R. LOEB.

SEWING MACHINE.

APPLICATION FILED JULY 17, 1915.

1,273,386.

Patented July 23, 1918.

6 SHEETS—SHEET 1.

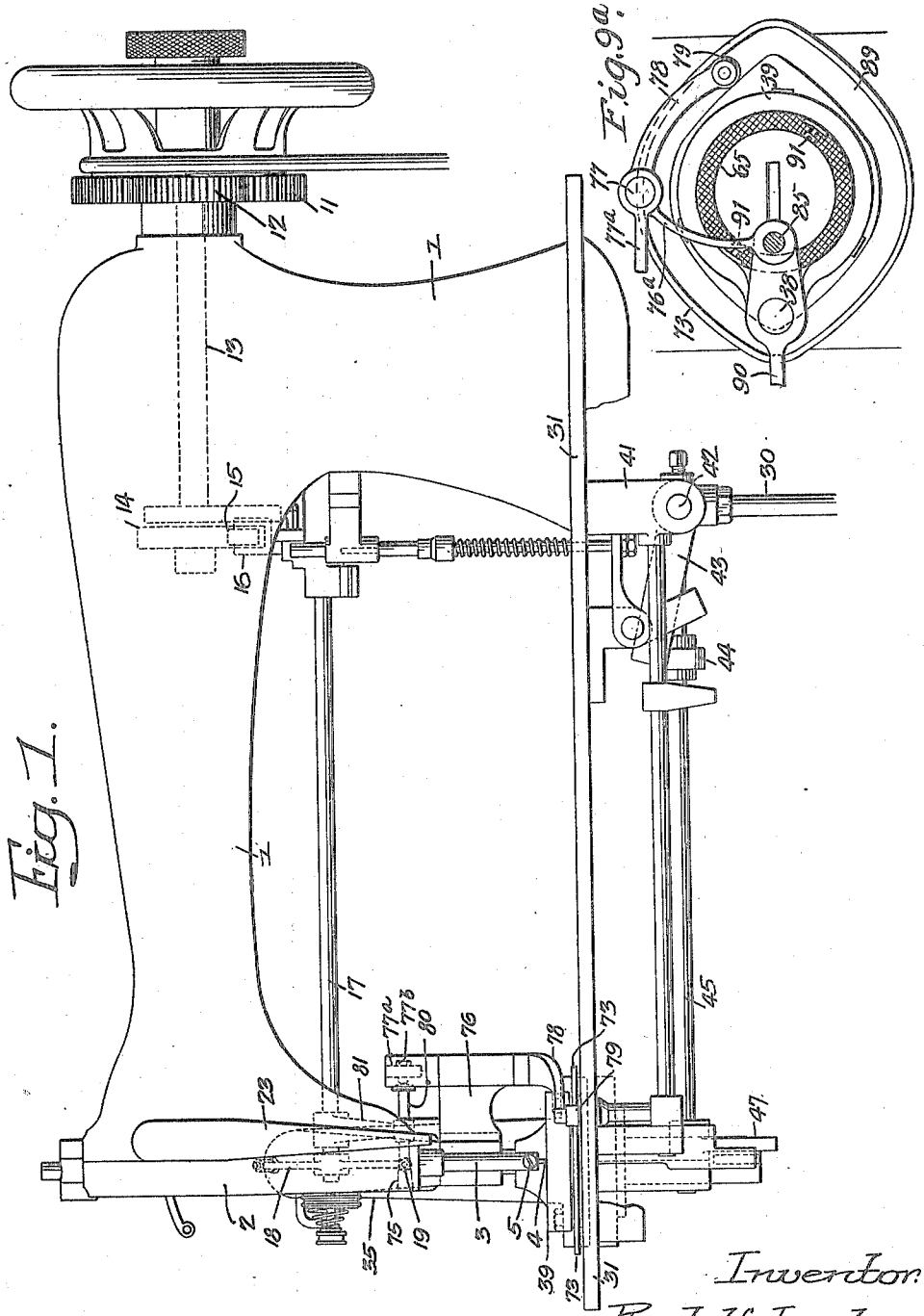


Fig. 1.

Fig. 9a.

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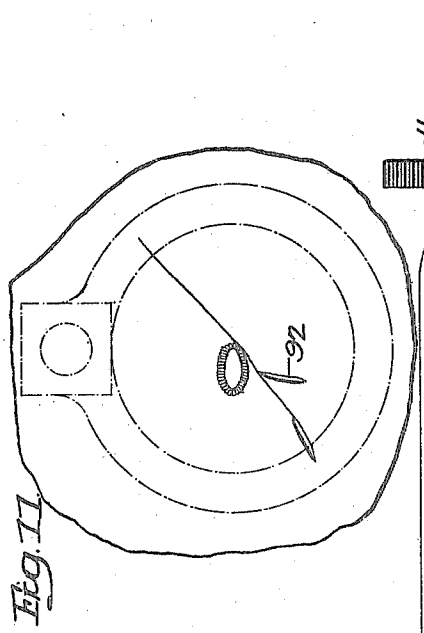


Fig. 11.

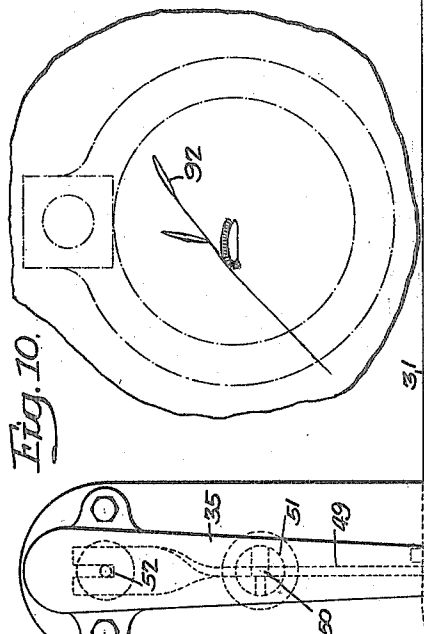


Fig. 10.

Fig. 2.

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6 SHEETS—SHEET 3.

Fig. 3.

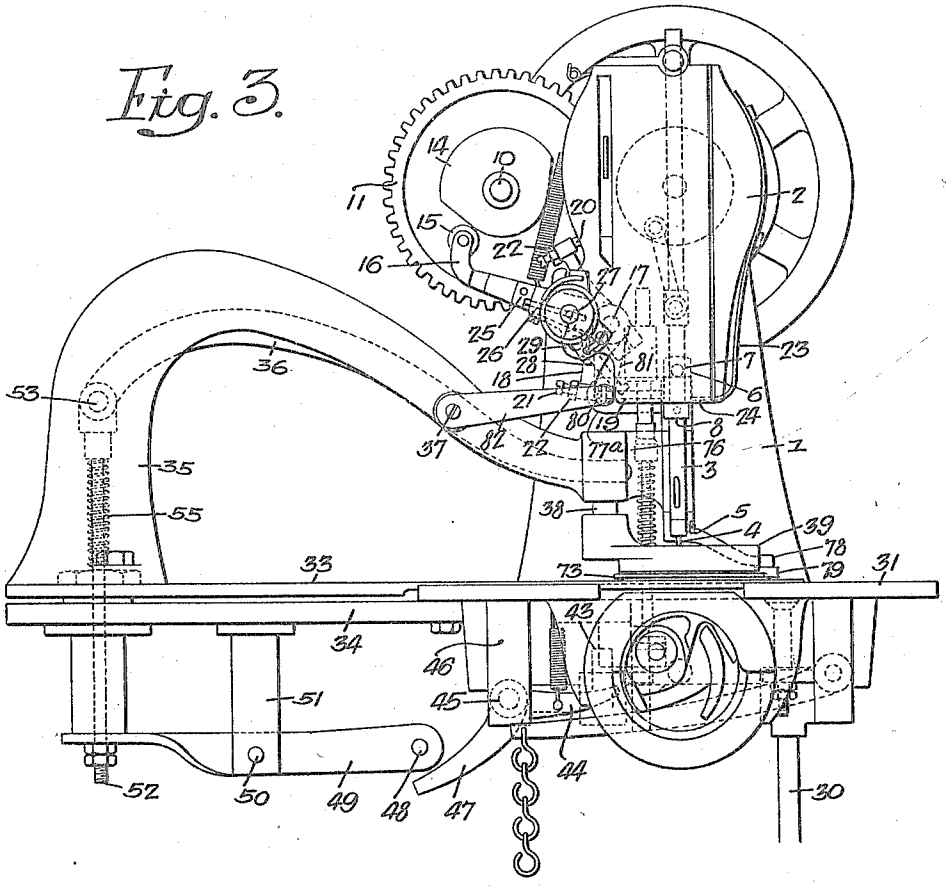
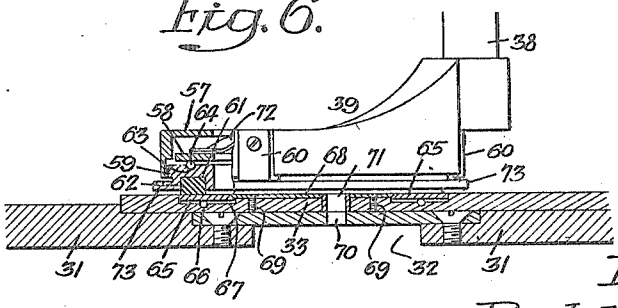


Fig. 6.



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6 SHEETS—SHEET 4.

Fig. 4.

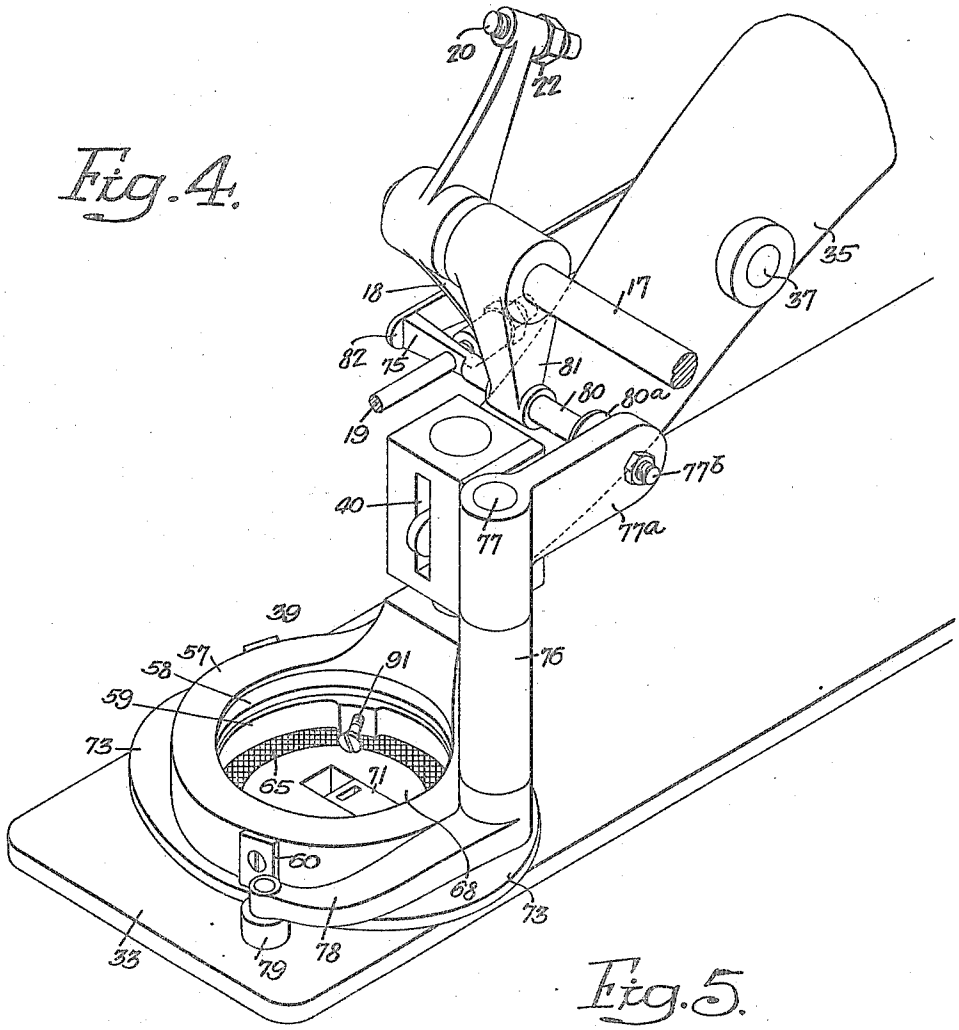
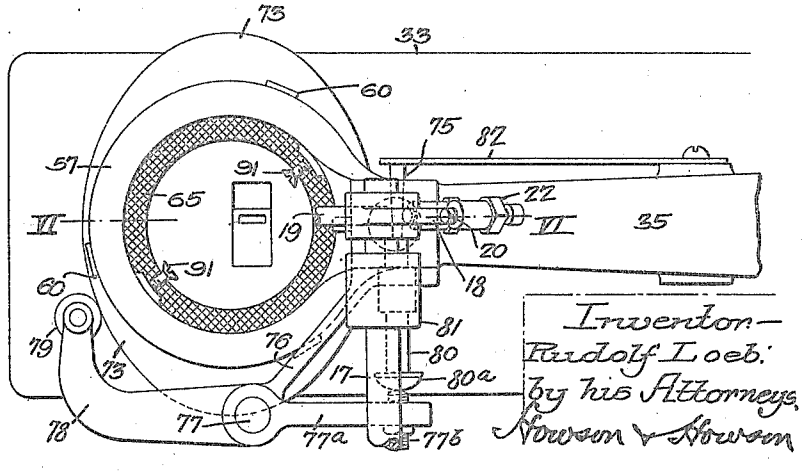


Fig. 5.



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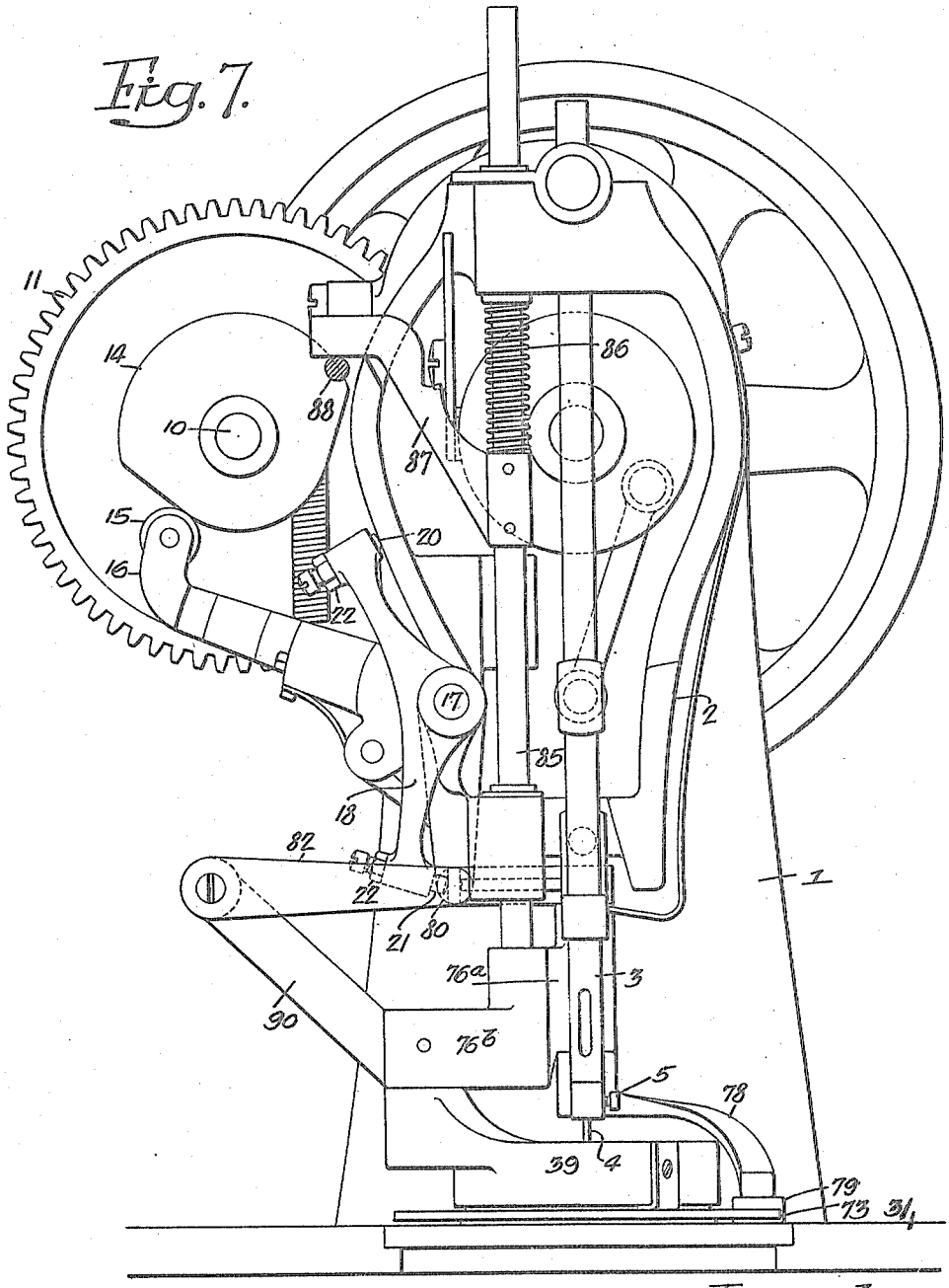
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6 SHEETS—SHEET 5.

Fig. 7.



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6 SHEETS—SHEET 6.

Fig. 8.

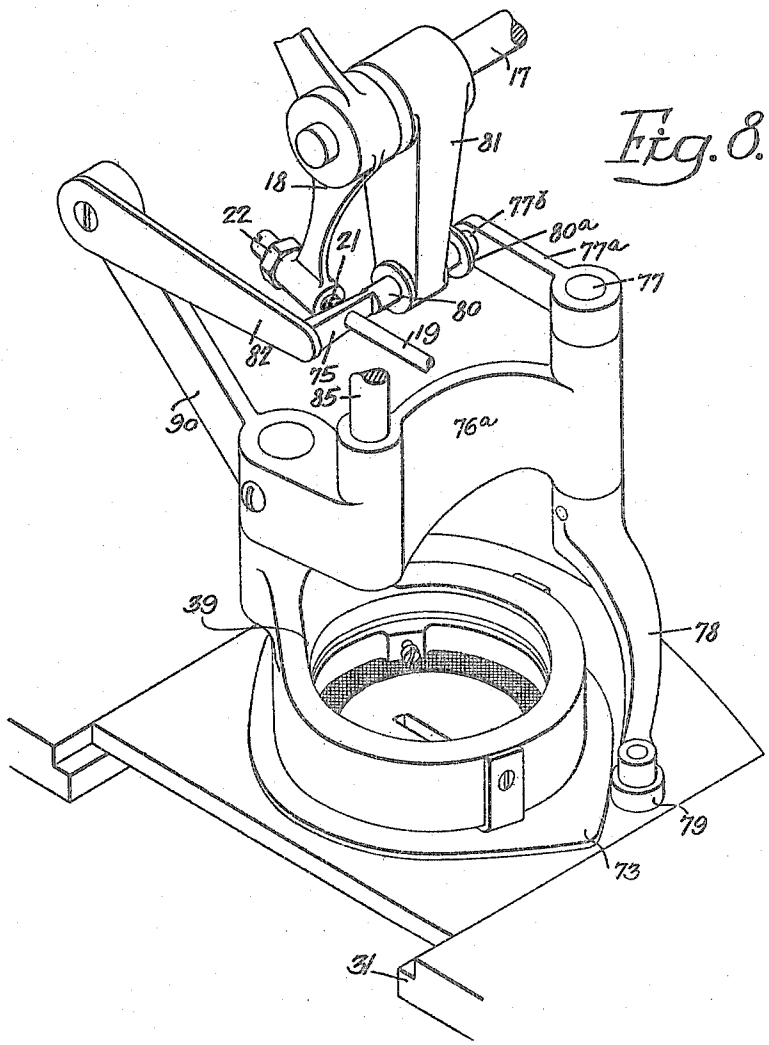
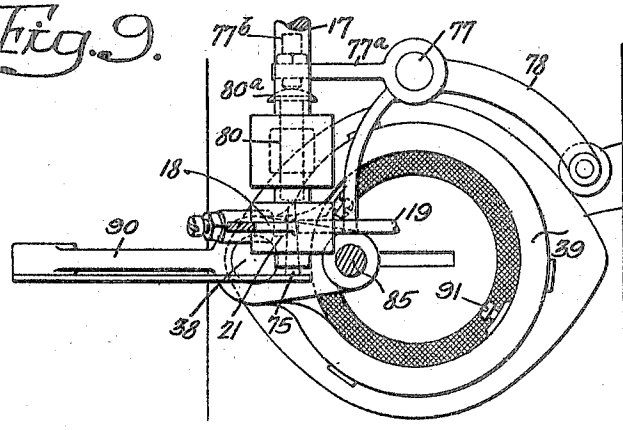


Fig. 9.



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UNITED STATES PATENT OFFICE.

RUDOLF LOEB, OF JENKINTOWN, PENNSYLVANIA.

SEWING-MACHINE.

1,273,386. Specification of Letters Patent. Patented July 23, 1918.

Application filed July 17, 1915. Serial No. 40,411.

To all whom it may concern:

Be it known that I, RUDOLF LOEB, a citizen of the United States, and a resident of Jenkintown, Montgomery county, Pennsylvania, have invented certain Improvements in Sewing-Machines, of which the following is a specification.

My invention relates to sewing machines; and the object of my invention is to provide a sewing machine of the embroidery type with means for effecting automatically the formation of eyelets of shapes other than round. The mechanism forming the subject of my present invention is designed to produce oval eyelets.

In carrying my invention into effect I employ a sewing machine having an oscillating or vibrating needle, and provide means in order to control the operative position of said needle in the formation or laying of the stitches at various points in the outline of the eyelet, whether oval or otherwise.

These and other features of my invention are more fully described hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, is a side view or elevation of a sewing machine having one form of mechanism which may be employed for this purpose;

Fig. 2, is a plan view of the same;

Fig. 3, is a front or end elevation thereof;

Fig. 4, is a perspective view on a larger scale of the needle controlling mechanism illustrated in Figs. 1, 2 and 3;

Fig. 5, is a plan view of the structure shown in Fig. 4;

Fig. 6, is a sectional view on the line VI—VI, Fig. 5;

Fig. 7, is a front or end elevation of a machine, on a larger scale than Fig. 3, illustrating a modified construction;

Fig. 8, is a perspective view of the modified needle controlling structure and its cam;

Fig. 9, is a plan view of the structure shown in Fig. 8,

Fig. 9^a is a similar view of a modified arrangement within the scope of my invention, and

Figs. 10 and 11, are views of a piece of fabric showing the manner of forming the eyelets therein.

My present invention has been applied to machines of the character illustrated in my Patent No. 1,187,074, dated June 13, 1916, and my application for patent filed December 31, 1913, Serial No. 809,799, and the object of my present construction is to automatically produce eyelets or marginal stitched apertures of predetermined shape, in the present instance oval.

For this purpose I employ a cam which is rotated by the operator simultaneously with the vibrations or oscillations of the needle, which cam effects changes in the operative position of the needle, so that while said needle has a throw or oscillation of given length in the formation of the stitches bounding the eylet, the relation or position of such throw with respect to any portion of the contour of the eyelet may be controlled and altered by the cam so as to effect the stitching of any shape of aperture desired, depending upon the shape of the cam. In the present instance an oval aperture is being stitched; an oval cam being employed for the purpose.

In the form of machine shown in Figs. 1, 2, 3, *et seq.*, which is a machine of the character illustrated in my application and patent above referred to, I provide a rotatable foot, by means of which the fabric is held to a rotatable plate or turntable mounted in the bed of the machine, between which foot and turntable the fabric is clamped so that it may be rotatively moved by said foot and turntable.

As in the structures of the application and patent before referred to, 1 represents the frame of the sewing machine, and 2 the head containing means for effecting vertical reciprocation of a needle bar 3, which in this type of machine is pivotally mounted so as to be capable of vibration under the action of suitable mechanism, which mechanism is well known in the art, and no extended reference thereto will be made herein. The needle bar carries a needle 4 which may be secured thereto by a set screw 5.

The lower part of the head of the machine is provided with an arm 6, pivoted at 7, and having a sleeve 8 through which said needle bar slides during its vertical reciprocation. Movement imparted to said arm 6 effects vibration or oscillation of the needle bar and the needle carried thereby, and for this purpose mechanism such as is described in my application before referred to may be em-

ployed, which mechanism includes means for adjusting or regulating the extent of such movement, and which is substantially as follows:

Carried by the frame of the machine is a counter shaft 10, having a gear wheel 11, receiving motion from a gear 12 on the main driving shaft 13 of the machine. The opposite end of said countershaft carries a cam 14, which engages a roller 15 carried by an arm 16 connected to a rock shaft 17 suitably journaled in or on the frame of the machine, and having at one end a substantially yoke-shaped lever 18, one end of which engages with a pin 19 adapted to slide in the head of the machine and impinge upon the arm 6. The lever 18 is provided with adjustable screws 20 and 21 forming contact points; said screws having lock nuts 22 whereby they may be retained in any predetermined adjusted position.

Return movement of the arm 6 when the roller carrying arm 16 is released from the action of the high side of the cam is imparted by means of a flat spring 23, suitably connected to the head of the machine, and having an end 24 bearing against the said arm 6. Upon rotation of the counter-shaft 10, movement is imparted to the cam 14 and transmitted to the arm 6 for the purpose of vibrating the needle-bar and its attached parts by the means just described; reverse movement of said needle-bar being accomplished by the spring referred to.

The extent of the movement of the needle-bar by the cam 14 and the roller arm 16 is determined by the size of said cam, while the position of the needle-bar, needle and presser-foot with respect to the slot in the stitch plate, is determined by the adjusting screws 20 and 21; one being set in and the other out, as the case may be, and the upper one, (indicated at 20 for instance) bearing upon the frame of the machine.

As in my former machine, illustrated in application, Serial No. 809,799, the arm or lever 16 is in two parts hingedly connected together by a pin 25 and held in operative condition by a pin 26 slidably mounted in said arm or lever, which pin 26 is in operative engagement with the end 27 of a bell-crank lever 28 which is pivoted to said arm or lever 16 at 29. When the pin 26 is withdrawn, in the manner hereinafter described, the cam 14 may move the end of the lever 16 on the pivot pin 25 without affecting the rock shaft 17. The bell-crank lever 28 is operatively connected to a rod 30, in a manner hereinafter described, which rod is actuated by a knee-lift (not shown) employed with machines of this type and under the control of the operator. Operation of said knee-lift in the usual manner stops the vibration of the needle; permitting it to reciprocate vertically and form tacking stitches in order to stop off the thread employed in the binding or edging of apertures in the fabric. These apertures are preferably preformed, and the means for holding and effecting the stitching of the fabric at the marginal outlines or edges of these apertures may be described as follows:

The bed-plate 31 of the machine is recessed or apertured at 32, and adapted to said recess or aperture is a plate 33. This plate carries means for holding the fabric; such means permitting complete rotation of the fabric upon a single axis in the plane of the vibration of the needle, more particularly described hereinafter. The plate 33 is supported by a bracket 34 suitably attached to the bed-plate 31 of the machine, and extending outwardly from the same at right angles thereto. The plate 33 carries a bracket 35, to which a lever 36 is pivoted at 37; one end of said lever being operatively connected to a post 38 carrying the fabric holding mechanism indicated at 39. The post is provided with a slot 40, to which the end of the lever 36 is adapted whereby rocking movement imparted to this lever will cause the fabric holding mechanism to move vertically.

Movement is imparted to the said lever 36 by the following mechanism: Supported in suitable bearings 41 attached to the bed-plate 31 of the machine is a shaft 42, carrying an arm 43 lying in contact with an arm 44 carried by a shaft 45 supported in suitable bearings 46; one of which is carried by one of the bearings 41. Attached to the forward end of the shaft 45 is an arm 47, for engagement with a pin 48 carried by a lever 49. The lever 49 is pivotally mounted at 50 in a post 51 depending from the bracket 34. The opposite end of the lever 49 is operatively connected to a rod 52 extending upward through the plate 33 and pivotally attached to the lever 36, at 53. A spring 55 surrounds the rod 52; tending to raise the lever 36, and maintain the fabric-holding element in its lowered position for operative engagement with the fabric.

The shaft 42 carries the rod 30 having a knee-piece (not shown). When the operator desires to raise the fabric-holding element, she pushes against the knee-piece which moves the rod 30 and causes the shaft 42 to rock or partially rotate. The arm 43, pressing upon the arm 44, rocking the shaft 45, brings the arm 47 in contact with the pin 48 of the lever 49, raising one end of the latter and drawing down upon the connecting rod 52, causes the lever 36 to raise the fabric holding element.

The fabric-holding means is more clearly shown in Fig. 6, wherein it is seen to consist of a circular element 57, which receives rings 58 and 59, properly secured together

by clips 60 carried by the element 57; the ring 59 being annularly recessed for engagement by flanges carried by said clips. The ring 59 is also channeled at 61 on its under side for the reception of a ring of rubber or similar material, indicated at 62, and being grooved on its upper side at 63 for the reception of balls 64 interposed between said ring 59 and a similarly formed groove in the ring 58, thereby forming a ball-bearing and permitting ready rotary movement of the rubber-shod lower ring 59 with respect to the rest of the structure.

The plate 33 is provided with a circular plate 65 disposed concentrically with respect to the rubber-shod foot-plate or ring 59 of the fabric-holding means, which plate 65 is grooved for the reception of balls 66 whereby an anti-friction bearing between the same and the recess 67 in the plate 33 receiving the same is provided; said circular plate 65 being roughened on its upper surface and held in place by a central clamping plate 68, which may be secured by screws 69. This clamping plate and the plate 33 are provided with registering openings 70 for movement with respect to a fixed needle guide 71 projecting through the same and coöperating with the needle.

The member 58 of the fabric-holding means may be in the form of an undulatory annular ring, as in my companion application Serial No. 809,799, before referred to, so that springs 72 may be interposed between it and the element 57 to insure pressure upon the rubber ring or foot 62 for holding the fabric against the rotatable plate or turntable 65. Two or more springs may be employed, as may be desired, to insure proper tension upon the material being embroidered.

The rotatable portion 59 of the foot is provided with a cam 73, and the engagement of such rotatable portion with the turntable is such that these parts may be rotated by the operator after the goods have been clamped between the same.

In the machine of my companion application, Serial No. 809,799, a lever, such as 18, acted directly upon a pin such as 19 to effect movement of the needle bar in one direction, and such movement could be regulated by changes in the relation or operative position of said lever. In my present invention, the action of this lever is through the intervention of a wedge-shaped member 75, the position of which does not determine the extent of oscillation or vibration of the needle-bar and needle, but the position occupied by such needle when vibrating, all of which is under the control of the cam 73.

In order that the cam may effect this result, the bracket 35 supporting the presser-foot carrier is provided with an arm 76 having a bearing for a stem 77; the lower end of which carries an arm or lever 78 with a roller 79 in engagement with the cam 73, while the upper end is operatively connected with the end of a rod 80 slidably mounted in an arm 81 carried by the rock-shaft 17; its opposite end being in engagement with a spring arm 82 carried by the bracket 35, so that such rod 80 is always under operative engagement with a member tending to move the same. This stem 77 will be moved in and out by the cam and spring as the cam is rotated by the operator through the intermediary of the goods.

The end 75 of the rod or stem 80 is wedge-shaped and provides means between the pin 19 operatively mounted to effect movement of the vibrating needle-bar and the end of the lever 18 whereby such vibrative movement is transmitted; such mechanism being more clearly shown in Figs. 4 and 5. It will be seen, therefore, that while the vibrating needle has a given range of movement, the position of its action may be changed by the mechanism just described so as to effect the formation of eyelets whose size and shape is determined by the size and shape of the cam employed to vary the relation of the needle to the stitching point; such cam in the present instance forming oval eyelets.

While the structure shown in Figs. 1, 2, 3, 4 and 5, is carried by a bracket such as 35 which is set to one side of the machine as in my second application before referred to, such arrangement is not essential and in Figs. 7, 8 and 9, I have shown an arrangement in which a presser-foot of the same character as that illustrated in Fig. 6, is carried by rod 85 vertically movable in the head of the machine and provided with a spring 86 whose tendency is to hold the presser-foot in the lowered position for engagement with the goods against the turntable 65. The rod 85 has an arm 87 projecting at one side adjacent its upper end with which a lifter member 88 operatively connected to the knee-lift (not shown) engages, so that through such means the operator may lift the said rod 85 as may be necessary to adjust the fabric beneath the presser-foot.

In this arrangement the stem 80 is carried in the same manner as in the structure shown in Figs. 1, 2, *et seq.*, and the lower end of the rod 85 carries a pair of arms 76^a and 76^b. The arm 76^a has a bearing for the steam 77, the lower end of which carries the arm or lever 78 with a roller 79 in engagement with the cam 73, while the upper end is operatively connected to the rod 80. The arm 76^b carries the presser-foot and in addition has a projection or extension 90 to which the spring arm 82 in engagement with the end of the rod 80 is connected.

Both forms of presser-feet for holding the

goods to the turntable 65 carried by the bed-plate of the machine are connected with knee-lift mechanism so that they may be raised as desired to insert the goods which have previously been punched or cut with small apertures of substantially the same shape as the finished eyelets. In order that the operator may be guided so that proper stitches bounding the apertures may be displayed, the inner wall of the rotatable ring of the presser foot is provided with a pair of set screws 91 which have a certain definite relation with respect to the projections of the cam, and in the practical operation of the machine the longitudinal axis of the substantially oval cut or aperture around which the stitches are laid is disposed by the operator in line with said set screws. This adjustment is effected while the presser foot is raised through the intermediary of the knee-controlled mechanism, and when properly positioned the presser foot is dropped so that its rubber tread or ring disposed on the under side holds the goods in contact with the turntable carried by the bed-plate of the machine. One complete revolution of the cam effects complete binding of the edge of the opening to form the eyelet.

It will be understood, of course, that the shape of the eyelet may be changed by altering the shape of the cam and that in lieu of a cam having a peripheral contour for engagement by the needle controlling arm, it may be grooved for the reception of a projecting or depending portion of said arm, as shown at 89, in Fig. 9[a].

Upon examining Figs. 10 and 11, it will be noted that the fabric as prepared for embroidery has a number of preformed apertures 92 therein, which apertures are to have their edges stitched or seamed. The fabric is held stretched in an ordinary tambour frame (not shown) commonly employed in embroidering machines of this character, and this tambour frame is laid over the bed-plate of the machine; the fabric-holding presser-foot being raised to permit the proper positioning of the fabric beneath the same, and the operator then manipulates said tambour frame so as to bring the ends of an aperture in the fabric directly opposite set screw guiding means carried by the rotatable portion of the presser-foot which moves with the cam. This guiding device is set arbitrarily with reference to the contour of the cam. The stitch operating mechanism of the machine is then set in motion, and simultaneously therewith the operator turns the fabric which moves the rotatable portion of the presser-foot and with it the cam, which cam automatically shifts the position of the stitch forming means so that it will operate to form the eyelet stitching following the contour of the cam, no matter what the shape of the latter may be.

Longitudinal operation or movement of the rod 80 by the stem 77 is effected by means of an arm 77[a] carried at the upper end of said stem, which has an adjustable set screw 77[b] at its end engaging a cap or head 80[a] on the end of the rod 80. This arm with its set screw is held in contact with the head 80[a] by the cam against the tension imparted by the spring arm 82.

I claim:

1. In an eyelet-forming machine, the combination of stitch-forming means, a turntable, a presser-foot, rotatable fabric-holding means carried by said presser-foot for coöperation with said turntable, said fabric-holding means being manually movable when the fabric is clamped between the same and the turntable, and means controlled by the rotatable portion of the presser-foot for regulating the position of the stitch-forming means.

2. In an eyelet-forming machine, the combination of stitch forming means, a turntable, a presser-foot, rotatable fabric-holding means carried by said presser-foot for coöperation with said turntable, said fabric-holding means being manually movable when the fabric is clamped between the same and the turntable, a cam actuated by the rotatable portion of the presser-foot, and means whereby said cam regulates the position of the stitch-forming means.

3. In an eyelet-forming machine, the combination of a needle, means for vibrating the same, a turntable, a presser-foot, rotatable fabric-holding means carried by said presser-foot for coöperation with said turntable, said fabric-holding means being manually movable when the fabric is clamped between the same and the turntable, a cam carried by said rotatable member, and means operated by said cam for regulating the position of the vibrating needle.

4. In an eyelet-forming machine, the combination of a needle, means for vibrating the same in a fixed plane, a turntable, a presser-foot, rotatable fabric-holding means carried by said presser-foot for coöperation with said turntable, said fabric holding means being manually movable when the fabric is clamped between the same and the turntable, a cam carried by said rotatable member, and means operated by said cam for cooperation with said vibrating means to regulate the position of the needle.

5. In an oval eyelet-forming machine, the combination of stitch-forming means including a needle-bar, a turntable, a presser-foot, rotatable fabric-holding means carried by said presser-foot for coöperation with said turntable, said fabric-holding means being manually movable when the fabric is clamped between the same and the turntable, means for vibrating said needle-bar, a cam movable with the rotatable member, a ta-

pered stem interposed in the means for imparting movement to the needle-bar, and means controlled by the cam for moving said stem.

6. In an oval eyelet forming machine, the combination of stitch-forming means including a needle-bar, a turntable, a presser-foot, rotatable fabric-holding means carried by said presser-foot for coöperation with said turntable, said fabric-holding means being manually movable when the fabric is clamped between the same and the turntable, means including a cam, a lever, a horizontally movable pin and a spring for vibrating said needle-bar, a cam carried by said rotatable member, a tapered stem interposed between said lever and horizontal pin for imparting movement to the needle-bar, and means controlled by the cam for moving said tapered stem.

7. In an eyelet-forming machine, the combination of stitch-forming means, a turntable, a presser-foot, rotatable fabric-holding means carried by said presser-foot for coöperation with said turntable, said fabric-holding means being manually movable when the fabric is clamped between the same and the turntable, a cam movable with said rotatable member, means for causing said cam to control the position of the stitch-forming means, the latter comprising a vibrating needle, and guiding means carried by the turntable to indicate the position of the portion of the fabric to be operated upon.

8. In an eyelet forming machine, the combination of stitch forming means, a turntable, a presser-foot, rotatable fabric holding means carried by said presser-foot for coöperation with said turntable, said fabric-holding means being manually movable when the fabric is clamped between the same and the turntable, a cam carried by said rotatable member, means for causing said cam to control the position of the stitch forming means, the latter comprising a vibrating needle, and a pair of radially mounted set screws carried by the turntable to indicate the position of the portion of the fabric to be operated upon.

RUDOLF LOEB.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."