United States Patent

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[54] **THREAD-CUTTING ATTACHMENT FOR SEWING MACHINES**
11 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **112/252**
[51] **Int. Cl.** **D05b 65/06**
[50] **Field of Search** 112/252, 130, 129

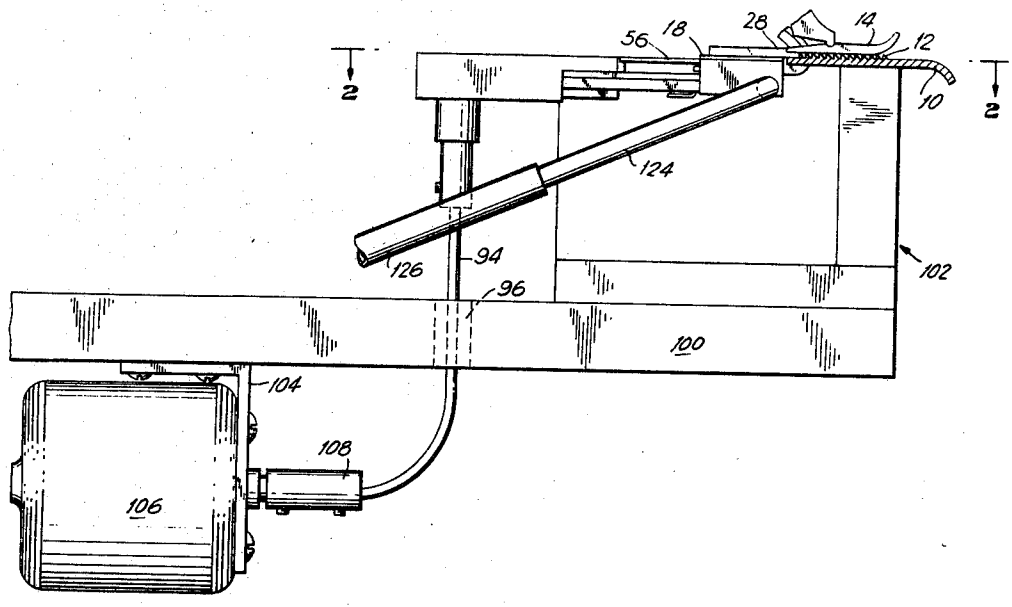
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ABSTRACT: A thread-cutting attachment for sewing machines, adapted to cut surplus thread from a stitched article. A first guide means is provided for guiding the article along a predetermined path in a predetermined plane during the stitching thereof. A second, low-friction guide means is located along this path immediately subsequent to the first guide means to continue the guiding of the article with low friction immediately subsequent to the stitching of the article. The stitched article slides along an exposed upper surface of this second guide means. A cutting means, which has cooperating fixed and oscillatable blades, is situated immediately beneath the second guide means for cutting surplus threads which extend from the article as it moves along the second guide means.



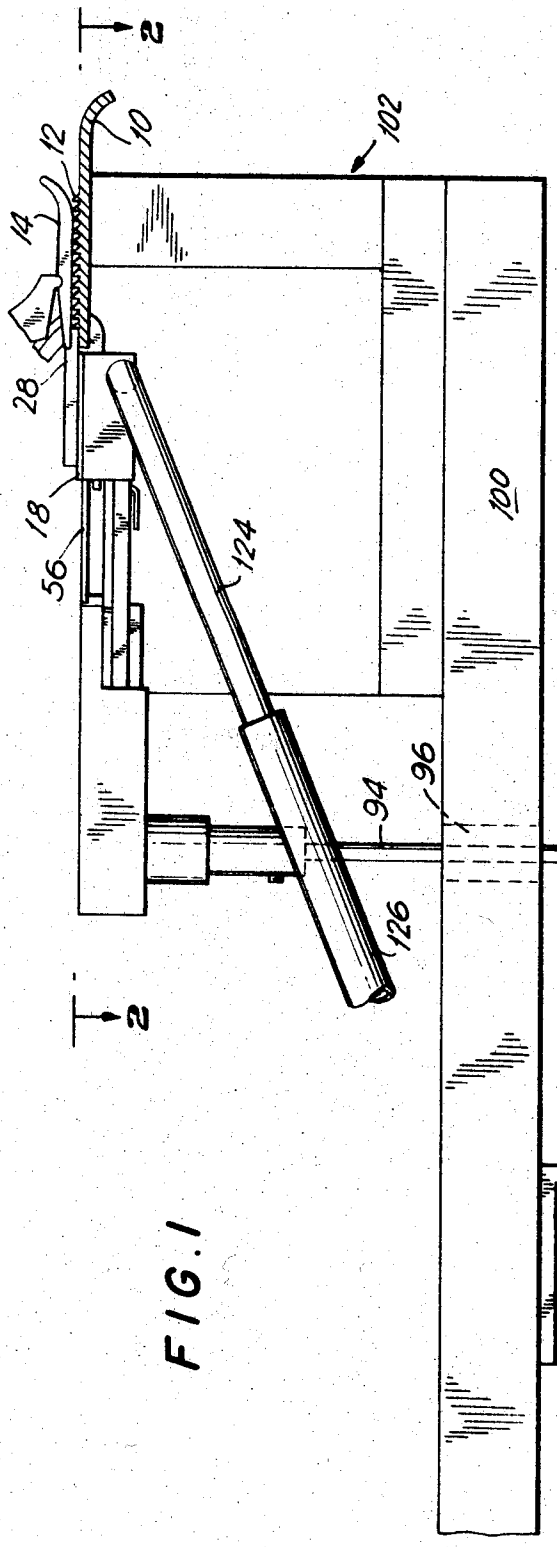

2
10
12
14
28
18
56
102
124
100
94
96
126
2
108
104
106

FIG. 1

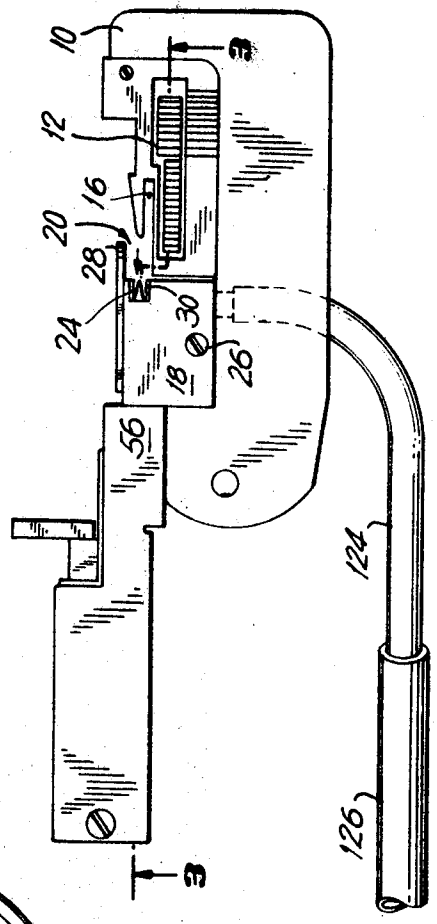
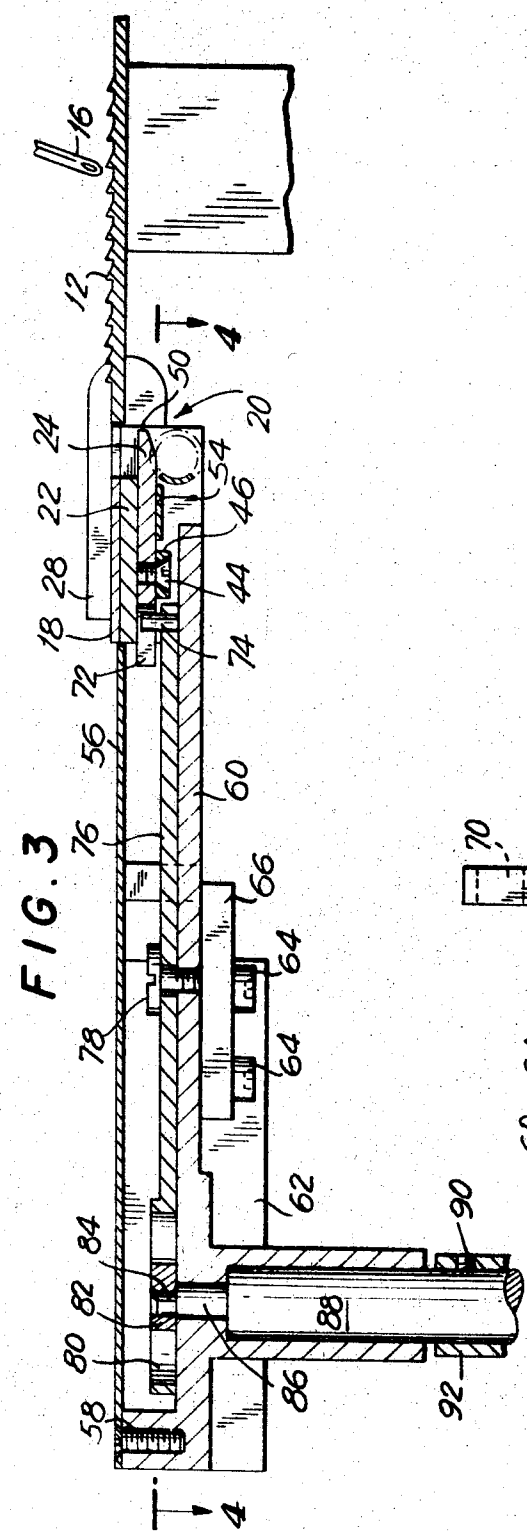

10
3
12
16
20
28
24
30
18
26
56
124
126
3

FIG. 2


FIG. 3
16
12
4
50
20
24
22
54
46
28
44
18
74
72
56
60
76
66
64
78
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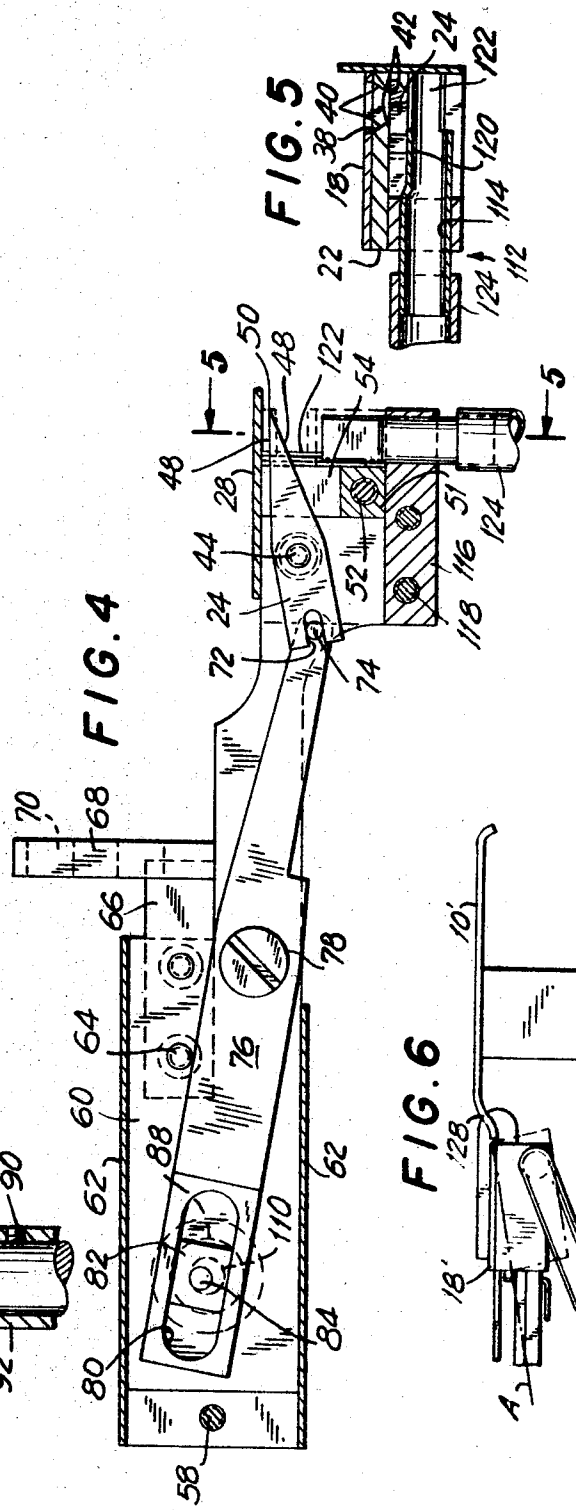
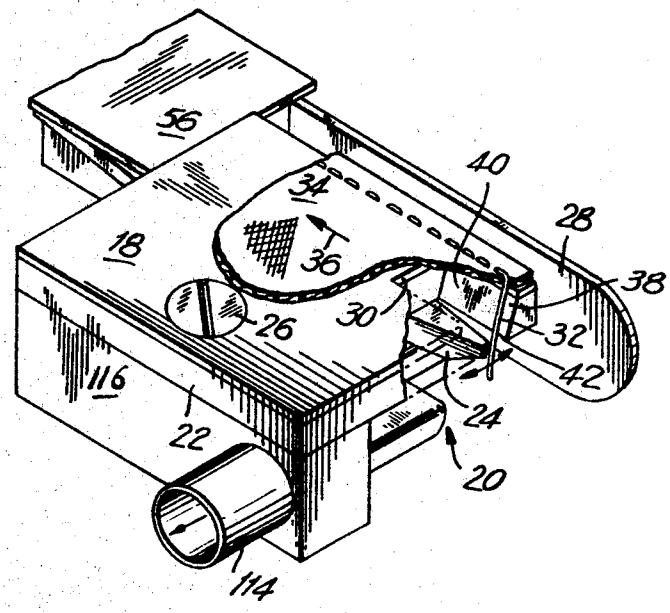

FIG. 4
70
68
66
78
64
76
60
88
62
110
82
84
80
58
5
50
48
122
54
28
51
124
44
52
116
24
118
72
74

FIG. 5
42
24
122
40
38
18
120
114
22
112
124
5

FIG. 6
10'
128
18'
A

FIG. 7


56
34
40
28
38
18
36
30
26
32
42
116
24
22
20
114

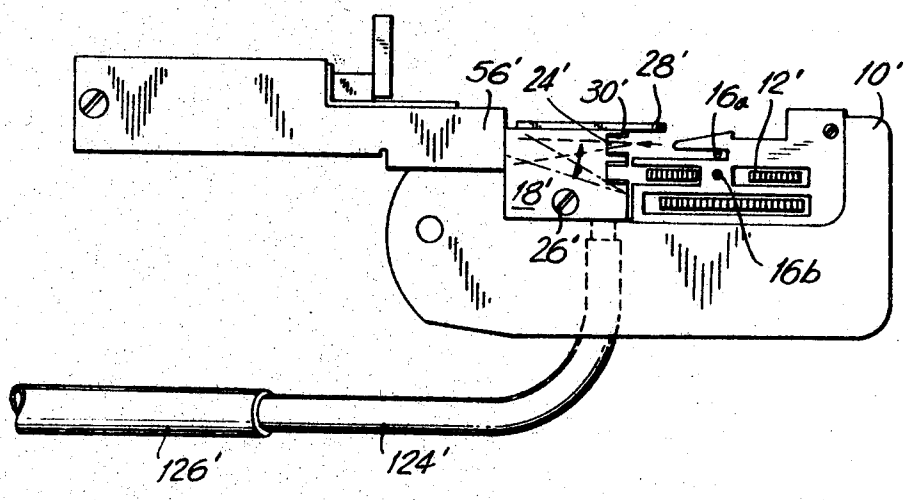

56'
24'
28'
30'
16a
12'
10'
18'
26'
16b
126'
124'

FIG. 8

THREAD-CUTTING ATTACHMENT FOR SEWING MACHINES

BACKGROUND OF THE INVENTION

The present invention relates to thread-cutting devices.

In particular, the present invention relates to an apparatus for removing surplus thread from a stitched article immediately subsequent to the stitching thereof.

Preferably, the structure of the invention takes the form of an attachment which may be mounted on a sewing machine.

During the sewing of articles, the thread with which the articles are stitched has surplus portions extending from the article. Although this surplus thread can be removed by hand, the labor costs involved in these operations are undesirably high, so that it has already been proposed to provide for sewing machines attachments capable of automatically cutting away the surplus thread so as to reduce the labor costs.

However, the known devices for cutting away the surplus thread suffer from several drawbacks. Thus, these known devices do not permit the article to slide along the sewing machine as easily as might be desired, so that it does not infrequently happen that an article will undesirably gather instead of smoothly sliding along the sewing machine immediately subsequent to the location where the thread is stitched to the article, necessitating an undesirable interruption in the sequence of operations. In addition, the known structures are highly complex and excessively expensive. Also, with the known devices there are generally a relatively large number of stationary and laterally shiftable cutting edges which coact with each other but which are arranged so as to provide only relatively small gaps for receiving the surplus thread, so that the surplus thread does not always reliably reach the cutting blades to be cut thereby.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide an attachment of the above general type which will avoid the above drawbacks.

In particular, it is an object of the invention to provide an attachment of this type which is far simpler and less expensive than conventional attachments and which at the same time will operate far more reliably.

Furthermore, it is an object of the invention to provide an attachment of this type which presents a surface of extremely low coefficient of friction to the stitched article so that the article will continue to slide smoothly subsequent to the stitching thereof away from the stitching location.

Also, it is an object of the invention to provide for a device of the above type a cutting structure composed of a relatively small number of cutting edges which, however, provide a sufficiently large space to receive the surplus threads irrespective of the thickness thereof, so that a reliable cutting of the threads will be assured.

Furthermore, it is an object of the invention to provide a structure of the above type which, while composed of a relatively small number of reliably operable elements, nevertheless has its components built in a robust manner capable of guaranteeing for the structure a long life of useful operation.

In accordance with the invention, the apparatus for removing the surplus thread from a stitched article acts immediately subsequent to the stitching of the article. The apparatus includes a first guide means which guides the article along a predetermined path in a predetermined plane during the stitching of the article. A second, low-friction guide means is located along this path immediately subsequent to the first guide means for continuing the guiding of the article with low friction immediately subsequent to the stitching of the article. The stitched article slides along an exposed upper surface of this second guide means. A cutting means, which has cooperating fixed and oscillatable blades, is situated immediately beneath the second guide means for cutting the surplus threads which extend from the article as it moves along the second guide means.

BRIEF DESCRIPTION OF DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a partly sectional and partly schematic side elevation of a structure according to the invention;

FIG. 2 is a plan view taken along line 2–2 of FIG. 1 in the direction of the arrows;

FIG. 3 is a sectional elevation, at an enlarged scale as compared to FIG. 2, taken along line 3–3 of FIG. 2 in the direction of the arrows;

FIG. 4 is a sectional plan view of part of the structure of FIG. 3, taken along line 4–4 of FIG. 3 in the direction of the arrows, and showing the details of the cutting means;

FIG. 5 is a sectional front end view of the attachment taken along line 5–5 of FIG. 4 in the direction of the arrows;

FIG. 6 is a schematic fragmentary elevation of a different embodiment of the structure of the invention;

FIG. 7 is a fragmentary perspective view, at an enlarged scale as compared to the remaining FIGS., showing the action which takes place during the cutting of surplus thread from a stitched article; and

FIG. 8 shows a variation of FIG. 2 according to which the cutting structure coacts with a two-needle machine.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. 1, there is schematically shown at the upper right portion thereof, in section, a work plate **10** forming a first guide means which guides the article during the stitching thereof toward the left, as viewed in FIG. 1. FIG. 1 schematically shows the feed dogs **12** and the presser foot **14** which coact in a known way with the plate **10** for feeding the work rearwardly, to the left as viewed in FIG. 1, during the stitching of the article. The feed dogs **12** are also schematically indicated in FIG. 2 which shows the stitching needle **16** in a schematic manner.

Immediately subsequent to the first guide means **10** is a second, low-friction guide means **18** which, as is apparent from FIG. 1, is in the same plane as the first guide means **10** to receive and continue the guiding of the stitched article immediately subsequent to the stitching thereof. This second guide means **18** is in the form of a plate made of any suitable metal and provided with an exposed upper surface having a low coefficient of friction. For example, the plate may be chrome plated, so that it will have an extremely smooth glossy upper surface along which the article slides immediately subsequent to the stitching thereof.

Situated immediately beneath the second, low-friction guide means **18** is a cutting means **20** which includes a stationary or fixed blade **22** and an oscillatable or swingable blade **24**. As may be seen from FIG. 7, the stationary blade **22** is in the form of a rigid metal plate of substantial thickness situated directly beneath and carrying the second guide means **18** which may be fixed to the stationary blade **22** as by a countersunk screw **26**.

At its front end, adjacent to a vertical guide plate **28**, the low-friction plate which forms the second guide means **18** is formed with a relatively large notch **30** of substantially rectangular configuration having a front open end which will easily receive any surplus thread such as the surplus thread **32** shown in FIG. 7 hanging from the fragmentarily illustrated article **34** which continues to move easily along the low-friction upper exposed surface of the second guide means **18** in the direction of the arrow **36** immediately subsequent to the stitching of the article **34**. It will be noted that the notch **30** is defined only by a pair of opposed side edges and a rear edge. It has no front edge, and in fact there is a substantial free open space preceding the open front end of the notch **30**, so that entry of the thread which is to be cut into the notch is assured. The stationary or fixed blade **22** is itself formed with a notch **38** which is aligned with and of substantially the same size as the notch **30**. At its upper surface the plate **22** has at the notch **38** a size for this notch which is the same as the notch **30**. However, the

opposed side surfaces 40 of the notch in the stationary blade 22 are inclined inwardly and downwardly toward each other, as shown most clearly in FIG. 5, and these inclined side surfaces 40 terminate in a pair of stationary cutting edges 42 which extend in the direction of the path along which the article moves, as indicated by the arrow 36 in FIG. 7.

A screw 44 is threaded into the plate 22 and extends through an opening of the oscillatable blade 24 of the cutting means 20, so as to define for the blade 24 a swing axis which is normal to the plane of the plate 18, and the head of the screw 44 carries a washer 46, so that the blade 24 will be reliably guided for swinging movement about the axis of the screw 44. The blade 24 has as its opposed far sides a pair of cutting edges 48 which are inclined toward each other as they approach the front tip 50 of the blade 24 (FIG. 4) and these cutting edges 48 respectively slidably engage the stationary cutting edges 42 to cut in coaction with the latter any surplus threads from the stitched article. As is indicated in FIG. 4, a block 51 is secured by a screw 52 to the underside of the plate 22, and the head of the screw 52 engages the lower surface of a leaf spring 54 which extends beneath and presses upwardly against the lower surface of the swingable blade 24 so as to maintain the latter in a position coacting properly with the stationary cutting edges 42.

After the cutting means 20 has cut surplus threads from the stitched article, it continues to move to the rear along the surface of a cover plate 56 which is fixed, as by a screw 58 to a rear wall portion of a rigid metallic base member 60 which forms the primary support for the attachment. The cover 56 is of a channel-shaped configuration so that it has a pair of opposed sidewalls 62 extending along both sides of the attachment. The underside of the base plate 60 fixedly carries, as by screws 64 a member 66 to which a rigid member 68 is welded, for example, and this member 68 is formed with suitable openings 70 which enable the attachment to be properly mounted on the sewing machine.

The blade 24 is formed distant from the notch 30 with an elongated cutout 72 extending inwardly from its rear end, and this cutout 72 receives a pin 74 which is fixed to and extends upwardly from a swingable drive lever 76 supported for swinging movement, also about an axis perpendicular to the common plane of the pair of guide means 10 and 18, by a screw 78 whose shank extends through an opening of the drive lever 76 and is received in a threaded opening of the base plate 60, as shown most clearly in FIG. 3.

At its rear end portion the drive lever 76 is formed with an elongated slot 80 (FIG. 4) which receives a slide block 82 longitudinally slidable along the slot 80 and resting on the upper surface of the base plate 60. This slide block 82 receives an eccentric driving pin 84 fixed to and displaced from the central axis of a reduced end portion 86 of a drive shaft 88 fixed, as by a set screw 90, to an adapter sleeve 92 which, as shown in FIG. 1, serves to fix the drive shaft 88 to a motor-driven rod 94. The flexible motor-driven rod 94 is curved and extends through an opening 96 of a frame member 100 of the sewing machine, this frame member forming part of the frame work 102 of the sewing machine which carries such structure as the work plate 10. A supporting clamp assembly 104 fixedly carries the horizontal driving motor 106 beneath the frame member 100, and the drive shaft of the motor is in turn fixed by an adapter sleeve 108 to the intermediate transmission rod 94, so that in this way, when the circuit of the motor 106 is closed in any suitable manner, as by actuation of a suitable electrical switch situated in the circuit of the motor 106, the eccentric pin 84 will rotate along the circle 110 shown in dotted lines in FIG. 4, to cause the slide block 82 to produce oscillation of the drive lever 76 which through the pin 74 will oscillate the blade 24 about the axis defined by the pivot screw 44.

The guide plate 28 is fixed to a side surface of the base plate 60 in any suitable way as by a pair of screws fixed to an extension of the plate 28 which extends down to the elevation of and engages the side edge of base plate 60.

A suction means 112 is provided for sucking away the threads which are cut from the stitched article with the cutting means 20. This suction means includes a metallic suction tube 114 extending through a bore which is formed in a supporting block 116 fixed by screws 118 to the underside of the fixed blade 22. The suction tube 114 has a flattened upper surface portion 120 spaced beneath the blade 22 so as to clear the swinging blade 24, and directly beneath the latter the suction tube 114 only has a rear wall portion 122. Outwardly beyond the supporting block 118, the metallic suction tube 114 has a second angularly bent suction tube 124 mounted thereon and communicating through a conduit 126 with a known suction box through which a vacuum pump or the like applies the suction so that the threads which are cut away will collect in such a suction box from which they can be removed from time to time.

It should be noted that it is not essential to situate the second guide means 18 in the same plane as the first guide means 10. For example, as is indicated in FIG. 6, the second guide means 18' can be situated in a plane lower than and parallel to the plane of the first guide means 10', these guide means 10' and 18' respectively corresponding to the guide means 10 and 18 described above. In this case the guide means 10' will be provided at its rear end with a smoothly curving portion 128 which directs the stitched article smoothly to the lower low-friction second guide means 18 ' of this embodiment. Otherwise the embodiment of FIG. 6 is the same as that described above.

However, if desired, the structure situated just to the rear of the first guide means 10' can be slightly inclined, as indicated by the dot-dash line A, so that this second guide means can also slope angularly downwardly toward the rear to receive the stitched article from the first guide means 10 '. The lower elevation of the second guide means, and its downward inclination to the rear, if desired, as illustrated in FIG. 6, further enhance the ease with which the stitched article will be displaced beyond the first guide means 10 '.

FIG. 8 shows how the structure of the invention can be adapted for use with a two-needle machine. Thus, in this case the feed dog means 12 ' coacts with needles 16*a* and 16*b*, and it will be noted that the angle of swing of the blade 24' has been increased by suitable changes in the transmission to the blade 24'. Also, the notched plate which provides the stationary cutting edges to coact with the swingable blade has its notch suitably widened, so that in this way the structure can be adapted for a two-needle machine.

We claim:

1. In an apparatus for removing surplus thread from a stitched article immediately subsequent to the stitching thereof; first guide means for guiding the article along a predetermined path in a predetermined plane during the stitching thereof, second, low-friction guide means located along said path immediately subsequent to said first guide means for continuing the guiding of the article with low friction immediately subsequent to the stitching of the article, the stitched article sliding along an exposed upper surface of said second guide means, and cutting means having cooperating fixed and oscillatable blades, said cutting means being situated immediately beneath said second guide means for cutting surplus threads extending from the article as it moves along said second guide means, said second guide means being located in its entirety at an elevation no higher than said first guide means and said second guide means having a front edge formed with an entrance notch for receiving surplus thread hanging down from a stitched article, said cutting means being situated in the path of movement of the surplus thread hanging down from the stitched article and entering said notch of said second guide means, said entrance notch being defined only by a pair of opposed side edges and a rear edge and having an open front end preceded by a substantial free open space for assuring entry of the surplus thread into said notch.

2. The combination of claim 1 and wherein said second guide means is situated in the same plane as said first guide means.

3. The combination of claim 1 and wherein said second guide means is situated in a plane different from and parallel to the plane of said first guide means.

4. The combination of claim 1 and wherein said second guide means is inclined with respect to and extends slightly lower than said first guide means.

5. The combination of claim 1 and wherein said oscillatable blade which coacts with said fixed blade swings about an axis normal to said plane.

6. The combination of claim 1 and wherein a suction means has a suction inlet located in the region of said cutting means for sucking away threads cut by said cutting means.

7. The combination of claim 1 and wherein said low-friction guide means is in the form of a stationary plate fixed to and located directly over said cutting means and having a smooth exposed upper surface of a low coefficient of friction along which the stitched article slides subsequent to said first guide means, said plate of said second guide means having a front edge formed with said entrance notch of said second guide means.

8. In an apparatus for removing surplus thread from a stitched article immediately subsequent to the stitching thereof: first guide means for guiding the article along a predetermined path in a predetermined plane during the stitching thereof, second, low-friction guide means located along said path immediately subsequent to said first guide means for continuing the guiding of the article with low friction immediately subsequent to the stitching of the article, the stitched article sliding along an exposed upper surface of said second guide means, and cutting means having cooperating fixed and oscillatable blades, said cutting means being situated immediately beneath said second guide means for cutting surplus threads extending from the article as it moves along said second guide means, said second guide means being located in its entirety at an elevation no higher than said first guide means and said second guide means having a front edge formed with an entrance notch for receiving surplus thread hanging down from a stitched article, said cutting means being situated in the path of movement of the surplus thread hanging down from the stitched article and entering said notch of aid second guide means, said low-friction guide means being in the form of a stationary plate fixed to and located directly over said cutting means and having a smooth exposed upper surface of a low coefficient of friction along which the stitched article slides subsequent to said first guide means, said plate of said second guide means having a front edge formed with said entrance notch of said second guide means, said fixed blade of said cutting means being located directly beneath and carrying said plate of said low-friction guide means, said fixed blade being formed with an entrance notch aligned with said entrance notch of said second guide means and into which said surplus threads move during sliding of the article along said plate, said fixed blade terminating at said notch thereof in a pair of opposed lower substantially parallel cutting edges extending in the direction of movement of the stitched article, and said oscillatable blade swinging about an axis normal to said plane and having an upper surface provided at its opposed sides with a pair of cutting edges which respectively coact with the stationary cutting edges at the lower end of said notch.

9. The combination of claim 8 and wherein said oscillatable blade is formed at an end distant from said notch with an elongated cutout, and a swingable drive lever swinging about a second axis normal to said plane and having a pin received in said cutout of said plane and having a pin received in said cutout of said oscillatable blade for oscillating the latter during swinging of said drive lever about said second axis.

10. The combination of claim 9 and wherein said fixed blade of said cutting means is itself in the form of a plate of substantial thickness extending beneath substantially the entire plate which forms said low-friction guide means.

11. The combination of claim 5 and wherein a drive means is operatively connected with said blade for oscillating the latter, and said drive means including a curved flexible motor-driven shaft.