May 19, 1970 A. HEIMANN ET AL 3,512,491

THREAD CUTTING MECHANISM FOR LOCKSTITCH SEWING MACHINES

Filed Sept. 27, 1968 2 Sheets-Sheet 1

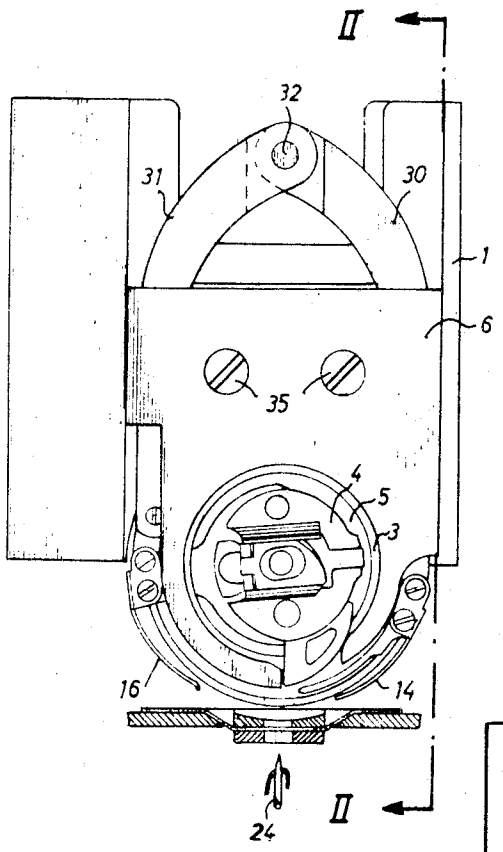


Fig. 1

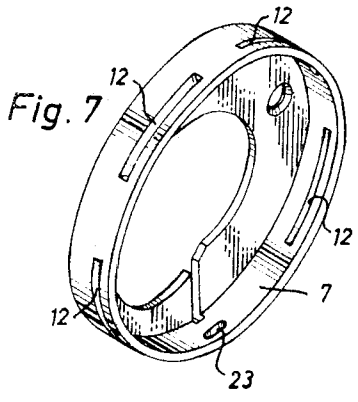


Fig. 7

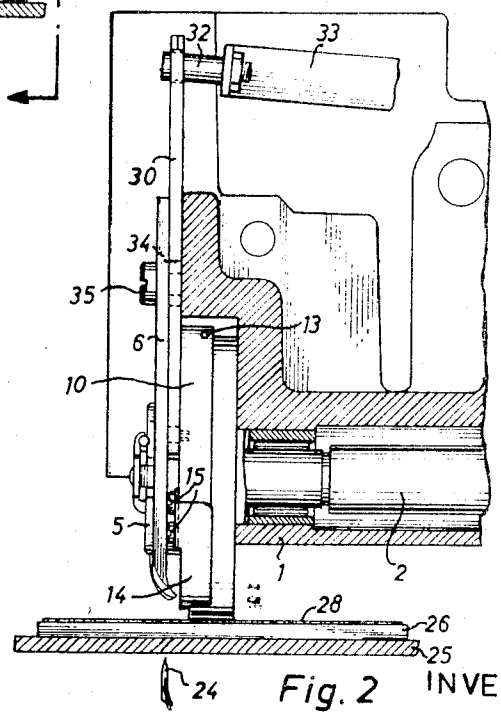


Fig. 2

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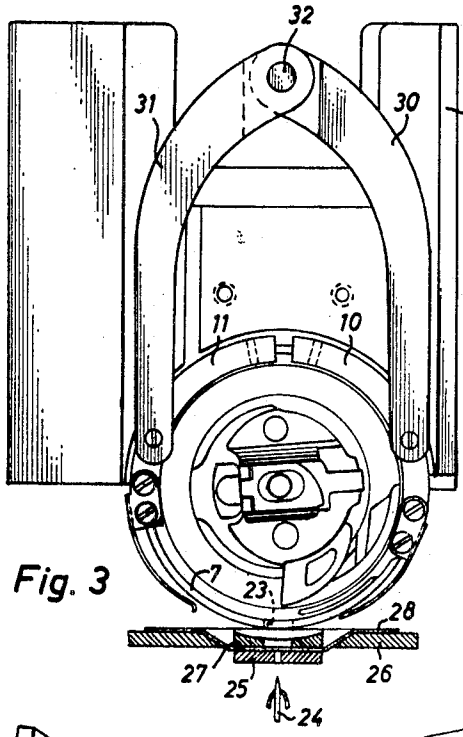


Fig. 3

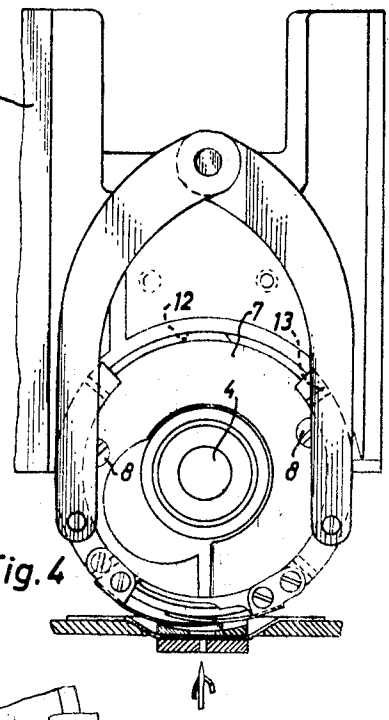


Fig. 4

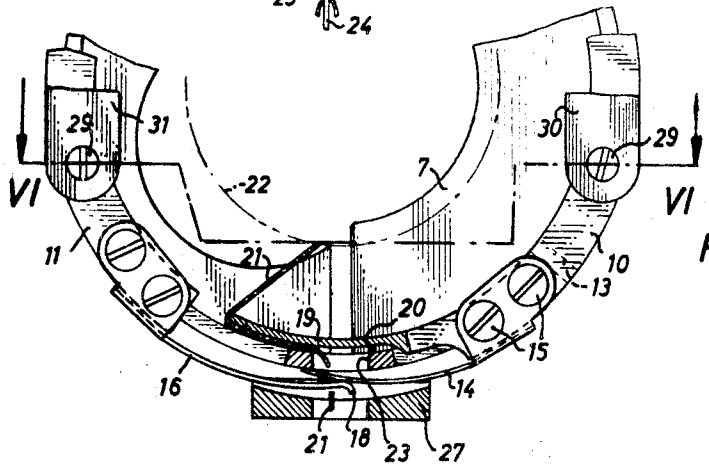


Fig. 5

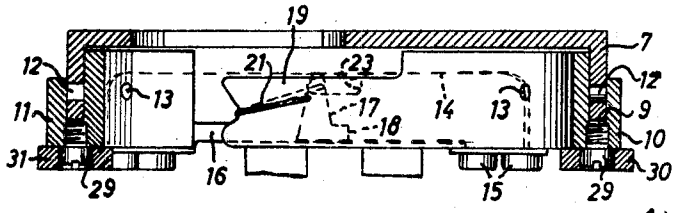


Fig. 6

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United States Patent Office 3,512,491 Patented May 19, 1970

3,512,491

THREAD CUTTING MECHANISM FOR LOCKSTITCH SEWING MACHINES

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Filed Sept. 27, 1968, Ser. No. 773,359
Claims priority, application Germany, Sept. 27, 1967, 1,660,916
Int. Cl. D05b 65/00
U.S. Cl. 112—252 13 Claims

ABSTRACT OF THE DISCLOSURE

A thread trimming mechanism for lockstitch sewing machines provided with means for withdrawing of a sufficient length of bobbin thread prior to the cutting of the thread by the cutting mechanism in the immediate proximity of the workpiece after the end of sewing operation. An arcuate cutting blade and an arcuate counterknife are mounted for oscillation concentrically about the loop taker in a contrary direction to one another to cut the thread within the path of motion of the needle. A thread draw-off means, which is in operation until the thread cutting operation, is provided.

BACKGROUND OF THE INVENTION

An object of the invention is the provision of an improved thread cutting mechanism for lockstitch sewing machines by means of which the bobbin thread may be drawn off before it is cut in the immediate proximity of the workpiece.

Another object of the invention is to provide a thread cutting mechanism for buttonhole lockstitch sewing machines having a rotating loop taker arranged above the throat plate, a reciprocating needle piercing the workpiece from below and a presser foot between the loop taker and the throat plate.

It is a further object of the invention to provide a thread cutting mechanism which is both simple in construction, and reliable in operation, and which can be embodied also in conventional sewing machines.

There are already known lockstitch sewing machines provided with an arcuate thread catcher disposed close to the outer surface of, and rotatable coaxially with the loop taker for catching either only the bobbin thread or the bobbin thread and a projecting end of the needle thread and supplying the thread or the threads to a stationary counterknife, arranged laterally of the stitch hole for the needle.

These thread cutting devices are described in German Pat. 353,627 to Duerkopp, of Sept. 8, 1918, U.S. Pat. 3,173,392 to Hedegaard, entitled "Thread Trimming Mechanism for Lockstitch Sewing Machines," U.S. Pat. 3,173,393 to H. Adam, entitled "Thread Cutting Mechanism for Lockstitch Sewing Machines."

These thread cutting mechanisms are not suitable for cutting the threads in the immediate proximity of a workpiece, since the arrangement of the stationary counterknife laterally of the stitch hole does not permit the thread ends leading to the workpiece to be cut off as short as possible. This is necessary, however, when using a cutting device in an automatic lockstitch sewing machine for producing buttonholes in linen.

SUMMARY

According to the invention, the above problems are solved substantially by the provision of a thread cutting device comprising an arcuate cutting blade mounted for concentric oscillation about the loop taker, a counterknife cooperating with the arcuate blade, and operating means for the cutting device, while the counterknife is mounted for oscillation with the loop taker and in a direction counter to the arcuate blade. The arcuate blade and the counterknife are carried by arcuate carriers having arcuate slots. A round guide element which is mounted about and encircles the rotating loop taker is provided to receive the carriers rotating in opposite directions to one another. The round guide is furnished with slits for receiving guide pins mounted in the oppositely rotating carriers.

The arcuate carrier carrying the arcuate blade is provided with a thread draw-off means, which is actuated prior to the thread cutting operation. A clearance is provided between the draw-off means and the inner side of the round guide, for receiving the thread before cutting.

The operating means for the cutting mechanism includes two levers, which are articulated to the carriers, and an actuating lever which is articulated to the free ends of the levers for displacing the carriers in opposite directions.

There is further provided a bobbin case retaining means which prevents the rotating loop taker from following the bobbin case and which serves as a guide for the two levers articulated to the carriers. For this purpose, distance pieces are arranged between the bobbin case retaining plate and that part of ths housing of the sewing machine which carries the rotating loop taker.

The counterknife cooperating with the arched blade is provided with a downwardly extending projection for raising the blade against the counterknife before the beginning of the cutting action.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation showing the rotating loop taker, the bobbin case retaining plate and the thread cutting mechanism;

FIG. 2 is a section taken approximately on line II—II of FIG. 1;

FIG. 3 is a view similar to FIG. 1, but without the bobbin case retaining plate;

FIG. 4 is a view similar to FIG. 3, showing the thread cutting mechanism in another position, without the loop taker;

FIG. 5 is an enlarged part of the elevational view shown in FIG. 4;

FIG. 6 is a section taken on line VI—VI of FIG. 5 and

FIG. 7 shows the round guide for the carriers in a perspective view.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A loop taker shaft **2**, carrying the rotating loop taker **3** is pivoted in the arm **1** (FIGS. 1 and 2) of a sewing machine. The bobbin case carrier **5** receiving the bobbin case **4** is provided with a bobbin case retaining plate **6** to prevent the rotating loop taker **3** from following it.

A round guide **7**, arranged coaxially to and encircling the loop taker **3**, is secured to the arm **1** by means of screws **8**. The round guide **7** is provided with slits **12** for slidably receiving guide pins **13**, which are inserted in two arcuate carriers **10**, **11**, formed with an arcuate slot **9**. In these slots **9**, the carriers **10**, **11** are slidably mounted in the slots **9** of the guide **7**.

An arcuate blade **14** is secured to the first carrier **10**. The second carrier **11** is provided with a counterknife **16** having an oblique cutting edge **17** and a projection **18** extending downwards for raising the arcuate blade **14** against the counterknife **16**.

The first carrier **10** is formed with an arcuate thread draw-off means **19**. Between it and the round guide **7**

there is provided a clearance **20** (FIG. 5) for receiving the bobbin thread **21**, which comes from a bobbin **22**, indicated by a dotted line in FIG. 5.

A clearance **23** is provided in the round guide **7** to permit the passage of the needle **24** piercing a workpiece **28** from below. The workpiece **28** lying upon a throat plate **25** and a fabric carrier plate **26** is pressed upon the throat plate **25** by a presser foot **27**.

Two levers **30, 31** are pivoted to the carriers **10, 11** by means of shoulder studs **29**. The free ends of both levers **30, 31** are articulated to a plug **32**, which is a part of an actuating lever **33**. The levers **30, 31** are slidably guided between the arm **1** and the bobbin case retaining plate **6**, which is secured to the arm **1**, distance pieces **34** (FIG. 2) secured by means of screws **35** being provided therebetween.

The operation of the above described thread cutting mechanism is as follows:

To cut the bobbin thread **21** it is necessary to press down the actuating lever **33** while the needle **24** (FIG. 3) is out of the throat plate **25**. The carriers **10** and **11** on the round guide **7** are thereby rotated counter to one another by the levers **30, 31**. First the thread draw-off means **19** engages the bobbin thread **21** for drawing off a length of thread from the bobbin **22**, which is sufficient to begin the next stitch formation (FIG. 5). Next, the bobbin thread **21** is cut off by the arcuate blade **14** and the counterknife **16**, in the path of motion of the needle **24**.

It will be noted that the bobbin thread **21** will be cut in the immediate proximity of the workpiece **28**.

In the foregoing the invention has been described with reference to a lockstitch sewing machine having a reciprocating needle piercing the workpiece from below, and a rotating loop taker arranged above the throat plate. It will be evident, however, that the invention may also be employed in a lockstitch sewing machine of conventional construction, in which the needle pierces the workpiece from above, while the rotating loop taker is arranged below the throat plate.

Further it is conceivable that, if the thread draw-off means were formed in such a manner that it could seize the projecting end of the needle thread loop which leads to the workpiece, but not the end leading to the needle, the thread mechanism would be suitable to cut the bobbin thread as well as the needle thread in the immediate proximity of the workpiece.

Other modifications and variations as well as the substitution of equivalent elements and parts for those shown herein, may be made without departing from the broader scope and spirit of the invention, as set forth in the appended claims. The specification and drawings are accordingly to be regarded in an illustrative rather than in a restrictive sense.

What we claim is:

1. In combination with a lockstitch sewing machine having a cylindrical rotating loop taker, a throat plate and a reciprocating needle, a thread cutting mechanism comprising: an arcuate cutting blade mounted for oscillation concentrically about said loop taker, a counterknife cooperating with said arcuate cutting blade, and operating means for said cutting means, said counterknife being mounted for oscillation concentrically with said loop taker in a counter direction to said arcuate cutting blade.

2. In a thread trimming mechanism as claimed in claim **1**, a first arcuate carrier carrying said arcuate cutting blade, a second arcuate carrier carrying said counterknife coacting with said cutting blade, said carriers having an arcuate slot and a round guide element mounted coaxially with and encircling said rotating loop taker, for slidably receiving said carriers, said carriers being rotatably counter to one another.

3. In a thread trimming mechanism as claimed in claim **1**, a first arcuate carrier carrying said arcuate cutting blade, a second arcuate carrier carrying said counterknife coacting with said cutting blade, said carriers having an arcuate slot, and a round guide element mounted coaxially with and encircling said rotating loop taker, for slidably receiving said carrier rotatable counter to one another, said first arcuate carrier having a thread draw-off means actuable prior to the thread cutting operation.

4. In a thread trimming mechanism as claimed in claim **1**, a first arcuate carrier carrying said arcuate cutting blade, a second arcuate carrier carrying said counterknife coacting with said arcuate cutting blade, said carriers having an arcuate slot, and a round guide mounted coaxially with and encircling said rotating loop taker, said round guide provided with slots for receiving guide pins secured in said carriers rotatable counter to one another, said first arcuate carrier having a thread draw-off means actuable prior to the thread cutting operation, and a clearance between said draw-off means and the inner side of said round guide, for receiving said thread.

5. In a thread trimming mechanism as claimed in claim **1**, a first arcuate carrier carrying said arcuate blade, a second arcuate carrier carrying said counterknife coacting with said arcuate cutting blade, said carriers having an arcuate slot, and a round guide element mounted coaxially with and encircling said rotating loop taker, said round guide element provided with slits for receiving guide pins in said carriers rotatable counter to one another, said first arcuate carrier having a thread draw-off means actuable prior to the thread cutting operation and a clearance between said draw-off means and the inner side of said round guide element, for receiving said thread, said operating means for said cutting mechanism including a pair of levers articulated to said carriers, and an actuating lever for said pair of levers articulated to said carriers, for movement in contrarotating direction, the free ends of said pair of levers being articulated to said actuating lever.

6. In a thread trimming mechanism as claimed in claim **5**, a bobbin case retaining means for preventing said rotating loop taker from following said bobbin case and for guiding said pair of levers articulated to said carriers.

7. In a thread trimimng mechanism as claimed in claim **5**, a bobbin case retaining plate for preventing said rotation loop taker from following said bobbin case and for guiding said two levers articulated to said carriers and distance pieces disposed between said bobbin case retaining plate and a part of the housing of said sewing machine carrying said rotating loop taker, for forming a guide for said levers.

8. In a thread trimming mechanism as claimed in claim **1**, wherein said counterknife cooperating with said cutting blade is provided with a downwardly extending projection, for raising said cutting blade against said counterknife before beginning the cutting action.

9. In combination with a lockstitch sewing machine having a cylindrically rotating loop taker, a reciprocating needle piercing a workpiece from below and a throat plate, a thread cutting mechanism comprising: an arcuate cutting blade mounted for oscillation concentrically with said loop taker, a counterknife cooperating with said arcuate cutting blade, and operating means for said cutting mechanism, said counterknife being mounted for oscillation concentrically with said loop taker and counter to the rotation of said arcuate cutting blade.

10. In combination with a lockstitch sewing machine for sewing buttonholes having a cylindrically rotating loop taker, a reciprocating needle piercing a workpiece from below, a thread drawing and cutting mechanism for the bobbin thread comprising: an arcuate cutting blade mounted for oscillation concentrically with said loop taker, a counterknife cooperating with said arcuate cutting blade, and operating means for said cutting device, said counterknife being mounted for oscillation concentrically

with said loop taker and counter to the rotation of said arcuate cutting blade.

11. In a thread trimming mechanism as claimed in claim **10**, a first arcuate carrier carrying said arcuate cutting blade, a second arcuate carrier carrying said counterknife, coacting with said arcuate cutting blade, said carriers having an arcuate slot, a round guide element mounted coaxially with and encircling said rotating loop taker, said round guide element having slits for receiving guide pins mounted in said carriers, said first arcuate carrier having a thread draw-off means actuable prior to the thread cutting operation and a clearance between said drawoff means and the inner side of said round guide element, for receiving said looper thread, said operating means for said cutting device including a pair of levers articulated to said carriers, an actuating lever for said pair of levers articulated to said carriers for movement counter direction to one another, the free ends of said levers being articulated to said actuating lever.

12. In a thread trimming mechanism as claimed in claim **11**, a bobbin case retaining plate for preventing said rotating loop taker from following said bobbin case

and for guiding said pair of levers articulated to said carriers, distance pieces disposed between said bobbin case retaining plate and a part of the housing of said sewing machine carrying said rotating loop taker, for forming a guide for said levers.

13. In a thread trimming mechanism as claimed in claim **10**, wherein said counterknife cooperating with said cutting blade is provided with a downwardly extending projection, for raising said cutting blade upon said counterknife before the cutting action.

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