A. D. SMITH.

THREAD TENSION, HOLDER, AND CUTTER FOR SEWING MACHINES.

APPLICATION FILED JULY 30, 1918.

**1,329,638.**

Patented Feb. 3, 1920.

3 SHEETS—SHEET 1.

Fig. 2.

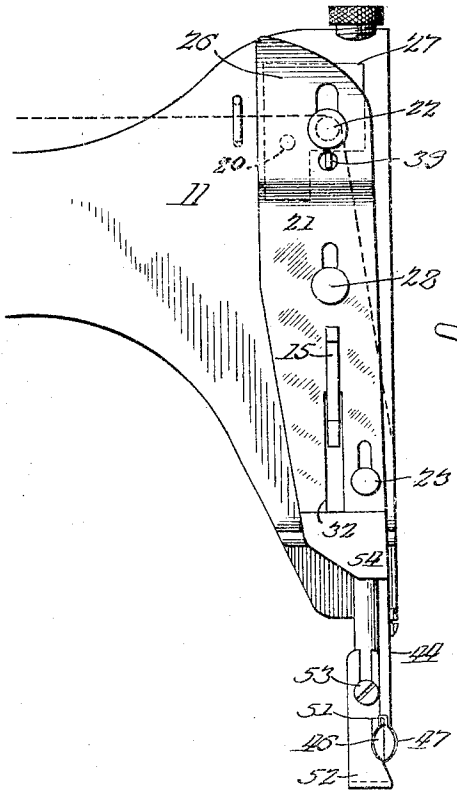
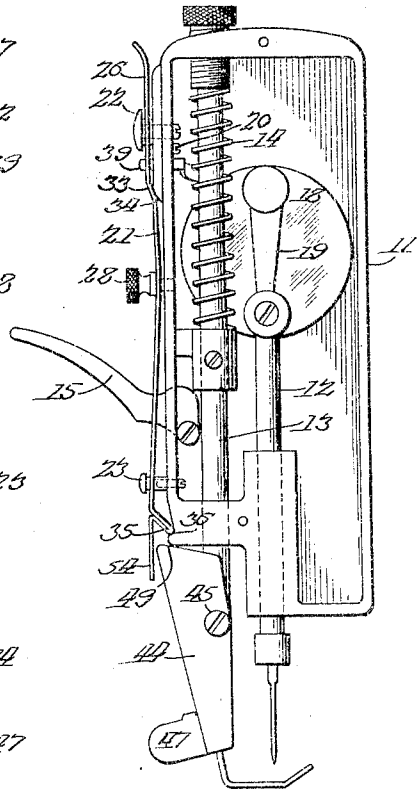
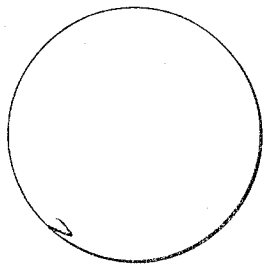



Fig. 1.



Inventor

Albert D. Smith

By Ira J. Wilson

Attorney

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3 SHEETS—SHEET 2.

Fig. 4.

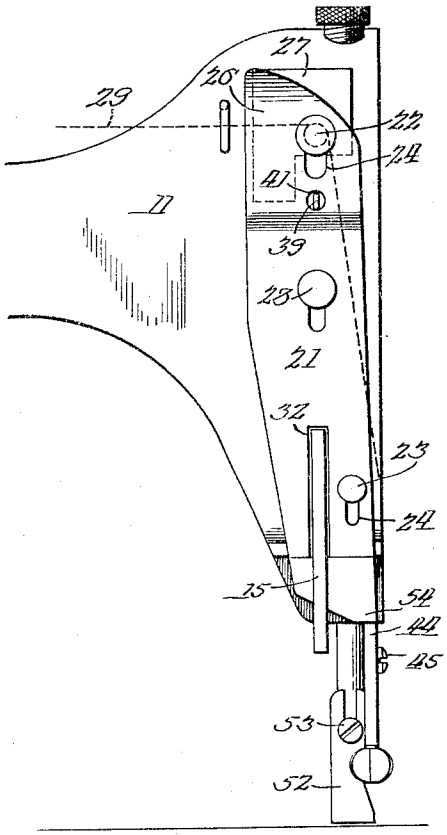
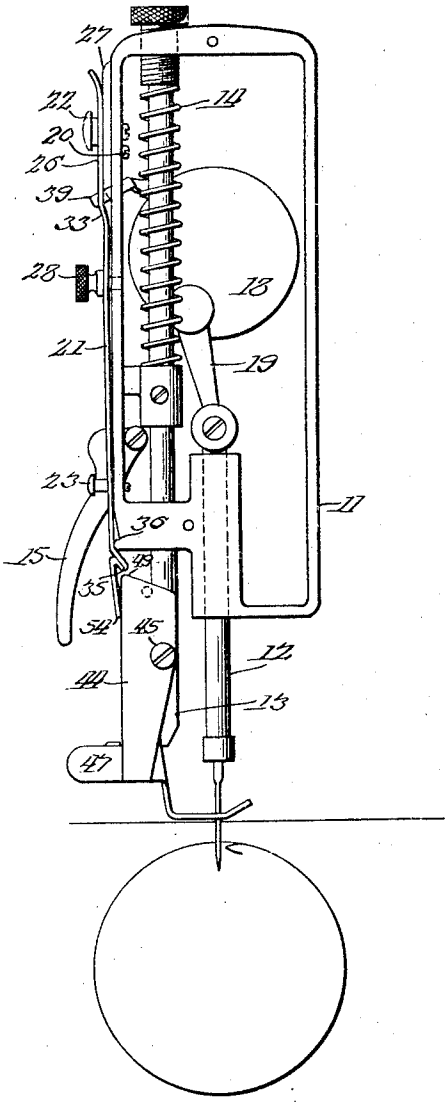



Fig. 3.




Inventor

Albert D. Smith

By Ira J. Wilson

Attorney

A. D. SMITH.

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3 SHEETS—SHEET 3.

Fig. 5.

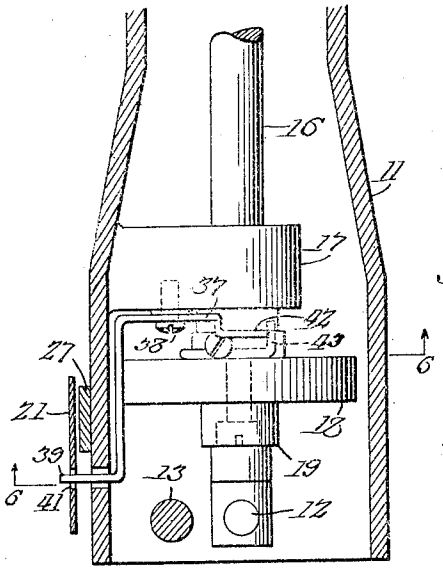



Fig. 6.

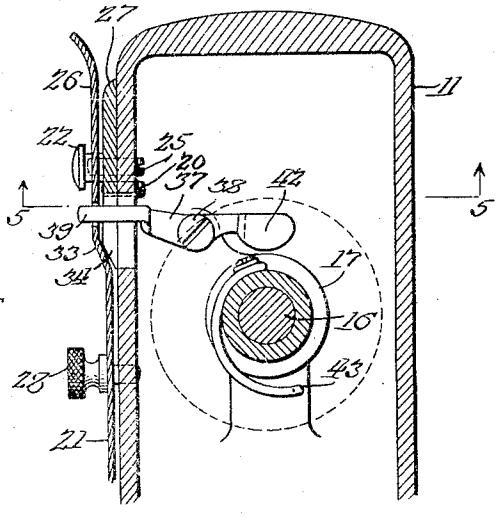



Fig. 7.

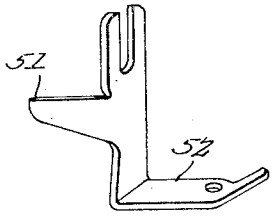
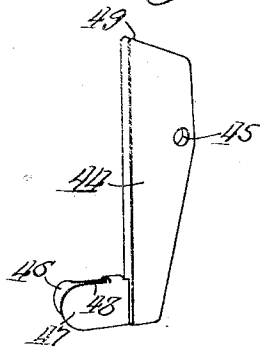



Fig. 8.




Inventor

Albert D. Smith

By Ira J. Wilson

Attorney

# UNITED STATES PATENT OFFICE.

ALBERT D. SMITH, OF DETROIT, MICHIGAN.

## THREAD TENSION, HOLDER, AND CUTTER FOR SEWING-MACHINES.

1,329,638. Specification of Letters Patent. Patented Feb. 3, 1920.

Application filed July 30, 1918. Serial No. 247,428.

*To all whom it may concern:*

Be it known that I, ALBERT D. SMITH, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Thread Tensions, Holders, and Cutters for Sewing-Machines, of which the following is a specification.

This invention relates to sewing machines and has more particular reference to means for imposing a tension on the upper thread before it enters the take-up, for gripping the needle end of the thread when commencing to sew to prevent unthreading, and also to cutting off the loose thread ends emanating from the thread gripping means.

The primary object of the invention is to provide a generally improved tension mechanism, and means for releasing and restoring the tension.

I have also aimed to provide improved means for coöperating with the tension mechanism for gripping the loose thread end from the needle and holding it when commencing to sew until automatically released simultaneously with actuation of the tension mechanism.

Another object is to provide a simplified tension mechanism which requires no adjustment for threads of different diameter and which is characterized chiefly by the inclusion of a tension plate of spring material mounted for sliding movement on the head of a machine and slidable lengthwise to bring its resilient end into and out of operative position in which to impose a tension on thread passing between the resilient end and the head. This spring tension plate also actuates the thread-gripping device to render the same inoperative when the plate has been automatically returned to operative position when commencing to sew. I prefer to move the spring tension plate to inoperative position by raising the presser-bar lifting lever, which lever when lowered, leaves the tension mechanism in inoperative condition. Thus, since the thread end from the needle is held in the gripping device new thread will be drawn freely from the upper spool when commencing to sew and the tension will be automatically restored, preferably just after the needle starts to ascend.

Other objects and attendant advantages will be appreciated as the invention becomes better understood by reference to the following specification when considered in connection with the accompanying drawings, in which—

Figure 1 is an end view of a sewing machine head equipped with my improvements, showing the presser-bar raised and the tension mechanism in operative condition;

Fig. 2, a rear elevation of the head with the parts as shown in Fig. 1;

Fig. 3, an end view of the head showing the presser-bar lowered and the tension mechanism in operative condition;

Fig. 4, a rear elevation of the head with the parts as shown in Fig. 3;

Fig. 5, a full-sized horizontal sectional view taken substantially on the line 5—5 of Fig. 6;

Fig. 6, a similar sectional view taken substantially on the line 6—6 of Fig. 5; and

Figs. 7 and 8, detail perspective views of the presser-foot and thread-gripping lever, respectively.

Referring to the drawings, it will be noted that I have shown only such parts of a sewing machine as are necessary for an understanding of my present improvements. The well known parts, which might be of any suitable or preferred construction, consist of a head designated generally by reference character 11, a needle-bar 12, a presser-bar 13 urged downwardly by an expansion spring 14, a lifting lever 15 for raising and lowering the presser-bar in connection with the spring, and a driving shaft 16 journaled in the bearing 17 and equipped with a crank disk 18 connected by means of a pitman 19 to the upper end of the needle bar. The face plate for covering the open front of the head is removed.

My improved tension mechanism is preferably arranged at the back of the sewing machine head and consists principally of a single tension member designated generally by character 21. The tension member, preferably in the form of an elongated plate of spring material, extends substantially from top to bottom of the head so as to function at both the upper and lower ends thereof, as will be presently seen. The member is mounted for vertical sliding movement on the head and for this purpose suitable guide studs 22 and 23 are provided, passing through elongated openings 24 in the ten-

sion member and being suitably secured to the head, preferably by means of adjusting screws 25 from the inside of the head. By means of these adjusting screws 25, the heads of the studs 22 and 23 are set at proper distances from the machine head when assembling so that after the machine passes to the user the position of these studs will not be changed. The tension member 21, having a relatively wide upper end 26 overlying a flat bearing plate 27 fixed to the head, is in fact, a flat spring bowed rearwardly at its middle, so that when drawn into the head at a medial point as by means of an adjusting screw 28 passing through a slot in the tension member and threadingly engaged in the head, the upper and lower ends of the tension member will be yieldingly urged against the head. Consequently, the upper end 26 becomes a yieldable tension urged against the fixed bearing 27, and by adjusting the screw 28 the pressure of the tension may be varied. Another adjustment is provided for the tension, consisting of an adjusting screw 20 passing through the rear wall of the head 11 from the inside and through the plate 27. This screw constitutes an abutment against which the spring 26 bears, and is so adjusted as to relieve the tension from the smallest thread used. This adjusting screw does not form a clearance for the thread, but simply relieves or eases the tension so that both the small and large threads will receive the proper tension. The upper thread indicated by 29 passes horizontally between the members 26 and 27, over the stud 22 and then through a suitably located guide to the take-up. Thus, the thread passes through a relatively wide tension, one bearing surface of which is resilient.

In order to relieve the tension and permit the upper thread to be drawn freely therethrough by the take-up as is desired when commencing to sew, I have provided a simple means for withdrawing the resilient end 26 of the tension member from the bearing plate 27 by shifting the tension member bodily in a lengthwise direction. The lengthwise shifting movement of the tension member is accomplished preferably by means of the lifting lever 15, which extends through an aperture 32 in the tension member, and bearing against the upper end of said aperture shifts the tension member upwardly when the lever is lifted to raise the presser-bar. When the tension member is thus moved upwardly, its inclined portion 33 will be brought into contact with the inclined lower end 34 of the bearing plate 27, causing the resilient end 26 of the tension member to be moved rearwardly away from the bearing plate. This raised inoperative position of the tension member is indicated clearly in Figs. 1, 2 and 6; and due to the elongation of the aperture 32 in the tension member, it will be manifest that when the lever 15 is lowered to lower the presser bar the tension member will remain in its raised inoperative position. To insure retention of the member 21 in this inoperative position, a releasable spring catch is provided. For this purpose, the lower end of the tension member is shaped to provide an inward projection 35 adapted to engage in a depression 36 in the rear lower face of the machine head, as shown in Fig. 1, and thus positively hold the tension member in elevated position but permit the member to be lowered from such position when the member is pressed downwardly with sufficient pressure to spring the projection 35 from its engaged position.

Means is now provided for automatically imparting a downward pressure on the tension member to return it to operative position, and consequently, restore the tension, and my invention contemplates automatic actuation of the tension member at a predetermined point in the rotation of the needle-bar driving shaft. To this end, I have provided a simple device actuated by a part on the driving shaft for tripping the tension member from its set inoperative position. This device, best shown in Figs. 5 and 6, consists in the present instance of a lever designated generally by character 37 pivotally mounted at 38 on a fixed part of the head, such as the bearing casting 17, and shaped so that its end 39 extends through the rear wall of the machine head and into an aperture 41 in the tension member 21. The other end of the lever 37 is shaped to provide a curved abutment 42 adapted to be positioned in the path of a resilient actuating member 43 suitably secured to the driving shaft. When the tension member is in operative position as shown in Fig. 3, and the machine is running, the curved abutments 42 will be withdrawn from the path of the actuating member 43, as will be obvious, but when the tension member has been raised to inoperative position the lever 37 will be moved by said tension member to the full-line position shown in Fig. 6 in which the abutment 42 is disposed in the path of the actuating member 43. The actuating member 43 is so arranged relatively to the needle bar as to actuate the lever 37 and restore the tension just after the needle bar has commenced to raise. At this time the full amount of upper thread has been drawn by the take-up, and upon restoring the tension the usual sewing operation commences.

Coöperating with the tension mechanism, I have provided a device for gripping the loose thread end from the needle and holding this end while the upper thread is being drawn by the take-up so as to prevent unthreading of the needle when commencing to

sew. This thread-gripping device, mounted on the lower end of the presser-bar, is constructed so that when the presser-bar is raised the gripping device will automatically be rendered operative, that is, in condition to grip the thread, and is further arranged in such coöperative relation with the tension member as to be actuated thereby for releasing the thread when the tension is restored. The thread-gripping device consists preferably of a lever 44 pivotally mounted at 45 on the presser bar, as shown, and equipped with a pair of resilient fingers 46 and 47 between which the thread is adapted to be engaged and gripped. One of the fingers is provided with a knife edge 48, by means of which the loose thread end which has been drawn upwardly between the members 26 and 27 may be cut off. Upon raising the presser-bar, the upper end 49 of the lever 44 will be brought into contact with the under-surface of the head 11 at one side of the pivot 45 causing the lever 44 to be tilted in a counter-clockwise direction to the position shown in Fig. 1. By this movement, the resilient finger 46 will be brought into contact with a fixed abutment 51, in this instance formed integral with and extending rearwardly from the presser-foot 52, which is secured by means of a set screw 53, to the presser-bar. This action will impose a side thrust on the finger 46, thereby closing the thread-gripping members with sufficient tension to permit the loose needle thread end to be drawn into the mouth between such members until tightly gripped thereby, whereupon the loose end may be cut off by pulling it down over the edge 48. The thread-gripping device will remain in this set position after the presser-bar has been lowered and will be automatically released from this position by the act of restoring the tension. This is accomplished by the lower end 54 of the tension member 21. It will be noted, viewing Fig. 1, that the lower end of the tension member is sprung rearwardly from a normal position and that after the tension member is tripped from its engagement with the recess 36 the lower end 54 will spring forwardly. This movement is utilized to actuate the thread-gripping device. It will be manifest that with the presser-bar lowered and the thread-gripping device in operative position and with the thread tension in raised inoperative position, the upper end of the lever 44 will be disposed forwardly of and in close proximity to the lower end 54 of the tension member. Thus, when the tension is restored automatically by the actuating member 42, said end 54 of the tension member will spring forwardly, striking the upper end of the lever 44 and throwing the same to the upright position shown in Fig. 3, in which its finger 46 is withdrawn from the abutment 51, and the thread end engaged between the gripping fingers is released.

Referring now to the operation in general, it will first be seen that the tension imposed on the upper thread by the resilient end 26 of the tension member must be properly adjusted. To this end of the machine is threaded with the finest silk thread and the regulating screws 20 and 28 adjusted to secure the desired tension on this fine thread as explained above. The regulating screw 28 should not be touched after the tension has been set in this manner, and it follows therefore, that when the heavier threads are used, the tension will be correspondingly heavier, the spring tension member being so shaped and proportioned as to impose a proper pressure on the various threads. By reason of the peculiar tension spring and organization of parts, it is found that the proper tension is obtained on all sizes of thread when sewing on all classes of goods including the finest silk chiffon to heavy overcoats, woolens, flannels, etc., without requiring adjustment of any kind. With the tension mechanism thus in proper adjustment, the needle-bar is raised and threaded and the presser-bar is raised to place the goods in position. By raising the presser-bar the tension on the upper thread is released and the thread-gripping device is rendered operative as described above, and the loose thread end from the needle will be drawn between the fingers 46 and 47 by the operator and cut off. When now the operator commences to sew, the take-up will draw the upper thread freely through the tension and the loose end of the thread is held so as not to be drawn back through the needle eye. After the needle is lowered and starts to ascend, the tension will be automatically restored and the thread grip released, thus returning the parts to the normal working position shown in Fig. 3.

It is believed that the foregoing conveys a clear understanding of the principle and operation of my improvements and of the objects prefaced above, and it should be understood that while I have illustrated one working embodiment thereof various changes might be made in the construction and arrangement without departing from the spirit and scope of the invention as expressed in the appended claims, in which—

I claim:

1. In a sewing machine, the combination with the head and presser-bar lever, of a thread-tension plate vertically slidable along the head, said plate when in a lowermost position exerting a tension on thread passing between the plate and head and releasing said tension when raised, the presser-bar lever being engageable with said plate to raise the same when operated to raise the presser-bar and allowing the plate to re-

main in raised position when the presser-bar lever is lowered, and means for lowering the tension plate into operative position.

2. In a sewing machine, the combination with a head, of a tension-plate of spring material mounted for sliding movement on the head and having a resilient end for imposing a tension on thread passing between such end and the head of the machine, means for sliding the plate to and from an operative position, and means for moving the tension end of the plate away from the head by sliding the plate to its inoperative position.

3. In a sewing machine, the combination with a head, of a tension-plate of spring material mounted for sliding movement on the head and having a resilient end for imposing a tension on thread passing between such end and the head of the machine, means for sliding the plate lengthwise to and from an operative position, and an inclined surface on the head by means of which the tension end of the plate is moved away from the head when the plate is shifted lengthwise to an inoperative position.

4. In a sewing machine, the combination with a head and a presser-bar lifting lever, of a tension-plate of spring material mounted for vertical sliding movement on the back of the head, adapted at its upper end to impose a tension on thread passing between this end and the head and shaped at its lower end to be actuated by said lifting lever to release the tension.

5. In a sewing machine, the combination with a head and a presser-bar lifting lever, of a tension-plate of spring material mounted for vertical sliding movement on the back of the head, adapted at its upper end to impose a tension on the upper thread and slidable to a tension-released position by operation of said lifting lever.

6. In a sewing machine, the combination with a head, of a tension plate of spring material mounted for vertical sliding movement on the back of the head, adapted at its upper end to impose a tension on the upper thread, an adjusting screw operating on the plate intermediate its ends for varying the tension, and means for shifting the plate vertically to release the tension.

7. In a sewing machine, the combination with a head, of a tension plate of spring material mounted for vertical sliding movement on the back of the head, adapted at its upper end to impose a tension on the upper thread, means for sliding the tension plate to an inoperative position, a needle-bar driving shaft, and means operated at a predetermined point in the rotation of said shaft for returning the tension plate to operative position.

8. In a sewing machine, the combination with a head, of a tension plate of spring material mounted for vertical sliding movement on the back of the head, adapted at its upper end to impose a tension on the upper thread, means for sliding the tension plate vertically, and means for causing the tension end of the plate to be moved away from the head by such sliding movement.

9. In a sewing machine, the combination with a head, of a tension-plate of spring material mounted for vertical sliding movement on the head and having a portion for imposing a tension on thread passing between the plate and head, means for varying the pressure of said tension, and means for moving the plate into and out of operative position without disturbing the adjustment of said tension-carrying means.

10. In a sewing machine, the combination with a head, of a spring tension-plate for imposing a tension on thread passing between the plate and the head and shiftable along the head in a vertical plane to and from an operative position, means for so moving the tension plate, and means for causing the tension portion thereof to be moved away from the head when the plate is shifted to an inoperative position.

11. In a sewing machine, the combination with a presser-bar, means for raising it, means on the lower part of the presser-bar for gripping the thread, and a spring tension-plate for imposing a tension at one end and adapted for actuating the thread-gripping means at its opposite end.

12. In a sewing machine, the combination of a spring tension-plate shiftable from an operative to an inoperative position, and a thread-gripping device adapted to be actuated by the spring tension-plate when the same is moved to operative position for rendering the gripping device inoperative.

13. In a sewing machine, the combination with a head, of a tension-plate of spring material mounted for vertical sliding movement on the back of the head adapted at its upper end to impose a tension on the upper thread, an adjusting screw operating on the plate intermediate its ends for varying the tension, means for shifting the plate vertically to release the tension, and a thread-gripping device actuated by the lower end of the tension plate.

14. In a sewing machine, the combination with a head, presser-bar and lifting lever therefor, of a normally inoperative thread-gripping device on the lower end of the presser-bar, and a thread tension member movable to an inoperative position by the lifting lever and arranged to actuate the thread-gripping device.

15. In a sewing machine, the combination with a head, presser-bar and lifting lever therefor, of a normally inoperative thread-gripping device on the lower end of the presser-bar, a thread-tension member mov-

able to an inoperative position by the lifting lever during which movement the thread-gripping device will be rendered operative, the construction being such that the presser-bar may be lowered without disturbing the condition of the tension and thread-gripping device, and means for automatically moving the thread tension member to operative position, during which movement said tension member will actuate the thread-gripping device to render its gripping means inoperative.

ALBERT D. SMITH.