May 12, 1959 F. W. KELLS 2,885,985

THREAD CLAMP FOR SEWING MACHINES

Filed Jan. 3, 1956

Fig. 1.

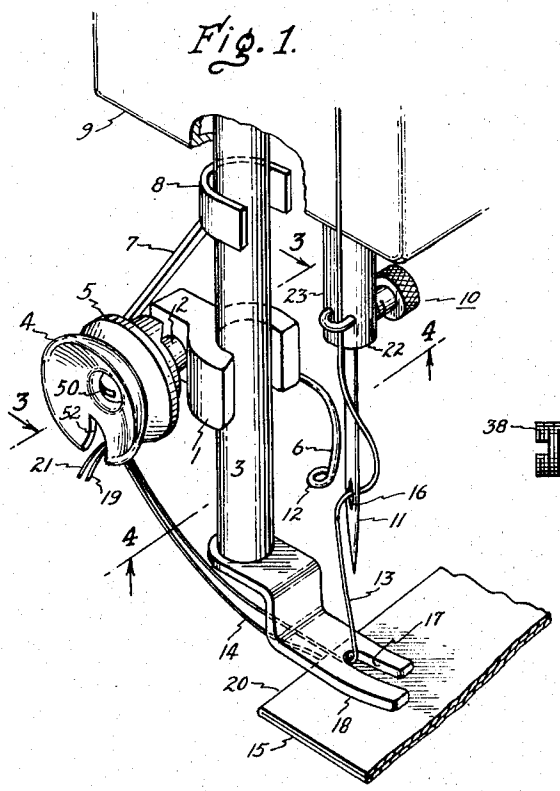


Fig. 3.

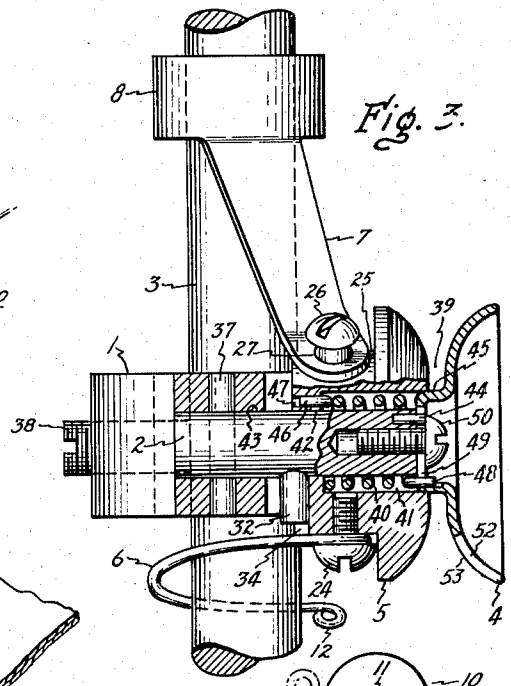


Fig. 2.

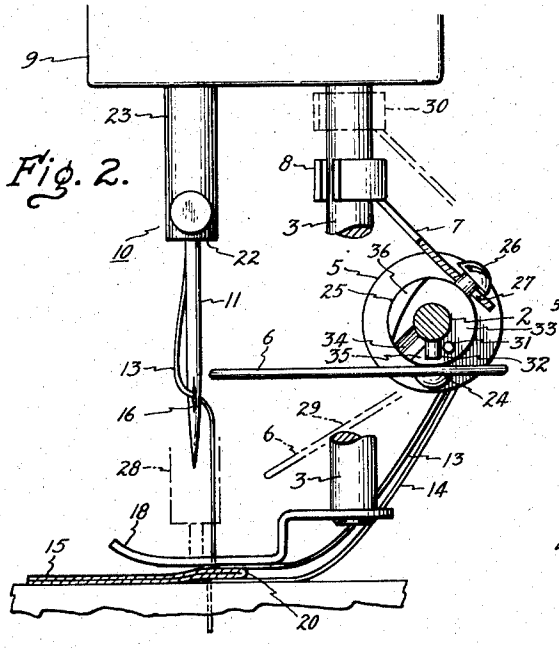
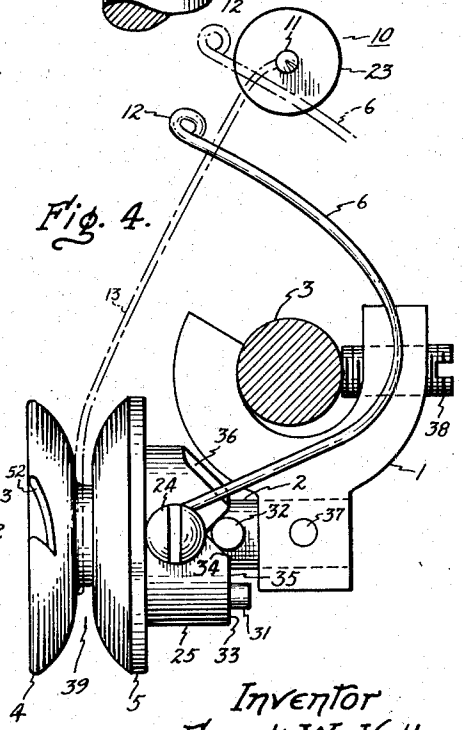


Fig. 4.



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THREAD CLAMP FOR SEWING MACHINES

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7 Claims. (Cl. 112—253)

This invention relates to thread clamps for sewing machines, and more particularly pertains to devices for clamping the loose end of the bobbin thread or the needle thread, or both, the device being automatically conditioned to receive and hold a thread end upon raising of the presser foot of the sewing machine and automatically operated in response to the initial stitching motion of the needle to release the held or clamped thread end or ends.

A general object of this invention is to provide an improved thread end holding device for sewing machines.

A more specific object of the invention is to provide an automatically operated thread end clamping device for sewing machines.

The device herein disclosed is applicable to substantially all types of domestic sewing machines and to many types of heavy duty manufacturing machines, is readily adjustable for effective operation on any specific machine with which it may be used, is readily attached or detached from a sewing machine, is simple and of inexpensive construction, is sure in operation, and is locatable in a position in which there is no interference with normal operation of the sewing machine.

In the operation of sewing machines of the types presently in common domestic use, and similar types, considerable thread is wasted and malfunction often occurs because the loose ends of the bobbin and needle threads during formation of the first stitch are pulled back into the work. The seamstress, to minimize first stitch failure, or unthreading, draws about one foot of extra thread from the needle and bobbin and lays these thread ends back across the work surface. Even when this precaution is taken, however, the first stitch is likely to be badly formed.

The device to which this invention is particularly directed comprises in its preferred embodiment a convenient attachment which mounts on the presser foot bar of a sewing machine and which is operated automatically into a thread-clamping condition upon raising of the presser foot and is thereafter operated into a thread-release condition in response to ensuing motion of the needle holder assembly as stitching starts.

The novel features which are believed to be characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a perspective view showing a device in accord with this invention in operative position in connection with partially broken away and fragmentary portions of a sewing machine;

Fig. 2 is a side elevation of the device of Fig. 1, shown partially in section, together with fragmentary representation of portions of the sewing machine with which the device is in use, taken from the right hand side and looking outwardly;

Fig. 3 is an enlarged detail sectional view of the device taken along line 3—3 of Fig. 1; and

Fig. 4 is an enlarged bottom view of the device taken along line 4—4 of Fig. 1 and showing further details thereof.

Referring to Fig. 1, the thread clamp device comprises a generally U-shaped mounting clamp or base member **1** with a projecting support member or portion in the form of a cylindrical post **2** extending laterally therefrom. Clamp **1** is rigidly, though preferably adjustably and removably, attached to the presser foot bar **3** of a sewing machine, and a pair of thread clamping jaw members **4** and **5** engaged on post **2** are, accordingly, carried in a position generally fixed with respect to the presser foot bar. A sensing or triggering arm member **6** and a conditioning arm member **7** are both attached to thread clamping disc **5**, which is mounted on support **2** to be movable therealong through a short distance and rotatable through a few degrees. Conditioning member **7** has a lower end loosely joined to the upper rear side of jaw member **5** and an upper end preferably in the shape of a yoke or collar **8** loosely fitting against bar **3** and arranged, upon raising of the presser foot, to meet sewing machine head housing **9**. Trigger member **6** comprises a relatively long and thin member, preferably with sufficient resilience to bend without breaking. The trigger member extends from an end attached to the lower side of disc or jaw member **5**, to the rear of presser bar **3** and curves forwardly to have a free forward end disposed, when the device is in thread-clamping condition, in the path of some portion of the needle holder assembly **10**. A needle **11** is connected as a part of the needle holder assembly. The forward end of member **6** comprises a loop **12** to avoid catching of work or injury to the operator.

The device as shown in Fig. 1 is operatively clamping the respective end portions of a needle thread **13** and of a bobbin thread **14** preparatory to starting the stitching of a work piece **15**. The needle thread, supplied from the usual spool and through appropriate guides of the machine, is threaded through eye **16** of needle **11** and is then preferably passed through the needle slot **17** of presser foot **18** and rearwardly under the foot to be wound one complete turn, or less, in the narrow annular wedge shaped groove existing between discs **4** and **5**. A short bitter end **19** of thread **13** is shown hanging from the clamping discs. In a similar manner, the bobbin thread **14** is brought out under the entering or rearward edge **20** of work piece **15** and its end portion is wound in a single turn, or less, in the clamping groove along with the needle thread. The bitter end of thread **14** is shown in typical position at **21**.

In operation, as needle **11** moves downwardly, some part of needle holder assembly **10**, such as the lower end **22** of needle bar **23**, will strike an end portion of trigger member **6**, at or adjacent loop **12**, and, as later explained in greater detail, the resulting downward swinging movement of trigger **6** causes the clamping disc **5** to move suddenly away from disc **4**, thereby to release the threads from the discs **4** and **5**.

Further details of the assembly are shown in Fig. 2, which is taken from the right hand side of the sewing machine head **9** looking outwardly. Trigger arm **6** is attached rigidly by a bolt **24** to the lower side of cylindrical collar or hub portion **25** of jaw member **5** and extends generally forwardly around presser foot bar **3**, shown broken away, to dispose its forward end loop or blunted portion **12** in the path of needle mounting bar **23**.

A bolt **26** passes loosely through a lower end slot **27** of conditioning arm **7** loosely to couple the arm to the upper rear side of collar **25**, and the upper yoke portion **8** of arm **7** is in position, upon raising of presser foot bar **3**, to engage the machine head **9** and, in response, to rotate jaw member **5** into the thread clamping position shown in Figs.

1 and 2. In this position, arm 6 is seen to be generally horizontal, but, upon lowering of the needle holder assembly into the position indicated by broken lines 28, arm 6 will be triggered by contact with assembly 10 into the position 29 while jaw member 5 will rotate counterclockwise through about 30 to 50 degrees on post 2 and arm 7 will rise to dispose yoke 8 in the position shown in broken lines at 30. The broken line positions of Fig. 2, accordingly, correspond to open jaw or thread releasing condition of the device.

In the thread-clamping, full line, condition shown in Fig. 2, the threads 13 and 14 from the needle 11 and from the bobbin, respectively, issue rearwardly from below presser foot 18 and pass upwardly and rearwardly to the clamping jaws.

A stop member 31 is preferably attached to hub 25 of movable jaw member 5 and is engaged, or closely approached, by a stationary fixed cam follower member 32 which is mounted to and extends outwardly from post 2. Cam follower 32 engages face 33 of hub portion 25, and, more particularly, permits jaw member 5 to slide along post 2 in response to rotation of the jaw member into a rotative position to engage follower 32 in a cam notch 34 formed into the face 33 of the hub. The cooperating cam means, accordingly, comprises follower 32, notch 34 and the portion 35 of face 33 which lies generally between stop 31 and notch 34.

Face 33 of hub 25 may be bevelled remote from the operating cam portions as at 36 for the purpose of providing clearance with portions of the mounting clamp or base member, thereby to make possible a more compact overall structure, as will be more apparent in Fig. 4.

Fig. 3 shows in sectionalized rear view, on enlarged scale, and partially in section, details of the clamping device which is in thread release or open position. Bolt 26 is seen to have moved upwardly, raising yoke 8 of arm 7 along presser foot bar 3, while bolt 24 has moved more toward the rear and trigger arm 6 now slants downwardly toward its forward end. Laterally extending post 2 is locked by pin 37 in clamp member 1, and the clamp or base member, in turn, is removably locked to bar 3 by means of set screw 38.

Cam follower member 32 is engaged in the cam notch 34 and jaw member 5 has moved slightly away from stationary jaw member 4 to open the thread slot 39 between the jaws. The motion of rotatable and slidable jaw member 5 toward and away from stationary jaw member 4 is determined by the respective operations of the cam means, including notch 34 and follower 32, and of a coiled compression spring 40 disposed in an enlarged bore 41 of movable jaw member 5. Spring 40 biases, because it is a compression spring, member 5 away from member 4, whereas rotation of member 5 by cam action causes sliding motion of member 5 toward member 4 against the force of spring 40. Jaw closing motion of member 5 toward member 4 is attained, as heretofore mentioned, by movement upwardly of bar 3, base 1 and members 4 and 5 while yoke 8 is in contact with previously shown head 9 of the sewing machine. The upward movement of the several lower parts of the clamping assembly relative to yoke 8 and arm 7 is such as to cause bolt 26 to move, with resultant rotation of member 5, into a position more nearly behind, rather than above, post 2.

The hub 25 of member 5 is preferably engaged on post 2 with a fit sufficiently tight to provide frictional resistance to rotation of member 5 on post 2, and the inner surface 42 of hub 25 engaging outer surface 43 of post 2 comprise means for restraining member 5 against rotation from its closed-jaw to its open jaw positions. Jaw member 4 is keyed or locked to the end of post 2 by means of a small key or pin 44 and comprises a collar or neck portion 45 which fits within enlarged bore 41 of member 5. Accordingly, friction between neck portion 45 and the surface of bore 41 may also restrain rotation

of member 5, and these portions of the assembly comprise means for restraining rotation of member 5 from its closed jaw position.

The ends of spring 40 are preferably turned outwardly and engage in sockets, the end 46 being inserted into socket 47 in hub 25 of member 5 and end 48 being inserted into a socket or slot 49 formed in member 4. Spring 40 may be so tensioned between its ends as to urge member 5 to rotate in either desired direction, whereby the spring may serve not only its primary function of biasing member 5 slidingly away from member 4, but also one or another of two additional functions. Specifically, the spring may urge the member 5 to rotate toward the position in which cam follower 32 engages in notch 34 or it may be adjusted to tend to oppose rotation of member 5 toward this position. If spring 40 is adjusted to urge member 5 to rotate into the position in which follower 32 engages the notch, the spring will function to impart snap action, upon triggering by trigger arm 6, into the jaw open position of jaw member 5. Such adjustment of spring 40 is desirable where other means for restraining member 5 in its jaw closed position are adequate. However, if jaw member 5 tends too readily to rotate into released position, the spring may be adjusted to assist, rather than to oppose, the restraining friction of member 5 on post 2.

Bolt 50 attaches stationary jaw member 4 rigidly to the end of post 2, but by slightly loosening the bolt, until member 4 moves outwardly sufficiently to disengage pin 44, member 4 may be rotated to wind or unwind spring 40 and thereby to adjust the spring to oppose or assist, or more or less to oppose or assist, rotation of member 5 toward its jaw opening rotative position.

Jaw member 4 preferably comprises a generally cup-shaped member sufficiently thin to have some resilience. Such resilience improves the clamping action of the jaws on thread of varying sizes. It will be apparent that the presence of threads in the notch 39 will increase the frictional resistance to rotation of member 5 from closed jaw position toward open jaw position.

It will be further apparent, particularly with reference to Fig. 4, that engagement of cam follower 32 with the surface portion 35, with which it is in contact when the jaws are in closed or clamping position, frictionally opposes rotation of jaw member 5 into its open jaw position shown in Fig. 4. The cam follower 32 and surface portion 35, accordingly, function as means to restrain rotation of jaw member 5 from its jaw open to its jaw closed position. The frictional force between follower 32 and surface portion 35 will depend upon the smoothness or roughness of surface portion 35, on the materials employed, and on other well known factors and various means of increasing resistance to rotation from the closed jaw position of member 5 will be apparent to those skilled in the art. It should be understood that it is most desired to oppose the starting of rotation of the movable jaw member from its jaw closed position, and that, accordingly, it is preferred that the static friction, or static resistance to rotation from the jaw closed position, should be, as it normally would tend to be, somewhat higher than the sliding friction or resistance immediately after rotation has been started or triggered by the striking of arm 6 by the needle holder assembly 10.

The view of Fig. 4, showing the device from below, may be compared with the previously described figures for a more complete understanding of the shape of trigger arm 6 and its positions. The arm 6 is shown in Fig. 4 in full lines in its position corresponding to the illustrated open jaw condition of the clamping device, while the broken line position corresponds to the closed jaw condition. The clamp or base member 1 is further seen to be attached by set screw 38 to presser foot bar 3, and arm 6 passes to the rear of bar 3. Cam follower 32 is engaged in cam notch 34, and the position of stop

31 which projects from face 33 is clearly shown. Bevel 36 cut into hub 25 provides clearance, permitting free motion of jaw member 5 without interference from the clamp member 1.

A notch 52 may be provided in stationary jaw member 4 with one or more sharp cutting edges 53 for convenience in cutting threads, for example, at the end of each sewing operation. Notch 52 is also seen in Fig. 1.

In several instances, parts of the device are identified in one of the figures without specific discussion. In such instances, the description applicable to some other figure applies equally, since identifying numerals are consistently employed throughout the several figures to assist in comparisons therebetween. It will be understood, however, that the device is shown in full lines in Figs. 1 and 2 in its jaw closed condition, while the full line views of Figs. 3 and 4 correspond to jaw open or thread release condition.

While only certain preferred embodiments of this invention have been shown and described by way of illustration, many modifications will occur to those skilled in the art and it is, therefore, desired that it be understood that it is intended in the appended claims to cover all such modifications as fall within the true spirit and scope of this invention.

What is claimed as new and what it is desired to secure by Letters Patent of the United States is:

1. A thread end holding device for a sewing machine, said device comprising a presser foot bar mounting clamp, a support member extending laterally from said clamp, a thread engageable member movably mounted on said support member, a spring in contact with and urging said thread engageable member into a thread releasing position, means to twist said thread engageable member in a predetermined direction of rotation into a thread clamping position, said means comprising a sewing machine head engageable arm attached to said thread engageable member, said thread engageable member and said support member being frictionally related whereby said thread engageable member is restrained by friction in said thread clamping position against the force of said spring, and means attached to said thread engageable member extending into the path of a portion of a needle and needle bar assembly of the machine operable to impart friction-releasing motion to said thread engageable member in a direction of rotation opposite to said predetermined direction in response to contact therewith by said portion of said assembly.

2. A thread holder comprising a generally U-shaped clamp member having a projecting portion, a jaw member fixed to said clamp member, a second jaw member rotatably mounted on said projecting portion of said clamp member and slideable therealong in directions toward and away from said fixed jaw member, a spring engaging between said clamp member and said rotatable jaw member urging said rotatable jaw member in the direction away from said fixed jaw member, cooperating cam means on said rotatable jaw member and said clamp member effective to force said rotatable jaw member toward said fixed jaw member in response to predetermined rotation of said rotatable jaw member, a sewing-machine-head-engageable arm joined to and extending from one side of said rotatable jaw member effective upon raising of said clamp member toward said head to rotate said rotatable jaw member in said predetermined rotation, and a sewing-machine-needle-assembly-engageable arm joined to and extending from a generally opposite side of said rotatable jaw member effective upon engagement therewith by the needle assembly to cause opposite rotation of said rotatable jaw member.

3. A thread end clamp for a sewing machine comprising attachment base means mountable on the presser foot bar of the sewing machine, a post extending from said means, a first stationary jaw member and a second rotatable and slideable jaw member both mounted on said post, a cam surface on said second jaw member and a cooperating cam follower forming a stationary part of said post, a spring having one end fixed to said post and another end engaging said second jaw member and biasing said second jaw member in a slidable direction along said post away from said first jaw member, said cam surface and follower being disposed and engaged to force said second jaw member toward said first jaw member in response to a predetermined rotational movement in a predetermined direction of said second jaw member, and arm means extending outwardly from said second jaw member for rotating said second jaw member through said predetermined rotational movement in said predetermined direction and alternately in the reverse direction in response to contacts thereof by, respectively, the head and alternately by the needle holder assembly of the sewing machine.

4. In a thread clamping device, a post, a stationary jaw member rigidly connected to said post, a second jaw member, means rotatively and slideably mounting said second jaw member on said post, cooperating cam means on said post and one said second jaw member establishing respective jaw open and jaw closed rotational limit positions of said second jaw member, at least one of said means comprising means frictionally opposing rotation of said second jaw member from said jaw closed position, a spring engaged between said jaw members biasing said second jaw member slidingly away from said first member, said cam means sliding said second jaw member against said spring bias toward said first jaw member in response to rotation of said second jaw member from said jaw open limit position to said jaw closed limit position, and means attached to said second jaw member and extending outwardly therefrom to rotate said second jaw member from one to the other of said limit positions.

5. A thread end holding device for a sewing machine comprising a base member, a stationary jaw member mounted on said base member, a movable jaw member movably supported on said base member, means urging said movable jaw member into open position, releasable means to restrain said movable jaw member in closed position, a pair of operative actuating elements coupled to said movable jaw member adapted and arranged to be contacted by respectively different portions of the sewing machine which are movable with respect to said base and with respect to each other, one said element moving said jaw member in one direction in response to contact thereof with one of said portions to close said jaws and the other said element comprising trigger means operative in response to contact of said other element with another of said portions to release said movable jaw member from said restraining means.

6. A thread holder for a sewing machine comprising a base member having a stationary jaw member affixed thereto, a rotatable movable jaw member, means to move said movable jaw member toward and away from said stationary jaw member in response to rotation of said movable jaw member in respectively opposite directions, and a pair of arms coupled to said movable jaw member adapted and arranged to contact respective relatively movable parts of said sewing machine and operative respectively to rotate said rotatable jaw member in respective directions in response to said contact with said respective relatively movable parts.

7. A thread end holding device for a sewing machine having a presser foot bar, a needle holder assembly and a head, said device comprising a base adapted to be clamped to said presser foot bar and movable therewith, a movable jaw member movably mounted on said base, a stationary jaw member fixed to said base, an element attached to and extending from said movable jaw member arranged to contact said head upon partial raising of said presser foot bar and to move said movable jaw member relative to said base from a jaw open position

spaced from said stationary jaw member to a jaw closed position thereon adjacent said stationary jaw member upon further raising of said presser foot bar, a spring engaged between said base and said movable jaw member urging said movable jaw member toward said jaw open position, a portion of said movable jaw member comprising restraining means connecting said movable jaw member and said base when said movable jaw member reaches said jaw closed position and effective to retain said movable jaw member in said jaw closed position against said spring force, and releasing means comprising an arm coupled to said portion of said movable jaw member and extening into the path of said needle holder portion of said assembly and operative upon contact

thereof by said assembly to release said restraining means thereby to cause said movable jaw member to be moved from its said second position by said spring, said jaw members being effective to clamp a thread end therebetween when said movable jaw member is in said jaw closed position and to release said thread end upon movement of said movable jaw member from said jaw closed position.

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