

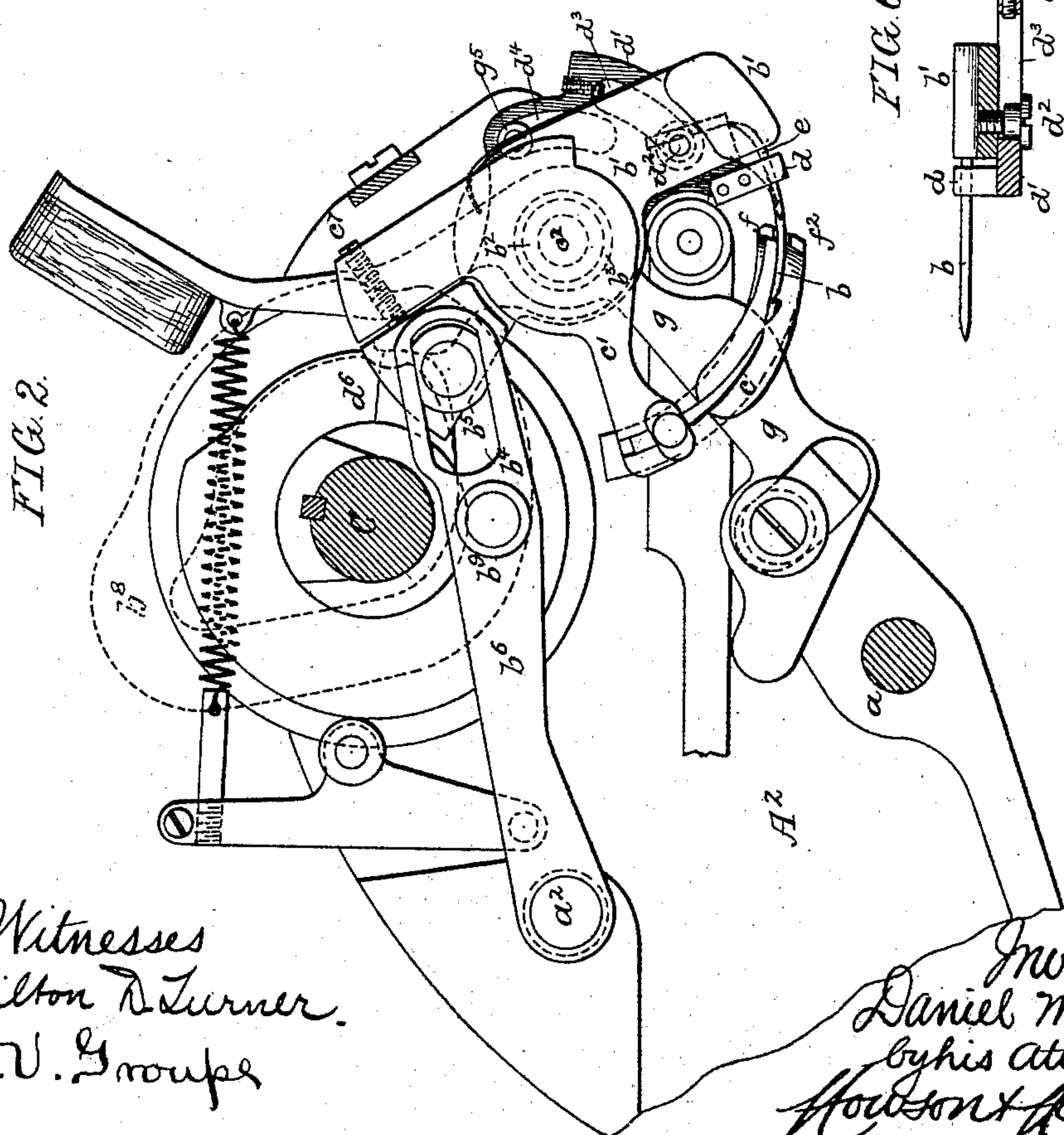
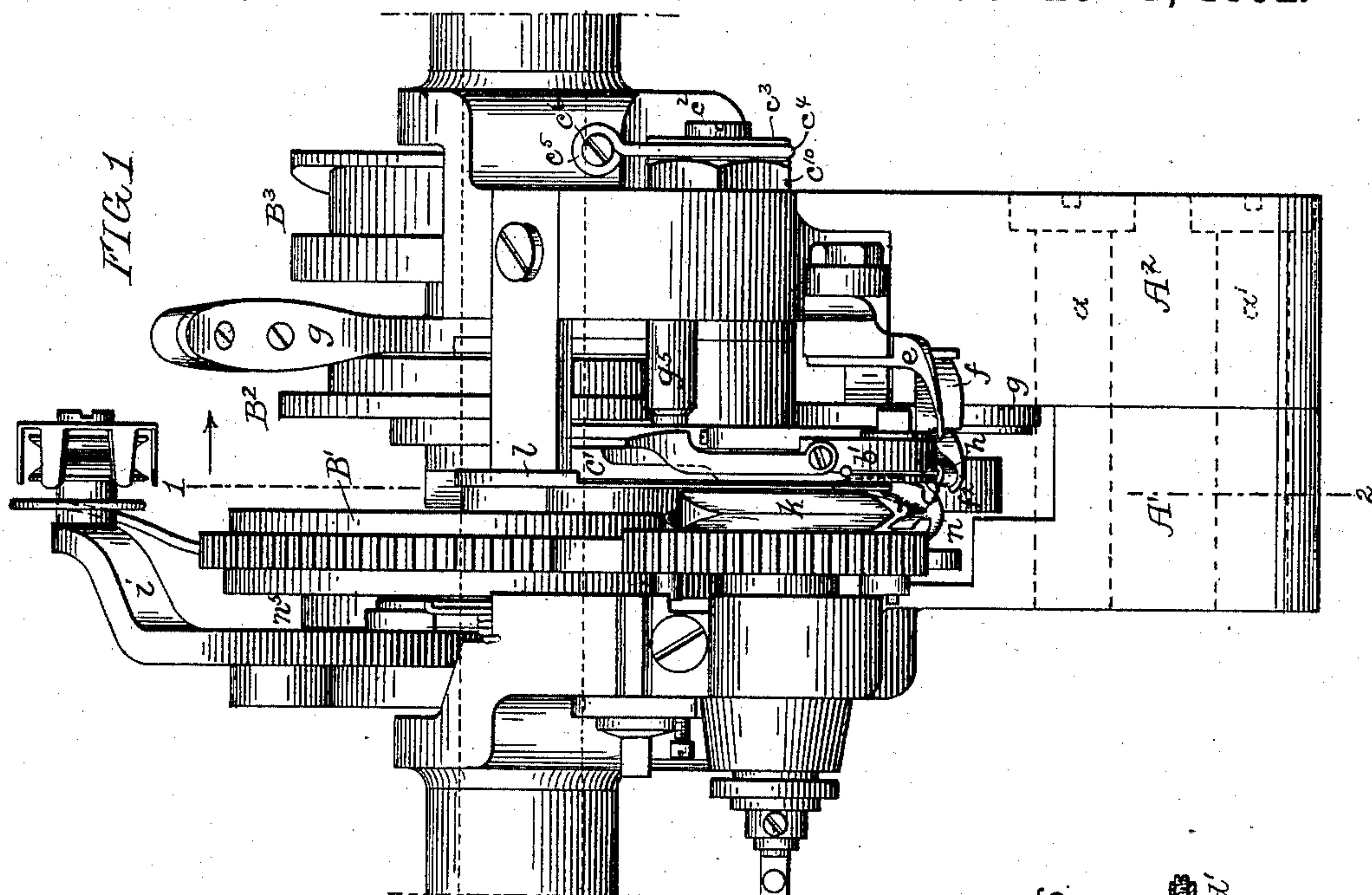
(No Model.)

3 Sheets—Sheet 1.

D. MILLS.
BOOT OR SHOE SEWING MACHINE.

No. 477,436.

Patented June 21, 1892.



Witnesses
Hamilton Turner.
A. V. Groupe

Inventor
Daniel Mills
by his Attorneys
Hobson & Fowler

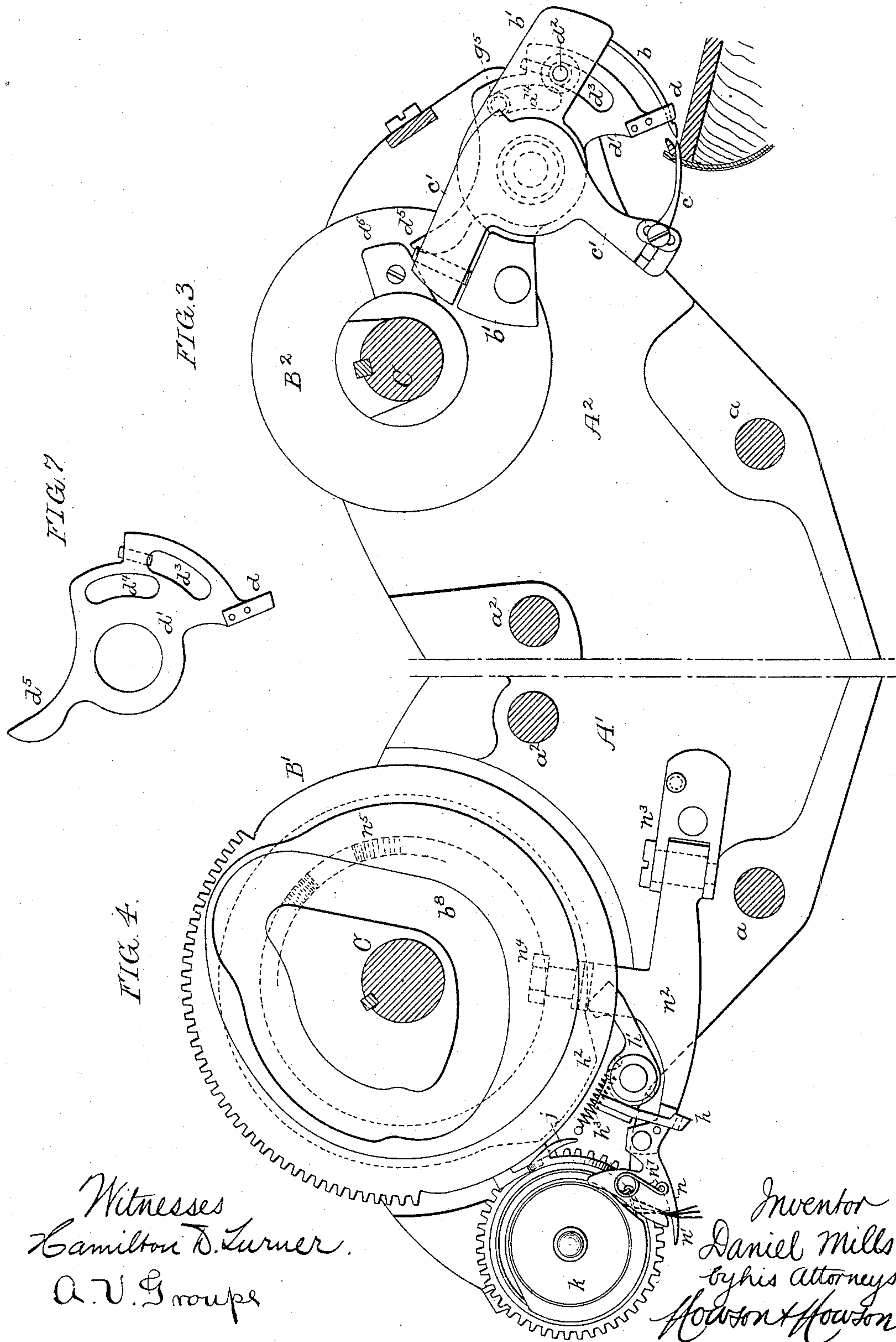
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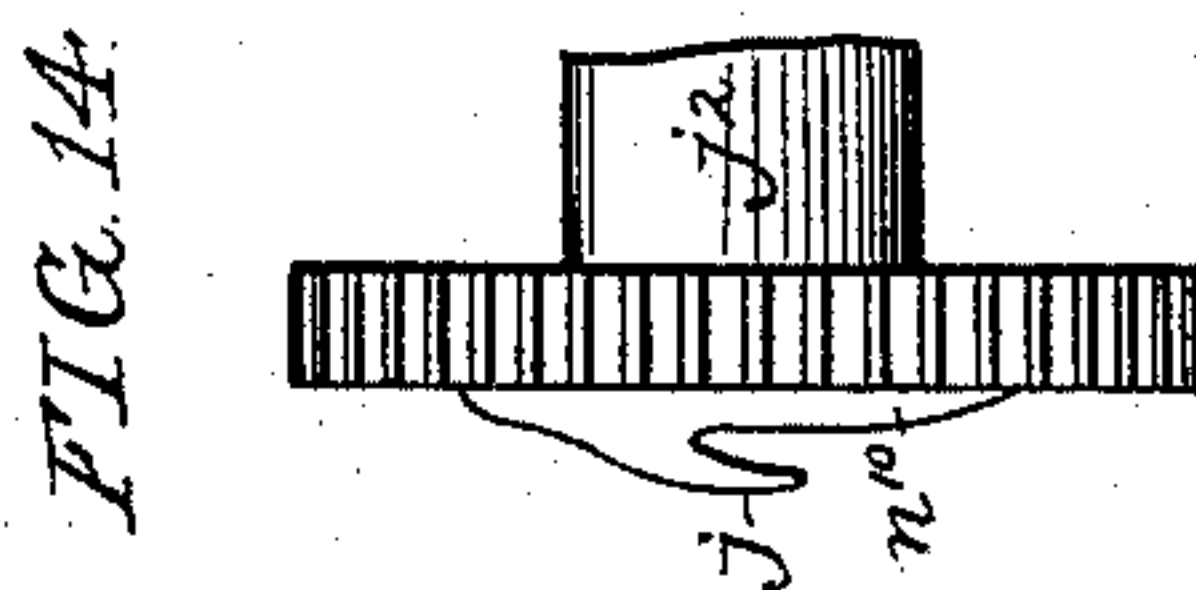
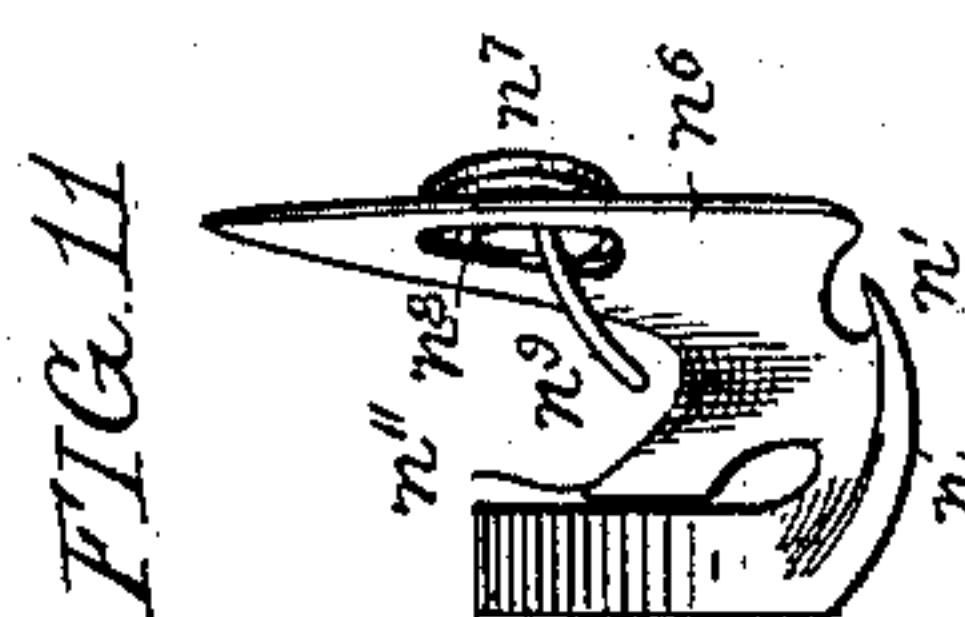
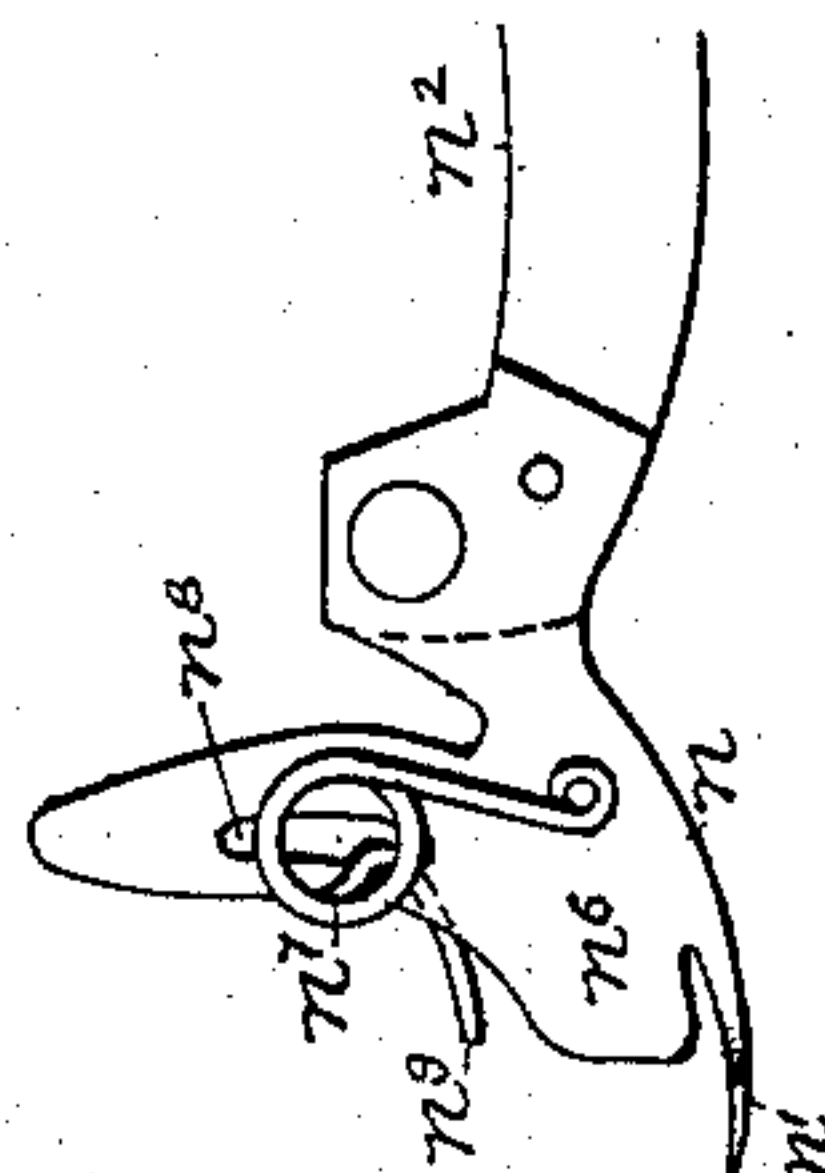
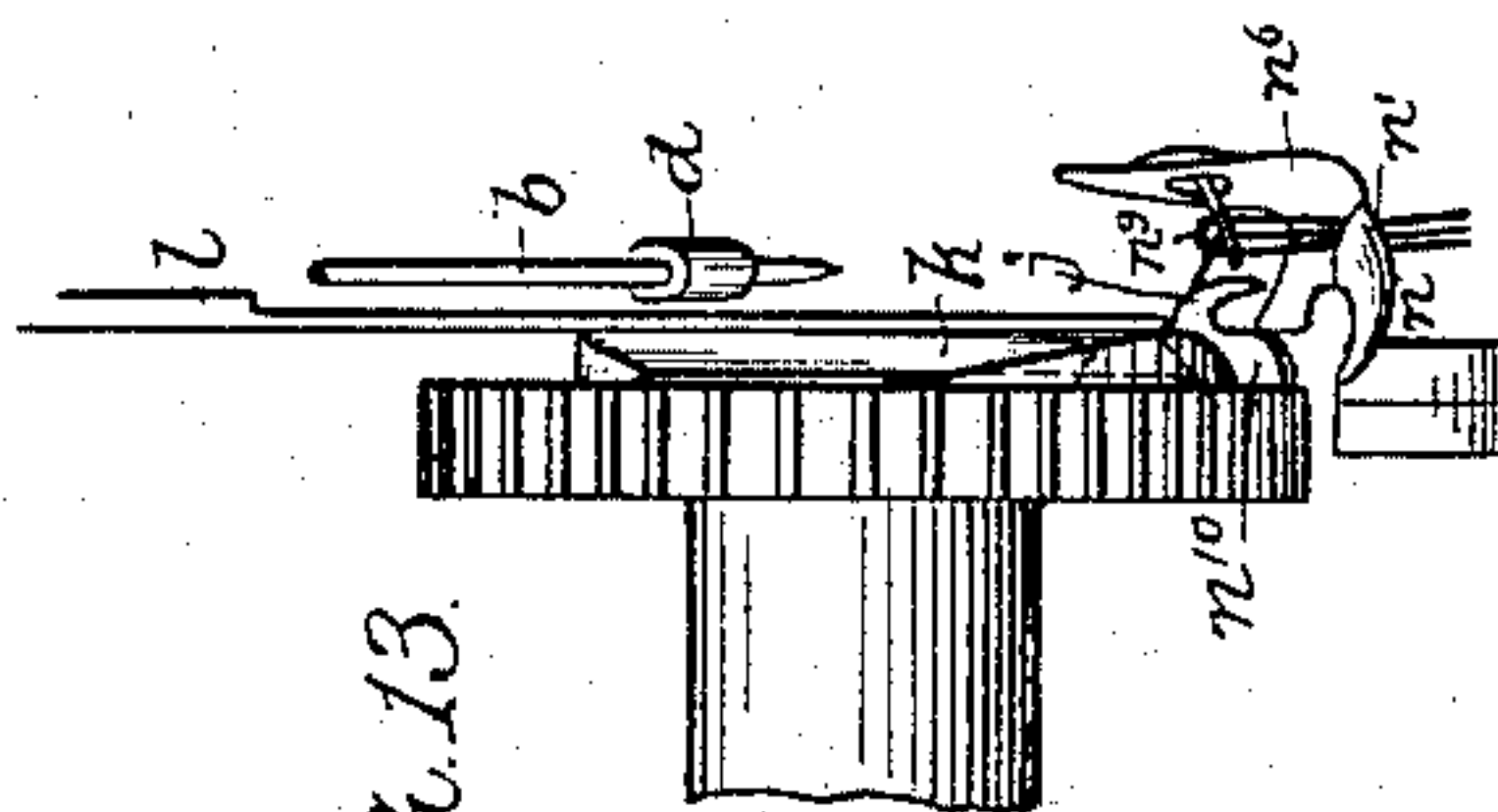
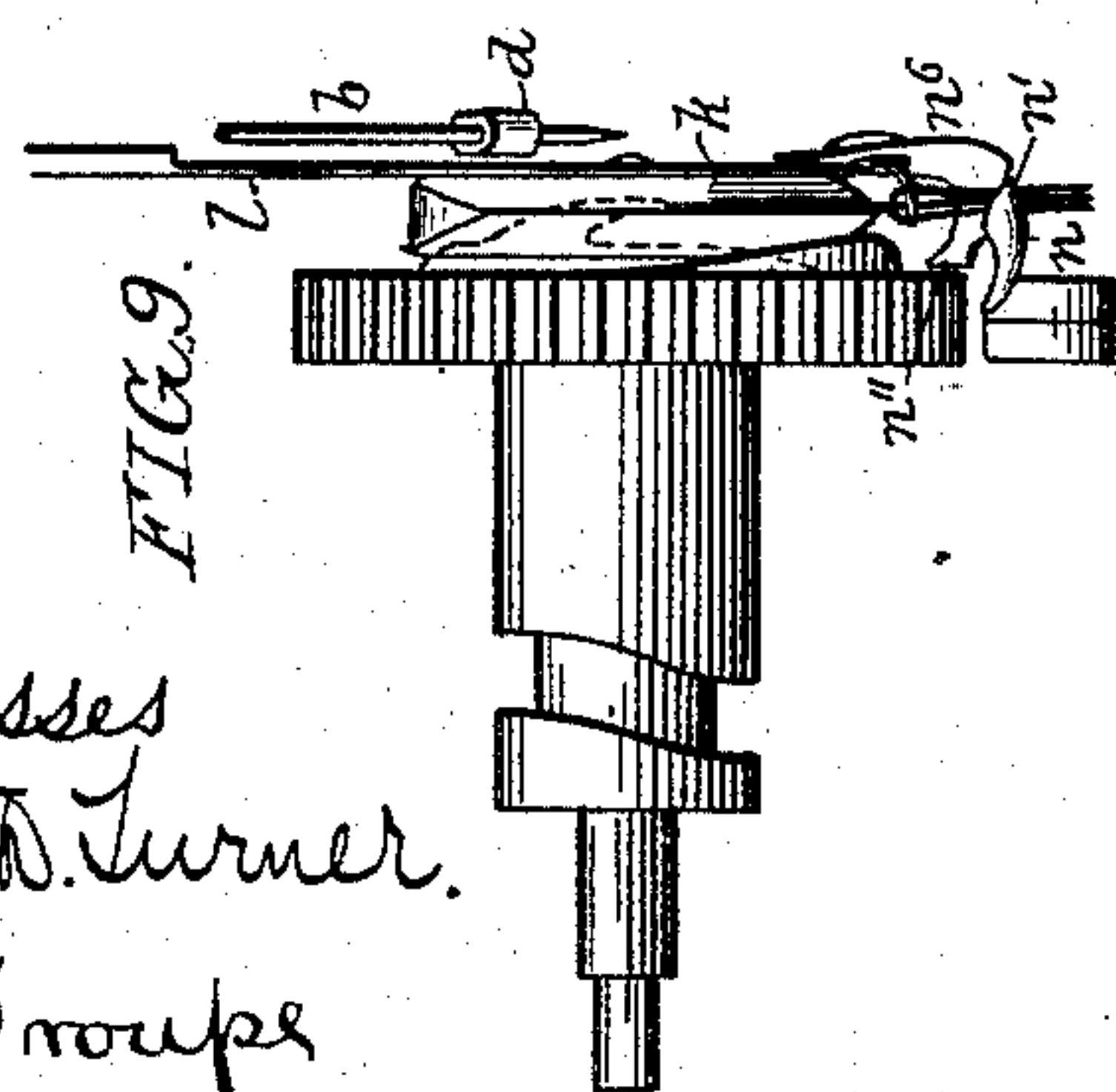
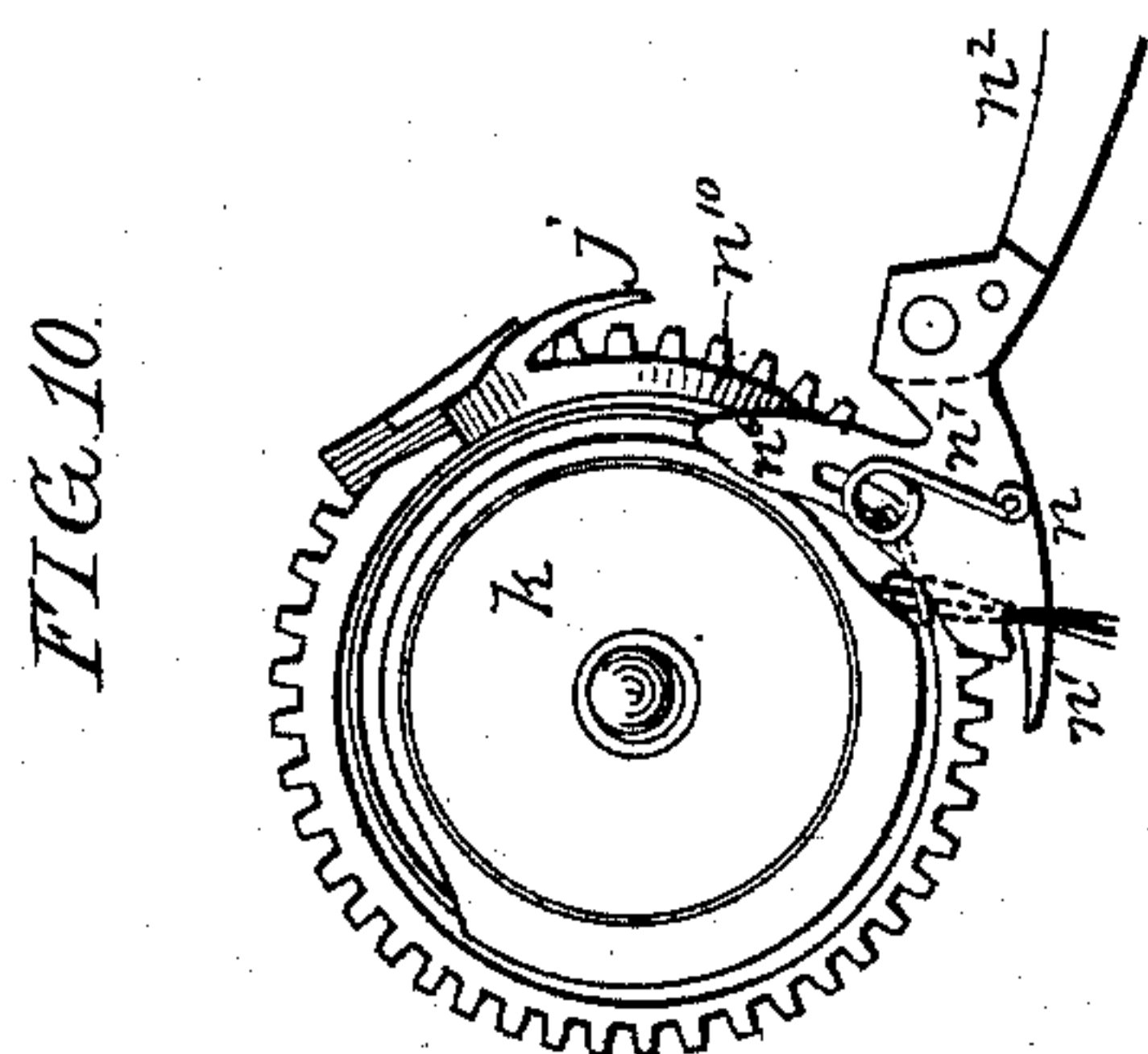
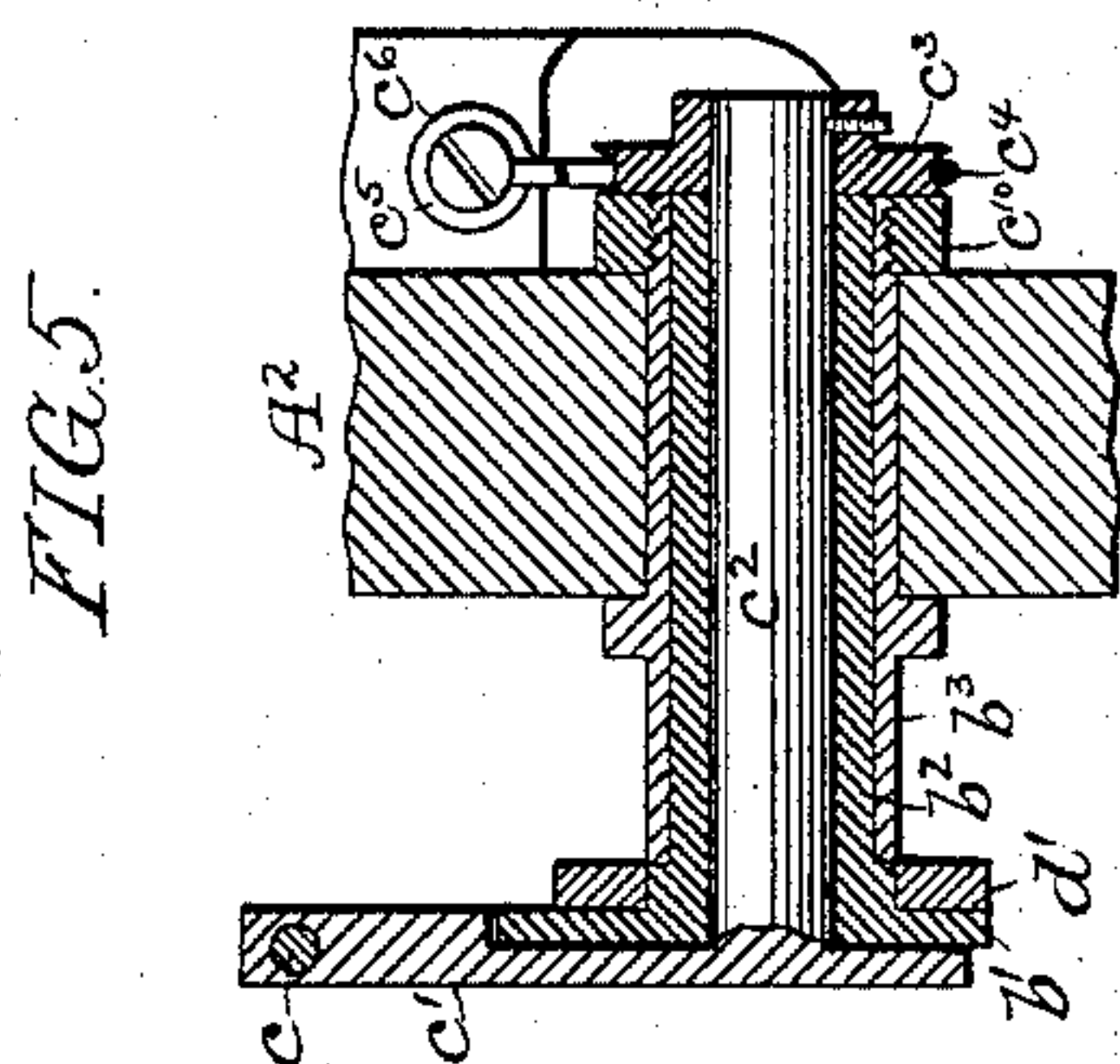
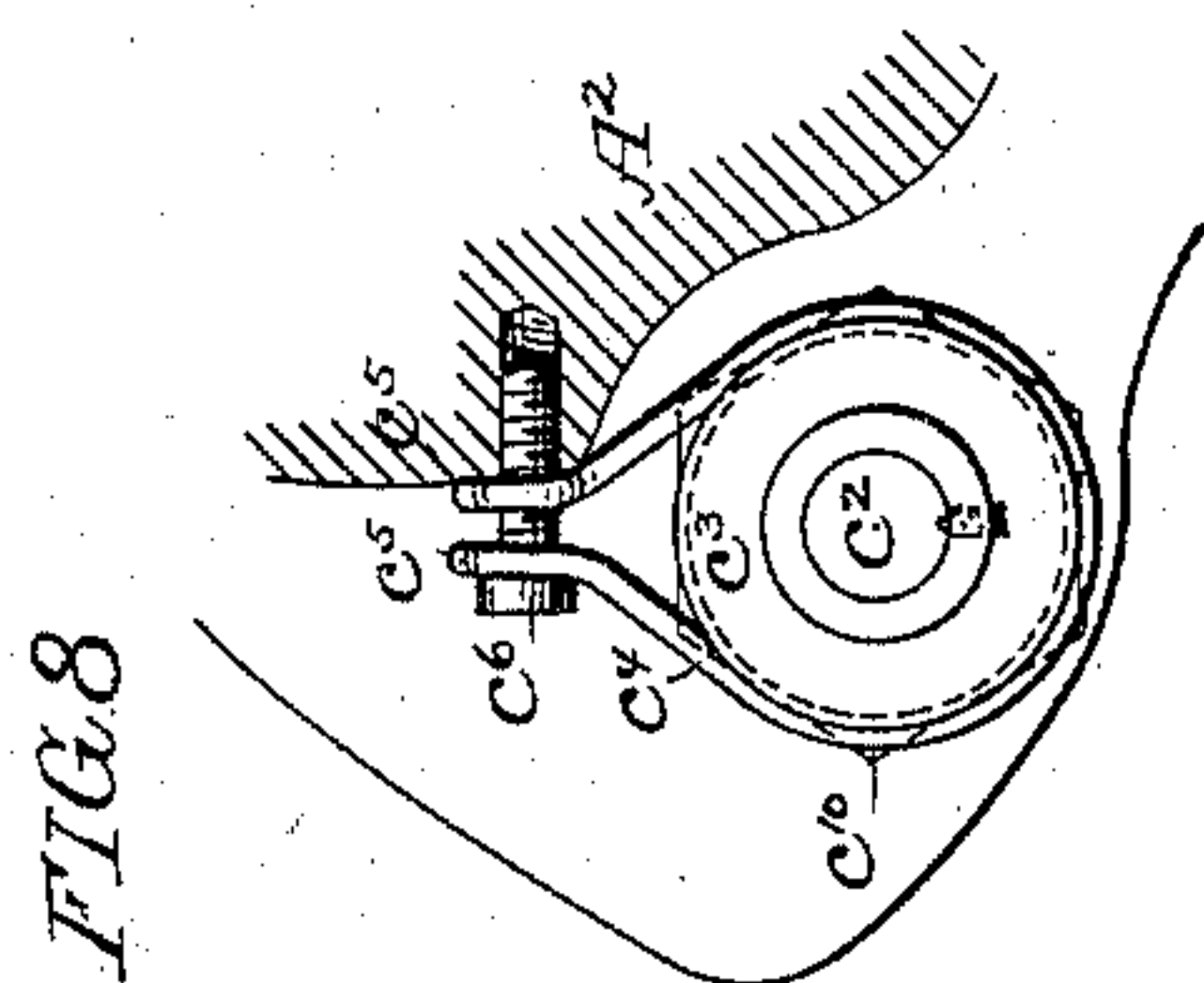
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3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

DANIEL MILLS, OF PHILADELPHIA, PENNSYLVANIA.

BOOT OR SHOE SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 477,436, dated June 21, 1892.

Application filed October 6, 1891. Serial No. 407,943. (No model.)

To all whom it may concern:

Be it known that I, DANIEL MILLS, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain
5 Improvements in Stitch-Forming Mechanism for Boot or Shoe Sewing Machines, of which the following is a specification.

My invention relates to improvements in machines whose general character is set forth
10 in my United States Patents Nos. 93,731, 96,944, and 97,951, of 1869, No. 101,644, of 1870, and No. 127,423, of 1872, and English Patents No. 1,237 of 1870, Nos. 937 and 2,899 of 1871,
15 No. 4,279 of 1875, and No. 1,160 of 1876. The machines described in the specifications of said Letters Patent are designed for sewing
20 a welt to the insole and upper, for stitching the outsole to the welt, and also for sewing the soles to the uppers of "turned" shoes, no one of the machines, however, being adapted
for the proper performance of all of these different classes of work. The characteristic
25 features of the mechanism in said machines are a curved needle which has a reciprocating motion or partial rotation to and fro around an axis and operates either with or
without an awl and with a needle-shield, a looper, a feed-dog, and a back or bottom gage, and in the case of the lock-stitch machines
30 with a discoidal bobbin, a hook for carrying the thread over the same, and other devices actuated by suitable cams, the whole of the mechanism being supported by a strong head placed on a stand in such a manner as to permit
35 the work to be properly presented to the sewing mechanism.

My present invention relates to a machine in which all of the kinds of work above noted may be performed, the improvements comprising
40 certain devices for insuring such rigid guidance of the needle-shield as will maintain it at all times in proper relation to the needle; also, mechanism for operating the needle and awl, so that the same will pass
45 through the work while point to point on the return movement of the awl; also, a device for controlling the operation of the needle-shield more effectively than before, and finally a laterally-moving thread-holder for
50 carrying the needle and bobbin threads out of the path of the rotating hook during a portion of the rotation of the latter, said thread-

holder also serving as a guide to hold the needle and bobbin threads in a certain position in respect to the work while said needle-
55 thread is being taken over the bobbin by the rotating hook.

In the accompanying drawings, Figure 1 is a front view of sufficient of the machine to
60 illustrate my present invention. Fig. 2 is a transverse section on the line 1 2, Fig. 1, looking in the direction of the arrow. Fig. 3 is a similar view with all parts of the machine removed, except those to which my present invention relates, and these parts being shown
65 in a different position from that of Fig. 2. Fig. 4 is a sectional view on the line 1 2, Fig. 1, but looking in the opposite direction; and Figs. 5 to 14 are detached views of parts of
70 the mechanism.

Like letters indicate corresponding parts in each of the figures.

The head is composed of two parts $A' A^2$, fitted and bolted together by bolts $a a' a^2$, the
75 various parts of the operating mechanism being mounted on said head, the sides $A' A^2$ of which have bearings formed in them for the reception of the main shaft C.

The needle is shown at b , c being the awl; d , the needle-shield; e , the feed-dog; f , the feed
80 back or bottom gage; f^2 , the needle back gage; g , the locking-arm for the back gages; h , the looper; i , the pull-back; j , the hook for carrying the thread over the discoidal bobbin k ; l , the bobbin-guard, and n the laterally-moving
85 thread-carrier.

The construction and combination of the parts to which my present invention relates and the devices for giving to each its peculiar motion in such manner that they will all
90 co-operate in effecting the required operation may be clearly understood by the following description: The needle-lever b' is formed or rigidly fixed upon the end of a shaft or axis
 b^2 , which is supported so as to vibrate freely
95 in a sleeve b^3 , secured to the part A^2 of the frame or head, as shown in Fig. 5, said lever b' being provided with a flattened roller b^5 ,
Fig. 2, for adaptation to the slot b^4 in the end of the operating-lever b^6 , (see Fig. 2,) said lever
100 b^6 being hung to the bolt a^2 and vibrated by a cam-groove b^8 in the disk B' , acting on a roller b^9 , carried by the lever, as shown by dotted lines in Fig. 2, the cam being also

shown by full lines in Fig. 4. The needle b is mounted on one end of the lever b' and is secured thereto by a suitable clamping-screw. The needle-shield d is secured to the needle-shield lever d' , and the latter is mounted so as to turn freely on the hub or shaft of the needle-lever b' , so as to swing concentrically with the axis of said lever, and said needle-shield lever is held in close working contact with the needle-lever by the screw d^2 , this screw passing through a segmental slot d^3 in the lever d' , as shown in Figs. 2, 3, and 6. Another segmental slot d^4 in the lever d' receives the small end of a fixed stud g^5 , projecting from the frame A^2 , as shown in Fig. 1, the object of this construction being to prevent the needle-shield from being forced against the sole, so that the needle-shield descends with the needle only to the desired limited extent.

By the provision of the segmental slot and screw d^2 , whereby the needle-shield lever is pressed against the side of the vibrating needle-lever at a point close to the outer edge of said shield-lever, the proper lateral position of the needle-shield in respect to the needle is always maintained, which cannot be effectively accomplished in all cases where the pivotal bearing of the needle-shield lever is the only means relied upon for preventing lateral twisting or distortion of said needle-shield lever and consequent shifting of the needle-shield. Contact of the needle-lever and needle-shield lever causes the latter to descend with the needle-lever until such descent is arrested by the stud g^5 , as shown in Fig. 3, whereupon the needle continues through the work. On the return stroke the needle-shield lever is locked, as described hereinafter, until the needle is withdrawn from the work, whereupon the needle-shield lever is unlocked, and the contact of the screw d^2 with the upper end of the slot d^3 will cause any further upward movement of the needle-lever to be imparted to the lever d' and its needle-shield. Hence the latter rises from the work with the needle after the latter has been drawn through the work.

In order to hold the needle-shield downward positively until it has to be again lifted, I provide the needle-shield lever d' with an arm d^5 , (see Figs. 3 and 7,) which is acted upon by a cam d^6 on the cam-disk B^2 , this cam being such that it will hold the needle-shield rigidly in position while the needle, after receiving the loop, is returning and drawing said loop through the work, the arm d^5 of the lever d' being at the proper time released from the control of the cam d^6 , so that said lever can be raised by the screw d^2 on the further rise of the needle-lever.

The looper-lever h' is journaled in the part A' of the frame or head, and on the front end of the looper-lever h' is the looper h , the rear end of the looper-lever h' being controlled by a cam h^2 on the cam-disk B' and held against

said cam by a spring h^3 , attached to the said looper-lever h' . (See Fig. 4.)

The awl-lever c' is independent of the needle-lever b' , and the shaft or spindle c^2 of said awl-lever c' passes through the hollow shaft b^2 of the needle-lever b' , which is mounted in the sleeve b^3 on the head, as before described, and as shown in Fig. 5. The sleeve b^3 is confined laterally to the frame A^2 by a nut c^{10} , Figs. 1, 5, and 8, and on the projecting rear end of the shaft or spindle c^2 of the awl-lever is a disk c^3 , which serves to hold both the awl-lever and needle-lever in proper longitudinal position in the sleeve, and said disk c^3 is grooved for the reception of the friction-band c^4 , which in the present instance consists of a wire bent so as to partially encircle said grooved portion of the disk and having at its opposite ends eyes c^5 for the reception of a clamping-screw c^6 , which is adapted to a threaded opening in the part A^2 of the head of the machine, so that any desired degree of friction can be imparted to the disk c^3 , and the awl-lever thus retained in any position to which it may be moved. (See Figs. 5 and 8.) The arm b^2 of the needle-lever b' plays between the two arms of the awl-lever c' , Figs. 2 and 3, so that there is a certain amount of dwell in the movement of the awl—that is to say, as the needle rises from the work the awl is thrust through the same and remains in that position until the needle in its descent almost touches the point of the awl, the latter being then withdrawn from the work and the needle following it, point to point. A set-screw c^7 is carried by one of the arms of the awl-lever c' , so as to regulate the distance apart of the points of the needle and awl on the downward movement.

The thread-holder, which serves to hold the needle and bobbin threads out of the path of the rotating hook while the needle-thread is being drawn by the pull-back and the hook is advancing into position to receive a fresh loop of needle-thread, is shown in Figs. 9 to 13, and consists of a plate n , having a laterally-projecting finger n' , behind which the needle and bobbin threads are received, the plate n being secured to the front end of a lever n^2 , which is hung to a suitable bearing n^3 in the head of the machine and has an anti-friction roller n^4 , bearing upon a side cam n^5 on the cam-disk B' . (See Fig. 4.) As the hook rotates a cam n^{10} in advance of the same (see Fig. 14) acts upon a lug n^{11} on the plate n and moves the latter outwardly toward the needle, as shown in Fig. 13, so as to carry the bobbin-thread and loop of needle-thread out of the path of the hook, and as soon as the hook has advanced sufficiently the cam n^5 restores the plate n to its normal position, Fig. 9. The needle and bobbin threads have a bearing behind the projecting finger or hook n' of the plate n while the loop of needle-thread is being drawn around the bobbin. Hence the changing position of said loop, due

to the rotation of the hook, does not cause any material stretching or spreading of the hole in the work through which the stitch is formed. The plate *n* also has an outer projecting plate or guard *n*⁶, as shown in Figs. 9 and 10, and on the outer side of this guard-plate is mounted a coiled spring *n*⁷, the point of which projects through an opening *n*⁸ in the plate and forms a finger *n*⁹ for engaging with the loop of needle-thread after it is pulled off the hook, said spring-finger yielding as the loop is pulled down, so as to freely discharge the same.

The operation of the machine is about as follows: Commencing at the point where the needle has just reached the limit of its forward movement, as shown in Fig. 2, the looper rises up, carrying the thread in position to be caught by the barb of the needle, which then begins its backward movement, taking the thread within its barb, and as soon as the barb is well within the work the looper drops to its normal position, the needle still receding. Before the barb of the needle reaches the needle-shield the arm *d*⁵ has been released from control of the cam *d*⁶ and the needle-shield is caused to rise with the needle in the usual way by the screw *d*² striking the end of the slot *d*³ in the needle-shield lever. The rotating hook having commenced to rotate, the movement of the needle is so timed that the rotating hook will enter the loop held by the needle, and the needle then makes a slight forward movement to release the loop and the hook-shaft recedes from the needle with the needle-thread on the hook, carrying the same over the bobbin. The pull-back then pulls the loop of needle-thread off the rotating hook, after which the needle resumes its backward movement, forcing the awl through the work. The needle again descends, and when it almost reaches the point of the awl the latter recedes and the needle passes through the work with it. The thread-holder *n* lies under the rim of the bobbin-face, as shown in Figs. 9 and 10, and prior to the hook reaching the needle and bobbin threads said plate is pushed laterally toward the needle by the action of the cam *n*¹⁰ in advance of the hook, thereby placing both needle and bobbin threads out of the way of said hook, as shown in Fig. 14.

Although I have shown my invention as embodied in a machine in which the bobbin and the hook for carrying the needle-thread over the bobbin are in a plane parallel to the plane of movement of the needle and awl, it will be evident that my invention is applicable as well to machines in which the bobbin and hook are in a plane at right angles to that of the needle and awl, as set forth in my English Patent No. 2,899 of 1871.

The hook-rotating mechanism, feeding and work-supporting devices, pull-back, &c., form the subject of separate applications for patent filed of even date herewith, Serial Nos. 407,939, 407,941, and 407,940, and hence are

not more specifically referred to in this specification.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a boot or shoe sewing machine, the combination of the needle-lever, the needle-shield and its lever, and a segmental slot and set-screw close to the outer edge of the needle-shield lever for preventing the lateral separation of said levers and consequent displacement of the needle-shield in respect to the needle, substantially as specified.

2. The combination of the needle, the vibrating needle-lever, the needle-shield and its lever, a slotted connection between said levers, whereby the needle-shield lever is raised on the rise of the needle-lever, and a cam bearing directly upon one arm of the needle-shield lever when said shield is down, thereby positively locking the shield in the depressed position, substantially as specified.

3. The combination of the needle-lever, the awl-lever independent thereof and having arms between which an arm of the needle-lever can play, and a frictional retaining device for the shaft of said awl-lever, substantially as specified.

4. The combination of the needle-lever, the awl-lever having arms between which an arm of the needle-lever can play, a grooved disk applied to the shaft of the awl-lever and serving as a longitudinal retainer therefor, and a friction-band applied to the grooved portion of the disk and serving to retain the same and the awl-shaft in circumferential position, substantially as specified.

5. The combination, in a boot or shoe sewing machine, of the needle, needle-shield, looper, discoidal bobbin, and rotating hook for carrying the loop of needle-thread over the bobbin, with the laterally-moving thread-holder located above the work and projecting forward in front of the rotating hook to such an extent as to engage with the bobbin-thread and with the discharged loop of needle-thread, whereby they are pushed out of the way of the hook as the latter advances to catch a fresh loop of needle-thread, substantially as specified.

6. The combination, in a boot or shoe sewing machine, of the needle, needle-shield, looper, discoidal bobbin, and rotating hook for carrying the loop of needle-thread over the bobbin, with the laterally-moving thread-holder projecting forward in front of the rotating hook to such an extent as to engage both with the bobbin-thread and the discharged loop of needle-thread and push them out of the way of the hook, said thread-holder having a laterally-projecting finger or hook forming a bearing for the needle and bobbin threads and preserving the same in proper relation to the work while the loop is being drawn, substantially as specified.

7. The combination of the needle, needle-

shield, looper, discoidal bobbin, and rotating
hook, with the laterally-moving thread-holder
projecting forward beyond the hook above
the work, so as to catch the loop of needle-
5 thread and the bobbin - thread, said thread-
holder having a laterally-projecting finger
forming a bearing for the thread, and an outer
guard-plate, substantially as specified.

8. The combination of the needle, needle-
10 shield, looper, discoidal bobbin, and rotating
hook, with the laterally-moving thread-holder

projecting forward beyond the hook above
the work and having a projecting spring-fin-
ger for engaging with the loop of needle-
thread, substantially as specified. 15

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

DANL. MILLS.

Witnesses:

EUGENE ELTERICH,
HARRY SMITH.