such source to said presser foot.

7. In a machine as claimed in claim 5, means removable supporting the reel on the working bed, and means to clamp said stand to the bed, said reel being rotatably mounted on said stand.

8. In a machine as claimed in claim 5, a tubular stand having a notch therein engageable with the edge of the working bed, and means to clamp said stand to the bed, said reel being rotatably mounted on said stand.

9. A sewing machine having a working bed and a presser foot movable towards and from the working bed, means to drive the machine, a first control member movable to start and stop said driving means, a second control member for raising and lowering the presser foot operatively connected thereto, a shaft mounted on the machine for vertical movement, a reel mounted on said shaft and rotatable about the axis thereof, means on said shaft to raise said reel along with the shaft, braking means for said reel responsive to up and down movement of the reel to release and apply braking action to the reel, and means operatively connecting said braking means to both said control members and responsive both to movement of the first control member to start the driving means and to movement of the second control member to raise said shaft so as to release such braking action.

10. A sewing machine having a working bed and a presser foot movable towards and from the working bed, means to drive the machine, a first control member movable to start and stop said driving means, a second control member for raising and lowering the presser foot operatively connected thereto, a shaft mounted on the machine for vertical movement, a reel mounted on said shaft and rotatable about the axis thereof, means on said shaft to raise said reel along with the shaft, braking means for said reel responsive to up and down movement of the reel to release and apply braking action to the reel, and means operatively connecting said shaft to both said control members and responsive both to movement of the first control member to start the driving means and to movement of the second control member to raise said shaft so as to release such braking action.

11. A sewing machine having a working bed and a presser foot movable towards and from the working bed, means to drive the machine, a first control member movable to start and stop said driving means, a second control member for raising and lowering the presser foot operatively connected thereto, a shaft mounted on the machine for vertical movement, a reel mounted on said shaft and rotatable about the axis thereof, means on said shaft to raise said reel along with the shaft, a stand in which said shaft is mounted, said stand having a friction surface below the reel, engageable therewith when the reel moves downward, and means operatively connecting said shaft to both said control members and responsive both to movement of the first control member to start the driving means and to movement of the second control member to raise said shaft so as to release such braking action.

12. A sewing machine having a working bed and a presser foot movable towards and from the working bed, means to drive the machine, a first control member movable to start and stop said driving means, a second control member for raising and lowering the presser foot operatively connected thereto, a shaft mounted on the machine for vertical movement, a reel mounted on said shaft and rotatable about the axis thereof, means on said shaft to raise said reel along with the shaft, a stand in which said shaft is mounted, said stand having a friction surface below the reel, engageable therewith when the reel moves downward, and means operatively connecting said shaft to both said control members and responsive both to movement of the first control member to start the driving means and to movement of the second control member to raise said shaft so as to release such braking action.

13. In a machine as claimed in claim 12, spring means acting on said lever urging the shaft downward.

14. In a machine as claimed in claim 13, said connecting means comprising flexible members.

15. In a machine as claimed in claim 12, said connecting means comprising flexible members.

16. A sewing machine having a working bed and a presser foot movable towards and from the working bed, means to drive the machine, a first control member movable to start and stop said driving means, a second control member for raising and lowering the presser foot operatively connected thereto, a shaft mounted on the machine for vertical movement, a reel mounted on said shaft and rotatable about the axis thereof, means on said shaft to raise said reel along with the shaft, braking means for said reel responsive to up and down movement of the reel to release and apply braking action to the reel, and an L-shaped lever pivoted on the machine and having one arm connected to said shaft, and means connecting the other arm of said lever to said control members so as to raise the shaft in response to movement either of the first control member to start the driving means or of the second control member to raise the presser foot, whereby to release the reel.

17. A sewing machine having a working bed and a presser foot movable towards and from the working bed, means to drive the machine, a first control member movable to start and stop said driving means, a second control member for raising and lowering the presser foot operatively connected thereto, a shaft mounted on the machine for vertical movement, a reel mounted on said shaft and rotatable about the axis thereof, means on said shaft to raise said reel along with the shaft, a stand in which said shaft is mounted, said stand having a friction surface below the reel, engageable therewith when the reel moves downward, an L-shaped lever pivoted on the machine and
having one arm connected to said shaft, and means connecting the other arm of said lever to both said control members so as to raise the shaft in response to movement either of the first control member to start the driving means or of the second control member to raise the presser foot.

18. In a machine as claimed in claim 17, spring means acting on said lever urging the shaft downward.

19. In a machine as claimed in claim 18, said connecting means comprising flexible members.

20. A sewing machine having a working bed and a presser foot movable towards and from the working bed, a sewing head over said bed, a presser foot carried by said head and operable for releasing pressure engagement with said bed, a treadle beneath said bed for actuating said machine and a second treadle operable to release said pressure engagement of the presser foot, a reel carrying stand mounted on said working bed comprising a vertical housing supported by said bed, a spindle arranged in said housing for vertical sliding movement relative thereto, and having its upper end projecting beyond the upper end of said housing, a stringer tape reel mounted for rotation about the projecting upper end of said spindle, said reel being normally in frictional engagement with the upper end of said housing, and means operatively connecting said spindle with both said treadles for elevating said spindle to engage the reel to move the same out of its frictional engagement with the housing, said means being operable in response to selective manipulation of the machine actuating treadle and the presser foot release actuating treadle.

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