To all whom it may concern:

Be it known that I, Albert H. De Vos, a citizen of the United States, residing at Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Blindstitch Mechanisms for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to sewing machines equipped for blind-stitching and has for an object to so combine stitch-forming mechanism and a strip-guide that a strip of tape, braid, or the like, may first be led to the needle, preferably in a direction transverse to a vertical plane through the line of feed, and then secured to a second ply of material by stitches, the connecting thread-portions of which, between adjacent needle punctures, are hidden from view.

Another object of the invention is to so combine stitch-forming mechanism and a strip-guide or binder, having spaced fold-inverting edge-portions, that upper and lower plies of braid, braid-like or the like may be simultaneously blind-stitched together or to the opposite sides of intermediate body-fabric material.

More specifically the invention has for an object to so combine stitch-forming mechanism and a binder of the so-called "English" type that a binding strip may be blind-stitched to position about the edge of a body-fabric.

Further objects of the invention are to provide adjustments whereby the binder-head may be shifted in any direction laterally of the needle to facilitate the proper relative arrangement of the binder and needle to suit the class of work in hand, and whereby the lower and upper fold-inverting edge-portions of the binder-head may be adjusted relatively to one another so that the needle may be caused to stitch more deeply into one than the other of the superimposed plies of the folded binding strip.

The above and other objects, to be hereinafter referred to, are attained by the present invention which, in its preferred embodiment, comprises a binder of the well known "English" type which is adjustably mounted upon the throat-plate of a flat-bed sewing machine of usual construction in such a position that the reciprocating needle traverses a path disposed very close to and preferably in advance of the upper and lower end-portions of the U-shaped fold-inverting edge common to binders of this type. As the binding-strip is bent over the fold-inverting edge the needle will, at each descent, pass twice into and out of the inner or hidden surface of the binding-strip without passing through to the outer or visible surface of said strip.

To secure the desired adjustments, the throat-plate is provided with a recess or slide-way extending in the direction of feed. Fitted within this slide-way is a slide-plate upon which is mounted for adjustment in a transverse direction the slotted shank of the binder-head. By virtue of these two separate adjustments in mutually transverse directions the binder-head may be shifted toward or from the needle in any desired direction.

The binder-head is divided longitudinally into two parts the upper of which is mounted upon the lower for lengthwise adjustment relative thereto, thus permitting adjustment of the upper fold-inverting edge-portion of the binder without disturbing the corresponding lower fold-inverting edge-portion thereof. A presser-foot, notched at one side to receive the delivery end of the binder, is arranged to cooperate with the feed-dog in the usual manner to advance the work.

The invention will be better understood by referring to the accompanying drawings in which Figure 1 is a fragmentary perspective view of the machine with the presser-foot broken away to show the manner in which the needle splits the thickness of binding material. Fig. 2 is a plan view showing the binder-head, needle, presser-foot and throat-plate in their proper relative positions. Fig. 3 is a similar view with the presser-foot and work removed to show the feed-dog. Figs. 4 and 5 are side and end elevations, respectively, of the binder-head. Fig. 6 is a sectional view taken on the line 6—6, Fig. 2. Fig. 7 is an enlarged sectional view taken on the line 7—7, Fig. 2 looking in the direction of the arrows. Fig. 8 shows a modified form of the invention and Fig. 9 is a perspective view of a blind-stitched seam formed by the machine.

The invention is preferably embodied in a sewing machine comprising the usual flat-bed 1 and head 2 in which is journaled the
presser-bar 3 and reciprocating needle-bar 4 carrying the eye-pointed needle 5 which is adapted to cooperate as usual with any suitable form of loop-taker mechanism. Secured within an aperture in the bed 1 by screws 6—6 is the semi-circular throat-plate 7 formed with the parallel slots 8 through which the feed-dog sections 9 operate in conjunction with the presser-foot 10 to feed the work in a manner well known. The shank 11 of the presser-foot 10 is secured to the presser-bar 3 in the usual manner.

Fitted within a suitable slide-way or recess in the throat-plate 7 is the slide-plate 10', apertured at 11' to give access to the throat-plate screw 6 and adapted for adjustment in a direction parallel to the line of feed. The slide-plate 10' may be secured in adjusted position by means of the screw which passes through the slot 13 in said slide-plate and is threaded into the throat-plate 7, as shown in Figs. 2 and 6.

The strip-guide or binder 14 is received within the recess 15 in the upper face of the throat-plate 7 and is provided with a shank 18 slotted at 17 and secured to the slide-plate by screws 18 which pass through the slot 17 and permit adjustment of the binder laterally of the line of feed in an obvious manner. The binder is divided longitudinally into upper and lower sections 19 and 20, respectively; the upper section 19 being adjustably secured to the lower section 20 by screws 21, 21 which pass through slots 22, 22 in the upper section 19 and are threaded into the lower section 20.

In the present instance the binder is of common form and comprises the usual U-shaped strip-guiding channel or passage-way 23, Fig. 5 defined by the inner U-shaped guide-wall 24 and the outer sheath-members 25, 25 which together form substantially an outer U-shaped guide-wall 26. At its delivery end the binder is formed with a second passage-way 27, Fig. 4, extending at right angles to the passage-way 23 and defined by the U-shaped guide-wall 28 which intersects the inner guide-wall 24 and forms at said intersection a U-shaped fold-inverting edge which is disposed in a plane parallel to the needle and includes the upper and lower fold-inverting edge-portions, or fold-presenting elements 29 and 30, respectively. Preferably these edge-portions are arranged at least partially in rear of the needle 5, as shown in Figs. 3 and 4, so that the needle will descend in advance of and close to said fold-inverting edge-portions and pierce or enter and emerge from the inner surfaces of the upper and lower plies of the folded binding-strip without passing entirely through to the outer or visible surface of said strip, as shown in Fig. 7.

It is to be understood that by adjusting the fold-inverting edge-portions 29 and 30 closely enough to the needle-path it is possible to form a seam wherein the stitching thread or threads will appear at the opposite sides of the seam. By referring to Fig. 3 it will be noted that the channels 23 and 27, extend directly toward the needle-path; that is, if projected in the directions of their respective lengths, they will be intersected by said needle-path. As a result, the needle will enter and emerge from the inner or hidden surfaces of the upper and lower plies of folded binding material and may or may not pass entirely through to the outer or visible surfaces of said plies depending upon the position of adjustment of the fold-inverting edge-portions 29 and 30 relatively to the needle.

As the delivery end of the binder is disposed mainly in rear of and close to the needle-path it is desirable that the presser-foot 10 be notched at 31 to clear the needle head. The upwardly disposed inclined guide-wall 32 of the notch 31 and a similarly inclined guide-wall 33 at the end of the recess 15 are parallel to and spaced from the vertical plane or planes of the fold-inverting edge-portions 29 and 30 to assist in controlling the binding-strip 3 as it is being inverted and held said strip close to the edge-portions 29 and 30 so that the needle will accurately split the material.

In the modification of the invention illustrated in Fig. 8 the inclined fold-inverting edge is shown as adjusted somewhat in advance of the needle 5 and notched at a to receive said needle which intersects each of the angularly related guiding channels 23 and 27. While this modification will not produce blind stitching, it will produce stitching wherein the connecting thread-portions between adjacent penetrative thread-loop structures are concealed.

One embodiment of the seam structure which may be formed by the present improvement is illustrated in Fig. 9 wherein a indicates the body-fabric about the edge of which the folded binding-strip b is secured by a line of stitches comprising the series of keyed, penetrative, thread-loop structures c which pass into and out of the inner or hidden surfaces of the upper and lower plies of the strip b and through the body-fabric a. The thread-loop structures d are joined by the connecting thread-portions d extending along said hidden surfaces. While I have illustrated thread-loop structures of the lock-stitch type it is to be understood that the invention is not limited to the use of any particular type of stitching-forming mechanism. Furthermore, in the particular embodiment of the seam illustrated, the location of the locking points is immaterial.
While the preferred form of the invention has been shown and described it is to be understood that the essential features of construction are susceptible of material modification within the scope of the invention.

The invention is not to be understood as limited to the use of the "English" type or any other particular type of binding guide but is of broad scope; the present device being the first to accomplish the attachment of a binding strip about the edge of a body-fabric by a series of stitches or keyed, penetrative thread-loop structures the connecting portions of which extending from one needle puncture to the next are concealed by the binding strip and the body-fabric.

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

1. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle and blind-stitch guiding mechanism including spaced fabric inverting elements disposed one above the other in close proximity to and in rear of the needle-path, whereby the needle will split the thickness of fabric at the folds which are formed as the fabric is drawn over said elements.

2. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, feeding mechanism, and means having a substantially straight fold-inverting edge-portions arranged in rear of and close to the needle-path, whereby the needle will blind-stitch the binding strip to a body-fabric.

3. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, feeding mechanism, and means having a substantially straight fold-inverting edge-portions arranged in rear of and close to the needle-path, whereby the needle will blind-stitch the binding strip to a body-fabric.

4. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, feeding mechanism, and a strip-guide having a U-shaped guiding channel extending transversely of the line of feed and directly toward the needle-path and terminating in fold-inverting means disposed closely adjacent the needle-path.

5. In a sewing machine, in combination, stitch-forming mechanism including a needle, feeding mechanism, and a binder formed with a fold-inverting edge inclined to the line of feed and having a U-shaped guiding channel extending transversely of the line of feed and directly toward the needle-path.

6. In a sewing machine, in combination, a binder having guiding means about which a longitudinally folded binding strip is inverted, and stitch-forming mechanism including a reciprocating needle so positioned as to pierce the binding strip at the point of inversion thereof.

7. In a sewing machine, the combination with stitch-forming mechanism including a needle, and feeding mechanism, of a binder having a U-shaped fold-inverting edge disposed partially in rear of the needle-path.

8. In a sewing machine, the combination of stitch-forming mechanism including a needle, and feeding mechanism, of a binder formed at its delivery-end with a U-shaped guide-wall, said guide-wall being formed at its receiving end with fold-inverting edge-portions arranged in rear of and close to the needle-path, whereby the needle will blind-stitch the binding strip to a body-fabric.

9. In a sewing machine, in combination, stitch-forming mechanism including a needle, feeding mechanism, and an adjustably mounted binding guide comprising relatively adjustable upper and lower strip-folding sections, the delivery end of said binding guide being formed with fold-inverting elements disposed at least partially in rear of the needle-path.

10. In a sewing machine, in combination, stitch-forming mechanism including a needle, feeding mechanism, and a strip-folding guide formed at its delivery end with a U-shaped fold-inverting edge disposed substantially in a plane which is parallel to the needle-path and intersects the stitching line in rear of said path.

11. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, feeding mechanism, and a strip-folding guide formed at its delivery end with a U-shaped fold-inverting edge disposed substantially in a plane which is parallel to the needle-path and intersects the stitching line in rear of said path.

12. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, feeding mechanism, and a strip-folding guide formed at its delivery end with a U-shaped fold-inverting edge, and stitch-forming mechanism including a reciprocating needle disposed in ad-
In a sewing machine, in combination, a reciprocating needle, feeding mechanism, and a binder having a U-shaped strip-guiding channel extending in a direction transversely of the line of feed and formed at its delivery end with fold-inverting edge-portions disposed in rear of the needle.

14. In a sewing machine, in combination, a reciprocating needle, feeding mechanism, and a binder having a U-shaped strip-guiding channel extending in a direction transversely of the line of feed and formed at its delivery end with fold-inverting edge-portions disposed in rear of the needle.

15. In a sewing machine, in combination, stitch-forming mechanism including a needle, feeding mechanism, a presser-foot formed at one side with a notch, and a fold-guide formed with a passage-way extending transversely of the direction of feed and having its delivery end disposed within the notch of said presser-foot, the needle being adapted to reciprocate within said notch and in advance of the delivery end of said fold-guide.

16. In a sewing machine, in combination, stitch-forming mechanism including at least a needle, feeding mechanism, a throat-plate having a needle aperture, and a strip-guide having a passage-way extending transversely of the plane defined by the needle and the stitching line, said strip-guide having at its delivery end an edge about which the strip is drawn into the path of the needle, a portion of said edge being disposed close to and in rear of the needle-path.

17. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, feeding mechanism, a binder having a U-shaped fold-inverting edge arranged at least partially in rear of the needle-path, and means in advance of said edge for holding the binding strip close to the latter.

In testimony whereof I have signed my name to this specification.

ALBERT H. DE VOE.
It is hereby certified that in Letters Patent No. 1,320,456, granted November 4, 1919, upon the application of Albert H. De Voe, of Westfield, New Jersey, for an improvement in "Blindstitch Mechanisms for Sewing-Machines," errors appear in the printed specification requiring correction as follows: Page 4, lines 22–23, claim 16, strike out the words "at least"; same page and claim, line 30, after the word "needle" insert the words at least; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of December, A.D., 1919.

[SEAL.]

M. H. COULSTON,
Acting Commissioner of Patents.