March 26, 1963 K. NICOLAY 3,082,716

SEWING MACHINES ATTACHMENT FOR THE SEWING OF RESILIENT WORKPIECES

Filed Nov. 10, 1960 4 Sheets-Sheet 1

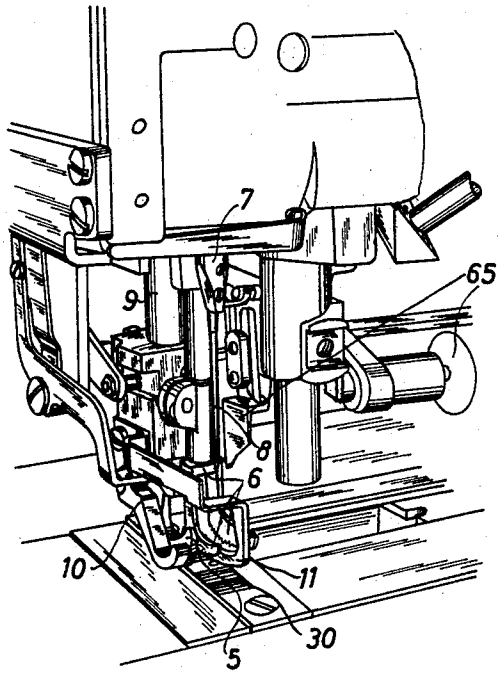


Fig. 2

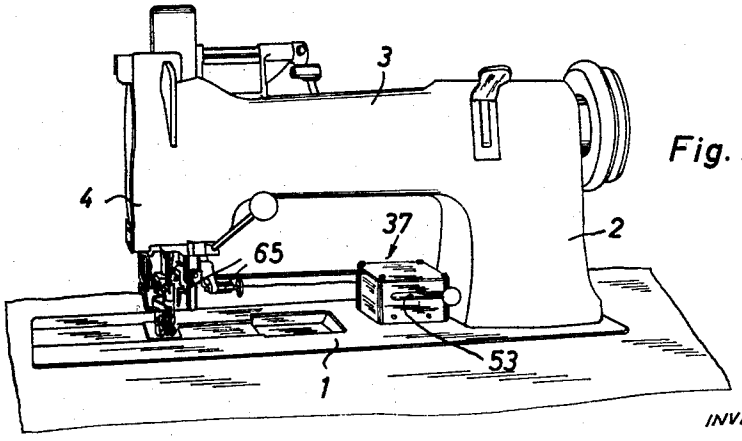


Fig. 1

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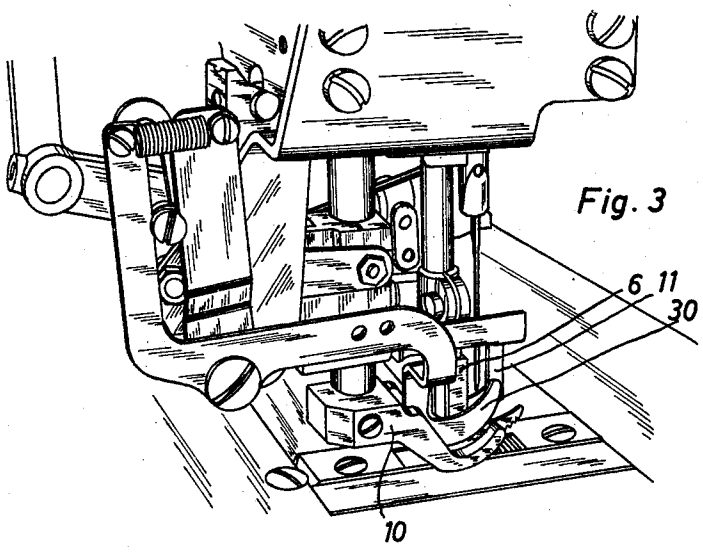


Fig. 3

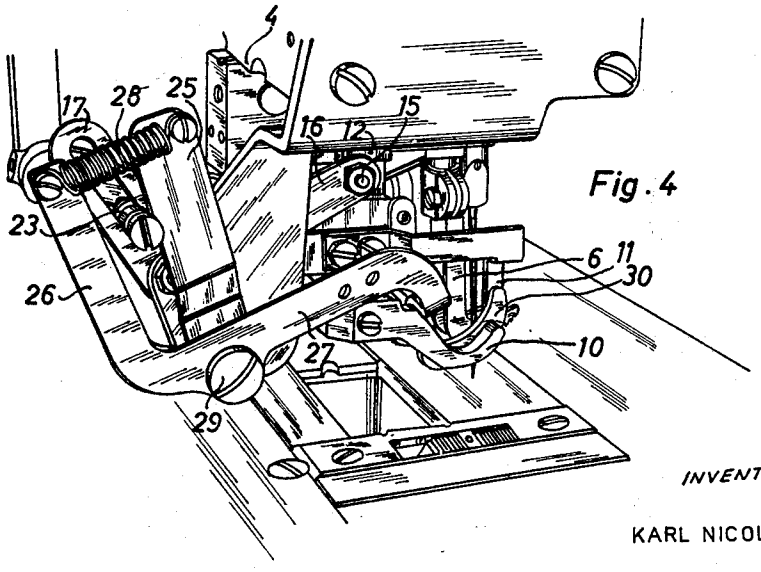


Fig. 4

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SEWING MACHINES ATTACHMENT FOR THE SEWING OF RESILIENT WORKPIECES

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Fig. 5

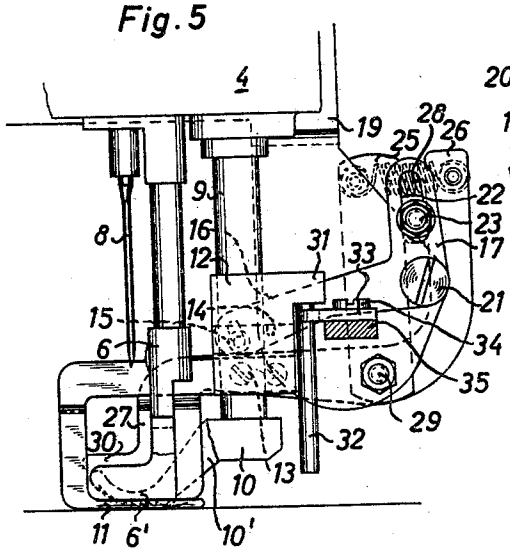


Fig. 7

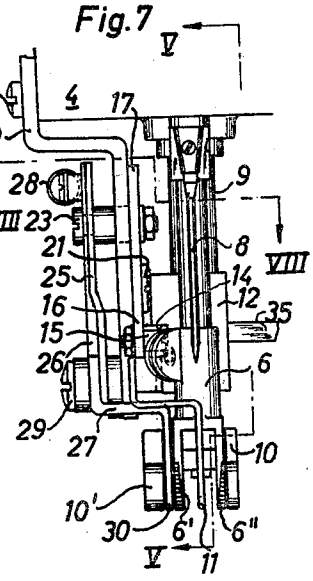


Fig. 6

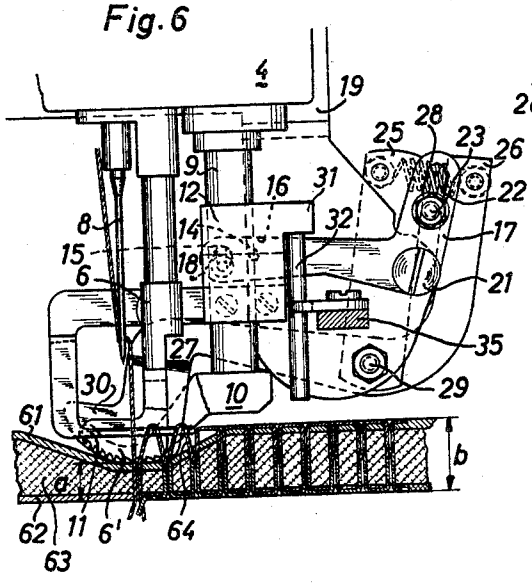
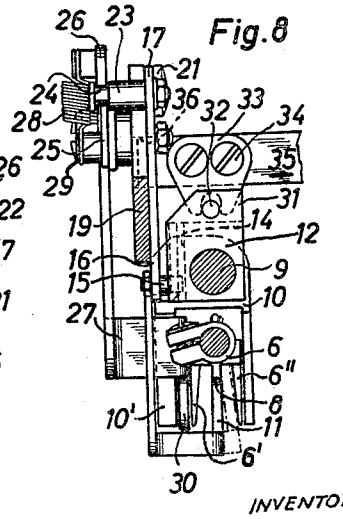


Fig. 8



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Fig.10

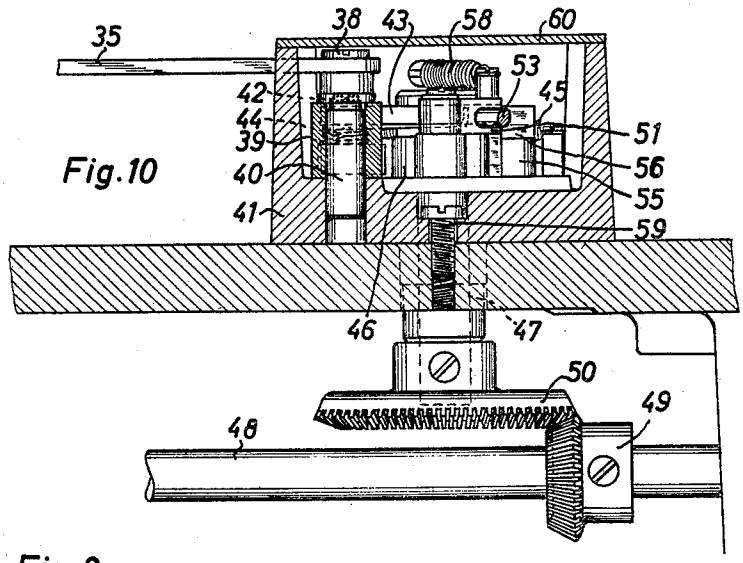
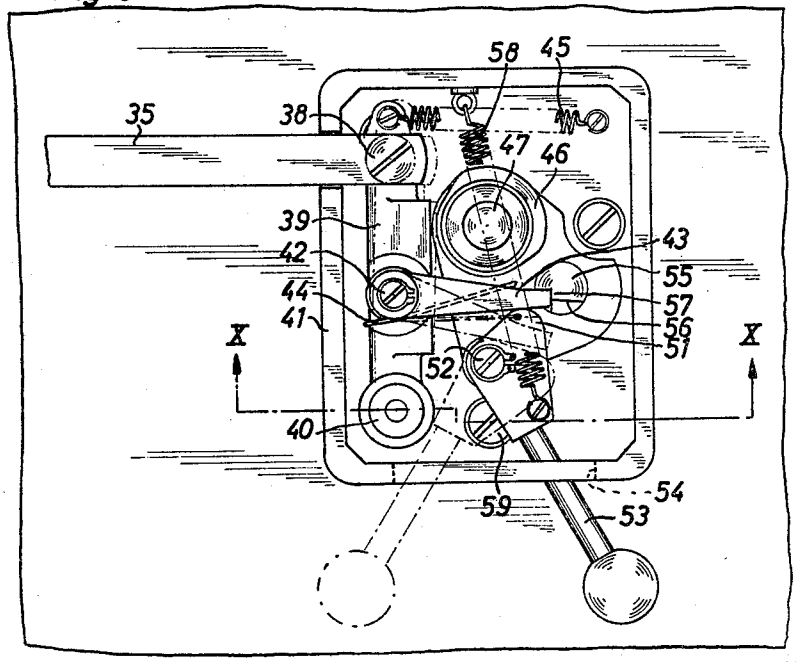


Fig.9



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3,082,716

SEWING MACHINES ATTACHMENT FOR THE SEWING OF RESILIENT WORKPIECES

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Claims priority, application Germany Nov. 14, 1959
12 Claims. (Cl. 112—2)

This invention relates to an attachment for the sewing of resilient materials, for example for the sewing on of resilient inserts for an article of clothing. This attachment is suitable for straight-stitch and zig-zag-stitch sewing machines, and also for sewing machines which in known manner are provided with a combined feed device consisting of a lower material feeder, a needle rod swinging out in the direction of the sewing and a controlled presser also called a hopper foot. The apparatus involves the use of a looper bar co-operating with the needle for the formation of thread loops over the workpiece.

Such looper bars for sewing machines are known. They serve the most varied purposes, for example for making carpets, blankets, fringes or the like, by forming one or more rows of thread loops on a basic material or for the making of button links in the sewing on of buttons with the aid of button-stitching machines. For the last mentioned use, looper bars are already known which, in stationary machines, are adjustable in height in order to make it possible to sew on buttons with links of different length. Furthermore, it is known to make the bar laterally swingable in order to facilitate the sewing on, with the same sewing machine, of buttons without links.

All these known arrangements are unsuitable for the solution of the problem to which the present invention is directed. The problem consists essentially in providing an attachment for sewing machines which facilitates the sewing on or sewing in of resilient materials, for example wadding or foamed rubber, on or between one or several layers of material in such manner that during the sewing procedure the workpiece, compressed by the presser foot in consequence of its resilience, is not held in its compressed state behind the stitching point by firm sewing stitches but can return at least approximately to its original state as regards thickness. This arrangement is for example particularly well suited for the insertion of the sleeves of an article of clothing tightly in the lower part of the arm hole and with looser stitches in the upper part of the armhole where a padding is provided.

A further problem consists in so forming the attachment that resilient materials of different normal thickness and different resilience can be worked without interruption of the stitch-forming operations of the sewing machine. Furthermore, an attachment responding automatically to the thickness and resilience of the workpiece is to be provided. Finally, there is still the problem of so forming the attachment that it can be switched on or off as desired during the sewing, in order to permit carrying out with the machine either the sewing on of resilient materials onto a workpiece or ordinary sewing work.

The invention solves this problem essentially in that a looper bar used on the sewing machine during the formation of loops is made adjustable in height in relation to the workpiece surface by manually or mechanically controlled transmission members. In this connection, by manually operating transmission members are to be understood hand levers and operating devices in operative connection with the looper bar to be actuated by the fore-arm of the operator, by pedals or by means

of the knee. As mechanically controlled transmission means are to be considered all driving means for the looper bar controlled in dependence on the rotation of the sewing machine, for example by curved plates or cams, and independently of the sewing machine drive.

If the attachment is to be used on a straight stitching machine, then pivoting movements reciprocating in dependence on the needle movement must be imparted to the height-controlled bar.

The height adjustment of the looper bar may be automatically controlled also by means of a feeler member sensing the workpiece in the area of the stitching point of the needle. This feeler member consists of a two-armed lever, one arm of which terminates in a sensing finger contacting the workpiece in the vicinity of the stitch point of the needle, and the other arm of which is bent upwards substantially at right angles in order to effect, via a bell-crank lever, the height adjustment of the looper bar. The looper bar itself is fixed to a supporting block, angularly swingable and axially movable on the presser bar, which, for the purpose of the height adjustment of the bar is in working engagement with the bell-crank lever and, via a coupling from an engageable and disengageable transmission, receives angularly pivoting movement for the formation of thread loops by means of the looper bar. For the purpose of fine adjustment of the working height of the bar, the lever in working communication with the feeler member has a pin movable to selected positions in a slot in the bell-crank lever and engaging a groove in the block. The lower arm of the bell-crank lever is likewise provided with a pin movably fixed in a slot which is pressed by means of a further lever, rotatably arranged under the tension of a spring, onto the arm of the two-armed lever.

The coupling for the communication of the pivoting movements to the overedge looper bar from the said transmission consist of a pin, which is inserted in a projection of the supporting block, and a dog embracing the pin on a part of its periphery, this dog being fixed to a pusher or thrust rod. The two-armed lever with the feeling member and the bell-crank lever are rotatably arranged on a holding plate fixed on the sewing-machine head, which has an opening for the mounting and guiding of the thrust rod.

The engageable and disengageable transmission for producing the pivoting movement of the looper bar has a driving cam, rotated via a pair of gear wheels, and a pivot lever capable of being brought into an ineffective position by means of a decoupling mechanism, and of co-operating with this cam under the action of a spring, to which the thrust rod in linked. The decoupling mechanism consists of a catch swingable on the pivot lever against the action of a spring, a stop bolt co-operating with this catch and a cam-shaped toggle member adapted to be brought to bear on the catch by means of a handle in order to hold the pivot lever in an ineffective position.

A representative embodiment of the invention is illustrated in the accompanying drawing, wherein:

FIG. 1 shows the attachment according to the invention on a flat-bed sewing machine, with a combined feed arrangement consisting of a lower material feeder, a needle rod swinging out in the direction of the stitching and a controlled work presser all in perspective representation;

FIG. 2 shows in perspective, and drawn to a larger scale, a part of the machine shown in FIG. 1;

FIG. 3 is a side view of the arrangment shown in FIG. 2, with the presser foot lowered;

FIG. 4 shows the same parts as FIG. 3 but with the presser foot raised;

FIG. 5 shows a partial section through the sewing machine, taken on line V—V of FIG.17;

FIG. 6 shows a section corresponding to FIG. 5 but with a workpiece inserted;

FIG. 7 shows a partial view of the attachment as seen from the front;

FIG. 8 is a part-sectional plan view taken on line VIII—VIII of FIG. 7;

FIG. 9 is a partial plan view of the base plate of the sewing machine, showing a coupling transmission with the cover removed; and

FIG. 10 is a sectional elevation through the transmission taken, on line X—X of FIG. 9.

The sewing machine illustrated in FIG. 1 has a base plate **1**, a standard or pillar **2** and a cantilever arm **3**, terminating in a head **4**. The machine also has a combined work-feeding means (FIG. 2) which consists of a lower work feeder **5** and an upper forked work feeder foot **6** having a needle bar **7** with the needle **8** swinging out in the direction of sewing, and a forked presser foot **10**, also called a hopper foot, fixed on the presser bar **9**.

As can best be seen from FIGS. 5–8, there is located between the two forks **6'** and **6''** of the upper work-feeder foot **6** a looper bar **11** which can be pivoted to-and-fro sideways under the needle **8** for the formation of thread loops. The bar **11** is fixed to a block **12** by means of screws **13**, this block being angularly pivotable and axially movable on the presser bar **9**. On its left-hand side (viewed from the front) the block **12** is provided with a groove **14** in which a pin **15** is loosely received, this pin being adjustably fixed in a slot **18** in one arm **16** of a bell-crank lever **16, 17** to enable a more accurate presetting of the swing of bar **11**. The lever **16, 17** is rotatably mounted on a stud screw **21** in a holding plate **19** which is fixed to the sewing-machine head **4** by means of screws **20** (FIG. 7). A pin **23** is adjustably inserted in a slot **22** in the arm **17** of the lever **16, 17** and has an annular groove **24** (FIG. 8). A lever **25** and an arm **26** of a double-arm lever **26, 27** are urged towards each other by the tension of a traction spring **28**, the ends of which engage said lever **25** and arm **26** respectively. The double-arm lever **26, 27** and the lever **25** are both rotatably mounted on a stud screw **29** on the rear side of the holding plate **19**. The arm **27** of the double-arm lever **26, 27** is bent inwards towards the needle **8** and terminates in a sensing finger **30** which is located between the fork **6'** of the material-feeder foot **6** and the fork **10'** of the presser foot **10**.

The block **12** has on its rear side a projection **31** (FIG. 5) in which there is inserted a vertical pin **32**, projecting downwards, the upper end of which, on a part of its periphery, is embraced by a dog **33**. This dog is fastened by means of screws **34** onto a thrust rod **35** running parallel to the base plate **1**, the end of rod **35** adjacent the machine head being movably supported and guided in an opening **36** (FIG. 8) located in the holding plate **19**.

The other end of the thrust rod **35** nearer the machine pillar **2** (FIG. 1) is led to an engageable and disengageable transmission indicated generally at **37** and arranged close to the pillar **2** of the sewing machine on the base plate **1**. As can be seen from FIGS. 9 and 10, the opposite end of the thrust rod **35** is linked by means of a stud screw **38** to a pivot lever **39** which is mounted in the transmission casing **41** so as to be rotatable about a bolt **40**.

On the pivot lever **39** there is mounted rotatably about a pin **42** a decoupling pawl **43** which is urged in clockwise direction by the tension of a spring **44** whose vertically bent ends abut the pivot lever **39** and the pawl **43**. The lever **39** is itself under the traction of the spring **45** which the transmission in its engaged state presses the pivot lever **39** against a control cam **46** fixed on the shaft **47**, this shaft being mounted in the transmission casing **41** and passing downwardly through the base plate **1**. The shaft **47** is driven via bevel wheels **49** and **50** by a driving shaft **48** located under the base plate **1** for setting in motion a part of the material advancing device and the stitch-forming tools.

A toggle switch comprising cam **517** is swingably on a bolt **52** in the transmission casing **41**. The cam **51** can be pivoted to-and-fro by means of a handle **53** attached to it, this handle projecting through a slot **54** in the front wall of the casing **41**. The pawl **43**, which is under the action of the spring **44**, bears on the cam **51** which co-operates with a stop bolt **55** which, for this purpose, is formed with a flattened portion **56** and a nose **57** (FIG. 9). A traction spring **58** connected at one end to the casing **41** and at the other end to the cam **51** serves to hold the handle **53** in its position either to the right or to the left of the pivot **52**.

The casing **41** is screwed firmly onto the base plate **1** of the sewing machine by means of screws **59** and is covered by means of a lid **60**.

The mode of operation of the attachment may be described as follows. As can be seen from FIGS. 2, 3, 5 and 7, the material-presser foot **10** and the material-feeder foot **6** are located in their lowered positions on the stitching plate of the sewing machine, and the sensing finger **30** and the looper bar **11** are likewise in their lowered position. If after the raising of the presser foot **10** and the feeder foot **6**, as shown in FIG. 4, a resilient workpiece (which for example consists of two layers of material **61, 62**, with a resilient insert **63**, FIG. 6) is introduced into the sewing machine and the presser **10** and feeder **6** are lowered onto the workpiece, then the workpiece is compressed in the vicinity of the sewing point to the mass "*a*," see FIG. 6. The sensing finger **30** now lies likewise on the upper material layer **61**, at its depressed level, having been raised from the needle plate by the inserted material. The two-arm lever **26, 27** is thus pivoted around the stud screw **29** to a certain extent in clockwise direction (FIG. 6), and with it also the bell-crank lever **16, 17**, is moved about its pivot in clockwise direction and, under the action of the spring **28** bears with its pin **23** against the lever **25** and the arm **26** between which the pin is clamped. This movement of the lever arm **16** has raised the block **12** with the aid of its pin **15** engaging in groove **14** the block **12**.

With the raising of the block **12**, the bar **11** fixed to it is raised also, and in fact to a height which corresponds approximately to the thickness "*b*" (FIG. 6) of the workpiece. If now during the stitching the bar **11** (FIG. 8) is pivoted to-and-fro stitch by stitch whilst the needle **8** is located above it, then the thread loops **64** are formed over and around the bar **11** and are drawn off the bar with the continuous advance of the workpiece, these loops then being filled out behind the stitching point by the resilient workpiece returning to its original form.

The activation of the looper bar **11** from its position of rest indicated in dot and dash lines in FIG. 8 for the receiving of its to-and-fro swinging action under the needle **8** is effected by changing over the handle **53** (FIGS. 1 and 9) to the left into the position shown in dot-and-dash lines in FIG. 9. This action causes pawl **43** under the action of the spring **44**, to be disengaged from the nose **57** of the stop bolt **55**. Therefore the pivot lever **39**, which previously was held out of contact with the cam **46** by the pawl **43**, can comes into effective connection with the cam **46** by means of the traction spring **45**. The rotations of the driving shaft **48** of the sewing machine effect the rotation of the cam **46** via the bevel wheels **49, 50** and, with the co-operation of the traction spring **45**, a to-and-fro swinging of the pivot lever **39** results. These pivotal movements are transmitted via the thrust rod **35** which is guided into the opening **36** (FIG. 8) in the holding plate **19** and, via the coupling connections **33, 32**, are communicated to the block **12** and thereby also to the bar **11** which can now swing to and fro under the needle **8** between the two forks **6', 6''** of the material feeder **6**.

Upon the complete lifting of the presser foot **10**, as in FIG. 4, not only the material feeder foot **6**, but also the sensing finger **30** and the bar **11** are raised. In this position the double-arm lever **26, 27** carrying the sensing finger **30** is pivoted so far about the stud screw **29** because of the engagement of the presser foot **10** with the arm **27** of that lever, that the arm **26** of the lever is removed from contact with the pin **23** in the bell-crank lever **16, 17**, against the tension of spring **28**. This lever is limited in its pivotal movement as the pin **15** located in its arm **16** takes along the block **12** to its position of contact with the sewing-machine head **4**, in which position also the bar **11** reaches its highest position. The lever **25**, rotatably mounted on the pin **29** next to the double-arm lever **26, 27**, effects the lifting of the block **12** by the bell-crank lever **16, 17** under the influence of the spring **28**.

It will be noted that clamping of pin **23** between lever arms **25** and **26** affords a non-positive, yieldable connection between members **16, 17** and **26, 27** whereby a rise of the feeler member **30** will be communicated to looper bar **11** only to the extent permitted by the loops **64** so that a tearing of the thread or any undue stretching of the loops will be avoided.

The attachment according to the invention is also suitable for sewing machines of other construction, for example upright sewing machines. The sewing machines embodying the inevntion may also be provided with an apparatus for the cutting of the edges of the work-piece, which has been generally indicated at **65** in FIGS. 1 and 2.

What I claim is:

1. A sewing-machine attachment comprising a looper bar spacedly positioned above a work surface, a stationary support holding means for said bar including an elongated member extending from said support substantially perpendicularly to said surface and a mounting longitudinally slidable and angularly swingable on said member, said bar being secured to said mounting, actuating means for periodically swinging said mounting on said member whereby said bar oscillates above said surfaces, a first lever linked with said mounting and pivoted to said support at a first fulcrum, a second lever pivoted to said support at a second fulcrum spaced from said first fulcrum and enagageable at a location adjacent said bar with a workpiece advancing on said surface in a direction transverse to the oscillations of said bar, a motion-transmitting connection between said levers for varying the elevation of said bar above said surface in accordance with the thickness of said workpiece.

2. An attachment acording to claim 1 wherein said actuating means comprises a rotatable cam, link means coupled with said mounting and engageable with said cam, spring means urging said link means into engagement with said cam, decoupling means adapted to maintain said link means spaced from said cam, operating means for inactivating said decoupling means, and drive means for imparting motion to said cam.

3. An attachment acording to claim 2 wherein said link means comprises an elongated rod and a cam-engaging lever articulated to said rod, said decoupling means comprising a fixed stop and a pawl on said cam-engaging lever pivotable into engagement with said stop.

4. An attachment according to claim 3 wherein said operating means comprises a toggle member manually displaceable between a first position disengaged from said pawl and a second position in which said pawl is urged into alignment with said stop by said toggle member, said pawl being provided with resilient means tending to disalign said pawl with said stop.

5. A sewing-machine attachment comprising a looper bar spacedly positioned above a work surface, a stationary support, holding means for said bar including an elongated member extending from said support substantially perpendicularly to said surface and a mounting longitudinally slidable on said member, said bar being secured to said mounting, a first lever linked with said mounting and pivoted to said support at a first fulcrum, a second lever pivoted to said support at a second fulcrum spaced from said first fulcrum and engageable at a location adjacent said bar with a workpiece advancing on said surface, and motion-transmitting connection between said levers for varying the elevation of said bar above said surface in accordance with the thickness of said workpiece.

6. A sewing-machine attachment comprising a looper bar spacedly positioned above a work surface, holding means for said bar including an elongated support extending substantially perpendicularly to said surface and a mounting longitudinally slidable on said support, said bar being secured to said mounting, feeler means engageable at a location adjacent said bar with a workpiece advancing on said surface, and a resilient connection between said feeler means and said mounting for tending to vary the elevation of said bar above said surface in accordance with the thickness of said workpiece, said resilient connection comprising a first lever rigid with said feeler means, a second lever coupled with said mounting, an arm pivoted on said first lever, a projection on said second lever received between said first lever and said arm, and spring means interconnecting said first lever and said arm for yieldably clamping said projection therebetween.

7. An attachment according to claim 6 wherein said second lever is provided with a slot, said projection being adjustably fastened to said slot.

8. An attachment according to claim 6 wherein said second lever has a slot and a pin adjustably mounted in said slot, said mounting comprising a block having a groove engaged by said pin.

9. An attachment according to claim 6 wherein said support comprises a post having a presser foot mounted thereon, said first lever having a portion overlying said presser foot for elevating said bar upon a raising of said presser foot from a workpiece positioned between the latter and said surface.

10. A sewing-machine attachment comprising a looper bar spacedly positioned above a work surface, holding means for said bar including an elongated support extending substantially perpendicularly to said surface and a mounting longitudinally slidable and angularly swingable on said support, said bar being secured to said mounting, actuating means for periodically swinging said mounting means on said support whereby said bar oscillates above said surface, feeler means engageable at a location adjacent said bar with a workpiece advancing on said surface in a direction transverse to the oscillations of said bar, and a resilient connection between said feeler means and said mounting for tending to vary the elevation of said bar above said surface in accordance with the thickness of said workpiece, said support comprising a post having a presser foot mounted thereon, said feeler means comprising a bell-crank lever having a first extremity adjacent said presser foot and a second extremity anchored to said resilient connection, said first extremity being engageable by said presser foot for elevating said bar upon a raising of said presser foot from a workpiece positioned between the latter and said surface.

11. A sewing-machine attachment comprising a looper bar spacedly positioned above a work surface, a stationary support, holding means for said bar including an elongated member extending from said support substantially perpendicularly to said surface and a mounting longitudinally slidable on said member, said bar being secured to said mounting, a first bell-crank lever linked with said mounting at one extremity and pivoted to said support at a first fulcrum, a second bell-crank lever pivoted to said support at a second fulcrum spaced from

said first fulcrum and having an extremity engageable at a location adjacent said bar with a workpiece advancing on said surface, and a motion-transmitting connection between the other extremities of said levers for varying the elevation of said bar above said surface in accordance with the thickness of said workpiece.

12. An attachment according to claim 11 wherein said motion-transmitting connection comprises a resilient link.

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