

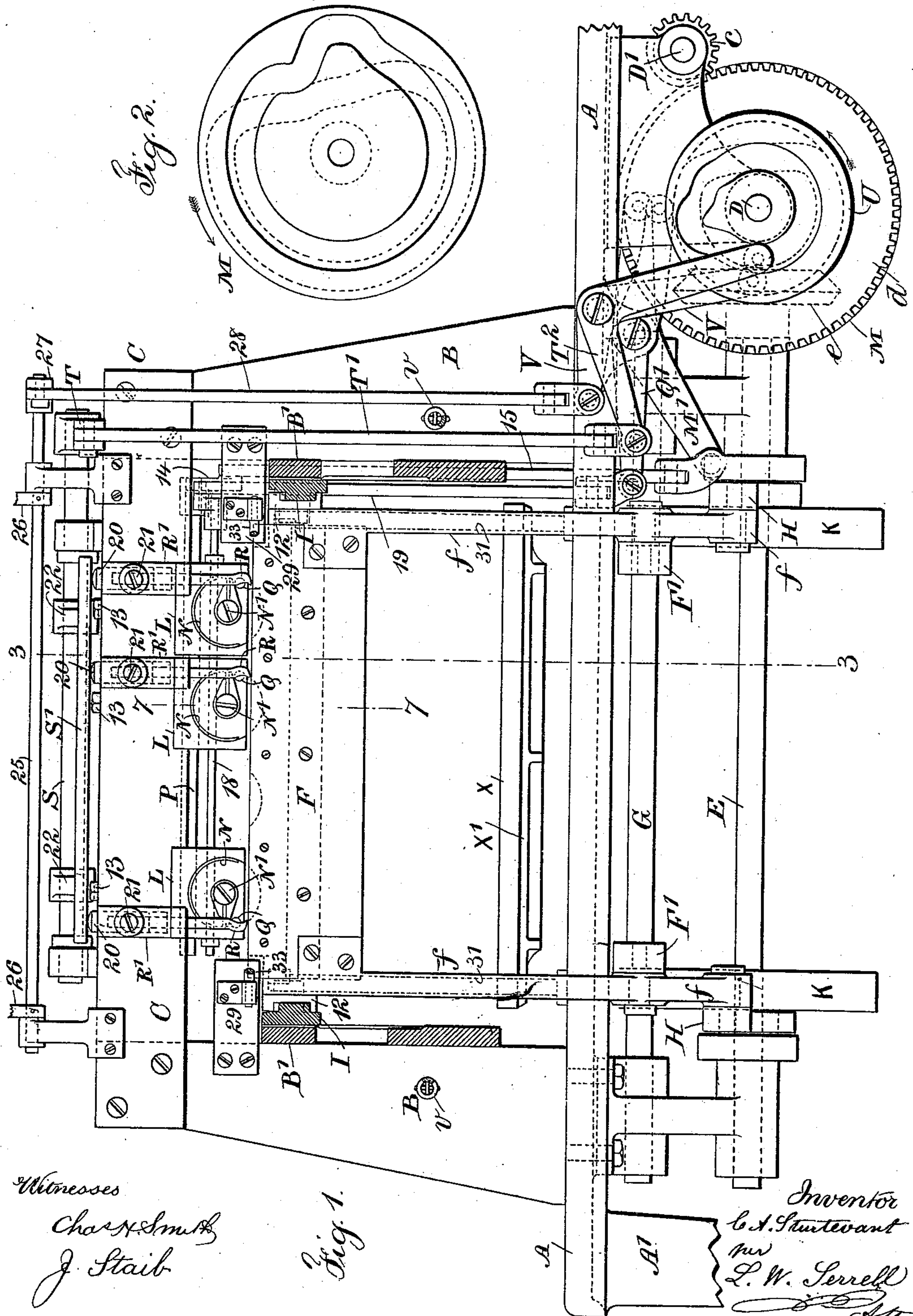
(No Model.)

4 Sheets—Sheet 1.

C. A. STURTEVANT.
BOOK SEWING MACHINE.

No. 549,754.

Patented Nov. 12, 1895.



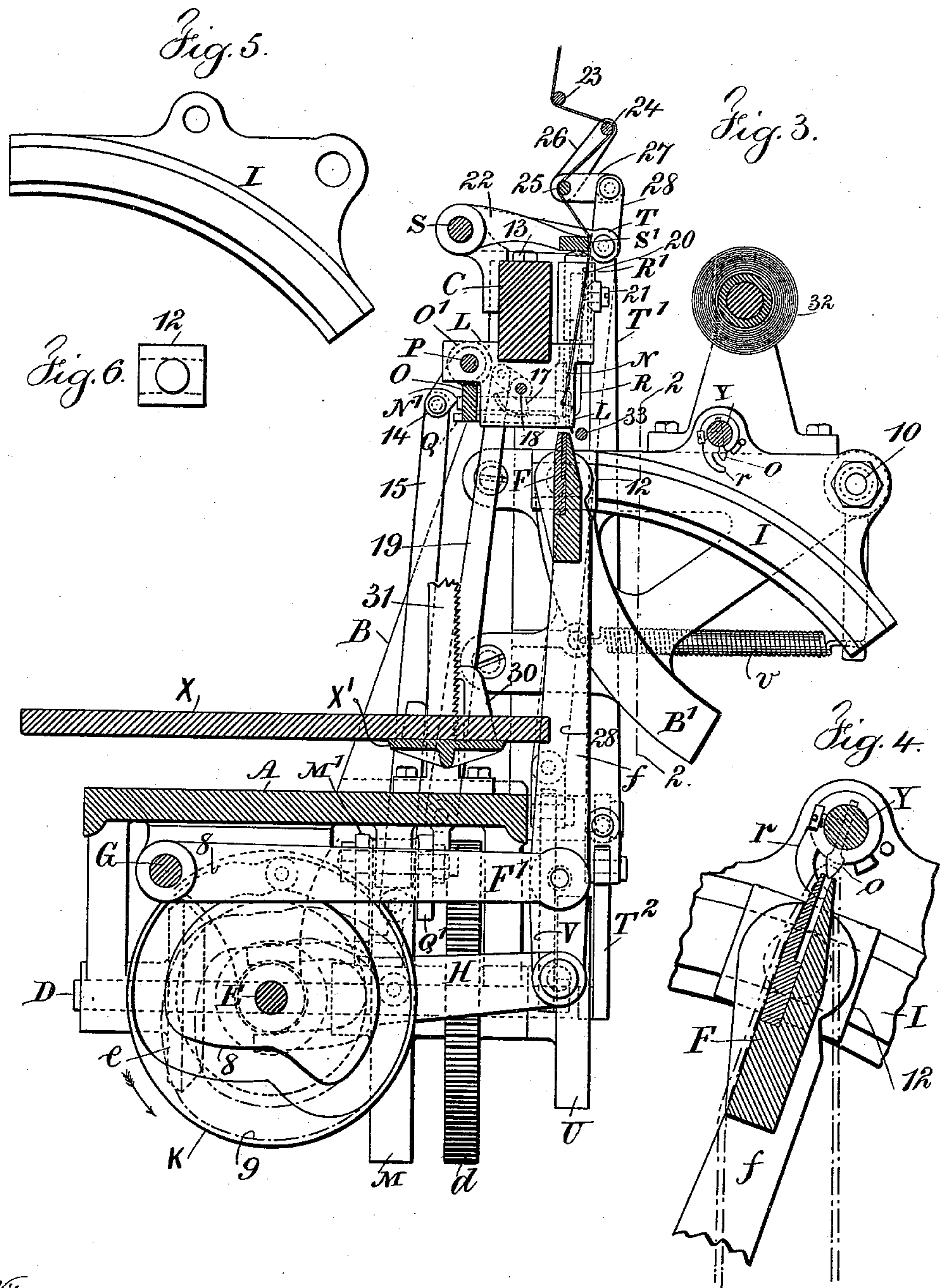
(No Model.)

4 Sheets—Sheet 2.

C. A. STURTEVANT.
BOOK SEWING MACHINE.

No. 549,754.

Patented Nov. 12, 1895.



Witnesses

Charles Smith
J. Staib

Inventor

Charles A. Sturtevant
per Lemuel W. Serrell
Att'y

(No Model.)

4 Sheets—Sheet 3.

C. A. STURTEVANT.
BOOK SEWING MACHINE.

No. 549,754.

Patented Nov. 12, 1895.

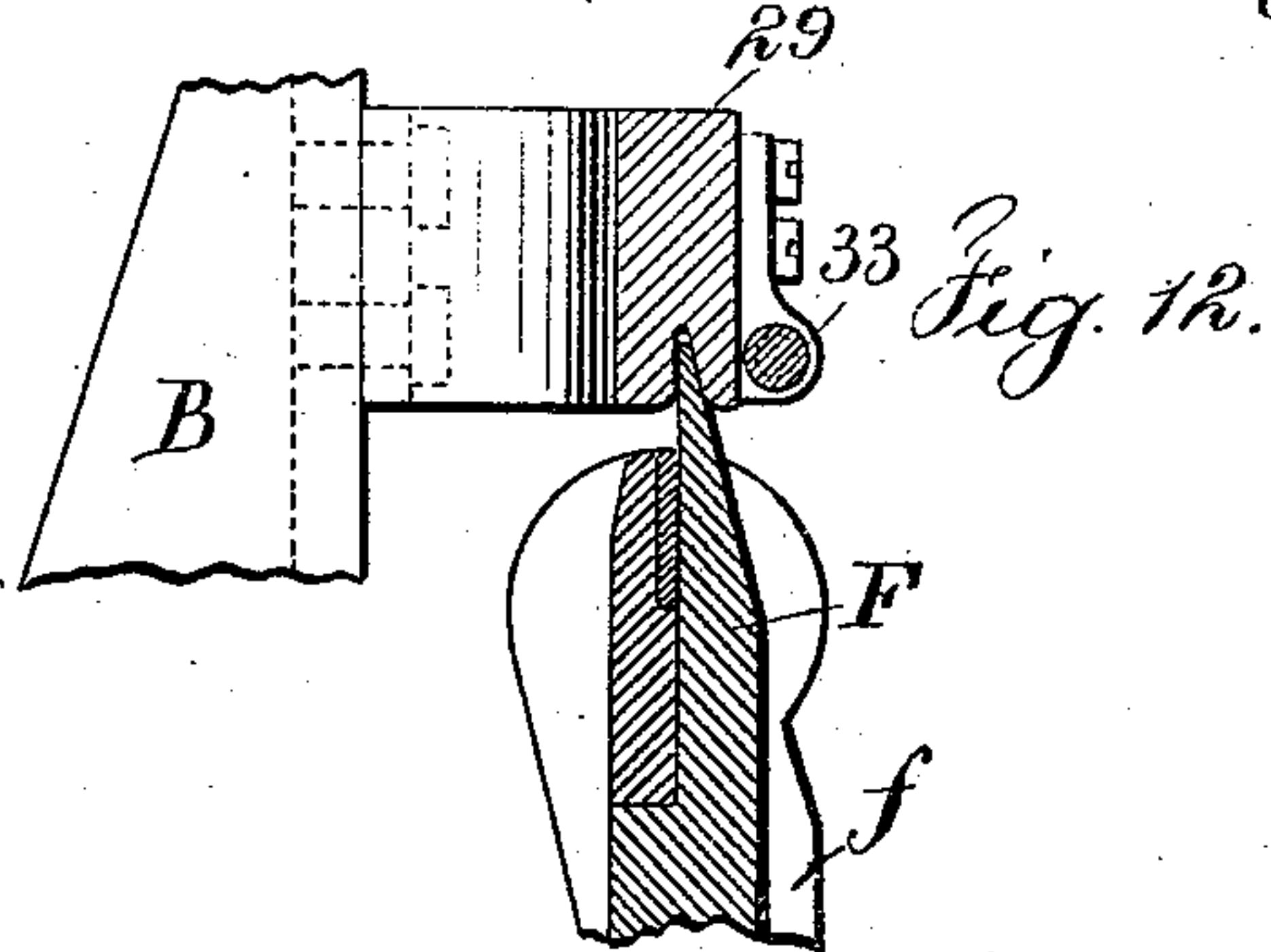
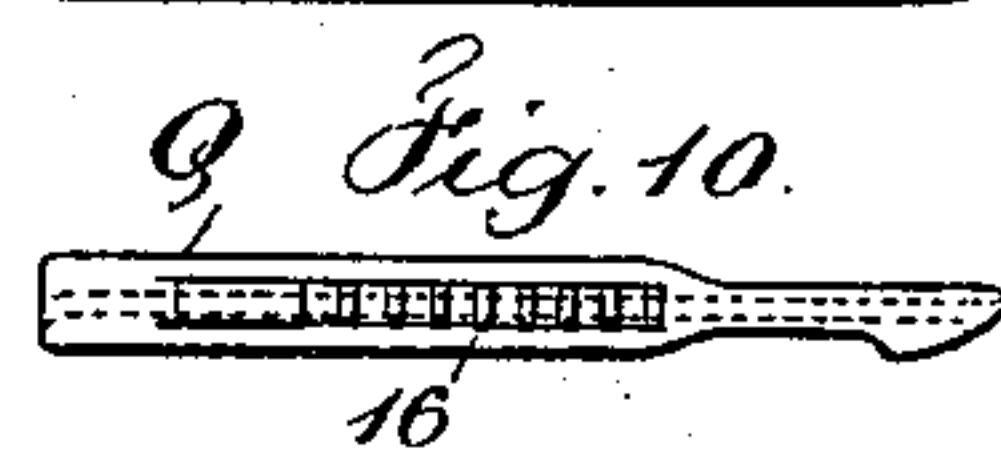
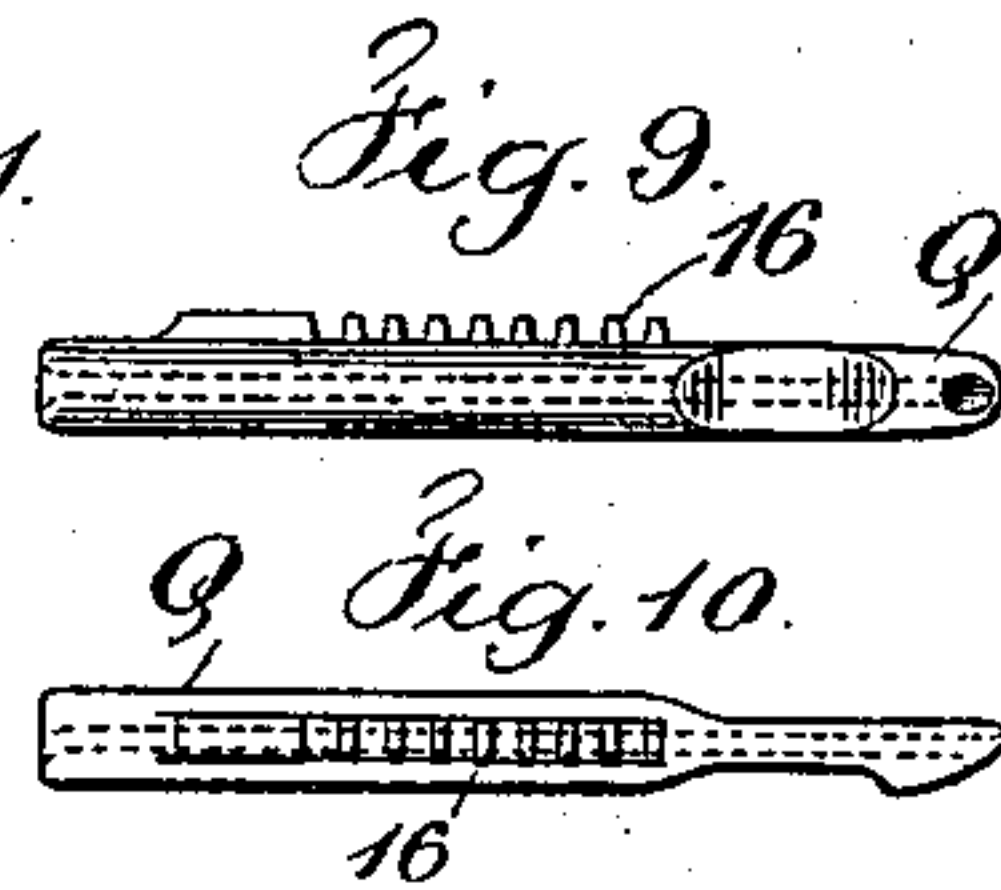
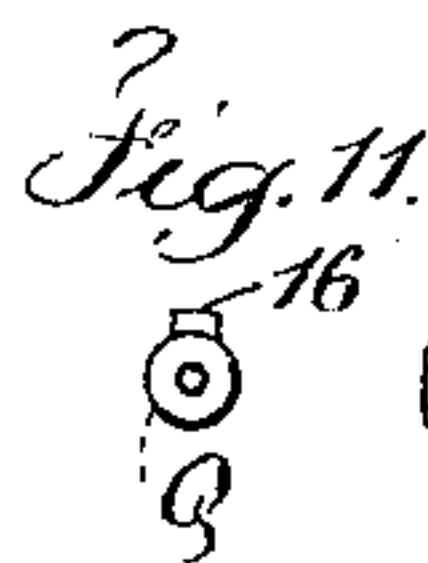
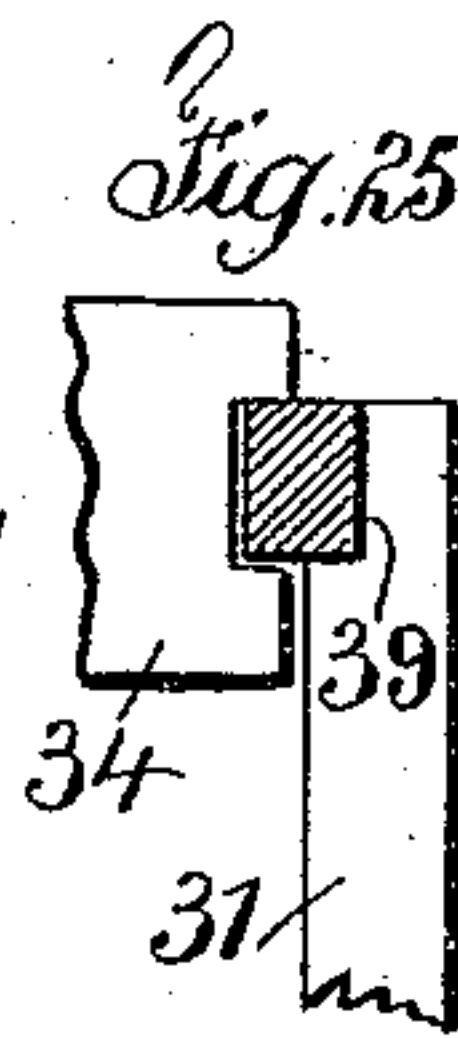
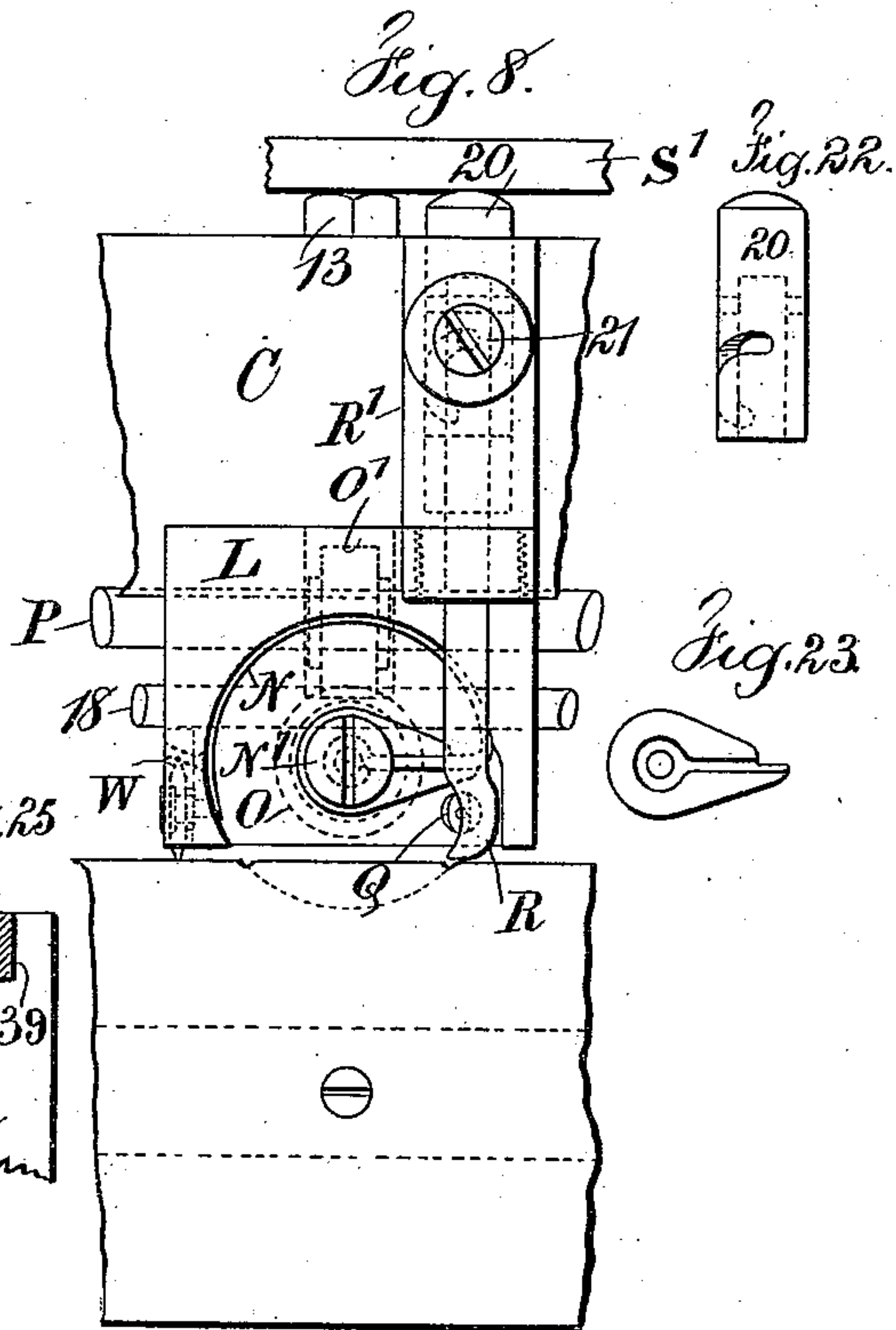
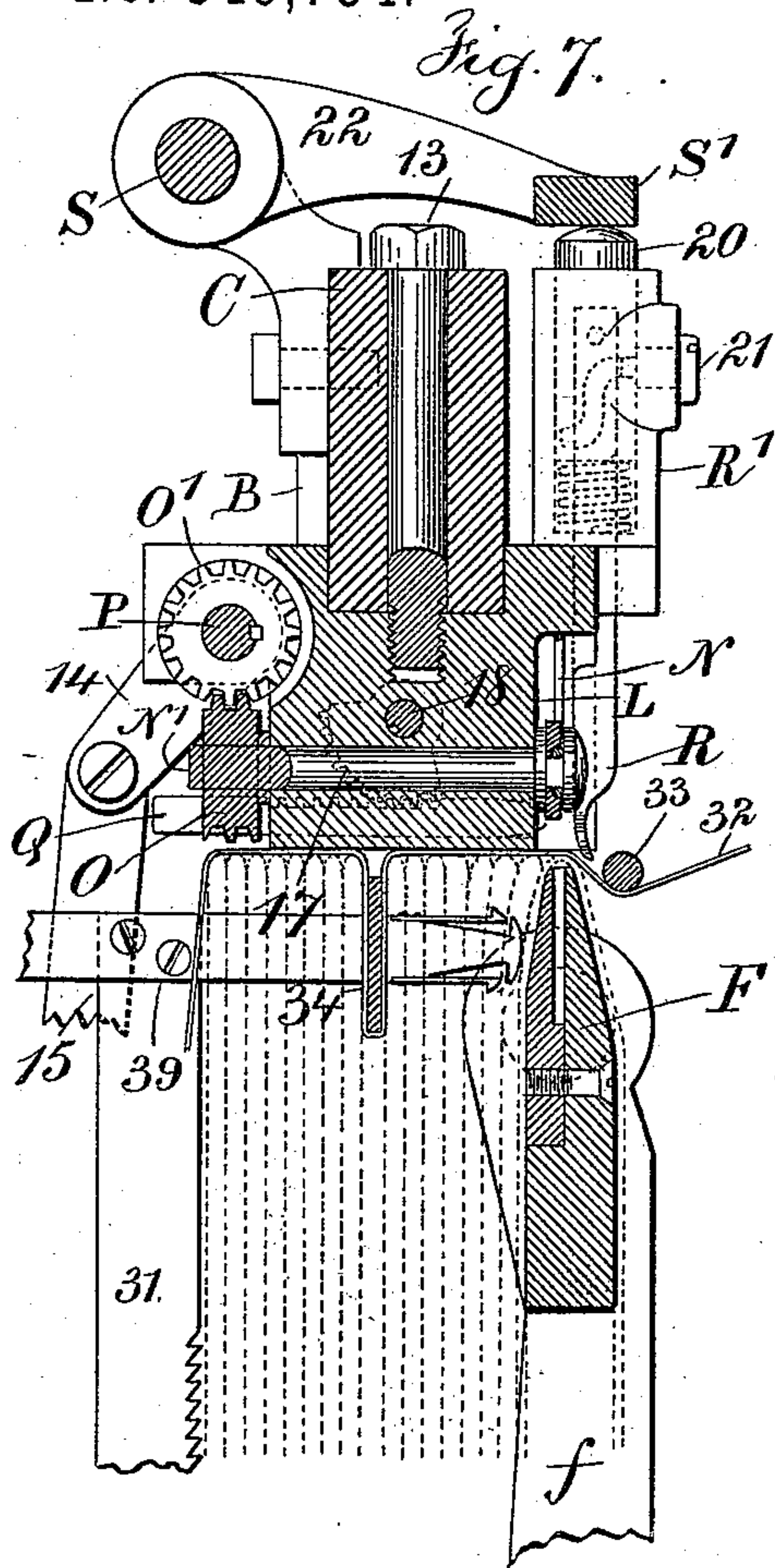
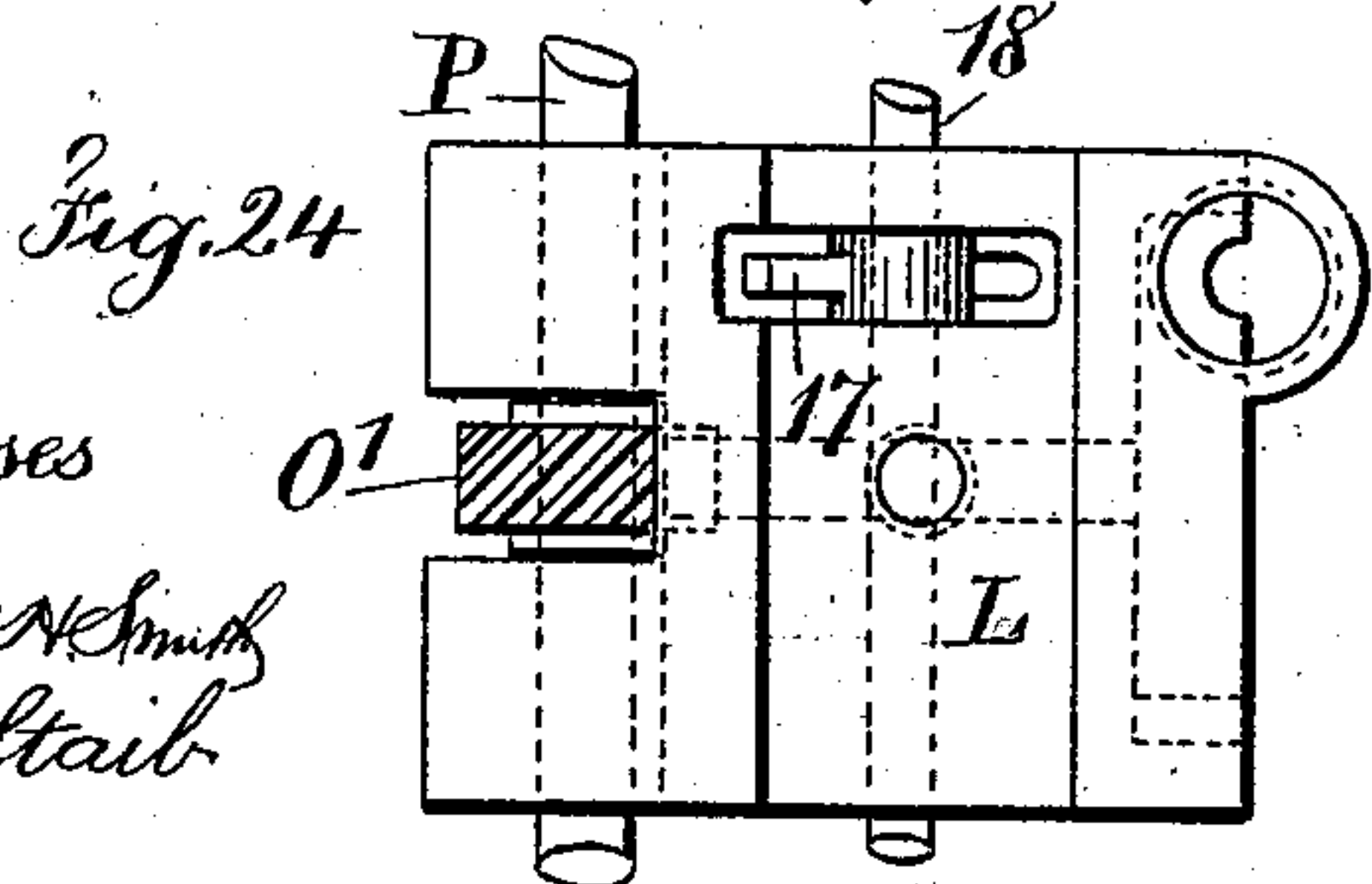
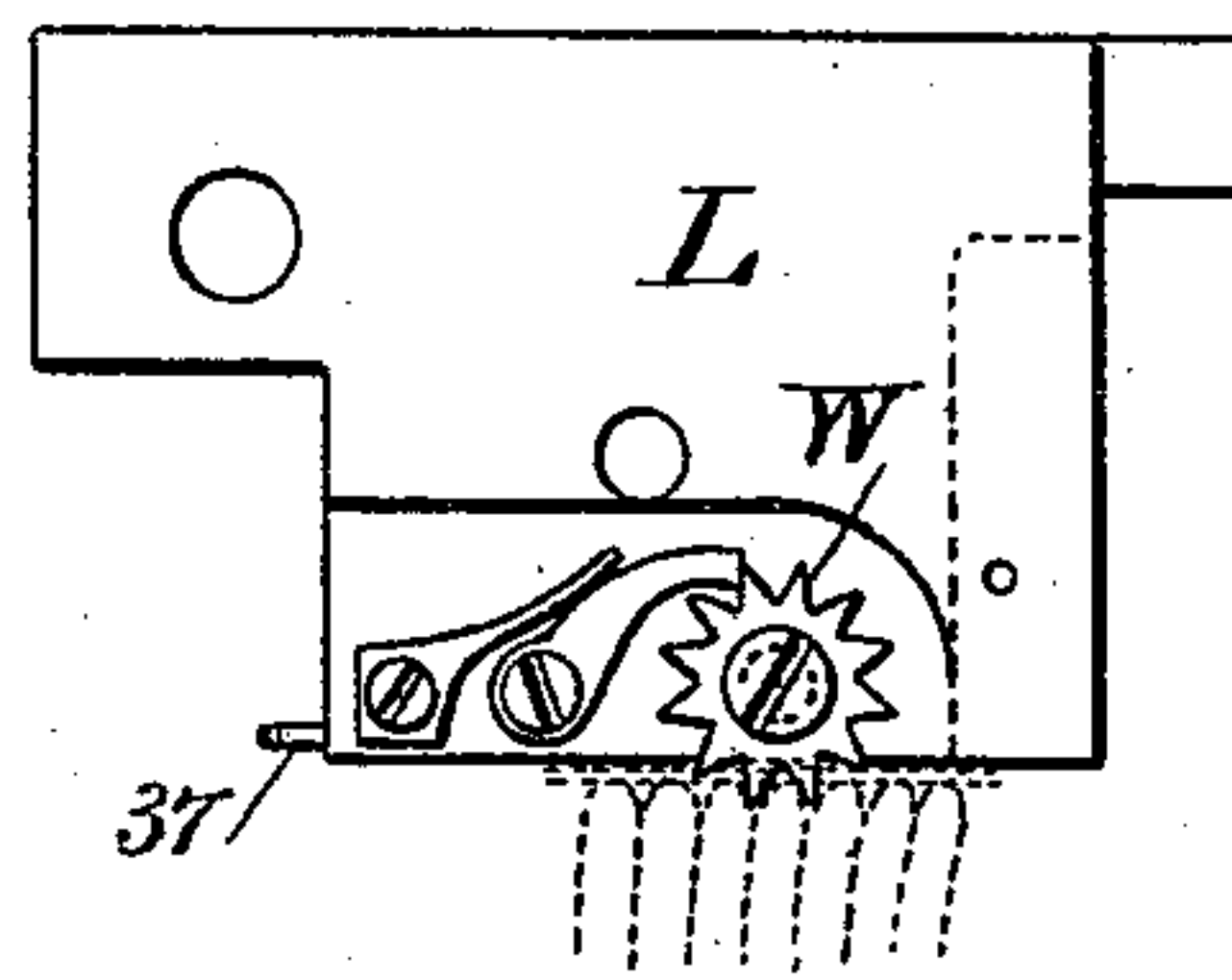


Fig. 13.



Witnesses
Charles A. Sturtevant
J. Staib

Inventor
Charles A. Sturtevant
per Lemuel W. Terrell
Atty

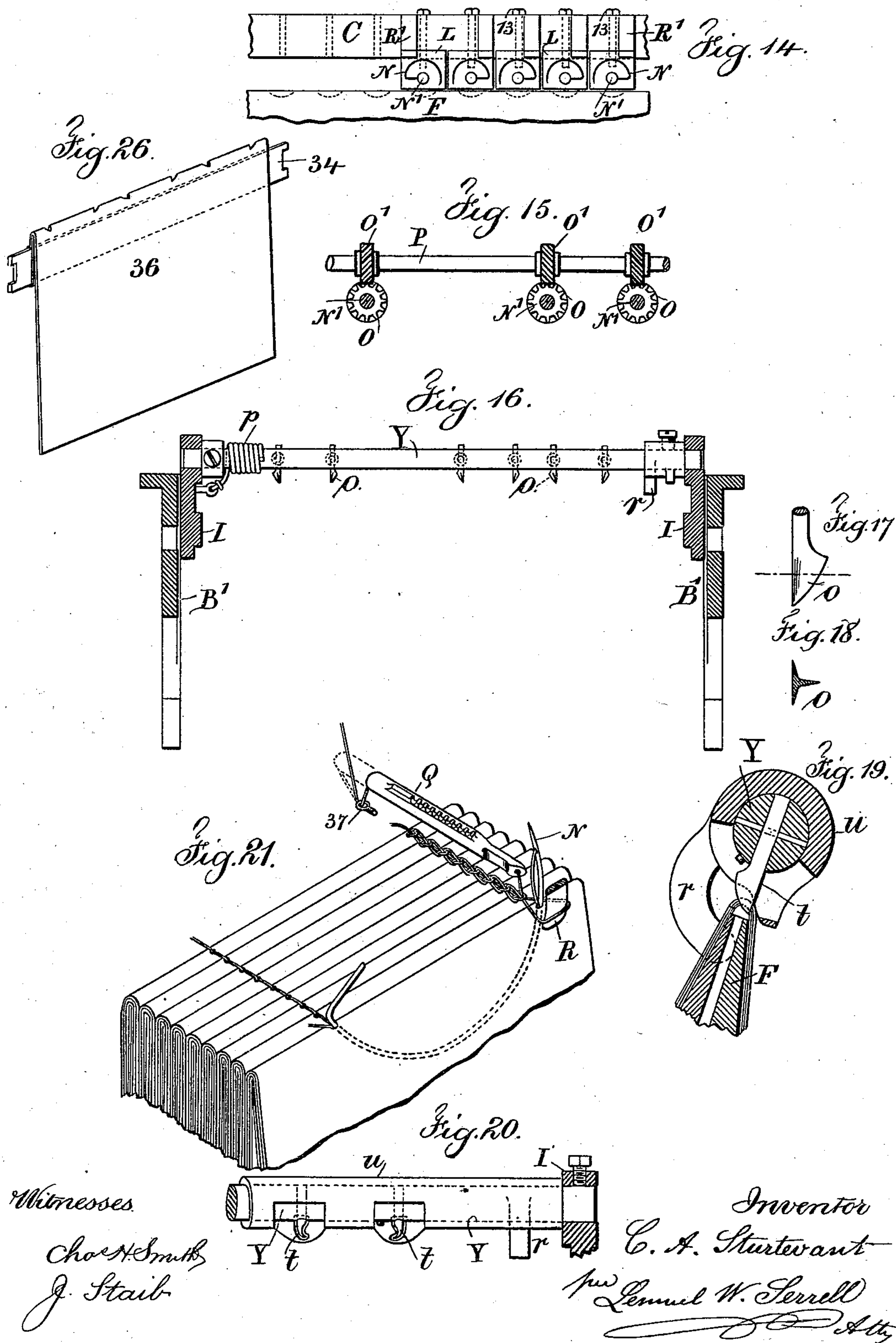
(No Model.)

4 Sheets—Sheet 4.

C. A. STURTEVANT.
BOOK SEWING MACHINE.

No. 549,754.

Patented Nov. 12, 1895.



Witnesses

Chas. H. Smith

J. Staib

Inventor

C. A. Sturtevant

per Lemuel W. Serrell

Atty.

UNITED STATES PATENT OFFICE.

CHARLES A. STURTEVANT, OF PLAINFIELD, NEW JERSEY.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 549,754, dated November 12, 1895.

Application filed February 4, 1895. Serial No. 537,221. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. STURTEVANT, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented an Improvement in Book-Sewing Machines, of which the following is a specification.

In this machine the folded sheets or signatures are placed upon a sheet-holding bar and carried up to position for being sewed, and the sewing device is composed of a half-circle eye-pointed needle to carry a thread into and out of the back of the signature, a looping device that carries a thread through a loop of the needle-thread, and a loop-spreader which holds the loop of the second thread for the eye-pointed semicircular needle to pass through said loop before the looper takes a second loop from the semicircular eye-pointed needle, to hold the same for the third stitch in sewing the respective signatures.

The present invention relates especially to the combination of devices for performing the sewing in the before-mentioned manner.

In the drawings, Figure 1 is a general elevation of the machine, some parts being removed, on the line 2 2, Fig. 3. Fig. 2 is a detached view of the looper and needle-cams. Fig. 3 is a vertical section at the line 3 3 of Fig. 1. Fig. 4 is a separate sectional view of the sheet-holding bar and the perforating device on a larger scale. Fig. 5 is a detached view of one of the guide-segments. Fig. 6 is a detached view of one of the guide-blocks. Fig. 7 is a section at the line 7 of Fig. 1, showing a needle-block and the devices for actuating the needle, such parts being on an enlarged scale corresponding to Fig. 4. Fig. 8 is a corresponding elevation to Fig. 7, showing one group of sewing devices. Fig. 9 is a side view, Fig. 10 a plan view, and Fig. 11 an end view, of the tubular looper. Fig. 12 shows the holding device at one end of the sheet-holding bar. Fig. 13 is a detached view of the signature-holding ratchet. Fig. 14 illustrates the manner in which the groups of sewing devices can be placed. Fig. 15 is a detached view illustrating the screw-gears made use of in actuating the needles; and Fig. 16 is an elevation of the perforator-bar, the end frames being in section. Fig. 17 is an elevation, and Fig. 18 a section, of one of

the perforators in a magnified size. Fig. 19 is a section, and Fig. 20 is a partial elevation, showing the nicking devices that may be used instead of the perforators. Fig. 21 is a diagram illustrating the stitch. Fig. 22 is an elevation of the plunger detached. Fig. 23 is a detached view of the needle-stock. Fig. 24 is a plan of the needle-block detached. Fig. 25 shows one end of the slat and a section of its supporting-bar. Fig. 26 is a perspective view of a supporting-slat and its attached sheet in smaller size.

The bed A of the machine is of any suitable or desired size, and it may be supported by legs, a portion of one of which is shown at A', and rising from this bed A are side frames B, holding a head-frame C, and this head-frame C may vary in length, so that the machine may be adapted to different sizes of signatures, or the machine may be made sufficiently large to take in the largest size of signature and only portions of the machine be made use of when sewing smaller sizes, some of the groups of sewing devices being either removed or thrown out of action, as hereinafter more fully set forth.

Any suitable power may be made use of for driving the machine. I have represented the driving-shaft D as having upon it a gear-wheel *d*, driven by a pinion *c* upon the motor-shaft D', and the cam-shaft E runs along beneath the bed A, and there are bevel-gears *e* for connecting the driving-shaft D and the cam-shaft E.

The signature-bar F is advantageously made of two pieces screwed together, as shown in Figs. 3, 4, and 7, and between the two parts forming the signature-bar there is a narrow opening, as shown in Fig. 7, for the half-circle eye-pointed needle to pass into. This opening may extend all along the signature-bar; but it is preferable that narrow openings be provided at regular intervals, as illustrated in Figs. 1 and 14, the bottom of each opening being described from the axis of the needle-shaft, so that the bottom of such opening forms a guide against which the semicircular needle rests as it is partially revolved first in one direction and then in the other.

At or near the ends of the signature-bar F are the end bars *f*, rigidly connected so as to form a three-sided frame, and there is a rock-

shaft G, supported under the bed A and having link-arms F', extending out from the said rock-shaft and pivoted at their ends to the end bars f, and there are other links H, pivoted at their outer ends to the lower ends of the end bars f and slotted or made as forks at their back ends to pass above and below the cam-shaft E, and there are cams K upon the shaft E, having grooves 8 and 9 in their respective faces, the grooves 8 acting upon rollers upon the arms F' and the grooves 9 acting upon rollers or studs upon the links H. It is now to be understood that the rock-shaft G forms a point of support for the signature-bar and the parts therewith connected, and that the cam-grooves 8, acting upon the arms F, act on the signature-bar so as to move it up or down, and the cam-groove 9 acts through the links H to swing the signature-bar and its end frames upon the pivotal connections between the arms F' and the end bars f, and by properly shaping the cams 8 and 9 the signature-bar will receive the motions required, and according to the descriptions hereinafter contained of its mode of operation.

Guide-segments I are pivoted at 10 upon arms extending out from the side frames B, and these segments I are ribbed as arcs of circles described from the pivotal connections between the lifting-arms F' and the end bars f, and guide-blocks 12 intervene between the ends of the signature-bar F and the guide-segments I, such guide-blocks being recessed to slide upon the ribs of the guide-segments and provided with trunnions passing into circular holes at the ends of the signature-bar; and it is now to be understood that as the signature-bar is raised and lowered by the cams, as before mentioned, the guide-segments I swing upon their pivots 10 and the guide-blocks 12 are moved back and forth upon their segmental ribs as the signature-bar is brought outwardly for receiving over it the folded signature, or brought inwardly previous to being raised to bring the signature into position for sewing; and it is advantageous to provide segmental bracket-frames B', fastened upon the side frames B, for holding the pivots 10 and for guiding the ends of the swinging segments I, as illustrated in Fig. 3.

Any desired number of needle-blocks L are to be provided, each needle-block carrying the eye-pointed needle, the looper, and the loop-spreader. I have represented in Fig. 14 five of these needle-blocks, and it will be apparent that they can be placed closely adjacent to each other or at distances apart, according to the number of threads that are employed in sewing the signatures together and according to the positions where such lines of sewing are to be performed across the back of the book; and in order to locate the needle-blocks and the needle with reference to the recesses in the signature-bar into which the needles pass, it is advantageous to provide screw-holes through the head-frame C at regular intervals apart, as illustrated in

Fig. 14, so that by removing either of the screws 13 its needle-block is detached and either taken out of the machine or applied at a different place, and through each of the needle-blocks is a needle-shaft N' and a needle N upon one end, and this needle N is eye-pointed and semicircular and occupies a recess in the face of the needle-block, so that such semicircular needle is supported by the semicircular shoulder of the recess in the block, and at the back end of the needle-shaft is a gear O, by which such needle-shaft and needle can be partially revolved first in one direction and then in the other.

I find it advantageous to employ a longitudinal shaft P, upon which are gears O' to engage the gears O upon the needle-shafts, and by providing feathers or keys upon the gears O' and a longitudinal groove in the shaft P the gears O' can be slipped along upon such shaft to come into the proper position for acting upon the gears O of the needle-shafts. These gears O O' might be bevel-gears, but I prefer to make them as right-angled helical gears, the teeth in the respective gears being at an angle of forty-five degrees, in order that both the needle-shafts and the shaft P may move together as the shaft P receives a partial revolution.

In order to give motion to the shaft P an arm 14 is provided at one end thereof with a connecting-rod 15 to a grooved cam M upon the shaft D, there being a bent lever M' between the lower end of the connecting-rod 15 and the roller that passes into the groove of the cam M.

In Fig. 2 I have shown the cam M detached, the dotted line representing the general shape of the groove that acts upon the bent lever M' and connecting-rod 15 to partially revolve the shaft P, and the full lines of the cam M, Fig. 2, show the shape of the groove that acts upon the looper hereinafter described; and it is to be understood that the shape of this cam that acts upon the shaft P is such that the needles receive a half-revolution, or nearly so, to carry each eye-pointed semicircular needle into the signature and out of the same, and then to draw back such needle sufficiently to throw out the loop of its thread for the looper to pass through the same, and then the needle draws back, leaving a loop of needle-thread within the signature with the loop caught over the looper or over a loop of looper-thread.

In each needle-block there is a looper Q, that is tubular for a second thread to pass through it and out at the end of the tube, and the looper is made substantially as shown in Figs. 9, 10, and 11, one side of the looper being removed or flattened closely adjacent to the hole through such looper and also flattened at the opposite side, leaving a projecting bevel point, as shown in Fig. 10, the object being that the bevel point shall pass through the loop of thread from the needle N, the looper thread passing out through the tube

of the looper and backwardly within the loop of needle-thread, so that the loop-spreader hereinafter described may take the loop of looper-thread, and the eye-pointed needle passing through the next signature comes out through the signature and passes into the loop held by the loop-spreader in front of the thread left around the looper-thread from the previous signature, and the parts are so timed that the looper Q is drawn back, leaving a loop of its own thread through the thread of the eye-pointed needle.

In order to give motion to the looper Q backward and forward at the proper time, any suitable mechanism may be employed; but I prefer to have teeth 16, in the form of a rack upon the top side of the looper-bar, which are engaged by teeth of a segment 17 upon a looper-shaft 18, that runs through the needle-blocks L, there being a segment 17 in a recess in each needle-block, and the looper-shaft being grooved so as to allow for the needle-block being slipped along under the head-frame C when the position of the needle-block is changed. The looper-shaft receives its rocking movement by a link 19, connected to an arm at its end, and which link 19 extends down to and is connected with a looper-lever Q', having a stud or roller engaged by the groove of the cam M. (Shown in full lines in Fig. 2.)

If the looper was properly shaped and the parts timed so that the looper and its second thread were concatenated or interlooped, similar to what is known as the "Grover & Baker" stitch, this portion of the sewing might be accomplished without the loop-spreader next described; but in order to draw up the loops together in the most advantageous manner in book-sewing, I provide with each needle-block a loop-spreader R upon a circular bar within the stock R', that is fixed to and extends up on the front portion of each needle-block, and the lower end of this loop-spreader is in the form of a thin curved finger, as seen in Figs. 7 and 8, and upon the upper end of the loop-spreader and rigidly connected therewith is a plunger 20, with a spring beneath it, (represented by dotted lines in Fig. 7,) which tends to lift the looper, and in this plunger is a cam groove, and the end of the pin 21 enters such groove, so that as the loop-spreader is raised it receives a partial revolution, and as it is depressed it is partially revolved in the other direction.

The rock-shaft S extends along over the head-frame C and is suitably supported, and there are arms 22 to the spreader-bar S', which extend along over the plungers 20, and the arm T at one end of the rock-shaft S has a connecting-rod T' to a bent lever T², pivoted upon the frame and having a roller or stud to the grooved cam U upon the shaft D, which groove is illustrated by the full lines in Fig. 1, and upon the back of this cam U is a second groove, (shown by dotted lines,) which is made use of in act-

uating the thread take-up, as hereinafter described.

The shape of the groove in the cam U that acts upon the lever T² and spreader-bar S' is such that such spreader-bar forces down the plunger of the loop-spreader at the proper time and the pointed end of the loop-spreader passes between the looper Q and its thread, such looper-thread coming out through the end of the tubular looper and passing back within the loop of needle-thread left by the eye-pointed semicircular needle aforesaid, and this loop-spreader R holds the loop of looper-thread, and as the looper draws back the loop-spreader is moved into the position represented in Fig. 8, with the loop of looper-thread around the wider portion of its thin hook-shaped end, so that the loop of looper-thread is spread for the needle N to pass up into as such needle N passes through a second signature, and then the loop-spreader R is raised to cast off its loop of looper-thread around the end of the needle N and the looper Q goes forward and takes a loop of thread from the needle N and the operations are repeated. In order to draw up the loop of looper-thread when the same is dropped by the spreader around the needle-thread, I provide an eye at 37 on the needle-block, (see Fig. 13,) through which eye the looper-thread passes, and this eye is so located that the rear end of the tubular looper moves back beyond it and thus tightens the thread, as illustrated in the diagram, Fig. 21.

It will be apparent that the spreader-bar S', extending along parallel to the head frame C, is adapted to act upon the loop-spreaders regardless of their position. Hence the needle-blocks can be placed wherever desired without varying the action of the spreader-bar and loop-spreaders.

The threads for the needles N are to be supplied from any suitable spools and pass beneath the stationary bar 23 and over the take-up bar 24 and behind the bar 25 and over the bar S' to the needle-eye, and the take-up bar 24 is to receive a motion at the proper time to draw up the threads, such motion being advantageously given by arms 26 to the bar 25, upon which is an arm 27 to the connecting-rod 28, leading to the bent lever V, pivoted upon the frame and having a roller or stud at the other end acted upon by the back groove in the cam U. (See Fig. 1.) This take-up device for the threads is similar to that which has heretofore been made use of in sewing-machines, and is so placed and timed that the needle-threads are drawn up and their loops tightened as the needles N are being drawn back out of the signature.

The signatures may be notched or sawed at the places where the needles enter and pass out of such signatures; and when this is done the signatures are supplied in succession upon the bar F, when the said bar is depressed and moved toward the operator by the action of the cams K, the sheet being laid over the sig-

nature-bar F in the manner indicated by dotted lines in Fig. 4. The sheet is then carried up with the folded edge immediately below the needles N, and in this operation the previously-sewed signatures are forced backwardly to give room for the introduction of the new signature and the sewing is performed as before described; but in order to steady the signature-bar F and bring it to the correct position, it is advantageous to provide upon the frame of the machine and adjacent to the two ends of the signature-bar the guide blocks 29, (shown in Figs. 1 and 12,) such guide blocks being notched upon their under edges for the reception of the beveled upper edge at the ends of the signature-bar, and the motion given to the signature-bar is such that its upper edge is carried bodily and vertically up into the notches of the guide-blocks and the signature-bar remains in position while the sewing is being performed, and then the signature-bar is lowered bodily and swung out from the sewed signature.

The signatures as they are sewed are more or less springy or elastic and are liable to expand and sometimes interfere with the insertion of the next signature. To avoid this, I provide upon either or all of the needle-blocks signature-holding ratchets W, (see Figs. 8 and 13,) such ratchets being within recesses in the needle-blocks, and the teeth of the ratchet-wheels may approximate in pitch the thicknesses of the signatures, so as to catch into the folded upper edges of the signatures, and the pawl of each ratchet prevents the wheel from turning by any expansive action of the signatures which might tend to move the top edges of the signatures forward; and it is advantageous to provide a table X upon which the lower edges of the signatures will rest, and such table can be raised or lowered, there being a cross-bar X' below the table upon which such table rests and with which it is connected; and there are pawls 30 engaging stationary racks 31 at the ends of the table X, so as to allow for raising or lowering such table to accommodate different sizes of signatures.

It will be apparent that in consequence of the ends of the cross-bar X' being notched adjacent to the pawls 30 the back edge of the table X can be lifted to swing the upper ends of the pawls out of engagement with the racks, and when the table is brought level the pawls firmly engage the racks and hold the table.

In some instances it is desirable to pass a strip or strips of muslin, tape, or other material across the backs of the books and to sew through the same. When this is made use of, the strip or tape 32 is passed below the bar 33 and lies between the top edges of the signatures and the under surfaces of the needle-blocks, as shown in Fig. 7, and the sewing will be performed in the manner before described, the needles passing through such strip, as well as through the signatures. It is, however, important to allow a certain

length of strip between one volume and the next as sewed upon the machine, and with this object in view I provide slats 34, that are of a width corresponding, or nearly so, to the width of the piece of muslin as cut off, and adapted to being pasted upon the interior back edges of the covers. Hence, by inserting a slat 34 between one volume and the next, as seen in Fig. 7, such slat is held by the strip of muslin or similar material, and when the volumes are separated such slats are removed and can be used over again, the strip of muslin or similar material being cut midway between one volume and the other in separating the volumes.

It is usually advantageous to have the half-circle eye-pointed needles arranged as illustrated in Figs. 1 and 14, so that the inter-looped looper-threads will be adjacent to the top and bottom portions of the back of the book, and with this object in view the half-circle needle near one end of the back of the signature will stand in and be moved in the opposite direction to the needle at the other end of the back of the signature, and to effect this object the angle of inclination of the teeth in the right-angled helical gears O and O' will be reversed, as illustrated in Fig. 15, and the looper and loop-spreader will be placed, as shown in Fig. 1, to come at the opposite side of the needle-block and adjacent to the stock of the needle when the needle is turned back out of the signature.

In some instances it is advantageous to puncture the signature at the fold thereof after the signature has been placed upon its bar F, so that the perforations in the paper are in the exact positions necessary for the needle to pass into and through such perforations in performing the sewing; and with this object in view the rod Y is supported at its ends in the guide-segments I, and such rod Y is provided with perforators o, set at the proper places and advantageously adjustable, and the rod Y is turned to a normal position by a spring p, Fig. 16, and there is a finger r projecting from the rod Y near one end, so that, the signature-bar F coming into contact with the finger r as such signature-bar and signature are swung toward the place of sewing, the finger r gives to the rod Y a partial revolution and causes the perforators o to turn down upon and penetrate the signature in the position shown in Fig. 4, and the finger r continues to turn the rod Y as the signature is moved along beneath such rod Y, and hence the perforators o are drawn out again from the paper, and the signature-bar F passing along clears the finger r, and the spring p turns the parts back to their normal position, ready to be acted upon again by the next signature.

In cases where it is desirable to cut out notches in the back or folded edge of the signature as the signature is carried up to place, I make use of stationary cutters t, Figs. 19 and 20, upon the cross-bar Y, which in this

instance is held rigidly in place, and the tube *u* is provided with notches in a downwardly-projecting portion or flange, which notches correspond to the cutters *t*. Hence as this tube *u* is rotated it presses the folded edge of the paper against the stationary cutters *t* and carries such paper along with the signature-bar as the latter is moved past and beneath the rod *Y*, and in this manner notches are cut by the cutters *t* at the places where the needles are to pass into and out of the folded back edges of the signatures.

When the perforators are employed, it is advantageous to make their outer edges curved to correspond to the curved path described by the eye-pointed needles in passing into and out of the signature, so as to open up the way for such needles, and the faces that are toward each other should be flat, so that the threads in the loops and lines of sewing will have straight surfaces against which to draw up.

In order to aid in balancing the weight of the guide-segments *I*, the springs *v* may be employed between the frame and such segments or between the frame and arms extending down from the segment-pivots 10.

In some instances it is advantageous to suspend the volumes as sewed by the slats 34, and with this object in view the slats 34 may be notched at their ends, as seen in Fig. 25, so as to be passed upon the supporting-bars 39, that are fastened to the upper ends of the racks 31, and the lines of sewing coming over the top edges of these slats 34 will hold the signatures so that the volumes hang from such slats; but, if desired, a sheet of paper 36 or other suitable material may be fastened to the slat, as seen in Fig. 26, and folded so as to be hung over the signature-bar and sewed the same as one of the signatures, and the slat will intervene between the volumes and support the same, and when the volumes are separated the slat and sheet are removed and can be used over again.

I claim as my invention—

1. The combination in a machine for sewing books, of a signature holding bar and means for moving the same, groups of sewing devices each composed of a semi-circular eye-pointed needle, a looper that supplies a second thread and takes a loop of thread from the eye pointed needle and a loop spreader for taking a loop of second thread from the looper, and mechanism for moving the respective parts, substantially as set forth.

2. The combination in a machine for sewing books, of a signature holding bar and means for moving the same, a frame and needle block removably connected to the cross head of the frame, a semi-circular eye-pointed needle and needle shaft carried by such block, a tubular looper through which a second thread is passed, and means for moving the needle and the looper to interloop the looper thread with the needle thread, substantially as set forth.

3. The combination in a machine for sewing books, of a signature holding bar and means for moving the same, a frame and needle block removably connected to the cross head of the frame, a semi-circular eye-pointed needle and needle shaft carried by such block, a tubular looper through which a second thread is passed, and means for moving the needle and the looper to inter-loop the looper thread with the needle thread, a vertically acting loop spreader, and means for actuating the same, substantially as set forth.

4. The combination in a machine for sewing books with the signature holding bar and means for actuating the same, of a frame having a head parallel to the sheet holding bar, needle blocks, and attaching screws passing through the head frame for holding the needle blocks in the positions where they may be placed, semi-circular eye-pointed needles, needle shafts carried by the blocks, and a shaft parallel to the signature holding bar and at right angles to the needle shafts, and connecting gears, substantially as set forth.

5. In a machine for sewing books, eye-pointed semi-circular needles, shafts carrying such needles, blocks supporting the shafts, and a head frame with which the blocks are connected, a rock shaft, at right angles to the needle shafts, and gears for connecting the rock shaft and the needle shafts, substantially as set forth.

6. In a machine for sewing books having signature holding mechanism, eye-pointed semi-circular needles, shafts carrying such needles, blocks supporting the shafts, and a head frame with which the blocks are connected, a rock shaft, at right angles to the needle shafts and gears for connecting the rock shaft and the needle shafts, a tubular looper through which a second thread passes, a rock shaft and segmental gears for actuating the same, and mechanism for actuating the rock shafts, substantially as set forth.

7. The combination in a machine for sewing books, having signature holding mechanism, of a needle block, a shaft supported by the same, a semi-circular eye-pointed needle, and mechanism for actuating the needle shaft and needle, a tubular looper through which a second thread passes, and means for actuating the same, a vertical loop spreader, a plunger, cam groove, pin, and spring for raising the loop spreader and partially rotating the same, a rock shaft and spreader bar for actuating the loop spreaders, substantially as set forth.

8. The combination in a machine for sewing books having the stitch forming mechanism of a signature bar, end bars for the same, a rock shaft, and links connecting the rock shaft with the end bars of the signature frame, a cam for raising and lowering the links and signature frame, a cam and links connected with the signature frame for swinging the same, substantially as set forth.

9. The combination in a machine for sewing

books having stitch forming mechanism of a signature bar, end bars for the same, a rock shaft, and links connecting the rock shaft with the end bars of the signature frame, a cam for
 5 raising and lowering the links and signature frame, a cam and links connected with the signature frame for swinging the same, guide segments at the ends of the signature bar, stationary pivots for the same, and guide blocks
 10 intervening between the guide segments and ends of the signature bar, substantially as set forth.

10. The combination in a book sewing machine having stitch forming mechanism with
 15 the signature bar and mechanism for moving the same, of stationary blocks notched at their under sides for receiving the ends of the signature bar as the same is lifted, substantially as set forth.

20 11. The combination in a machine for sewing books with the signature bar and the sewing mechanism and means for actuating the same, of a guide bar beneath which a strip of muslin or other material is passed to be sewed
 25 to the signatures, and slats introduced into the folds of the muslin or other material between one volume of sewed signatures and the next and beneath the needle blocks and below the threads that unite the signatures, substan-
 30 tially as set forth.

12. The combination, in a machine for sewing books, with the signature bar needle blocks and sewing mechanism, of ratchet wheels and pawls upon the needle blocks, such
 35 wheels being in contact with the folded edges of the signatures and turned by them as they are forced backwardly and sewed for preventing the sewed signatures springing forward

as the signature holding bar is removed, substantially as set forth. 40

13. The combination with the stitch forming mechanism and the signature bar in a book sewing machine and means for moving the same, of perforators with which the folded
 45 back edges of the signatures are brought into contact by the movement of the signature bar, substantially as set forth.

14. The combination with the stitch forming mechanism and the signature bar in a book sewing machine and means for moving
 50 the same, of perforators with which the folded back edges of the signatures are brought into contact by the movement of the signature bar, and a finger with which the signature bar comes into contact for giving motion to the
 55 parts of the perforating device as the signature bar is carried past the perforators, substantially as set forth.

15. The combination with the book sewing mechanism, of slats interposed between the
 60 signatures at intervals and having notches at their ends and a supporting bar and spring latches for holding the slats, substantially as set forth.

16. The combination with the signature bar
 65 and the book sewing mechanism of a slat and a sheet attached thereto and adapted to being placed upon the signature bar and sewed in between one volume and the next, substantially as specified. 70

Signed by me this 31st day of January, 1895.

CHAS. A. STURTEVANT.

Witnesses:

GEO. T. PINCKNEY,
 S. T. HAVILAND.