

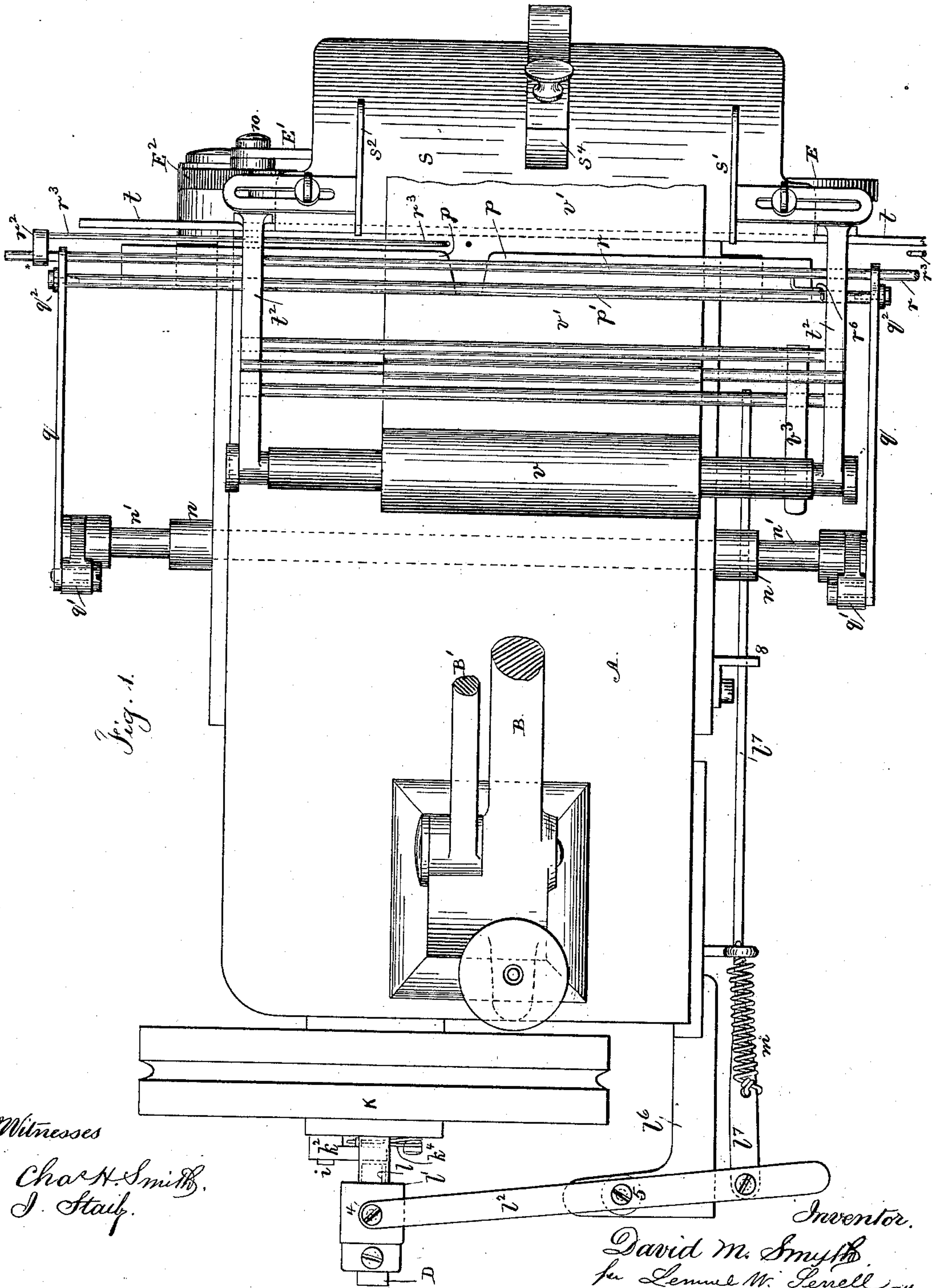
(No Model.)

4 Sheets—Sheet 1.

D. M. SMYTH.
BOOK SEWING MACHINE.

No. 378,467.

Patented Feb. 28, 1888.



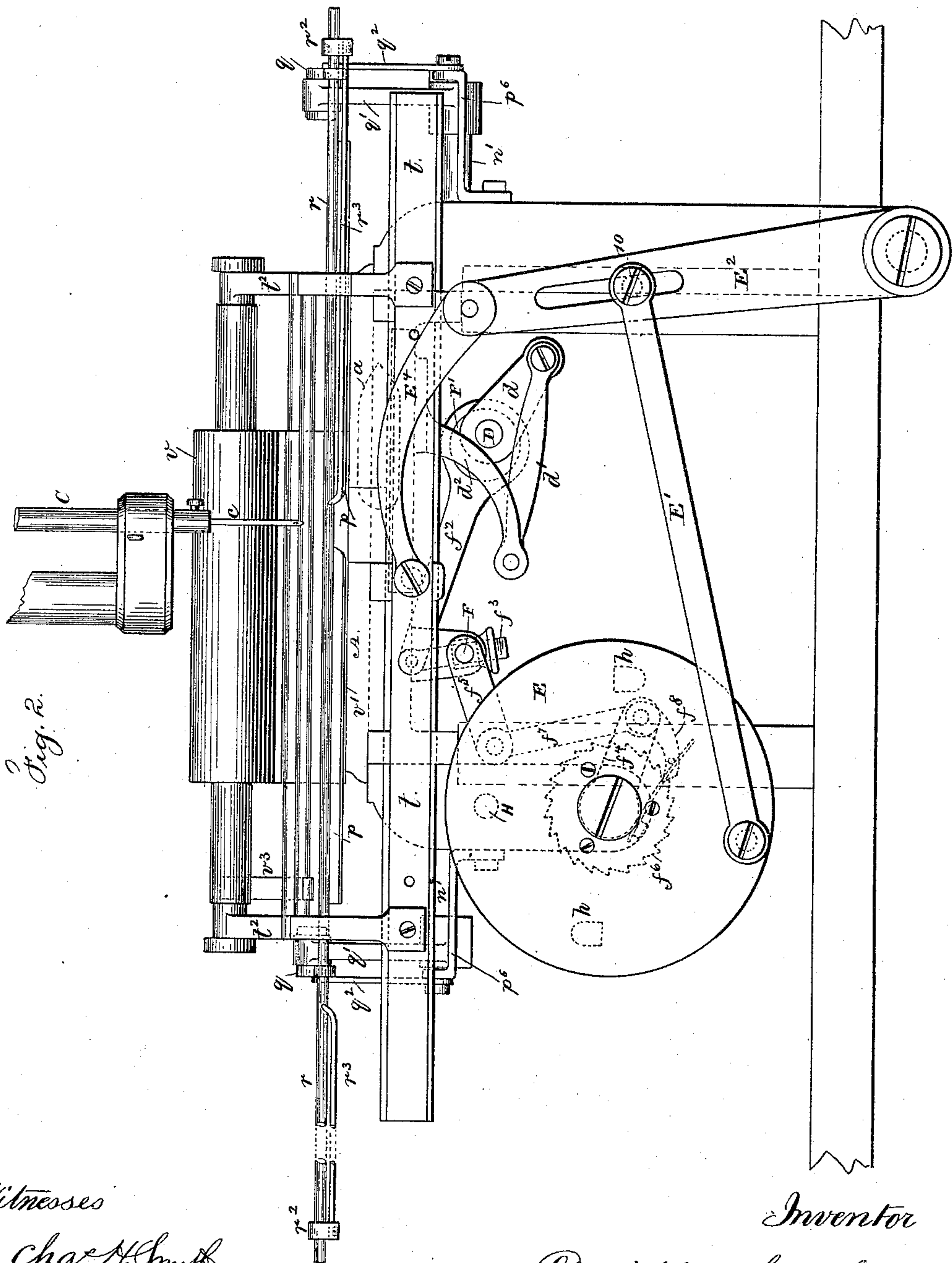
(No Model.)

4 Sheets—Sheet 2.

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Witnesses

Chas. H. Smith
J. Stacy

Inventor

David M. Smyth
per Lemuel W. Serrell atty

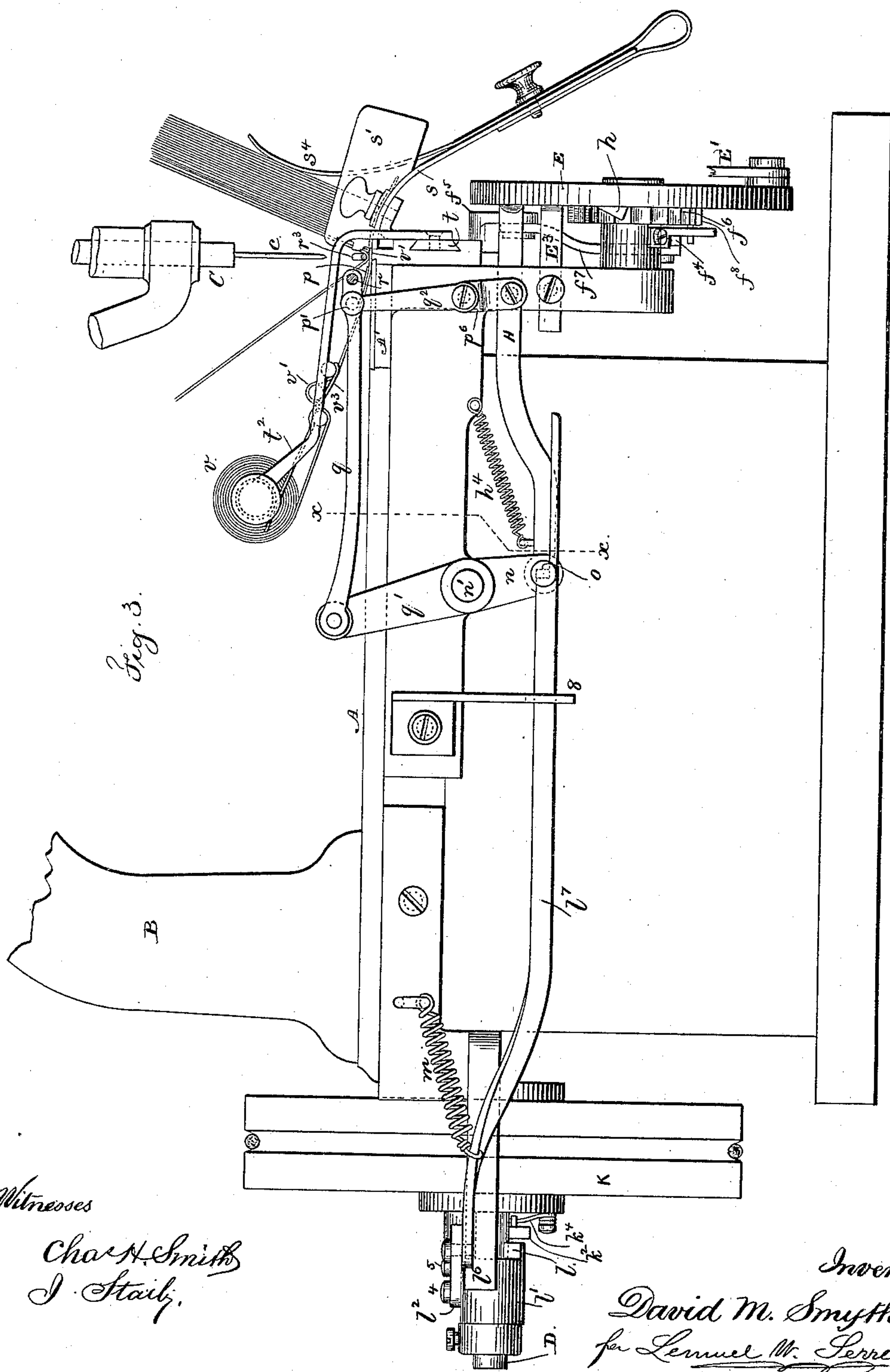
(No Model.)

4 Sheets—Sheet 3.

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N. PETERS, Photo-Lithographer, Washington, D. C.

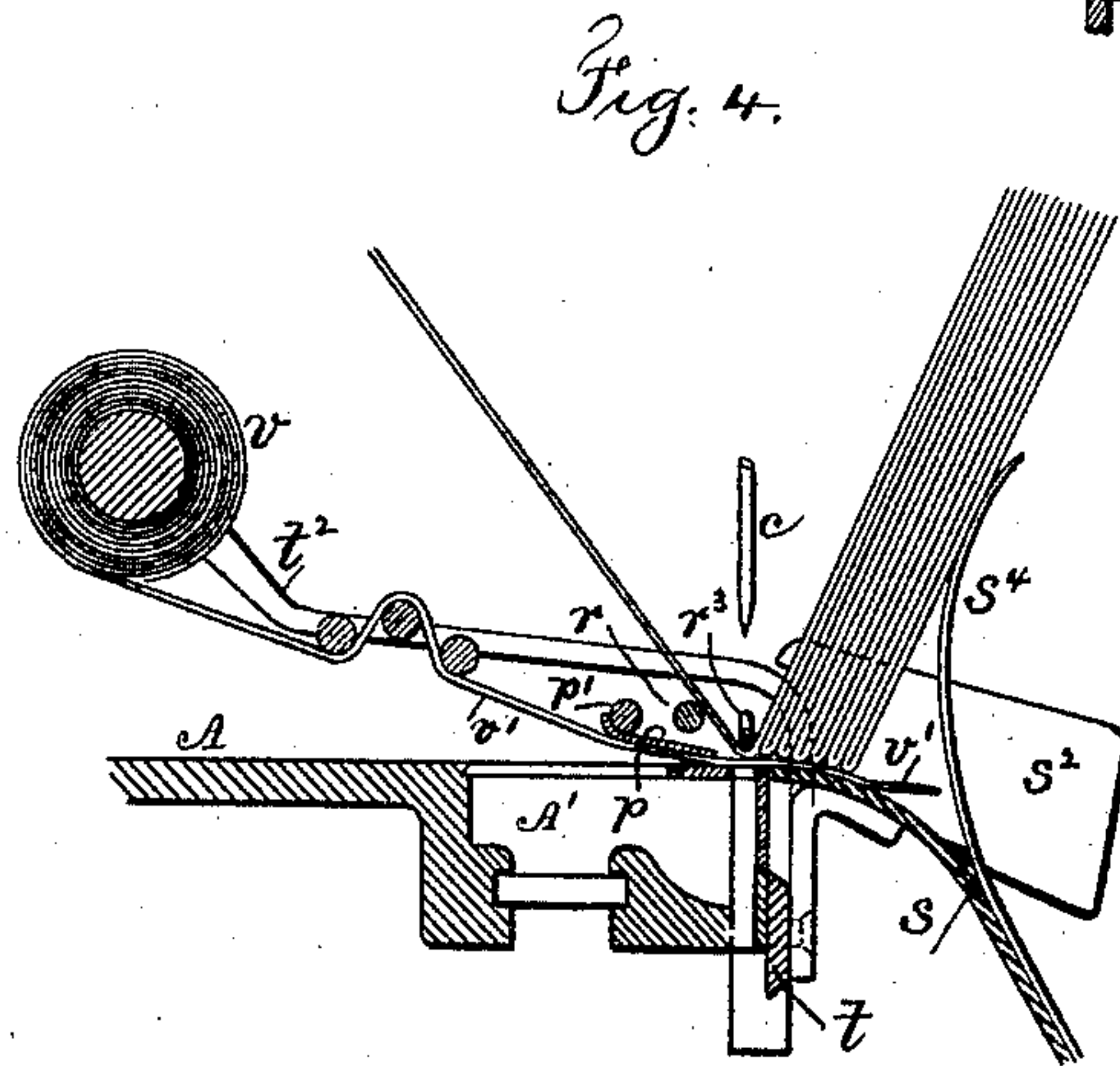
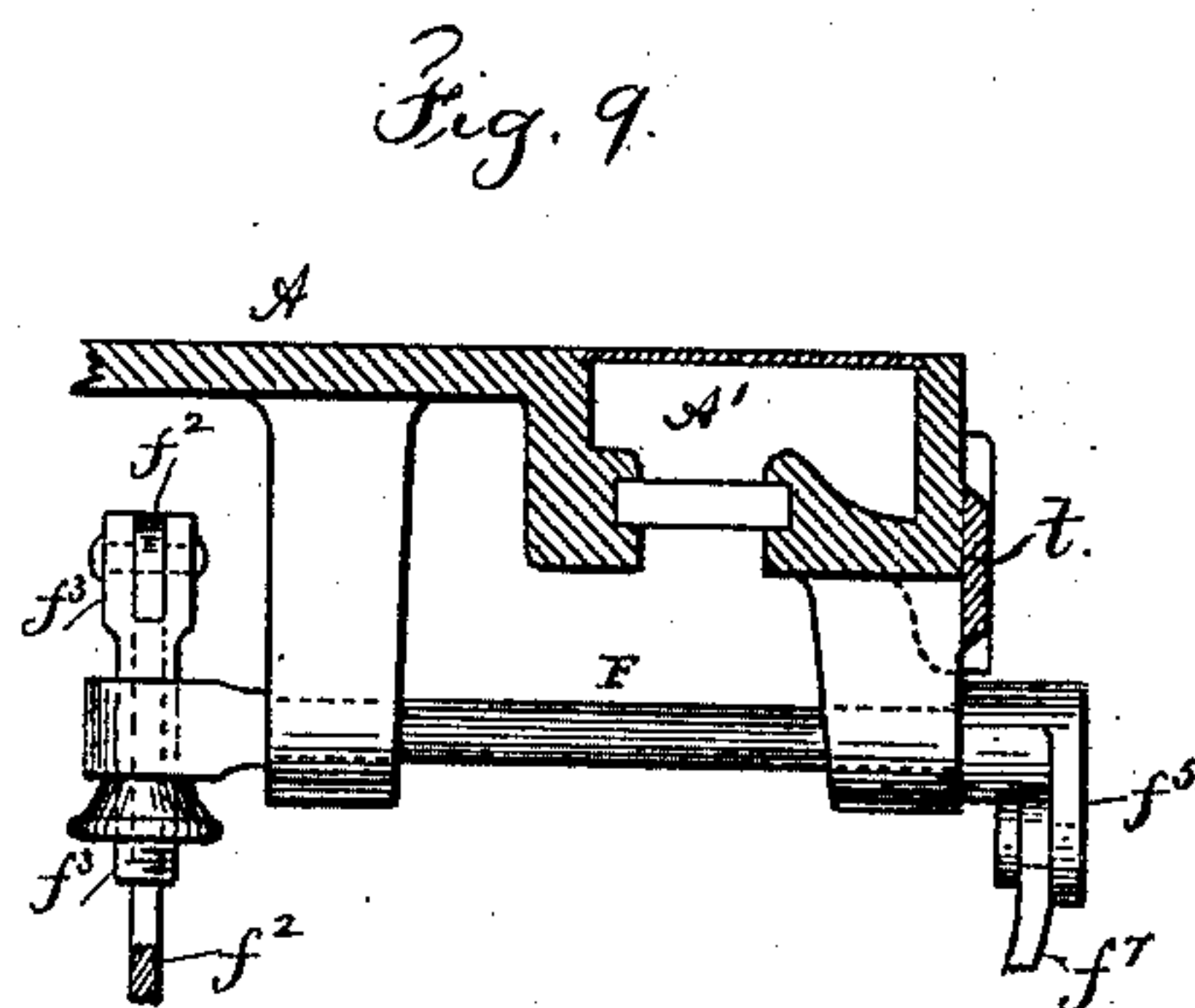
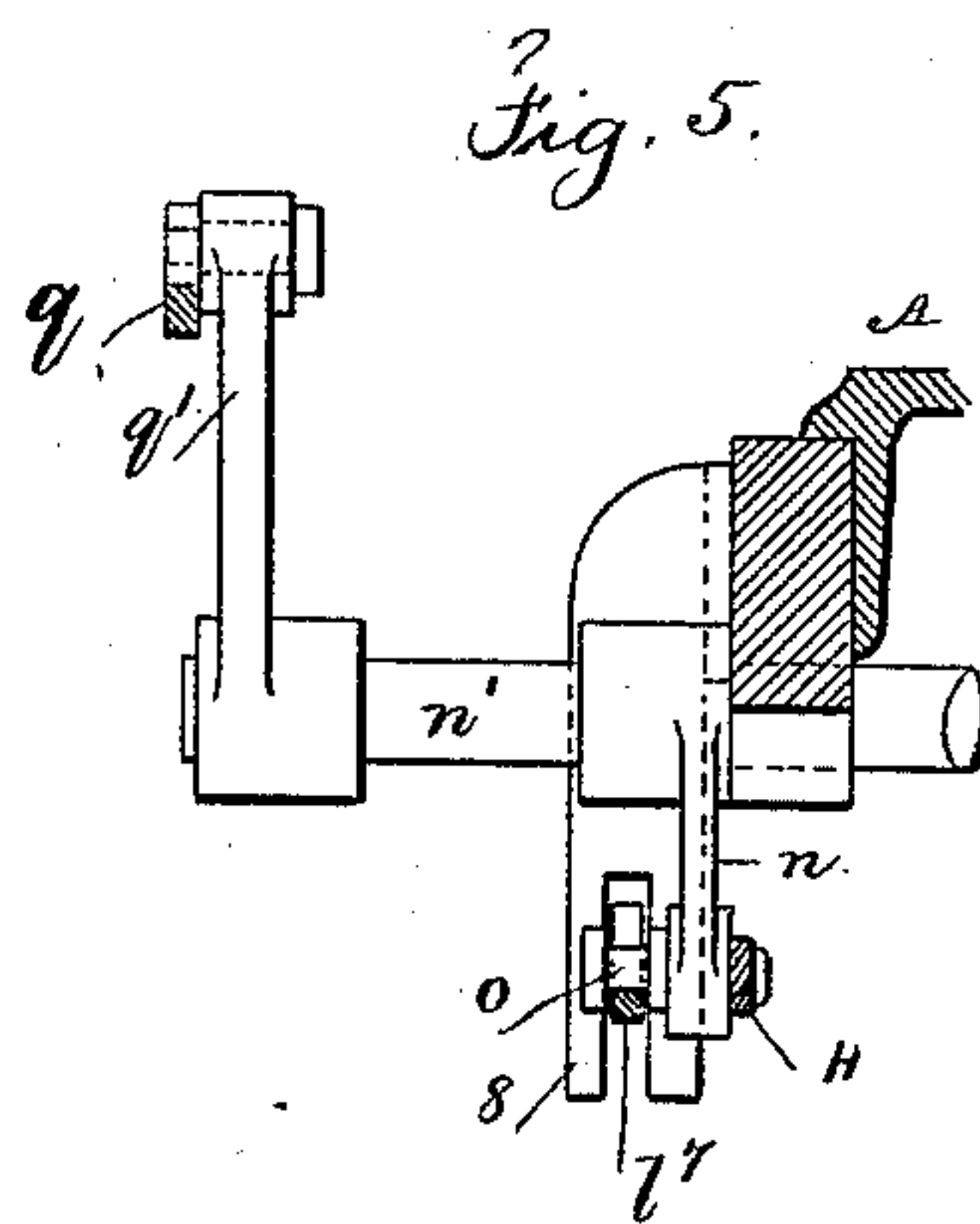
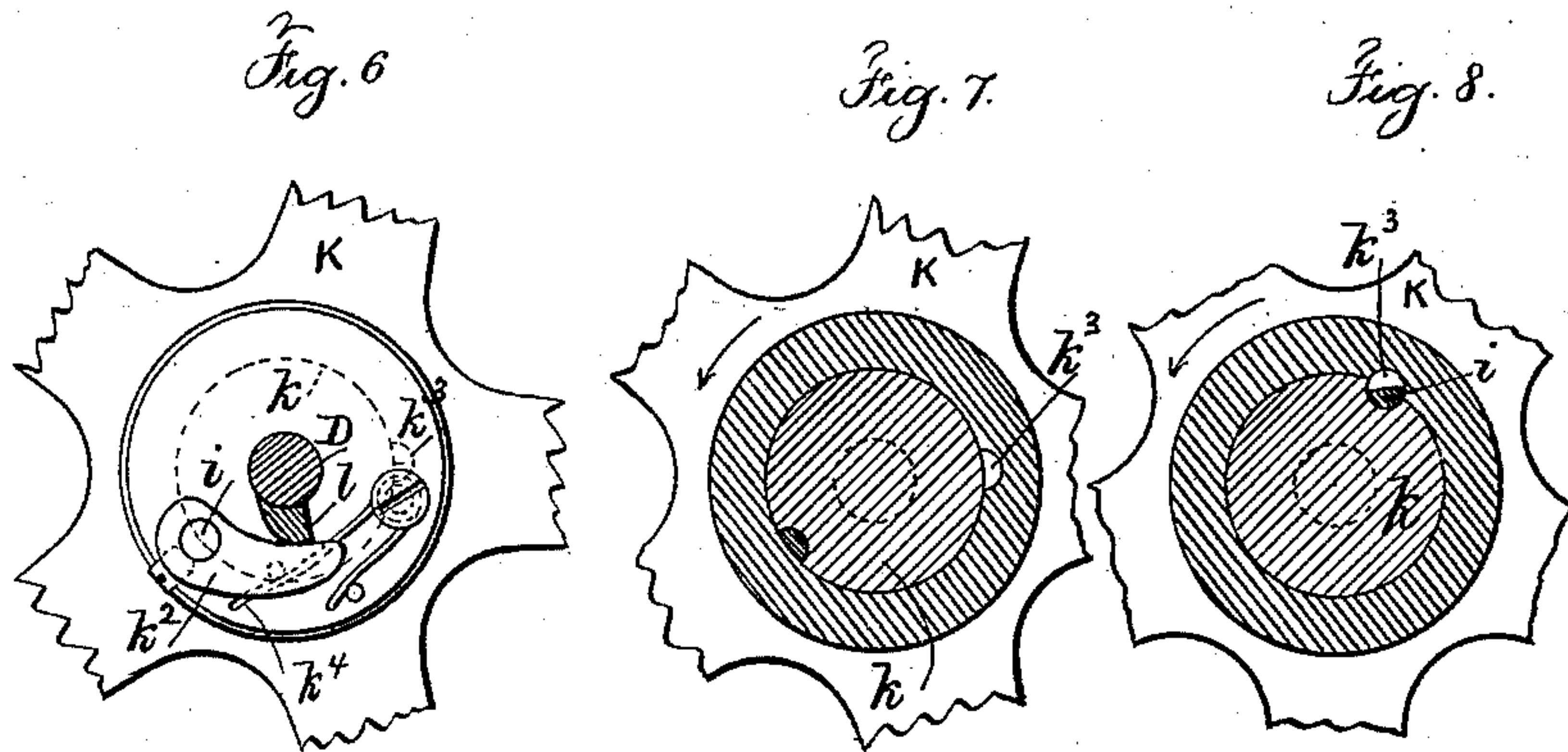
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4 Sheets—Sheet 4.

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J. Staley.

Inventor.

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per

Lemuel W. Perrell atty

UNITED STATES PATENT OFFICE.

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

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 378,467, dated February 28, 1888.

Application filed May 27, 1886. Serial No. 203,357. (No model.)

To all whom it may concern:

Be it known that I, DAVID M. SMYTH, of Hartford, in the State of Connecticut, have invented an Improvement in Machinery for Sewing Books, of which the following is a specification.

The folded sheets or signatures have been united by staples or by sewing to a strip of muslin or other fabric to form the volume.

My invention relates to peculiar devices and combinations of parts whereby the folded sheets or signatures are guided and held while being sewed to a strip of muslin or other fabric; also, to a peculiar table that supports the signatures after they are sewed, and which gives to the sheets such relative positions that the sheets that have been sewed do not get in the way of the additional sheets that are added successively as the sewing progresses. I also provide a stop-motion that is automatic, and serves to arrest the movement of the parts after each signature has been sewed, and the same is relieved and the machine started as soon as a fresh signature is in place.

In the drawings, Figure 1 is a plan view with part of the arm of the sewing-machine partially removed. Fig. 2 is a front elevation with the signature-holding table removed. Fig. 3 is a side elevation of the machine. Fig. 4 is a section of the sheet-holding table, guide-bars, and roll of backing fabric. Fig. 5 is a section at *x x*. Figs. 6, 7, and 8 represent the clutch for connecting the shaft to the driving-wheel in its different positions; and Fig. 9 shows the rock-shaft and arms for moving the feed-disk.

The bed A of the sewing-machine is provided with an arm, B, as usual, at the end of which is the head for the needle-bar C, and *c* is the needle. The needle-bar receives its motion from the lever B', or by any other well-known device.

Beneath the bed A there is the shuttle-raceway A', in which the shuttle *a* (shown by dotted lines in Fig. 2) is moved back and forth, as usual. The main shaft D is provided with a crank, *d*, from which the link *d'* extends to the shuttle-driver *d''* and gives motion to the same.

The devices for driving the shuttle form no

part of my invention, and I am not limited to the devices shown.

The disk E is rotated progressively. It turns once for each two signatures sewed, and by the connecting-rod E', crank E'', and link E''' moves the table holding the sewed signatures, as hereinafter described.

The rock-shaft F is moved by the eccentric F', rod *f''*, and crank-arm *f'''*, and at the end of the rock-shaft F, next to the disk E, there is a crank-arm *f'''* and link *f''* connected to the link *f''* and spring-pawl *f'''*, that acts upon ratchet-wheel *f'''* at the back of the disk E, so as to revolve the disk E progressively or by a step-by-step motion. The feed movement may be given by a clamp in place of the ratchet and pawl, and the extent of movement given each time to the disk E may be varied by adjusting the length of the arm *f'''* of the rock-shaft F, because the movement given to the disk E will be greater from the same throw of eccentric F' when the crank-arm *f'''* is shortened and the reverse when lengthened.

When the crank-arm *f'''* is lengthened, a larger number of stitches can be put into the same length of fold at the back of the signature, because the movement given to the pawl *f'''* will be less each rotation of the main shaft, and the ratchet-teeth can be smaller or a less number taken up each movement of the pawl. By changing the position of the crank-pin 10 the extent of motion given to the table and to the volume that is being sewed may be varied, so as to adapt the machine to signatures of different dimensions. The arm E''' extends from the bed A, and applies friction to the back of the disk E to prevent the disk moving by momentum or accidentally. As the table reaches its extreme movement in one direction, it has to be stopped for the insertion of a signature, and when it reaches the extreme movement in the other direction it has also to be stopped. I therefore provide two cam-studs, *h*, upon the back of the disk E at one hundred and eighty degrees apart, and these are placed so as to give end motion to the stop-bar H as soon as one signature has been sewed, and to stop the movements of the machine as each signature is sewed.

The driving-wheel K is loose upon a hub,

5 k , around the main shaft D, and there is a collar at each side of the driving-wheel to retain it in place, and within the hub k there is a clutch-key in the form of a bolt, i , with one side removed, and this clutch-key has a crank-arm, k^2 , upon its outer end, and there is a recess in the eye of the wheel K, as at k^3 , so that when the clutch-key is turned into the position shown in Fig. 8 such key is partially within said recess k^3 , and the wheel K, as it is rotated by power, revolves the main shaft D and runs the machine; but when the clutch-key is turned into the position shown in Figs. 6 and 7 it is entirely within the hub k , and the driving-wheel is free to continue rotating, but it does not move any part of the machine. The spring k^4 tends to move the crank-arm k^2 toward the shaft D and turn the clutch-key so that it couples the wheel K to the shaft D. Around this shaft D there is a loose sleeve, l' , having a finger, l . When this sleeve is moved endwise, the finger l is brought into the path of the arm k^2 , and as the latter runs under the finger the arm k^2 and bolt i are moved and the shaft D uncoupled from the driving-wheel. The parts are placed so that the main shaft D stops at a point where the needle is in its elevated position, so as to be out of the way of the signature as it is introduced, as hereinafter described, to be sewed when the machine is again started.

30 The sleeve l' is united to the lever l^2 by the pivot-screw 4, and the lever l^2 has its pivot 5 upon the bracket l^6 , and at the other end is the sliding stop-bar l^7 , that is guided by the stationary fork 8, and acted upon by the spring m to raise the bar and draw it forward and toward the disk E.

40 The stop-bar H, before named, is supported by the frame of the machine, through which it slides endwise, and at the other end it is pivoted to the crank-arm n upon the rock-shaft n' , and the crank-pin o of this arm n projects over the sliding stop-bar l^7 . There is a notch or offset in this stop-bar l^7 , so that when one of the cam-studs h upon the disk E presses the stop-bar H endwise, as aforesaid, when the sewing of one signature is completed, the crank-arm n is moved and the stop-bar l^7 pressed along endwise, and by the lever l^2 the sleeve l' is slipped along on the shaft D, the finger l brought in the path of the arm k^2 , and this latter is moved by contact with the finger, and the clutch-bolt i is turned and the shaft D liberated from the driving-wheel, and the machine stops.

55 When a signature has been inserted into the machine and it is ready to be sewed, the operator simply presses down the stop-bar l^7 , unlatching it from the crank-pin o , and the spring m moves the stop-bar l^7 endwise, and by the lever l^2 draws back the sleeve and the finger l , and the clutch-bolt i is moved by its spring k^4 and connects the driving-wheel to the shaft, and the machine commences to sew as before.

65 There is a sheet-holder upon the edge of the sewing-machine in the form of a frame. The

foot-pieces p are made of metal plates lying upon the bed of the sewing-machine. These are attached at their back edges to the bar p' , that extends across the machine, and at its ends there are links q , pivoted thereto and to the crank-arms q' , that are affixed to the rock-shaft n' , before described, and there are also links q^2 , pivoted at their upper ends to the bar p' , and at their lower ends to arms p^6 , that extend out from the bed A. These links guide the bar p' in its movements and hold it up. There is also a bar, r , that is parallel with the bar p' , and sliding freely through the ends of the links q . This bar r is considerably longer than the bar p , and at each of its ends there is a head-piece or arm, r^2 , carrying the signature-needle r^3 . Only one of these signature-needles is fully shown in Fig. 1, but the distance between the inner end of one and the inner end of the other is as great as the length of the back fold of the signature, so that there is room for inserting the signatures between the ends of the needles r^3 . There is a guide-finger, r^6 , extending out from the slide-bar r and resting upon the bar p' . This finger forms a guide as the bar r^3 is moved endwise, and prevents the round bar r being turned or the needles r^3 lifted from the bed.

The table s , holding the signatures after they are sewed, is provided with movable gages $s' s^2$, which are adjusted to the proper distance apart for receiving the back folds of the signatures between them. This table s receives its support from the slide-bar t , that is within supports at the front of the sewing-machine. The link E^4 , from the lever E^2 , is connected to this slide t , so as to be moved by the same, and carry the signatures along under the needle as the sewing progresses. From the slide-bar t the arms t^2 reach backward and support the roll v , of open muslin or other suitable fabric, v' . This fabric is passed beneath the foot-plates p and lies upon the table s . There is a friction-spring, v^3 , acting against the roll v , to prevent the same turning too easily and to apply a tension to the fabric v' as the same is drawn off.

115 The attendant inserts a folded signature with the back downward upon the sewing-machine bed. The signature is partially open, and at one portion it is between the guides $s' s^2$. At the time of inserting the sheet or signature the table s is at its extreme movement in one direction, and the sheet does not have to be passed beneath the needle. The operator now moves the bar p and the sheet-holding needles endwise, running one needle, r^3 , into the fold of the signature, as seen in Figs. 1 and 4, to keep the signature down to place on the bed.

125 The two signature-needles are in line with the sewing-needle, and either one can be moved up toward the sewing-needle, but its end movement is arrested by the arm r^2 coming into contact with the link q before the end of the signature-needle reaches the sewing-needle; hence the signature-needle will remain as a guide to the signature as the table and signa-

tures are moved along and sewed by the ordinary shuttle-stitch, the signature being moved along beneath its stationary needle as the sewing progresses, and the signature is sewed to the fabric v' that intervenes between the back fold of the signature and the bed. As soon as the signature has been sewed and the needle rises at the last stitch, the table s is moved to its extreme in either direction, one of the cams h presses back the stop-bar H and stops the sewing, as aforesaid, and at the same time the rock-shaft n' and arms q are moved, and the bar r and signature-needles are carried forward to move the sewed sheet away from the line of the needle and give room for the introduction of the next signature. The parts are to be so timed that the cam h passes entirely across the end of the stop-bar H before the machine is entirely stopped; hence the spring h^t is free to act in swinging the rock-shaft n' and drawing the bar r back to give the necessary space for the insertion of the next signature.

The spring-support s^t , fastened to the table by a screw passing through a slot in the table, is used to keep the sewed signature from falling over, and this is moved from time to time as the volume increases in size. When one or more volumes have been sewed, the fabric is cut to separate one volume from the next.

The surface of the table s at the place occupied by the several signatures is preferably convex, so that the signatures will occupy the inclined position shown in Figs. 3 and 4. This gives room for the easy insertion and opening of the successive signatures for sewing.

I claim as my invention—

1. The combination, with the sewing mechanism, of a table and arms carrying a roller and a strip of fabric, a feed mechanism to move the table progressively, the signature-needles, the bar r^s , and arms r^2 , carrying the signature-needles, substantially as set forth.

2. The combination, with the sewing mechanism and the table for holding and moving the signatures, of a feed mechanism for acting

upon the table, and the disk E , cam-studs h , stop-bar H , the bolt i , crank-arm k^2 , and mechanism, substantially as specified, connected to the stop-bar H and operating the arm k^2 , for stopping the machine automatically at the completion of the sewing of each signature, substantially as set forth.

3. The combination, with the sewing mechanism and the table for holding and moving the sheets, of the mechanism for moving the table, the signature-needles, the bar for holding the same, and the cam-disk E , stop-bar H , rock-shaft n' , cranks n and q' , and links for moving the sewed signature away from the path of the needle, substantially as set forth.

4. The combination, with the sewing mechanism and the table for holding and moving the signatures, of the disk E , link E' , lever E^2 , link E^t , and slide t , to hold and move the table, the step-by-step mechanism to rotate the disk E , the cams h , stop-bar H , crank n , notched rod l' , lever l^2 , sleeve l' , finger l , and clutch-bolt, main shaft D , and driving-wheel K , substantially as set forth.

5. The combination, with the sewing mechanism and means for moving back the successive signatures after being sewed, of a table having a convex surface upon which the folded back edge of the sewed signatures are supported, substantially as and for the purposes specified.

6. The combination, with the sewing mechanism, means for moving back the sewed signatures, a table for supporting the sewed signatures, and means for reciprocating the table, of the signature-needle r^s , for keeping open and holding each signature in place while being sewed, substantially as and for the purposes specified.

Signed by me this 19th day of May, A. D. 1886.

DAVID M. SMYTH.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.