

No. 670,195.

Patented Mar. 19, 1901.

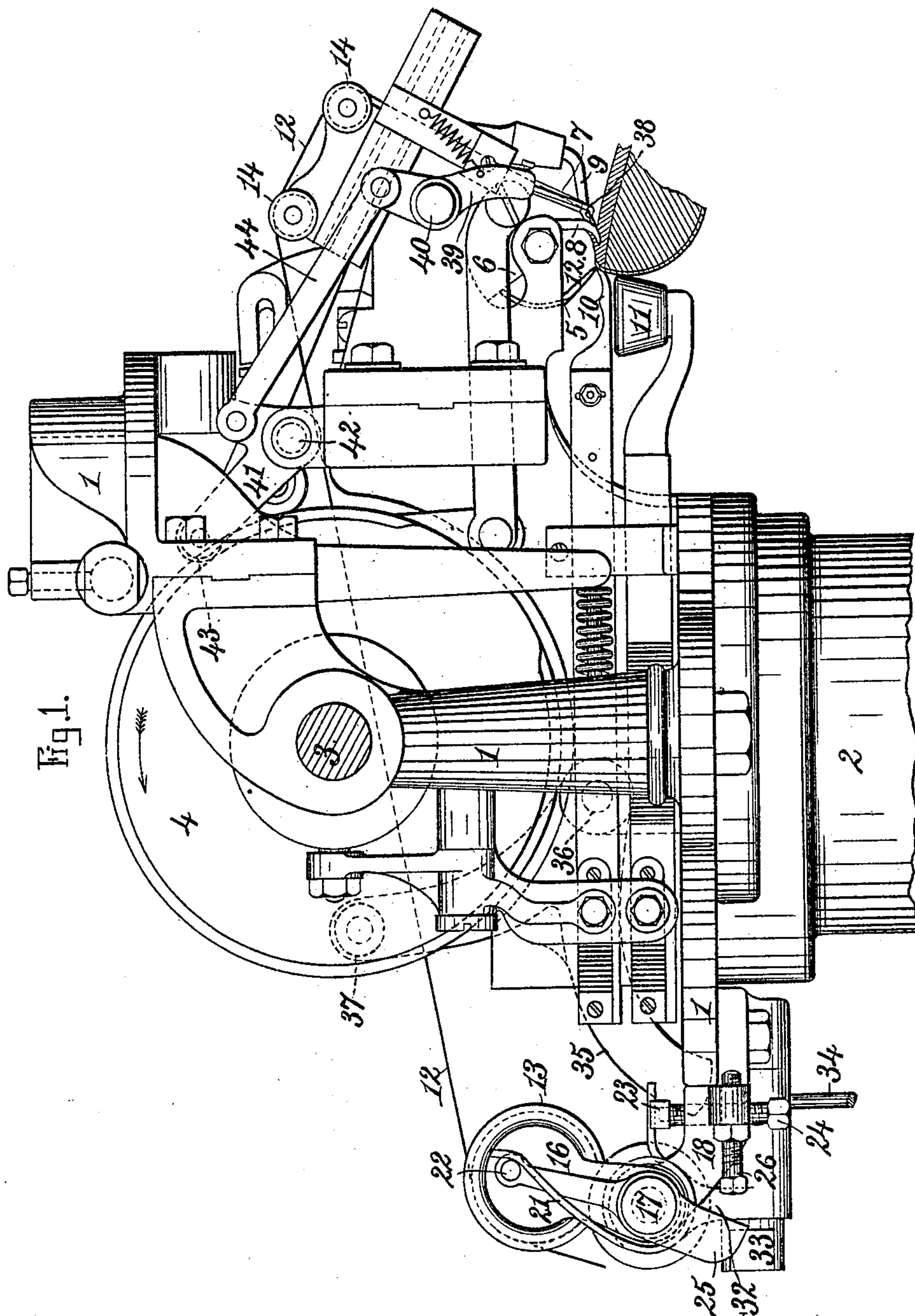
H. CHADBURN.

THREAD CONTROLLING MECHANISM FOR SEWING MACHINES.

(Application filed Nov. 11, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

Harry St. Squires
S. Bayard Thompson.

Inventor.

Henry Chadburn.

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2 Sheets—Sheet 2.

Fig. 3.

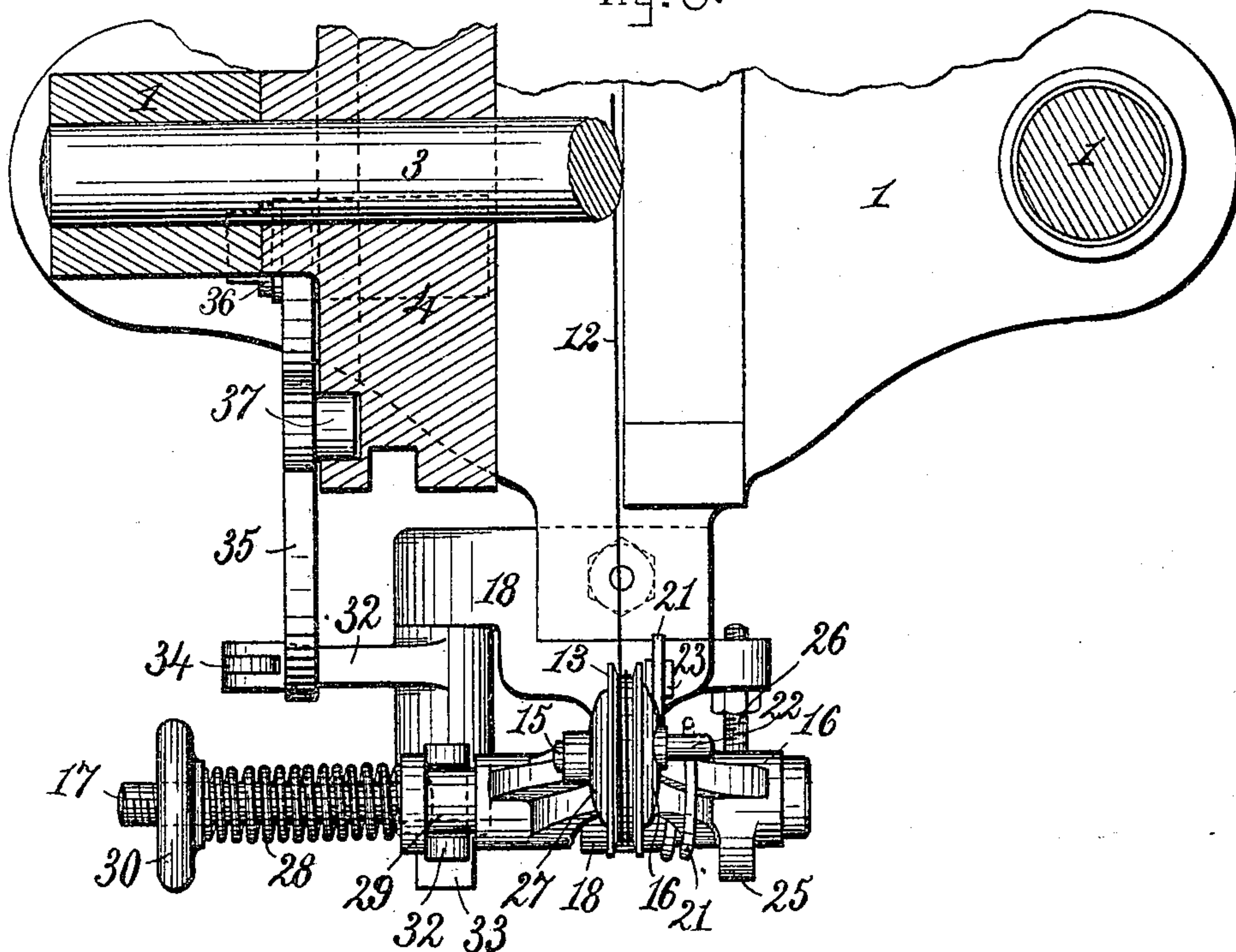
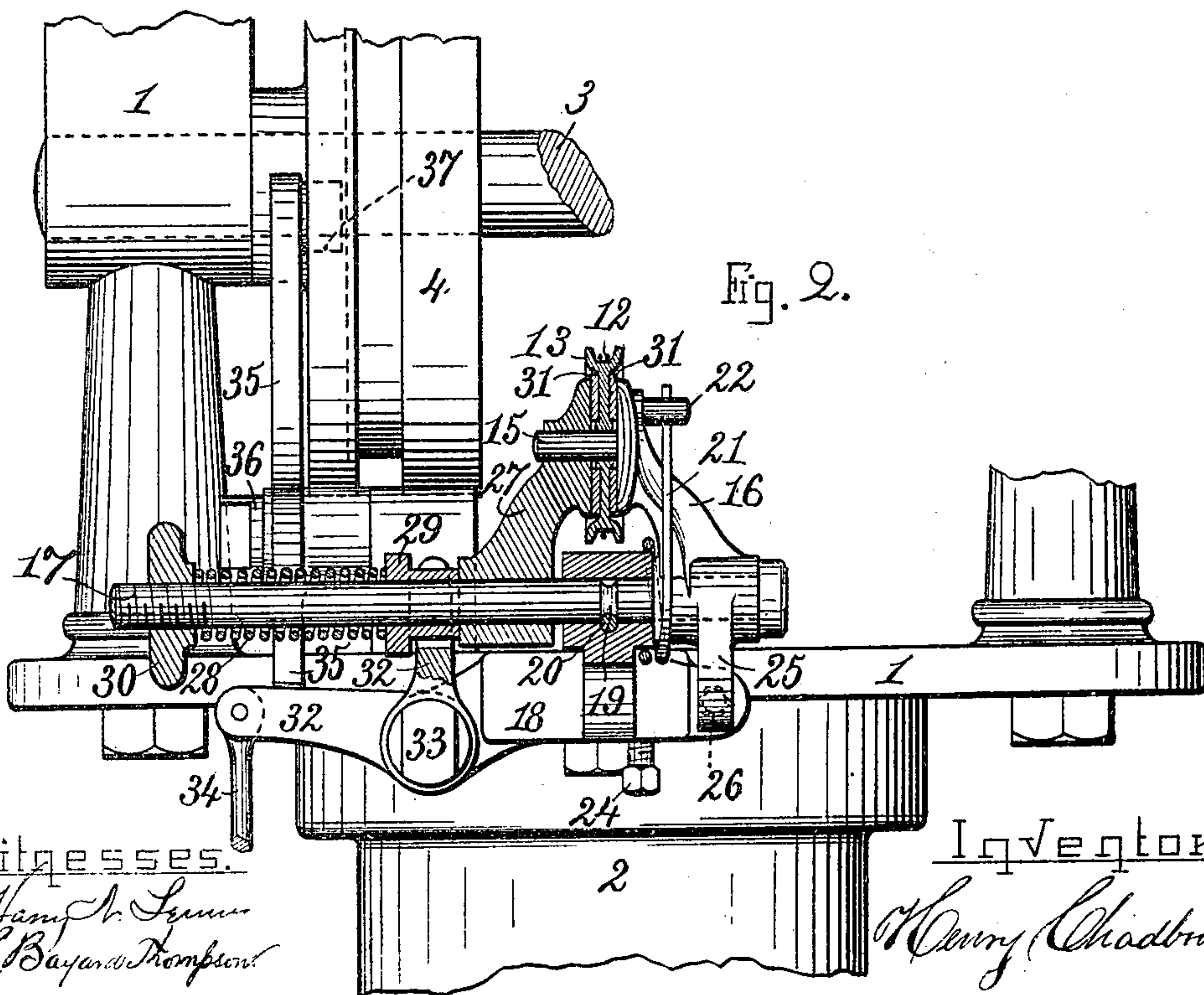


Fig. 2.



Witnesses.

Harry A. Lyman
S. Bayard Thompson

Inventor.

Henry Chadbourn

UNITED STATES PATENT OFFICE.

HENRY CHADBOURN, OF STONEHAM, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY.

THREAD-CONTROLLING MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 670,195, dated March 19, 1901.

Application filed November 11, 1898. Serial No. 696,189. (No model.)

To all whom it may concern:

Be it known that I, HENRY CHADBOURN, of Stoneham, in the county of Middlesex and State of Massachusetts, have invented certain
5 new and useful Improvements in Sewing-Machines, of which the following is a specification.

This invention relates to improvements in sewing-machines, and particularly to that
10 class of sewing-machines used in sewing boots and shoes. It relates more especially to the mechanisms used in the handling of the thread during the formation and the setting of the stitches.

15 The invention consists in a novel construction and operation of the tension wheel or device, whereby it is movable bodily in the direction of the feeding of the thread against a retarding and preferably gradually increasing
20 influence, such as a spring-pressure exerted thereon, and whereby thread can be drawn through the tension device when the retarding influence increases, so as to exceed the tension produced by the tension device; also, in combination, with such a tension device, of a tension-releasing mechanism which will allow
25 thread to be drawn freely through the tension device and at the same time will allow the retarding influence on the tension device to return said device to its normal position, and also, in combination with such a construction of tension device and releasing mechanism, a thread-arm which will control a quantity of
30 thread within a bight or loop carried thereby and on the stitch side of the needle to prevent rendering of thread through the barb of the needle during the formation of the stitch.

The invention also consists in minor details of construction and operations of parts,
40 as will be fully set forth hereinafter and claimed.

The invention is carried out substantially as illustrated on the accompanying drawings, which form an essential part of this specification, whereon—
45

Figure 1 represents a side elevation as seen from the right of a sewing-machine containing my invention. Fig. 2 represents a detail sectional rear elevation of the tension device
50 and the mechanisms employed in the opera-

tion of the same in carrying out my invention. Fig. 3 represents a detail sectional plan view of the parts shown in Fig. 2.

Like characters of reference refer to like parts wherever they occur on the different
55 parts of the drawings.

The machine is provided with a suitable supporting-frame 1 for the support of the various devices which constitute the machine, which frame is secured upon a suitable stand-
60 ard or support 2 in the usual manner. Within bearings in the frame 1 is mounted the driving-shaft 3, from which the various devices receive their movements through the medium of any well-known mechanical device
65 or devices, such as the cam or cams 4, which are firmly attached to the driving-shaft and driven thereby.

The machine is preferably provided with a curved hook-needle 5, which is mounted upon
70 a pivoted needle-block 6, movable upon its pivot, and within suitable guides in the frame 1 by means of any well-known and convenient connecting mechanism between said block
75 and the driving-shaft 3 in order to cause the needle carried by said block to have a forward-and-backward vibration to pierce and withdraw from the work while sewing. The particular mechanism used to cause these
80 vibrations of the needle form no part of my present invention and may be varied as desired. Therefore I have not endeavored to fully illustrate it on the drawings or describe the same in the specification.

The machine is also preferably provided
85 with a rotating or oscillating looper 7, a channel-guide 8, a feed-point 9, a back gage 10, an auxiliary back gage 11, and suitable and well-known mechanisms to cause them to perform their functions in sewing the work;
90 but such mechanisms have not been illustrated on the drawings or described in this specification, as their particular construction is immaterial to the proper working of my present invention and forms no essential part
95 thereof.

The thread 12 in its passage from the thread-supply (not shown on the drawings) is carried around the tension-wheel 13 a sufficient
100 number of times to prevent it from slipping.

From the tension-wheel the thread is carried over one or more thread-trucks 14 and through the hollow looper-shaft and looper 7 to the work being sewed. The tension-wheel 13 is
 5 rotatably mounted upon a stud or pin 15 on the outer end of an arm 16, mounted upon a shaft 17, carried by a bracket 18 on the frame 1. The shaft 17 may be free to rotate in the bracket 18 and be kept from longitudinal
 10 movement therein by means of the groove 19 on said shaft, and the pin 20, resting in said groove, as shown on the drawings, or the arm 16 may be free to rotate upon the shaft 17 and the shaft 17 be rigidly secured within the
 15 bracket. A spring 21 acts upon the arm 16 in such a manner that it normally forces said arm, with the tension-wheel 13 thereon, backward and in an opposite direction to that of the feeding of the thread from the thread-
 20 supply to the needle. On the drawings this spring has been shown as a "rat-trap" spring having one end resting against a stud or pin 22 on the arm 16, the coil surrounding the hub of said arm or the shaft 17 and the other
 25 end of the spring resting within a grooved block 23 upon the top of the screw 24. By the adjustment of the screw 24 the strength of the spring 21 may be increased or diminished, as desired.

30 It will be seen that the influence of the spring 21 is such as to normally force the tension-wheel backward or in a direction opposite to the direction of the feeding of the thread to the needle.

35 The arm 16 is provided with a projection 25, which engages an adjustable stop 26 to limit the backward movement of the arm and tension-wheel caused by the action of the spring 21. A second arm 27 is mounted and
 40 longitudinally movable upon the shaft 17 and stud 15, being pressed toward the arm 16 with a yielding pressure by means of the tension-producing spring 28, surrounding the shaft 17 between a collar 29, free to move longi-
 45 tudinally on said shaft 17, and an adjusting-nut 30, adjustable longitudinally on the screw-threaded end of the shaft 17, the collar 29 resting against the arm 27. Friction-producing washers 31 are placed upon the stud
 50 15, one between the arm 16 and the tension-wheel and another between the arm 27 and the tension-wheel. It will thus be seen that the tension-wheel, with a friction-producing washer on either side thereof, is held be-
 55 tween the arms 16 and 27 and that the action of the spring 28 upon the arm 27 will cause tension to be applied to said tension-wheel, which tension may be varied by the adjust-
 60 ment of the nut 30 to produce the desired tension on the thread 12, carried by said wheel.

In order to release the tension-wheel from tension, I provide the machine with the lever 32, fulcrumed at 33 to the frame 1 or a bracket
 65 attached to the frame, one arm of said lever engaging the collar 29 on the opposite side to that engaged by the spring 28. It will be

seen that when said lever is turned in one direction it will move said collar longitudinally upon the shaft 17 and by removing the
 70 influence of the spring 28 from the arm 27 will relieve the tension-wheel from friction and thread carried thereby from tension. The opposite end of this tension-releasing lever 32 may be connected to a suitable treadle
 75 (not shown on the drawings) by means of a rod 34 or by other means and in such a manner that the lever may be operated by the treadle at any time to release the tension from the thread, so as to enable thread to be
 80 drawn freely through the tension-wheel when desired. I also provide the machine with an automatic and intermittently-operating mechanism to engage the lever 32, which mechanism is operated by the move-
 85 ments of the machine while sewing, and which mechanism has been shown on the drawings as consisting of a lever 35, fulcrumed at 36 to the frame 1 and having one end thereof provided with a pin and roll 37, engaging a
 90 suitably-shaped cam-groove in the cam 4 and having its opposite end in position to engage and operate the lever 32 when the tension is to be released.

In connection with a tension device oper-
 95 ated as above described I use a thread-arm 38, which engages and forms a bight or loop in the thread on the stitch side of the needle or in that part of the thread which is between the needle and the last stitch formed in the work.
 100 This thread-arm is operated automatically and intermittently from some suitable moving part of the machine. On the drawings this operating mechanism has been shown as consisting of the lever 39, fulcrumed at 40 to the
 105 frame of the machine and having the thread-arm 38 attached thereto; a bell-crank lever 41, fulcrumed at 42 to the frame of the machine and having a pin or roll 43 thereon in engagement with a suitably-shaped cam-
 110 groove on the cam 4 to oscillate the lever 41, and a connecting rod or link 44 between the levers 39 and 41 to convey the movements of the lever 41 to the lever 39 and its attached thread-arm. The lower end of the thread-
 115 arm is so located that when vibrated by the action of the cam-groove upon the lever 41 and upon the connected mechanism it will vibrate across the lower end of the looper and by engaging the thread which leads from the
 120 looper to the last stitch formed will draw the thread to one side and form a bight or loop in the thread. The bight or loop so formed is of sufficient size to contain substantially the necessary amount of thread to prevent
 125 rendering of thread through the barb of the needle.

With the various parts of the machine in the positions shown on the drawings and a boot or shoe held in position, as illustrated,
 130 having the channel-guide 8 resting within the channel and the back gage pressed against the side of the boot or shoe and locked, the operation of the machine in sewing a seam

within the channel of the boot or shoe is substantially as follows: The needle begins its forward movement to pierce the work, and by so doing allows the spring 21 to gradually
 5 move the tension-wheel backward a part of its movement. While the needle is making its work-piercing or forward stroke the thread-arm engages the thread between the looper and the work being sewed and by moving it
 10 to one side from a direct course between said parts forms a loop or bight in the thread, which it holds until needed. This movement of the thread-arm carries the thread into such a position that when the looper loops the
 15 thread into the barb or hook of the needle that part of the thread which is between the thread-arm and the looper will be placed within the needle. Thus a certain amount of thread is held by the thread-arm in the
 20 loop which it has made between the needle and the work. The looper places the thread into the barb or hook of the needle after the needle reaches the end of its forward stroke; but just before the thread is placed in the
 25 needle by the looper the tension-wheel is relieved from its tension-producing device by the action of the tension-releasing mechanism. During the loop-drawing stroke of the
 30 needle to set the stitch, as hereinafter described, the tension-wheel was drawn forward with its carrier against the influence of the spring resistance on the carrier and until said
 35 resistance had equaled the resistance of the tension-producing device on the tension-wheel; but by the forward movement of the needle above mentioned the tension-wheel
 40 was allowed to be moved backward with its carrier, a part of its movement caused by the spring resistance acting thereon and as above set forth. As the tension-wheel is free to rotate
 45 upon its fulcrum when relieved from the action of the tension-producing device, and as the thread is held in front of the tension-wheel by the previous stitch and the thread-
 50 handling devices, the spring resistance upon the tension-wheel carrier will move the carrier backward until it reaches its stop, allowing the tension-wheel to turn freely upon its fulcrum, thus supplying thread in front of
 55 the tension-wheel or between the tension-wheel and work being sewed free from the influence of the tension-producing device. During this latter part of the backward movement of the tension-wheel carrier and its tension-wheel the looper completes the thread-
 60 looping operation, and as soon as the looping operation has been completed the needle commences its backward movement to draw the loop through the perforation made by it in the work being sewed. At the same time
 65 the thread-arm moves so as to deliver the thread which it has been holding in the loop formed by the thread-arm as it is required by the consequent increase in the distance between the barb of the needle and the last-completed stitch. When the barb of the needle enters the work, the thread-arm becomes

entirely disengaged from the thread. After the needle has wholly withdrawn from the work in its backward movement the tension
 70 is applied to the thread by the withdrawal of the tension-releasing mechanism, and the completion of the backward movement of the needle exerts sufficient strain upon the thread to properly set the stitch; but prior to the
 75 setting of the stitch the tension-wheel, with its carrier, will be moved against the spring resistance acting on the carrier until said resistance has gradually increased and equals the tension applied to the tension-wheel by
 80 the tension-producing device or until the tension-wheel occupies substantially the position shown in the drawings, when any surplus thread required in the loop being drawn will be supplied through the tension-wheel
 85 under full tension. The machine will then be in the position shown in the drawings and ready to repeat the operation above described. It will thus be seen that thread is supplied for both sides of the loop drawn
 90 through the work by the loop-drawing movement of the needle, which thread is free from tension until after the needle is free from the work, and that when the tension is applied to the thread the loop will be drawn against
 95 the gradually-increasing resistance acting upon the tension-wheel carrier, which will increase until it equals the influence of the tension-producing device upon the tension-wheel, when further thread, if necessary, will
 100 be supplied through the tension-wheel under full tension. Thus it is possible to have the parts so finely adjusted that the full tension will be reached just as the setting of the stitch is completed and without the necessity of
 105 drawing thread under full tension, said full tension being used only to give the required strain on the thread to properly set the stitch.

The above is a description of the operation of that part of the machine which contains
 110 my invention; but the operations of the other devices—such as the feed-point, the channel-guide, the back gage, and the auxiliary back gage—take place at the proper times to perform their required functions and need no
 115 particular description.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. In a chain-stitch sewing-machine, a hook-
 120 needle, a looper, and complementary stitch-forming mechanisms, including a tension device mounted upon a vibratory carrier moved bodily in one direction by the pull of the needle upon the thread during its loop-drawing
 125 stroke, and a spring to move said tension device bodily in the opposite direction, combined with an automatic intermittently-operated tension-releasing mechanism to release the thread from the action of the tension de-
 130 vice, for the purpose set forth.

2. In a chain-stitch sewing-machine, a hook-needle, a looper, and complementary stitch-forming mechanism, including a tension de-

vice mounted upon a vibratory carrier moved
in one direction by the pull of the needle
upon the thread during its loop - drawing
stroke, a spring to move said tension device
5 bodily in the opposite direction, and an auto-
matic intermittently-operated tension-releas-
ing mechanism to release the thread from the
action of the tension device, combined with
a thread-arm and operating mechanism to
10 cause said thread-arm to form a loop or bight
in the thread between the looper and the last
stitch and deliver the thread held in said loop
to the needle during the loop-drawing stroke
of the needle, for the purpose set forth.
15 3. In a sewing-machine, a needle and com-
plemental stitch-forming mechanism, a ten-
sion device normally exerting constant ten-
sion on the thread carried thereby, a movable
carrier carrying said tension device, a yield-
20 ing mechanism acting upon said carrier and
tending to hold it at that end of its move-

ments which will cause a pulling strain to be
exerted upon the thread between the tension
device and the needle, and an automatic ten-
sion-releasing mechanism acting upon the 25
tension device to intermittently release the
thread from the action of the tension device,
combined with a thread-arm engaging the
thread between the last stitch and the device
used to loop the thread into the barb of the 30
needle, and acting upon the thread to draw
thread and form a loop or bight of thread
between the last stitch and said looping de-
vice, and giving up said thread for the stitch
side of the loop when drawn through the 35
work by the needle, for the purpose set forth.

In testimony whereof I have affixed my sig-
nature in presence of two witnesses.

HENRY CHADBURN.

Witnesses:

HARRY N. LENNIS,
L. BAYARD THOMPSON.