Aug. 5, 1969 H. B. BERG 3,459,142

BAG STITCHING MACHINE

Filed Aug. 21, 1967 2 Sheets-Sheet 1

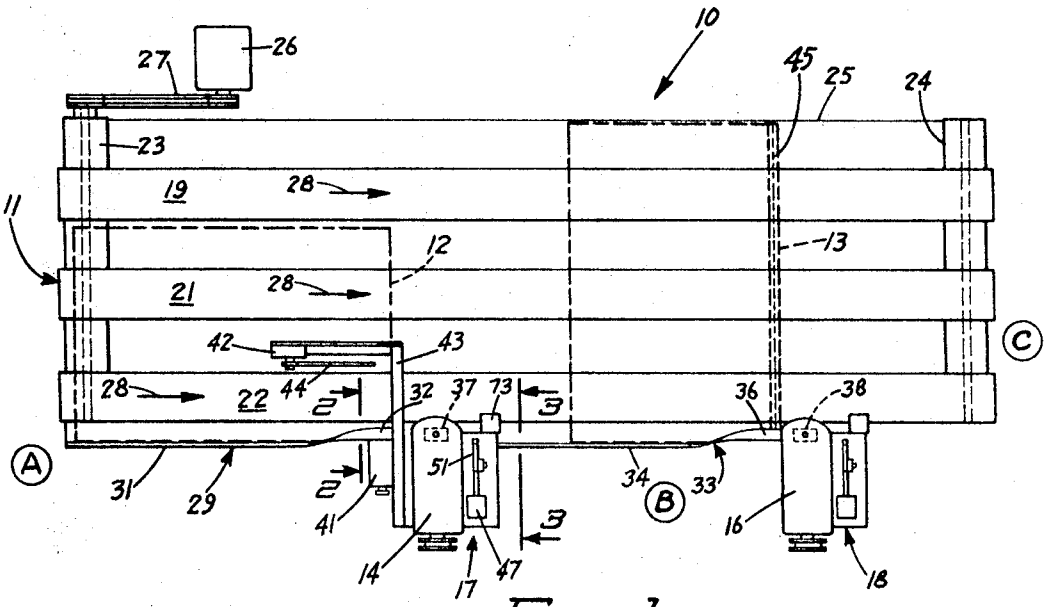

FIG. 1

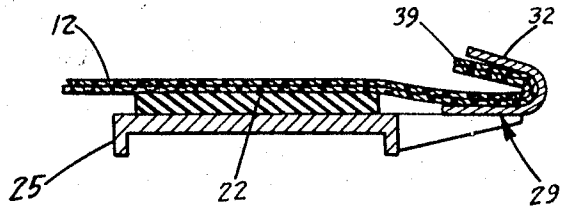

FIG. 2

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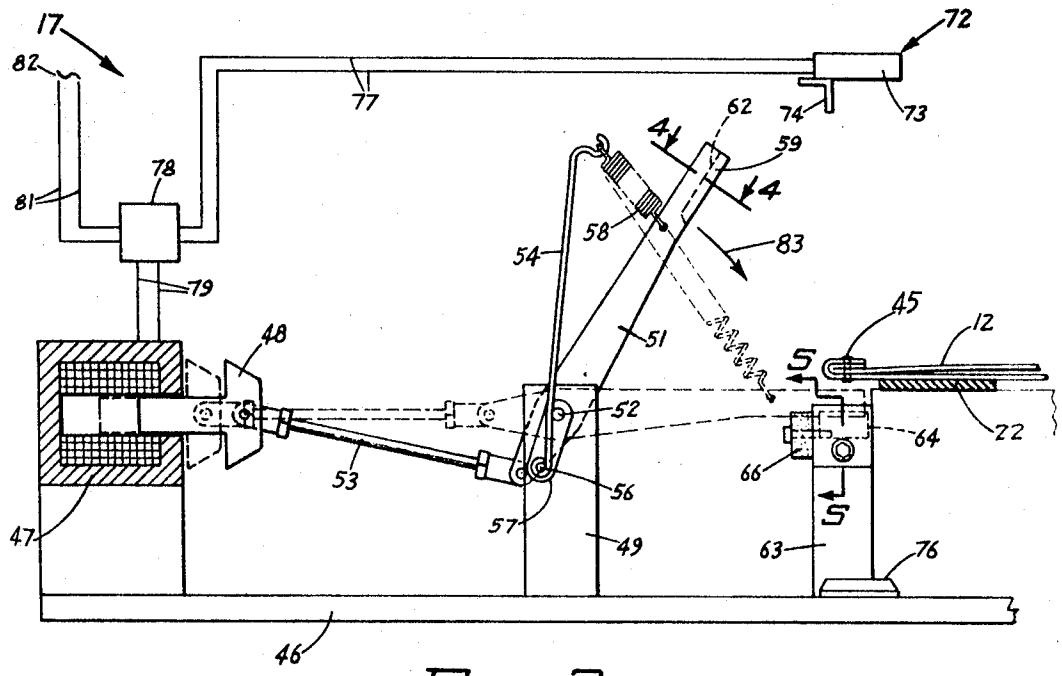

FIG. 3

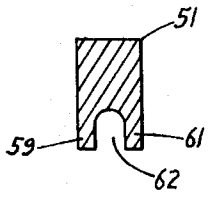

FIG. 4

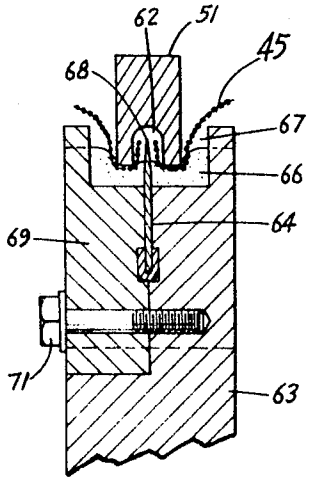

FIG. 5

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BAG STITCHING MACHINE

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U.S. Cl. 112—10 11 Claims

ABSTRACT OF THE DISCLOSURE

A machine for sewing bags having a plurality of moving endless belts for carrying unstitched bags under the sewing heads of a pair of spaced sewing machines. The bags move along a linear guide which aligns the bags with the sewing heads of the machines and folds over the side and one end of the bag as it moves under the sewing heads whereby a double thickness is sewed. An automatic thread cutting device located near the trailing sides of each sewing machine severs the thread connecting spaced bags moving on the endless belts. Each thread cutting device has a knife holding support located below the thread. The support has a removable side wall which permits the replacement of the knife and a longitudinally upwardly open recess which protects the knife as well as protects the operator of the machine from the knife. An impact resilient block mounted on the outside of the support is engaged by an arm which moves toward the knife forcing the thread into engagement with the knife. The arm is connected to a solenoid which is operable to move the arm against a force of a spring toward the knife. A light sensitive control is used to energize the solenoid when the space between adjacent bags is in alignment with the cutting knife. At this time the arm swings downwardly carrying the thread connecting the bags into engagement with the knife.

The invention broadly relates to a bag sewing machine equipped with an automatic thread cutting device. The machine has a conveyor for moving an unstitched bag in an elongated path through a guide which laps one side of the bag and feeds the lapped side under a sewing head of a sewing machine whereby the lapped side is sewed. A first thread cutting device located adjacent the trailing side of the first sewing machine automatically severs the thread connecting adjacent bags after the first bag is free of the sewing head.

The free bag is then turned ninety degrees and one end of the bag is placed against a second guide which laps the end of the bag and feeds the lapped end of the bag under the sewing head of a second sewing machine. A second thread cutting device associated with the second sewing machine automatically severs the threads of the adjacent bags as they move from the second sewing machine.

The thread cutting device has a stationary member for releasably holding a knife under the thread. A resilient impact member mounted adjacent the knife cushions the downward movement of an arm so that the arm does not strike the knife. The arm moves into a recess containing the knife thereby protecting the knife from damage while at the same time protecting the operator of the machine from the knife. The automatic thread cutting device has a light emitting and light sensitive control which senses the position of the bag on the conveyor so that when a thread connecting adjacent bags is located between thread cutting means, a motor is energized whereby the thread is severed separating adjacent bags.

In the drawings:

FIGURE 1 is a plan view of the bag stitching machine of this invention;

FIGURE 2 is an enlarged sectional view taken along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged sectional view taken along the line 3—3 showing the automatic thread cutting apparatus of this invention;

FIGURE 4 is an enlarged sectional view taken along the line 4—4 of FIGURE 3; and

FIGURE 5 is an enlarged sectional view taken along the line 5—5 of FIGURE 3.

Referring to the drawings, there is shown in FIGURE 1 the bag sewing machine of this invention indicated generally at **10**. The machine is illustrated in a diagrammatic plan with parts of the frame omitted and bags shown by broken line rectangles. Machine **10** has an elongated conveyor **11** operable to move folded material as shown by dotted rectangular bags **12** and **13** toward spaced sewing machines **14** and **16**. Sewing machines **14** and **16** are convention chain stitching machines having sewing heads **37** and **38** respectively. An automatic thread cutting device indicated generally at **17** mounted adjacent the trailing side of sewing machine **14** is operable to sever the thread connecting adjacent bags. An identical thread cutting device indicated generally at **18** mounted adjacent the trailing side of sewing machine **16** severs the thread of adjacent bags after the first or leading bag leaves the sewing head **38**.

Conveyor **11** comprises three spaced endless belts **19**, **21** and **22** trained about a drive roller **23** and an idle roller **24**. The belts slide along the top of a table **25** which forms part of a frame to support the table and the rollers above the floor. The table may be provided with intermediate support rollers for the upper runs of belts **19**, **21** and **22**. The details of the frame structure is not illustrated in the drawing as it is not essential to the description of the invention. An electric motor **26** through belt drive **27** rotates drive roller **23**. On operation of motor **26**, belts **19**, **21** and **22** move at a uniform rate of speed over table **25** in the direction of arrows **28**. The belts move at the same uniform rate of speed which is synchronized with the speed of operation of the sewing machines **14** and **16** whereby the belts aid in feeding the bags into and through the sewing heads **37** and **38**.

Extended linearly along the near side of the machine is a guide **29** having a linear upright flange **31** used to align the open side of the bag to be stitched with sewing head **37**. Upright flange **31** is turned over into a top turn flange **32** immediately forward of the sewing machine **14** so as to lap the open side **39** of the bag. As shown in FIGURE 2, the lapped side **39** of the bag is turned over by the curvature of top flange **32** so that four layers of material are stitched by the sewing head **37**.

Extended forwardly from sewing machine **16** is a guide indicated generally at **33** which is similar in construction to guide **29**. Guide **33** has a linear upright edge **34** used to align one end of bag **13** with sewing head **38**. Forward of sewing head **38**, guide **33** has an upright flange **34** turned inwardly to form a top flange **36**. In use, flange **36** laps the end of the bag before it moves under sewing head **38**.

Mounted on the frame adjacent sewing machine **14** is a control box **41** operable to vary the speed of the motors of both sewing machines **14** and **16** conjunctively with the speed of conveyor motor **26** so as to keep the operation of the sewing machines in synchronism with the movement of belts **19**, **21** and **22**. An on-off switch **42** electrically coupled to the control box functions to simultaneously turn on and off the sewing machine motors and the conveyor motor **26** in response to the posi-

tion of bag 12. Switch 42 is carried on an elevated support arm. The operating member of switch 42 is coupled to a downwardly projected feeler finger 44. The lower end of finger 44, located between belts 21 and 22 engages bag 12 as it moves under finger 44. The bag raises finger 44 to an up position to hold switch 42 in an on position. As soon as bag 12 leaves the feeler finger, it drops turning switch 42 to the off position stopping both sewing machines 14 and 16 as well as conveyor 11. The finger 44 is located forward of sewing head 37 so that the sewing machine stops with the bag in the sewing head.

In use, an operator at station A places the folded material with the open side in engagement with the linear upright flange 31 as shown by the dotted rectangular bag 12. Belts 19, 21 and 22 move the material along upright flange 31 and into engagement with top flange 32 which laps the open side of the bag and directs the lapped side into the sewing head 37. Operation of sewing head 37 continuously places chain stitch 45 along the folded edge of the material. The operator at station A successively places the folded material on the conveyor spacing the bags about 4 to 6 inches apart. Under these conditions, the adjacent bags are interconnected with a stitching or thread which is automatically cut with thread cutting device 17. The details of the operation of the thread cutting device are described hereafter.

With the thread between adjacent bags cut, an operator at station B rotates the bag ninety degrees placing one end of the bag in engagement with the upright guide flange 34. The conveyor belt moves the bag through the top turned flange 36 which laps one end of the bag and directs the lapped end to sewing head 38. Sewing machine 16 operates continuously and interconnects adjacent bags with a short section of stitching which is automatically severed by thread cutting device 18. An operator at station C removes the bags from the conveyor and stacks them for transportation to another location.

Reference to FIGURE 3, there is shown a side view of automatic thread cutting device 17 with the operative parts in the non-cut position shown in full lines and the operative parts in the cut position shown in broken lines. Cutting device 17 comprises a flat horizontal base plate 46 adapted to be adjustably mounted on the frame of the machine so that the cutting portions of the cutting device can be aligned with the thread connecting adjacent bags. Secured to the outer end of plate 46 is a motor 47, shown as a solenoid having a longitudinally movable core 48. Projected upwardly from the midportion of plate 46 is an upright support 49 carrying an angularly movable arm 51. A horizontal pivot pin 52 pivotally mounts arm 51 on the upper end of support 49. Arm 51 has a downward projection pivotally connected at one end to an adjustable length link 53 extended outwardly and pivotally connected at its opposite end to core 48. Reciprocal movement of core 48 causes angular movement of arm 51 from the full line position to the broken line position. Mounted on one side of support 49 is an upright rod 54 having an upper hooked end. The lower end of rod 54 is turned about a pin 56 laterally projected from a flat member 57 secured to the side of support 49 by pivot pin 52. A coil spring 58 is connected to the upper hooked end of rod 54 and the outer end portion of arm 51 thereby biasing arm 51 to an up non-cut or full line position. On energization of solenoid 47, the core 48 moves into the solenoid angularly pulling arm 51 in a downward direction to the cut position or dotted line position against the biasing force of spring 58. When solenoid 47 is de-energized, spring 58 quickly biases the arm in the up position.

Referring to FIGURE 4, there is shown the cross-sectional shape of the outer end of arm 51 having a generally inverted U-shape. The lower side of arm 51 has spaced downwardly projected legs 59 and 61 located on opposite sides of the longitudinal groove or space 62.

As shown in FIGURE 3, a second upright support 63 is secured to the inner end of plate 46 in alignment with arm 51. Support 63 is used to hold a knife or blade 64 in alignment with space 62 of arm 51 and to support a resilient impact block 66 for arm 51. Block 66 may be a rubber member bolted to the front side of support 63. As shown in FIGURE 6, support 63 has a recess 67 at its upper end positioning the cutting edge 68 of the blade 64 below the top of the side walls of support 63. This protects the cutting edge from damage as well as protects the operator from the cutting edge. The upper portion of support 63 has a removable side block 69 secured to the opposite portion of the support with a bolt 71. Side block 69 is used to clamp the blade 64 in the support and may be removed to replace the blade 64. To replace blade 64, bolt 71 is removed to release side block 69 whereby the blade may be laterally removed from support 62.

The automatic operation of the thread cutting device is accomplished through a light responsive control indicated generally at 72 which energizes solenoid 47 immediately after a bag passes over the blade 64. Control 72 has a light emitting and light sensitive unit 73 mounted on a frame 74 above and slightly inwardly of guide 29 so as to project a beam of light downwardly onto the bag as it moves from sewing machine 14. Located below the bag in alignment with the light emitting element of device 73 is a mirror 76 which reflects the light back to the light sensitive element of device 73 thereby triggering the device to affect an actuation of solenoid 47. As long as the bag is located between device 73 and mirror 76, the light sensitive element of the device will not be activated. Line 77 electrically connects the light emitting and light sensitive device 73 to a junction control box 78 having suitable controls to connect the solenoid 47 to a source of electric power 82. Lines 79 and 81 respectively connect the control box to solenoid 47 and the power source 82.

In use, the automatic thread cutting device 17 severs the stitching interconnecting adjacent bags while the bags are being moved by conveyor 11. The light emitting and light sensitive device 73 senses the position of the bags on the conveyor by actuating switch elements in the junction control box 78 when the space between adjacent bags is in alignment with the knife holding support 63. At this time, the light emitted from device 73 is reflected by mirror 76 back to the light sensitive element of the device whereby the switch elements in control box 78 function to connect solenoid 47 to a source of electric power. With the solenoid 47 energized, core 48 moves into the solenoid thereby angularly moving the arm downwardly in a direction of arrow 83 with impact or hammer action. As the arm 51 moves downwardly, the legs 59 and 61 of the outer end of the arm engages the stitch 45 to move the stitch downwardly over the cutting edge 68 of knife 64. The arm 51 does not engage the knife as it strikes the resilient impact block 66 preventing the arm from striking the metal of the support. Legs 59 and 61 are adjacent knife 64 locating the cutting edge 68 of knife 64 in the longitudinal groove 62 of the arm. As shown in FIGURE 5, this stretches the portion of the stitching 45 over the knife edge thereby affecting a cut of the stitching. The solenoid 47 is only energized a short period of time so that arm 51 is almost immediately retracted by the tension force of spring 58 and resilient spring of block 66 which urges the arm to its full line position as shown in FIGURE 3. In this position, the thread cutting device is ready to affect a second cutting operation to separate the next adjoining bags

The automatic thread cutting device 18 is identical in construction and function to the thread cutting device 17. Each thread cutting device can utilize conventional single edge or double edge razor blades for the cutting blade 64.

While there has been shown a preferred embodiment of the bag sewing machine and automatic thread cutting device of this invention, it is understood that various changes and omissions of the parts may be made by

those skilled in the art without departing from the invention. The invention is defined in the following claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A bag sewing machine comprising a conveyor means for moving material in an elongated path, a sewing machine having a stitching head located at one side of the conveyor means, guide means located along said one side of the conveyor means for guiding an edge portion of the material on the conveyor means to the stitching head, control means for synchronizing the operation of the conveyor means and sewing machine whereby the material moves with the conveyor at the same rate of speed as it is fed through the stitching head, a thread cutting device located adjacent the trailing side of the sewing machine for severing the thread connecting adjacent pieces of material moving with the conveying means, said thread cutting device having a knife means, stationary means holding the knife means below the thread connecting adjacent pieces of material, a movable arm having a portion engageable with the thread, motor means connected to the arm operable to drive the thread engaging portion of the arm toward the knife means, and a light responsive control for sensing the position of the material on the conveyor, said control operative to actuate said motor means to cut the connecting thread by driving the thread by means of the movable arm into engagement with the knife means.

2. The bag sewing machine of claim 1 wherein the arm portion has an inverted U-shaped cross-section aligned with the knife means whereby the arm portion has a groove for accommodating the cutting edge of the knife means.

3. The bag sewing machine of claim 2 wherein the stationary means has a recess, said knife means being located in said recess, resilient means in said recess around said knife means engageable by the U-shaped arm portion to absorb the impact of the moving arm and prevent the arm portion from engaging the knife means.

4. The bag sewing machine of claim 1 wherein the motor means is a solenoid electrically coupled to the light responsive control whereby the solenoid is energized when the connecting thread is aligned with the knife means supported below the thread, and said arm being pivotally mounted on the stationary means connected to the solenoid and movable toward the knife means to carry the connecting thread into engagement with the knife means thereby severing the thread and movable away from the knife means to allow continued movement of the material between the arm and knife means.

5. A thread cutting device for severing a thread connecting space moving members comprising: cutting means operable to sever the thread connecting spaced moving members, said cutting means having a movable portion and a stationary knife with the thread located between said movable portion and said knife, motor means connected to the movable portion of the cutting means operable to drive the movable portion toward the stationary knife, said knife having a cutting edge facing the thread to cut the thread, said movable portion having a groove to accommodate said cutting edge and control means to energize the motor means when the thread connecting the spaced moving members is between the movable portion and the stationary knife, said control means including light emitting and light sensitive means for sensing the position of the spaced moving members and operable to affect actuation of the motor means when the thread connecting the space moving members is between the movable portion and the knife whereby the cutting means severs the thread connecting the space moving members.

6. The thread cutting device of claim 5 wherein the movable portion of the cutting means is an arm pivotally mounted from movement toward and away from the stationary portion, said knife having a cutting edge facing the arm, said motor means connected to the arm to move the arm toward the cutting edge and means to bias the arm away from the knife.

7. The thread cutting device of claim 5 wherein the motor means is a solenoid electrically coupled to the light emitting and light sensitive means whereby the light sensitive means controls the energization of the solenoid.

8. The thread cutting device of claim 5 wherein the movable portion of the cutting means is an arm having an outer end with an inverted U cross-section, said stationary portion including a knife having a cutting edge facing the arm and in alignment with the midportion of the outer end of the arm, a first support pivotally mounting the arm for movement toward and away from the knife, and a second support for holding the knife.

9. The thread cutting device of claim 8 wherein the knife has a cutting edge located in the recess in the second support, said second support having a separate member holding the knife in its cutting position, said separate member being movable whereby the knife can be replaced.

10. The thread cutting device of claim 8 including resilient means secured to the second support and engageable by the arm as it moves toward the knife to absorb the impact of the moving arm.

11. The thread cutting device of claim 8 wherein the first support, the second support and the motor means are mounted on a plate.

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U.S. Cl. X.R.

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