

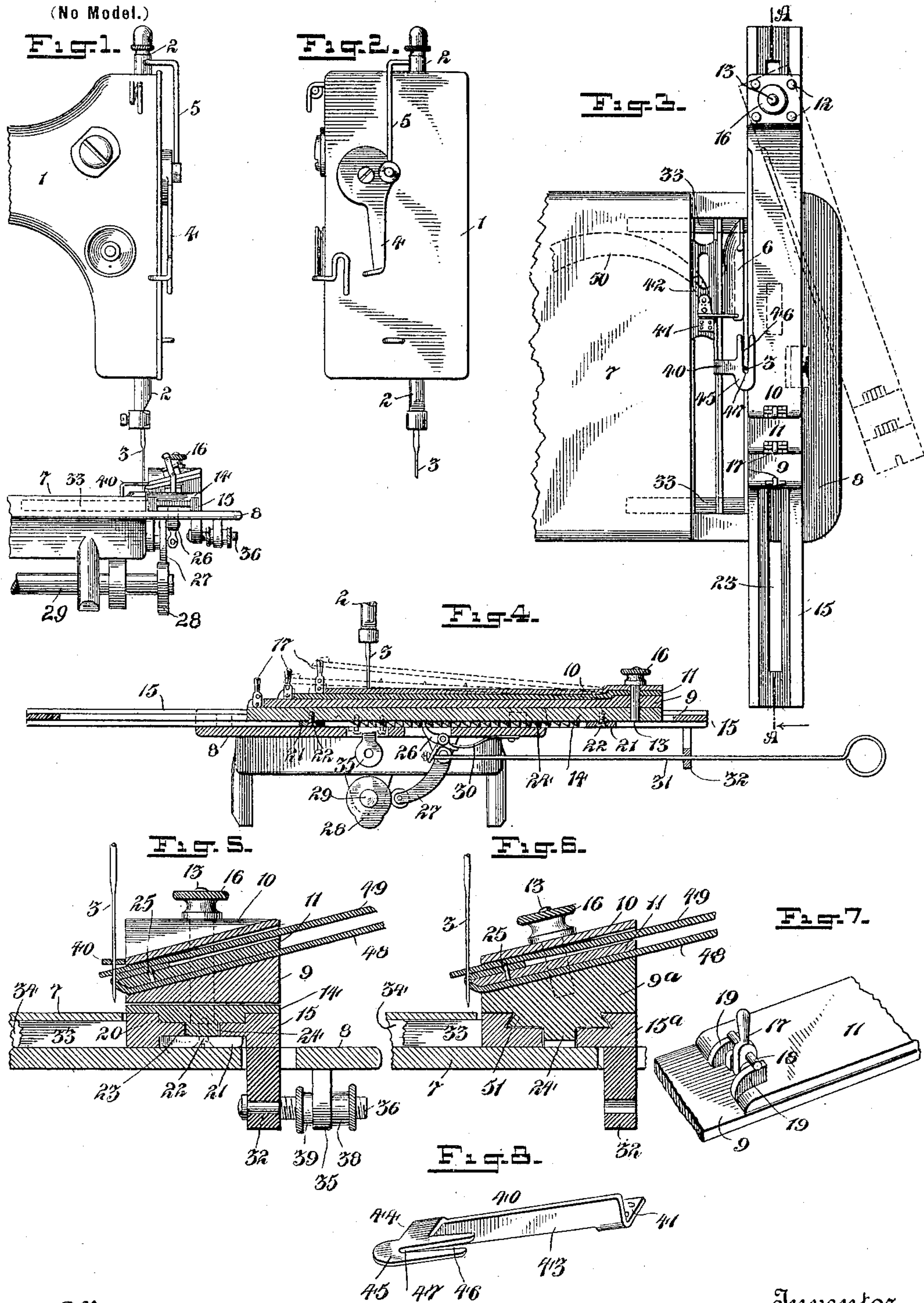
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M. SPITZER.

BLIND STITCH SEWING MACHINE.

(Application filed Jan. 17, 1900.)



Witnesses
Geo. W. Maylor
Julius K. H. K.

Inventor
Maurice Spitzer,
By his Attorney
Alvin K. Goodwin.

UNITED STATES PATENT OFFICE.

MAURICE SPITZER, OF ALBANY, NEW YORK.

BLIND-STITCH SEWING-MACHINE.

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To all whom it may concern:

Be it known that I, MAURICE SPITZER, a citizen of the United States of America, residing at the city of Albany, county of Albany, and State of New York, have invented certain new and useful Improvements in Blind-Stitch Sewing-Machines, of which the following is a specification.

My invention has for its object to provide simple and effective mechanism or appliances adapted more especially for blind-stitching the seams of leather bodies of collapsible measuring-diaphragms used in dry gas-meters, but applicable for any service where accurate blind-stitching is required.

The invention will first be described, and then will be particularly defined in claims hereinafter set forth.

Reference is made to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a front elevation of parts of the work-arm and bed-plate of a sewing-machine with my invention adjusted thereto. Fig. 2 is an end view of this arm, more particularly showing the take-up lever. Fig. 3 is a plan view of the bed-plate, the shuttle, the needle, the needle-guide, and the preferred three-plate work-clamp, which is partly swung outward in dotted lines. Fig. 4 is an end view showing one arrangement of feeding mechanism for the work-clamp, with other details, the clamp, its carriage, and the carriage-track and supporting bed-plate being in cross-section on the line A A in Fig. 3. Fig. 5 is an enlarged cross-section showing the preferred three-plate work-clamp of Figs. 1, 3, and 4, with the guided needle passing through the work held by the clamp. Fig. 6 is a cross-section showing a modified work-clamp having but two laterally-swinging clamp-plates. Fig. 7 is an enlarged perspective view illustrating the work-clamp latch devices, and Fig. 8 is an enlarged perspective view of the detached needle-guide.

Collapsible dry-meter diaphragm-bodies are usually formed by pasting together lapped portions of cut leather pieces and then sewing these pieces together by hand and with a blind-stitch along opposite sides and both edges of the seam. It is essential that these stitches do not pass through or too nearly

through the undermost piece, which if permitted would allow leakage of gas from the diaphragm and render the meter useless. These hand sewing operations are difficult and tedious, and therefore expensive, and entail loss of both time and material because of taking the stitches at irregular depths, which will not permit the seams to pass the usually severe light-test for tightness and too often require cutting out of the entire seam and the attaching or insertion of another piece before the leather body is ready for connection to the heads of the diaphragm. By my invention the sewing is much more quickly done and with unfailing regularity of facial depth of the blind-stitching, which not only economizes time and material, but assures a positively gas-tight diaphragm.

In the drawings the numeral 1 indicates a sewing-machine work arm or head in which reciprocates a bar 2, carrying a quite-thin needle 3. In some prior sewing-machines the take-up is operated by the presser-foot of the work-feeding devices; but as I have devised other special mechanism for feeding the work I have pivotally connected the take-up lever 4 by a wire or rod 5 with the needle-bar 2 to actuate the take-up directly from said bar, as will be understood from Figs. 1 and 2 of the drawings. Any suitable threaded shuttle 6 coöperates with threaded needle 3 in forming the stitches of the seams. The sewing-machine bed-plate 7 is here shown with a lowered end portion 8 to allow the traveling work-clamp which it supports to hold the work at proper height relatively to the needle and shuttle.

The preferred construction of work-clamp (shown in Figs. 1, 3, 4, and 5 of the drawings) has three clamping-plates—a lower plate 9, a top plate 10, and a center plate 11. All three plates are here shown rigidly fastened together at one end by rivets 12. The two upper plates 10 11 are preferably elastic, so that they normally spring upward and separate at their free ends to facilitate insertion of the work and as indicated by dotted lines in Fig. 4. The three plates at their connected ends are together pivoted on a pin 13, which is fixed in a carriage 14, adapted for transverse movement relatively to the needle 3 on a suitable track or guide-bar 15, which preferably rests

on part 8 of bed-plate 7. All three plates 9 10 11 thus may be swung around horizontally together on the pivot-pin 13 and entirely clear of the needle 3, further to facilitate insertion 5 of the work and as indicated by dotted lines in Fig. 3 of the drawings. The plates 9 10 11 are held to the carriage at the pivot 13 by a nut or milled head 16 on the pivot, which also permits easy removal of the clamp-plates 10 from the carriage.

Any approved fastening devices may be used to hold the opposite or free ends of the clamp-plates to the carriage and to each other. For this purpose I show three latches 17, one 15 pivoted to the carriage and one to each of the bottom and center clamp-plates and all having transverse pins 18, adapted to lock over the bottom, center, and top clamp-plates. The pins 18 of latches 17 preferably act on 20 cam-shaped lugs 19 on the clamp-plates, which permits the clamp to be securely closed upon diaphragm-leathers of varying thickness. The latches and their bearings are arranged to prevent side play of the clamp on 25 the carriage or of the clamp-plates on each other at one end, and the pivot 13 prevents side play at the other end. Hence the entire clamp, as guided by the joint of the carriage with the track, will move with its inner edge 30 always in a true line or path relatively to the needle 3. The carriage may be movably fitted to the track 15 in any preferred manner. I show in Fig. 5 an ordinary tongue-and-groove connection at 20. To prevent upward jump- 35 ing or vibration of the carriage and work-clamp, I show in Figs. 4 and 5 washers or plates 21, held by screws 22 to the carriage and underlying shoulders of the track 15 at opposite sides of its slot 23, which receives 40 the carriage-ratchet 24.

The center clamp-plate preferably projects edgewise toward the needle 3 beyond the top and bottom clamp-plates, and this projecting edge is preferably beveled or thinned under- 45 neath. The two upper clamp-plates preferably slope or incline laterally toward the needle, as shown more clearly in Figs. 1, 5, and 6 of the drawings, to cause as little as possible of the undermost leather, when doubled 50 around the center clamp-plate 11, to be presented for passage of the needle 3 facially through the outer portion only of the bend and without passing directly through said under leather, thereby assuring minimum fa- 55 cial penetration by the needle of this bent or doubled portion of the work. One of the clamp-plates, preferably the center one 11, has a requisite number of light and sharp pins 25, which hold the lapped leathers to 60 each other at the seam, and thus obviate the necessity of pasting them together, as now is done prior to hand-sewing the seams.

The carriage 14 may be moved along the track 15 with the work-clamp in any approved 65 manner to feed the work to the needle 3. I now prefer to provide the carriage with the above-named bottom ratchet 24, which is en-

gaged intermittently by a pawl 26, pivoted to a rocking arm 27, fulcrumed to bed-plate portion 8 and operated by a cam 28 on a shaft 70 29 of the sewing-machine mechanism. The pawl works through a slot in the plate 8 and is normally held in the ratchet 24 by a spring 30, fastened to part 8. A pull-rod 31, held to a finger on the pawl and guided in an eye 32 75 on the track 15, provides for drawing the pawl from the ratchet by hand to allow retraction of the carriage and work-clamp after each row or line of stitches is made.

In view of different thicknesses of dia- 80 phragm-leathers or other fabrics to be blind-stitched, I provide for adjusting the work-clamp with relation to the needle. This may be done in various ways. I show the track 15 having two inwardly-extending fingers 33, 85 which are fitted to slots 34 in the bed-plate 7. I prefer to use a screw adjustment and to locate the screw below the bed-plate, out of the way of the operator. I therefore attach to the track a lug 35, to which is revolubly held 90 the screw 36, which passes freely through a guide-lug 37 on the fixed plate 8. This screw carries two nuts 38 39, which may be manipulated to shift the track 15, with its carriage and work-clamp, laterally to any extent to- 95 ward or from the needle 3 as the track moves on bed-plate portion 8 and its fingers 33 slide in the slots 34. After the necessary fine or delicate adjustment is effected the track and carriage and work-clamp are securely locked 100 by tightening the nuts 38 39 on the lug 35.

I have found in practice that the very thin needle necessarily used in blind-stitching quite-thin leather pieces has a tendency to sway or vibrate laterally, probably due to the 105 rapid working of the needle or to the pull of the tension devices, or both combined. This at times prevented that accurate alinement of the stitches necessary to produce the most perfect seam. To obviate this difficulty, I 110 have provided a needle-guide operated, preferably, by the shuttle-carrier, and therefore moving with the shuttle and partly above the bed-plate 7 and adapted by its peculiar form to steady the needle laterally just prior to 115 its entrance into the work, thus assuring accurate alinement of all stitches of the seam and without interference with the sewing-threads. One preferred needle-guide is shown in operative position in Figs. 1, 3, and 5 and 120 detached in perspective in Fig. 8 of the drawings. This guide 40 is preferably made of sheet metal and with a flange 41 for attaching it to the shuttle-carrier 42. The guide-shank 43 moves in a slot of the work-plate, 125 (not shown,) and to this shank is connected by a flange 44 the needle-guiding head proper, 45, which has a tapered slot 46, the inner end or throat 47 of which is but slightly wider 130 than the diameter of the needle 3 and steadies the needle just prior to its entrance into the work.

The general operation of my invention is as follows: The nut 16 is loosened and the

latches 17 are disengaged, and the clamp-plates 9 10 11 are together swung on pivot 13 away from the needle to any most convenient position—say at forty-five or ninety degrees.

5 The seam edge of one piece of leather 48 is then laid between plates 10 11 and pressed onto the retaining-pins 25, and the main portion of piece 48 then is slipped or looped closely around under center plate 11 and between it and lower plate 9. The second

10 leather piece 49 then is laid between plates 10 11 with its seam edge overlapping piece 48, whereupon the plates 10 11 will be closed upon the leather and then locked by the two

15 upper latches 17, and the three plates are now swung back to sewing position, plate 9 is locked to carriage 14 by its latch 17, and the nut 16 is again tightened. As the sewing proceeds, the lever 4 is oscillated by its

20 connection 5 with the needle-bar 2 to take up slack of the upper thread, and shuttle 6 is reciprocated by carrier 42, actuated by a lever 50 or otherwise to interlock its thread with the upper thread in the usual or any approved

25 manner. Meanwhile the carriage and work-clamp are accurately fed in a straight line toward the operator by pawl 26. The mechanism operating the needle and the shuttle and the needle-guide is so relatively timed

30 that the tapering guide-slot 46 advances toward the needle and embraces it, and the guide moves enough farther ahead to carry the contracted throat 47 of slot 46 practically up to the needle the instant before the latter

35 enters the diaphragm-leathers 48 49 or other work, through which it carries the upper thread, which locks below with the shuttle-thread. This inner part 47 of the guide-slot thus steadies the needle no matter how

40 quickly it reciprocates and assures its uniformly-true passage into the work at each successive stitch. The needle carries its thread entirely through piece 49, but passes facially only through the bend of piece 48, as shown

45 in Figs. 5 and 6 of the drawings, the degree of facial penetration of piece 48 by the needle and its thread thus being practically uniform for each and every stitch. The taper of guide-slot 46 allows the guide to easily advance upon the needle during forward stroke

50 of the shuttle and to recede freely therefrom on its back stroke without bringing cutting or weakening strains upon the needle-thread. When this one line or row of stitches is completed, the rod 31 is pulled to release pawl 26

55 from ratchet 24 and allow the carriage 15 to be pushed freely backward, whereupon the clamp-plates 9 10 11 are unlocked and swung outward on pivot 13, and the two half-joined

60 pieces are removed and then are reversed in the clamp, with the piece 49 now closely looped around the center plate 11. The clamp is again tightened on the work and is swung back and locked to the carriage, and the second line of stitches then is formed by sewing

65 through piece 48, but not entirely through piece 49 or facially through its bend. These

two finished lines of stitches produce a seam simulating the hand-sewed seam, but far neater and stronger and making a permanently-gas-tight joint of the two pieces. The general form and open-ended arrangement of the work-clamp permits the last seam of a cylindrical diaphragm-body to be made quite as quickly as all prior seams of its pieces, as the cylinder may be quickly slipped onto the clamp-plates at or from the open ends of these plates and will be turned inside out to allow its adjustment prior to sewing the final line of stitches.

Fig. 7 of the drawings shows how the near equivalent of parts 9 and 14 of Figs. 1, 4, and 5 may be formed in one piece 9^a, having the feed-rack 24 and guided both laterally and vertically on the track 15^a by one dovetail-joint connection 51. In this modification only the two elastic clamp-plates 10 11 may be swung over on the pivot 13, and the part 9^a forms the lower clamp-plate, as well as the carriage. This construction is not so convenient for adjusting the work as that having the three swinging clamp-plates and is illustrated mainly to prove that the work-clamp may have various constructions within the scope of this invention.

I am not limited to the precise construction of needle-guide herein shown nor to its operation by or from the shuttle-carrier, as it may be otherwise formed and operated, provided it have the functions herein described relatively to the work-clamp and a sewing mechanism.

I claim as my invention—

1. A blind-stitch sewing-machine having a needle and related mechanism forming stitches, and a work-clamp movable transversely to the line of action of the needle and having plates adapted to hold two pieces of work while one piece is doubled over the edge of one of said plates, thereby causing the needle to pass but partly through said doubled piece at its bend; said clamp-plates being inclined toward the needle and the plate over which the work is doubled having a thinned edge thereby assuring minimum facial needle penetration at the bend of the work, and means feeding the work-clamp relatively to the needle during stitching of the seam, substantially as described.

2. A blind-stitch sewing-machine having a needle and related mechanism forming stitches, a work-clamp movable transversely to the line of action of the needle and having plates adapted to hold two pieces of work while one piece is doubled over the edge of one of said plates, thereby causing the needle to pass but partly through said doubled piece at its bend, means feeding the work-clamp relatively to the needle during stitching of the seam, and means adapted to move the work-clamp toward or from the line of action of the needle thereby permitting adjustment to accommodate varying thicknesses of the work while assuring proper facial needle

penetration at the bend of the work, substantially as described.

3. A blind-stitch sewing-machine having a needle and related shuttle or looper mechanism forming stitches, a work-clamp movable transversely to the line of action of the needle and having plates adapted to hold two pieces of work while one piece is doubled over the edge of one of said plates, thereby causing the needle to pass but partly through said doubled piece at its bend, means feeding the work-clamp relatively to the needle during stitching of the seam, and a needle-guide moving with the shuttle or looper and causing true entrance of the needle into the work, substantially as described.

4. A blind-stitch sewing-machine having a needle and related mechanism forming stitches, a track laterally adjustable on the machine-frame toward and from the needle, a carriage and work-clamp movable on said track transversely to the line of action of the needle and having plates adapted to hold two pieces of work while one piece is doubled over the edge of one of said plates, and means feeding the carriage and work-clamp relatively to the needle during stitching of the seam, substantially as described.

5. A blind-stitch sewing-machine having a needle and related mechanism forming stitches, a track, a carriage movable on said track, a work-clamp comprising plates adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates; said clamp-plates being together pivoted at one end to the carriage and having fastenings at their free ends permitting passage of the work endwise within the clamp and subsequent clamping of the work, and means feeding the carriage and work-clamp relatively to the needle during stitching of the seam, substantially as described.

6. A blind-stitch sewing-machine having a needle and related mechanism forming stitches, a track, a carriage movable on said track, a work-clamp comprising elastic plates held together and to the carriage at one end and normally separating at their free ends and adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, fastenings adapted to hold the plates to the work and to the carriage, and means feeding the carriage and work-clamp relatively to the needle during stitching of the seam, substantially as described.

7. A blind-stitch sewing-machine having a needle and related mechanism forming stitches, a track, a carriage movable on said track, a work-clamp comprising elastic plates held together at one end and pivoted thereat to the carriage for outward swinging to facilitate insertion of the work, said plates normally separating at their free ends and adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, fastenings adapted to hold the plates to the work and to the carriage, and means feeding

the carriage and work-clamp relatively to the needle during stitching of the seam, substantially as described.

8. The work-clamp comprising a carriage and plates adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, said plates being held to each other at one end where they are also held to the carriage, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage, substantially as described.

9. The work-clamp comprising a carriage and plates having work-retaining pins and adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, said plates being held to each other at one end where they are also held to the carriage, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage, substantially as described.

10. The work-clamp comprising a carriage and plates adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, said plates being held to each other at one end where they are also pivoted to the carriage for outward swinging to facilitate insertion of the work, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage, substantially as described.

11. The work-clamp comprising a carriage and elastic plates adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, said plates being held to each other at one end where they are also held to the carriage and normally separating by their elasticity at their free ends, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage, substantially as described.

12. The work-clamp comprising a carriage and elastic plates adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, said plates being held to each other at one end where they are together pivoted to the carriage for outward swinging to facilitate insertion of the work, and fastenings at the free and normally-separated ends of the plates adapted to clamp said plates on the work and hold them to the carriage, substantially as described.

13. The work-clamp comprising a carriage and plates adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, said plates being held to each other at one end where they are also held to the carriage, and fastenings at the free ends of the plates adapted to clamp the plates to the work and hold them to the carriage; the plate over which the work is doubled being projected edgewise beyond the cooperating clamp-plate and carriage, substantially as described.

14. The work-clamp comprising a carriage

and plates adapted to hold two pieces of work while one piece is doubled over the edge of one of the plates, said plates being held to each other at one end where they are also held to the carriage, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage; said clamp-plates being inclined toward one edge and the plate over which the work is doubled having a thinned edge thus assuring minimum facial penetration of the sewing-needle at the doubled portion of the work, substantially as described.

15. The work-clamp comprising a carriage and three clamp-plates held to each other at one end where they are also held to the carriage, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage, substantially as described.

16. The work-clamp comprising a carriage and three clamp-plates held to each other at one end where they are also held to the carriage, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage; the two upper plates being elastic and normally separating from each other and the lower plate at their free ends to facilitate insertion of the work, substantially as described.

17. The work-clamp comprising a carriage and three clamp-plates, said plates being held to each other at one end where they are together pivoted to the carriage for outward

swinging to facilitate insertion of the work, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage, substantially as described.

18. The work-clamp comprising a carriage and three clamp-plates, said plates being held to each other at one end where they are together pivoted to the carriage for outward swinging to facilitate insertion of the work, and fastenings at the free ends of the plates adapted to clamp the plates on the work and hold them to the carriage; the two upper plates being elastic and normally separating from each other and the lower plate at their free ends further to facilitate insertion of the work, substantially as described.

19. In a blind-stitch sewing-machine, the combination, with the needle, the shuttle or looper, and a transversely-movable work-clamp having plates adapted to hold two pieces of work while one piece is doubled over the edge of one of said plates, thereby causing the needle to pass but partly through said doubled piece at its bend, of a needle-guide moving with the shuttle or looper and having a tapering slot providing a contracted needle-guiding throat, substantially as described.

MAURICE SPITZER.

Witnesses:

A. B. HADLEY,
J. L. HORNBOUGH.