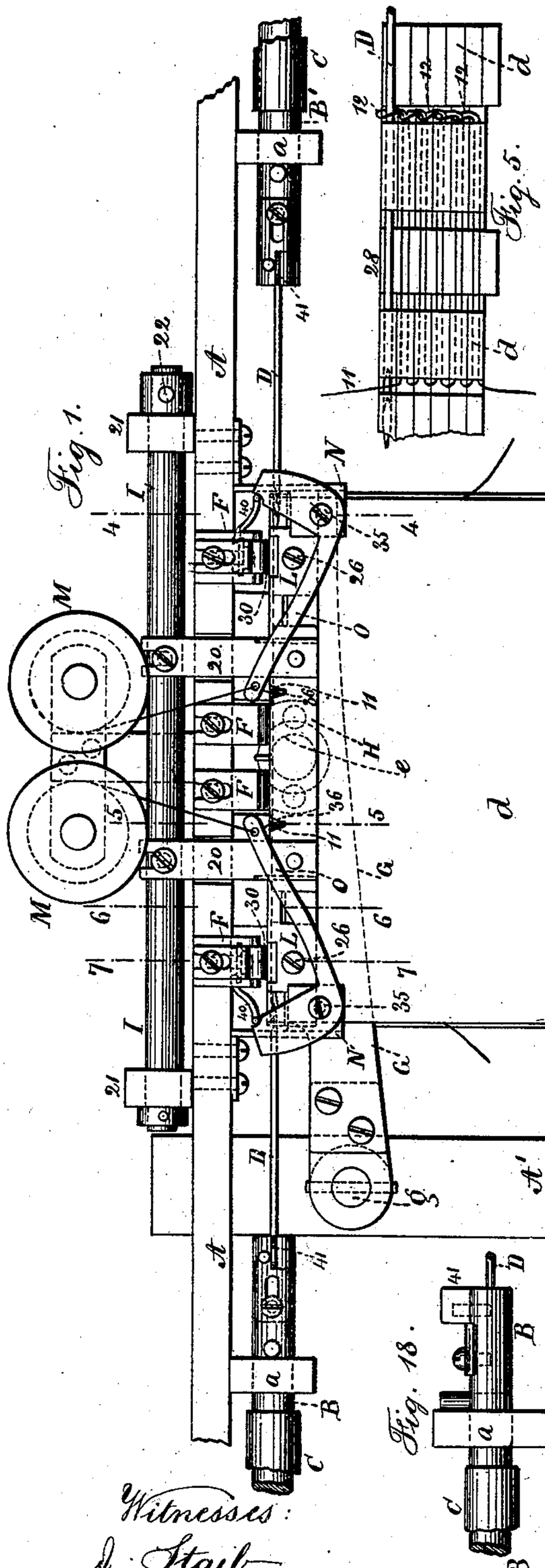
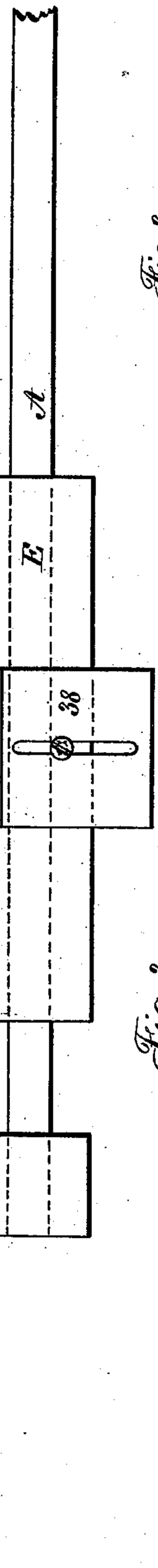
(No Model.) 2 Sheets—Sheet 1.

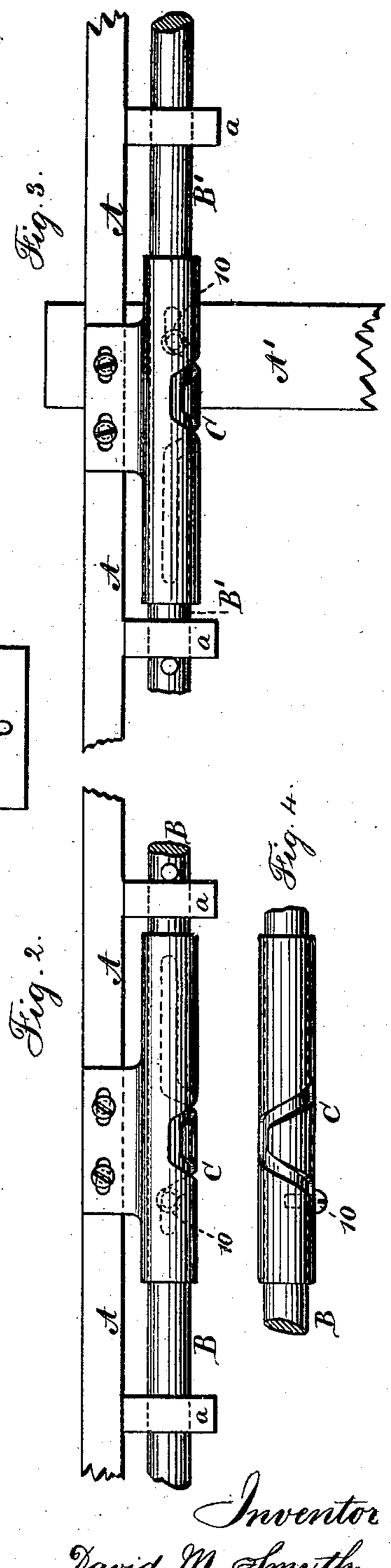
D. McC. SMYTH.

BOOK SEWING MACHINE.

No. 378,984. Patented Mar. 6, 1888.







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Inventor:
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per Samuel W. Serrell atty

(No Model.) 2 Sheets—Sheet 2.

D. McC. SMYTH.

BOOK SEWING MACHINE.

No. 378,984. Patented Mar. 6, 1888.

Fig. 6.

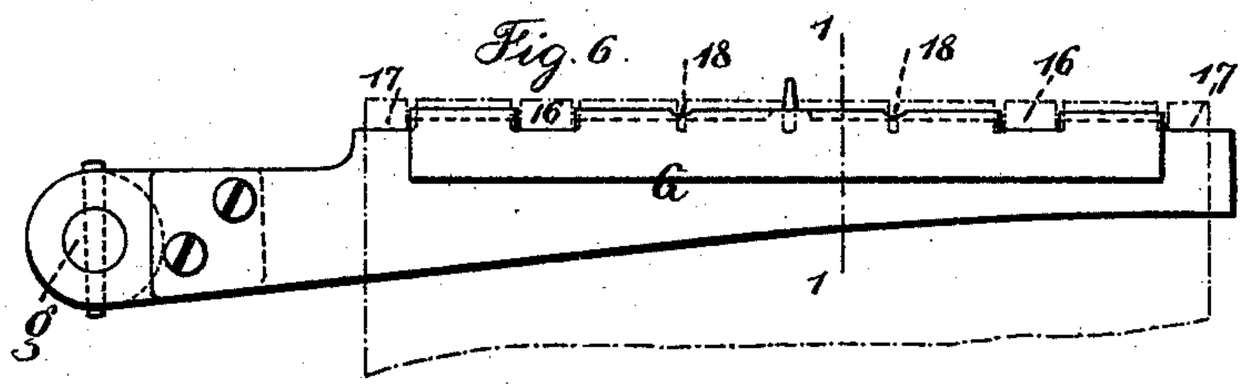


Fig. 7.

Fig. 16.

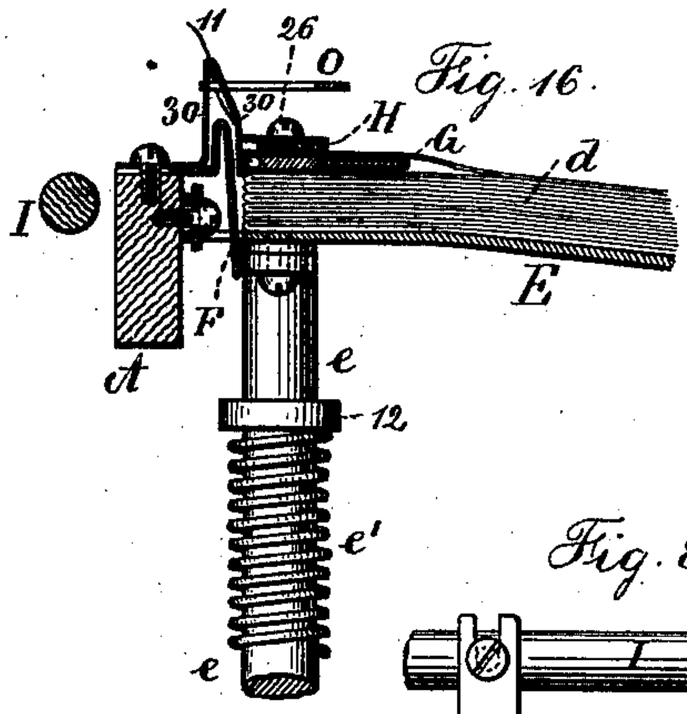


Fig. 17.

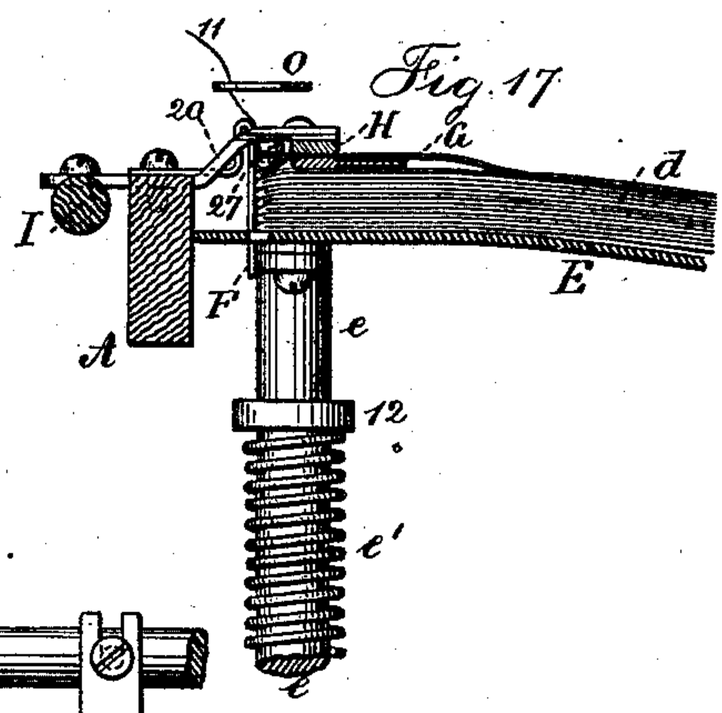


Fig. 8.

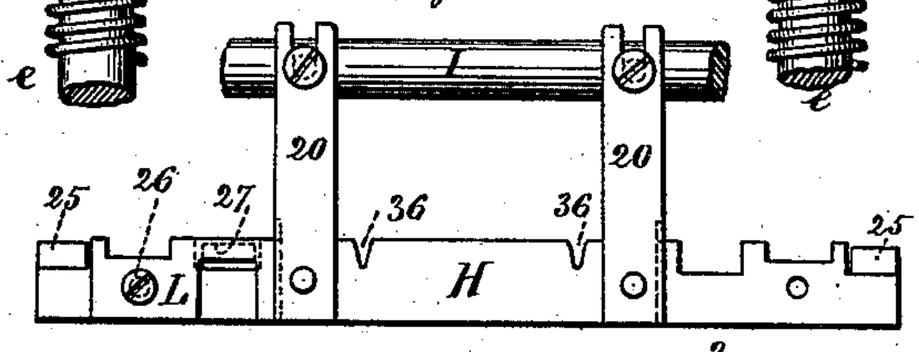


Fig. 11.

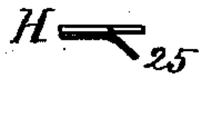


Fig. 10.

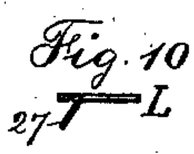


Fig. 9.

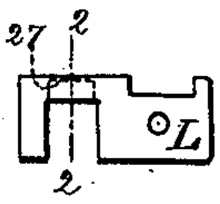


Fig. 15.

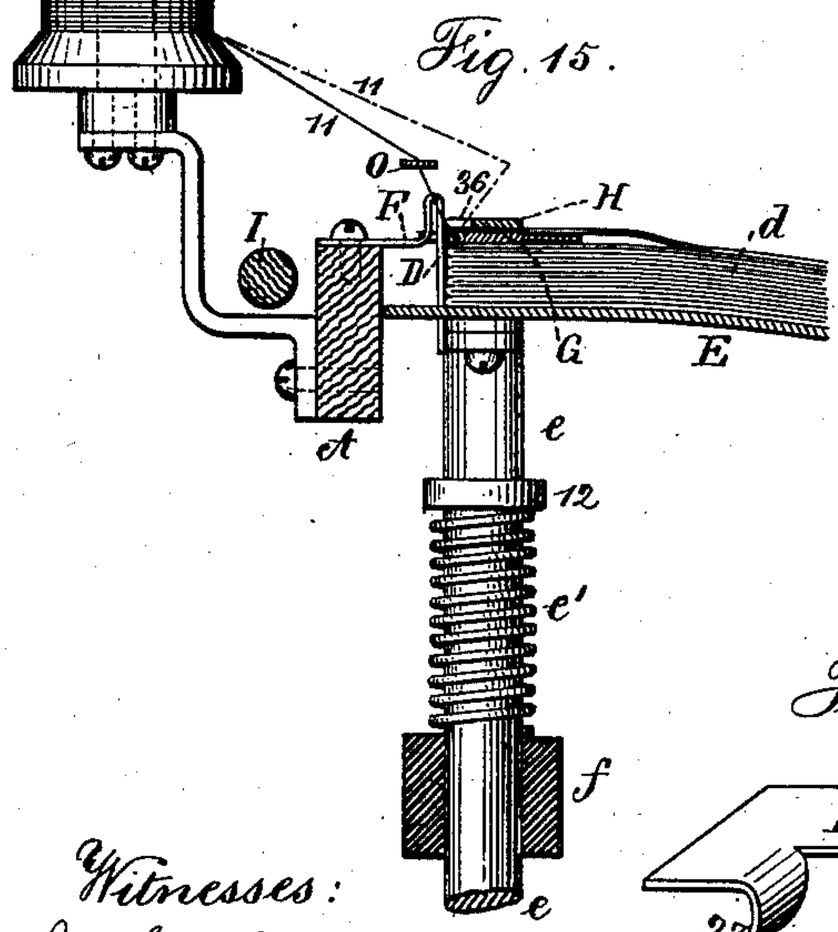


Fig. 14.

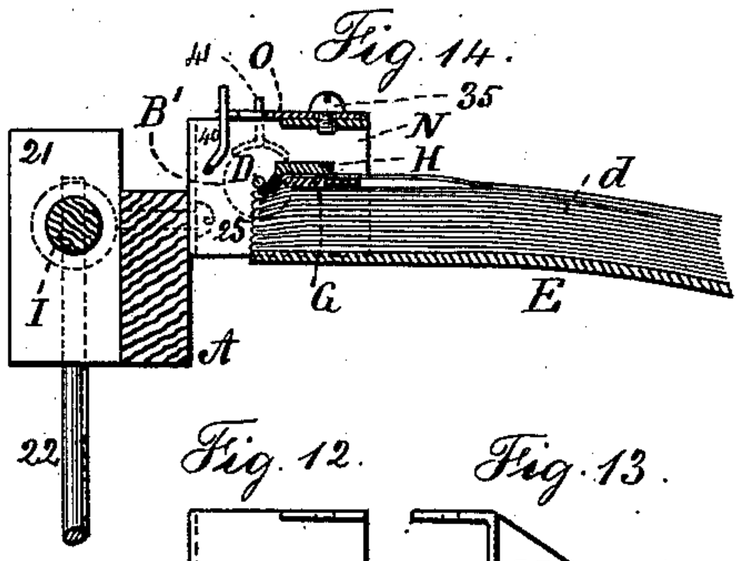


Fig. 12.

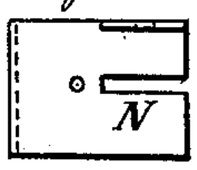


Fig. 13.

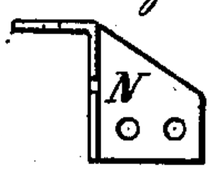
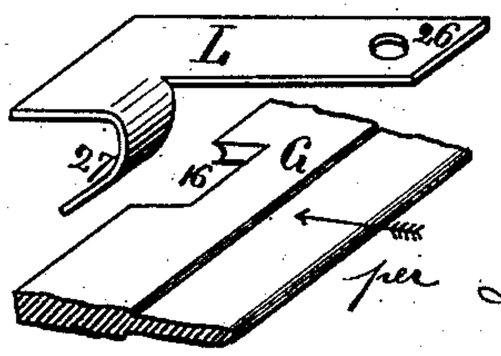


Fig. 19.



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Inventor:
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UNITED STATES PATENT OFFICE.

DAVID McCONNELL SMYTH, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE SMYTH MANUFACTURING COMPANY, OF SAME PLACE.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 378,984, dated March 6, 1888.

Application filed August 27, 1887. Serial No. 248,003. (No model.)

To all whom it may concern:

Be it known that I, DAVID MCCONNELL SMYTH, of Hartford, in the county of Hartford and State of Connecticut, have invented an Improvement in Book-Sewing Machines, of which the following is a specification.

The object of this invention is to sew the folded sheets or signatures by loops of thread drawn into such signatures by a needle having a looping-hook near the point, such looping-needle passing into the folded back edge of the signature in a manner similar to that illustrated in Letters Patent No. 184,989, granted December 5, 1876; but in the present instance a shuttle is rendered unnecessary, as a single thread is used, which is looped with itself at the end notch of each signature.

In the drawings, Figure 1 is a plan view of the machine. Figs. 2 and 3 show the stationary tubular cams through which the needle-bars pass at the opposite ends of the machine. Fig. 4 is an elevation of one of the tubular cams. Fig. 5 shows part of the back of the book with the threads for sewing the same. Fig. 6 is a detached view of the sheet-carrying arm. Fig. 7 is a cross-section of the same at the line 1 1, Fig. 6. Fig. 8 is a detached view of the presser-bar. Fig. 9 is a detached view of one of the spring finger-plates, and Fig. 10 is a section of the same at the line 2 2. Fig. 11 is an end view of the presser-bar. Figs. 12 and 13 show the bracket forming the needle-guide. Figs. 14, 15, 16, and 17 are sections through the signatures and parts for performing the sewing at the lines 4, 5, 6, and 7, Fig. 1. Fig. 18 is an elevation of the end of the needle-bar, and Fig. 19 is a perspective view of part of the sheet-holder and one of the fingers.

The frame of the machine is of any suitable character, the parts A being longitudinal bars or rails and the parts A′ being transverse connections for the same.

The needle-bars B B′ are reciprocated endwise by any suitable means, and they are guided by the brackets *a* upon the rails A of the frame, and there are stationary tubular cams C fastened upon the frame A, and through which the needle-bars slide freely, and these tubular cams are slotted (see Figs. 2, 3, and 4) for the reception of pins 10 upon the needle-bars. These slots are straight in the end portions and zigzag or V-shaped toward one end of each cam, the object of these tubular cams being to give to the needle-bar and the needle a partial rotation near the outer ends of their movements.

The needles D are straight and in line with the axis of the needle-bars, and near the ends of these needles are hooks instead of eyes, and when the sewing is performed it is by a series of loops, as illustrated in Fig. 5—that is to say, the signatures are sawed with transverse channels and the needle passes through the fold of the signature at the back, entering the end saw-cut, and the hook of the needle draws the thread 11 through the signature upon the backward movement of the needle, the thread having been laid into the hook, and then the needle, as it is again moved forward, goes through its own loop 12 and along through the fold at the back of the next signature, and the hook again seizes the thread and draws it back, and as the hook of the needle approaches the loop 12 of the thread said needle receives a partial rotation by the slot of the tubular cam and draws the loop of thread through the previous loop, casting off this previous or first loop and drawing the same up around the threads of the second loop, and then the needle, as it goes forward in its second loop, is again partially rotated and passes into the third signature, and so on. Thereby the threads go from one signature into the next at one of the saw-cuts, and at the saw-cuts nearest the ends of the signatures the threads are looped together. The devices for performing the operations reliably are hereinafter described.

It is to be borne in mind that where the signatures are small they may be united by one thread and one needle only, as illustrated in Fig. 5; but usually two looping-needles and two threads will be made use of, as shown in the drawings; but as the two looping-needles and the devices used with them operate in the same manner it is only necessary to describe one looping-needle and the parts used in connection with the same.

The signatures *d* are laid in succession upon

the table E, and this is supported by a column, *e*, sliding at its lower end through any suitable support—such as that shown at *f*, Fig. 15—and between this support and a collar, 12, is a helical spring, *e'*, which is sufficiently strong to support the table and the signatures, but which yields to the presser-bar H, hereinafter described, so that the necessary space is provided for introducing the folded signatures in succession, and there are stationary gages F attached to the frame A, and against these the back folded edges of the signatures are presented in succession by the swinging sheet-holding arm G, which is mounted upon a vertical shaft, *g*, and to which a movement is given at the proper time by any suitable mechanism, so as to carry the folded signature that is laid over it in above the previously-sewed signatures upon the table E, and to hold such signature in position while the sewing is performed. This sheet-holding arm swings in the same horizontal plane as that in which the needle-bars and needles reciprocate, and the edge of this sheet-holding arm is channeled, as seen in Fig. 7, for the passage of the needle or needles as they pass along in the fold of the signature, and the edge of the sheet-holding arm is notched at 16 and 17, so that the folded back edge of the signature can be pressed downwardly where these notches occur, in order that the looping-needle may pass above the signature at these places, instead of through the fold, and the arm is also notched at 18 to correspond with the notch sawed in the signatures where the thread 11 is laid into such notch.

The presser-bar H, Figs. 1 and 8, is connected by the arms 20 to the rock-shaft I, that is supported in the bearings 21 on A, and to this rock-shaft a slight movement is given at the proper time by a lever-arm, 22, and a cam or other suitable device, the object of this movement being to force the sewed signatures and table downwardly against the action of the spring *e'*, and then the presser-bar H is raised sufficiently for the unsewed signature and the arm G to pass in beneath such presser-bar. This presser-bar corresponds in length, or nearly so, to the length of the back of the book, and at the end portions of such presser-bar there are inclined spring-fingers 25, that come above the notches 17 in the arm G and press down the end portions of the fold at the back of the signature, so that the needles, instead of passing into or through the entire fold of the signature, pass outside of and above the same, as indicated in Fig. 5, and I also usually make use of the spring finger-plates L, attached by the screws 26 to the presser-bar H and provided with downwardly and outwardly inclined fingers 27, that serve to press down the folded back edge of the signature at the notches 16 in the arm G, so that the needles D will pass outside of the signatures between two of the saw-cuts, as seen at 28, Fig. 5, thereby causing the threads to be drawn outside of the folded back of the signatures, in order that a strip of parchment or a tape may be inserted beneath these threads for strengthening the back of the book. These strips or tapes may be inserted when the book is being sewed or afterward, as desired.

It is usually desirable to avoid making saw-cuts in the back edges of the signatures, in which case the finger 27 is the same width as the opening 16 in the arm G, so that the parallel edges of the parts act as shears to cut the paper at right angles to the back and through the folds in the paper and press it downwardly as the sheet is carried into contact with the finger 27. The fingers 25 may also act as shears against the angles in the arm G at the notches 17.

It is usually preferable to introduce spring-guides 30 between the stationary guides F and the back edge of the signature that is being sewed, as seen in Fig. 16, so that such spring-guides may yield as the needle passes along in the fold of the signature and lessen the risk of the needle becoming injured, and these springs return the signature to the exact position after the needles have been withdrawn.

Upon reference to Fig. 14 the relative positions of the looping-needle, the spring-finger 25, and the arm G will be seen, and in Fig. 15 the needle is represented as within the signature and in the grooved edge of the arm G, and in Fig. 17 the needle is shown as passing above the downwardly and outwardly inclined spring-finger 27, the parts being in section at the respective lines 4, 5, 6, and 7, Fig. 1.

In order to insure the proper position of the looping-needle, I make use of the bracket needle-guides N, Figs. 1, 12, and 13, which guides have slots for the sheet-holding arm G to swing into and be supported while the sewing is being performed, and they are also perforated for the passage of the looping-needles, and it is not necessary to entirely withdraw the needles from these bracket-guides, as the points of the needles may remain above these spring-fingers 25 upon the end portions of the presser-bar H.

The threads are to be supplied from any suitable spools, M, and the threads pass through eyes at the outer ends of the guide-arms O, and these guide-arms are pivoted at 35, so as to be swung by any suitable device and carry the threads backwardly into the notches 36 in the presser-bar H and lay the threads in the path of the looping-needle hook, and when these guide-arms O are moved in the other direction they allow the threads to draw off freely into the fold of the signature, and there is no fear of the needle-point penetrating and splitting the thread in its movement into the next signature.

Convenient devices for moving the guide-arms O are the springs 40, acting in one direction, and projections 41 on the needle-bars, acting in the other direction, to swing the arms and lay the threads into the hooks of the looping-needles.

The back edge of the table E is bent down-

wardly and receives a fence or gage, 38, to prevent the sewed signatures slipping backwardly upon such table, and I remark that each volume as sewed may be removed from said table E, or more than one volume may be sewed before removing them from said table.

The operations of the machine as a whole will be understood from the descriptions of the different devices and their modes of operation, and I remark that any suitable mechanical movements may be employed for communicating to the respective parts the reciprocating movements herein set forth.

I claim as my invention—

1. The combination, with a table upon which the sewed signatures are received, of a sheet-holding arm to present the signatures in succession, the edge of the arm being channeled and notched, the reciprocating needle-bar and looping-needle having a hook near the point, the presser-bar, and the spring-fingers for acting upon the folded back edge of the signature, substantially as set forth.

2. The combination, in a book-sewing machine, of a looping-needle, a swinging sheet-holding arm grooved and notched on its edge, a guide-arm for presenting the thread to the looper-needle, a notched presser-bar, and spring-fingers for depressing portions of the signature at the folded and sawed back, substantially as set forth.

3. The combination, in a machine for sewing books, of a presser-bar, a rock-shaft for supporting and moving the same, spring-fingers upon the presser-bar, a swinging sheet-holding arm, and reciprocating looping-needles, substantially as set forth.

4. The combination, with the needle in a book-sewing machine, of stationary inclined fingers and a sheet-holding arm having a notched edge that acts against the fingers to cut the paper against the edges thereof and press aside one portion of the folded back of the signature for the passage of the needle or looper, substantially as set forth.

Signed by me this 10th day of August, 1887.

DAVID McCONNELL SMYTH.

Witnesses:

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WILLIAM G. MOTT.