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J. E. ACKERMAN ET AL

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STRIP-GUIDING DEVICE FOR SEWING MACHINES

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2 Sheets-Sheet 1

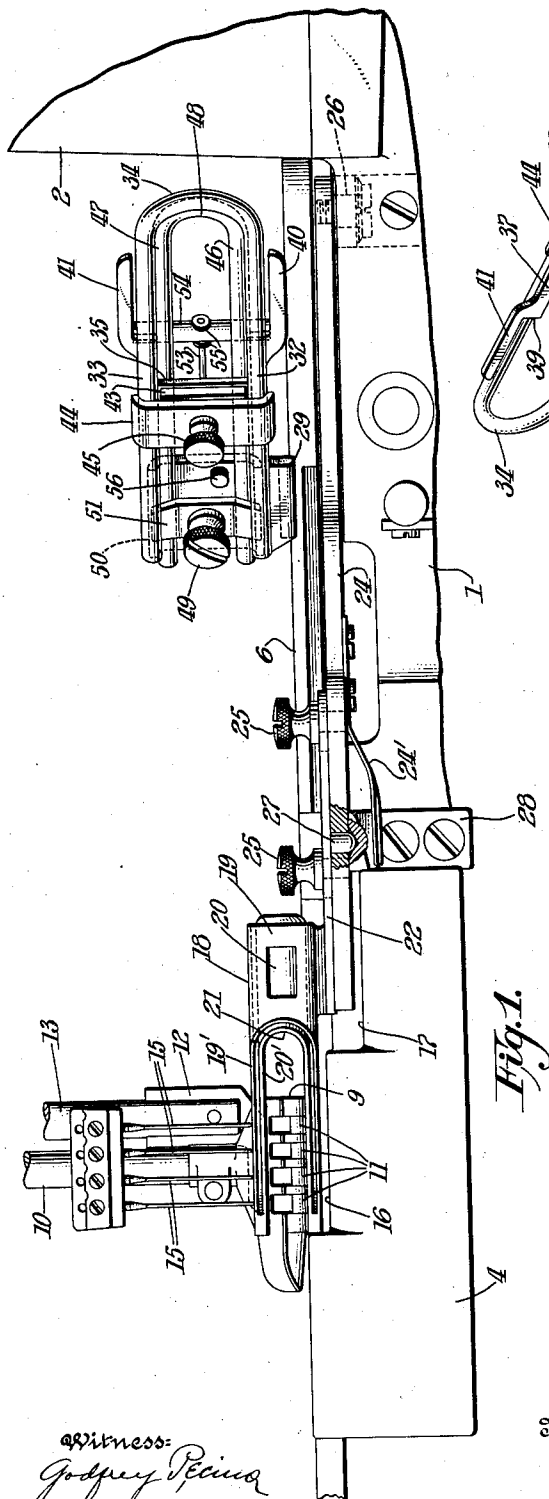


Fig. 1.

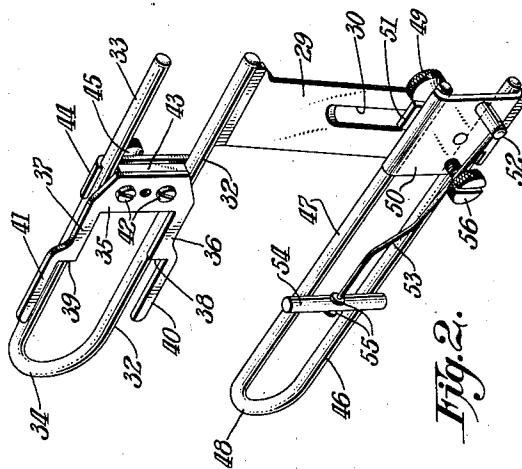


Fig. 2.

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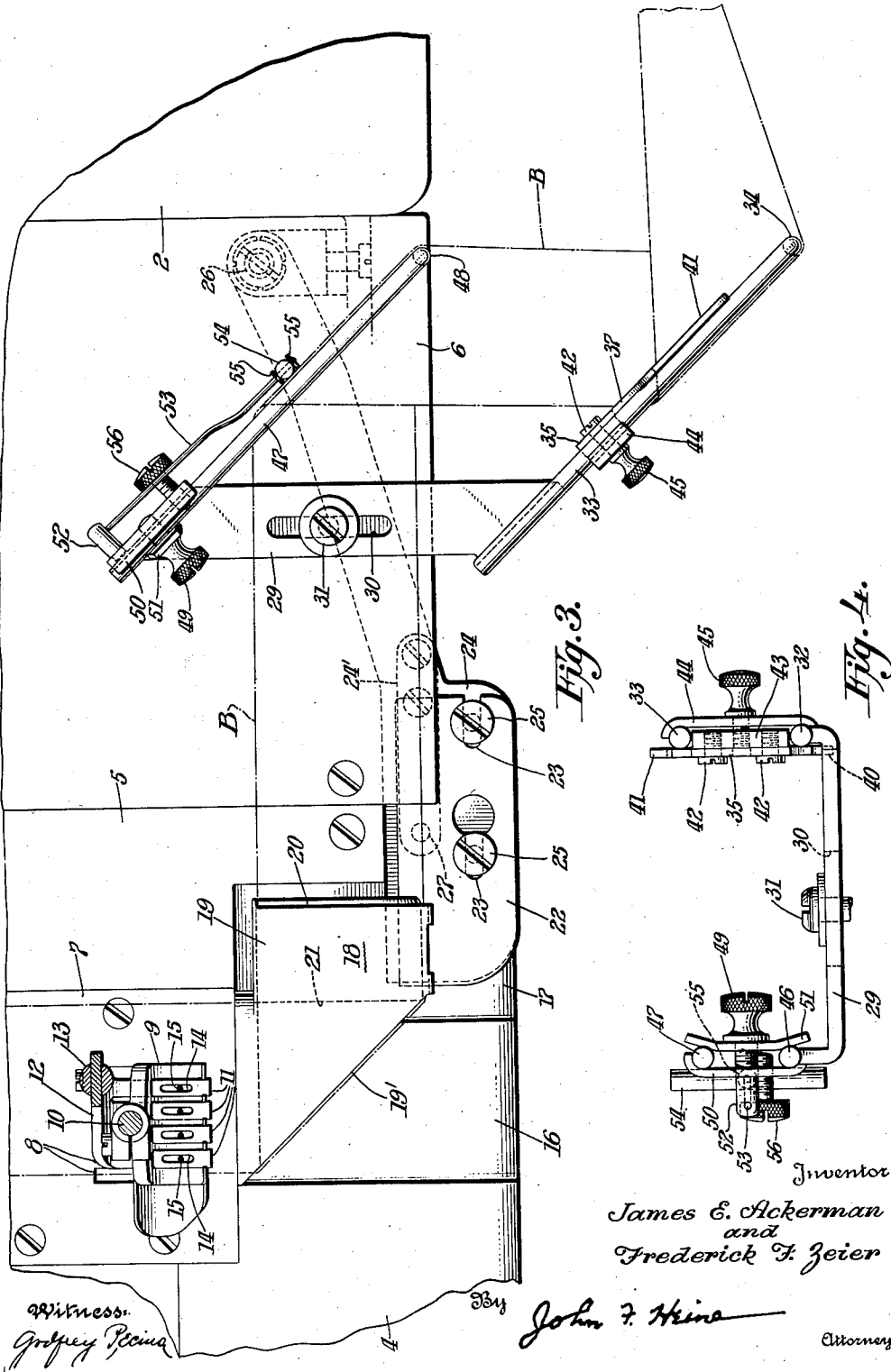
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UNITED STATES PATENT OFFICE

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STRIP-GUIDING DEVICE FOR SEWING MACHINES

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19 Claims. (Cl. 112—138)

This invention relates to strip-guiding devices for sewing machines and, more particularly, to strip-guiding devices for directing a binding-strip to a transverse or strip-reversing binder of a sewing machine.

A strip-reversing binder conventionally extends transversely of the line of feed and has the strip-receiving end of its U-shaped binding-strip passageway directed toward the bracket-arm standard of the sewing machine. When the binder is adapted to deliver wide binding-strips to the stitch-forming mechanism of the sewing machine, as for example in binding blankets, considerable difficulty has been experienced in leading the wide binding-strip to the binder from a supply-reel, owing to the interposition of the bracket-arm standard of the machine and the insufficiency of available space under the bracket-arm for a wide binding-strip reel and for smoothly doubling the binding-strip longitudinally.

The present invention has for an object to provide strip-guiding means which will facilitate the application of wide binding-strips smoothly and evenly to body materials, and particularly to body materials which are soft in texture, such as soft blankets and the like.

The invention has also for its object to provide means for directing a wide binding-strip past the sewing machine arm standard to a strip-reversing binder, with the binding-strip longitudinally doubled and properly tensioned for application of the binding-strip to a body material of soft texture.

The invention consists in the strip-guiding and tensioning devices, and in the combinations and arrangements of parts hereinafter described in connection with the accompanying drawings, which illustrate a preferred embodiment of the invention and in which:

Fig. 1 is a front elevation of a portion of a sewing machine, including the needles, the presser-foot and the bed-frame to which the improved guiding devices have been applied.

Fig. 2 illustrates, in perspective, the strip doubling and reversing guides detached from the machine and as viewed from the rearward side of said guides.

Fig. 3 is a top plan view, partly in section, of the strip guides and of the portion of the sewing machine shown in Fig. 1.

Fig. 4 illustrates the strip-doubling and reversing guides in end elevation, as viewed endwise of the wire-loop devices of said guides.

The sewing machine, in part illustrated in the

drawings, has a bed-frame 1 from which rises a conventional bracket-arm standard 2. The bed-frame 1 has cover-plates 4, 5 and 6, including a throat-plate 7 provided with feed-slots 8.

Opposed to the throat-plate 7 is a presser-foot 9 attached to a vertically disposed presser-bar 10; said presser-foot 9 having the tread portion thereof suitably slotted to receive the laterally space work-engaging members 11 of a feeding foot 12 secured to the lower end of a vertically disposed feed-bar 13. The feeding-foot members 11 have needle-slots 14 providing clearance for a plurality of vertically disposed needles 15 having endwise reciprocatory work-penetrating and laterally vibratory work-feeding movements. Any well known or preferred form of mechanism may be employed for actuating the needles 15 and for imparting work-feeding movements to the feeding foot 12 in suitably timed relation to lifting movements imparted to the presser-foot 9; the present invention not being dependent upon any specific form of actuating mechanism for these members.

The bed-frame cover-plate 4 has its upper face stepped lengthwise of the bed-frame to form a clearance-depression 16 in front of the throat-plate 7 and an adjacent clearance-depression 17. The closure-plate depression 16 provides clearance for a binder 18 of a conventional strip-reversing type. The binder 18 is adapted to accommodate a wide binding-strip and has the usual spaced outer and inner walls 19 and 20 providing therebetween a binding-strip passageway of horizontal U-shape extending crosswise of the line of feed; whereby the strip-receiving end of said passageway is directed toward the bracket-arm standard 2. The walls 19 and 20 are cut away obliquely to the longitudinal axis of the binder to provide parallel strip-reversing edges 19' and 20' which are inclined to the line of seam formation and are disposed in front of the feeding mechanism of the machine. The spaced upper and lower members of the inner wall 20, in the region of the edges 19', 20', form a mouth adapted to receive a margin of a body material which is guided by a binder-wall 21 disposed parallel to the line or lines of seam formation.

The binder 18 has a shank-plate 22, formed with slots 23 and supported by a horizontally widened end portion of a carrier-arm 24, upon which said shank-plate is adjustably secured by screws 25; said screws 25 passing through said slots 23 to provide for adjustment of the binder crosswise of the line of seam formation. The upper edge of the bed-frame 1 is cut away to

provide clearance for the carrier arm 24 at the under side of the forward edge portion of the cover-plate 6. Adjacent the bracket-arm standard 2, the carrier-arm 24 is pivotally secured by a screw 26 to the bed-frame 1, whereby the binder may be swung horizontally forwardly out of operative position. Extending slightly below the lower face of the carrier-arm 24 is a latch-pin 27 adapted in the operative position of the binder 18 to enter a recess formed in the upper face of an angular keeper-plate 28 secured to the front side of the bed-frame 1; said latch-pin being releasably held seated in the keeper-plate recess by a spring 24' attached to the under side of the arm 24. The depression 17 in the closure-plate 4 provides the requisite clearance for the free end of the carrier-arm 24.

The upper face of the closure-plate 6 is suitably channelled crosswise of the bed-frame 1 to receive a supporting-plate 29 having a slot 30 entered by a screw bolt 31, by means of which said supporting-plate is secured upon the closure-plate 6 for adjustment in a direction substantially parallel to the direction of feed of the work past the needles of the sewing machine.

The supporting-plate 29 extends forwardly beyond the bed-frame 1. Suitably attached to the upturned forward end of the supporting-plate 29 is the free end portion of the lower limb 32 of a primary horizontal U-shaped strip-reversing device 32, 33, 34, in the form of a rod bent into U-shape. The upper limb 33 of the U-shaped rod is preferably substantially parallel to the lower limb 32 of the rod, and said limbs 32, 33 are preferably disposed in a common vertical plane inclined at an angle of approximately 45° to a vertical plane containing the line of feed of the work past the needles. The bend 34 connecting the limbs 32 and 33 of the U-shaped rod is preferably smoothly rounded, and said bend is located at the end of the described strip-reversing device remote from the supporting plate 29 and from the line of feed of the work past the needles. Inasmuch as the primary strip-guiding device 32, 33, 34 is carried by the supporting-plate 29 forwardly of the bed-frame 1, the bend 34 of said device is so located as to obviate interference by the arm-standard 2 with the guiding of a binding strip to the binder 18.

Clamped against the rearward side of the limbs 32, 33 of the primary strip-reversing device, for adjustment lengthwise of said limbs, is an edge-guide member 35 having horizontally spaced arms 36 and 37 formed with edge-guide shoulders 38 and 39. The shoulders 38 and 39 are opposed to and spaced from the bend 34 of the strip-reversing device; said arms 36 and 37 being each reduced in width at the free ends thereof to provide parallel strip-confining fingers 40 and 41. The fingers 40 and 41 are disposed at the relatively remote sides of the limbs 32 and 33 in spaced relation to said limbs to accommodate the margins of a binding-strip guided by and inverted about said limbs.

The edge-guide member 35 is secured by screws 42 to a guide-block 43 disposed between the limbs 32 and 33 for adjustment of the edge-guides toward and from the bend 34 of the primary strip-reversing device. The guide-block 43 is held in set position by a clamp-plate 44 releasably secured to said guide-block by a thumb-screw 45; said clamp-plate 44 having rounded ends partly embracing the limbs 32, 33 and being disposed at the side of said limbs opposite the edge-guide member 35.

The upturned rearward end of the supporting-plate 29 carries the free end portion of the lower limb 46 of a supplementary U-shaped strip-reversing member 46, 47, 48. This supplementary member corresponds structurally to the primary strip-reversing device, as it likewise comprises a rod bent into U-shape so that the upper limb 47 thereof is substantially parallel to the lower limb 46 and the limbs are connected by a rounded bend 48. The limbs of the supplementary strip-reversing device are preferably disposed in a vertical plane substantially parallel to a vertical plane containing the limbs 32, 33 of the primary strip-reversing device. It is preferred, however, to space the limbs 32, 33 of the primary strip-reversing device more widely from each other than the limbs 46, 47 of the supplementary device; the difference in the spacings of said limbs of the respective devices being such that the proximate faces of the limbs 32, 33 are spaced from each other substantially the same as the relatively remote faces of the limbs 46, 47.

The primary and supplementary strip-reversing devices extend from the same side of the supporting plate 29 at an angle of approximately 45° to the longitudinal axis of said supporting plate; said devices being disposed in tandem upon the supporting plate to successively guide the binding-strip B (shown in dot-dash lines in Fig. 3). The described primary and supplementary strip-reversing devices are, furthermore, so positioned with respect to each other that the limbs of the respective devices are substantially normal to lines bisecting the angles formed by the leads of the binding-strip to and from said devices. The bend 34 of the primary strip-reversing device leads the bend 48 of the supplementary device in a direction substantially parallel to the direction of feed of the work past the needles of the sewing machine and, therefore, in a direction to which the spaced limbs of both of said devices are inclined at corresponding acute angles of approximately 45°.

The binding-strip B is led to the primary or front strip-reversing device in front of the arm-standard 2 and in a direction transverse to the line of feed of the machine. The binding-strip is drawn over the limbs 32, 33 of the guide, between said limbs and the strip-margin confining fingers 40, 41, whereby the bend 34 of the guide acts to double the strip longitudinally. The edge-guides 38 and 39 are preferably evenly spaced from the bend 34, whereby the binding-strip is longitudinally folded medianly of the width of the strip.

The binding strip B, thus longitudinally doubled, is then passed between the strip-guide limbs 32 and 33 and is drawn rearwardly toward the supplementary strip-guide in a direction substantially parallel to the line of feed of the machine, whereby the doubled strip is reversed or turned inside out and the direction of lead of the strip is changed at substantially a right angle.

The binding-strip B is then drawn across the supplementary strip-guide, with the upper ply of the doubled and reversed strip passing over the upper limb 47 of the strip-guide and with the lower ply of the strip passing under the lower limb 46 of the strip-guide; whereby the fold of the binding-strip is entered and guided by the bend 48 of the strip-guide. The binding-strip is then drawn between the strip-guide limbs 46 and 47 in a direction transverse to the line of feed of the machine and therefore at a right an-

gle to the direction of lead of the strip from the primary strip-guide. In doing this, the doubled binding-strip B is turned outside in or reversed and the binding-strip margins are disposed in substantially horizontal planes. The bend 48 of the supplementary strip-guide is preferably so located that the binding-strip B is delivered by the supplementary strip-guide in alignment with the strip-passageway of the binder 18, whereby the binding-strip enters the binder 18 smoothly and evenly. Furthermore, the proximate faces of the limbs 46 and 47 of the supplementary strip-guide are preferably spaced so that the upper and lower plies of the folded strip delivered by the supplementary strip-guide are spaced substantially the same as when entering the binder 18.

In twice reversing the doubled binding-strip B, the bends 34 and 48 of the strip-guides impose a tension upon the fold portion of the binding-strip which is slightly in excess of the tension imposed upon the free margins of the strip by the parallel limbs of the two strip-guides. This inequality in tensions, when imposed upon a wide binding strip, may result in distortion of the strip to an extent producing undesirable effects in the finished product. In order to obviate this condition, the present invention includes means for imposing an additional tension upon the binding-strip margins, as will now be described.

Secured by a screw 49 to the free end portions of the limbs 46 and 47 of the rearward or supplemental strip-guide are opposed clamp-plates 50 and 51 which are together adjustable lengthwise of the limbs 46 and 47 into different set positions thereupon. Extending horizontally rearwardly from the rearward clamp-plate 50 is an anchoring post 52 for one end of a wire-spring 53. The opposite end of the spring 53 passes freely through an aperture extending transversely of a strip-tensioning rod 54 medianly of the ends of said rod. The rod 54 is therefore pivotally supported by the spring 53, said rod being held against movement endwise of the spring 53 by small retaining collars 55 carried by the spring at opposite sides of the rod 54. The spring 53 biases the rod 54 to bear yieldingly against the limbs 46 and 47 of the supplementary strip-inverting member at points spaced from the bend 48 of said member. The pivotal axis of the rod 54 is preferably substantially midway between said limbs 46 and 47, whereby the pressures exerted by the arms of said rod against said limbs 46 and 47 are substantially equal. The spring 53 is adjustably tensioned by a screw 56 threaded into the clamp-plate 50 so that the head of said screw bears upon the spring in proximity to the anchoring post 52.

The strip-guiding, strip-folding, strip-reversing and strip-tensioning devices hereinbefore described comprise a unit assembly readily applicable to different sewing machines; the unit assembly being particularly adapted for use in connection with sewing machines employing transverse binders of the flat type requiring folding of the work in advance of the binder. By the use of the described unit assembly, the binding-strip is properly folded, tensioned and directed to the binder from a remotely located supply-reel without interference by the bracket-arm standard of the machine.

Having thus set forth the nature of the invention what we claim herein is:

1. A strip-guiding attachment for use in connection with sewing machines, comprising, a sup-

porting-plate, parallel and spaced primary and supplementary strip-reversing devices carried by said supporting-plate and each adapted to reverse and to change the direction of lead of a longitudinally doubled strip of material passed successively through said devices, said devices each consisting of a U-shaped rod having spaced strip-margin reversing limbs connected by a strip-fold reversing bend, and said devices being positioned with respect to each other so that the limbs of the respective devices are disposed substantially normal to lines bisecting the angles formed by the leads of the strip to and from said devices.

2. A strip-guiding attachment for use in connection with sewing machines, comprising a supporting-plate, spaced primary and supplementary strip-reversing devices carried by said supporting-plate and each adapted to reverse and to change the direction of lead of a longitudinally doubled strip of material passed successively through said devices, said devices being arranged parallel to each other and each consisting of a U-shaped guide having spaced strip-margin reversing limbs connected by a strip-fold reversing bend, the spaced limbs of said primary strip-reversing device being disposed in a plane substantially parallel to a plane containing the spaced limbs of said supplementary strip-reversing device, and said primary strip-reversing device having the bend thereof leading the bend of the supplementary device in a direction to which the spaced limbs of both of said devices are inclined at corresponding acute angles of approximately 45°.

3. A strip-guiding attachment for use in connection with sewing machines, comprising, primary and supplementary substantially U-shaped strip-doubling and reversing rods arranged substantially parallel to each other and each having the spaced limbs thereof connected by a rounded bend; said primary strip-reversing device having the bend of the U-shaped rod thereof leading the bend of the supplementary U-shaped rod in a direction to which the spaced limbs of both of said rods are inclined at corresponding acute angles of approximately 45°.

4. A strip-guiding attachment for use in connection with sewing machines, comprising, parallel primary and supplementary substantially U-shaped strip-doubling and -reversing rods each having spaced substantially parallel limbs connected by a rounded bend, said primary strip-reversing device having the bend of the U-shaped rod thereof leading the bend of the supplementary U-shaped rod in a direction to which the spaced limbs of both of said rods are inclined at corresponding acute angles of approximately 45°, and the limbs of the primary U-shaped rod being more widely spaced than the limbs of the supplementary U-shaped rod.

5. A strip-guiding attachment for use in connection with sewing machines, comprising, primary and supplementary substantially parallel U-shaped strip-doubling and -reversing rods each having spaced substantially parallel limbs connected by a rounded bend, said primary strip-reversing device having the bend of the U-shaped rod thereof leading the bend of the supplementary U-shaped rod in a direction to which the spaced limbs of both of said rods are inclined at corresponding acute angles of approximately 45°, and said limbs of the primary U-shaped rod having the proximate parallel faces thereof spaced from each other substantially the same extent as the

spacing of the relatively remote parallel faces of the limbs of the supplementary U-shaped rod.

6. A strip-doubling and -reversing device for sewing machines, comprising, a rod bent into U-shape and providing spaced strip-guiding limbs connected by a rounded strip-reversing bend, edge-guides associated with the respective limbs of said rod in spaced relation to said rounded bend, supporting means upon said rod for said edge-guides, and means providing for adjustment of said edge-guides lengthwise of the limbs of said rod.

7. A strip-doubling and -reversing device for sewing machines, comprising, a rod bent into U-shape and providing spaced strip-guiding limbs connected by a rounded strip-reversing bend, edge-guides associated with the respective limbs of said rod in spaced relation to said rounded bend, a supporting member common to said edge-guides, and releasable means for clamping said supporting member to the limbs of said rod.

8. A strip-doubling and -reversing device for sewing machines, comprising, a rod bent into U-shape to form spaced strip-guiding limbs connected by a rounded strip-reversing bend, a guide-block disposed between said limbs for adjustment lengthwise of the limbs, edge-guides carried by said guide-block and associated with the respective limbs of said rod, said edge-guides comprising strip-guiding shoulders opposed to and spaced from said bend of the rod, and releasable means for securing said block to said rod in set positions of said edge-guides.

9. A strip-doubling and -reversing device for sewing machines, comprising, a rod bent into U-shape to form spaced strip-guiding limbs connected by a strip-reversing bend, a guide-block disposed between said limbs for adjustment lengthwise of the limbs, edge-guides carried by said guide-block and disposed at the relatively remote sides of said limbs, strip-confining fingers extending from said edge-guides toward said bend in substantial parallelism with said limbs, and releasable means for securing said guide-block in different set positions of said edge-guides.

10. The combination with a strip-doubling and reversing device for use in connection with sewing machines, said device having spaced strip-inverting members, of strip-margin tensioning means opposed to said members and imposing a frictional drag upon the margins of a doubled strip directly at the points of reversal of said margins.

11. A doubled-strip reversing device for sewing machines, comprising, a substantially U-shaped guide rod having spaced strip-margin reversing limbs connected by a strip-fold reversing bend, a strip-tensioning member opposed to said limbs at strip-margin reversing points thereof spaced from said bend, and a spring located between said limbs for supporting and yieldingly urging said member against said limbs.

12. A strip-reversing device for sewing machines, comprising, a substantially U-shaped guide having strip-margin reversing limbs connected by a strip-fold reversing bend, a strip-tensioning member yieldingly opposed to said strip-margin reversing limbs at strip-reversing points of said limbs spaced from said bend, and a spring located between said limbs and pivotally carrying said member whereby equal pressure is applied to marginal edges of the strip.

13. A strip-reversing device for use in connection with sewing machines, comprising, a substantially U-shaped rod having spaced strip-mar-

gin reversing limbs connected by a strip-fold reversing bend, a strip-tensioning member opposed to said strip-margin reversing limbs at points of the respective limbs spaced from said bend, a spring for yieldingly holding said member against said limbs, and means providing for adjustment of said strip-tensioning member lengthwise of said limbs toward and from said bend.

14. A strip-reversing device for use in connection with sewing machines, comprising, a rod bent into U-shape thereby providing spaced strip-margin reversing limbs connected by a strip-fold reversing bend, a strip-tensioning member yieldingly opposed to said strip-margin reversing limbs at points of said limbs spaced from said bend, a spring located between said limbs and providing a pivotal support for said member, and supporting means for said spring providing for adjustment of said strip-tensioning member lengthwise of said limbs.

15. A strip-reversing device for sewing machines, comprising, a substantially U-shaped rod having spaced strip-margin reversing limbs connected by a strip-fold reversing bend, a strip-tensioning member yieldingly opposed to said strip-margin reversing limbs at points of said limbs spaced from said bend, a spring located between said limbs and providing a pivotal support for said member, and means for regulating the tension of the spring to thereby vary the pressures of said member on the marginal edges of the strip.

16. In a sewing machine, the combination with work-feeding mechanism, and a binder having a U-shaped strip-guiding passageway extending crosswise of the line of feed of the work, said binder having strip-reversing edges disposed in advance of said work-feeding mechanism at an inclination to said line of feed, of primary and supplementary binding-strip guides each inclined at substantially the same angle to said line of feed and disposed with respect to each other to successively change the direction of lead of a binding strip, said supplementary strip-guide comprising a substantially U-shaped strip-doubling and -reversing rod disposed with respect to said binder to direct the binding-strip in longitudinally doubled form into substantial alinement with said U-shaped passageway of the binder.

17. In a sewing machine, the combination with work-feeding mechanism, and a binder having a U-shaped strip-guiding passageway extending crosswise of the line of feed of the work, said binder having strip-reversing edges disposed in advance of said work-feeding mechanism at an inclination to said line of feed, of primary and supplementary binding-strip guides each comprising a substantially U-shaped rod providing spaced strip-margin guiding limbs inclined at substantially the same angle to said line of feed and connected by a rounded strip-doubling bend, said guides being disposed with respect to each other to successively change the direction of lead of a binding-strip, and said supplementary strip-guide being disposed with respect to said binder to direct the binding-strip in longitudinally doubled form into substantial alinement with said U-shaped passageway of the binder.

18. The combination in a sewing machine having a bed-frame, a bracket-arm standard rising from one end of said bed-frame, work-feeding mechanism, and a binder provided with a U-shaped strip-guiding passageway having the binding-strip receiving end thereof directed toward said bracket-arm standard, said binder hav-

ing the delivery end thereof provided with strip-reversing edges disposed in advance of said work-feeding mechanism at an inclination to said line of feed, of primary and supplementary binding-strip guides for directing a binding strip to said binder, said strip-guides each consisting of a U-shaped rod having spaced strip-margin reversing limbs inclined to said line of feed and connected by a strip-fold reversing bend, said primary strip-guide having the bend thereof disposed in front of said bed-frame and leading the bend of the supplementary device in a direction substantially parallel to the line of feed, and said supplementary strip-guide being disposed above said bed-frame in position to direct the

binding strip in longitudinally doubled form into substantial alinement with said U-shaped passageway of the binder.

19. A strip-guiding attachment for use in connection with sewing machines, comprising, a supporting-plate, and spaced primary and supplementary strip-doubling and -reversing devices carried in tandem by said supporting-plate and arranged parallel to each other, said devices each consisting of a U-shaped rod having spaced strip-margin reversing limbs connected by a strip-doubling and -reversing bend.

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