No. 766,128. PATENTED JULY 26, 1904.

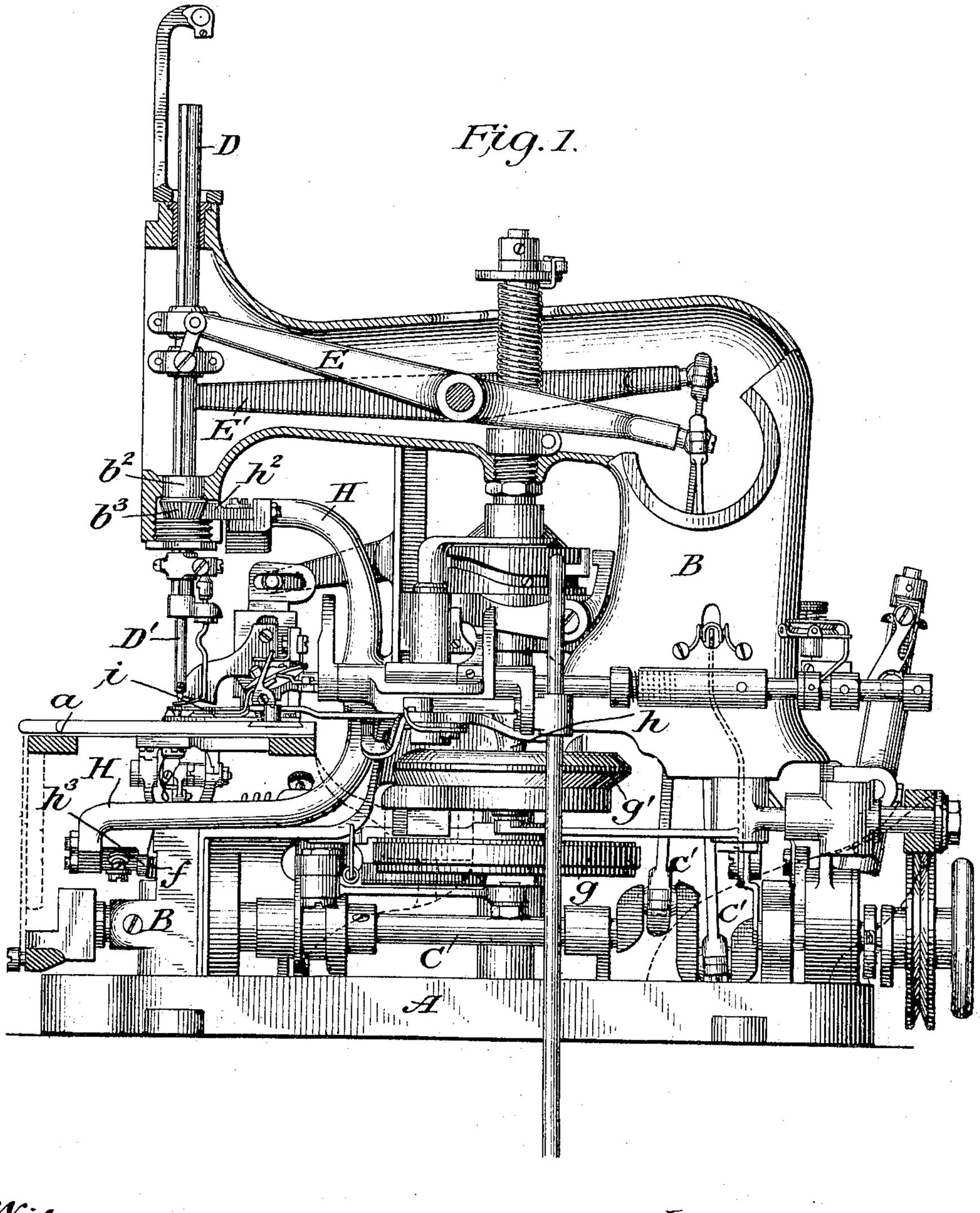
E. B. ALLEN.

BUTTONHOLE STITCHING MACHINE.

APPLICATION FILED APR. 3, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Chas. H. Baker.

E. C. Duffy

Inventor:

Edward B. Allen

by Henry Calvert

Atty.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

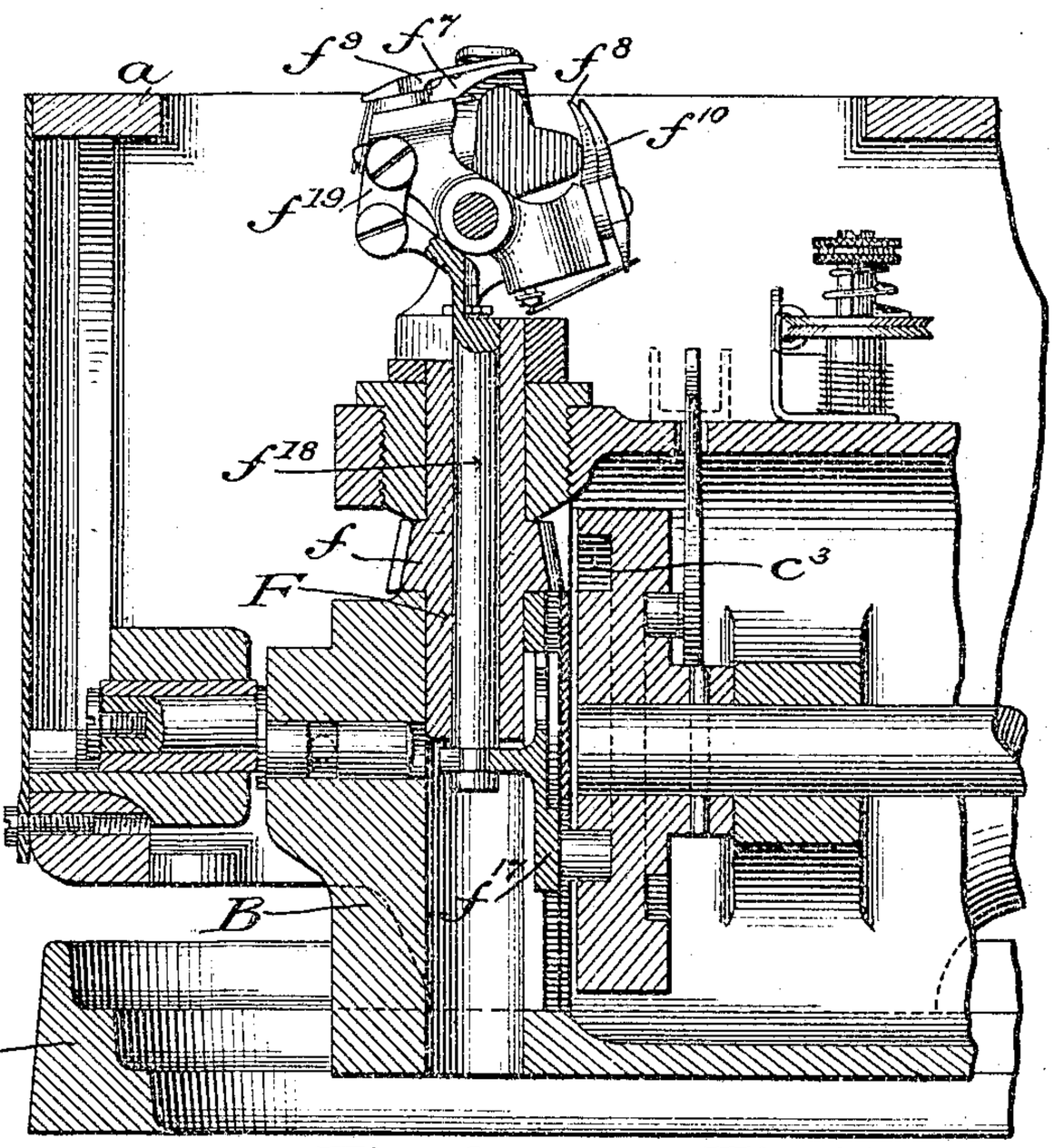


Fig. 6.

Fig. 7.

Fig. 5.

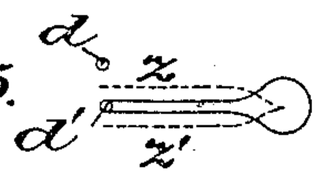


Fig. 8.

Fig. 3.

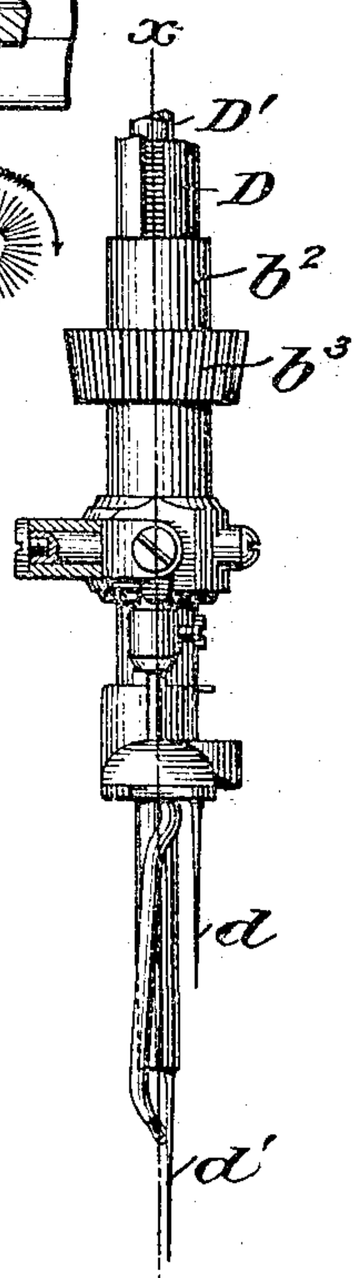
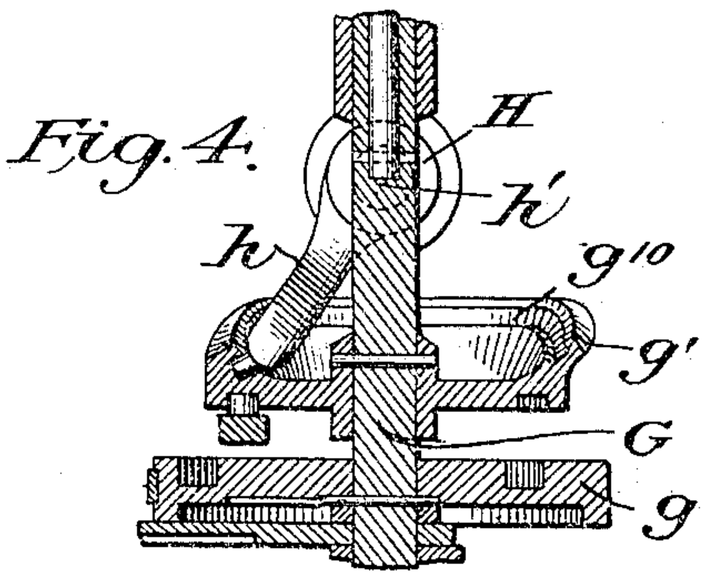


Fig. 4.



Witnesses:
Chas. H. Baker.
E. C. Ruffley

Inventor:
Edward B. Allen
by Henry Calvert Atty.

No. 766,128. Patented July 26, 1904.

UNITED STATES PATENT OFFICE.

EDWARD B. ALLEN, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

BUTTONHOLE-STITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 766,128, dated July 26, 1904.

Original application filed July 24, 1900, Serial No. 24,679. Divided and this application filed April 3, 1902. Serial No. 101,191.

(No model.)

To all whom it may concern:

Be it known that I, EDWARD B. ALLEN, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Buttonhole-Stitching Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

In machines for stitching eyed buttonholes in which the eye portions of the buttonholes are of considerable size, owing to the fact that a segment of the material in which the buttonholes are formed is removed or punched out, it has heretofore been customary to locate the slit-penetrating needles of the stitch-forming mechanisms concentric with the axes of rotation of the stitch-forming devices where rotating stitch-forming devices are employed or concentric with the centers of rotation of the work-holding devices where the work-holding devices are turned in stitching about the eye portions of the buttonholes. Owing to this concentric location of the slit-penetrating needles of the stitch-forming mechanisms, it has been necessary in working eyed buttonholes to impart slight lateral and longitudinal movements to the stitch-forming devices where the latter were the rotating moving elements or the work-clamp was when the work was turned relative to the stitch-forming devices in stitching the eyes of the buttonholes given the slight lateral and longitudinal movement referred to. These plans of stitching eyed buttonholes have been objectionable owing to the fact that the mechanism for causing the lateral and longitudinal movements of the stitching devices or of the work were more or less complicated and especially were objectionable owing to the fact that it has been found practically impossible with the construction referred to, and more particularly when turning stitch-forming devices with concentric slit-needles were employed, to form the eye portions of buttonholes with evenly-radiating stitches, so that the work was more or less unsightly.

This invention has for its object to obviate the difficulties referred to, and this object is effected according to the present invention by locating the slit-penetrating needles of machines for working eyed buttonholes eccentric to the axis of rotation of the turning stitching devices or eccentric to the axis of a turning work-clamp, so that the lateral and longitudinal movements of the stitching devices heretofore required in working eyed buttonholes of material size will no longer be required during the rotary movements of the stitching devices, while at the same time more perfect work can be done. In other words, according to the present invention the slit-penetrating needle of an overedge-stitch-forming mechanism is located to move during the rotary movements of the stitch-forming devices or of the work in a vertical path that intersects the plane of the work between the axis of rotation of the stitch-forming devices or of the work and the edge being stitched.

In the accompanying drawings, Figure 1 is an elevation of a buttonhole-sewing machine embodying the present invention. Fig. 2 is a sectional view showing the looper mechanism mounted for rotation, so as to properly coöperate with the rotating needles. Fig. 3 is a detail view showing the needles and upper looper constructed for rotary movements. Fig. 4 is a detail view showing a part of the mechanism for imparting rotary movements to the stitching devices. Figs. 5, 6, 7, and 8 are diagrams illustrative of the operation of the machine embodying the invention.

The general construction and operation of the machine embodying the present invention is the same as that fully shown and described in my United States application, Serial No. 24,679, filed July 24, 1900, of which this application is a division.

Referring to the drawings, A denotes a base, rigid with which is a stationary work-plate *a*, which supports the work-clamp or work-holder *i;* and B denotes a traveling frame, movable relative to the said base A and work-plate *a*, and which traveling frame carries the stitch-forming mechanism of the machine, said mechanism comprising in the present in-

stance a depth-stitch needle d and a slit-penetrating needle d', carried by out-of-time needle-bars reciprocated vertically by levers E and E', operated from cranks c' on the main shaft C. The needle-bars are mounted to reciprocate vertically in a sleeve b^2, provided with a pinion b^3, by which said sleeve and the needle-bars may be turned at proper times. The looping mechanism employed in the present machine for coöperation with the out-of-time needles d and d' comprises a rotary sleeve F, provided with a pinion f, said sleeve carrying the alternately-operating loopers f^7 and f^8, with their coöperating spreaders f^9 and f^{10}, the rocking head to which said loopers are attached being operated from the cam c^3 through the slide f^{17}, rod f^{18}, and link f^{19}.

Suitably mounted in the traveling frame B is a rocking lever H, the upper arm of which is provided with a rack h^2, meshing with the pinion d^3 for rotating the needle-bars and needles and the lower arm of which is provided with a rack h^3, meshing with the pinion f for rotating the looping devices. The lever H rocks upon an axis stud or rod h', (denoted by dotted lines in Fig. 4,) and the sleeve or shaft of said lever H is provided with an arm h, provided with a stud entering a cam-groove g^{10} in a cam-wheel g', turning with the shaft G, to which intermittent rotary movements are imparted through the instrumentality of the feed-wheel G.

The axis of rotation of the stitch-forming devices is denoted by the dotted lines $x\ x$ in Fig. 3, and it will be observed that the slit-needle d' is mounted eccentric to said axis, while the depth-stitch needle d is mounted still further eccentric to said axis and on the same side of said axis as the slit-needle d'. The amount of eccentricity of the said slit-needle to the axis of rotation of the stitch-forming devices is preferably just equal to the transverse radius of the buttonhole-eye or equal to half the transverse diameter of the said eye. This eccentric arrangement of the slit-needle to the axis of rotation of the stitch-forming devices is indicated by the diagram, Fig. 5, in which z denotes the path of travel of the axis of rotation of the stitch-forming devices while stitching one side of a buttonhole and z' the path of travel of the said axis while stitching the other side of the buttonhole. Figs. 6, 7, and 8 illustrate the several stages of the operation of stitching a cut-out eyed buttonhole. This arrangement of needles relative to their axis of rotation or to the axis of rotation of the stitch-forming devices enables the working of an eyed buttonhole with evenly-radiating stitches all around the end portion of the eye, a result not heretofore effected by any machine having turning stitching devices. In this improved machine the stitching-frame B remains perfectly stationary while the radiating stitches at the end portion of the buttonhole are being formed, while in prior machines employing stitch-forming devices either the stitching-frame or the work was moved laterally as well as longitudinally while the eye portions of the buttonholes were being worked, these lateral and longitudinal movements of the stitching devices or the work having been necessary in machines heretofore constructed in stitching cut-out eyed buttonholes, owing to the fact that the slit-needles were located concentric with the axes of rotation of the stitching devices.

While I have herein illustrated my invention as applied to a buttonhole-stitching machine employing two straight needles, both of which are located above the work-plate, I do not wish to be understood as limiting my invention to this type of machine, as the invention is equally applicable to those classes of overedge-stitching machines in which the slit-penetrating needles are located beneath the work and employing either straight or curved slit or overedge needles, as also to machines in which the periodical rotary movements are imparted to the work-clamps or work-holders, as well as to machines in which the stitch-forming devices have periodical rotary movements in stitching the eye portions of buttonholes while the work remains relatively stationary.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a buttonhole-sewing machine, the combination of overedge-stitch-forming mechanism comprising a slit-penetrating needle, a work-holder, means for giving a relative rotary movement to said slit-penetrating needle and said work-holder, the said slit-penetrating needle being located to move during said rotation in a path that intersects the plane of the work between the axis of said rotation and the edge being stitched.

2. In a buttonhole-sewing machine, the combination of overedge-stitch-forming mechanism comprising a slit-penetrating needle, a work-holder, means for giving a relative rotary movement to said stitch-forming mechanism and work-holder, the said slit-penetrating needle being located to move during said rotation in a path that intersects the plane of the work between the axis of said rotation and the edge being stitched.

3. In a buttonhole-sewing machine, the combination of overedge-stitch-forming mechanism comprising a slit-penetrating needle, a work-holder, means for giving a bodily rotation to said stitch-forming mechanism relative to the work-holder, the said slit-penetrating needle being located to move during said rotation in a path that intersects the plane of the work between the axis of said rotation and the edge being stitched.

4. In a buttonhole-stitching machine, the combination with an overedge-stitch-forming mechanism comprising a slit-needle and a depth-stitch needle both arranged above the

work-plate of the machine, of a work-holder, and means for giving a relative rotary movement to said stitch-forming mechanism and work-holder, said slit-needle being located to move, during said rotary movement, in a vertical path which intersects the plane of the work between the axis of said rotation and the edge being stitched.

5. In a buttonhole-stitching machine, the combination with an overedge-stitch-forming mechanism constructed for periodical rotation and comprising a slit-needle and a depth-stitch needle both arranged above the work-plate of the machine, of a work-holder, and means for imparting periodical rotary movements to said stitch-forming mechanism, said slit-needle being located eccentric to the axis of rotation of the said stitch-forming devices.

6. In a buttonhole-stitching machine, stitch-forming devices mounted for rotative movements about the eye of a buttonhole and comprising an edge or slit needle and a depth-stitch needle, said edge or slit needle being eccentric to the vertical axis of rotation of said stitch-forming devices and said depth-stitch needle being still further eccentric to said axis on the same side thereof on which the said edge or slit needle is eccentric, combined with means for imparting periodical rotary movements to said stitch-forming devices, a feeding mechanism and work-holding means.

7. In a buttonhole-stitching machine, stitch-forming devices mounted for rotative movements about the eye of a buttonhole and comprising an edge or slit needle and a depth-stitch needle, both arranged above the work-plate of the machine, said edge or slit needle being eccentric to the vertical axis of rotation of said stitch-forming devices and said depth-stitch needle being still further eccentric to said axis on the same side thereof on which the said edge or slit needle is eccentric, combined with means for imparting periodical rotary movements to said stitch-forming devices, a feeding mechanism and work-holding means.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD B. ALLEN.

Witnesses:
JOSEPH F. JAQUITH,
HENRY A. KORNEMANN.