(No Model.)

2 Sheets—Sheet 1.

A. I. JACOBS.

BOOK SEWING MACHINE.

No. 435,605. Patented Sept. 2, 1890.

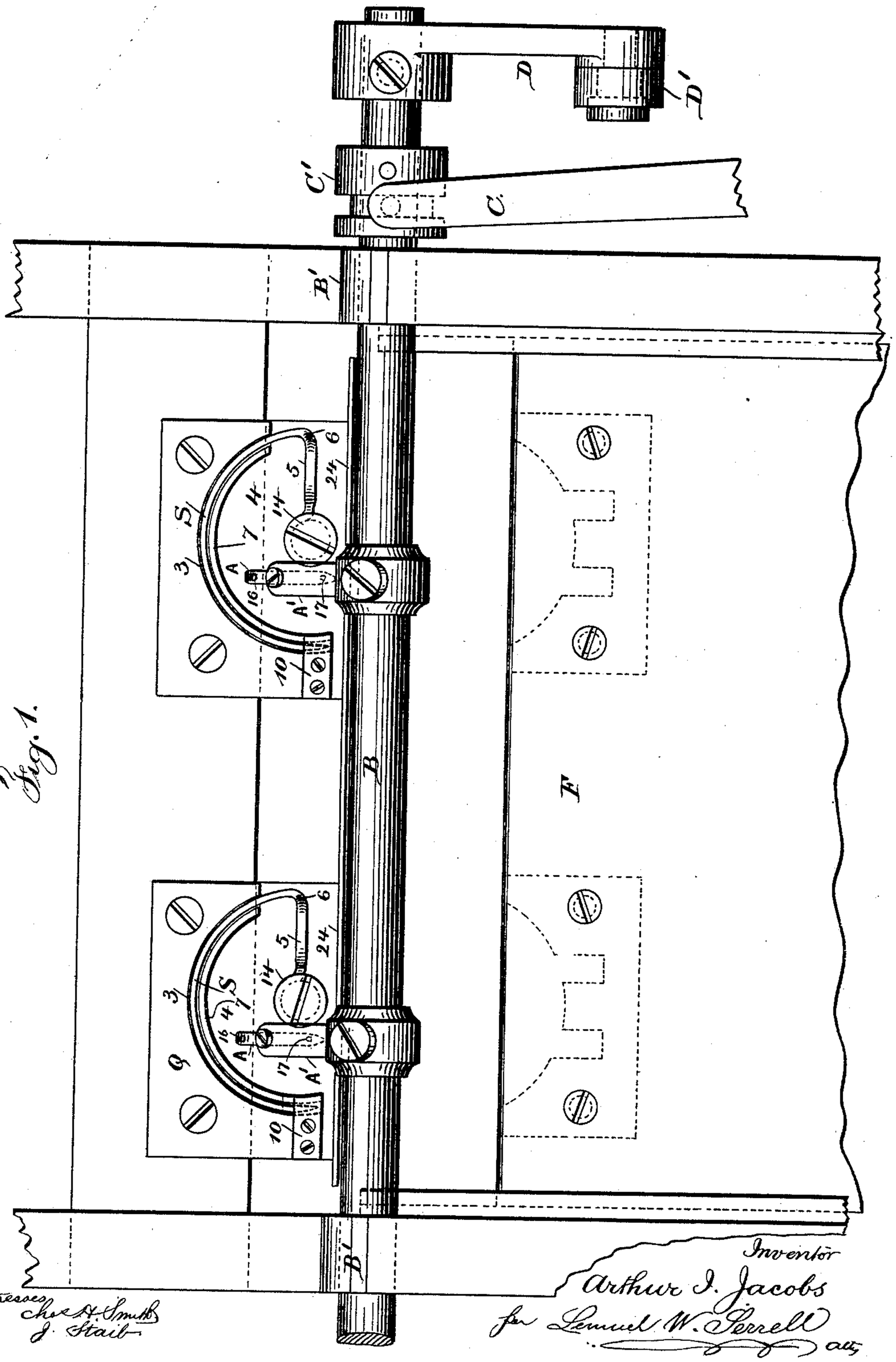

Fig. 1.

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Inventor
Arthur I. Jacobs
per Lemuel W. Serrell
Atty

(No Model.)

2 Sheets—Sheet 2.

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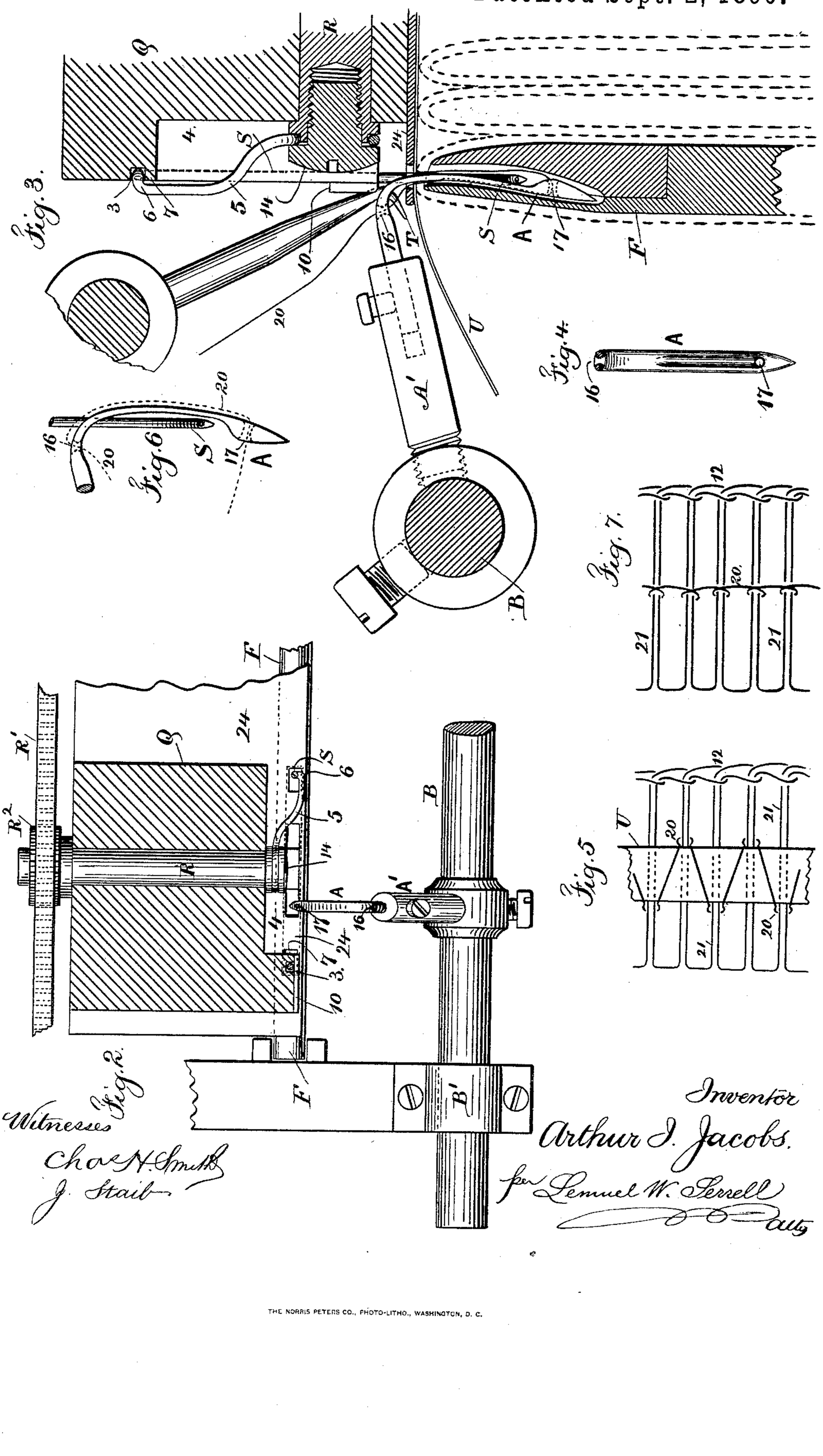

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Atty

UNITED STATES PATENT OFFICE.

ARTHUR I. JACOBS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE SMYTH MANUFACTURING COMPANY, OF SAME PLACE.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 435,605, dated September 2, 1890.

Application filed April 7, 1890. Serial No. 346,887. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR I. JACOBS, a citizen of the United States, residing at 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.

In Letters Patent No. 220,312, granted October 7, 1879, to D. M. Smyth, the needle made use of is semicircular and eye-pointed, and such needle passes into the fold of the signature and through the sheet-holding arm and comes out again at the back of the folded signature, and the thread is interlooped, and in Patent No. 262,325, granted August 8, 1882, a similar needle is represented passing into and out of the folded signature, and there is also a looper that passes into a loop of thread carried by the semicircular needle, so that in the sewing operation the threads are interlooped where they pass out of the folded signature, and in some instances the semicircular needle has been within a semicircular recess in a stationary block in order that the needle may be supported in its passage into the fold of the signature, such semicircular recess being shown in Patent No. 234,732.

In my present improvements I make use of a semicircular needle—such as represented in the patents before mentioned—and I also make use of a looping device, acting in connection with such semicircular needle—such, for instance, as that represented in the patent No. 250,991—and my present invention relates to the peculiar features of construction hereinafter set forth.

In the drawings, Figure 1 is an elevation illustrating the present improvement. Fig. 2 is a plan view showing the needle-block and needle in section. Fig. 3 is a section in a larger size, representing the needle and eye-pointed vibrator and the sheet-holder. Fig. 4 is a section through the vibrator at the eye thereof. Fig. 5 is a diagram representing the stitch that is produced by the machine, and Fig. 6 is a modification in the shape of the eye-pointed vibrator whereby a stitch can be made similar to that represented by the diagram Fig. 7.

The semicircular needle S is connected with the needle-shaft R, and this shaft R passes through the needle-block Q, and at the rear end is a pinion R^2, that is acted upon by a rack-bar R′, to which motion is communicated at the proper time to partially rotate the shaft R and give a movement to the needle. Any suitable mechanism, however, may be made use of for partially revolving the needle-shaft R at the required time.

In the face of the needle-block Q there is a semicircular groove 3, and the block is recessed or cut away semicircularly, as at 4, so that the end of the shaft R and the screw 14, by which the needle is attached to the shaft R, may be within such recess and back behind the plane of motion of the semicircular needle. This feature, however, of the screw within the recess 4 is not my invention, and I remark that the arm 5 of the needle that extends from the semicircular portion to the shaft R and the shank at the end of such arm 5 for the screw 14 may be of any ordinary form or character, and any suitable connection may be made use of between the shaft R and the arm 5 of the needle S.

It will be apparent that in consequence of the semicircular groove 3 being in the face of the needle-block Q the arm 5 cannot pass to the semicircular portion of the needle and occupy the same plane as the semicircular portion of the needle, as has heretofore been the case, because the semicircular portion of the needle sets back into the groove 3. For this reason it is necessary to bend the arm 5 forward and make a sharp bend at 6 at the junction of the arm 5 with the semicircular portion of the needle, in order that this portion 6 at the end of the arm 5 may be in front of the face of the needle-block Q, while the needle itself occupies the semicircular groove 3.

The semicircular groove 3 is to fit the needle as closely as possible without producing friction or wear thereupon; but in order to show the existence of a groove in Fig. 1 of the drawings the groove is too wide in proportion to the needle. The object of this groove is to support the semicircular needle both on the inside and on the outside. Hence the needle itself is compelled to travel in a given path, and it cannot be sprung out of shape by the severe strain to which it is exposed in passing into or through the paper

of the signature or in drawing up the thread. It will be discovered that in cases where the needle-block Q only surrounds the outer edge of the semicircular needle, such needle may draw more nearly into a straight line as the needle is withdrawn from the signature, and thus the work may be imperfect and the needle may become bent; but in consequence of the rib 7 being within the semicircle of the needle, such needle is supported upon its interior side as well as the exterior, and the bend at 6 allows for the connection to the arm 5 without the rib 7 interfering with the movement of the needle. I also find it advantageous to make use of a guiding-plate 10, which is near the point of the needle as it is withdrawn into the block, and hence is close to the place where the needle is caused to penetrate the folded signature, and this guiding-plate insures the proper position of the point of the needle laterally in order that it may enter the folded signature, and it also prevents the point of the needle being sprung laterally by the tension applied to the thread in drawing up the same.

It is to be understood that the needle S has an eye near the point and that the thread is carried into the signature by such semicircular needle, and a loop of such thread is taken by the looper T from near the eye of the semicircular needle as the point of such needle passes up out of the signature, as represented in the aforesaid patent, No. 250,991, and that the loop of thread from one signature is held in position for the semicircular needle as it passes through the next signature to also pass through such loop, and then the looper T drops the first loop and takes another loop. Hence the loops of thread passing through the signatures are interlaced one with the other, as shown at 12, Figs. 5 and 7. There is a sheet-holding plate at 24, that is perforated for the passage of the semicircular needle similar to that made use of in book-sewing machines heretofore constructed.

In connection with the semicircular needle I make use of an eye-pointed vibrator or needle A, which projects from an arm or stock A′, upon a shaft B, and this shaft B is supported in bearings B′, and it receives an endwise motion by any suitable means—such, for instance, as a lever C, having a pin acting in a grooved collar C′, such lever receiving motion at the proper time by a suitable cam—and this shaft B is also rocked for raising the eye-pointed vibrator A out of the signature, or thrusting it down into the same, and this rocking motion is given to the shaft B by any suitable means—such, for instance, as a crank arm D, acted upon by a link or connecting-rod D′, to a cam upon the machine—and the parts are so timed that after the sheet-holding arm F has brought the signature up beneath the sheet-holding plate 24 the eye-pointed vibrator A is passed down into the fold of the signature and into a recess in the upper edge of the sheet-holding arm F, and then the semicircular needle is actuated to pass into the folded signature and through a loop of thread carried by the eye-pointed vibrator A, and after the point of the semicircular needle S has emerged from the folded signature and the looper T has taken a loop of its thread, then the needle S is drawn back out of the signature, and simultaneously the eye-pointed vibrator A is raised above the folded signature, leaving a loop of its thread around the loop of thread led into the fold of the signature by the semicircular needle S.

Usually the eye-pointed vibrator A will be recessed upon its convex surface above the eye that is near the point, as indicated in Fig. 3, in order that the semicircular needle S may pass through the loop of thread at the convex side of the eye-pointed vibrator, and in that case the thread will pass through the eye 16 near the shank of the eye-pointed vibrator and along the concave side of the needle and out through the eye 17 and up to the signature that has previously been sewed, and the loop of thread 20 will be a plain loop, through which the longitudinal loops of thread 21 from the needle S pass, as indicated in Fig. 5, and usually there will be a tape or strip of parchment or similar material, as indicated at U, outside the back of the book, and the eye-pointed vibrator A will be thrust into one signature at one side of the strip U and into the next signature at the other side of the strip U, so that such strip will be bound to the back of the book by the crossing of the thread 20, and to accomplish this the shaft B is rocked at the proper time to cause the eye-pointed vibrator to pass into each signature in succession; but such shaft B receives an endwise motion between the one perforation and the next equal to the width of the strip U, so that one perforation is made in one signature at one side of such strip and in the next signature at the other side of such strip; but in cases where the strip U is not made use of it is not necessary to give to the shaft B an endwise motion, and the loops of thread 20 will be in line with each other across the back of the book.

If the eye-pointed vibrator is recessed upon the concave side of the needle, as indicated in Fig. 6, the thread 20 may pass up through the eye 16 and in a groove on the convex side of the eye-pointed vibrator and forward through the eye 17 and then upward and backward to the previously-sewed signature. In this instance the loop of thread 20 will be wound around the longitudinal threads 21 within the fold of the signature, as indicated in Fig. 7.

In the application of Reynolds and Jacobs, Serial No. 291,441, filed November 21, 1888, there are represented perforators within the sheet-holding arm or bar, acting outwardly to pierce the folded signature with holes at the places where the needle enters the folded signature. These may or may not be made use of with the improvements herein described.

It will be apparent that the bend in the arm 5 between the offset 6 and the point of attachment to the shaft R or axis of motion. should be sufficient to carry the point of attachment back behind the plane in which the semicircular needle moves, in order that the axis or point of attachment may be out of the way of the eye-pointed vibrator in its movements into and out of the signature.

If the signatures are sewed at the places where the eye-pointed vibrator enters, or if the paper is otherwise perforated, the eye-pointed vibrator may have a rounding or dull end.

I do not claim the stitches that are represented in Figs. 5 and 7, as these are not my invention.

I claim as my invention—

1. The combination, with the needle-shaft and the semicircular eye-pointed needle having an arm at the rear end extending to and connected with the needle-shaft, of a needle-block grooved upon its face for the reception of the needle, whereby the needle is supported upon its concave side, substantially as set forth.

2. The combination, with the needle-shaft, the sheet-holder, and the needle-block, of the semicircular eye-pointed needle having a bend or offset 6 between the semicircular portion and the arm 5, substantially as set forth.

3. The combination, with the needle-shaft, the sheet-holder, and the needle-block, of the semicircular eye-pointed needle having an offset or bend at 6, and the arm 5 bent backwardly so that the connection to the shaft or axis of motion of the needle is behind the plane in which the semicircular needle moves, substantially as set forth.

4. The combination, with the sheet-holding arm and curved eye-pointed needle S, of the eye-pointed vibrator with an eye near the end for the passage of a second thread, and a rock-shaft and stock for supporting and moving the eye-pointed vibrator into and out of the signature upon the sheet-holding arm, substantially as set forth.

5. The combination, with the sheet-holding arm and a needle for laying the thread longitudinally within the signature, of an eye-pointed vibrator, a rock-shaft and stock for giving motion to the vibrator, and mechanism for communicating an endwise motion to the rock-shaft to vary the position of the vibrator as it passes into the alternate sheets, substantially as set forth.

6. The combination, with the sheet-holding arm, a needle carrying threads longitudinally into the signature, of the vibrator A, formed as an arc of a circle, an eye near the point and a recess above the eye for the passage of the needle carrying the second thread, and a guide-eye near the shank of the vibrator, substantially as set forth.

Signed by me this 27th day of March, 1890.

ARTHUR I. JACOBS.

Witnesses:
W. B. McCRAY,
CHAS. E. PARKER.