Oct. 31, 1950 V. J. SIGODA 2,527,582

SEWING MACHINE FOR BLIND STITCHING

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Fig. 1.

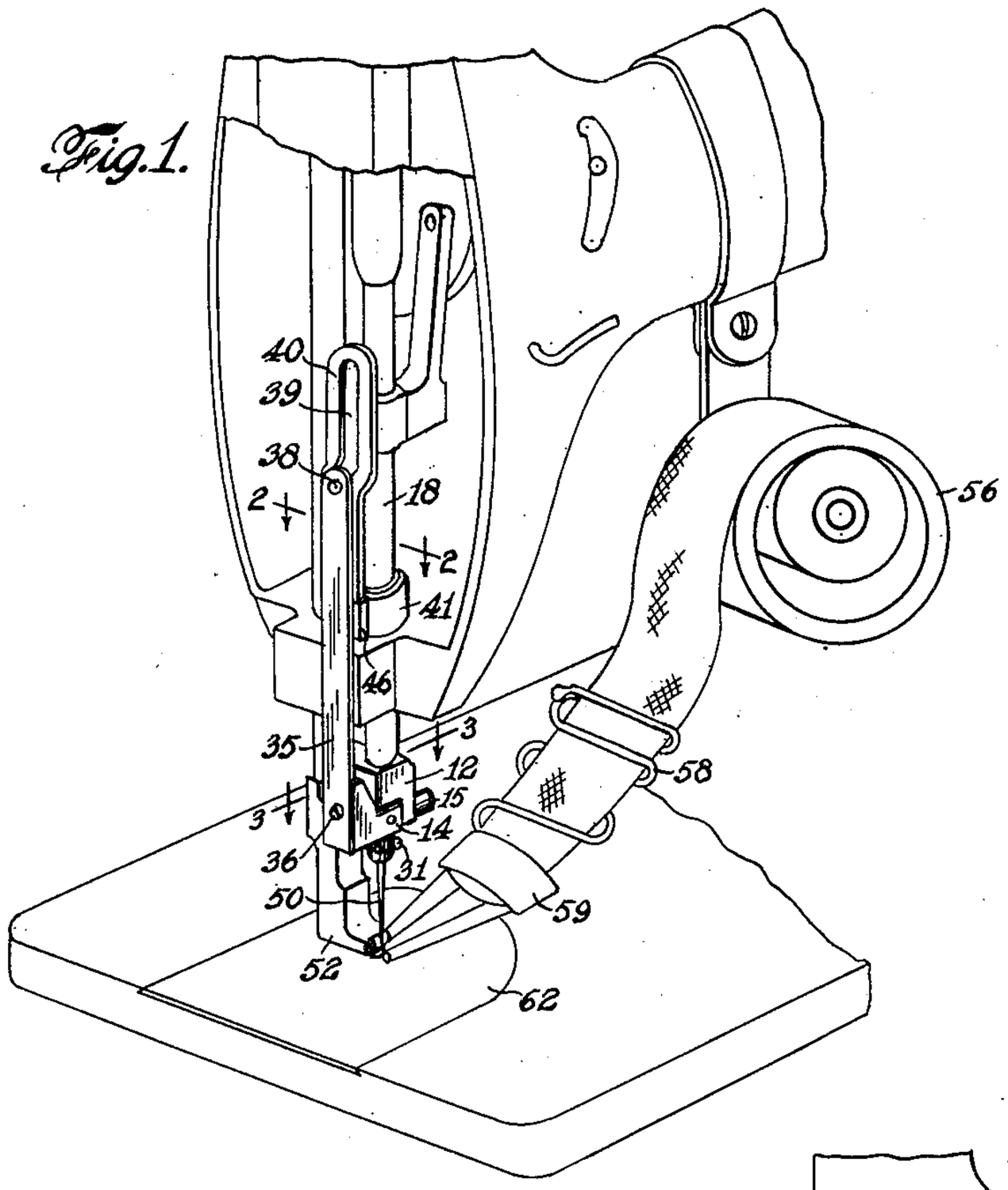

Fig. 6.

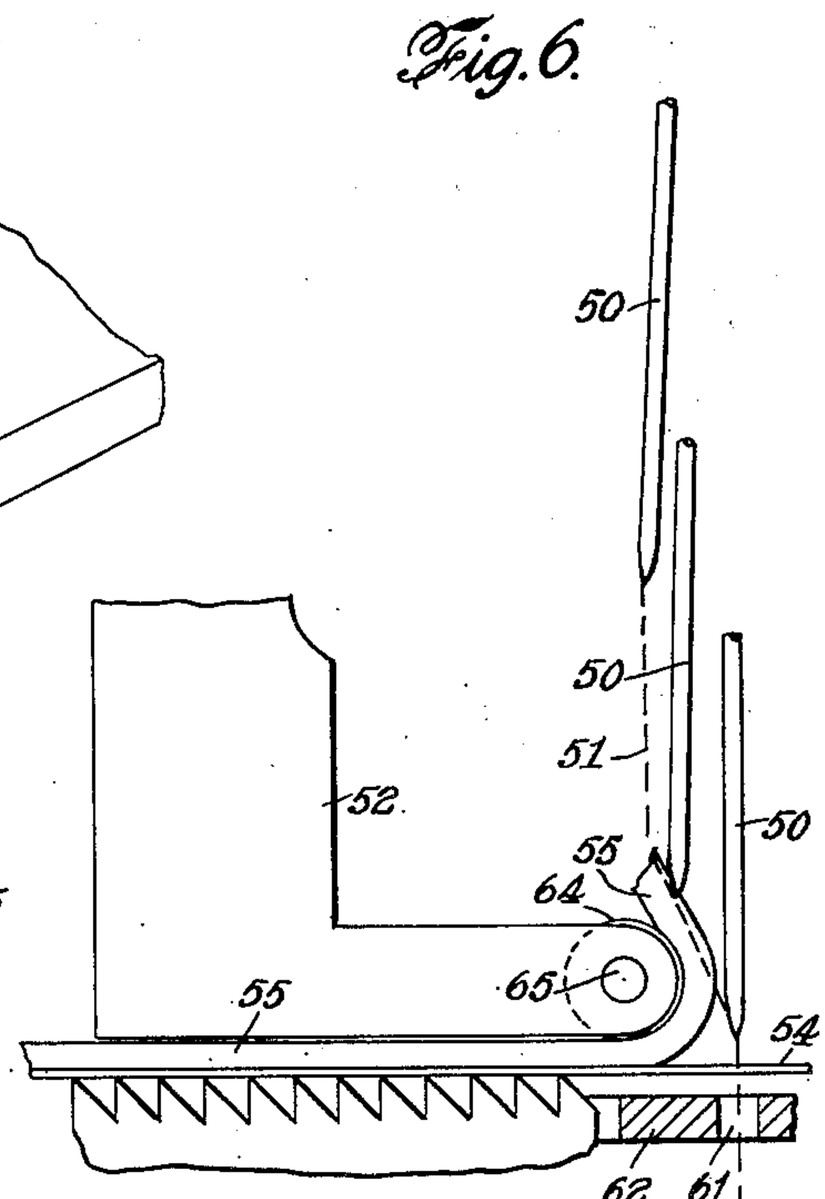

Fig. 2.

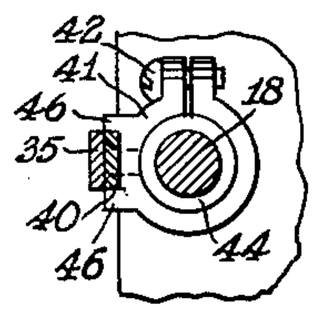

Fig. 4.

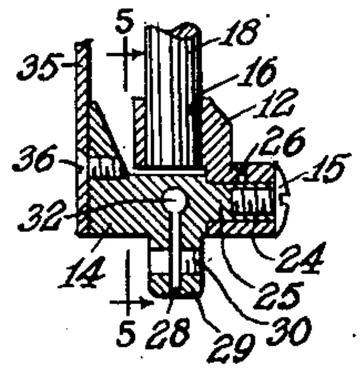

Fig. 3.

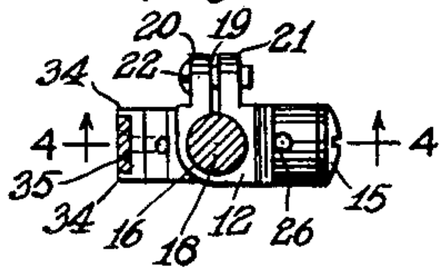

Fig. 5.

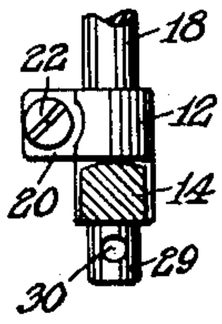

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Fig. 7.

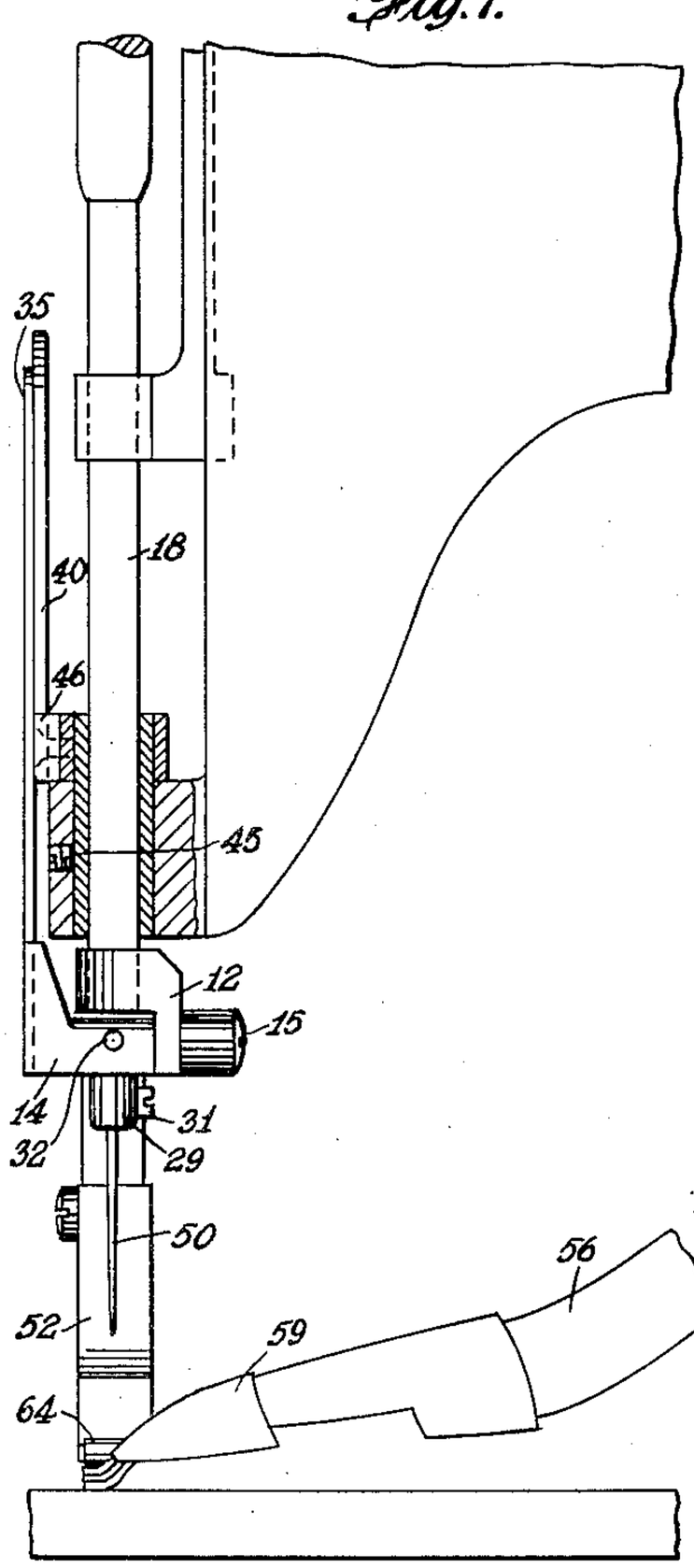


Fig. 8.

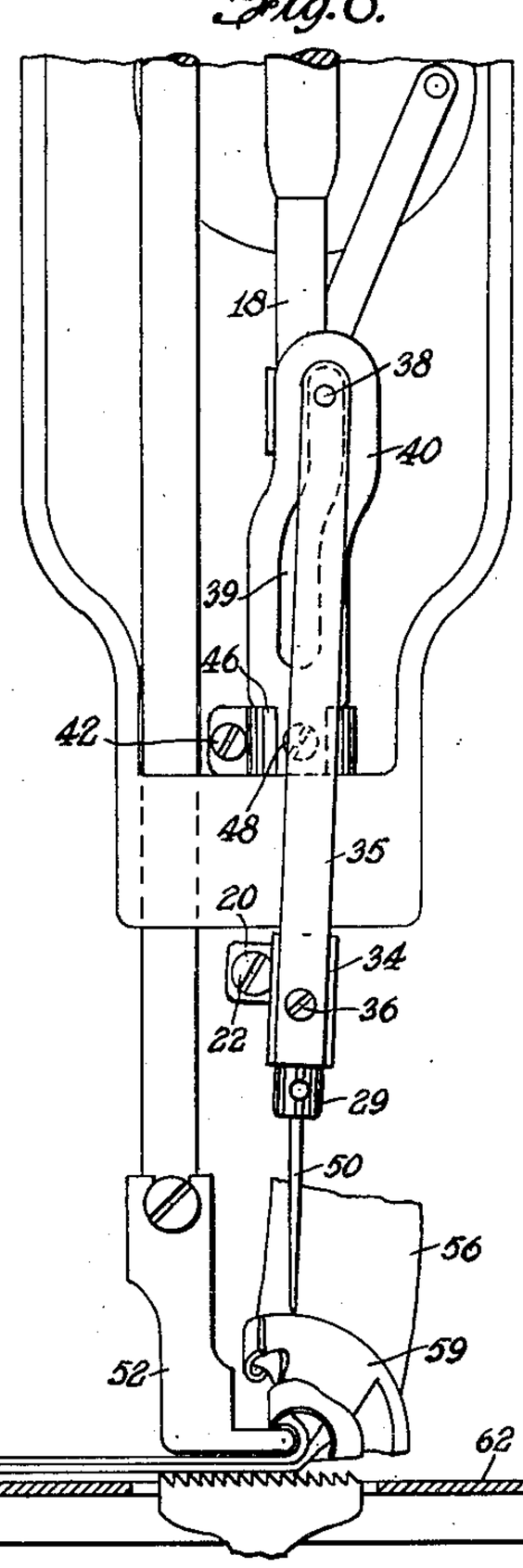


Fig. 9.

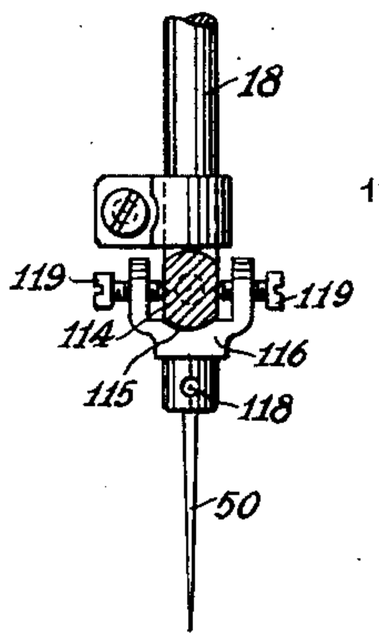


Fig. 10.

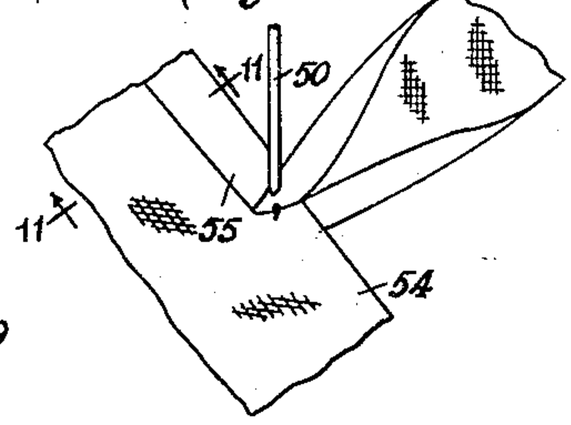
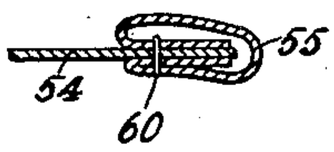


Fig. 11.



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UNITED STATES PATENT OFFICE

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SEWING MACHINE FOR BLIND STITCHING

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Application December 6, 1946, Serial No. 714,504

8 Claims. (Cl. 112—176)

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This invention relates to sewing machines, more particularly to machines for making piping or the like or sewing it to the edge of a piece of goods with a blind or invisible stitch.

Machines adapted to perform this type of work, as presently constructed, have certain disadvantages. To operate them satisfactorily it is necessary to use special needles and it has been found that in order to prevent frequent thread breakage it is necessary to use thread having special twist. Furthermore, such machines are so operated that the needle, in descending, frictionally engages the material overlying the end of the presser foot and it is necessary to specially construct the latter so that it will yield.

The principal objects of the present invention are:

(*a*) To provide a novel type of sewing machine for performing the type of work referred to above which will operate satisfactorily at high speed with ordinary needles and ordinary thread;

(*b*) To provide an attachment by which any standard sewing machine may readily be converted into one for piping and the like with a blind stitch;

(*c*) To provide a novel type of needle-supporting mechanism which permits tilting of the needle at an angle to its axis of reciprocation for more effective engagement of the goods in forming a blind stitch;

(*d*) To provide means for adjusting the path of the needle point with reference to its axis of reciprocation; and

(*e*) To provide a sewing machine for stitching piping with a blind stitch which may be operated with a rigid or non-yielding presser foot.

Other objects will in part appear and in part will be obvious from the following detailed description of the present preferred embodiment of the invention, read in conjunction with the drawings in which:

Fig. 1 is a perspective view of the operating head and a portion of the bed plate of a sewing machine embodying the invention and equipped with a so-called "English binder" for folding a strip of material to form piping;

Fig. 2 is a detailed horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a section, on the line 3—3 of Fig. 1, through the needle bar and showing the swivel needle-holder of the invention in plan;

Fig. 4 is a vertical central section through the needle-holder taken on the line 4—4 of Fig. 3;

Fig. 5 is a side elevation, partly in section, taken on the line 5—5 of Fig. 4;

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Fig. 6 is an enlarged detail showing portions of the presser foot, feed dog and throat plate and illustrating various positions assumed by the needle in its travel;

Fig. 7 is a front elevation, partly in section, of the novel needle-holder and actuating mechanism shown in relation to other parts of the machine.

Fig. 8 is a side elevation as seen from the left of Fig. 7;

Fig. 9 is a detailed view partly in section showing a modified form of needle-holder embodying means for adjusting the initial angle of the needle-holder;

Fig. 10 is a fragmentary detail showing piping being applied to the edge of a piece of fabric and illustrating a step in the formation of a blind stitch; and

Fig. 11 is a section taken on the line 11—11 of Fig. 10.

Various well known details such as the needle eye and grooves and the sewing thread are omitted for simplicity as not bearing on the invention.

Referring to Figs. 1, 7 and 8, the invention resides in mechanism for tilting or deflecting the needle in a plane generally parallel to the line of stitching, which plane includes the axis of reciprocation of the needle as a whole. The point of the needle is deflected in said plane during its descent toward the rear of the machine, i. e. toward the goods being stitched. During the latter part of its descent, as the needle approaches the presser foot, it is brought to a vertical position for passage through the throat plate. The apparatus for accomplishing this movement will first be described, followed by an explanation of its advantages.

The needle is carried by a swivel holder which might aptly be described as a knee-action holder. This holder comprises two relatively rotatable parts, a bearing member 12 and a pivoted needle clamp 14 which are held together by a screw 15. The details of construction of these parts may best be seen in Figs. 3, 4 and 5.

The bearing member 12 is provided with a cylindrical socket 16 to receive the needle bar 18. The member is split at 19 and provided with a pair of lugs 20 and 21 which may be drawn together by a screw 22 to clamp the member to the needle bar. At one side of and below the socket 16 the bearing member is provided with a horizontally extending bore 24 which rotatably receives and supports the shaft portion 25 of the needle clamp 14. Said shaft portion is drilled and tapped to receive the screw 15 which holds

the two parts together. An oil hole **26** permits lubrication of this bearing. The needle is carried in an aperture **28** in a downward extension **29** which is drilled and tapped as shown at **30** to receive the needle-holding screw **31** (Figs. 1 and 7). A cross hole **32** is provided in member **14** in communication with aperture **28** for use in removing needles in known manner. The outer vertical face of member **14** is extended upwardly and provided with flanges **34** between which is mounted the lower end of an arm **35** held to member **14** by a screw **36**.

The upper end of arm **35** is provided with a cam follower, preferably a roller (not seen), connected to the end of the arm by a pin **38**. The cam follower is adapted to engage with the sides of a cam slot **39** formed in a cam bar **40**.

The cam bar **40** is supported from its lower end by a clamping collar **41** which is tightened by a screw **42**. This collar is secured to the top of the needle bar bushing **44** which is fixed in the head of the machine in the usual way by a set screw **45** (Fig. 7). The connection between the cam bar **40** and the collar **41** is made by means of a pair of flanges **46** (Fig. 2) and a screw **48** (Fig. 8).

It will be evident that the interposition of the knee-action needle holder between the end of the needle bar **18** and the needle **50** requires that the operating position of the needle bar be shifted upwardly. This may readily be done in known manner by altering the point of connection between the needle bar and its driving mechanism sufficiently to bring the needle into normal operating position.

As is best seen from Figs. 1 and 8, as the needle bar moves up and down, carrying with it the needle holder, the arm **35** following the cam slot **39** will cause the point of the needle to follow a curved path as shown in Fig. 6 by the dotted line **51**. It will also be noted that the needle is at an angle to the vertical and tilted somewhat backwardly toward the presser foot **52** as it moves toward the latter. To understand the significance of this movement it is necessary to discuss briefly the nature of the work done by the machine.

Referring to Figs. 10 and 11, the machine operates to stitch to the edge of a piece of fabric **54** a piping or binding **55** which is folded over upon itself when finished, on both sides of the fabric, as shown in Fig. 11. This piping is formed from a piece of flat braid or bias cut fabric supplied to the machine from a roll **56** (Fig. 1) and fed through an appropriate gate or tensioning device **58** to a folder **59** of the type known in the trade as an "English binder." Such apparatus for folding and applying the piping is well illustrated and its operation described in Seaman et al. U. S. Patent No. 1,756,036 of April 29, 1930. The binding is fed to the needle in such manner that its upper fold extends around the toe of the presser foot and curves backwardly thereover to a slight extent, as shown in Figs. 6 and 8. As the needle descends, it is pointed directly at the toe of the presser foot in a slightly angular position and strikes the under-layer of the upper fold of the piping, passing therethrough and thence into and through the base fabric **54** and through the lower fold of the piping. The machine is so adjusted that the needle does not penetrate the outer layer of the upper fold of the piping and so the stitching on the upper surface of the work is "blind" and does not show, as will readily be understood from Fig. 11 where the stitch is shown at **60**.

As will be appreciated from Fig. 6, the needle point enters the material while deflected rearwardly and after doing so it is moved forwardly into a vertical position so as to amply clear the presser foot and pass through the needle hole **61** in the throat plate **62**. Obviously, once the needle has penetrated the material it may be moved away from the presser foot without affecting the stitching since in so moving it carries the material with it. Since this action avoids friction or rubbing by the needle against the work drawn upwardly and rearwardly over the presser foot, one of the principal causes of thread breakage is eliminated. In addition, the rearward displacement of the point where the needle enters the material and its slightly angular attack makes it possible to obtain uniform penetration of the goods with ordinary needles, thus eliminating the necessity for special needles which have heretofore been required in machines for doing this type of work. The forward movement of the needle as it passes the presser foot makes it unnecessary to use a yielding foot and ordinary feet may be used. Preferably a foot having a roller at the toe is used, as shown at **64**, the roller rotating on a pin **65**.

Fig. 9 shows one possible modification of the needle-holder to provide means for adjusting the location of the path followed by the needle point. By this means the path shown at **51** in Fig. 6 may be moved forward or backward. Instead of mounting the needle directly on the swivel member **14**, it is carried by a separate clamp mounted on a modified swivel member **114** which has an arcuate lower face **115** serving as a bearing surface for a yoke **116** in which the needle is secured in the usual way by a screw at **118**. The yoke may be rotated slightly about the member **114** on the surface **115** by means of a pair of opposed screws **119**, thus throwing the needle point backwardly or forwardly as may be desired. Once adjusted, the yoke maintains a fixed position relative to the pivoted member **114** and, in operation, the latter member is rocked about its pivot in the same manner as the member **14** described above.

While the invention has been described in connection with one particular embodiment thereof, it will be appreciated that many changes may be made in the details of construction without departing from the spirit of the invention as defined in the claims. For example, the swivel action of the needle may be obtained by means of cam surfaces and cam followers differently constructed and otherwise located than those described. Other possible changes in details of the design for accomplishing the same novel results will readily occur to those skilled in the art. Neither is the invention to be regarded as limited to the stitching of piping since it resides in the mechanism regardless of the particular class of work performed.

What is claimed is:

1. In a sewing machine having a head in which a needle bar is mounted for reciprocation and a stationary bushing for said bar extending into said head, means for deflecting the needle point from its axis of reciprocation during a part of its travel comprising, a bearing member carried by said bar, a needle holder pivotally mounted on said member, a stationary cam secured to said bushing, and an arm attached at one end to said holder and having a cam follower at the other end to coact with said cam, whereby said holder

is rocked about its pivot as it reciprocates with said bar.

2. In a sewing machine having a head in which a needle bar is mounted for reciprocation and carrying a presser foot adjacent the path traversed by the needle, means for deflecting the needle point from its axis of reciprocation during a part of its travel comprising, a bearing member carried by said bar, a needle holder having a pivotal connection with said member, a stationary cam carried by said head, and an arm attached at one end to said holder and having a cam follower at the other end coacting with said cam, said cam being shaped and said pivotal connection being so positioned as to deflect the needle point toward said foot as the needle moves toward it and to move said point away from said foot as it passes it.

3. In a sewing machine, in combination, a reciprocating needle bar, a member comprising a clamp for attachment to the end of said bar and a horizontally extending socket offset to one side of said bar, a needle clamp having a shaft rotatably secured in said socket, and positioned axially of said bar, an arm secured to said needle clamp at one end and having a cam follower at the other end, a cam coacting with said follower, and means for attaching said cam in fixed position on said machine, whereby upon reciprocation of said bar said needle clamp is rotated slightly with reference to said member.

4. In a sewing machine, in combination, a reciprocating needle bar, means for attaching a needle to said bar to permit deflection of the needle point from its axis of reciprocation during part of its travel and for positioning the path of the needle point, said means comprising a member attached to said bar and rotatable through a small arc on an axis perpendicular to said bar, a needle clamp comprising a yoke bearing against said member, and a pair of opposed screws passing through the legs of the yoke and engaging said member for fixedly adjusting the position of said clamp relative to said member to position said path.

5. In a sewing machine having a reciprocating needle bar, a presser foot, and means for feeding material to be stitched over the toe of said foot in a forwardly inclined position which presents the under side of the material to the needle, means for deflecting the needle point comprising: a bearing member carried by the needle bar, a needle clamp pivotally mounted on said member for rotation in a plane parallel to the line of stitching, a stationary cam supported at a distance from said clamp, and an arm fixed to said clamp and having a cam follower adapted to engage said cam, said cam acting through said arm to deflect the needle point toward said material during its descent and away from said presser foot after it has entered the material so as to form a blind stitch in the material which extends over the toe of said foot.

6. In a sewing machine having a head slidably supporting a reciprocating needle bar, a presser

foot, and means for feeding material to be stitched over the toe of said foot in a forwardly inclined position which presents the under side of the material to the needle, means for deflecting the needle point comprising: a bearing member carried by the needle bar, a needle clamp pivotally mounted on said member for rotation in a plane parallel to the line of stitching, a stationary cam supported within said head, and an arm fixed at its lower end to said clamp and having a cam follower at its upper end adapted to engage said cam, said cam acting through said arm to deflect the needle point toward said material during its descent and away from said presser foot after it has entered the material so as to form a blind stitch in the material which extends over the toe of said foot.

7. An attachment for a sewing machine having a head, a fixed bushing extending into said head, a reciprocating needle bar operating through said bushing, a presser foot and means for feeding material to be stitched over the toe of said foot in a forwardly inclined position which presents the under side of the material to the needle, said attachment providing means for deflecting the needle point and comprising: a bearing member attachable to the lower end of the needle bar, a needle clamp pivotally mounted on said member for rotation in a plane parallel to the line of stitching, a stationary cam attachable to said bushing within said head, and an arm fixed to said clamp and having a cam follower adapted to engage said cam, said cam acting through said arm to deflect the needle point toward said material during its descent and away from said pressed foot after it has entered the material so as to form a blind stitch in the material which extends over the toe of said foot.

8. In a sewing machine having a reciprocating needle bar, means for attaching a needle to said bar to permit deflection of the needle point from its axis of reciprocation during part of its travel so that it follows a non-linear path and for enabling the position of said path to be varied, said means comprising a member attached to said bar and rotatable on an axis perpendicular to said bar, a needle clamp attached to said member and rotatable through a small arc relative thereto, and means for fixedly adjusting the position of said clamp relative to said member, whereby the position of the non-linear path followed by the needle point may be varied.

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