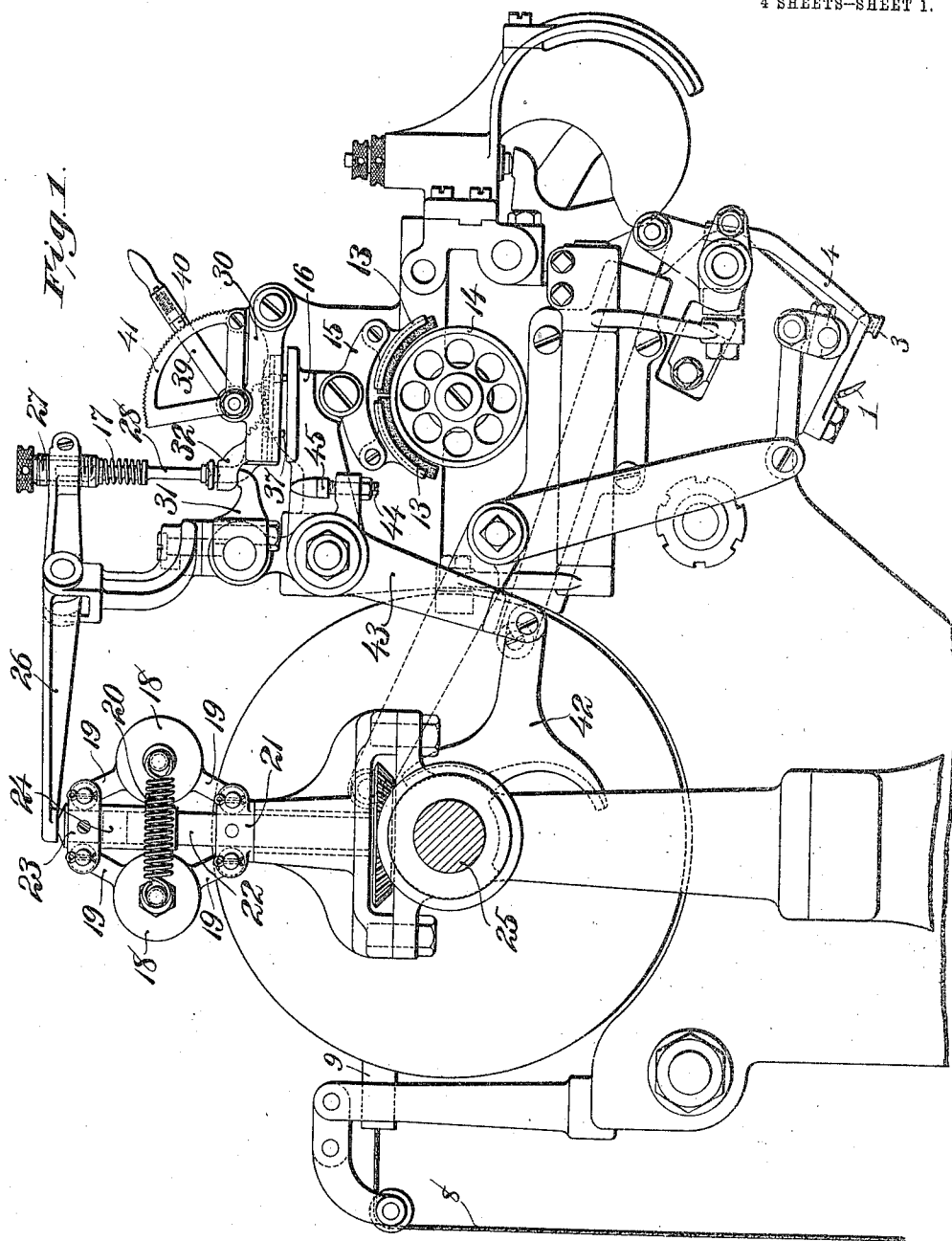


1,030,743.

4 SHEETS--SHEET 1.



W. L. Gilman.

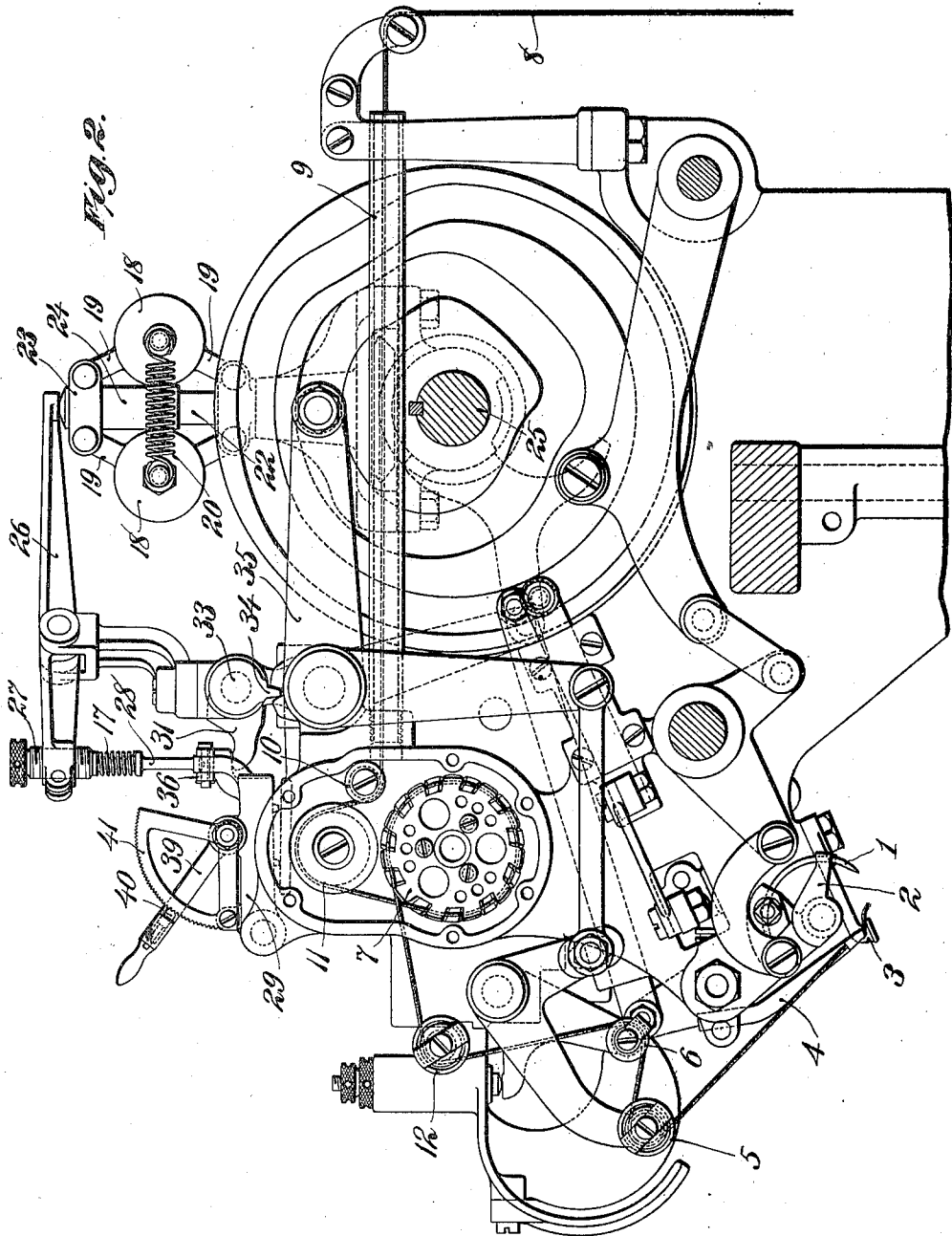
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TENSION DEVICE FOR SEWING MACHINES.
APPLICATION FILED SEPT. 1, 1909.

1,030,743.

Patented June 25, 1912.

4 SHEETS—SHEET 2.



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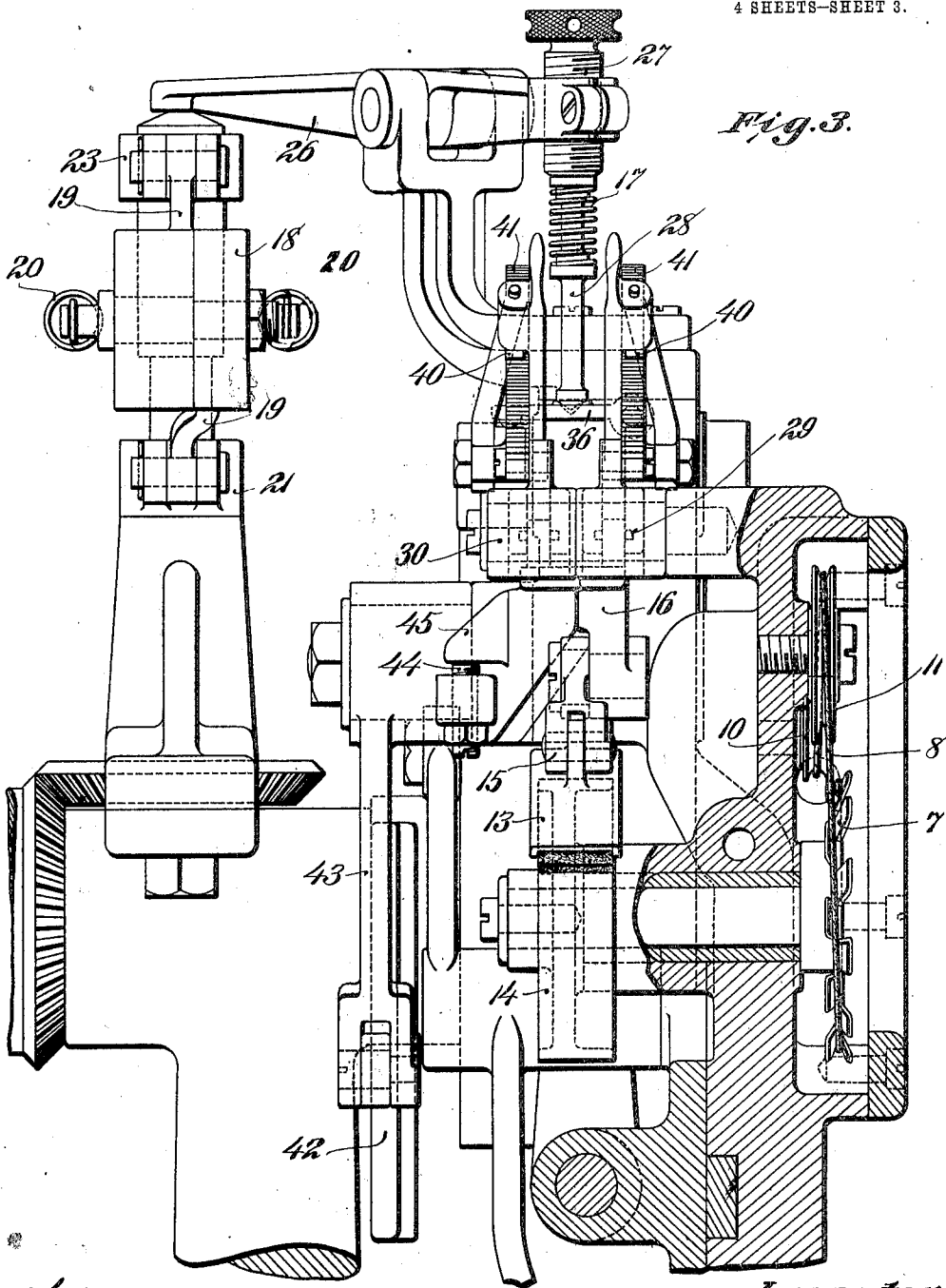
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1,030,743.

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4 SHEETS-SHEET 3.



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TENSION DEVICE FOR SEWING MACHINES.
APPLICATION FILED SEPT. 1, 1909.

1,030,743.

Patented June 25, 1912

4 SHEETS—SHEET 4.

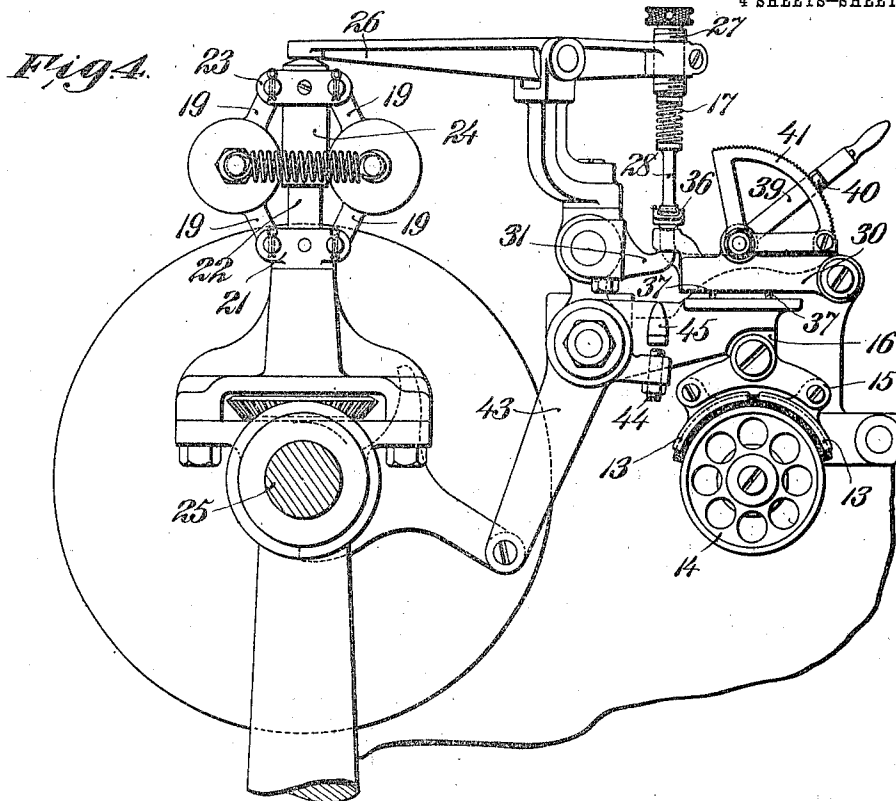


Fig. 5.

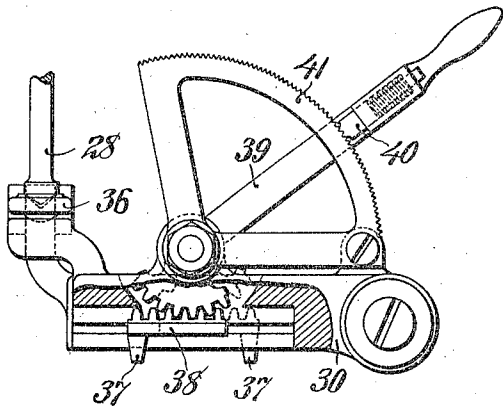


Fig. 6.

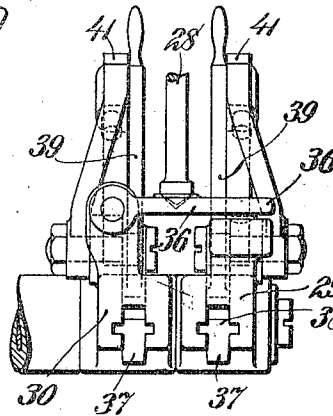
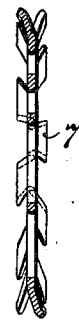


Fig. 7.



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UNITED STATES PATENT OFFICE.

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TENSION DEVICE FOR SEWING-MACHINES.

1,030,743.

Specification of Letters Patent.

Patented June 25, 1912.

Application filed September 1, 1909. Serial No. 515,673.

To all whom it may concern:

Be it known that I, WILLIAM C. MEYER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Tension Devices for Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improved tension device for sewing machines and is designed particularly for use on wax thread shoe sewing machines which form a chain stitch, although the invention is capable of use on other types of sewing machines.

In the operation of sewing machines, and particularly wax-thread chain-stitch sewing machines, it has been found that the tension which must be exerted on the thread to produce the best results varies with the speed at which the machine is operated, a heavier tension ordinarily being required to produce a tight seam when the machine is operated at a slow speed than when the machine is operated at a high speed.

The principal object of the present invention is to provide means whereby the tension on the thread is controlled automatically by the speed of the machine so that the desired amount of tension may be exerted upon the thread at all times.

With this object in view a feature of the present invention contemplates the provision, in a sewing machine, of means responsive to variations in the speed of the machine and operating to vary the tension on the thread when the speed of the machine varies.

Broadly considered this feature of the present invention contemplates the provision of any suitable means operating in response to variations in the speed of the machine to vary the tension on the thread. In the preferred form of this feature, of the invention, however, a tension device for the thread is provided and a governor therefor which is driven by the machine and which operates the tension device to vary the tension on the thread when the speed of the machine varies. In accordance with this feature of the invention the tension on the thread may be either increased or diminished as the speed of the machine increases.

In machines of the type illustrated in the drawings accompanying this application, it has been found that the best results can be secured when the tension on the thread is decreased as the speed of the machine increases and increased as the speed of the machine decreases. Accordingly, in the illustrated embodiment of the invention hereinafter described, the governor for the tension device is arranged to operate the tension device so as to vary the tension on the thread inversely with the speed of the machine.

Other objects of the present invention are to simplify and improve the construction and arrangement of the various parts of tension devices for sewing machines and particularly tension devices of that type which are adapted to exert different degrees of tension on the thread during each cycle of operations of the sewing machine.

With these objects in view the present invention also consists in certain devices, combinations and arrangements of parts hereinafter described and claimed the advantages of which will be obvious to those skilled in the art from the following description.

The several features of the present invention will be clearly understood from an inspection of the accompanying drawings in which—

Figure 1 is a view in side elevation, with the cam shaft shown in section, of a chain-stitch shoe-sewing machine with the preferred embodiment of the invention applied thereto. Fig. 2 is a sectional elevation of the machine looking in the opposite direction to Fig. 1. Fig. 3 is a view in front elevation, partly in section, and on an enlarged scale, of the tension and tension regulating devices. Fig. 4 is a view in side elevation of the tension and tension regulating devices, illustrating the same parts shown in Fig. 1 but in a different position. Fig. 5 is a detail view in side elevation partly in section of the connections between the spring and brake of the tension device. Fig. 6 is a view in rear elevation of the parts illustrated in Fig. 5 and Fig. 7 is a detail edge view, partly in section, of the tension truck.

The machine illustrated in the drawings is a curved hook needle shoe sewing machine of the same general type as that illustrated in the patent to French & Meyer, No.

412,704, dated October 8, 1889, although the various parts are somewhat differently arranged and are actuated by somewhat different mechanism. Inasmuch as the present invention relates principally to the tension and tension regulating devices, the construction and arrangement of the other parts need be but briefly described. It may be said, however, that the stitches are tightened or set when the needle is in the work by the action of the take up which pulls the loop of thread last drawn out by the needle tightly around the shank of the needle. This is the mode of operation of the particular machine. In the machine illustrated in the drawings, however, a uniform and relatively light tension is exerted upon the thread during the retracting stroke of the needle and a comparatively heavy tension during the action of the take up whereas in the patented machine a uniform tension is exerted upon the thread at all times.

Referring now to the drawings 1 indicates the curved hook needle, 2 the needle guide, 3 the thread arm, 4 the looper 5 the take up, 6 the auxiliary take up, and 7 the tension truck. The thread 8 leads from the back of the machine through the tube 9 and passes under the guide roll 10 over the guide roll 11, around the tension truck 7, over the guide roll 12, under the auxiliary take up 6, over the main take up 5 and through the eye of the looper 4 to the work. The mechanism for actuating the needle, needle guide, thread arm, looper, and take up will be readily understood from an inspection of the drawings and need not be specifically described.

In the embodiment of the present invention illustrated in the drawings the tension on the thread is produced by a brake in the form of two brake shoes 13 which are arranged to bear upon the periphery of a brake disk 14 secured to the shaft upon which the tension truck 7 is fixed. These brake shoes are pivotally mounted at the opposite ends of an arm 15 pivotally mounted midway between its ends upon the outer end of a brake carrying lever or arm 16. The arrangement of the brake shoes 13 and lever 16 is such that a downward movement of the lever around its pivot presses the shoes against the disk 14 and thereby retards its rotation so as to place the thread leading from the tension truck to the work under tension. The brake carrying lever 16 is forced downwardly so as to produce the desired amount of tension on the thread by means of a spring 17 and suitable connections between the spring and the lever. These connections will be hereinafter described.

The means illustrated in the drawings for varying the tension on the thread when the

speed of the machine varies consists of a governor driven from the cam shaft of the machine, and intermediate connections to the spring 17, the arrangement being such that when the speed of the machine increases the tension of the spring 17 is diminished and when the speed of the machine diminishes the tension of the spring is increased. The governor consists of two weights 18 which are supported at the center joints of toggle levers 19 and are acted upon by coiled springs 20, the tendency of which is to draw the weights toward each other. The lower ends of the toggle levers 19 are pivoted to a collar 21 fast upon a vertical shaft 22, while the upper ends of the toggle levers are pivoted to a collar 23 upon a sleeve 24 mounted to slide longitudinally on the shaft 22. The shaft is driven from the cam shaft 25 of the machine by intermeshing bevel gears so that the speed of the shaft 22 varies with that of the machine. It will be obvious from an inspection of the drawings that the sleeve 24 will fall as the speed of the machine increases and will rise as the speed of the machine decreases. This movement of the sleeve 24 is utilized to control the tension of the spring 17 and to this end the sleeve is arranged to engage the rear end of a lever 26, the forward end of which is provided with a sleeve 27 the lower end of which forms an abutment for the upper end of the spring 17. The spring 17 is thus compressed more or less, depending upon the speed of the cam shaft 25 and shaft 22 driven therefrom, and consequently the amount of tension on the thread is controlled by and is dependent on the speed at which the machine is operated. To enable the tension of the spring 17 to be adjusted manually by the operator to give the desired tension on the thread at any given speed, the sleeve 27 is screw threaded in the lever 26 so that it can be adjusted vertically therein.

The connections between the spring 17 and the brake carrying lever 16 comprises a rod 28 around which the spring 17 is coiled and two levers 29 and 30 which are acted upon by the rod 28 and which engage the lever 16. Two actuating levers 29 and 30 are provided in order that the pressure on the brake carrying lever 16 may be varied during each cycle of operations of the machine to cause a heavier tension to be exerted on the thread during the stitch setting stroke of the take up than during the thread drawing stroke of the needle. When both levers 29 and 30 are in engagement with the lever 16 a heavy tension is exerted upon the thread. To remove a portion of the pressure on the lever 16 so as to give a comparatively light tension on the thread during the retracting stroke of the needle, the lever 29 is raised during a portion of

each cycle of operations of the machine and to accomplish this an arm 31 is provided which extends beneath the rearwardly projecting end 32 of the lever 29. The arm 31 is secured to a rock shaft 33 which is provided with a projecting tooth 34 engaging a correspondingly shaped recess in the hub of a cam actuated lever arm 35. To permit both levers 29 and 30 to be acted upon by the spring pressed rod 28 and also to permit the lever 30 to be moved independently of the lever 29, a bar 36, best shown in Fig. 6, is pivotally secured at one end to the rear end of the lever 30 and at its other end is provided with a rounded projection which fits a corresponding recess in the rear end of the lever 29. The rod 28 at its lower end is seated in a recess in the bar 36 midway between the two levers 29 and 30. By reason of this construction the pressure of the spring 17 is transmitted to both of the levers 29 and 30 and the lever 29 can be raised without removing the pressure of the spring from the lever 30.

It is sometimes desirable to adjust either the amount of the light tension or the heavy tension independently of the other and to enable this to be done each of the levers 29 and 30 is provided with an abutment 37 to bear on the brake carrying lever 16, which abutment is longitudinally adjustable in the lever. Each of these abutments consists of a projection from a slide 38 mounted in a suitable guideway and provided with rack teeth meshing with teeth on the hub of a hand lever 39, which hand lever 39 is pivotally mounted on one of the levers 29 and 30 and is provided with a spring pressed locking pin 40 arranged to engage a series of teeth on a segment 41 secured to the lever. By means of the handles 39, the abutments 37 can be readily adjusted by the operator to vary the proportion of the light to the heavy tension or to change the amount of both tensions independently of any adjustment of the spring 17.

While the machine is operating to sew a seam the lever 30 remains continuously in engagement with the brake carrying lever 16 so as to produce a predetermined uniform tension on the thread. During the stitch setting stroke of the take up, the lever 29 is also in engagement with the brake carrying lever 16 so as to produce a comparatively heavy tension on the thread but during the loop drawing stroke of the needle the lever 29 is raised and the thread is held under light tension by the action of the lever 30.

When the machine is stopped and the work is to be withdrawn from the machine it is desirable that the thread be relieved of all tension, and to secure this result the machine illustrated in the drawing, is provided with a tension release, which, when the cam

shaft of the machine is rotated by hand in a reversed direction, raises the brake carrying lever 16 so as to lift the brake shoes 13 out of engagement with the disk 14. This tension release comprises a swinging link or arm 42 such as is commonly employed in mechanisms of this character, which is adapted to be swung from the position illustrated in Fig. 4 to that illustrated in Fig. 1 upon a reversal in the direction of rotation of the cam shaft 25. The arm 42 is pivotally mounted upon the lower end of a bell crank lever 43, the forward horizontal arm of which is provided with an adjustable set screw 44 arranged to engage a projection 45 on the brake carrying lever 16.

The nature and scope of the present invention having been indicated and a construction embodying the several features thereof in their preferred form having been specifically described, what is claimed is:—

1. A sewing machine, having, in combination, stitch forming devices, and means responsive to variations in the speed of the machine operating during the continued operation of the machine in sewing a seam to vary the tension on the thread when the speed of the machine varies.

2. A sewing machine, having, in combination, stitch forming devices, and means driven by the machine and operating during the continued operation of the machine in sewing a seam to vary the tension on the thread when the speed of the machine varies.

3. A sewing machine, having, in combination, stitch forming devices, a tension device, and a governor therefor operating during the continued operation of the machine in sewing a seam to vary the tension on the thread when the speed of the machine varies.

4. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a spring acting on the brake and means responsive to variations in the speed of the machine operating during the continued operation of the machine in sewing a seam to vary the tension of the spring when the speed of the machine varies.

5. A sewing machine, having, in combination, a tension device including a brake, a spring for actuating the brake, means whereby the tension of the spring can be adjusted manually and a governor operating during the continued operation of the machine in sewing a seam to vary the tension of the spring when the speed of the machine varies.

6. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a spring acting on the brake, an abutment for the spring, and a governor operating during the continued operation of the machine in sewing a seam to move said abutment to vary the tension of the spring when the speed of the machine varies.

7. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a spring acting on the brake, an abutment for the spring, a carrier in which the abutment is mounted so as to be capable of a manual adjustment to vary the tension of the spring, and means responsive to variations in the speed of the machine operating to move the carrier to vary the tension of the spring when the speed of the machine varies.

8. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a brake carrier, a lever for actuating the brake carrier, a spring acting on the lever, and an abutment on the lever arranged to bear on the brake carrier and adjustable longitudinally of the lever to vary the tension on the thread.

9. A chain stitch sewing machine, having, in combination, stitch forming devices, including a hooked needle and a stitch setting take up operating while the needle is in the work, a spring and devices actuated thereby to produce tension on the thread, means for causing the spring to produce relatively light tension on the thread during the loop drawing stroke of the needle and relatively heavy tension during the stitch setting stroke of the take up and means operating automatically to vary the tension of the spring when the speed of the machine varies.

10. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a brake carrier, two levers for actuating the brake carrier, means for exerting spring pressure on the levers, connections between the levers and carrier adjustable to vary the tension on the thread, and means for raising one lever during each cycle of operations of the machine.

11. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a brake carrier, a spring for actuating the brake carrier, two sets of connections between the brake carrier and spring and means for throwing one set of connections out of operation during each cycle of operations of the machine.

12. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a spring for actuating the brake, two sets of connections between the brake and spring, means for throwing one set of connections out of operation during each cycle of operations of the machine and means for varying the tension of the spring in response to variations in the speed of the machine.

13. A sewing machine, having, in combination, stitch forming devices, a tension device including a brake, a brake carrier, two levers for actuating the brake carrier, a bar

connecting the levers while permitting one to move independently of the other, a spring acting on said bar between the levers, and means for raising one lever during each cycle of operations of the machine.

14. A chain stitch sewing machine, having, in combination, stitch forming devices including a hook needle and a stitch setting take up acting while the needle is in the work, a tension device including a brake, a brake carrier, and means for actuating said brake carrier to produce relatively light braking pressure during the loop drawing stroke of the needle and relatively heavy braking pressure during the stitch setting stroke of the take up.

15. A chain stitch sewing machine, having, in combination, stitch forming devices including a hook needle and a stitch setting take up operating while the needle is in the work, a tension device including a brake, a spring, connections between the spring and the brake, and means for actuating said connections to produce relatively light braking pressure during the loop drawing stroke of the needle and relatively heavy braking pressure during the stitch setting stroke of the take up.

16. A chain stitch sewing machine, having, in combination, stitch forming devices including a hook needle and a stitch setting take up operating while the needle is in the work, a tension device including a brake, a spring, and means for causing the spring to act on the brake to produce relatively light braking pressure during the loop drawing stroke of the needle and relatively heavy braking pressure during the stitch setting stroke of the take up.

17. A sewing machine, having, in combination, stitch forming devices, a tension device including a spring, means whereby the tension of the spring may be adjusted manually, and means driven by the machine acting during the continued operation of the machine in sewing a seam to vary the tension of the spring when the speed of the machine varies.

18. A chain stitch sewing machine, having, in combination, stitch forming devices, including a hooked needle, and a stitch setting take-up operating while the needle is in the work, a spring and devices actuated thereby to produce tension on the thread, and means for causing the spring to produce relatively light tension on the thread during the loop drawing stroke of the needle and relatively heavy tension during the stitch setting stroke of the take-up.

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