

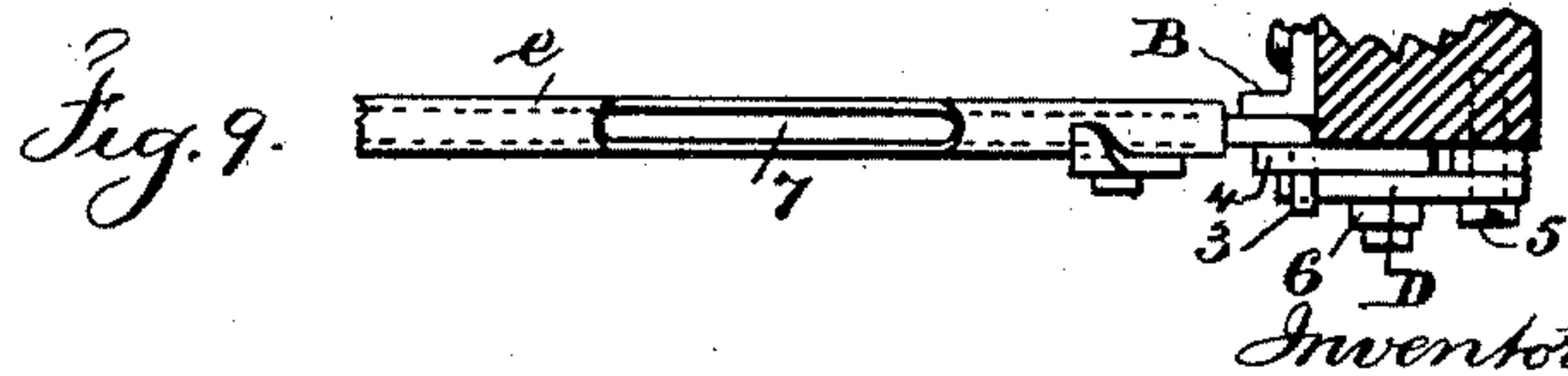
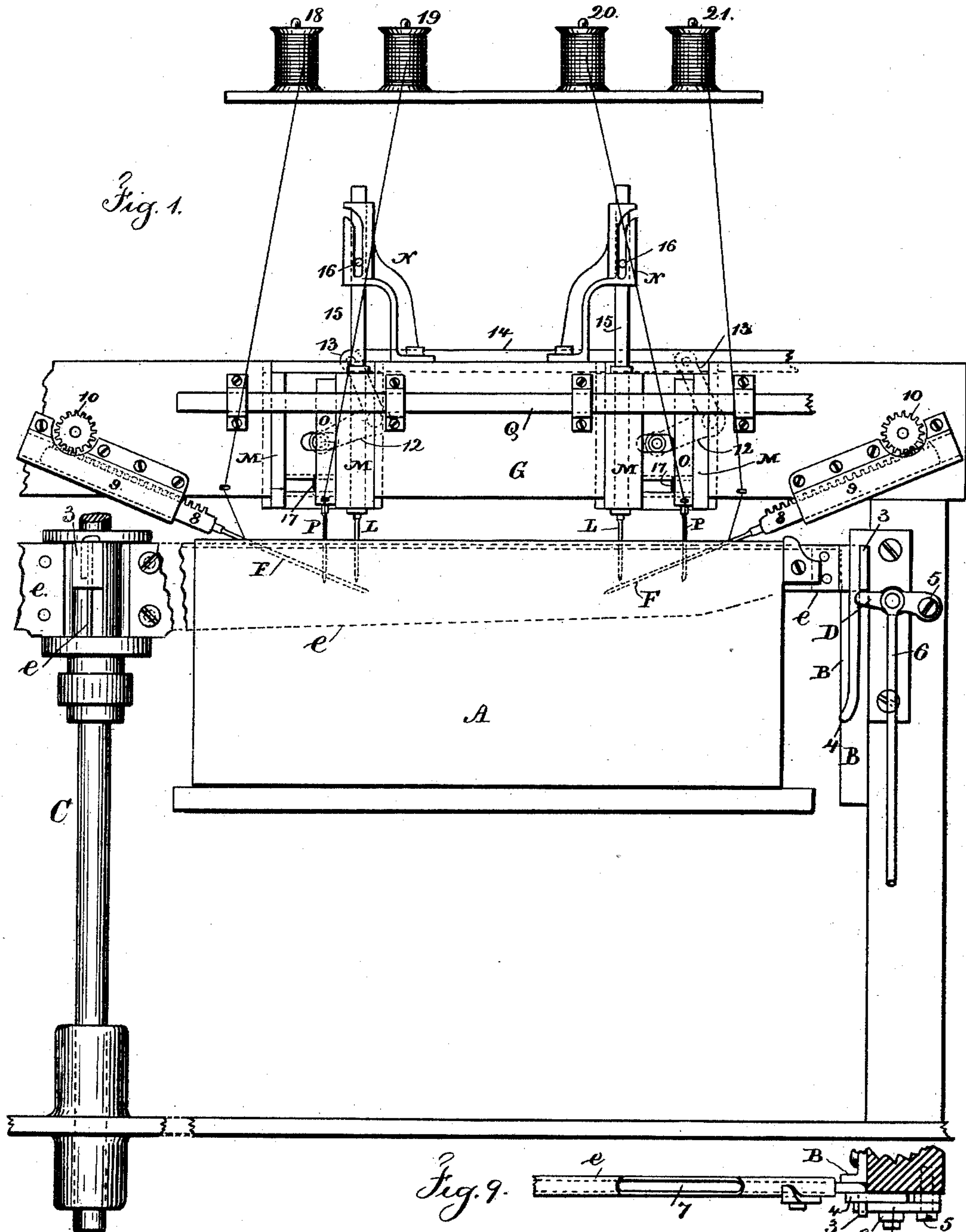
(No Model.)

3 Sheets—Sheet 1.

D. M. SMYTH.
BOOK SEWING MACHINE.

No. 468,117.

Patented Feb. 2, 1892.



Witnesses

Chas. H. Smith
J. Staib

Inventor

David M. Smyth
per Lemuel W. Perrell atty

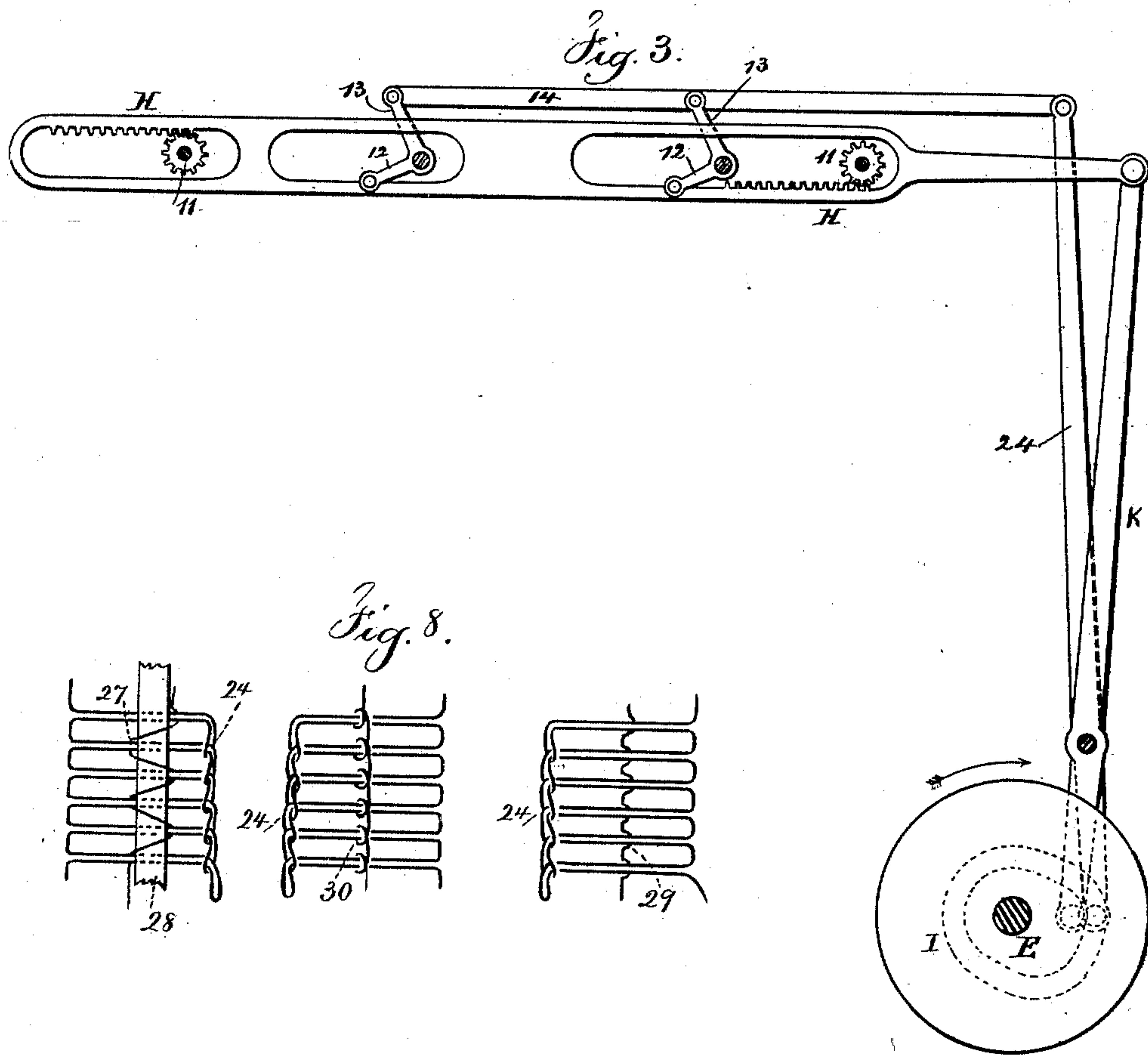
(No Model.)

3 Sheets—Sheet 2.

D. M. SMYTH.
BOOK SEWING MACHINE.

No. 468,117.

Patented Feb. 2, 1892.



Witnesses
Char. H. Smith
J. Stait.

Inventor
David M. Smyth
per Lemuel W. Terrell
att'y

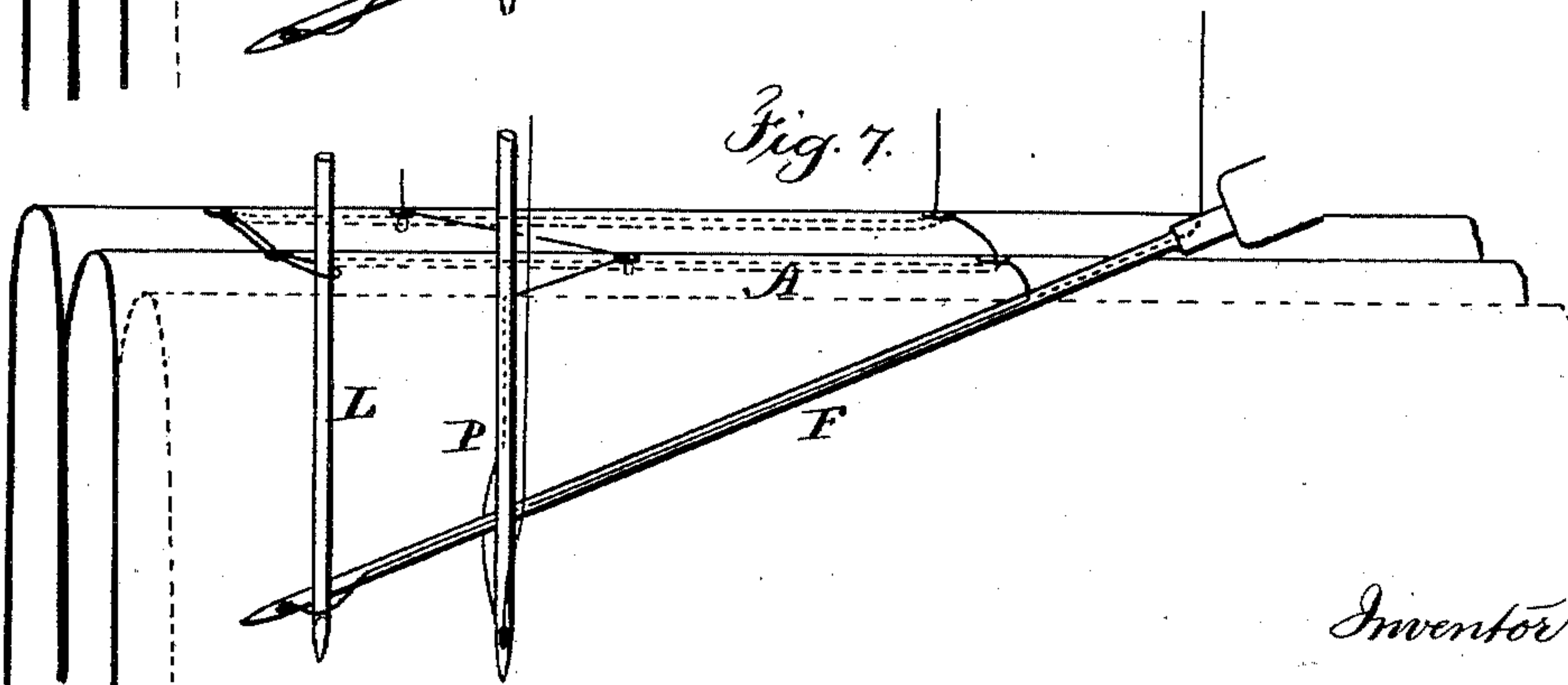
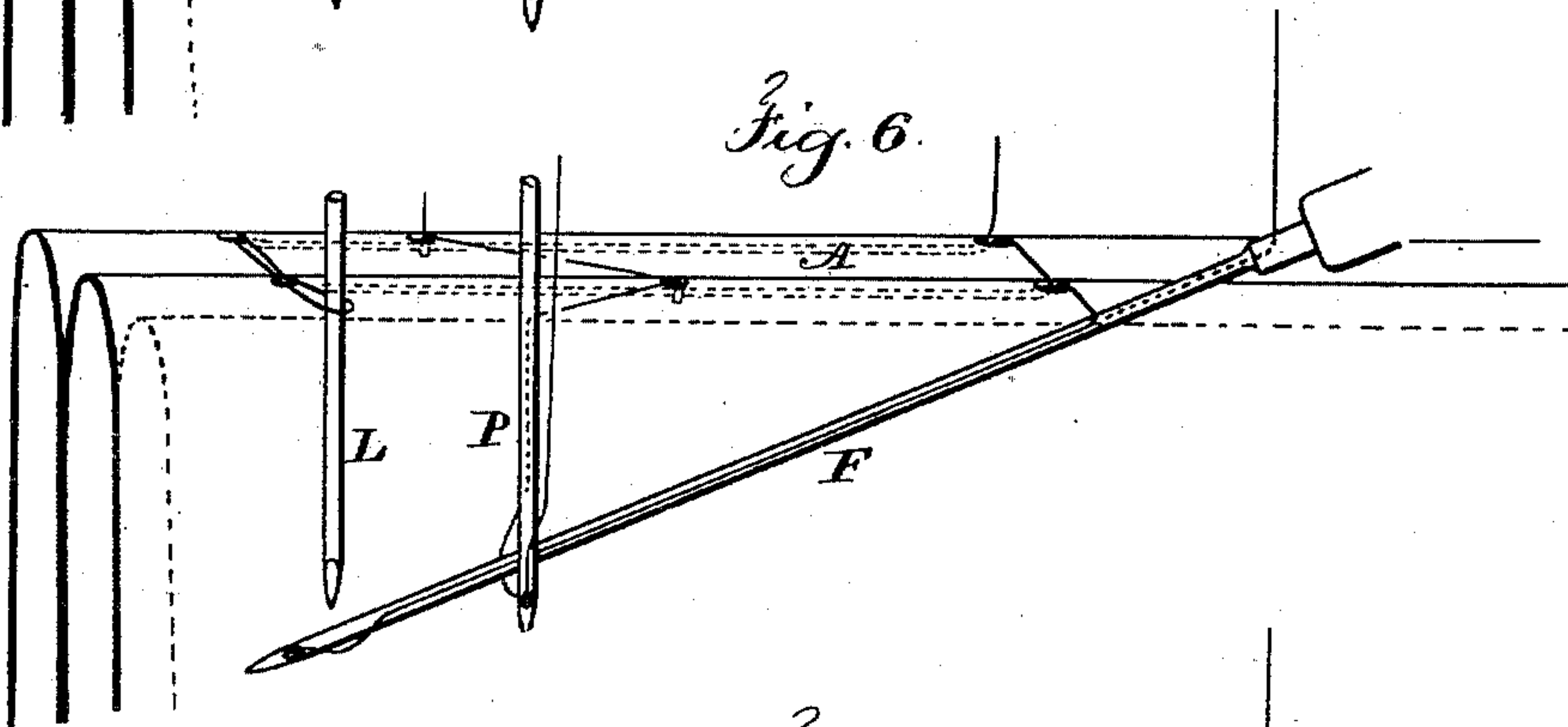
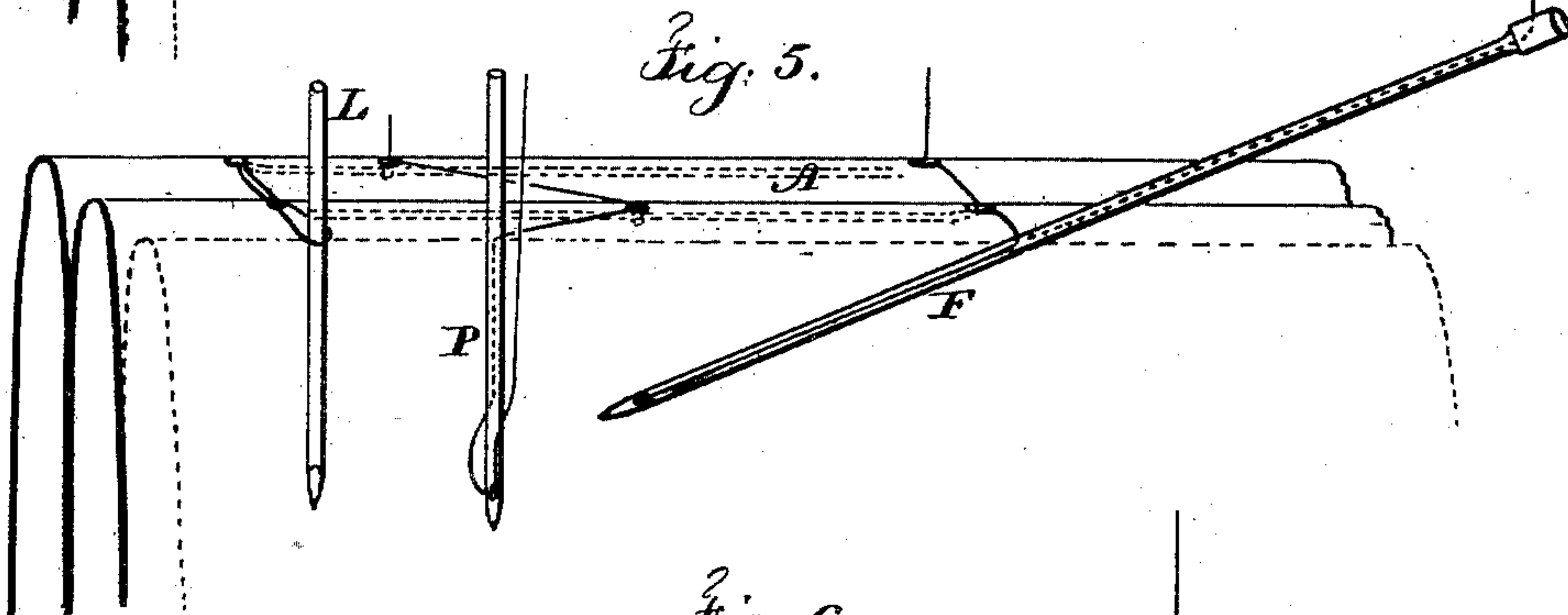
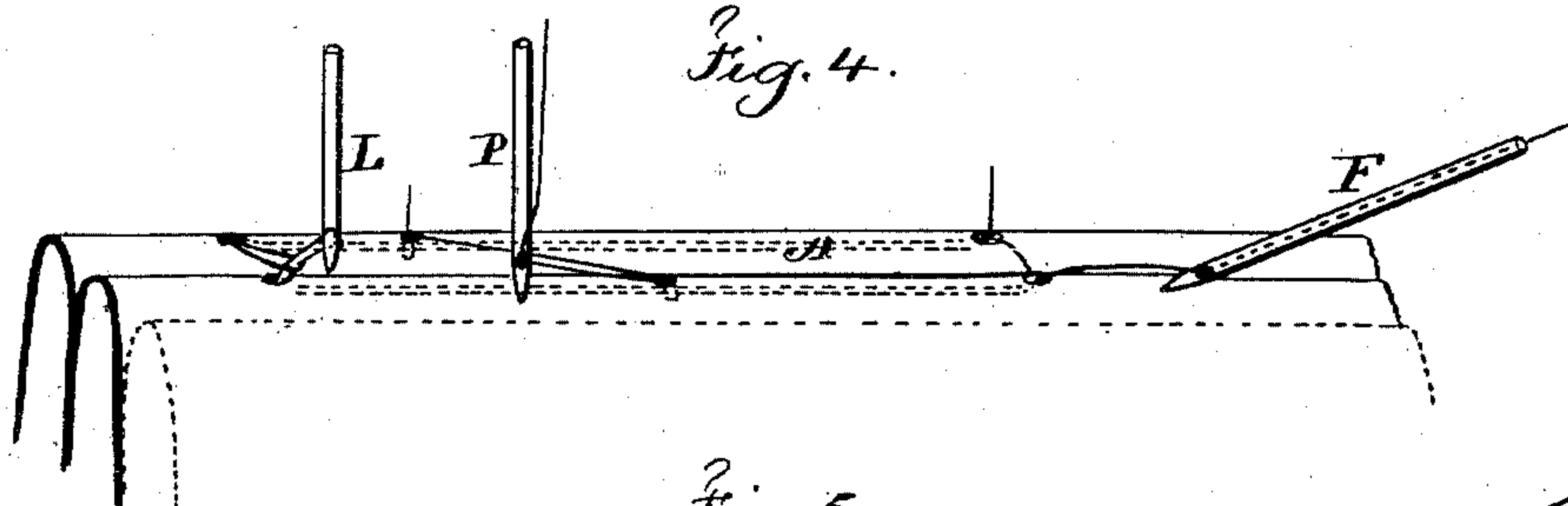
(No Model.)

3 Sheets—Sheet 3.

D. M. SMYTH.
BOOK SEWING MACHINE.

No. 468,117.

Patented Feb. 2, 1892.



Witnesses

Chas. H. Smith
J. Staib

Inventor

David M. Smyth
per Lemuel W. Serrell
[Signature]

UNITED STATES PATENT OFFICE.

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

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 468,117, dated February 2, 1892.

Application filed April 10, 1891. Serial No. 388,400. (No model.)

To all whom it may concern:

Be it known that I, DAVID McCONNELL 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 Letters Patent No. 250,990, granted December 13, 1881, to me, a machine is represented in which two needles, placed diagonally, are made use of with a looping device for sewing the signatures, and in my patent, No. 220,312, granted October 7, 1879, a book-sewing machine is represented having a sheet-holding bar or arm, over which the folded signatures are laid successively. I have combined with the aforesaid sheet-holding arm and diagonally-operating needles looping devices and eye-pointed needles forming groups of sewing devices. One thread in each group of sewing devices is carried by the eye-pointed needles directly through the folded signature. The second thread is carried diagonally by the diagonally eye-pointed needles through the loop of the first thread, and a hook seizes a loop of the second thread, drawing it out of the back of the signature and interlooping the same with the thread in the next signature; and I provide for moving the vertical eye-pointed perforating-needle from one position to another when desired for sewing across a tape or band by penetrating one signature at one edge of such tape or band and penetrating the next signature at the opposite edge of such tape or band, and I secure the moving end of the sheet-holding arm by a locking device that effectually prevents vibration and holds the sheet-holding arm in the proper relation to the sewing devices.

In the drawings, Figure 1 is an elevation of my improvements, partially diagrammatic. Fig. 2 is a sectional plan representing the needle-carriers and the devices that may be made use of in giving motion to the same, and Fig. 3 is a diagrammatic view indicating the devices that may be employed for giving motion to the respective parts. Figs. 4, 5, 6, and 7 are diagrammatic views illustrating the successive stages in the sewing operation. Fig. 8 is

a diagram illustrating the manner in which the threads are laid together, and Fig. 9 is a sectional plan showing the outer end of the sheet-holding arm and the locking devices therefor.

The vertical shaft C is provided with sheet-holding arms *e*. Usually four of these arms are made use of, and the shaft C is rotated progressively and raised and lowered as in my Patent No. 220,312, so that the sheet or signature A can be put upon one of the arms *e* and carried around and then raised up to position for receiving the sewing-threads, and then the shaft and arms are moved downwardly to bring the sheet-holding arm out of the sewed signature, and a partial rotation is then given to the vertical shaft C for bringing another signature around to position, and then it is raised for the sewing to be performed.

I remark that I have shown my improvements in the sewing devices as applied to the sheet-holding arms represented in said Patent No. 220,312; but the said improvements are available with sheet-holding arms that are moved to present the sheet properly to position by any desired mechanism. As the sheet-holding arm is swung around, the outer end thereof comes in contact with the stop B, and at the end of the sheet-holding arm is an angle-piece or finger 3, and as the sheet-holding arm is raised up such finger 3 passes behind the hanging hook 4 and between the same and the stop B. Hence as this sheet-holding arm is raised it is brought accurately to position, and I make use of a lifter D, pivoted at 5 and acted upon by a rod 6 to a suitable cam upon the driving-shaft E, which cam raises the lifter D and causes the end thereof to follow up the finger 3 and raise the sheet-holding arm fully to place and hold the same firmly during the sewing operation. This prevents looseness of the parts and insures the proper position of the sheet in relation to the needles.

The sheet-holding arm *e* is preferably made of two plates of sheet metal, so as to be hollow, and the upper surface or edge of the arm is slotted, as at 7, for the passage of the needles made use of in sewing, and these slots are to be at proper positions to accommodate

the groups of sewing devices. I have represented two groups of sewing devices; but the number may be increased, according to the size of book that is being sewed. Each group of sewing devices contains a diagonally-placed eye-pointed needle F, having a stock 8, sliding in a diagonal holder 9 upon the cross-bar G. This stock 8 and the needle carried by it are reciprocated by suitable mechanism. I prefer and use the pinion 10, meshing into teeth upon the stock 8, and the pinion 10 is driven by suitable connections to the driving-shaft of the machine.

I have represented a sliding rack-bar H with teeth gearing into a pinion 11 upon the opposite end of the short shaft passing through the cross-bar G, and where the diagonal needles are set in reverse positions, as shown in Fig. 1, the teeth upon the sliding rack-bar H, that gear into one pinion 11, may be upon the upper part of the rack-bar and those that gear into the other pinion upon the lower part of the rack-bar, as seen in Fig. 3. By this means the needles F are projected and retracted, and the sliding rack-bar H is to receive its motion from any suitable mechanism, such as a properly-shaped cam I upon the driving-shaft E, acting upon a lever K, that is connected to the end of the sliding rack-bar H, and the shape of this cam I is to be such that the diagonal needles F will be thrust through the signature at the proper time and then drawn back slightly to form loops that are to be taken by loopers herein-after described, and then the needles F are drawn back out of the signature.

Each looper L has a hook at the end and it is supported by a vertically-moving slide M, fitted in guides in the cross-bar G, and this slide M is moved up and down by any suitable mechanism—such, for instance, as a rock-shaft supported by the cross-bar G and provided with cranks 12 and 13. The pins of the cranks 12 pass into slots in the slides M, and the cranks 13 are connected by a bar 14, that receives motion at the proper time by a lever 24 and cam upon the driving-shaft E. Each looper L is upon a rod 15, that passes through the slide M, and can be turned therein, and there are collars or similar devices upon this looper-rod 15 by which end motion of the rod 15 in the slide itself is prevented, and there is a standard N, with a cam-slot, to take the pin 16 on the looper-rod 15 for giving to the looper-rod and looper a partial rotation to shed one loop off the looper as the looper completes its upward movement, such looper retaining the last loop taken by its hook from the needle F. The slide M is recessed for the reception of the bar O, that carries the eye-pointed needle P, and there is a horizontal slot or similar device in the slide M for the reception of a block 17 upon the needle-bar O for giving to this needle-bar O an up-and-down movement corresponding to that given to the looper L by such slide M, and there is a horizontal bar Q upon the face

of the cross-bar G, which bar Q is notched for the needle-bar O to pass freely in the same as the slide M is raised and lowered and the needle-bar carried with it, and this horizontal bar Q may occupy a fixed position, or it may be moved endwise between one stitch and the next to carry the needle-bar and eye-pointed needle P from one position to the other, for the purposes hereinafter stated, and this horizontal bar Q may receive its motion from any suitable device—such as a cam—that is rotated once for each two complete movements of the diagonal sewing-needles. It is now to be understood that the parts are so timed that after a folded sheet or signature has been brought up to position for being sewed the needles F are thrust through the fold of the signature and carry with them threads from the spools 18 and 21. During this operation the eye-pointed needles P and loopers L have been thrust down through the fold of the signature and the needles P pass to their extreme downward position and rise slightly to throw out loops of thread adjacent to their eyes, and the slide M stands still, while the diagonal needles F are completely projected, and in so doing such diagonal needles pass through the loops of thread from the spools 19 and 20, that are carried down by the eye-pointed needles P. In consequence of the diagonal positions of the needles F they pass below the points of the loopers L, and such needles F draw back slightly to throw out loops of thread, and then the slides M are again moved downwardly for the loopers L to pass through such loops of thread, and as they rise their hooks take the threads from 18 and 21 and draw the same up from the eye-pointed needles F, and it is to be understood that the loops of thread from the previously-sewed signature are around the upper parts of the loopers L and the fresh loops of thread are drawn up by the hooks of the loopers, and in the extreme upward movement the loopers receive a partial rotation by the stationary cams and pins 16 in order that the previous loops may not be caught by the hooks, but be cast off around the fresh loops of thread held by the hooks of the loopers. During these movements the diagonal needles F have been drawn back out of the signature and the thread sufficiently tightened by any suitable take-up mechanism for drawing the thread in the previously-sewed signature tight, and the parts are in position for sewing another signature as soon as presented to the same. If the eye-pointed needles P remain in a uniform position, each line of sewing will be composed of a double thread laid in by the needle F, which double thread passes through a loop of thread from the needle P, and the double threads laid in by the needle F are looped one over the other across the back of the book by the looper L, as at 24, Fig. 8, and they pass in and out of the signatures at the place where such needle F penetrates the signatures. If the eye-pointed needles P are moved between the sew-

ing of one signature and the sewing of the next by the horizontal bar Q, then the thread carried by such eye-pointed needle from the spool 19 or 20 will be laced across the tape or strip 28 at the back of the book, as at 27, Fig. 8, the penetration in one signature being at one edge of such tape or strip and in the next signature at the other edge of such tape or strip. I have represented the needle-bars O and eye-pointed needles P as adapted to be moved by the needle-bar from one position to the other. The thread from one of the spools to the needle P may pass straight across the book-back and the loops be U-shaped, as seen at 29, Fig. 8; but if the needle F passes at the opposite side of the needle P from that shown in Figs. 6 and 7 the thread laid by such needle P will be looped around the threads from the needle F, as illustrated at 30, Fig. 8.

In Figs. 4 to 7 the sheet or signature to be sewed is indicated by dotted lines, the needles and threads being in full lines. In Fig. 4 the parts are represented in the position for commencing the sewing operation. In Fig. 5 the needles and looper are shown as having passed into the signature and ready for the needle F to pass through the loop of thread from the needle P. In Fig. 6 the needle F has passed through the loop of thread from the needle P and partly drawn back. In Fig. 7 the looper L is shown as having passed through the loop of thread from F, ready to draw up the same, and the needles F and P are withdrawn to complete the sewing operation.

I claim as my invention—

1. The combination, with the diagonally-reciprocating eye-pointed needle and the sheet-holding arm, of a reciprocating looper that passes through the fold of the signature and takes the thread from the diagonal needle, and a vertically-reciprocating eye-pointed

needle also passing through the fold of the signature and carrying a thread, through a loop of which thread the diagonal needle passes, substantially as set forth.

2. The combination, with a sheet-holding arm and means for moving the same, of an angle-piece at the end of the sheet-holding arm, a hanging hook behind which the finger is passed, and a lifter for raising and holding the arm, substantially as set forth.

3. The combination, with diagonally-reciprocating eye-pointed needles and mechanism for moving the same, of loopers and vertically-reciprocating eye-pointed needles and mechanism for reciprocating the same to cause the loopers and vertical needles to penetrate the signature and perform the sewing, and mechanism, substantially as specified, for moving the vertically-reciprocating needles and their bars from one position to another between the sewing of one signature and the next, substantially as specified.

4. The combination, with the diagonally-reciprocating eye-pointed needle, of a vertically-reciprocating looper passing through the fold of the signature and drawing up and looping the thread and a vertically-reciprocating eye-pointed needle carrying a thread through the fold of the signature, the said diagonally-reciprocating needle being provided with means for passing the said needle through the loop of thread carried by the vertically-reciprocating eye-pointed needle, a slide carrying the looper-bar and the bar for the vertically-reciprocating eye-pointed needle, and mechanism for moving said slide, substantially as set forth.

Signed by me this 16th day of March, 1891.
DAVID McCONNELL SMYTH.

Witnesses:

JOS. E. SMYTH,
E. J. CANFIELD.