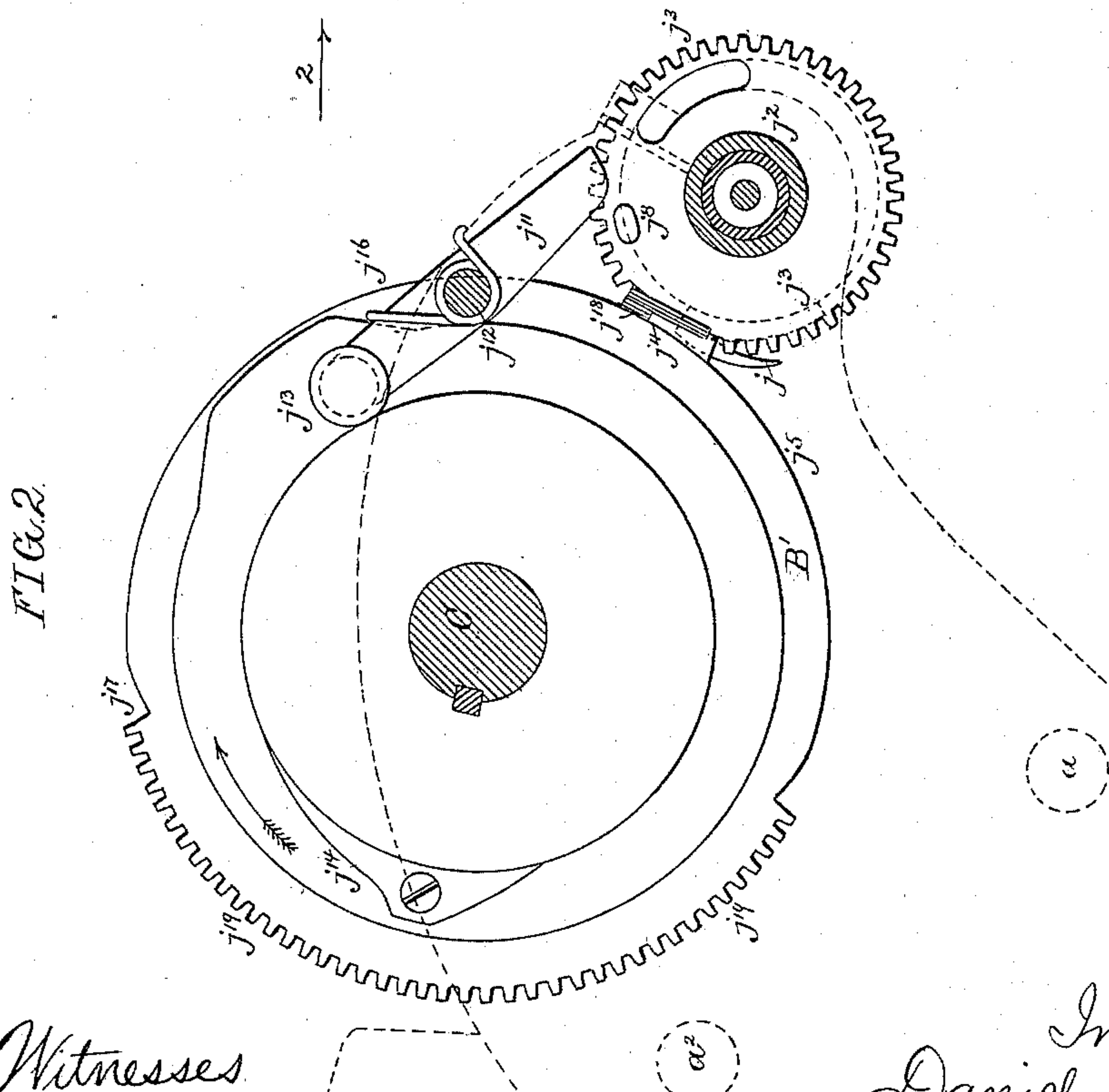
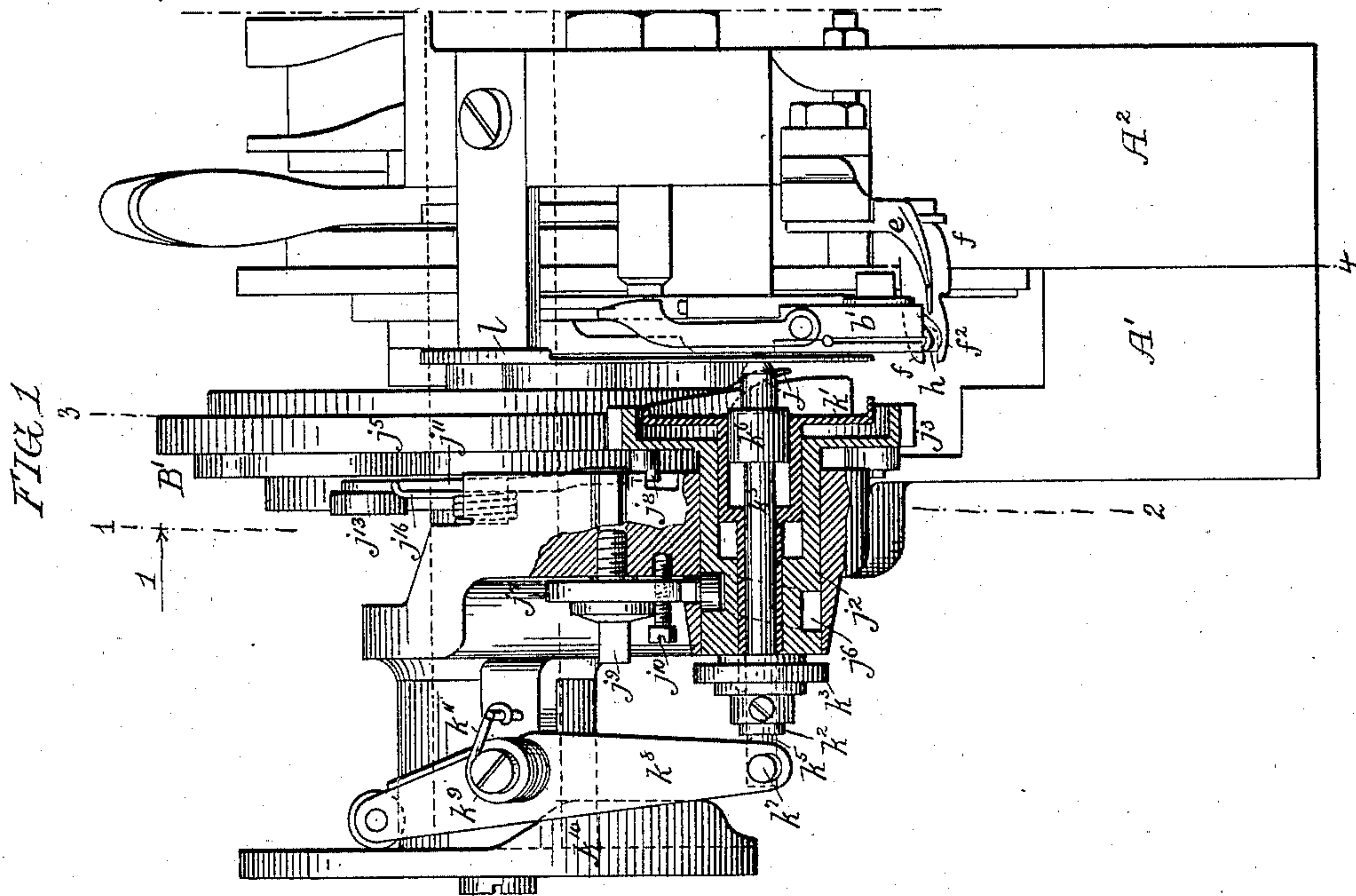


(No Model.)

2 Sheets—Sheet 1.

D. MILLS.
ROTATING HOOK MECHANISM FOR BOOT OR SHOE SEWING MACHINES.
No. 477,433. Patented June 21, 1892.



Witnesses
Hamilton D. Turner
A. V. Groupe

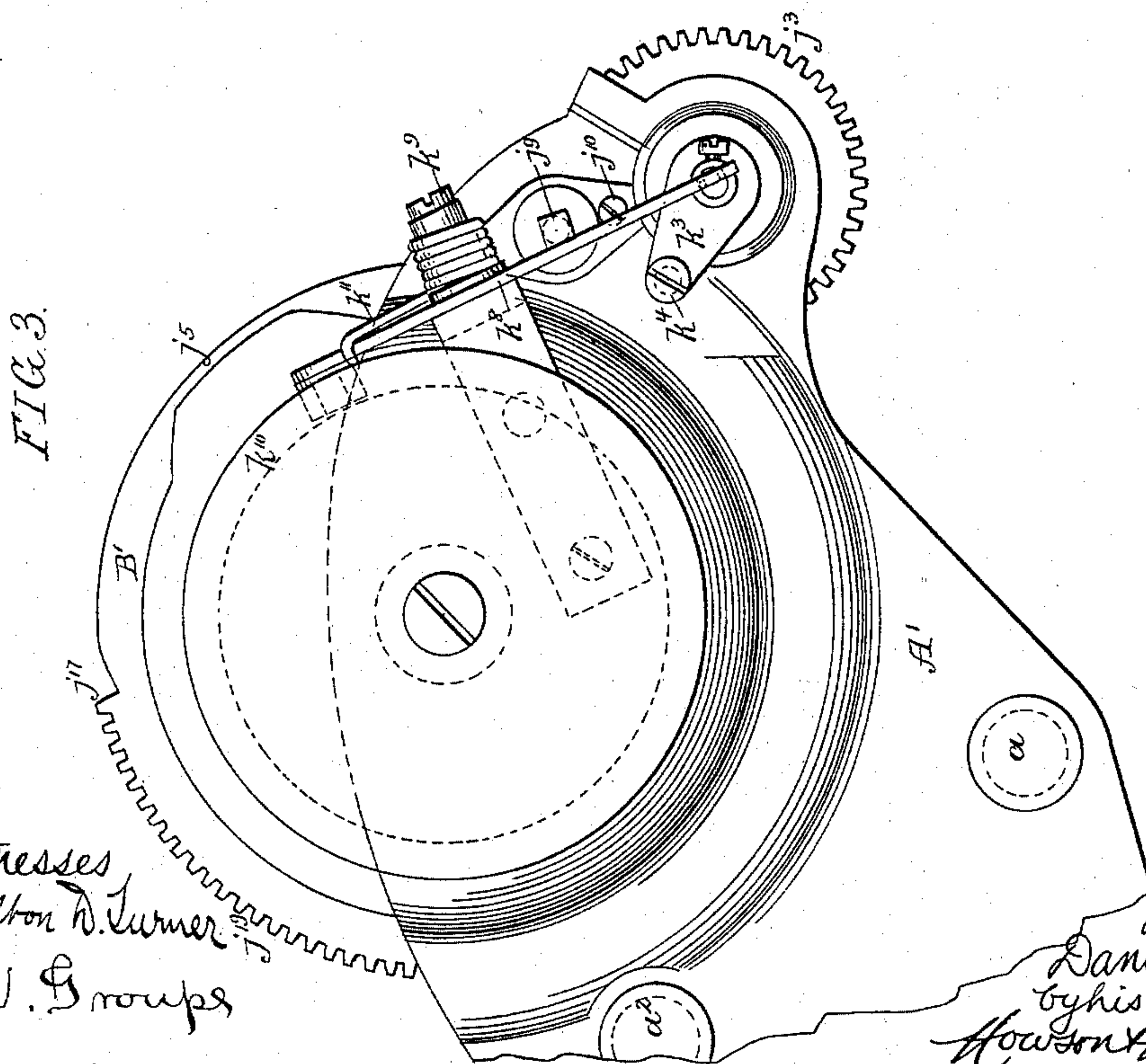
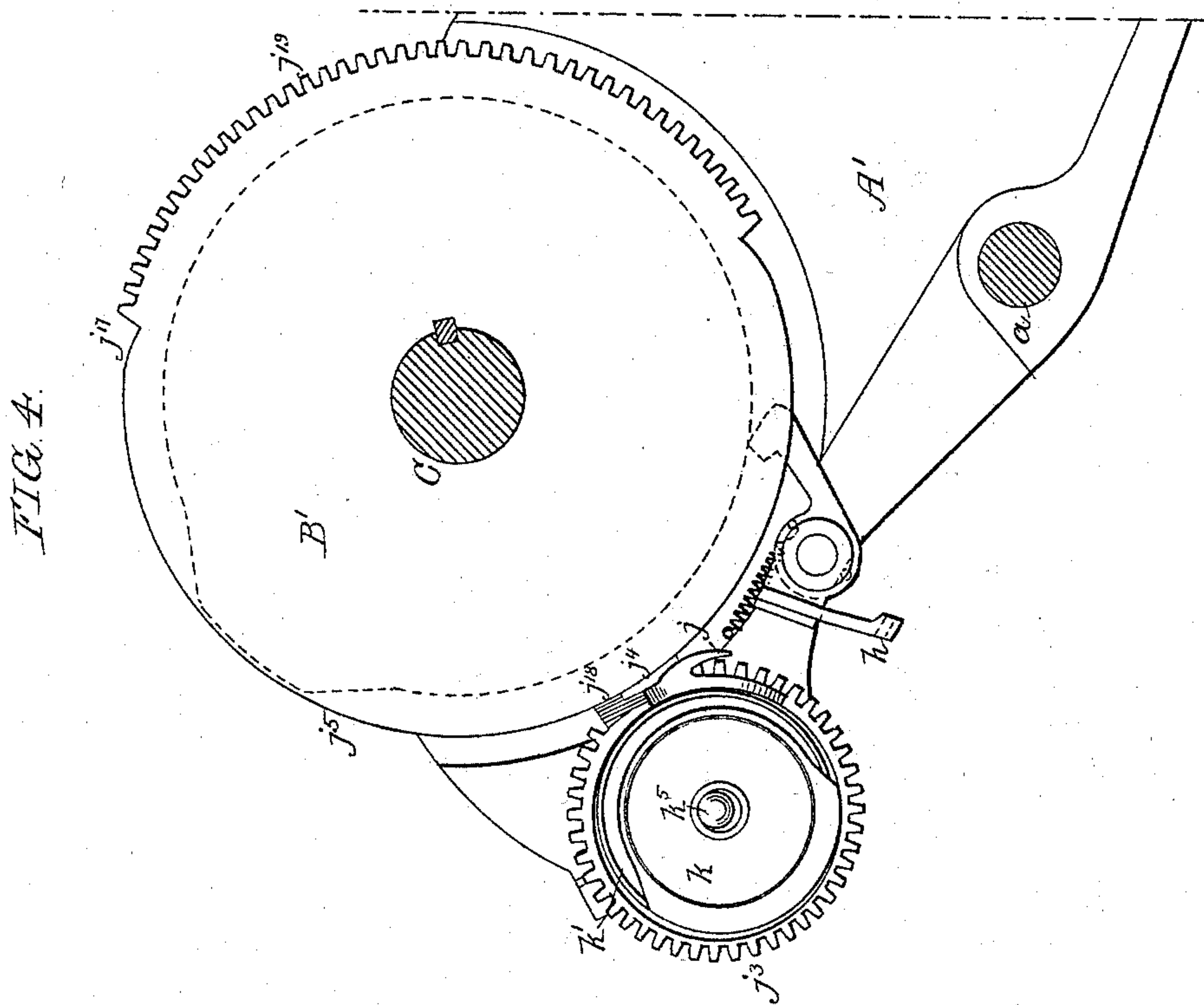
Inventor
Daniel Mills
by his Attorneys
Howson & Howson

(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

DANIEL MILLS, OF PHILADELPHIA, PENNSYLVANIA.

ROTATING HOOK MECHANISM FOR BOOT OR SHOE SEWING MACHINES.

SPECIFICATION forming part of Letters Patent No. 477,433, dated June 21, 1892.

Application filed October 6, 1891. Serial No. 407,939. (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 Rotating Hook 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, No. 4,279 of 1875, and No. 1,160 of 1876. The
15 machines described in the specifications of said Letters Patent are designed for sewing 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
20 of the machines, however, being adapted for the proper performance of all of these different classes of work. The characteristic features of the mechanism in said machines are a curved needle which has a reciprocating motion or partial rotation to and fro around an
25 axis and operates either with or without an awl and with a needle-shield, a looper, a feed-dog, a back or bottom gage, and in the case of the lock-stitch machines with a discoidal bobbin, a hook for carrying the thread over the same, and other devices actuated by suitable
30 cams, the whole of the mechanism being supported in a strong head placed on a stand in such a manner as to permit the work to be properly presented to the sewing mechanism.
35 My present invention relates to a machine for performing all of the different kinds of work above noted, the improvements having especial reference to the mechanism for rotating and longitudinally moving the hook which carries the loop of needle-thread over the discoidal bobbin, and said improvements comprising mechanism for imparting to the hook intermittent movements of rotation in
40 the same direction and for locking it between such movements; also means for imparting the lateral movement to the hook-shaft, and permitting the adjustment of the hook from or toward the needle; and also means for
50 starting the rotation of the hook-shaft by a gradual or accelerating motion, so as to pre-

vent shock or jar in the movement of the same or in the action of the gearing for operating it.

In the accompanying drawings, Figure 1 is
55 a front view of sufficient of the machine to illustrate the invention, the parts to which the invention relates being shaded to give them greater prominence. Fig. 2 is a transverse section on the line 1 2, Fig. 1, looking
60 in the direction of the arrow 1. Fig. 3 is an end view looking in the direction of the arrow 2; and Fig. 4 is a transverse section on the line 3 4, Fig. 1, looking in the direction of the arrow 3.

The two parts $A^1 A^2$ of the head are bolted
65 together and have bearings for the driving-shaft C, which carries the various operating-cams of the machine, b^1 being the vibrating needle-lever; d , the needle-shield; e , the feed-dog; f , the feed back gage; f^2 , the needle
70 back gage; j , the rotating hook, and k the discoidal bobbin.

The intermittently-rotating hook j for carrying the thread around the bobbin k is
75 secured to the front face of the hook-shaft j^2 , and on said hook-shaft j^2 is a spur-gear j^3 , which is provided with a certain number of teeth and a concave blank space j^4 , the radius of the blank space corresponding with the
80 convex radius j^5 of the driving-disk B' on the shaft C. (See Figs. 2 and 3.) The disk B' is provided on its periphery with a number of teeth j^{10} , equal in number to the number of
85 teeth in the hook-shaft spur-gear j^3 , so that as the said disk B' is continuously rotated intermittent forward rotating movements will be imparted to the hook-shaft and the latter will be locked between such movements by
90 reason of the engagement of the curved face j^5 of the disk B' with the concave face j^4 of the hook-shaft spur-gear.

In order to prevent the wearing of the parts and the noise which would result from the direct engagement of the rotating spur-segment
95 j^{10} with the pinion j^3 while the latter is at rest, I impart movement to said spur-pinion j^3 before the spur-teeth j^{10} reach such position as to intermesh therewith, this movement being effected by means of a lever j^{11} , hung to a stud
100 j^{12} on the frame and adapted to act upon a lug or projection j^8 on the face of the pinion j^3 ,

this lever having an anti-friction roller j^{13} , acted upon by a cam j^{14} , Fig. 2, and by a spring j^{16} , which serves to hold the lever normally in position for the action of said cam. Just before the first tooth of the spur-segment j^{19} reaches a position to strike the end of the concave portion of the pinion j^3 the lever j^{11} is acted upon by the cam j^{14} and in turn acts upon the lug or projection j^8 of the pinion j^3 , so as to impart a slight forward motion thereto, such motion being permitted, owing to the fact that there is in advance of the first tooth of the segment j^{19} a recess j^{17} . The cam j^{14} is so formed that the first movement imparted to the lever j^{11} is a slow and gradual movement, which rapidly increases in speed after the lever is in contact with the stud j^8 , so that, while the lever is brought slowly into contact with said stud and starts the movement of the pinion j^3 slowly, the movement of said pinion is accelerated after the start, and by the time the spur j^{19} begins to mesh with the pinion the latter is traveling at the same surface speed as the spur-segment. Hence the movement of the hook is started easily and gradually and without any jerk or noise. To still further lessen the tendency to noise, the concave portion j^4 of the pinion j^3 is composed in part of a rawhide block j^{18} , and when, after the rotation of the pinion j^3 , the concave portion of the same is brought into position to receive the convex portion j^5 of the drive-disk the block j^{18} prevents any noise, such as would be caused if the convex surface j^5 and concave surface j^4 were both wholly of metal.

The hook-shaft j^2 has a motion toward and from the needle, so that the hook will approach to the center of the needle-path to catch the loop of needle-thread and will then be withdrawn to its normal plane of rotation, and this lateral movement of the hook-shaft is effected by means of a cam j^6 , formed upon the shaft, as shown in Fig. 1, said cam engaging with a tongue or finger j^7 , which is carried by a set-screw j^9 , adapted to a threaded opening in the side of the head, a second set-screw j^{10} being adapted to a threaded opening in the finger j^7 and being seated in a recess in the head, as shown in Fig. 1, so that it not only serves to hold the finger j^7 and prevent it from turning when the screw j^9 is turned, but also serves to lock the finger j^7 longitudinally—that is to say, in the direction of movement of the hook-shaft. Hence the said finger is rigidly held in position. By manipulating the set-screws, however, the finger j^7 can be very accurately adjusted, so as to effect a correspondingly-accurate adjustment of the hook-shaft and its hook, and thus cause the latter to work up to the center of the needle-path whatever the size of the needle may be, this movement of course being entirely independent of and having no effect upon the in-and-out movement of the hook-shaft, due to the engagement of the cam j^6 with the finger. By imparting an intermittent rotating movement in the same direction to the hook,

whereby the thread is passed over the bobbin, I am enabled to operate the machine more rapidly than those in which a vibrating or back-and-forth movement is imparted to the hook, as no time is lost while the hook is receding to its first position after passing the thread over the bobbin. The hook having intermittent rotating movements always in the same direction, moreover, causes less wear of parts and less noise than a vibrating hook.

The hook-shaft spur-pinion is made hollow or recessed at the face for the reception of the bobbin-holder k' , which has a spindle k^2 extending through the hook-shaft and held at the rear end by an arm k^3 , secured to the frame A' by a set-screw k^4 . (See Fig. 3.) Through the spindle k^2 extends a pin k^5 , which has near its front end a collar k^6 and at the rear end a pin k^7 , which is adapted to the slotted arm of a lever k^8 , hung to a pin k^9 , and acted on by a side cam k^{10} and by a spring k^{11} , as shown in Fig. 1. A longitudinal reciprocating movement is thus imparted to the pin k^5 , and the collar k^6 of the same is caused to press the bobbin k firmly against the retainer-plate l while the rotating hook is first applying the loop of needle-thread to the bobbin, the subsequent retraction of the pin k^5 permitting the bobbin to lie loosely between the bobbin holder and retainer, so that the loop can be readily drawn over the bobbin.

The mechanism for operating the needle, awl, needle-shield, feeding, and work-supporting devices, pull-back, &c., form the subject of separate applications filed by me of even date herewith, Serial Nos. 407,943, 407,941, and 407,940. Hence these parts are not referred to at length in this specification. Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a boot and shoe sewing machine, the combination of the needle, the bobbin, the hook, the hook-driving mechanism for intermittently rotating said hook in the same direction around the bobbin, and mechanism for longitudinally reciprocating the hook-shaft in its bearings, substantially as specified.

2. In a boot and shoe sewing machine, the combination of the needle, the bobbin, the hook-shaft and its hook, a pinion on the shaft having alternating toothed portion and plain concave segment, a driving-gear having alternating toothed portion and plain convex segment for engaging with the toothed portion and concave segment of the pinion, and means for rotating said drive-gear, whereby the hook-shaft has intermittent forward movements of rotation around the bobbin, with periods of dwell during which it is locked, substantially as specified.

3. In a boot and shoe sewing machine, the combination of the needle, the bobbin, the hook-shaft and its hook, a spur-pinion on said hook-shaft, the spur-segment for engagement with said pinion, and a lever and cam whereby the initial movement is imparted to the

hook-shaft before the driving-spur segment engages with the pinion on said shaft, substantially as specified.

4. In a boot and shoe sewing machine, the
5 combination of the needle, the bobbin, the hook-shaft and its hook, a spur-pinion on said hook-shaft, a driving spur-segment, and a lever and cam for starting the movement of the hook-shaft independently of said spur-gears,
10 said cam having a differential pitch, substantially as specified.

5. The combination of the needle, the ro-

tating hook, the hook-shaft free to slide in its bearings and having a cam, a stud or finger engaging with said cam, and screw-stems for
15 adjusting and locking said stud or finger, substantially as specified.

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.