

C. THEINE.  
Book-Stitching Machine.

No. 197,575.

Patented Nov. 27, 1877.

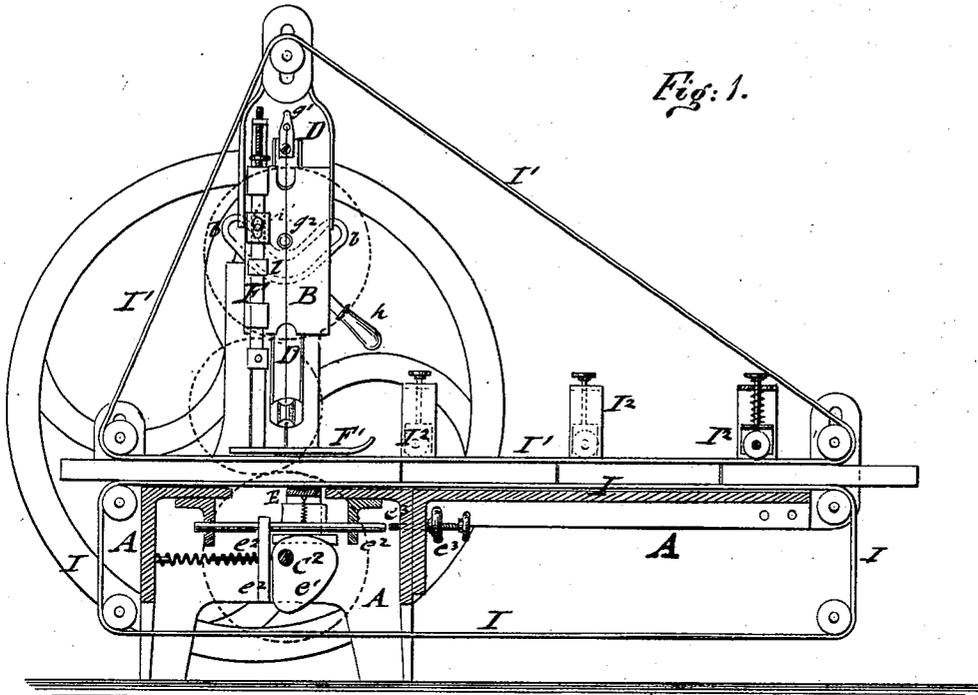


Fig: 1.

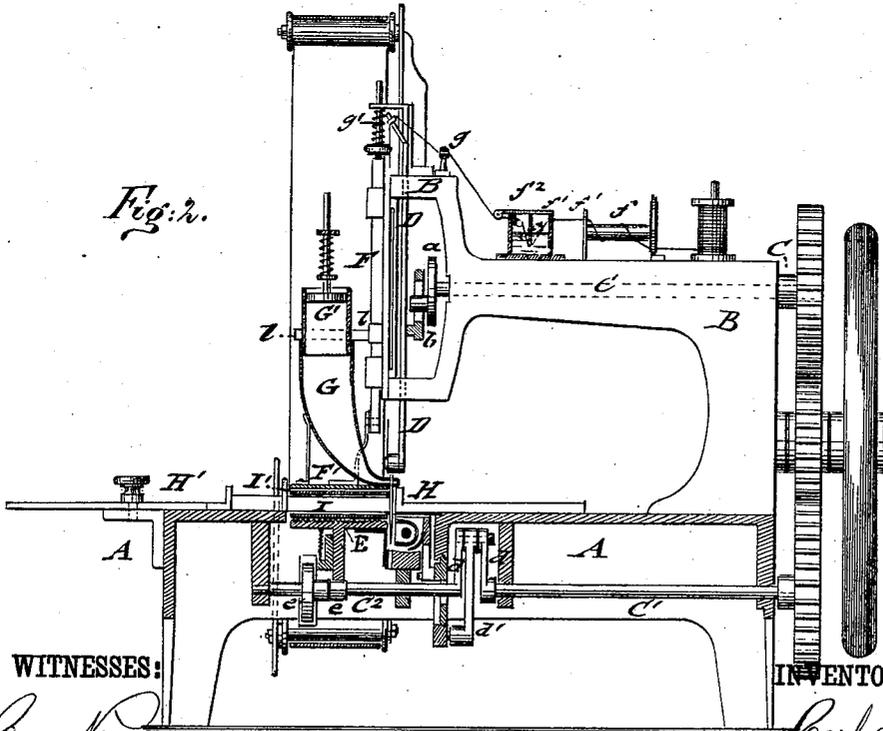


Fig: 2.

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# UNITED STATES PATENT OFFICE.

CARL THEINE, OF MINDEN, PRUSSIA, GERMANY.

## IMPROVEMENT IN BOOK-STITCHING MACHINES.

Specification forming part of Letters Patent No. **197,575**, dated November 27, 1877; application filed July 30, 1877.

*To all whom it may concern:*

Be it known that I, CARL THEINE, of Minden, Prussia, in the Empire of Germany, have invented a new and Improved Book-Stitching Machine, of which the following is a specification:

In the accompanying drawings, Figure 1 represents a sectional front elevation, and Fig. 2 a side elevation, partly in section, of my improved book-stitching machine.

Similar letters of reference indicate corresponding parts.

The object of this invention is to provide an improved book-stitching machine for the purpose of stitching the large numbers of pamphlets, catalogues, school-books, diaries, periodicals, and other publications, in a quicker and more superior manner than heretofore, so that the annoying detaching or getting loose of the leaves may be avoided, and so that they may be finished with a neater exterior and at considerably less cost.

The main difficulty in book-stitching machines was found in the breaking of the needle when forced through layers of paper of certain thickness, and also in the considerable power required to force the needle through greater thicknesses of paper. The breaking of the needle was avoided to some extent by the use of oil or other lubricating substances, which, however, is objectionable, as the paper is smirched, and as too much time is lost in lubricating the needle for each stitch.

For the purpose of overcoming these difficulties I have arranged, in connection with the needle, a receptacle filled with a lubricant of certain consistency and slow flow, such as soft soap, the needle being passed through the same and covered over its entire length for each stitch, so as to facilitate its working.

For the purpose of accelerating the working of the machine, the articles to be stitched are fed in continuous manner to the needle, and the upper thread passed through liquid glue, so as to hold the parts more securely together.

The folded sheets of the books, pamphlets, &c., are, before being passed through the machine, connected by gluing at the back, and then continuously and successively passed through the same, where they are stitched,

along the backs, the threads being finally cut and the covers applied, and thus a neat, durable, and strong connection of the parts obtained.

The invention consists of a machine constructed on the general principle of a shuttle sewing-machine, with a needle-lubricating apparatus attached to the presser bar and foot, and a continuous feed and guide arrangement that is adjustable for the different sizes and thicknesses of books.

In describing the invention, I will first refer in general terms to the parts constructed in the nature of a sewing-machine, then point out my improvements thereon, and give, finally, a short description of the operation of the machine, together with the points of novelty of the same.

By referring to the drawings, A represents the table of my improved book-stitching machine, which supports, on a horizontal top standard or arm, B, the upper shaft C, that imparts motion to the needle-bar, the lower shaft C<sup>1</sup> imparting motion to the shuttle and feed device.

The upper and lower shafts are revolved by suitable gearing and fly-wheel, either by hand, foot, or other power.

The upper shaft C engages, by a crank-disk and pin, *a*, the heart-shaped cam *b* of the needle-bar D, to the lower end of which the needle is secured by a suitable clamp-screw. The needle-bar is reciprocated by this mechanism so as to pass through the paper, form the loop in returning, and, finally, draw the thread tight, in the usual manner, when arriving at the highest position.

The lower shaft C<sup>1</sup> revolves, by a double crank, *d*, a second front shaft, C<sup>2</sup>, and operates, by a second crank, *d'*, the reciprocating shuttle-carriage, in the customary manner.

The front shaft C<sup>2</sup> carries two eccentric-cams—a smaller cam, *e*, for raising the feed-plate E, and a larger cam, *e'*, for engaging the guided and spring-acted feed-rod *e''*, so as to move the same forward and allow of its return.

The length of stitch is controlled by an adjusting-screw, *e''*, having a leather or other cushion, against which the feed-rod *e''* strikes on its return motion. The lower thread is ar-

ranged in the shuttle in the usual manner, while the upper thread is conducted from the spool, first through an eye of the rotary disk of a tension-cylinder,  $f$ , then once or twice around the same, and through two eyes,  $f^1$ , and, lastly, into a receptacle,  $f^2$ , for liquid glue. The receptacle  $f^2$  has a lateral slide,  $f^3$ , with guide-slit at the lower or bottom edge, along which the thread is passed, so as to be kept continually immersed in the glue. The thread then passes upward and out between the cover, and a piece of rubber pressed against the same, which removes the surplus glue from the thread and conducts it back into the reservoir. The thread, being thus saturated with glue, is passed over the outer rounded-off end of the cover to the fixed eye  $g$  of the arm B, then through a second eye,  $g^1$ , of the needle-bar, to a spring-tension,  $g^2$ , and, finally, through a hole in the set-screw to the needle.

The presser-bar F has a foot-plate,  $F'$ , of enlarged size, for the purpose of holding firmly the book or other article during the stitching, and exerting the necessary pressure thereon during the forward motion. The presser-bar is raised by means of a lever,  $h$ , that engages a square pin for retaining the same in raised position.

To prevent, during the stitching of the books, the descent of the presser-foot beyond a certain point, a slotted adjustable guide-piece,  $i$ , is arranged on the presser-bar, which guide forms contact with a stop-pin,  $i'$ .

Below the guide-piece  $i$  is secured, to the presser-bar, a yoke,  $l$ , that serves for the support of the needle-lubricating reservoir G, which is further secured by a brace-connection with the presser-plate. The upper part of the reservoir is made of cylindrical shape, so as to guide a sliding and spring-acted piston,  $G'$ , that presses on the lubricating material, and feeds it through an aperture at the lower curved and tapering end of the reservoir to the needle, the needle passing through the aperture, so as to be covered by the lubricating material over its entire surface, and prevent thereby any turning or breaking of the needle when piercing the layers of paper in stitching.

The books to be stitched have to be guided in uniform manner to the needle, which is accomplished by means of parallel rectangular guides H H', of which the guide H is attached in fixed position, and the guide H' in adjustable position, to the table A, so as to be adjusted to the size of the books, and press them against the fixed guide.

The steady and automatic forward motion of the books is accomplished, in connection with the feed-plate and presser-foot, by means of two endless belts, I I', of rubber or other elastic material, and by a number of spring-acted presser-rolls, I<sup>2</sup>, which are guided in standards of the fixed guide.

The lower belt I runs in a shallow groove of the table A, so as to be flush with the same, and is stretched at both ends over upper and

lower guide-rollers, which are adjustable in slots to admit the tight stretching of the belt.

The upper belt I' is laid over three rollers, of which the two lower ones are arranged in slotted bearings at both ends of the table A, and the upper one in slotted bearings at the end of a vertical extension of the arm B. The three rollers admit not only the stretching of the upper belt I', but also the adjustment of the same into higher or lower position, according to the thickness of the books to be stitched.

The presser-rolls I<sup>2</sup> of the fixed guide H exert a constant pressure on the upper belt, and by the same on the connected sheets of paper placed between the belts I I', so that by the forward motion of the feed-plate not only the book below the needle, but the whole series of books between the belts, is moved for an equal distance, and thus continuously and uniformly fed forward, to be subjected to the stitching action of the needle.

Operation: The folded sheets are first arranged back to back, and connected by glue, the books so formed being inserted, when dry, between the feed-belts of the machine. The machine is then set in motion, and thereby the books stitched successively, the stitch being formed by the threads of the needle and shuttle, in the customary manner, and the feed produced by the feed-plate when the stitch is formed in connection with the belts and pressure-rolls. The feed-plate returns after each forward motion, and exposes the adjoining portion of the book to the needle, which pierces easily the paper as it descends for each stitch through the perforated end of the lubricating-reservoir. The stitching is continued as long as books are fed to the feed-belts, and the books taken off at the opposite end, where the threads are cut and the books then provided with the covers. Books, pamphlets, &c., of from twenty to thirty millimeters in thickness may be stitched with great rapidity.

The upper thread gives, when saturated with glue, an additional hold to the thread, and retains the connection of the same with the heels, even in case the thread should break. In case it is desired to work with warm glue, a suitable heating device may be arranged in connection with the glue-reservoir on the main arm of the machine.

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

1. The combination, with the reciprocating needle, of a lubricating-receptacle attached to the presser-bar, and having an aperture at its lower end for the passage of the needle, substantially as and for the purpose set forth,

2. The combination, with the needle, of a tapering lubricating-reservoir, having an aperture at its lower end for the passage of the needle, and a spring-acted piston at its upper end, for keeping up a regular supply of the lubricant, substantially as set forth.

3. The combination, with the presser-foot and feed-plate, of adjustable upper and lower feed-belts, substantially as and for the purpose set forth.

4. The combination, with the presser-foot and feed-plate, of adjustable upper and lower feed-belts, and of fixed and laterally-adjustable guides, substantially as specified.

5. The combination of the feed-plate,

presser-foot, and upper and lower feed-belts with side guides, and with pressure-rolls bearing on the upper feed-belt, substantially as set forth.

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Witnesses:

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