Aug. 18, 1942. T. A. ANDERSON 2,293,096

THREAD SEVERING DEVICE FOR SEWING MACHINES

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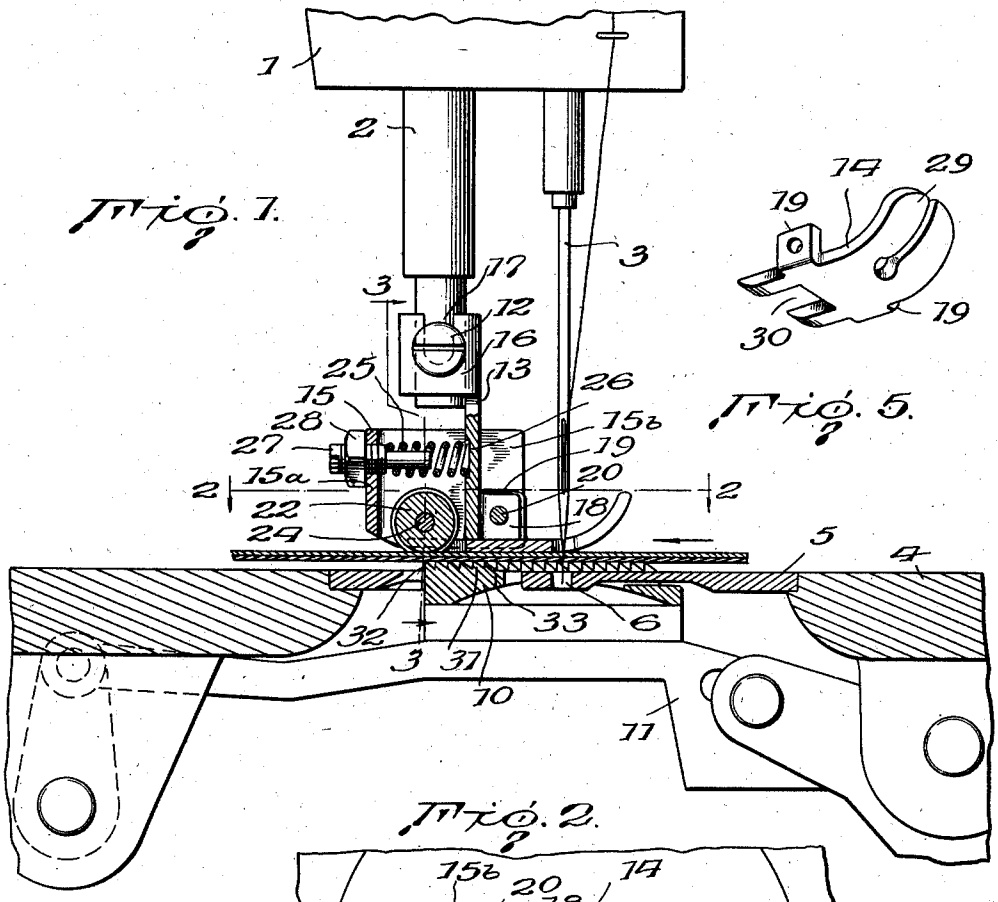


FIG. 1.

FIG. 5.

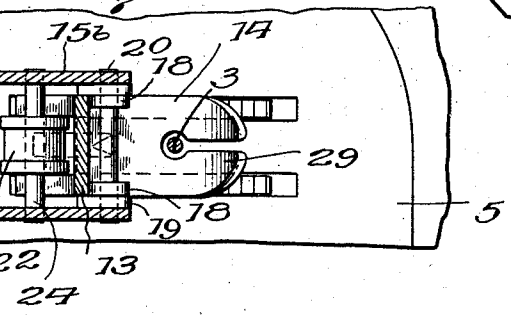


FIG. 2.

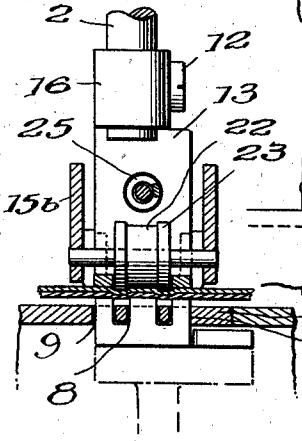


FIG. 3.

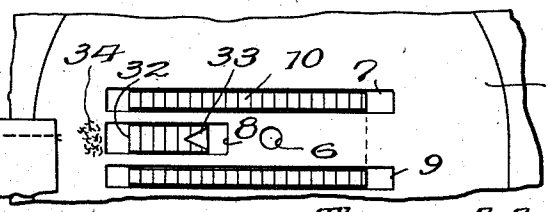


FIG. 4.

Inventor
Thomas A. Anderson,
By Pennie Davis Marvin & Edmonds
Attorneys

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THREAD SEVERING DEVICE FOR SEWING MACHINES

Thomas A. Anderson, Hartwell, Ga., assignor, by mesne assignments, to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

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23 Claims. (Cl. 112—252)

This invention relates to thread severing means and more particularly to thread severing means associated with and forming a part of a sewing machine.

In the manufacture of garments, the closing of bags, and in many other instances where articles are stitched one after another it is the practice to pass the articles through a sewing machine operating at a high rate of speed practically as fast as they can be fed to the sewing machine by the operator, without stopping or slowing down the speed of operation of the sewing machine during the interval between the final stitching operation on one article and the initial stitching operation on the succeeding article, with the result that the successive articles are connected by a thread chain or a series of thread loops which have to be cut. The cutting of the threads connecting such articles ordinarily is done by the operator with a pair of scissors, even though such a method of severing the threads between the articles is not satisfactory as it necessitates a separate operation requiring an appreciable amount of the operator's time, and, as only one cut between articles is made, it leaves a "tail" of thread attached to each end of the article.

It has been proposed to equip sewing machines with attachments which would sever the thread after the stitching operation on each article, but such attachments have not proven entirely satisfactory due to the fact that they have required some operation on the part of the operator, were complicated, required modification of the sewing machine, or left a relatively long "tail" of threads attached to each end of the article which was stitched.

The present invention provides thread severing means for sewing machines which is not open to the above objections to prior thread severing means for sewing machines in that the thread is severed automatically and immediately after the last stitch upon the article. Furthermore, succeeding thread loops or the thread chain formed by the continued operation of the sewing machine are destroyed until just prior to the introduction of a succeeding article into a position to be stitched, thereby eliminating not only the thread "tail" from both ends of the articles, but also the necessity of the operator to cut the thread between successive articles, and leaving her free to devote her entire time to feeding articles into stitching position.

In accordance with the present invention the sewing machine is provided with cooperating severing elements which are maintained inoperative as long as the article to be stitched is between them, but which are brought into operation to sever the thread immediately upon the passage of the article from between them, thereby making the severing operation entirely independent of the operator, or of the duration of the stitching operation, and insuring the severing of the thread close to the stitched article. The cooperating severing elements continue to operate as long as the machine is operating and there is no stitched article between them so that the thread chain or thread loops which are formed between articles are continuously destroyed until a succeeding article enters between the severing elements, when they again are rendered inoperative.

Contrary to previously proposed means for severing the thread after the completion of the stitching operation on any article, the present invention does not depend upon shearing the thread, but severs the thread by crushing it between cooperating severing elements, at least one of which is mounted to move toward the other with sufficient force to cause the thread to be given a blow which will sever it. One of the cooperating severing elements is in the form of a pressure or anvil member and the other cooperating severing element is in the form of a hammer member and may have a sharp edge. The anvil member preferably is carried by the presser foot of the sewing machine and preferably is in the form of a freely rotatable roller so that a different surface will continuously be presented to the sharp-edged hammer member, thereby to lessen wear on and prolong the life of the anvil member. The hammer member preferably is carried by and forms a part of the feed dog of the sewing machine, although it might be formed upon some other part of the sewing machine, such as a pinking roller, if the sewing machine is provided with such a roller. When the anvil member is carried by the presser foot and is arranged and constructed to cooperate with a sharp-edged hammer member on the feed dog it is resiliently urged downward, but not with sufficient force that it will not be raised by an article to be stitched as it passes beneath the presser foot. Thus, as long as a stitched article is passing beneath the pressure or anvil member the latter will be raised to a position where it will not be struck by the hammer member of the feed dog, and the cooperating anvil and hammer members will be maintained inoperative, but as soon as the stitching operation on the article has been completed and it has passed from beneath the pressure or anvil member, the latter will be forced down into a position where it can be struck by the hammer member during the normal cycle of movement of the feed dog, and as the thread will be between the anvil and hammer during such movement it will be crushed and severed at the stitch just behind the last stitch on the article due to the fact that the feed dog of a sewing machine operates in synchronism

with the needle. As the feed dog continues to operate as long as the sewing machine remains in operation, the sharp edged hammer member carried thereby continues to strike against the anvil as long as there is no stitched article between them with the result that the entire length of thread between stitched articles is literally masticated or chewed away.

The invention will be further described in connection with the accompanying drawing but it is to be understood that such further illustration and description is by way of exemplification and that the invention is not limited thereto except to the extent set forth in the appended claims.

In the drawing:

Fig. 1 is a vertical sectional view through a portion of a sewing machine having the present thread severing means secured thereto.

Fig. 2 is a horizontal sectional view on line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 1.

Fig. 4 is a more or less diagrammatic view illustrating how the thread between stitched articles is chewed away, and

Fig. 5 is a perspective view of the presser foot member of the present device.

The present invention may be applied to lock-stitch sewing machines, chain-stitch sewing machines, over-edgers, two needle sewing machines, or any other type of sewing machine where the articles to be stitched are passed successively through the stitching position.

For purpose of illustration, the invention is shown in the accompanying drawing as applied to a plain lock-stitch sewing machine having the usual head 1 which carries a presser foot bar 2 and needle 3. The sewing machine also has the usual work-supporting bed-plate 4 provided with a throat plate 5 having an opening 6 for the needle and parallel slots 7, 8 and 9 for the feeding teeth of a feed dog 10. The usual mechanism, a part of which is shown at 11, is provided to impart the back and forth and up and down movement to the feed dog to feed the articles to be stitched through the sewing machine in the direction indicated by the arrow.

In the preferred form of the invention, the usual presser foot of the sewing machine is replaced by a presser foot assembly which is secured to the lower end of the presser foot bar 2 by the usual thumb screw 12. The presser foot assembly comprises a vertically-extending shank member 13, a sole-plate 14, and a U-shaped yoke member 15 having a base portion 15ª and forwardly-extending arms 15ᵇ. The upper part 16 of the shank member 13 is bent in rectangular or other appropriate shape to conform to the shape of the lower end of the presser foot bar 2 and is adapted to be slipped over the lower end of the presser foot bar 2 and securely held thereto by the thumb screw 12 which is received in a slot 17 in one side of the upper portion 16 of the member 13. The lower end of the member 13 is provided at each side with a forwardly-extending ear 18, and the sole-plate 14 is provided intermediate its length with a pair of upwardly-extending ears 19. A pivot pin 20 extends through the ears 18 and 19 and through the forwardly-extending arms 15ᵇ of the yoke member 15 so that the yoke member has a swinging movement in a verticle plane about said pin as will hereinafter appear.

The vertically-extending member 13, the sole-plate 14, and the yoke member 15 preferably are die-stamped to maintain the cost of manufacture as low as possible, but if desired those parts may be cast, in which case the vertically-extending member 13 and the sole-plate 14 may be made integral.

A pressure or anvil member in the form of a roller 22 having flanges 23 at each end thereof is mounted for free rotatable movement on an axis pin 24 extending between the arms 15ᵇ of the yoke member, and rearwardly of the vertically-extending member 13 and in alignment with the needle 2 of the sewing machine.

The rear portion 15ª of the yoke member and the roller 22 carried thereby are normally urged downwardly by a spring 25 interposed between the member 13 and the base 15ª of the yoke member. The forward end of the spring is received in a recess or socket 26 in the rear face of the member 13, and in order that the force with which the spring will urge the rear of the yoke member and the roller carried thereby downwardly may be adjusted, the rear end of the spring bears against the shoulder on an adjusting screw 27 extending through the base of the yoke member. A lock nut 28 holds the screw in adjusted position.

The presser foot sole-plate 14 is formed with the usual upwardly curved split toe portion 29 under which the articles to be stitched are fed, and through which the needle passes. In order to provide a more extending gripping surface, the bottom of the sole-plate is made longer than usual, and the rear part thereof is bifurcated to provide an opening 30 through which the pressure or anvil roller extends.

The feed dog is similar to feed dogs now used in sewing machines and includes portions having feeding teeth 31 which extend through the slots 7, 8 and 9 to engage the articles to be stitched to feed them through the sewing machine. However, the feed teeth which pass through the central slot 8 extend rearwardly a sufficient distance to bring the rear tooth 32 beneath the roller 22 when the feed dog is in its upward and back position. The rear tooth 32 of the feed dog preferably is formed with a knife edge and when the sewing machine is operating and there is no article to be stitched between it and the anvil member, it cooperates with the anvil member, as a hammer, to sever the thread loops formed by the stitching mechanism. The anvil roller 22 and the feed dog, including the hammer tooth 32 having the knife edge, are made of hard steel to withstand the wear to which they are subjected. In order to better guide the series of chain loops of the chain thread connecting stitched articles beneath the roller 22, the inner end portion of the part of the feed dog which extends through the slot 8 is provided with a thread guiding groove 33, preferably V-shaped in top plan and having its apex portion disposed upwardly and rearwardly, as illustrated in Figs. 1 and 4.

As will be seen from Fig. 3, the flanges 23 of the anvil roller overlie the portions of the throat plate between the slot 8 and the slots 7 and 9 at each side thereof so that when there is no article to be stitched interposed between the anvil roller and the throat plate, and the yoke member 15 and the roller 22 are in their lowermost position, the flanges 23 will rest upon and be supported by those portions of the throat plate. Consequently, in the absence of work, the face portion of the roller 22 between the flanges 23 thereof and with which portion of the roller the

hammer tooth 32 coacts in severing the thread, is disposed above the level of the throat-plate 5, i. e., above the level of the work-engaging face of the presser-foot. Obviously, as the roller 22 is elevated by work passing under the flanges thereof, the higher intermediate portion of said roller opposed to the hammer tooth 32 is correspondingly elevated, thereby obviating marring of the stitched work by the sharp edge of the tooth 32.

The spring 25 constantly tends to swing the rear part of the yoke member 15 and the anvil roller 22 carried thereby downwardly about the pivot pin 20 so that the portion of the roller between the flanges 23, which is in alignment with the needle 3 and the guiding groove 33 of the feed dog, will be struck by the knife edge of the hammer tooth 32 of the feed dog once during each cycle of the movement of the feed dog. However, as soon as the article being stitched is fed backwardly through the sewing machine far enough to come beneath the roller 22 it raises the roller away from the path of movement of the feed dog sufficiently that the hammer tooth 32 of the feed dog no longer cooperates with the roller to effect a severing action and that tooth like the other of the feed teeth merely functions to feed the articles through the sewing machine. As soon as the stitched article passes beyond the vertical center of the roller 22 the spring 25 forces the roller downwardly to a position where it will be struck by the hammer tooth 32 in the next upward rear movement of the feed dog.

The central part of the roller 22 being in alignment with the needle of the sewing machine and the guiding groove 33 of the feed dog, the chain loops formed by the continued operation of the sewing machine will lie beneath the roller which acts like an anvil to back up the thread when it is being struck by the knife edge of the hammer tooth 32. As the roller 22 is freely rotatable on the axis pin 24, and as the feed dog moves through a counter-clockwise path which is generally elliptical, the edge of the tooth 32 as it strikes the thread lying against the roller, will not only crush the thread until it breaks, but also will cause a slight rotative movement of the roller so that a new striking surface of the roller will constantly be presented to the tooth 32, thereby greatly prolonging the life of the anvil roller.

As the mechanism for operating the feed dog is synchronized with the mechanism for operating the needle so that the feed dog moves through its cycle once for each stitch which the needle makes, it will be apparent that the maximum length of the thread left at the end of a stitched article will be substantially the length of the stitch for which the sewing machine is adjusted.

As long as the anvil roller 22 is in its lower position it will be struck by the tooth 32 during each cycle of movement of the feed dog. Thus the chain of thread loops formed between the final stitch upon one article and the initial stitch on the succeeding article, by the continued operation of the sewing machine, will repeatedly be subjected to the cooperating severing action of the roller 22 and the hammer tooth 32, with the result that the entire chain of thread loops will be masticated or chewed away until the very instant the succeeding article is fed rearwardly far enough to pass beneath the roller 22 and thereby raise the roller again to its inoperative position. The chewed or masticated portions of the thread, shown at 34 in Fig. 4, will be brushed away by the feeding of the following stitched article through the sewing machine.

During the severing of the thread loops attached to a stitched article and thereafter the extended lower surface of the presser foot sole-plate 14 holds the machine end of the thread between the cooperating severing members and the needle so that it cannot fly back through the eye of the needle on the next upward movement of the needle bar, and thereby insures that the needle will be threaded when a succeeding article is inserted into stitching position.

As it naturally requires a greater compressive force to crush a coarse thread until it is severed than it does to crush a fine thread, the tension which the spring exerts to move the roller 22 downwardly towards the tooth 32 will be adjusted in accordance with the weight of the thread being used at any particular time.

From the foregoing description it will be seen that the present invention provides a device for severing the "tail" of thread on a stitched article by crushing it between cooperating hammer and anvil members until it breaks, as distinguished from prior devices where the severing of the thread has been by a shearing action, as with shears or other cooperating shearing blades. Also, the present invention provides a device which is wholly automatic in its operation and which not only severs the "tail" of thread on a stitched article at the stitch following the last stitch made on the article but also masticates or chews away the entire chain of thread loops between successive articles up to an initial stitch on a following article, so that the "tail" of thread is eliminated from both ends of the article.

While the invention is particularly adapted for sewing machines in which successive articles to be stitched are fed through the sewing machine without stopping the sewing machine between successive articles it is equally as well adapted to sewing machines which are not so operated and which are stopped after the sewing of each article and in such cases will function to sever the "tail" of thread close to the article and just after the last stitch upon the article.

I claim:

1. In a sewing machine mechanism having a coacting feed dog and presser foot, a severing member carried by the feed dog, and a pressure or anvil member carried by the presser foot for coaction with said severing member to sever a thread passing between said severing member and the pressure or anvil member, said pressure or anvil member being mounted for movement toward or from the severing member and being moved from the severing member to an inoperative position by a stitched article passing between it and said severing member.

2. In a sewing machine having a feed dog and a presser foot, a thread severing member carried by the feed dog, a pressure or anvil member carried by the presser foot for movement toward and from the severing member carried by the feed dog, and a spring member for resiliently urging the pressure or anvil member toward the severing member carried by the feed dog.

3. In a sewing machine having a feed dog and a coacting presser foot, a severing member carried by the feed dog, a member pivotally connected to the presser foot for movement toward or from the feed dog, a rotating pressure or anvil member carried by said movable member for

coaction with the severing member of the feed dog, and means engaging said movable member for constantly urging the pressure or anvil member toward the severing member carried by the feed dog.

4. A sewing machine having a feed dog and a coacting presser foot, a severing member carried by the feed dog, a member pivotally connected to the presser foot for movement toward and from the feed dog, a rotating pressure or anvil member carried by said movable member for coaction with the severing member of the feed dog, and means engaging the movable member for constantly and resiliently urging said pressure or anvil member toward said severing member, said pressure or anvil member being moved away from the feed dog to a position inoperative to cooperate with said severing member by the interposition of a stitched article between it and said severing member.

5. In a sewing machine having a presser foot and a feed dog, a rotary pressure or anvil member carried by the presser foot, and a severing hammer tooth carried by the rear portion of the feed dog and adapted to cooperate with said rotary pressure or anvil member to sever thread attached to a stitched article.

6. In a sewing machine having a presser foot and a feed dog, a rotary pressure or anvil member carried by the presser foot and mounted to move toward and from the feed dog, spring means normally urging said rotary pressure or anvil member toward said feed dog, and a severing tooth carried by the rear portion of said feed dog for cooperating with said pressure or anvil member when it is in its position nearest said feed dog, to sever thread attached to a stitched article.

7. In a sewing machine, a presser foot assembly including a presser foot portion and a yoke having forwardly-extending arms, a rotary pressure or hammer member mounted between said arms, spring means normally urging said yoke and pressure or hammer member towards the path of stitched articles through the machine, a feed dog, and a sharp-edged hammer tooth carried by the rear portion of said feed dog for cooperating with said rotary pressure or anvil member to sever thread attached to a stitched article, said yoke member and the pressure or anvil member carried thereby being raised against the tension of said spring means to a position inoperative to cooperate with said hammer tooth of the feed dog upon the interposition of a stitched article between said pressure or hammer member and said hammer tooth.

8. In a sewing machine in which articles are stitched by successively passing them through the sewing machine without stopping the operation of the sewing machine, means for severing the threads connecting such articles comprising a pressure or anvil member carried by the presser foot, a hammer member having a sharp edge carried by the feed dog of the sewing machine adapted to cooperate with said pressure or anvil member, means normally urging said pressure or anvil member to a position operative to cooperate with said hammer member, said pressure or anvil being raised to an inoperative position by the interposition of a stitched article between said pressure or anvil member and said hammer member but again being returned to a position operative to cooperate with said hammer member immediately upon the passage of an article from between them whereby upon continued operation of the sewing machine said pressure or anvil member and said hammer member continue to cooperate to chew or masticate the threads connecting successive articles from immediately after the passage of one article from between said members until immediately prior to the entry of a succeeding article between them.

9. In a sewing machine a presser foot assembly adapted to be detachably connected to a presser foot bar of a sewing machine and comprising a presser foot member, a generally U-shaped yoke member having the arms thereof extending forwardly, a rotary pressure or anvil member mounted between said forwardly-extending arms of the yoke member and means for normally and resiliently urging said yoke member and the pressure or anvil member carried thereby to an operative severing position, and a severing member carried by the rear portion of the feed dog of the sewing machine and adapted, when said pressure or anvil member is in its operative severing position, to cooperate therewith to sever threads interposed between them.

10. In a sewing machine, a rotary pressure or anvil member carried by the presser foot of the sewing machine, means for normally and resiliently urging said pressure or anvil member to an operative severing position, said pressure or anvil member having a radially-extending flange at the ends thereof adapted to bear upon a portion of the throat plate of the sewing machine to support the pressure or anvil member when the pressure or anvil member is in its operative severing position, and a severing member carried by the feed dog of the sewing machine and adapted to cooperate with the portion of the pressure or anvil member between the end flanges thereof to sever thread interposed between said severing member and the pressure or anvil member when the latter is in its operative severing position, said pressure or anvil member being moved to a position inoperative to cooperate with said severing member by the interposition of a stitched article between them but being returned to operative severing position immediately upon the passage of said article from between them.

11. In a sewing machine having a presser foot and a feed dog, a work-responsive severing member located behind said presser foot, a severing member carried by the feed dog and adapted during the movement of the feed dog to cooperate behind said presser-foot with said first-mentioned servering member to sever thread attached to a stitched article, said presser foot holding the machine end of the thread after a severing operation to prevent unthreading of the sewing machine needle.

12. In a sewing machine, a feed dog, a severing member carried by the feed dog, a second severing member for cooperating with the severing member carried by the feed dog located at the side of the path of stitched articles passing through the sewing machine opposite the feed dog, said second severing member being mounted for movement toward and from the severing member carried by the feed dog, and being moved away from said severing member to an inoperative position by the interposition of a stitched article between it and the severing member carried by the feed dog.

13. In a sewing machine, a feed dog, a severing member carried by the feed dog, a pressure or anvil member for cooperating with said severing member located at the side of the path of stitched articles passing through the sewing ma-

chine opposite the feed dog, said pressure or anvil member being mounted for movement toward and from the severing member and being moved away from said severing member to an inoperative position by the interposition of a stitched article between it and the severing member carried by the feed dog.

14. In a sewing machine, a feed dog, a severing member carried by the feed dog, a second severing member for cooperating with the severing member carried by the feed dog located at the side of the path of stitched articles passing through the sewing machine opposite the feed dog, spring means for normally urging said second severing member toward the severing member carried by the feed dog, said second severing member being moved away from the severing member carried by the feed dog to an inoperative position by the interposition of a stitched article between it and the severing member carried by the feed dog.

15. In a sewing machine, a feed dog, a severing member carried by the feed dog, a pressure or anvil member for cooperating with said severing member located at the side of the path of stitched articles passing through the sewing machine opposite the feed dog, spring means for normally urging said pressure or anvil member toward said severing member, the pressure with which said spring urges said pressure or anvil member toward said severing member being such that the pressure or anvil member will be moved away from said severing member to an inoperative position by the interposition of a stitched article between the pressure or anvil member and the severing member.

16. In a sewing machine having stitch-forming mechanism including a reciprocatory needle, a work-support, a work-responsive thread-severing member disposed for engagement with one face of the work rearwardly of the path of needle-reciprocation, a complemental thread-severing member having a knife-edge disposed at the opposite side of the work and adapted in the absence of work to engage a portion of said work-responsive thread-severing member in thread-chain severing relation, said portion of the work-responsive member opposed to said knife-edge being disposed in spaced relation to said work-support in the absence of work, and means effective upon operation of the machine for imparting uniform operative movements to said complemental thread-severing member in successive stitch-forming cycles.

17. In a sewing machine having stitch-forming mechanism including a reciprocatory needle, two cooperating thread-severing members disposed rearwardly of the path of needle reciprocation and maintained separated by work passing through the machine, one of said members being movable in the direction of travel of the work and the other being movable in a direction substantially normal to the plane of the work into thread-severing engagement with each other.

18. In a sewing machine having stitch-forming mechanism including a reciprocatory needle, a presser-foot, two cooperating thread-severing members maintained separated by work passing through the machine, one of said members being movable in the direction of travel of the work and the other being movable relative to the presser-foot in a direction substantially normal to the plane of the work into thread-severing engagement with each other.

19. A sewing machine having a needle, a feed-dog, a throat-plate having needle and feed-dog clearance apertures, means for imparting work-advancing movements to said feed-dog, said feed-dog having a thread-severing edge disposed in rear of said needle-aperture, a spring-pressed presser-foot having a planar work-engaging surface opposed to said feed-dog, and complementary thread-severing means disposed in rear of the planar work-engaging face of said presser-foot and in rear of the thread-severing edge of the feed-dog as the latter begins its feed-stroke, said complementary thread-severing means being yieldingly urged towards said throat-plate for engagement by said thread-severing edge in the absence of work, whereby the thread trailing rearwardly from the stitching point of the machine will be severed when said thread-severing edge of the feed-dog, in the feed-stroke of the latter, engages said complementary thread-severing means.

20. In a thread-chain severing device for sewing machines, a presser-foot having a supporting shank, a work-engaging sole-plate carried by said presser-foot shank and provided with a needle-aperture, a work-responsive member pivotally mounted upon and extending rearwardly from said shank for movement about an axis transverse to the length of said sole-plate, and a thread-chain severing element carried by said member for movement into and out of the plane of the work-engaging face of said sole-plate.

21. In a thread-chain severing device for sewing machines, a presser-foot having a supporting shank, a work-engaging sole-plate carried by said presser-foot shank and provided with a needle-aperture, a work-responsive member pivotally mounted upon and extending rearwardly from said shank for movement about an axis transverse to the length of said sole-plate, a peripherally flanged roller journaled upon said member for turning movements about an axis substantially parallel to the pivotal axis of said member, said roller providing a peripheral anvil-face movable into and out of the plane of the work-engaging face of said sole-plate.

22. In a thread-chain severing device for sewing machines, a presser-foot having a supporting shank, a work-engaging sole-plate carried by said presser-foot shank and provided with a needle-aperture, a work-responsive member pivotally mounted upon and extending rearwardly from said shank for movement about an axis transverse to the length of said sole-plate, a thread-chain severing element carried by said member, a spring bearing upon said member in a direction to depress said severing element towards the plane of the work-engaging face of said sole-plate, and means providing for adjustment of the pressure of said spring upon said member.

23. In a sewing machine, including a presser-foot and a feeder movable relative to the foot, means carried by the presser-foot and feeder for cooperative action to sever a thread drawn therebetween by a piece of material as the latter passes rearwardly from beneath the presser-foot, and means functioning to secure that end of the thread remaining attached to the machine needle after the thread has been severed.

THOMAS A. ANDERSON.