(No Model.) 4 Sheets—Sheet 1.

D. M. SMYTH.

BOOK SEWING MACHINE.

No. 491,228. Patented Feb. 7, 1893.

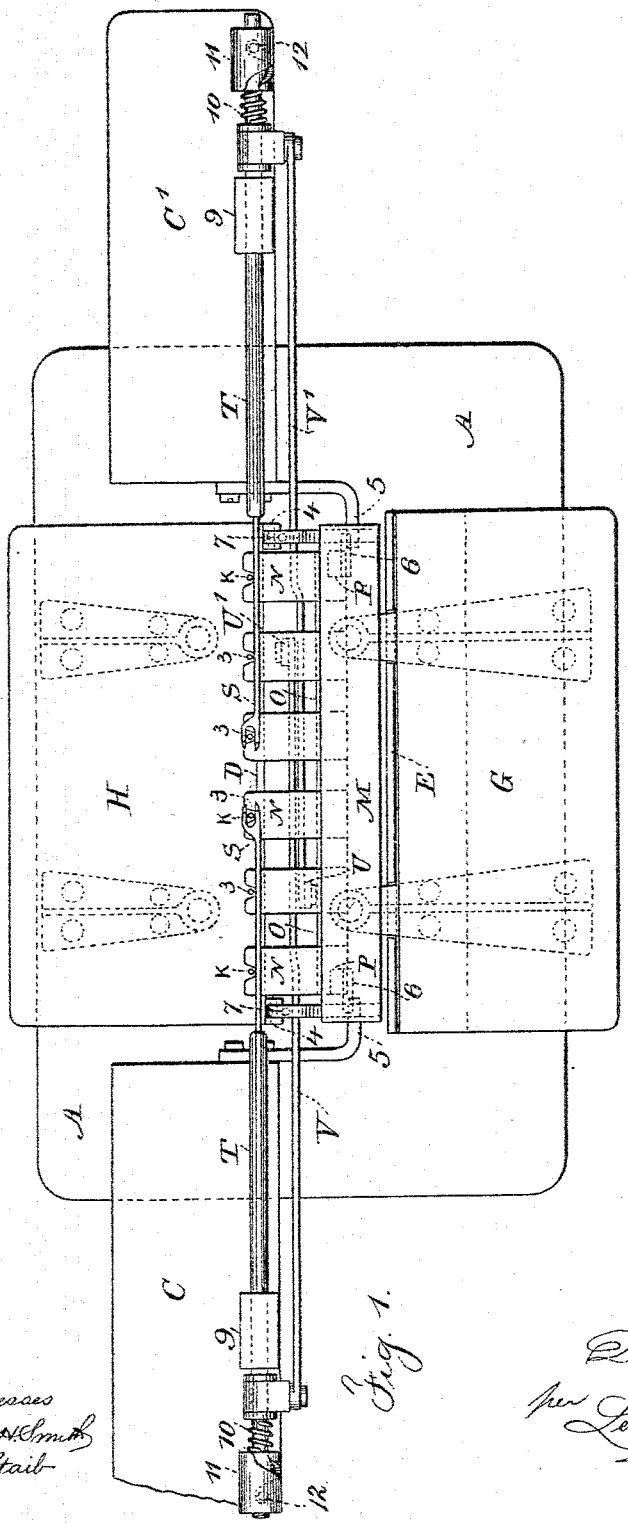

Fig. 1.

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per Lemuel W. Serrell
Atty

(No Model.) 4 Sheets—Sheet 2.

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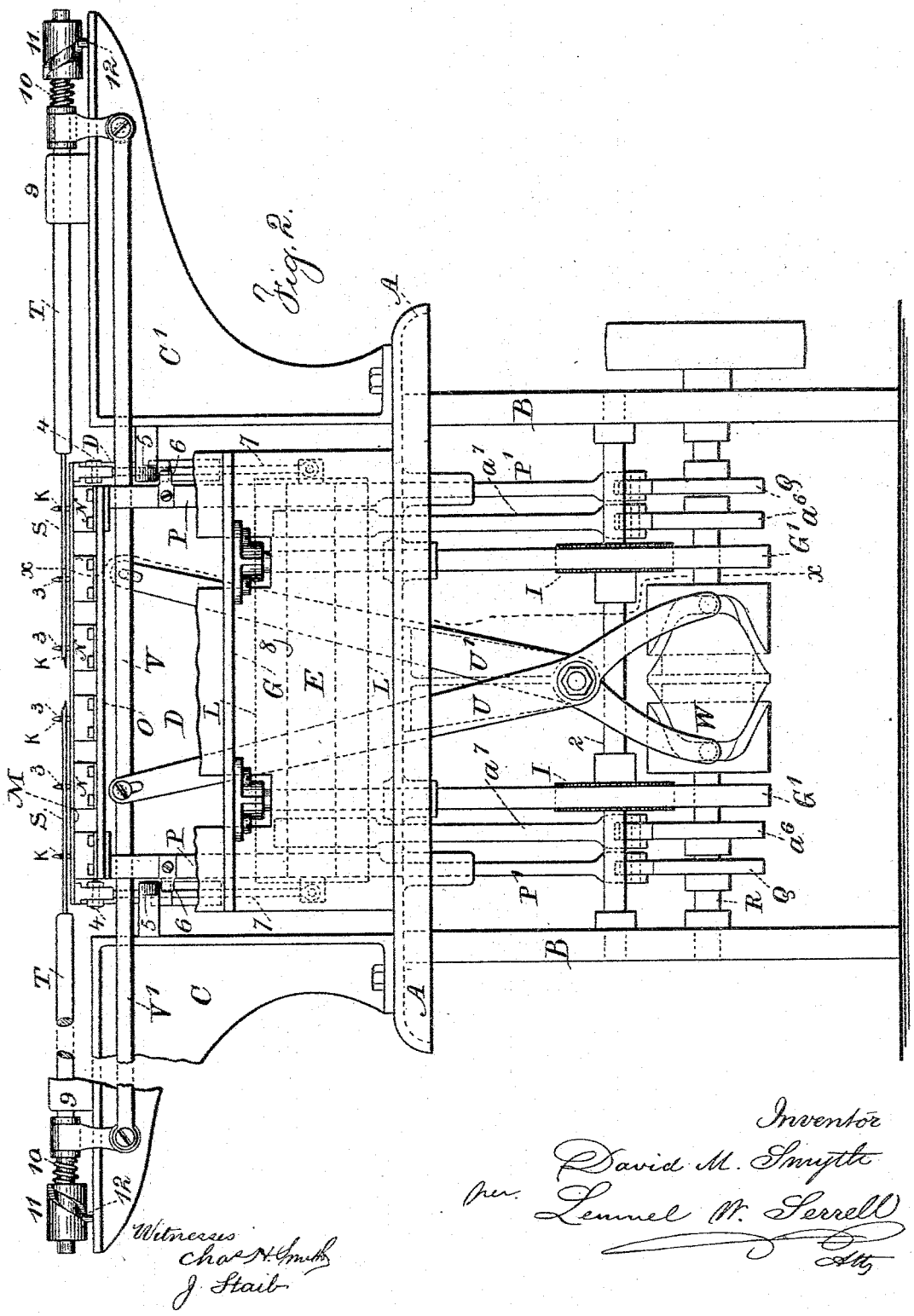

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

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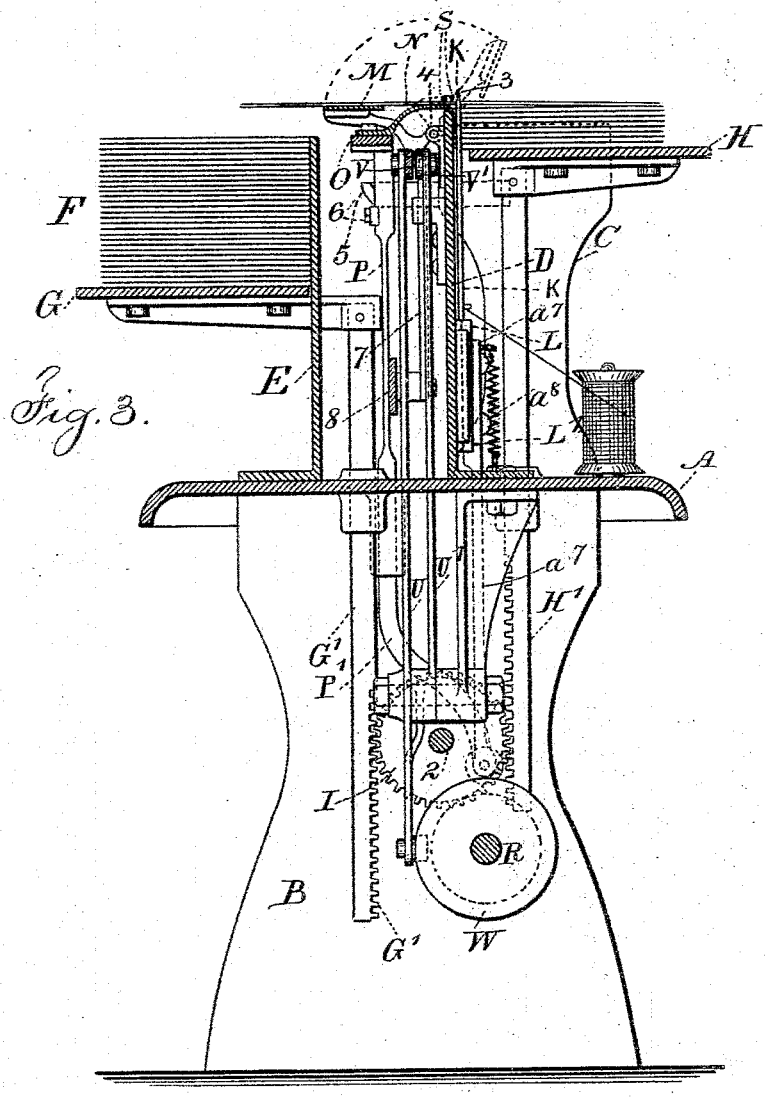

Fig. 3.

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(No Model.) 4 Sheets—Sheet 4.

D. M. SMYTH.

BOOK SEWING MACHINE.

No. 491,228. Patented Feb. 7, 1893.

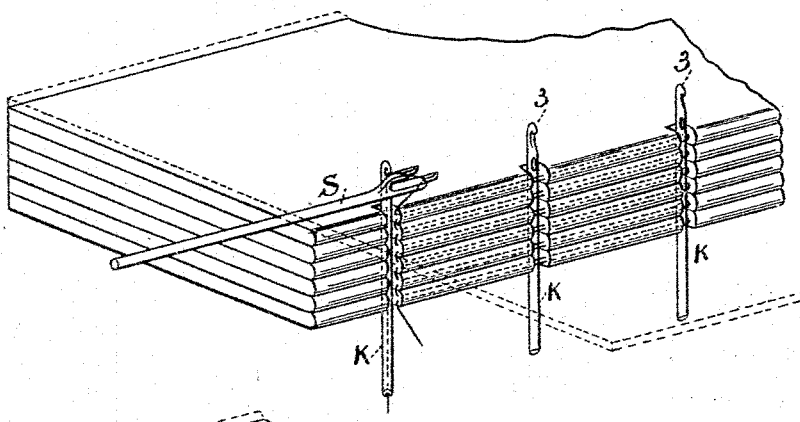


Fig. 4.

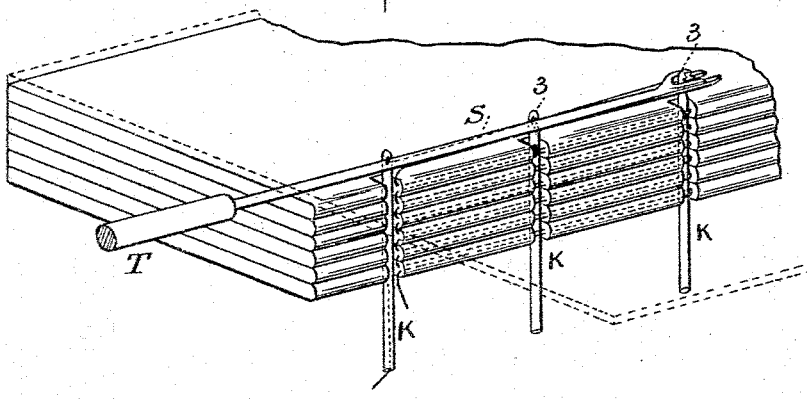
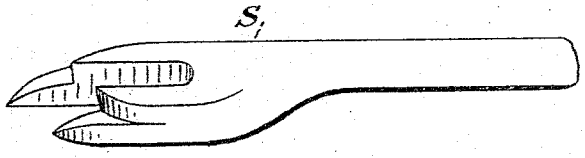


Fig. 5.

Fig. 6.



Witnesses
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J. Stair

Inventor
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UNITED STATES PATENT OFFICE.

DAVID M. SMYTH, OF NORTHWOOD, NEW HAMPSHIRE, ASSIGNOR TO THE SMYTH MANUFACTURING COMPANY, OF HARTFORD, CONNECTICUT.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 491,228, dated February 7, 1893.

Application filed July 5, 1892. Serial No. 438,865. (No model.)

To all whom it may concern:

Be it known that I, DAVID M. SMYTH, a citizen of the United States, residing at Northwood, in the county of Rockingham and State of New Hampshire, have invented an Improvement in Book-Sewing Machines, of which the following is a specification.

In the Patent No. 74,948 granted to me February 25, 1868, a machine is represented for sewing books with a reciprocating needle passing along the fold of the signature, and in Patent No. 91,175 granted to me January 8, 1869, the sheets to be sewed are laid upon one table and the sewed signatures are received upon another table, one passing upwardly as the other passes downwardly, and in Patent No. 435,616, granted to me September 2, 1890, two needles are represented passing in opposite directions into the fold of the signature. In my present invention the sheet is laid open while being sewed and the thread is carried along by loopers acting in opposite directions, so that the sewing is uniform, there being catch stitches passing out from one signature into the next at the end saw-cuts in the respective signatures, and the sheet after it has been sewed is folded over and pressed down ready to receive another signature in position.

In the drawings Figure 1 is a general plan view. Fig. 2 is an elevation. Fig. 3 is a vertical section at the line $x\,x$. Figs. 4 and 5 are diagrams illustrating the positions of the parts as the sewing progresses, and Fig. 6 is a perspective view in enlarged size of the looper.

The bed A is supported by a suitable frame B, and upon the bed near the opposite ends are the brackets C C′ having an open space between them, and there is a central plate D between the two brackets C C′ and a vertical guide or fence E adjacent to the back of the folded signatures F as they lie upon the receiving table G, and there is a second table H upon which the sewed sheets are received. These tables G and H are provided with vertical guide racks G′ H′ at opposite sides of the gear wheels I, so that as one table H is depressed by the accumulation thereon of sewed signatures, the other table G is raised up so that the top signature in the pile of signatures is near the upper edge of the fence E, and I remark that the mechanism hereinafter described that presses upon the sewed sheets to force them down to a given position, carries down the second table H and simultaneously elevates the receiving table G.

The needles K are more or less numerous according to the size of the book that is to be sewed, and these needles K are received at their lower ends into a needle bar L that is behind the plate D, and this needle bar is received into guides L′, so that it can be raised or lowered, and the needles that come toward the top and bottom of the signatures are made with eyes near the points for the threads with which the sewing is performed. The needle-bar L is raised by the cams a^6 on the shaft R acting upon the rods a^7 and said needle bar is brought down by the springs a^8. The intermediate needles are preferably larger and each is provided with an eye near the point, into which can be inserted a cord or tape, so that such cords or tapes can be drawn into the saw-cuts in the sewed signatures after each volume or a number of volumes have been sewed, such operation being performed by rotating the shaft 2 of the gear wheel I, so as to run up the table H and strip the signatures off from the row of needles K, and in this operation the receiving table G is lowered so as to be ready for receiving another pile of unsewed signatures.

The intermediate needles K are provided with hooks 3 at the upper end, so that such hooks retain the threads with which the books are sewed, as hereinafter described, and such threads are laid in the folds of the signatures and between the needles and such folds, as represented in Figs. 4 and 5, the needles themselves being within the saw-cuts and behind the crossing threads. There is a turner M pivoted at 4 which in its normal position is slightly above the upper end of the plate D, and it may be swung over, as indicated by the dotted lines Fig. 3, and it passes above the upper ends of the needles K, and there are fingers N that are connected to the bar O, and these fingers extend across the top edge of the plate D and lap upon the back folded edges of the sewed signatures, and such fingers are preferably notched, as indicated in Fig. 1, adjacent to the respective needles.

The bar O is supported by the springs P, and it is lifted by the rods P′ that extend below the springs and are acted upon by the cams Q upon the main shaft R, and there are stationary cams 5 and projecting studs 6 upon the upper ends of the springs P and adjacent to the stationary cams 5, so that when the fingers N, bar O and springs are lifted by the action of the cams Q the fingers are drawn back by the studs 6 sliding over the stationary cams 5, and in so doing the ends of the fingers N are drawn back from beneath the top signature and behind the fold of that signature, so that when the signature is folded over by the action of the turner M at the back fold, the fingers N pass clear of the back of the signature and rise above the same, and then such fingers come down upon the signature and press the signature downwardly until it is about the same level as the top edge of the plate D. During this operation the springs P have yielded, and when the studs 6 pass above the top edges of the stationary cams 5, the springs P throw the fingers N over the back edge of the folded signature, and as the parts come down, the studs 6 move upon the back surfaces of the stationary cams 5 until such studs pass below the lower edges of such stationary cams and the springs P return the parts to their normal positions.

In order to actuate the turner M there are rods 7 connected by a cross bar 8 with the springs P, and hence such rods 7 rise and fall with the springs when moved as aforesaid, and these rods 7 are immediately below the lever arms extending out from the pivots 4 and carrying the turner M, so that as the fingers N are lifted, the turner M is lifted more rapidly, because the rods 7 are near the fulcrums or pivots 4, hence the turner M is caused to swing over into the position shown by the dotted lines in Fig. 3 and carry with it the half of the folded sheet or signature.

The loopers S are supported by the looper bars T that travel through the guides 9 upon the brackets C C′, and to these loopers and looper bars motion is communicated by the levers U U′ and links V V′ that receive motion from the cam W upon the main shaft R, and these loopers S are moved simultaneously toward and from each other, and the connections between the looper bars and the links are fitted with springs 10, so that the parts may yield slightly, and at the outer ends of the looper bars there are cams 11 that come into contact with the stationary pins 12 on the respective brackets C C′. The looper at the inner end of each bar is formed as a finger or fork, shown in larger size in Fig. 6, one finger of the looper being in line with the rod of the looper and the other finger extending out at one side thereof, and both fingers are made with offsets or shoulders around which the threads draw, as shown in Figs. 4 and 5.

The mode of sewing is as follows: All of the signatures in the folded condition are channeled across the back with saw-cuts as usual, and the unsewed signatures are placed upon the receiving table G, and the saw-cuts correspond in position to the respective needles K, and the upper ends of these needles K extend above the top edge of the plate D and the turner M. The attendant takes one signature and opens it out and lays it upon the turner and upon the table H or the previously sewed signatures and the upper ends of the needles pass through the saw-cuts and project above the sheets of the signature. The position of the open sheet is indicated by the dotted lines in Figs. 4 and 5. The needle bar L and needles K now descend slightly sufficiently for throwing out loops of thread from the eye-pointed end needles K, and the loopers S come up in opposite directions and take the threads from the end needles, such loopers at this time standing with the finger of the looper directly above the looper itself, as indicated in Fig. 4, and these needles move simultaneously toward each other until the loopers reach the two adjacent needles near the middle of the back of the signatures, at which moment the cams 11 running upon the pins 12 give to the loopers a quarter rotation, turning the fingers of the loopers down horizontally and throwing the loops of threads over the hooks 3 of the two middle needles, and then the loopers are drawn back, but the slots in the cams 11 are so shaped that the loopers do not commence to rotate back to their normal positions until the loops of thread have been left in the hooks 3 of the needles. The needles K now draw down slightly and simultaneously therewith the springs P are raised, so that the fingers N are drawn back from beneath the fold of the open sheet, and the turner M folds over one half of the folded sheet upon the other half of the folded sheet and over the table H, and the loopers have by this time drawn out from between the fold of the sheet, leaving the threads from the end eye-pointed needles around the hooks of the two middle needles, and the adjacent threads of the loops of threads in the hooks of the intermediate needles; and then the fingers N spring back over the sewed signature, and as they descend they press down the said sewed signature and hold it down while another open sheet is being laid over the needles, which by this time have risen to their highest point and draw down slightly to throw out the loops of thread from the end needles, and the loopers come forward toward each other with the forks of the loopers up edgewise, the fingers of the loopers being directly above the looper bars, so as to enter the loops of thread and carry the same toward each other as before described, and the sewing operation is thus continued until the desired number of sheets have been sewed, and then tapes or cords are threaded into the eyes of the hooked needles and the table H is raised so as to draw in the cords or tapes into the places that had been occupied by the needles within the saw-cuts or

channels and between the bases of such saw-cuts or channels and the longitudinal threads that lie within the folds of the signatures. It is to be observed also that the tapes or cords that are drawn in by the two middle needles are drawn into the loops that have been left around such needles in the sewing operations as before described.

In Figs. 4 and 5 one end of the signature is shown and a portion of the back of such signature to near the middle thereof is represented, it being understood that the instrumentalities acting upon the other end are the same, so that the sewing at the other end of the back corresponds to that illustrated in said figures, hence in all instances the sewing threads pass at the end saw-cuts from one signature to the next, the loops of such threads where they come toward each other near the middle of the back are around the middle cords or tapes, and the intermediate cords or tapes pass along in the saw-cuts between the bottoms of the saw-cuts and the double threads in the folds of the signatures; and there may be any desired number of these intermediate saw-cuts and tapes that are drawn in by the needles, as aforesaid.

I claim as my invention:—

1. The combination in a book sewing machine of a needle bar and needles carried thereby and arranged in groups or series, the end needle in each group being eye pointed and carrying a thread and the intermediate needles being hook pointed, and loopers passing in opposite directions toward each other and laying loops of thread over the end hook pointed needles of each group, and mechanism for turning one half of the folded signature over on the other half, and mechanism for actuating the needle bar and loopers substantially as specified.

2. The combination in a book sewing machine with the receiving and second tables for the unsewed and sewed signatures, of a needle bar and vertical needles in groups adapted to pass through the sawcuts in the signatures, the end needles in each group being eye-pointed and carrying threads, the other needles being hook pointed, loopers each having a finger projecting near the end and mechanism for moving the same toward and from each other and for giving to the loopers a partial rotation as they come nearest together for passing the loops of thread taken from the eye-pointed needles over the hooks at the ends of the groups, and a turner for turning over the folded signature, the one half upon the other half, and fingers and mechanism for actuating the same, whereby the sewed signatures and the table supporting the same are pressed downwardly by the action of the fingers, substantially as set forth.

Signed by me this 25th day of June, 1892.

DAVID M. SMYTH.

Witnesses:
CHARLES E. GROSS,
WM. MERCER DYKE.