Aug. 25, 1931. J. KIEWICZ 1,820,569

THREAD TRIMMER FOR SEWING MACHINES

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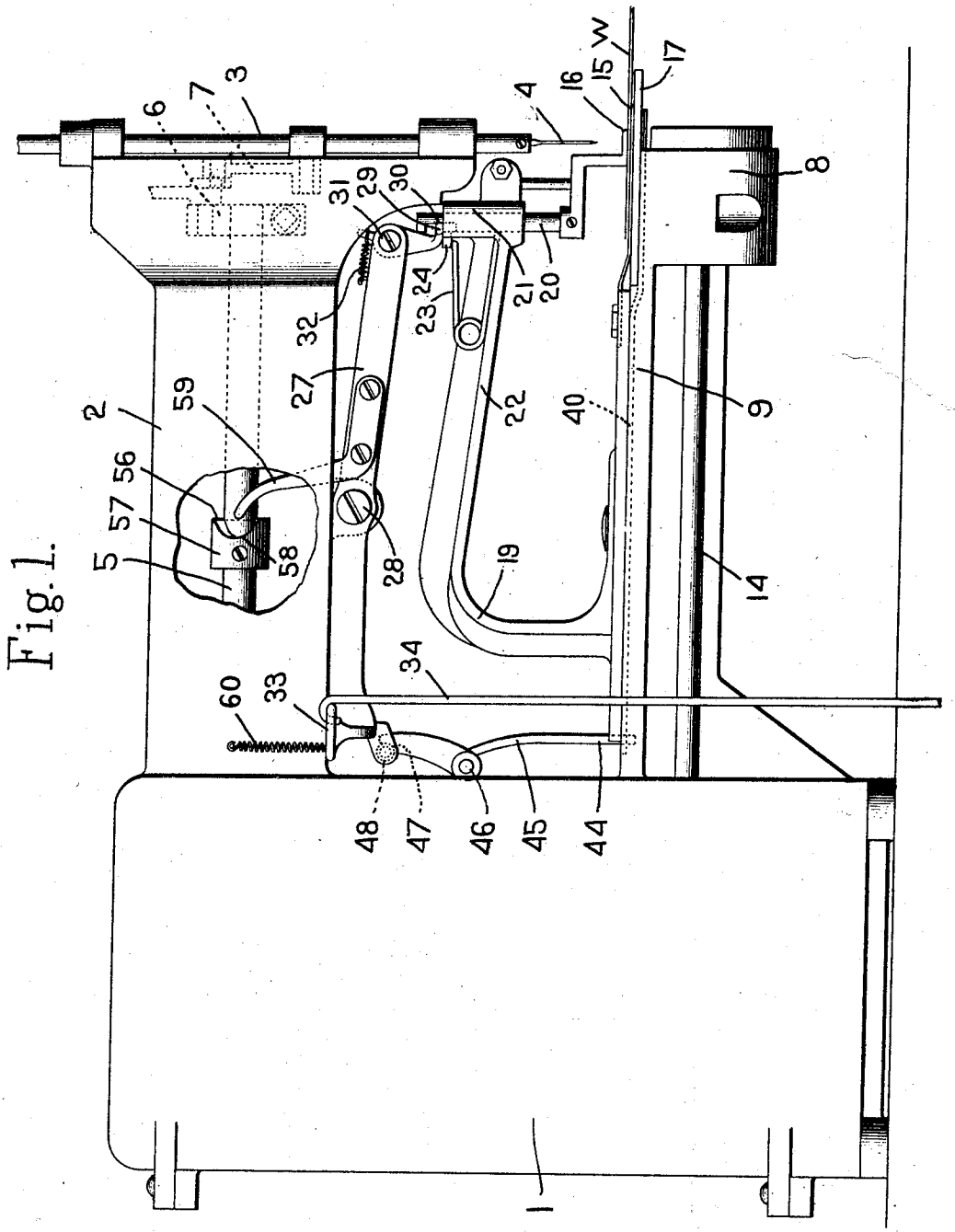


Fig. 1.

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Fig. 2.

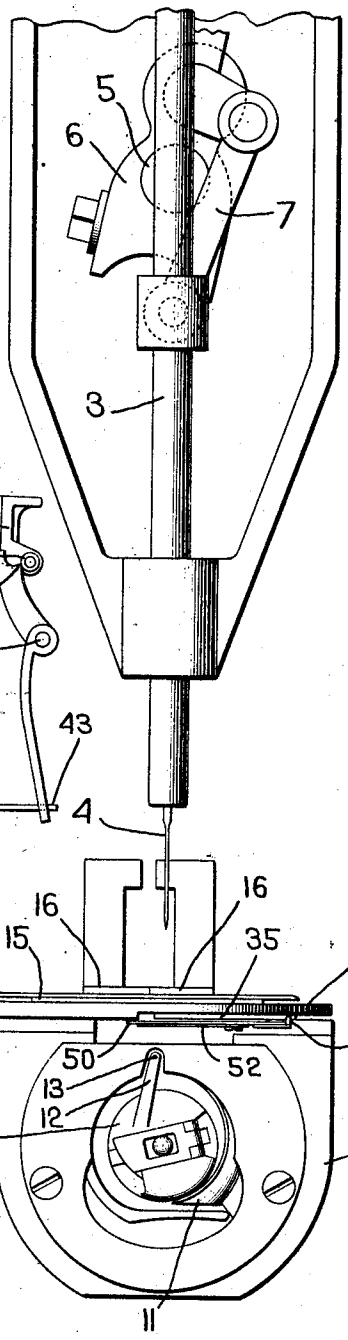


Fig. 10.

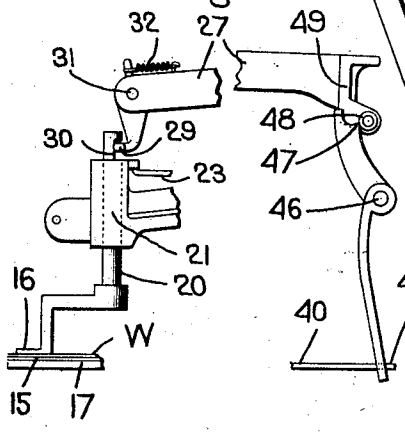
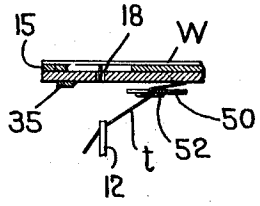


Fig. 11.



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THREAD TRIMMER FOR SEWING MACHINES

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Fig. 3.

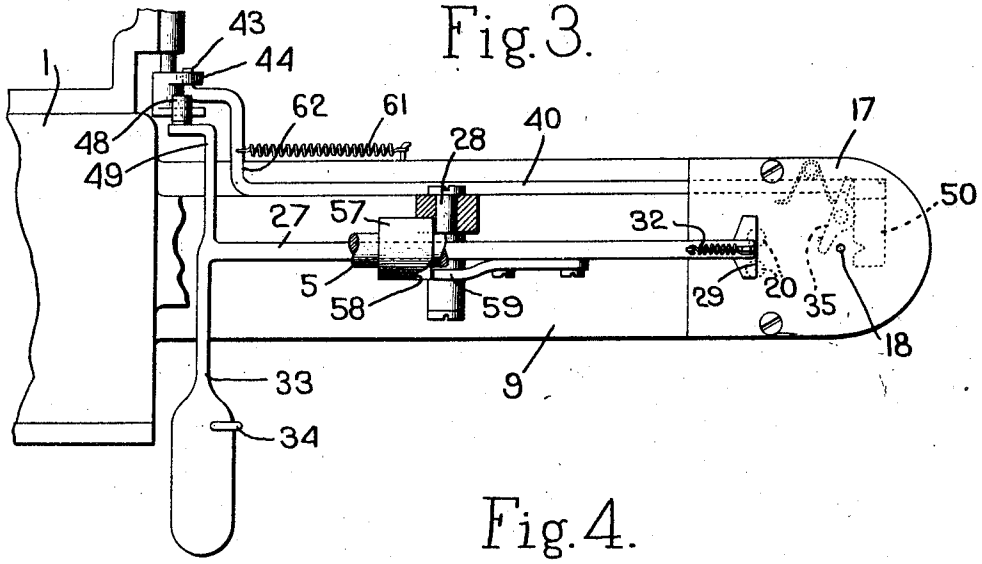


Fig. 4.

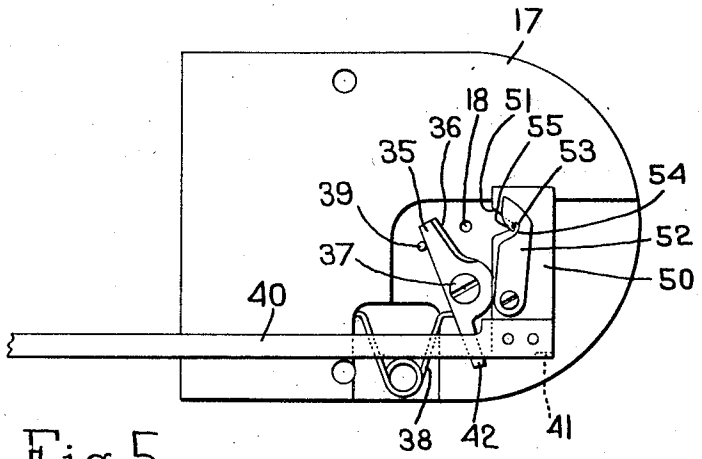
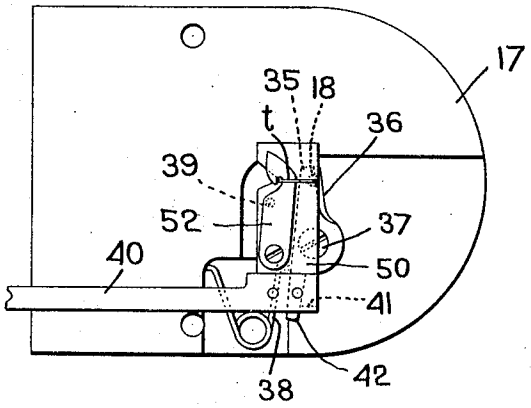


Fig. 5.



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Fig.6.

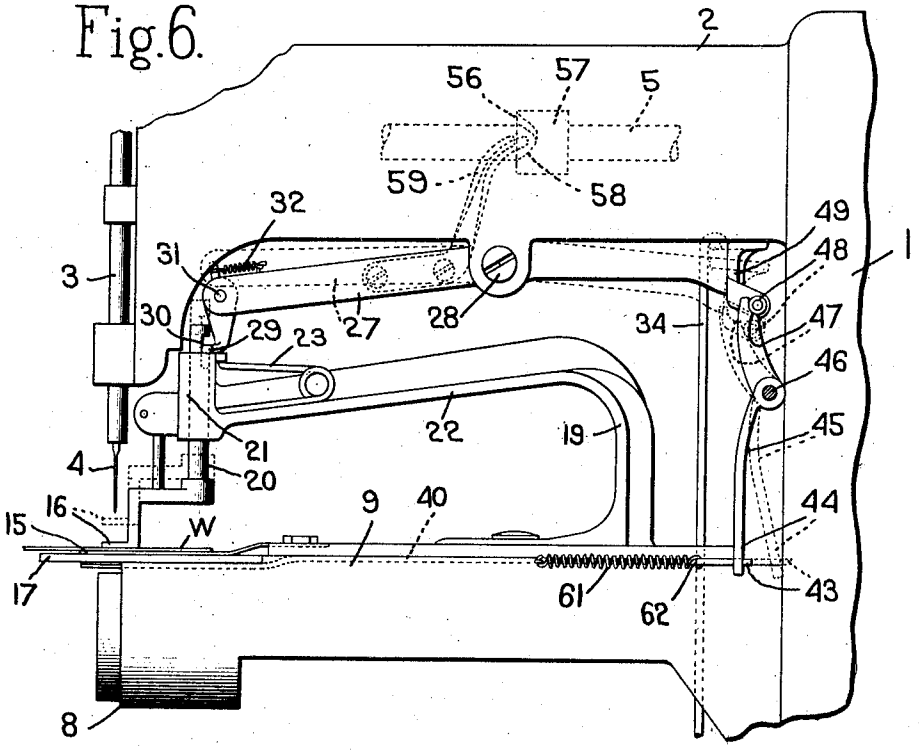


Fig.7.

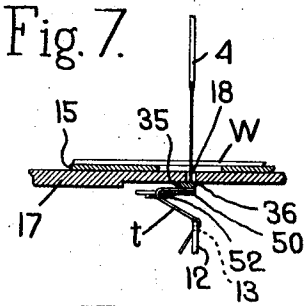


Fig.8.

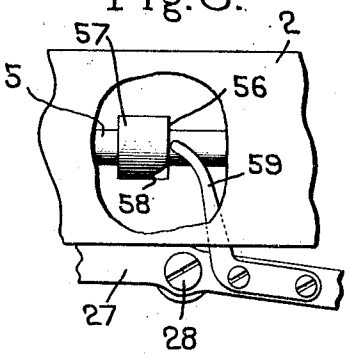
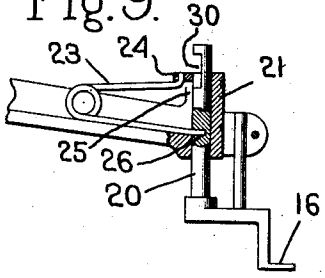


Fig.9.



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UNITED STATES PATENT OFFICE

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THREAD TRIMMER FOR SEWING MACHINES

Application filed September 24, 1925. Serial No. 58,246.

This invention relates to sewing machines and particularly to a sewing machine having a thread cutter for cutting the thread at the end of the sewing operation which cutter is actuated independently from the stitch-forming mechanism.

One of the objects of the invention is to provide an improved sewing machine of this type with means which will permit the operation of the thread cutter only when the needle is withdrawn from the work thus obviating any danger of interference between the needle and the thread cutter such as might occur if it were possible to actuate the thread cutter when the needle was in the work.

Another object of the invention is to provide an improved sewing machine with safety means which will prevent the operation of the thread cutter while the machine is running.

Some sewing machines of this type are also equipped with means for pulling off a length of the under thread from the bobbin before the thread is cut so as to leave an end of sufficient length to enable the first stitch to be properly formed when the machine is again started.

Further objects of the invention are to provide a construction whereby the thread pull-off as well as the thread cutter can be actuated only when the needle is withdrawn from the work and also to provide a construction which will prevent the operation of the pull-off as well as the thread cutter while the machine is running.

Another object of the invention is to provide a novel machine wherein the pull-off and the thread cutter are actuated by the means employed to open the work clamp.

Other features of the invention will be apparent from the following description.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a side view of a sewing machine having my improvements applied thereto;

Fig. 2 is a fragmentary front view;

Fig. 3 is a partial plan view with the overhanging arm broken out to better show the construction;

Fig. 4 is an under side view of the work-supporting plate showing the thread cutter in the position it assumes during the sewing operation;

Fig. 5 is a similar view showing the thread cutter in thread cutting position;

Fig. 6 is a fragmentary view showing the opposite side of the sewing machine from that illustrated in Fig. 1;

Fig. 7 is a fragmentary sectional view showing the operation of the pull-off and cutter;

Fig. 8 is a detail view showing the operation of the means for preventing the actuation of the cutter except when the needle is in retracted position;

Fig. 9 is a fragmentary sectional view of the support for the upper work clamp;

Fig. 10 is a fragmentary view showing the operation of the clamp-opening means;

Fig. 11 is a fragmentary sectional view showing the way in which the end of the under thread is held after the pull-off arm has returned to its normal position and while the first stitch is being formed on the next succeeding operation.

My invention is capable of being applied to sewing machines of various types and for illustrative purposes I have shown it as it might be embodied in a two-thread sewing machine in which the stitch-forming mechanism includes a reciprocating needle operating from above the work and penetrating the latter and a bobbin beneath the work having associated therewith an oscillatory hook which casts the loop of needle thread about the bobbin. As stated above, however, the invention is equally applicable to other types of sewing machines.

In Fig. 1, 1 indicates the head or frame of a sewing machine which is provided with the usual overhanging arm 2 in which reciprocates a needle bar 3, the latter carrying the usual needle 4. This needle bar is reciprocated from a drive shaft 5 which ex-

tends longitudinally of the arm 2 and which is connected to the needle bar through a crank arm 6 fast on the shaft and a link 7 all as usual in sewing machines.

The under thread mechanism is received in a housing 8 formed on the under side of a work-supporting arm 9 which extends from the frame 1 and it comprises the usual bobbin 10 and an oscillatory hook 11 which takes the loops of needle thread and casts them about the bobbin. The bobbin has associated therewith a guide finger 12 provided at its end with a guide eye 13 through which the bobbin thread passes. The hook 11 is actuated by an oscillatory shaft 14 which may be actuated by any suitable mechanism (not shown), it being understood that the shafts 5 and 14 operate in timed relation with each other.

The parts thus far described are or may be all as usual in sewing machines of this type and form no part of my present invention.

The work *w* in which the stitches are to be formed is retained in a work-holding clamp comprising the two clamping members 15 and 16. The lower clamping member 15 rests on a supporting plate 17 which is detachably secured to the arm 9 and which is formed with the sewing opening 18 through which the needle enters at each penetrating thrust. These two work clamps are shown as secured to a frame member 19 which is pivotally mounted on the arm 9 so as to permit the work clamps to oscillate back and forth on the supporting plate 17 as necessary in forming the stitches.

The upper work clamp 16 is yieldingly pressed against the work but is capable of being raised manually to release the work. Said upper clamp 16 is made in two sections, each having a clamping foot to engage the work and each section has rising therefrom a post 20 which slides in a bearing 21 formed on the forwardly extending arm 22 of the frame 19. Each post 20 is acted upon by a spring 23 which yieldingly holds the corresponding work clamp section in its lowered position. Each spring 23 is a U-shaped spring, one end of which engages a projection or lug 24 on the bearing 21 and the other end of which extends through a slot 25 in said bearing and enters into a recess 26 formed in the post 20.

Means are provided whereby the work clamp 16 may be raised manually and for this purpose I have herein shown a lever 27 which is pivoted to the arm 2 at 28 and which carries at its forward end a foot portion 29 that is received in notches 30 formed in the rear of the posts 20. This foot member 29 is shown as pivotally connected to the end of the lever as at 31 and it is acted on by a spring 32 which yieldingly holds it in its operative position shown in Fig. 1. When the lever 27 is rocked to elevate the right hand end thereof the foot member will engage the upper end of the notches 30 and thus raise the upper work clamp against the action of the springs 23. The lever 27 may be operated manually by means of a treadle and for this purpose the lever is shown as provided with a lateral extension 33 to which is connected a link 34 leading to the treadle so that when the treadle is depressed the lever 27 will be rocked and the work clamps 16 raised as above described.

60 indicates a spring which is connected to the rear end of the lever 27 and tends to hold said lever in the position shown in Fig. 1 with the treadle raised.

The thread cutter herein shown is arranged to cut the under thread. It operates beneath the work and is actuated by means capable of being operated independently of the stitch-forming mechanism. In the present embodiment the thread cutter is actuated by the means for raising the work clamps 16 so that the manual operation of opening the clamps to remove the work will actuate the cutter. The thread cutter also has associated therewith a pull-off device arranged to pull off a desirable length of thread from the bobbin so that there will be sufficient bobbin thread projecting through the eye 13 to form properly the first stitch at the next sewing operation.

The thread cutter herein shown is in the form of a swinging cutting blade 35 having a cutting edge 36 and pivoted at 37 to the under side of the work-supporting plate 17. This cutting blade is acted on by a spring 38 which tends to hold it in retracted position against a stop 39. When in its inoperative or retracted position it is back of the needle opening 18. The cutting of the thread is accomplished by swinging the cutter to the right Fig. 4 into the position shown in Fig. 5, which carries it against the thread leading downwardly from the work to the under thread mechanism thereby severing said thread. This thread-cutting movement of the thread cutter 35 is accomplished by a sliding actuating member 40 which extends lengthwise of the supporting arm 9 and the forward end of which extends under the work-supporting plate 17 and has a shoulder or lug 41 thereon adapted to engage the tail 42 of the knife as the actuating member 40 is retracted. The rear end of this actuating slide 40 is provided with the laterally-extending finger 43 which is situated behind the lower end 44 of a lever 45 pivoted to the frame at 46. The upper end of this lever is provided with the cam surface 47 with which co-operates a roll 48 carried on an arm 49 extending laterally from the rear end of lever 27. When, therefore, the treadle is actuated to pull downwardly on the connec-

tion 34 and thus rock the lever 27 for the purpose of opening the work clamps, the downward movement of the roll 48 on the cam surface 47 will swing the lever 45 from the full to the dotted line position Fig. 6 and will thus move the cutter-actuating slide 40 to the rear thereby to actuate the cutter and cut the thread *t* beneath the work.

The construction herein shown is such that as the lever 27 is swung the cutter will be actuated just before the work clamps are opened. The connection between the lever 27 and the posts 20 allows for a certain amount of lost motion, this being provided for by making the notches 30 of sufficient length so that when the parts are in their normal position shown in full lines Figs. 1 and 6 the foot 29 will be spaced from the upper end of the notches 30. This will allow a certain initial swinging movement of the lever 27 before the foot 29 engages the upper ends of the notches 30 and thereby begins to lift the work clamps. During this initial swinging movement the cutter is actuated so that the cutting of the under thread is accomplished while the work is still clamped. This results in cutting the thread close to the work. It will be noted that the cam surface 47 is in the nature of a projection which is situated directly beneath the roll 48 when the parts are in their normal position. The initial swinging movement of the lever 27 will cause the roll 48 to ride over the projection 47 which will give the lever 45 its swinging movement thereby actuating the cutter and this actuation will occur before the work clamps have been raised.

The sliding actuator 40 is actuated upon by a spring 61 which tends normally to hold it in its inoperative position against a stop shoulder 62, and which returns it to such inoperative position after it has been actuated.

The means for pulling off a length of thread *t* from the bobbin before the latter is cut comprises a pull-off arm or blade 50 extending laterally from the slide 40. This pull-off arm is formed with a thread-receiving notch 51 and also with a thread-retaining member 52. The latter is in the form of a plate situated on the under side of the pull-off arm 50 and is formed with a thread-receiving eye 53 having a threading slot 54 leading thereto. The construction is such, as seen in Fig. 4, that the thread retainer forms a beak or nose 55 which extends across the notch 51.

When the parts are in normal position they are in the position shown in Fig. 4, that is, the cutter 35 is at the rear of the sewing opening 18 and the pull-off arm 50 on the front side thereof. Whenever the slide 40 is moved to the rear the pull-off arm 50 is carried across the opening 18 into the position shown in Fig. 5 and during this movement it engages the under thread *t* beneath the work and draws off a length of thread through the eye 13 as shown in Fig. 7. During this pulling-off operation the thread *t* will be drawn through the threading slot 54 into the eye 53. During the final movement of the actuator 40 the lug 41 is brought into engagement with the tail 42 of the cutter thereby swinging the latter into the position shown in Fig. 5 and causing it to cut the thread. The thread cutter 35 operates between the pull-off arm and the work.

The cut end of the thread *t* will be retained in the eye 53 by the retaining member 52 so that when the pull-off arm returns to its normal position the said end will be held in proper position to ensure that when the machine is again started the first stitch will be properly formed.

It will be noted that the thread cutter and the pull-off arm are actuated by means which can be operated independently of the needle and that both the cutter and the pull-off arm swing across the path of the needle during their operative movements.

One feature of my present invention relates to a device or mechanism which will prevent the operation of the thread cutter and pull-off arm except when the needle is withdrawn from the work and which also will prevent the operation of the cutter and pull-off arm if the needle is reciprocating. This avoids any possibility of the needle or cutter being damaged by the operation of the cutter and pull-off arm when the needle is in the work.

A simple device for accomplishing this object is herein illustrated and it comprises a flange or abutment on the shaft 5 provided with a re-entrant portion and a finger on the lever 27 which co-operates with said flange or abutment, the engagement of the finger with the flange or abutment preventing the lever 27 from being actuated except when the re-entrant portion of the flange is in line with the finger. This flange or abutment, which is indicated at 56, is constituted by the end face of a collar 57 which is secured to the shaft 5, said collar having a notch or recess 58, the face of which forms the re-entrant portion of the abutment.

The finger on the lever 27 is indicated at 59 and when the work clamps are in their lowered position as shown in Fig. 1 the end of the finger lies just in front of the abutment face 56 of the collar 57. The re-entrant portion 58 is so situated on the shaft that it is in line with the end of the finger 59 when the shaft is in the position shown in Fig. 1, which is the position it occupies when the needle is raised from the work. As soon as the shaft is turned in either direction sufficiently to cause the needle to enter the work the re-entrant portion 58 of the flange is carried out of line with the end

of the finger 59, as shown in Fig. 8, and when this condition obtains the lever 27 will be locked against swinging movement by the engagement of the finger with the abutment surface 56. Therefore, it will not be possible to depress the treadle and thereby actuate the thread cutter and pull-off when the needle is in the work or at any time except when the needle is in the position shown in Fig. 1.

The construction herein illustrated will also prevent the operation of the thread cutter and pull-off arm while the machine is running for if an attempt is made to depress the treadle while the machine is running the rapid rotation of the collar 57 will prevent the finger 59 from entering the re-entrant portion 58.

With my invention, therefore, all possibility of operation of the thread cutter or pull-off arm except when the needle is stationary in its raised position is prevented.

An advantage which results from operating the pull-off and cutter by means of the treadle is that it reduces the liability of breaking the thread during the pulling-off movement. Where the pull-off is actuated by some driven part of the machine it frequently is given so quick a movement that there is danger that it will break the thread. The depression of the treadle, however, is a relatively slow movement so that the pulling off of the thread is accomplished without any quick movement with the result that there is less danger of breaking the thread.

While I have illustrated one embodiment of the invention adapted to accomplish the desired object yet the invention is not limited to this or any particular form of the invention as it resides in the broad idea of providing a sewing machine in which the thread cutter is capable of operation independently of the stitch-forming mechanism with means to prevent the operation of the thread cutter except when the needle is in its retracted position.

I claim:

1. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle operating to penetrate the work from above, of needle-reciprocating mechanism, manually-operable means to cut the thread, and means moving with the needle-reciprocating mechanism which prevents the operation of said thread-cutting means except when the needle is in a predetermined position.

2. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle operating to penetrate the work from above, of needle-reciprocating mechanism, manually-operable means to pull off a length of thread and to cut the thread, and means moving with the needle-reciprocating mechanism which prevents the operation of the pull-off and thread cutter except when the needle is in a predetermined position.

3. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle operating to penetrate the work from above, of needle-reciprocating mechanism, manually-operable means to cut the thread beneath the work, and means moving with the needle-reciprocating mechanism which prevents the operation of the thread-cutting means except when the needle is in a predetermined position.

4. In a two-thread sewing machine, the combination with stitch-forming mechanism including a reciprocating needle operating to penetrate the work from above, of a shaft from which the needle is reciprocated, means to pull off a length of under thread and to cut the thread beneath the work, actuating devices therefor operable independently of the stitch-forming mechanism, and means on the shaft which prevents the operation of said pull-off device and thread-cutting device except when the needle is in a predetermined position.

5. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle arranged to penetrate the work from above, of a rotary member for operating said needle, manually-operable means to cut the thread, and means carried by the rotary member for preventing the operation of said thread-cutting means while the rotary member is in operation.

6. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle arranged to penetrate the work from above, of a rotary member for operating said needle, manually-operable means to pull off a length of thread and to cut the thread, and means carried by the rotary member for preventing the operation of said pull-off device and thread cutter while the rotary member is rotating.

7. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle, of a shaft from which the needle is reciprocated, a work clamp by which the work is clamped during the sewing operation, clamp-opening means, a thread cutter for cutting the thread, means to actuate the thread cutter by the clamp-opening means before the clamp is opened, and means associated with the shaft to prevent the operation of the clamp-opening means except when the shaft is in a predetermined angular position.

8. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle, of a work clamp by which the work is clamped during the sewing operation, a movable member by which the clamp is opened, there being a lost motion connection between said movable mem-

ber and clamp, a thread cutter, means for actuating the thread cutter to cut the thread during the initial movement of said member, whereby when the member is operated the thread is first cut while the clamp is closed and then the clamp is opened, and means carried by the movable member to prevent the opening of the clamp except when the needle is in a predetermined position.

9. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle, of a work clamp by which the work is clamped during the sewing operation, a movable member for opening the clamp, there being a lost motion connection between said member and clamp, a thread cutter and a thread pull-off, means to actuate said cutter and pull-off to cut the thread during the initial movement of said clamp-opening member, whereby when said member is actuated the thread will first be pulled off from the source of supply and cut before the clamp is opened, and means carried by the movable member to prevent the opening of the clamp except when the needle is in a predetermined position.

10. In a sewing machine, the combination with a drive shaft, of a needle reciprocated thereby, a work clamp, thread-cutting mechanism, manually-operable means to open the work clamp and actuate said mechanism, and a safety device carried by said shaft for permitting the operation of the thread-cutting mechanism only when the shaft is in a predetermined position.

11. In a sewing machine, the combination with a shaft, of a needle reciprocated thereby, a work clamp, a lever by which the work clamp is opened, a collar on said shaft having a recess, a finger carried by said lever and co-operating with said collar to prevent the actuation of the lever to open the clamps except when the shaft is in a predetermined position, and means actuated by the lever to cut the thread.

12. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle, of needle-reciprocating means, a work clamp by which the work is clamped during the sewing operation, clamp-opening means, means actuated by the clamp-opening means to cut the thread before the clamp is opened, and means associated with the needle-reciprocating means to prevent the opening of the clamp except when the needle is in a predetermined position, said means being operative both when the machine is idle and when it is running.

13. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle, of needle-reciprocating means, a work clamp by which the work is clamped during the sewing operation, clamp-opening means, means actuated by the clamp-opening means to pull off a length of thread and then to cut the thread before the clamp is opened, and means associated with the needle-reciprocating means and operative either when the machine is running or when it is idle to prevent the operation of the pull-off device and the thread cutter except when the needle is in a predetermined position.

14. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle, of a movable member by which the needle is reciprocated, a work clamp by which the work is clamped during the sewing operation, clamp-opening means, a thread cutter for cutting the thread, means to actuate the thread cutter by the clamp-opening means, and means moving in timed relation with said movable member and which prevents the operation of the clamp-opening means except when said movable member is in a position corresponding to the raised position of the needle.

In testimony whereof, I have signed my name to this specification.

JOHN KIEWICZ.