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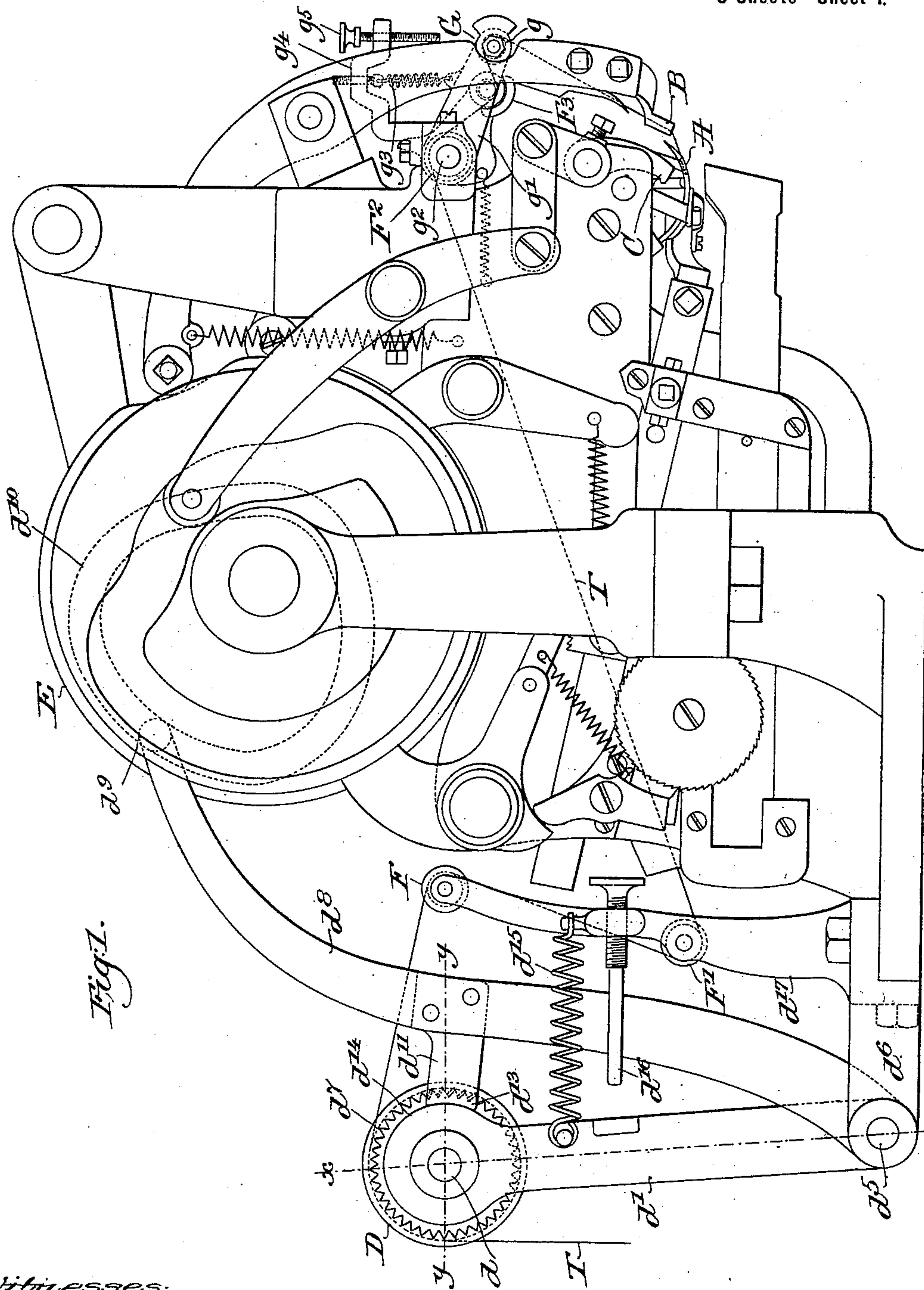
A. GODFREY.

TAKE-UP AND TENSION FOR SEWING MACHINES.

(Application filed Oct. 29, 1898. Renewed Oct. 9, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:

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Inventor:  
Alexander Godfrey  
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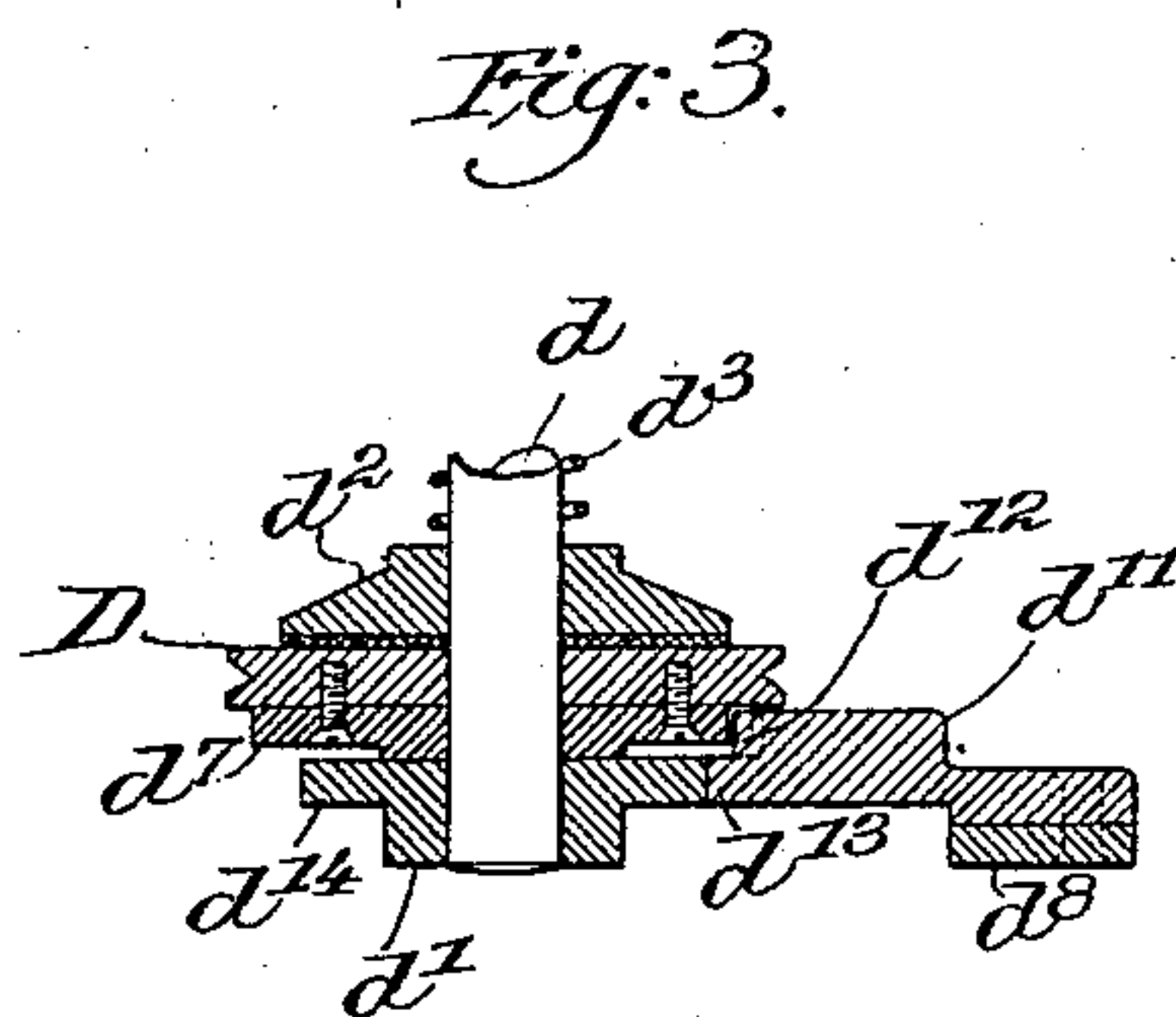
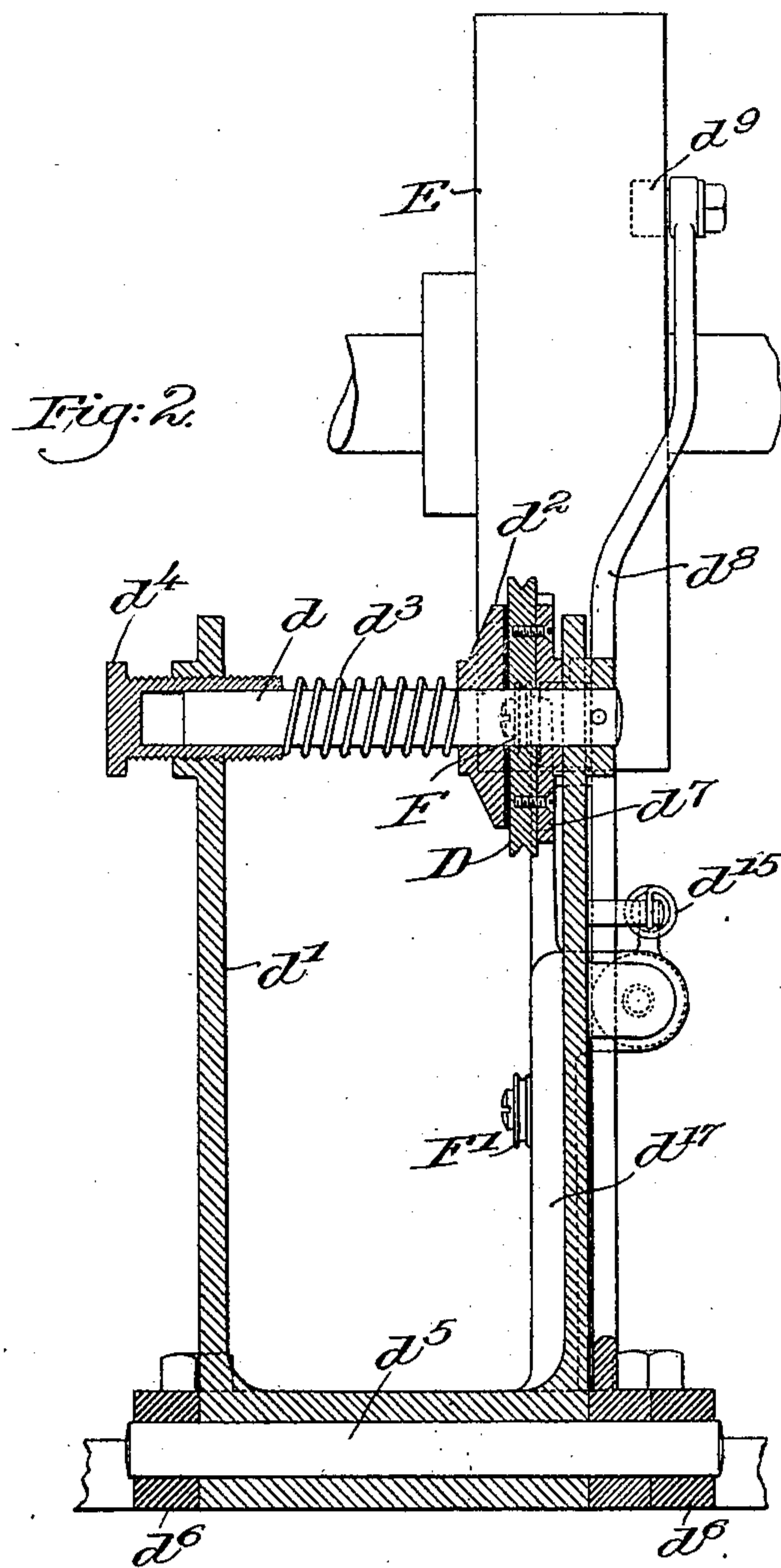
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3 Sheets—Sheet 2.



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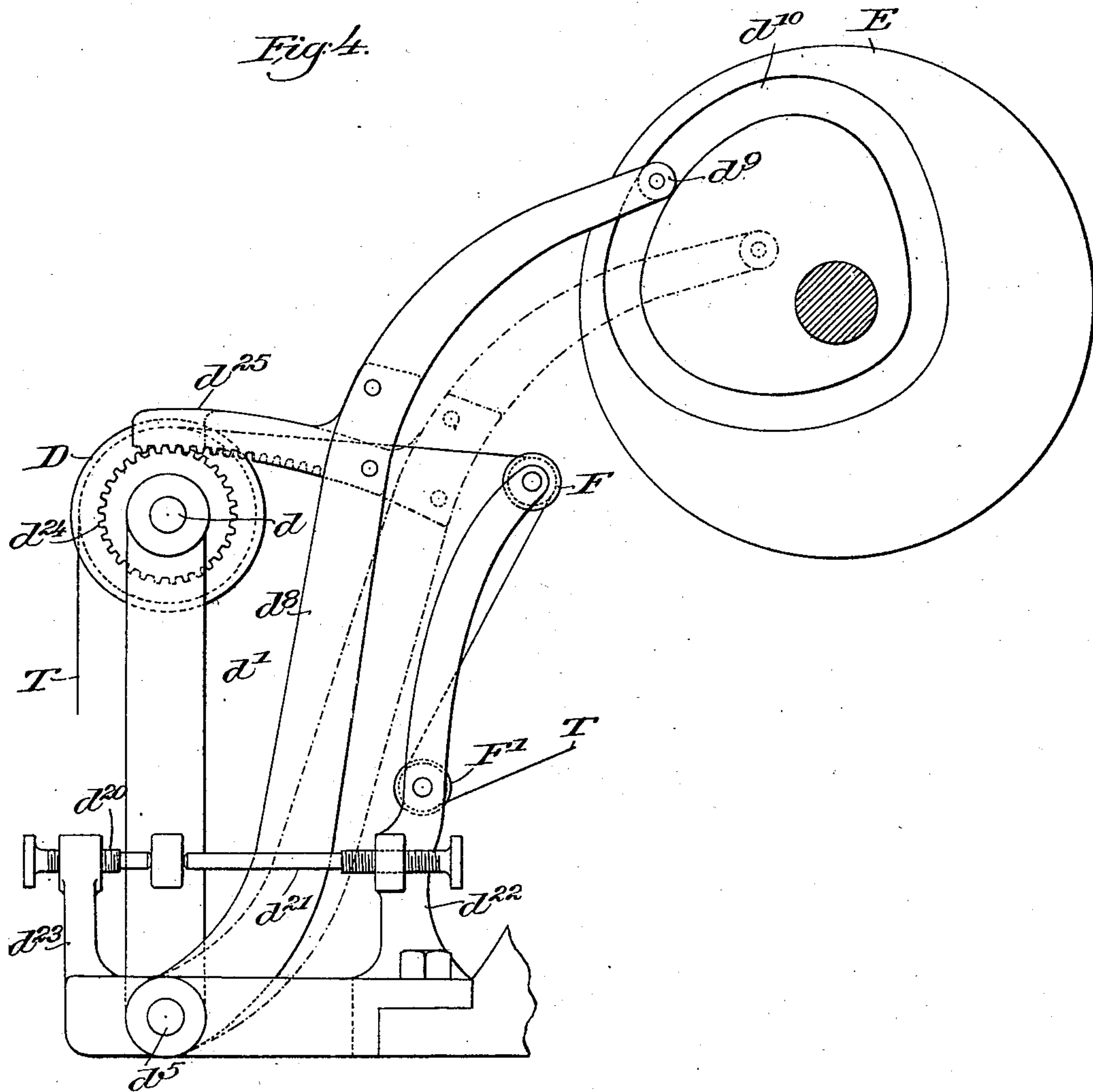
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(No Model.)

3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

ALEXANDER GODFREY, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR TO  
UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY,  
A CORPORATION OF NEW JERSEY.

## TAKE-UP AND TENSION FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 706,045, dated August 5, 1902.

Application filed October 29, 1898. Renewed October 9, 1901. Serial No. 78,130. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER GODFREY, a citizen of the United States, and a resident of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Take-Up and Tension Devices, of which the following is a specification.

The present invention relates generally to improvements in sewing-machines of the curved-hooked-needle chain-stitch type—such, for example, as the familiar welt and turn shoe-sewing machines—and more particularly to improvements in the thread-handling mechanism of said machines, whereby with a simplified construction and arrangement I secure a new and improved result. In the earlier stages of this art the needle was the only thread-handling means, and upon it devolved the double duty of pulling the slack thread from the preceding loop and pulling off from the tension thread enough for the next stitch, or, more strictly speaking, an amount of thread equal to that used up in the preceding stitch. This mode of operation was early found to be objectionable in that it caused severe rendering of the thread through the hook of the needle and around the between substances, which was injurious to the materials, both leather and thread. These objections have been partially remedied in machines of the prior art by the provision of what is commonly termed a “pull-off,” which is an auxiliary thread-handling device which relieves the needle of the major portions of its duty of pulling off thread from the tension, and still further and more completely remedied by the provision of a combined take-up and pull-off, which acts while the needle is in the work to tighten the loop around its shank and thereafter to pull from the tension an amount of thread nearly equal to that used up in making the preceding stitch.

In accordance with the present invention I secure all the substantial advantages of the construction above referred to without the use of a pull-off and without the use of a take-up proper by the use of a movable cam-actuated

tension device, which while the needle is in the stock exerts an active pull on the thread to tighten the loop of thread then around the shank of the needle. In this connection I desire to say that while I consider my present invention in its most generic sense to be broad enough as to this feature to include any substantial shortening of the loop, as above stated, and while the word “tighten” as used herein is, unless otherwise qualified, to be taken as including such a shortening I find that when the loop around the shank of the needle is drawn tight enough to bring the loop which is interlocked with it into position against the material and to set the stitch of which such interlocked loop forms a part an essentially better result is secured, since the stitch is then set by a more direct pull and one which is resisted by the shank of the needle. I desire, further, to say that I am aware that a movable tension has been employed to pull down loops of thread against interlocked loops of leather, as in the machine of patent to Coupal *et al.*, No. 385,299, and that a spring-actuated movable tension has been employed to tighten a loop of thread around the shank of the needle, as in patent to Chadbourn, No. 670,195. The Coupal device above referred to, however, differs essentially from my present invention in that it takes no part in the forming of a chain-stitch and, further, in that it acts after the needle has withdrawn from the material. The difference between the Chadbourn device and the present invention is that between a reactive instrumentality which merely gives back to the thread a part of the energy said instrumentality has received from the pull of the thread and an active instrumentality taking active part in the stitch-forming operation.

It has been discovered by those skilled in the art that the best results can be secured in this class of machines by locking the thread at the tension side and setting the stitch against the tension of a spring interposed between the thread-lock and the work, and it has been proposed to accomplish this result by connecting the spring with the fulcrum of



the take-up lever, which in such construction is made movable, and also by providing a separate spring-controlled thread-engaging device between the take-up and thread-lock.

5 I secure the same result in a simpler and more effective way by combining a spring-controlled thread-engaging device with my improved movable tension, and such combination constitutes another feature of the present invention.

10 My present invention further consists of certain other devices and combinations of devices hereinafter set forth and claimed, the advantages of which will be readily seen by any one skilled in the art.

15 The accompanying drawings illustrate the preferred and a modified form of my invention as applied to the machine of patent to French and Meyer, No. 412,704, which is the well-known Goodyear welt and turn machine.

20 Figure 1 is a side elevation. Fig. 2 is a section on line  $x x$ , Fig. 1. Fig. 3 is a section on line  $y y$ , Fig. 1. Fig. 4 shows in side elevation a modified form of my movable tension with its actuating-cam.

25 The stitch-forming instrumentalities of the machine of the drawings comprise a curved hooked needle A, a looper B, a thread-finger, sometimes called a "thread-measurer," C, all of which, together with cooperating mechanisms not herein particularly described, may be and conveniently are the same as in said patented machine. Said patented machine is provided with a combined take-up and pull-off which, when the machine is provided with my invention, as shown in the drawings, is omitted, together with its connections with its actuating-cam.

30 The preferred form of my improved tension (illustrated in the drawings) comprises a thread-truck D, mounted to rotate upon a short shaft  $d$ , secured at opposite ends in the arms of the swinging yoke  $d'$ . (See Fig. 2.) A friction-disk  $d^2$  is pressed by a coiled spring  $d^3$  against the side of the truck D to offer a frictional resistance to the rotation of the truck D in a manner usual in this class of devices. The pressure of spring  $d^3$  may be conveniently regulated by the thimble  $d^4$ , which is fitted to slide on the shaft  $d$  and is exteriorly threaded to engage a threaded bearing in the yoke  $d'$ . The yoke  $d'$  is mounted to swing on the short shaft  $d^5$ , secured in suitable bearings in the bracket  $d^6$ , projected from the frame of the machine. To the thread-truck D is secured the toothed wheel  $d^7$ , which when held from rotation holds the truck D from rotation, thereby locking the thread at supply side. Upon the shaft  $d^5$  is mounted a swinging lever  $d^8$ , which carries a cam-roll  $d^9$ , working in a cam-path  $d^{10}$ , formed on the lateral face of the cam-disk E, which in the machine of the drawings is the cam-disk, in which in the patented machine here-  
65 in before referred to was formed the cam-path

which actuated the take-up, said cam-path being omitted in the machine of the drawings. To the lever  $d^8$  is secured a rearwardly-projected arm  $d^{11}$ , having the concaved toothed portion  $d^{12}$  and a smooth concaved portion  $d^{13}$ , projecting slightly to the rear of the toothed portion  $d^{12}$ , (see Fig. 3,) the toothed portion  $d^{12}$  being adapted to engage the toothed wheel  $d^7$  and hold the same from rotation and the smooth concaved portion  $d^{13}$  being adapted to engage the circular upper end  $d^{14}$  of one of the arms of the yoke  $d'$  just before the teeth of the toothed portion  $d^{12}$  bottom on the toothed wheel  $d^7$ . A spring  $d^{15}$  is provided, secured to the yoke  $d'$  and to a fixed part of the machine, which normally holds said yoke against an adjustable stop  $d^{16}$ , also mounted in a fixed part of the machine, conveniently the bracket  $d^{17}$ .

85 The above-described arrangement is such that when the lever  $d^8$ , by the action of cam  $d^{10}$ , is swung to the rear the truck D is locked and held from rotation, and the yoke  $d'$  is swung to the rear, moving the truck D bodily backward and exerting a pull on the thread. When the lever  $d^8$  is swung forward, the spring  $d^{15}$  moves the yoke  $d'$  forward, imparting a bodily forward movement to the truck D in a direction to slacken the thread, the truck D, however, remaining locked until the yoke  $d'$  strikes the stop  $d^{16}$ , when a further movement of the lever  $d^8$  disengages the toothed portion  $d^{12}$  of the arm  $d^{11}$  from the toothed wheel  $d^7$  and leaves the truck D free to be rotated by any pull on the thread sufficient to overcome the frictional resistance offered by the disk  $d^2$ .

In the drawings, T represents the thread which leads from the wax-pot (not shown) around the truck D, around the thread-rolls F F', over the thread-roll F<sup>2</sup>, under the auxiliary take-up or slack-thread controller F<sup>3</sup>, over the thread-engaging device G, through the looper to the work.

110 In the modification of my improved tension device shown in Fig. 4 the yoke  $d'$  has no swinging movement during the operation of the machine, but is held in the desired position by the adjustable stops  $d^{20}$  and  $d^{21}$ , secured to fixed parts of the machine, conveniently the brackets  $d^{22}$  and  $d^{23}$ . As shown in the figure last referred to, a gear  $d^{24}$  is secured to the lateral face of the truck D, which is arranged to be engaged by a segmental rack  $d^{25}$ , carried by the lever  $d^8$ . The length of the rack  $d^{25}$  is such that it runs off the gear  $d^{24}$  before the lever  $d^8$  has reached the limit of its forward movement, leaving the truck D free to be rotated by a pull of the thread sufficient to overcome its restraining frictional resistance.

In the preferred form of my tension (shown in Figs. 1, 2, and 3) the time at which the truck D is unlocked is regulated by the adjustable stop  $d^{16}$ , and in the form shown in 130



Fig. 4 the time at which said truck is unlocked may be varied by setting the yoke  $d'$  farther to the front or rear by means of the adjustable stops  $d^{20}$  and  $d^{21}$ .

5 The spring-controlled thread-engaging device, which I have heretofore described as combined with my improved movable tension, is shown at G, and, as shown, comprises a thread-roll  $g$ , over which the thread T passes, which  
10 is mounted upon a swinging lever  $g'$ , fulcrumed at  $g^2$  to a fixed part of the machine. As shown in the drawings, the thread-engaging device occupies substantially the same position relative to other working parts of the  
15 machine which in the patented machine hereinbefore referred to is occupied by the combined take-up and pull-off. The spring controlling the thread-engaging device G is shown at  $g^3$  and, as shown, consists of a coiled spring  
20 secured at one end to the lever  $g'$  and at the other to a bracket  $g^4$ , projected from a fixed part of the machine. The bracket  $g^4$  also supports an adjustable stop  $g^5$ , which limits the extent of the upward movement of the  
25 lever  $g'$ , the spring  $g^3$  acting to hold the lever  $g'$  against the stop  $g^5$  until its elastic force is overcome by a pull on the thread.

I have shown in the drawings an auxiliary take-up or slack-thread controller  $F^3$ , which  
30 is similar to analogous devices in the prior art and merely serves to insure proper operation of the looper.

The operation of the machine of the drawings, as shown in Figs. 1, 2, and 3, is as follows: Assuming that the stitch has already  
35 been formed, tightened, and set and that the needle is in its most retracted position holding a loop of thread in its hook, after the feed has taken place the needle advances toward the work, slackening up the loop which  
40 it holds in its hook and which after it has penetrated the work lies around its shank. As the needle advances to penetrate the work the lever  $d^8$  commences to swing backward, locking the truck D from rotation and moving  
45 it bodily toward the back of the machine, thereby causing it to exert a positive pull on the thread to pull up the loop which has been slackened by the advance of the needle  
50 and while the needle is in the work to tighten said loop around its shank. When all the slack has been taken out of the loop which is around the shank of the needle, a further movement of truck D depresses the thread-  
55 engaging device G against the tension of its controlling-spring, thereby bringing upon the thread a gradually-increasing stitch-setting strain, which draws the loop of thread which is interlocked with the loop around the shank  
60 of the needle into place against the work and sets the stitch of which such interlocked loop forms a part, the spring controlling the thread-engaging device acting to determine the tightness to which the stitch is set. After the  
65 stitch has been set the lever  $d^8$  commences to

swing forward, giving up thread first to the looper for the looping operation and by its continued movement also giving thread to the needle until it has withdrawn from the work and approaches the end of its retracting  
70 stroke, when the yoke  $d'$  strikes the stop  $d^{16}$  and the bodily movement of truck D ceases and said truck is unlocked. After the truck D has been unlocked, as above stated, the further retracting movement of the needle by  
75 exerting a pull on the thread causes a slight rotation of the truck D against the frictional resistance which restrains it, so that during the final portion of its retracting stroke the needle draws some thread from the tension  
80 substantially as in said patented machine.

The only difference which need be noted between the operation just described and that of the modified form of my invention shown in Fig. 4 consists in the fact that in  
85 said modified form the truck D, having no bodily movement, is positively rotated to pull on the thread during the time in which it has been hereinbefore described as moving bodily toward the back of the machine and is rotated  
90 in an opposite direction during the time in which it has been heretofore described as moving bodily forward. In this form of my invention the positive rotation of truck D ceases and the truck is left free to be rotated  
95 by the pull of the thread during the final portion of the retracting stroke of the needle.

I desire to say that in this specification I have used the word "tension" as including so-called thread "locks" or "clamps" or any  
100 means for restraining the thread to enable a strain to be brought thereon.

Having thus described my invention in its preferred and a modified form, I claim as new and wish to secure by Letters Patent of the  
105 United States—

1. A hook-needle chain-stitch shoe-sewing machine, having, in combination, stitch-forming mechanism, and a movable, cam-actuated tension device acting, while the needle is in  
110 the material, to tighten the loop which is around its shank, substantially as described.

2. A hook-needle, chain-stitch shoe-sewing machine, having, in combination, stitch forming and setting mechanism, comprising a movable, cam-actuated stitch-setting tension device, and a spring exerting a gradually-increasing strain on the thread while the stitch is being set, substantially as described.

3. A hook-needle chain-stitch shoe-sewing  
120 machine, having, in combination, stitch-forming mechanism, and a movable, cam-actuated tension device acting, while the needle is in the material, to tighten the loop which is around its shank, and to set the stitch of  
125 which the loop interlocked therewith forms a part, substantially as described.

4. A hook-needle chain-stitch shoe-sewing machine, having, in combination, stitch-forming mechanism, a thread-truck, means for in-  
130



termittently locking and unlocking said truck, and a cam and suitable connections for actuating said truck while locked to exert a pull on the thread, substantially as described.

- 5 5. A hook-needle chain-stitch shoe-sewing machine, having, in combination, stitch-forming mechanism, a thread-truck, means for intermittently locking and unlocking said truck, and a cam and suitable connections for mov-

ing said truck bodily while locked to exert a pull on the thread, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALEXANDER GODFREY.

Witnesses:

LOUIS H. HARRIMAN,  
WM. L. BAKER.