(No Model.) 3 Sheets—Sheet 1.

E. P. & H. H. ARNOLD.

SHOE SEWING MACHINE.

No. 507,873. Patented Oct. 31, 1893.

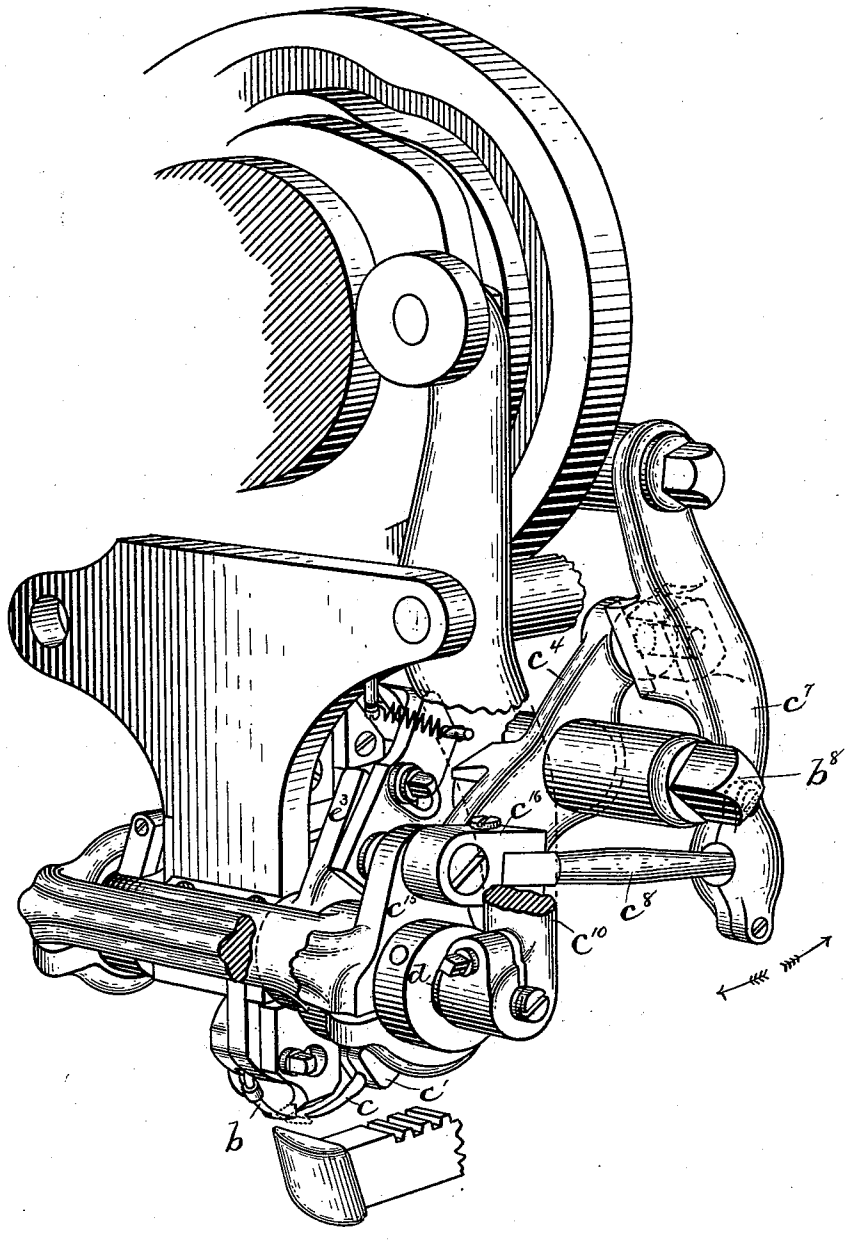


Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

E. P. & H. H. ARNOLD.

SHOE SEWING MACHINE.

No. 507,873. Patented Oct. 31, 1893.

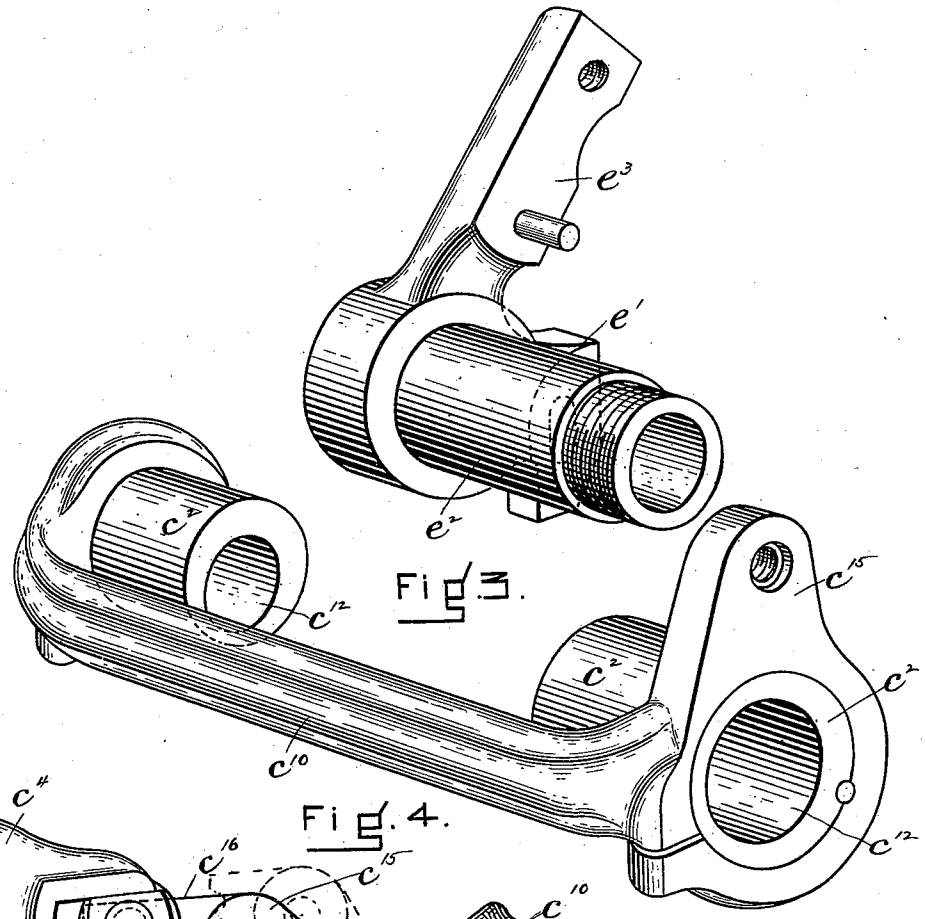


Fig. 3.

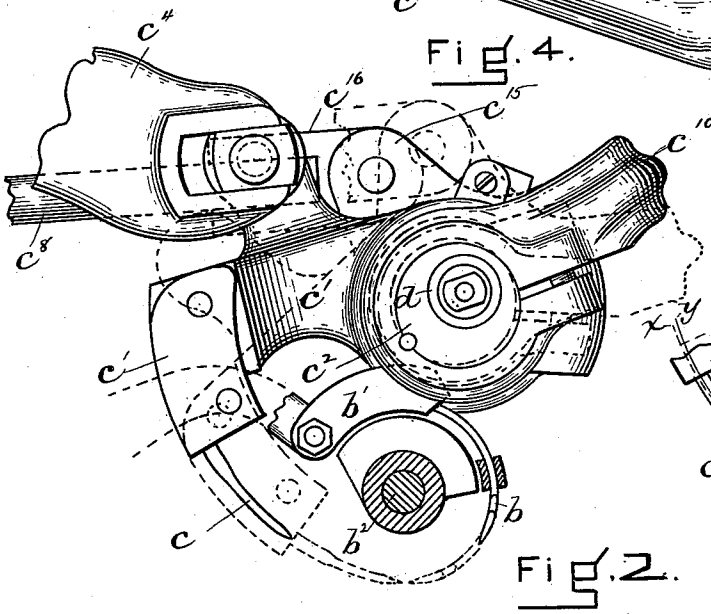


Fig. 2.

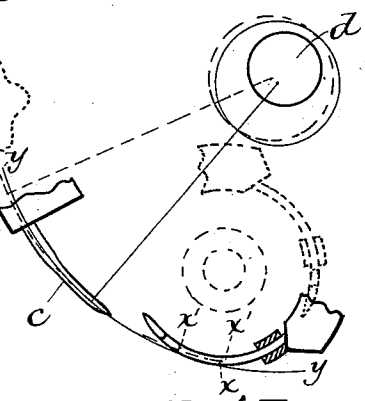


Fig. 5.

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

E. P. & H. H. ARNOLD

SHOE SEWING MACHINE.

No. 507,873. Patented Oct. 31, 1893.

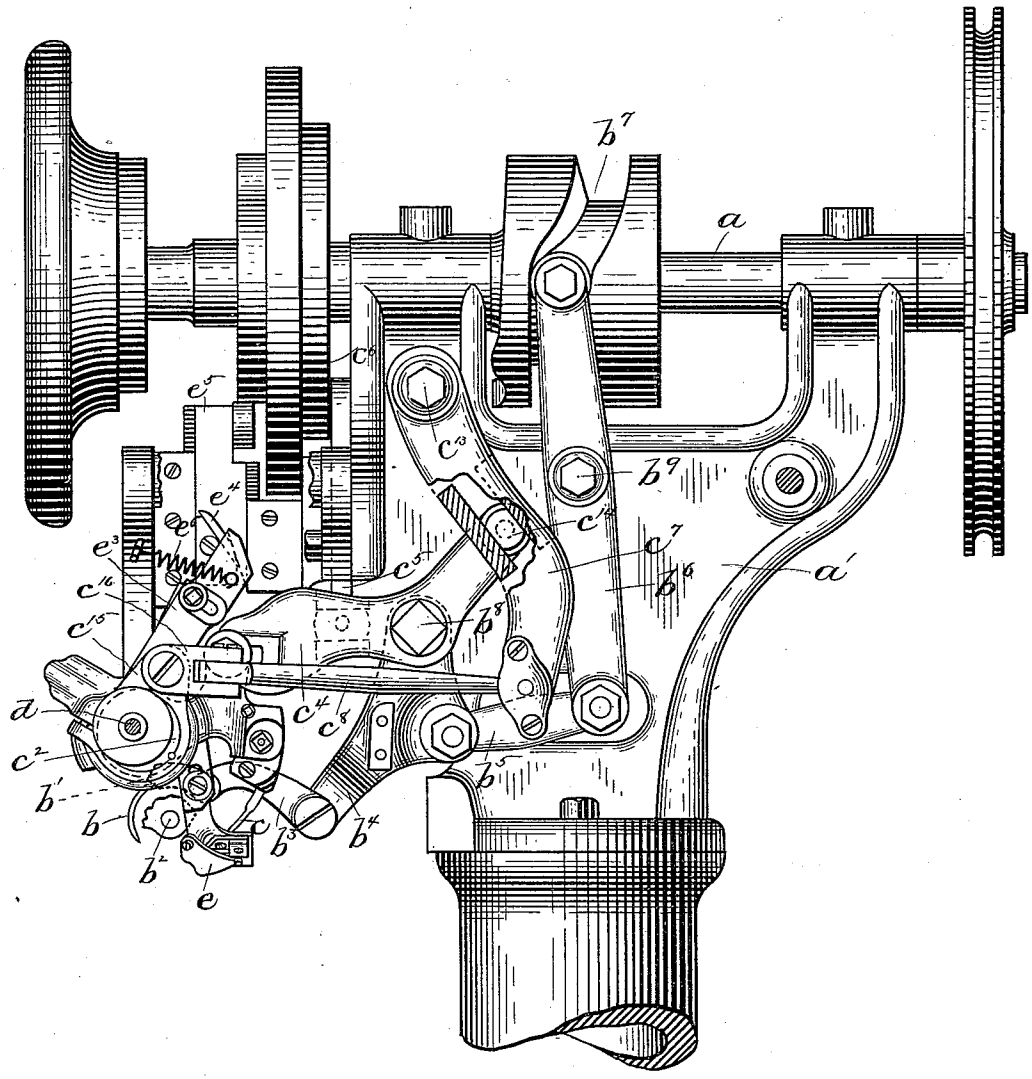


Fig. 6.

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UNITED STATES PATENT OFFICE.

EZRA PRESCOTT ARNOLD AND HENRY HERBERT ARNOLD, OF ROCKLAND, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE EPPLER WELT MACHINE COMPANY, OF BOSTON, MASSACHUSETTS.

SHOE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 507,873, dated October 31, 1893.

Application filed January 14, 1893. Serial No. 458,357. (No model.)

To all whom it may concern:

Be it known that we, EZRA PRESCOTT ARNOLD and HENRY HERBERT ARNOLD, both of Rockland, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Curved-Needle Sewing-Machines, of which the following is a specification.

This invention relates to a sewing machine, principally for boot and shoe sewing, employing a curved needle and a curved awl, arranged to oscillate in curved paths, the awl being arranged opposite the needle, so that it forms a hole in the material into which the needle advances to take the thread and draw it through said hole. A type of this class of sewing machines is shown in Letters Patent of the United States, granted to Andrew Eppler, Jr., March 10, 1891, No. 447,872. In sewing machines of this class, it is very desirable to arrange the needle so that it will vibrate on a shorter radius than the awl. To accomplish this result the awl-carrying arm has to be longer than the needle arm and mounted on a different center. Heretofore the awl has always oscillated in a path which is the true arc of a circle, the center on which it oscillates being fixed. The result of this arrangement is that the point of the awl intersects the path of the point of the needle very briefly, so that the hole formed by the awl for the reception of the needle does not coincide with or follow the path of the needle to the extent that is to be desired, the path of the awl crossing the path of the needle at a considerable angle.

Our invention has for its object to enable the point of the awl to travel in the same path with the needle during a considerable part of the movement of the awl, so that the hole made by the awl will more nearly coincide with the path of the needle than heretofore, thus enabling the needle to more readily pass through the material and perform its function, with less strain and resistance than usual.

To this end the invention consists in the combination with the awl and needle and with suitable mechanism for reciprocating or oscillating the same, of means for giving the awl a movement eccentric to its axis of oscillation, so that, when it is penetrating the work, it will approximately follow or coincide with the path of the needle, instead of simply crossing the same somewhat abruptly at an angle, all of which we will now proceed to describe.

Of the accompanying drawings, forming part of this specification: Figure 1 represents a perspective view of a portion of a sewing machine provided with our improvements. Fig. 2 represents an elevation of a portion of the mechanism taken from the side opposite that viewed in Fig. 1. Figs. 3 and 4 represent perspective views of parts hereinafter described. Fig. 5 represents a diagrammatic view, showing the paths of the awl and needle. Fig. 6 represents a side elevation of the principal parts of the machine.

The same letters of reference indicate the same parts in all the figures.

In the drawings: a represents the driving-shaft of the machine, which is journaled in bearings in the supporting-frame a'.

b represents the needle, affixed to the needle arm b', which is mounted to oscillate upon a fixed stud or center b^2, suitably attached to the supporting-frame. The needle is oscillated by means of the system of levers b^3 b^4 b^6, connecting-rod b^5 and cam b^7, the levers b^4 and b^6 being mounted respectively on fixed studs b^8 b^9.

c represents the awl, which is affixed to an arm c', said arm having bearings which are mounted to oscillate upon hollow studs c^2 c^2. The said studs are connected by a cross-bar or yoke c^{10}, so that the studs are caused to turn or oscillate together, as hereinafter described. The studs c^2 are provided with eccentric orifices or bearings c^{12} c^{12}, which are fitted to turn upon a fixed horizontal rod or journal d, the arrangement being such that, when the studs c^2 are turned upon the rod d, the arm c' and awl c will be raised or lowered, as the case may be.

Suitable mechanism is provided for oscillating the awl-carrying arm upon the studs c^2, said mechanism, as herein shown, comprising a lever c^4, engaged with a slide c^5, which is vertically reciprocated in a fixed guide, by means of a cam-groove in the disk c^6 affixed to the driving-shaft, said lever being mounted to oscillate upon the fixed stud b^8, and en-

gaged at one end with the awl-carrying arm c', as shown in Figs. 2 and 6.

Mechanism is provided for independently oscillating or rocking the studs c^2 c^2 to raise and lower the arm c' and awl c, said mechanism being, as herein shown, a lever c^7, mounted to oscillate upon a fixed stud c^{13}, and engaged with a pivoted stud c^{14} on the lever c^4; and a rod c^8, connecting the swinging end of the lever c^7 with an ear c^{15} affixed to the yoke c^{10} that connects the studs c^2 c^2, the connecting-rod c^8 having an end-piece c^{16}, connected to the rod by a vertical pivot and to the ear c^{15} by a horizontal pivot, the object of this being to permit the studs c^2 c^2 and the awl-carrying arm thereon to move laterally to give the awl the usual work-feeding movement.

There is nothing new in the construction and operation of the machine, excepting the means for raising and lowering the awl and its carrying arm. Hence a full description of the construction of the machine and of the stitch-forming operation is not deemed essential, said construction and operation being substantially the same as set forth in the above-mentioned patent.

In the operation of the machine, the awl is given an upward movement while it is moving forward from the position shown in Figs. 2 and 5, so that the awl, instead of moving in the true arc of a circle, moves in an eccentric path, said movement being due to the partial rotation of the studs c^2 c^2 caused by the mechanism above described, the studs c^2 c^2 being so turned while the awl is moving forward to penetrate the work that the awl is slightly raised while moving forward. When the awl is moving backward, the studs c^2 c^2 are turned in the opposite direction and thus give the awl a corresponding outward or downward movement, the path of the awl being eccentric in both directions. The eccentricity of the path of the awl is such as to give it a greater length of movement in the same path with the needle than would be possible if the awl were moved upon a fixed center. The awl is therefore caused to make the hole for the reception of the needle in such direction that practically the whole length of the hole is in position to receive the needle, without the imposition of any material strain upon the needle. The eccentric movement of the awl is illustrated diagrammatically in Fig. 5, in which the dotted line x—x shows the eccentric path of the awl, the same following the path of the needle practically between the points x' x', the distance between said points being substantially equal to the length of the hole required by the needle in its passage through the material. The full line y—y shows the necessary relation of the path of the awl to the path of the needle, in case the awl moves in the true arc of a circle on a fixed or unvarying center. It will be seen by comparison of the lines x—x and y—y that the awl, in its work-penetrating movement, conforms more closely to the path of the needle than it could do if mounted to swing on a fixed support.

One of the advantages of this improvement is that, in sewing welts and uppers to the inner soles of welted boots and shoes, a lighter inner sole can be used than heretofore, owing to the fact that the needle exerts little or no lateral strain upon the inner sole in passing through it. Another advantage is that the upward movement given to the awl when penetrating the work enables the awl to exert a slight degree of tension upon the upper of a boot or shoe and thus to a certain extent conform the upper more closely to the last.

The machine is provided with a suitable welt guide e, which is suitably connected to an arm e', affixed to a hollow stud e^2, which is mounted upon the supporting-rod d, and is provided with an arm e^3, which co-operates with a cam e^4 on a slide e^5, and with a spring e^6, in imparting the usual movements to the welt guide. There is nothing new, however, in this welt guide, or in its operating mechanism.

We do not limit ourselves to the particular means here shown for giving the awl the described eccentric movement, as said movement may be effected by any other suitable means without departing from the spirit of our invention.

We claim—

1. In a curved needle sewing machine, the combination with the curved needle, the curved awl, and mechanism for oscillating the same, of means for giving the awl a movement eccentric to its axis of oscillation, substantially as and for the purpose specified.

2. In a curved needle sewing machine, the combination with the curved needle, the curved awl, and operating mechanism therefor, of a support or journal for the awl arm, said support being eccentric to the axis of oscillation of the awl, and connections between said eccentric support and the driving-shaft whereby the support is oscillated or rocked when the machine is in operation, as set forth.

3. In a curved needle sewing machine, the combination with the curved needle and operating mechanism therefor, of the rigidly-connected studs or bearings mounted to oscillate on a fixed support said bearings being eccentric to the axis of oscillation of the awl, mechanism substantially as described for oscillating said eccentric bearings, the awl-carrying arm mounted to oscillate independently on said eccentric bearings, and mechanism for oscillating the awl-carrying arm, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 7th day of January, A. D. 1893.

EZRA PRESCOTT ARNOLD.
HENRY HERBERT ARNOLD.

Witnesses:
C. F. BROWN,
A. D. HARRISON.