2 Sheets—Sheet 1.

G. W. GLAZIER.

BOOK SEWING-MACHINE.

No. 184,961. Patented Dec. 5, 1876.

Fig. 6.

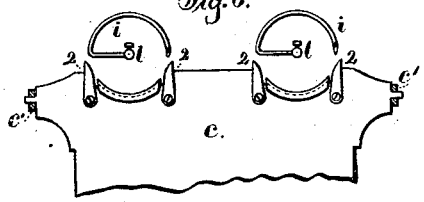


Fig. 5.

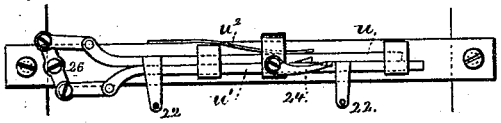
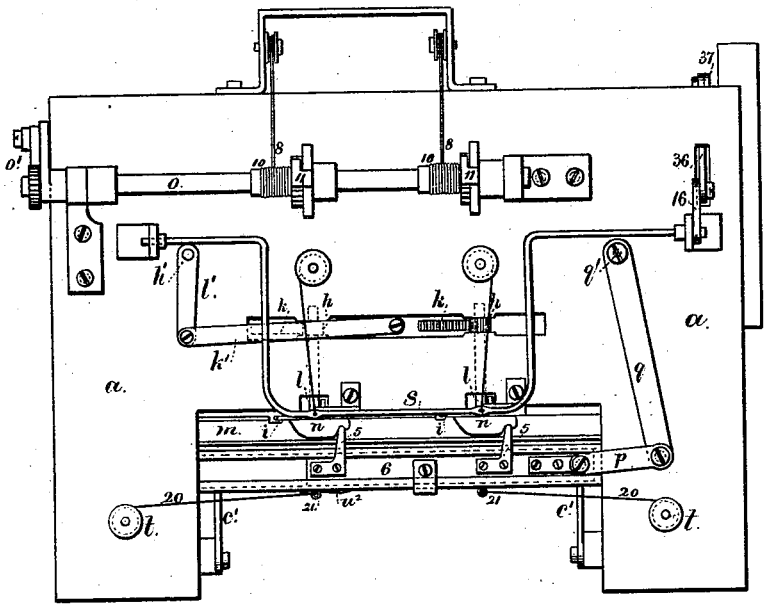


Fig. 4.



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2 Sheets—Sheet 2.

G. W. GLAZIER.

BOOK SEWING-MACHINE.

No. 184,961. Patented Dec. 5, 1876.

Fig. 2.

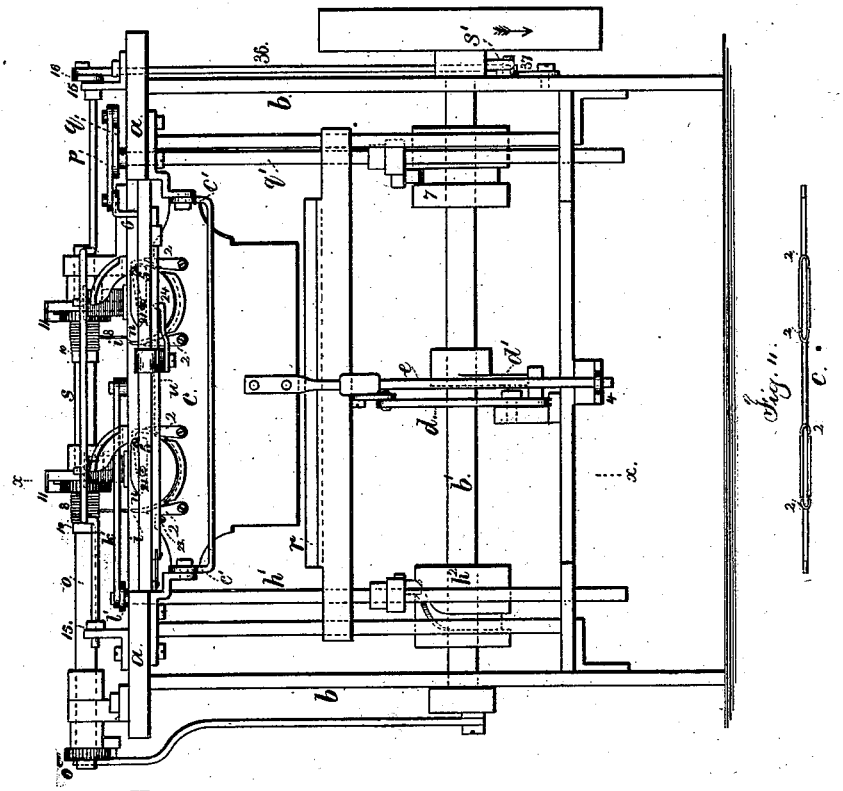
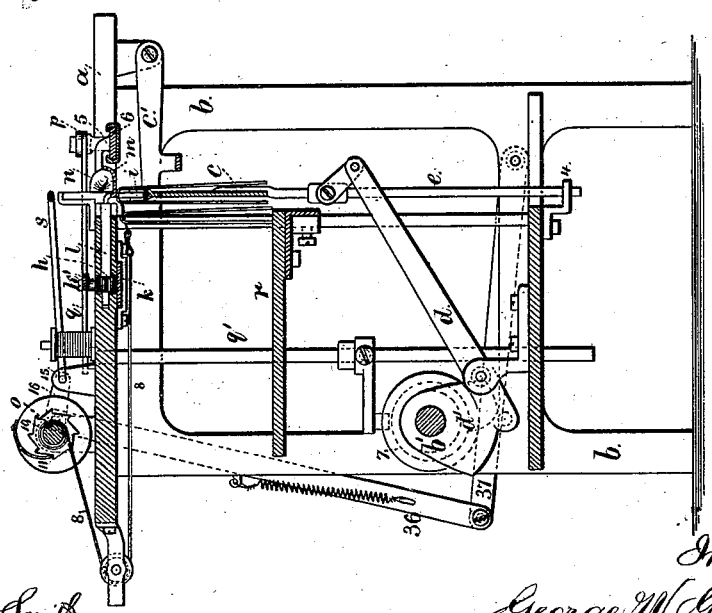


Fig. 11.

Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE W. GLAZIER, OF SALEM, ASSIGNOR TO THE SMYTH MANUFACTURING ASSOCIATION, OF LYNN, MASSACHUSETTS.

IMPROVEMENT IN BOOK-SEWING MACHINES.

Specification forming part of Letters Patent No. **184,961**, dated December 5, 1876; application filed April 3, 1876.

To all whom it may concern:

Be it known that I, GEORGE W. GLAZIER, of Salem, in the State of Massachusetts, have invented an Improvement in Machines for Sewing Books, &c., of which the following is a specification:

In a machine invented before mine, by David M. Smyth, there were semicircular needles passing into the notches of the folded sheet, and carrying a thread through the eye near the point, and such needles left their thread upon the point of a looper, which served to hold the sheets until there was a volume sewed, and then the looper drew in a cord, that was laid in its hook previous to drawing off the sewed sheets. Such needle or needles, however, were liable to bend by the weight of the volume sewed, and more than one volume at a time was difficult to sew, and there was nothing to prevent the threads cutting the paper at the end saw-cuts in the sheet, because such threads simply drew out from the fold of one sheet and entered into the notch, and between the fold of the next sheet, and the strain in hammering the back of the book, or upon the threads when in use, was liable to break such threads or cause them to injure the paper.

In my invention the sheet is placed in a folded condition, with the proper transverse saw-cuts, upon a peculiar holder, that determines the position of the sheet accurately, and guides the semicircular needles. The sheet is carried to the path of the needles. They make a half-revolution, passing in at one saw-cut and out at the next. The loop of needle-thread is taken by a shuttle to each needle, such shuttle carrying one of the back-cords of the book; hence the loops of needle-thread draw over the shuttle and around the said cords, causing them to occupy the saw-cut.

There is a catch-stitch cord applied at the saw-cut where the needle enters, and this is moved between one stitch and the next, so that the needle passes first one side of such cord, and then on the other side the next stitch, whereby the said catch-stitch cord or thread is interwound with the needle-threads, and prevents them being broken or embedding themselves in the paper. The back-cords of the book, that are supplied by the shuttle, are drawn along gradually, and the sheets are partially suspended, and the necessary looseness is maintained in the sewing of the back; and between one volume and the next the mechanism that draws these cords along is so operated as to pull off from the shuttles the cord necessary for attachment to the book-covers at the front and back of each volume.

In the drawing, Figure 1 is a plan of the machine. Fig. 2 is a front elevation. Fig. 3 is a section at the line *x x*. Fig. 4 is a plan of the edge of the sheet-holder. Fig. 5 is an inverted plan of the mechanism for moving the catch-stitch cords, and Fig. 6 is an elevation of the sheet-holder and circular needles.

The table *a* is supported upon a suitable frame, *b*, and *b'* is the shaft to which power is applied.

The sheet-holder *c* is made of a size adapted to receive the folded sheet, and I remark that each machine may be large enough for the largest volumes, and have numerous sets of needles and shuttles; but only those needles, shuttles, and their appliances will be put into operation that are required for the particular size of book that is being sewed, or there may be a machine adapted to each size of book. In the drawing I have shown two needles and their appliances.

The upper edge of this sheet-holder *c* is made with segmental notches, containing a grooved edge to guide the semicircular needle hereafter described, and at the ends of these notches are the gage-points 2 2, that are similar to small gages tapered to a point. These might be used to perforate the sheets at the places for the needles to enter and emerge; but it is preferable to have the backs sawed, as usual, at the places corresponding with these gage-points.

This sheet-holder is provided with links *c'*, that guide it to place as it is carried up by the lever *d* and cam *d'*, acting upon the stem *e* of such sheet-holder, which stem slides through the guide 4.

As the sheet-holder descends after the sheet

has been sewed, the links c' swing the same forward into a position ready for the next sheet.

The needles i are each an arc of a circle, and the wire is bent to form an arm passing to the shaft l, that is provided for each needle, and is at the center of the arc of the needle.

Each needle-shaft l is provided with a pinion, h, and said shaft is mounted in suitable bearings in the bed a. There is a rack, k, in contact with the pinions h, and to this rack end motion is given at the proper times to partially revolve the needles, first one way and then the other. The link k', crank l', shaft h^1, and cam h^2 are represented as the means for giving these movements to the rack. The shuttles n are set in the raceway m, and are moved by the shuttle-drivers 5 upon a rod, 6, that receives motion from the link p, crank-arm q, shaft q', and cam 7 upon the driving-shaft b'. Each shuttle carries a cord adapted to become one of the back-cords of the book, and before the sewing is commenced the cord from each shuttle is tied to a hook, or otherwise connected to its corresponding traction-cord 8, leading to the small drums 10 upon the shaft o. This shaft o is provided with pawls 11, that act to rotate the drums when the cords are being wound upon them; but by raising such pawl the cord may be drawn off as the drum is turned back. These traction-cords are tightened sufficiently to draw the shuttle-cords a little distance under the bed a; and as the sewing progresses these cords 8 are drawn back the proper distance each movement of the machine to move the sewed sheet out of the way of the next sheet to be sewed, and for this purpose the ratchet and pawl o' are employed, the same receiving motion from a crank-pin upon the shaft b'.

It will now be apparent that if the parts are properly timed the semicircular needle passes into the notch at the back of the folded sheet and emerges at the next notch, the needle having been guided and kept from injuring the sheet by the grooved edge of the notch in the sheet-holder. The shuttle passes through the loop of needle-thread that is brought above the sheet by the said semicircular eye-pointed needle. The needle draws back, and the thread draws around the shuttle and around the cord that passes off from such shuttle, suspending the sheet by the shuttle-cord, and the sheet is drawn back as aforesaid, and its weight is taken by the platform r, that is so adjusted vertically that the edges of the sheet rest upon such platform.

The needles, having been turned back, are ready to pass into the next sheet when presented. There is a thread-controller or take-up formed of the bar s, that is pivoted at 15, and actuated by the crank-arm 16, link 36, lever 37, and cam s', that rises at the proper time and prevents the slack thread remaining in the fold of the sheet, and draws the stitch sufficiently tight.

If these parts only were used the book-sewing could be accomplished; but it is preferable to employ catch-stitch cords 20, passing from spools, which may be located at t, through eyes 21, and thence through eyes 22 to the saw-cut in the sheet at which the needle enters. These eyes 22 are moved so that the needle at one movement passes at one side of its catch-stitch cord, and the next movement at the other side of such cord, whereby the cord is interlaced or confined in the saw-cut of the sheet, for the purposes hereinbefore set forth.

Suppose the needle-thread as it passes out of the saw-cut is at the right side of the catch-stitch cord; if the next descent of the needle is at the left of such cord, and the needle-thread is carried under it, the cord will be confined in the groove or saw-cut at the back of the book. The said catch-stitch cord is then moved to the left, so that the needle will pass in at the right and above such cord, and the operation is repeated.

In Fig. 5 I have shown a simple device for moving these eyes. The two bars u u^1 are pressed together by a spring, u^2, and connected at one end by a small lever, 26, and there is an eye, 22, attached to each bar. The pawl 24 from the shuttle-driver passes between these bars, and is directed by the side of one bar into the notch of the next bar u^1, and carries that bar to the extreme of movement of the pawl, bringing the notch of the next bar u (by the movement resulting from the lever 26) behind the pawl. The pawl retires between the bars u u^1, they spring slightly apart, and the notch of the next bar, u, is taken up on the next forward movement, and so on, the eyes and the catch-stitch cords being placed first one side and then the other side of the needle's path in entering the fold.

The capacity of this machine is large, because a number of volumes can be sewed before the machine is stopped for their removal, it only being necessary to give a partial rotation to the shaft o by hand to draw the volumes along and leave the proper amount of back shuttle-cord between one volume and the next.

The increased strain in moving a number of volumes is not detrimental, because it is independent of the sewing mechanism.

I claim as my invention—

1. The sheet-holder c, made with a notched edge, containing a groove for the needle, in combination with a semicircular or segmental needle, substantially as set forth.

2. The sheet-holder c, having the gage-points 2 at the ends of the segmental groove for receiving the sheet, in combination with the segmental needle, substantially as set forth.

3. In a book-sewing machine, the combination of a sheet-holder, a segmental eye-pointed needle, a shuttle carrying the back-cord for the book, and mechanism, substantially as specified, for communicating the relative movements to the parts, as specified.

4. The combination, with the back-cords of

the book, and the means for supplying the same and sewing the sheets to such back-cords, of means, substantially as shown, for drawing such back-cords along progressively as the sewing is performed, and rendering the sewing sufficiently loose, substantially as set forth.

5. The method herein specified of interlacing a catch-stitch cord with the needle-threads in sewing books, by causing the needle to pass at one side of such cord at one stitch, and at the other side of such cord at the next stitch, substantially as set forth.

6. The traction-cord 8, book-back cord, drums 10, and shaft *o*, actuated as set forth, in combination with the shuttles *n*, segmental needles *i*, sheet-holder *c*, and mechanism for moving the needles, shuttles, and sheet-holder, substantially as set forth.

7. The eyes 22, rods *u* u^1, and pawl 24, in combination with the shuttles, shuttle-drivers, and segmental needles, substantially as set forth.

Signed by me this 18th day of March, 1876.

GEO. W. GLAZIER.

Witnesses:
WM. HOWLAND,
HENRY F. CHASE.