

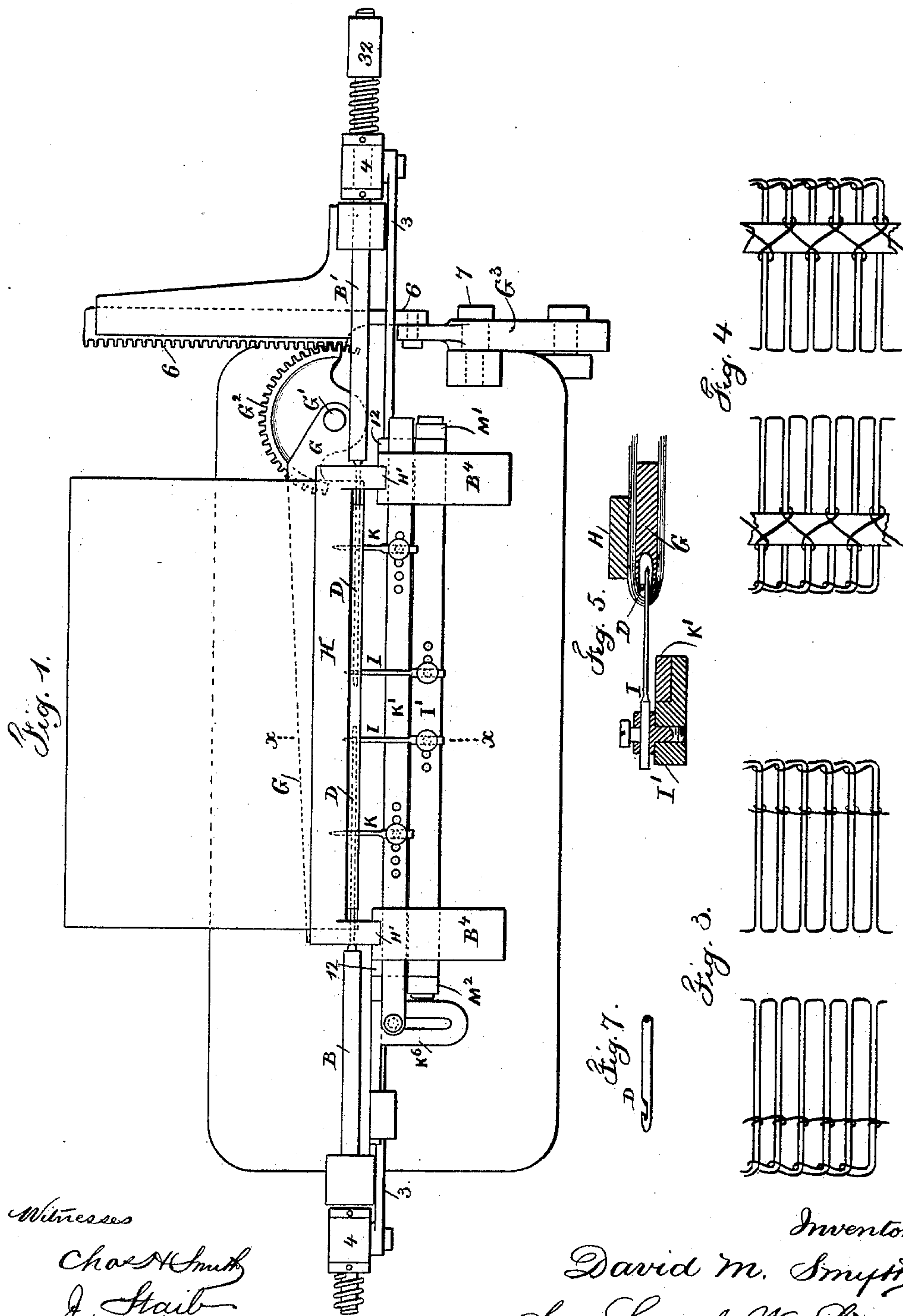
(No Model.)

3 Sheets—Sheet 1.

D. M. SMYTH.
BOOK SEWING MACHINE.

No. 435,616.

Patented Sept. 2, 1890.



Witnesses
Chas. H. Smith
J. Staib

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

(No Model.)

3 Sheets—Sheet 2.

D. M. SMYTH.
BOOK SEWING MACHINE.

No. 435,616.

Patented Sept. 2, 1890.

Fig. 2.

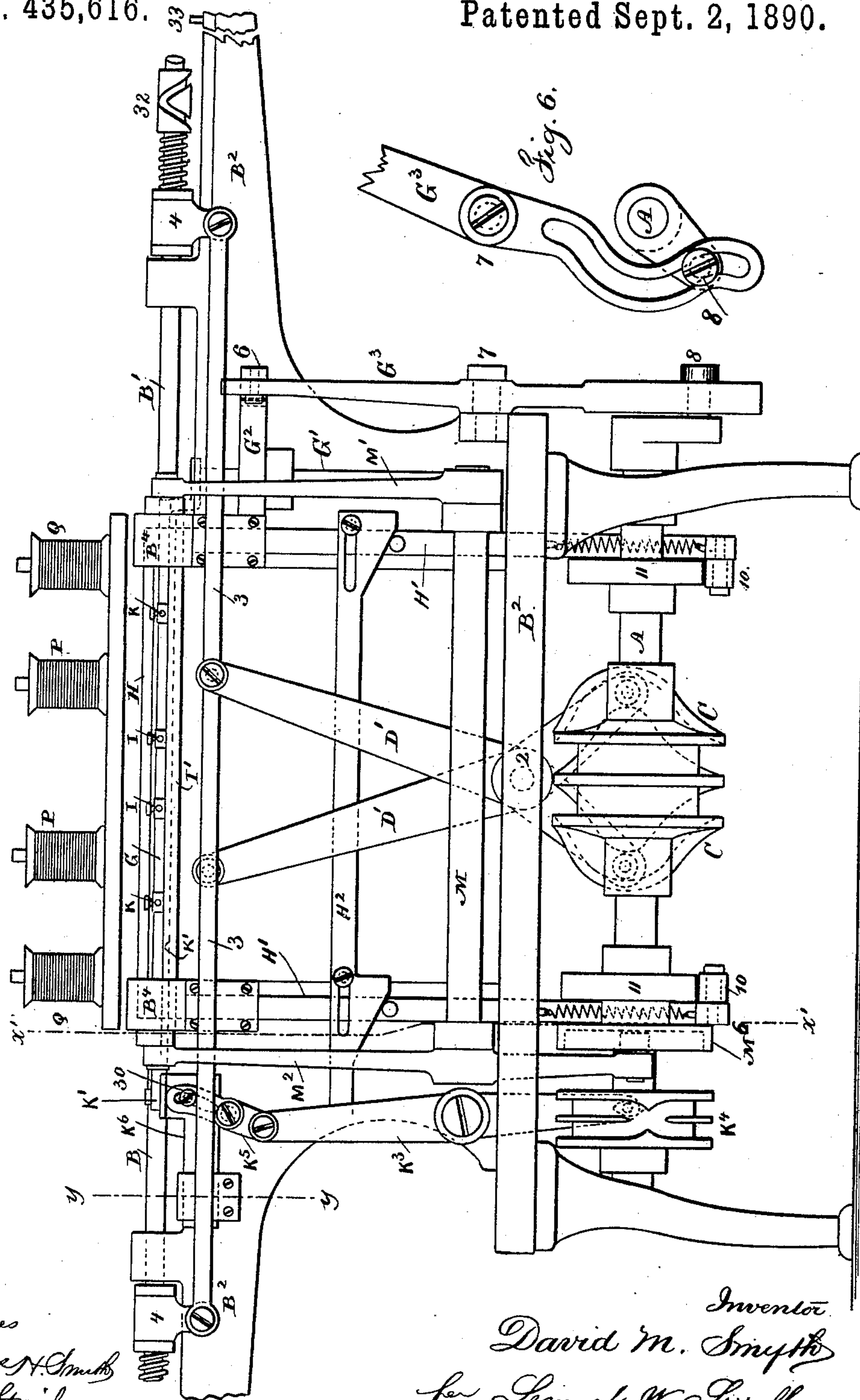
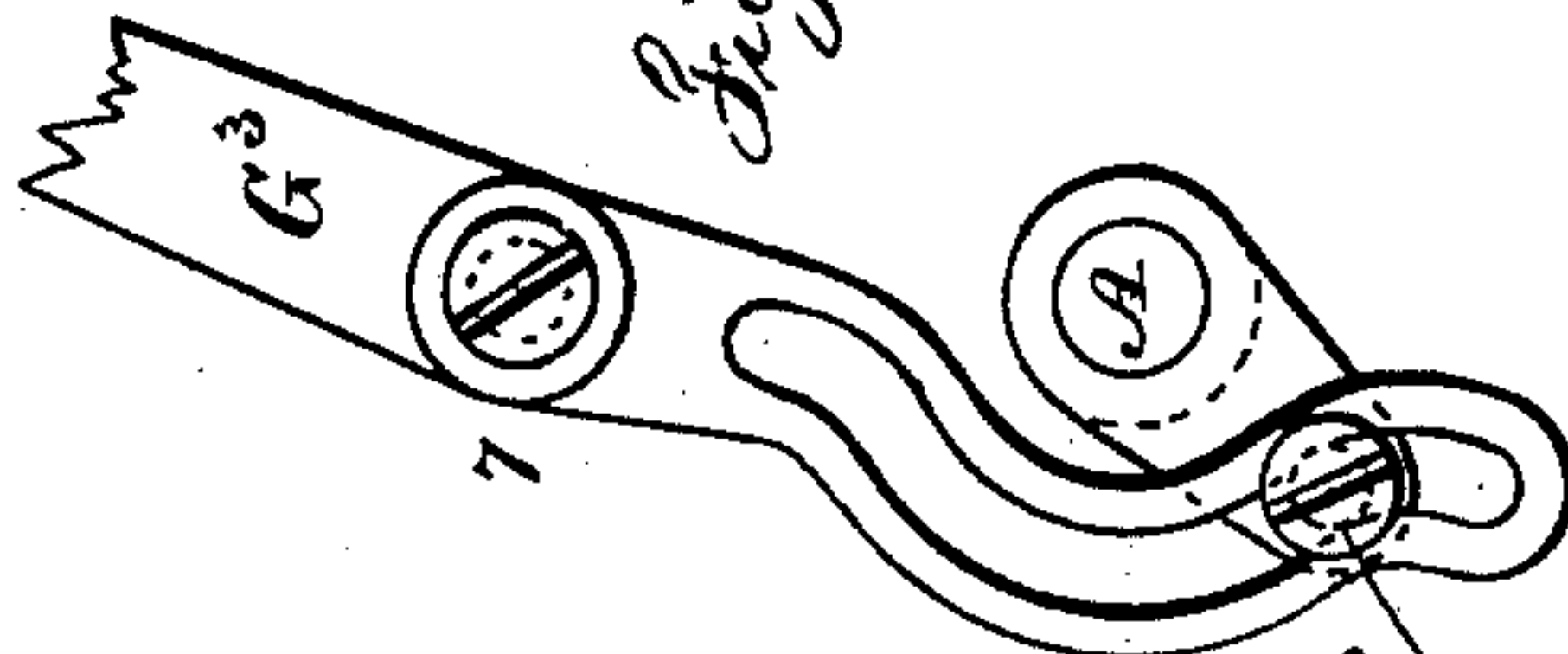


Fig. 6.



Witnesses
Chas. H. Smith
J. Staib

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

(No Model.)

3 Sheets—Sheet 3.

D. M. SMYTH.
BOOK SEWING MACHINE.

No. 435,616.

Patented Sept. 2, 1890.

Fig. 11.

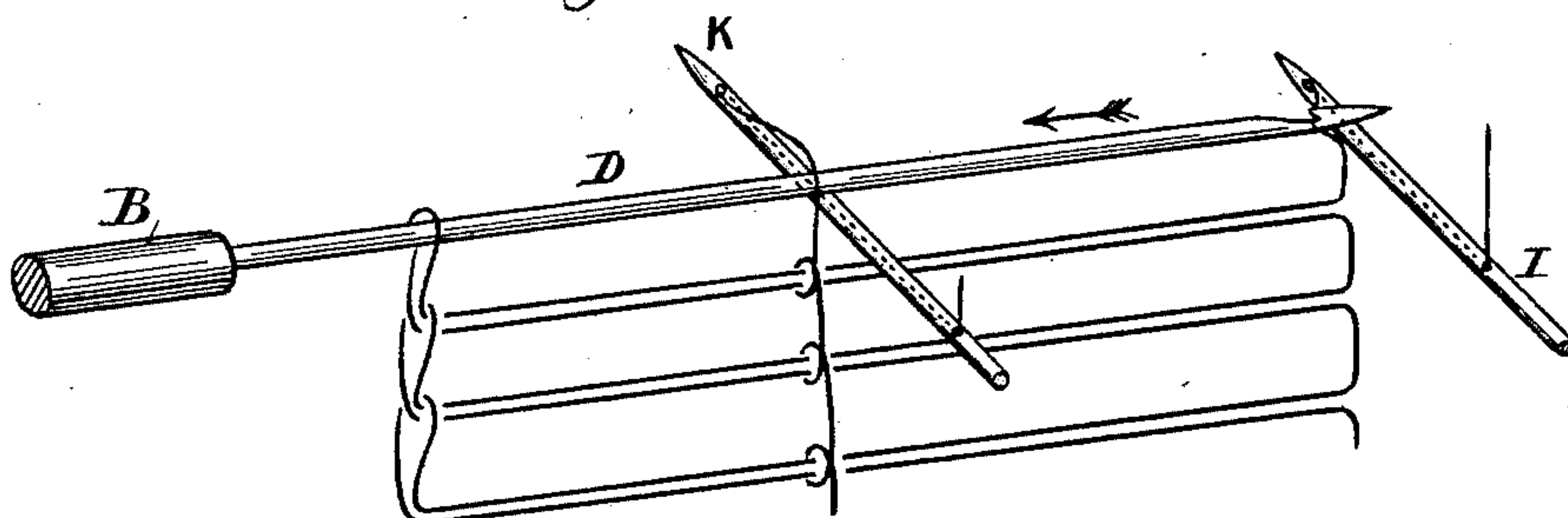


Fig. 12.

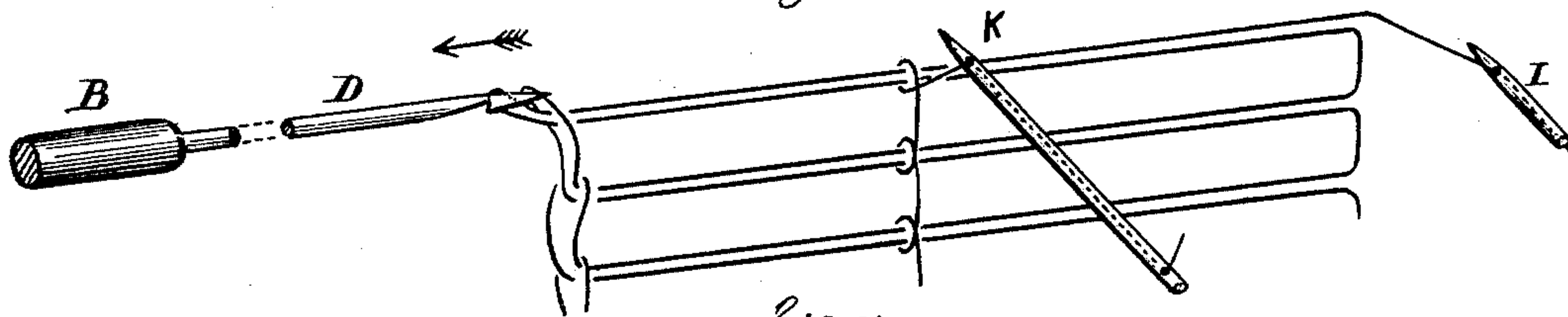


Fig. 10.

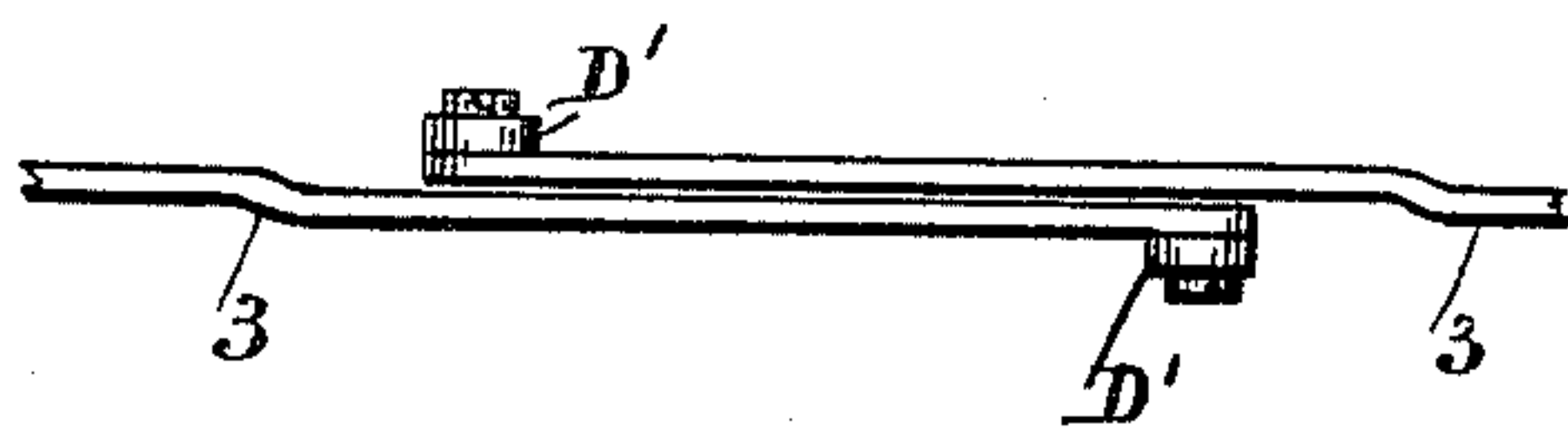
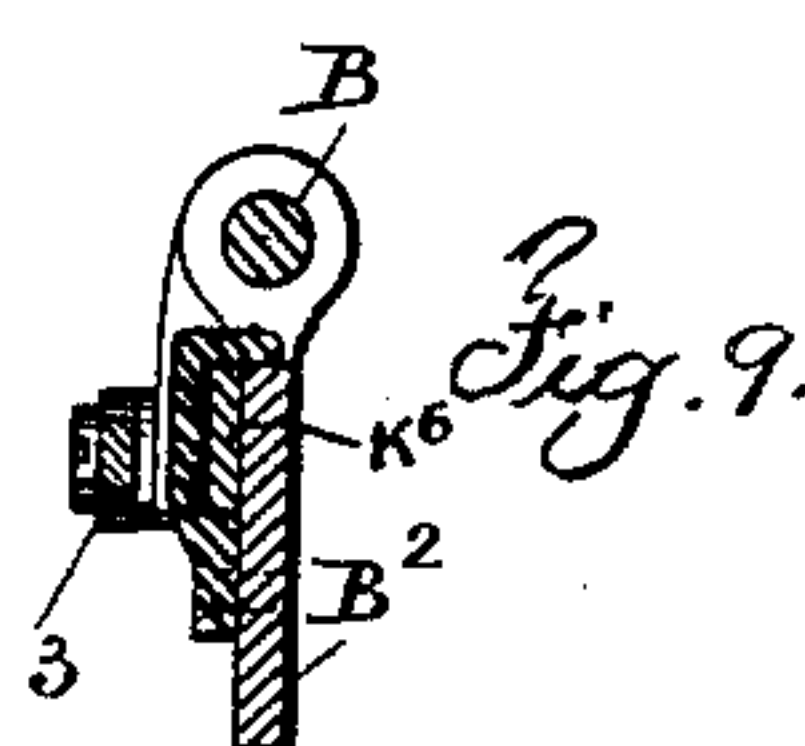
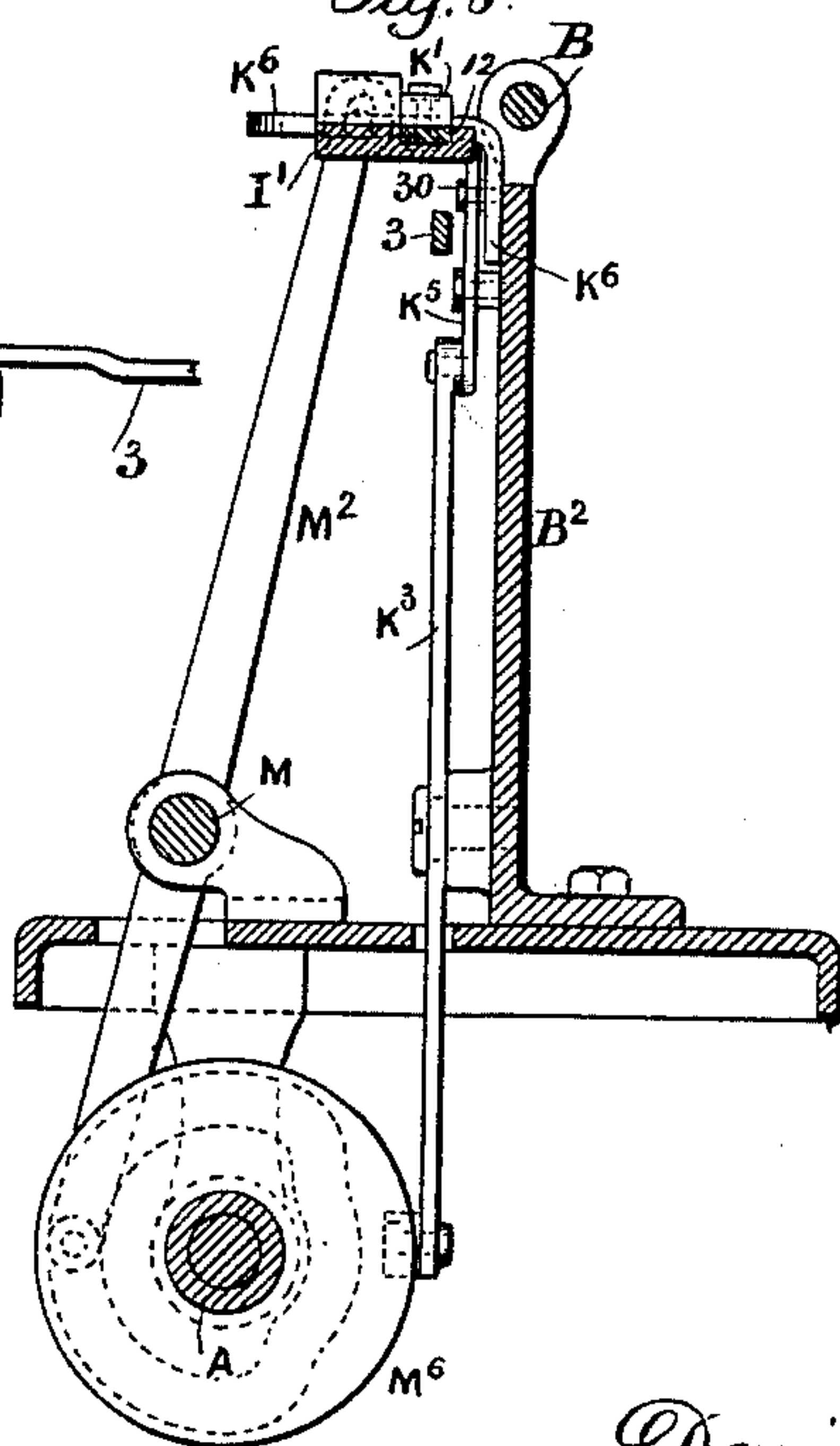


Fig. 8.



Witnesses

Chas. H. Smith
J. Staib.

Inventor

David M. Smyth.

By his Attorney

Lemuel W. Senell

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. 435,616, dated September 2, 1890.

Application filed November 9, 1888. Serial No. 290,366. (No model.)

To all whom it may concern:

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

In Letters Patent No. 378,984, granted to me March 6, 1888, a machine is represented for sewing books. My present invention is
10 an improvement upon the same. In the said patent the back of the book or of the signatures to be set together to form such book has to be notched by saw-cuts in order to allow the reciprocating needles to pass into the sig-
15 natures and for the threads to be introduced that are drawn into such signatures by the hooks of the needles. In my present invention I make use of perforating-needles that are passed into the signatures at the back
20 folds of the same, and such needles carry with them the threads that are taken by the longitudinally-reciprocating hooked needles of my said patent, and there are also other threads introduced by the needles, through
25 loops of which threads said reciprocating needles pass, thereby locking the threads together and firmly sewing the book.

In the drawings, Figure 1 is a plan view of those portions of my machine containing the
30 present improvements. Fig. 2 is an elevation of the same, and Figs. 3 and 4 are diagrams illustrating the direction in which the threads are interlooped in performing the sewing. Fig. 5 is a cross-section in larger size of the
35 needle-bar and presser-bar at the line $x x$, Fig. 1; and Fig. 6 is a partial elevation of the lever for moving the sheet-holding arm. Fig. 7 is an elevation in larger size of a portion of one of the hook-pointed needles. Fig. 8 is a
40 section vertically at the line $x' x'$, Fig. 2. Fig. 9 is a section at the line $y y$, Fig. 2. Fig. 10 is a detached plan view of portions of the rods 3 and levers D' , and Figs. 11 and 12 are diagrammatic views illustrating the manner in
45 which the needles perform the sewing.

I make use of the horizontal shaft A, to which the power is applied, and said shaft is supported in the lower parts of the frame B^2 of the machine. Upon this shaft A are the cams C,
50 the grooves of which are properly shaped to

give motion to the levers D' and D' upon the fulcrum 2, and at the upper ends these levers $D' D'$ are connected by the bars 3 to the collars 4 upon the needle-bars $B B'$, respectively. These needle-bars $B B'$ are similar to
55 those in my aforesaid patent, No. 378,984, and the needles D, carried by the same, are made with hooks near the points, and they receive the reciprocating movement, as fully described in said patent, and pass into the fold of the
60 signature, there being incisions or saw-cuts near the top and bottom back edge of the signature through which such needles pass, and when the needles are fully projected into the fold of the signature they receive the loops
65 of thread, as hereinafter described; but when the needles are withdrawn and the hooks pass outside of the cuts in the signature such needles receive a partial rotary movement to clear the loop of thread from the hook,
70 and then the needles pass on through the loops of thread into the next signature to draw out the second loops of thread through the loops of thread of the first signature and interloop the same, as in the aforesaid pat-
75 ent. I make use of the swinging sheet-holding arm G similar to that in the aforesaid patent, except in the particulars hereinafter named. Said sheet-holding arm G is upon a
80 vertical shaft G' , that is provided with a segmental gear G^2 , and there is a lever G^3 , connected to a rack 6 near the upper end, gearing into the teeth of the gear-segment G^2 , and this lever G^3 is on the pivot 7, and the lower
85 end thereof is slotted, as seen in Fig. 6, for the reception of the crank-pin 8 upon the shaft A. The shape of the slot in the lever G^3 is such that while the crank-pin 8 is moving through the central portion of the slot the lever remains stationary, because such
90 slot has at this part an arc of a circle corresponding to the radius of the crank, and the parts are placed so that the crank-pin 8 is in the curved portion of the slot, while the sheet-holding arm is in position for the sewing to
95 be performed, after which the crank-pin moves the arm out of the sewed sheet and then returns the same rapidly into the next signature, which has been laid by the attendant upon the top of the previously-sewed sig-
100

nature, and the arm G carries such signature properly into place beneath the presser-bar H. The sheets as they are sewed to form the book are to be laid in succession upon a suitable table—such, for instance, as that shown in my patent, No. 378,985, granted March 6, 1888—and this table is to descend as the signatures accumulate in the sewing of the book. This presser-bar H is provided with vertical guide-bars H', sliding in the frame and having rollers 10 at their lower ends, and there are cams 11 upon the shaft A, that act upon such rollers 10, bars H', and presser-bar H at the proper time to force down the sewed signatures, and then the presser-bar is raised by the action of suitable springs for the next signature to be inserted beneath it, and the upward movement is limited by the adjustable wedge-bar H², against which pins upon the bars H' come into contact in the upward movement.

Instead of providing saw-cuts in the back of the book corresponding in number to the longitudinal threads and cross-threads made use of in sewing, I provide two sets of needles. One set I supply threads to the hooked needles D and the other set K supply threads that cross the back of the book and are inter-looped with the threads that are drawn in from I by the needles D. I have shown two needles K; but the number may be increased to any desired extent.

Upon the frame B² are the horizontal slide-ways B⁴, into which are received the bars K' and I', and the bar K' rests upon and is received into the notched ends 12 of the bar I', so that these bars K' and I' and the sets of needles I and K can be reciprocated laterally of the bars to carry the needles endwise into the back folded edge of the signature, and the bar K' can be reciprocated endwise, if desired, for a purpose hereinafter stated.

Any suitable means may be employed for reciprocating the bars I' and K' laterally; but I have shown the rock-shaft M and levers M' and M², the upper ends of which are slightly slotted and receive screws that connect them to the ends of the bar I', and the lever M² is extended downwardly, and it is acted upon by the cam M⁶ upon the shaft A, so as to give the bars I' and K' a lateral reciprocation at the proper time.

There are spools P P for supplying threads to the needles I and spools Q Q for supplying threads to the needles K, and upon reference to Fig. 1 it will be seen that the needles K pass into the signature to a greater depth than the needles I. The sheet-holding arm G is grooved upon its edge for the passage of the needles D. It is also grooved or recessed transversely for the needles K and I to pass in, and this grooving is sufficiently deep to allow for the loops of thread to be thrown out from the respective needles I and K, the shape of the cam M⁶ being such as to draw back the bars I' and K' slightly after they have been projected laterally to the full

extent. From this description it will be apparent that the needles K are to carry threads from the spools Q into the folded back edge of the signature, and then the loops of thread are thrown out by a slight withdrawal of the needles, so that the longitudinally-moving needles D pass through the loops of thread from both the needles K and I, and the hooks upon the needles D seize the threads from the needles I and draw the same from said needles and through the loops of thread from the needles K and pull the loops to the top and bottom saw-cuts of the signature, and then such needles D pass through such loops into the next folded signature, as described in my aforesaid patent, for performing the sewing. As soon as the needles D are withdrawn, or nearly so, the bars I' and K' are moved laterally to withdraw the needles I and K from the signature, and it will be seen that in consequence of the needles K penetrating farther than the needles I a lateral motion can be commenced to be given to the bars I' and K' before the needles D are fully withdrawn.

It is preferable to provide slots or ranges of holes in the bars I' and K' for receiving the clamping-screws for the respective needles I and K, so that the positions of the needles I may be varied, if necessary, to suit the size of book that is being sewed, and the numbers and positions of the needles K can also be varied to introduce two or more cross-threads at the backs of the signatures.

Upon reference to the diagrams Figs. 3, 11, and 12 it will be seen that the threads supplied by the needles K are convoluted, so as to pass around the loops of threads that are drawn off from the needles I. This is accomplished by the needles K passing in below the needles D, so that the loops of thread from such needles K being thrown upwardly allow the needles D to pass through them, and the needles K as they are withdrawn leave the convoluted threads around the threads from the needles I and pass forward again into the folded back edge of the next signature that is laid upon the pile after the presser-bar H has been forced down and raised up again.

In many instances it is desirable to introduce a strip of parchment, a tape, or a heavy cord at the back of the book. With this object in view the bar K' can be moved endwise within the supports upon the bar I'. This end motion is given by any convenient means. I have, however, shown a lever K³, acted upon by the double-grooved cams K⁴ upon the shaft A, there being a traveler or switch pivoted at the lower end of the lever K³, which switch crosses over from one peripheral groove to the other, so that the lever K³ remains in one position during one rotation of the shaft A and in another position during the next revolution of the shaft A, and this lever K³ is connected at its upper end either directly to the bar K' or immediately through the short lever K⁵ with the sliding bracket-piece

K⁶, the upper portion of which is slotted for the pin upon the bar K', so that this bar K' and the bar I' can be moved laterally, as before described, and at one stitch the needles 5 K will penetrate the signature in one position, and after being withdrawn the bar K will be moved endwise to the desired extent, so that the next penetration of the needles K will be at a slight distance from the previous penetration, and this distance can be regulated by 10 shifting the pin 30 in the slot of the lever K⁵, so that the threads from the needles K can be made to pass across the cord or strip of parchment, or a tape passing vertically and 15 across the back of the book, whereby the threads in the sewing of the book will be interlooped or convoluted, as illustrated in the diagram Fig. 4, and will also hold the strips or cords firmly to the back of the book.

20 Upon reference to Fig. 12 it will be seen that the loop of thread from the needle I is drawn into the upper signature and through the loop of thread from the signature next below, and this latter loop is cast off by the 25 needle drawing out of it, and the needle D receives a partial rotation at this time to prevent the hook catching the loop that is to be thrown off. This partial rotation of the needle may be effected by any suitable means.

30 I have shown in Fig. 2 an inclined cam-groove at 32 on the end of the stock B' to run upon the stationary pin 33 on the frame B² to give this turning motion to the needle-stock and needle at the end of the outward stroke. The 35 top and bottom parts of the signature at the back fold will usually be bent downward at the end saw-cuts or incisions, as set forth in my patent, No. 378,984, in order that the loops of thread may not extend to the edges of the 40 signature that are usually trimmed off. It will be evident that the sewing can be performed by the needles D I whether the needles K are used or not, as the thread from the needle I passes out of one signature into the 45 next, and the loops also connect such threads across the back of the book.

I claim as my invention—

1. The combination, with the sheet-holding arm or bar and the hook-needles D and mechanism for reciprocating the same, of the needles I, for supplying threads to be taken by the hooked needles D, the bar I', for support-

ing the needles I, and mechanism, substantially as specified, for moving the bar I' and giving to the needles I an endwise movement 55 to cause them to penetrate the folded back of the signatures, substantially as set forth.

2. The combination, with the sheet-holding arm and the endwise-moving needles D, passing into the fold of the signature, of the needles I, for supplying thread, mechanism for 60 moving the same to cause them to penetrate the fold of the signature, and the needles K and means for reciprocating the same, for supplying loops of thread through which the 65 threads are drawn by the needles D, substantially as set forth.

3. The combination, with the sheet-holding arm and the thread-supplying needles I and means for moving the same, of the needles D 70 and mechanism for moving the same endwise and carrying threads along the fold of the signature and the thread-carrying needles K and mechanism for moving the same to cause them to penetrate the folded back edge of 75 one signature at one place and the next signature at a different place and lay threads across the tapes or cords, substantially as set forth.

4. The combination, with the sheet-holding 80 arm and the needles D, of the needles I and needle-bar I', the needles K, bar K', supported on and moved laterally by the bar I, the slotted support B⁴ for the bars I' K', and mechanism, substantially as specified, for giving 85 to the bars I' K' a lateral motion and to the bar K' an end motion, substantially as set forth.

5. In a book-sewing machine, the combination, with the sheet-holding arm and needles 90 D, that lay doubled threads along in the folded signatures, of needles K, that lay loops of thread in the path of the needles D, so that the longitudinal threads may be passed through such loops, and means for giving motion to the needles and looping the longitudinal 95 threads, where they pass from one signature to the next, substantially as specified.

Signed by me this 23d day of October, 1888.

DAVID M. SMYTH.

Witnesses:

HENRY KNOWLTON,
OLIVE J. TILTON.