Oct. 24, 1939. E. C. COVELL 2,176,957

TUFTING MACHINE

Filed Nov. 20, 1937 3 Sheets-Sheet 1

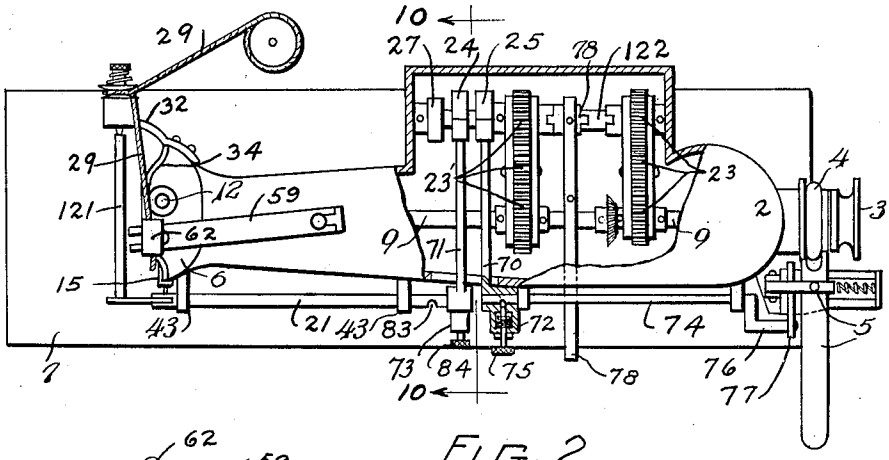


FIG. 2.

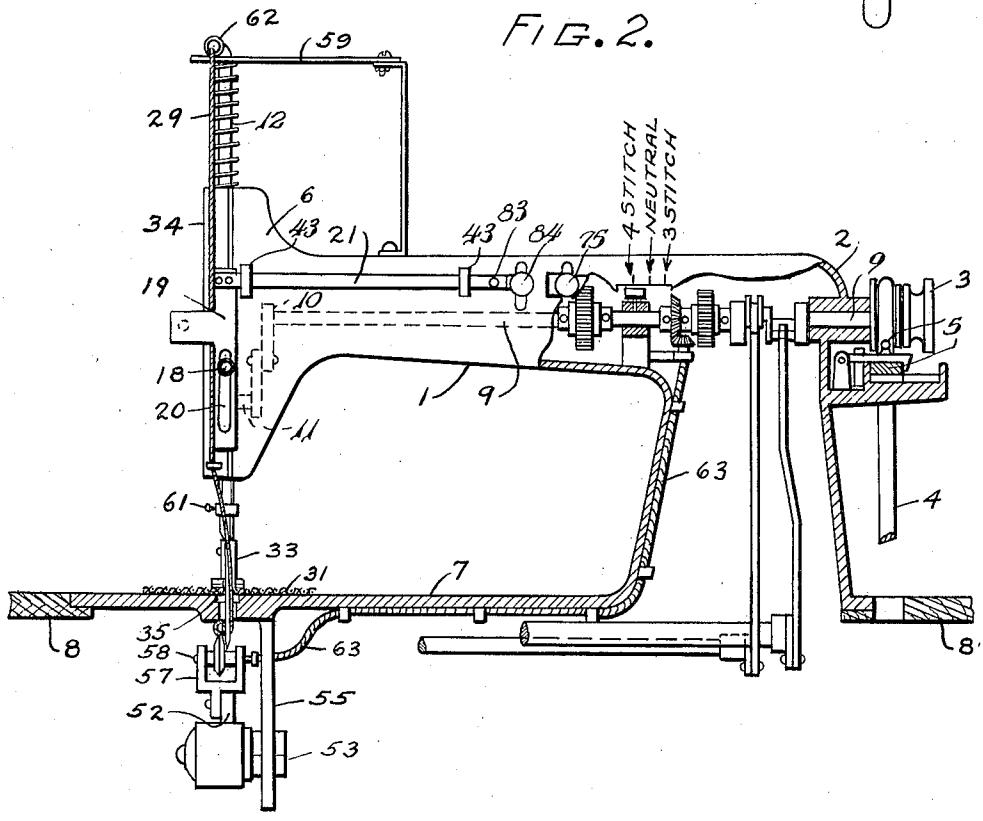


FIG. 1.

Inventor

EARL CHAPMAN COVELL.

By Howard J. Whelan.

Attorney

Oct. 24, 1939. E. C. COVELL 2,176,957

TUFTING MACHINE

Filed Nov. 20, 1937 3 Sheets-Sheet 2

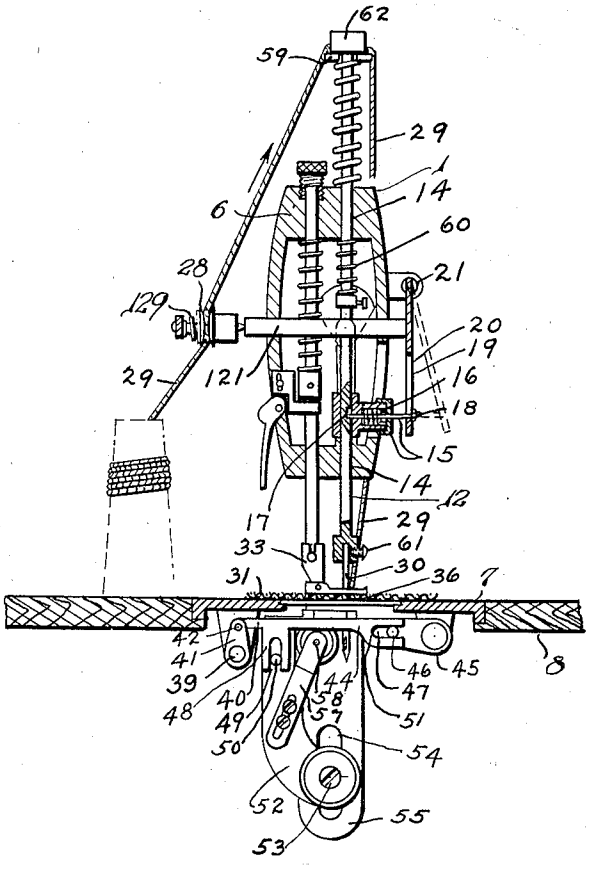


FIG. 3.

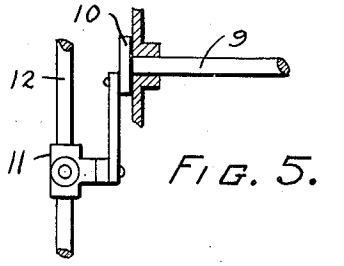


FIG. 5.

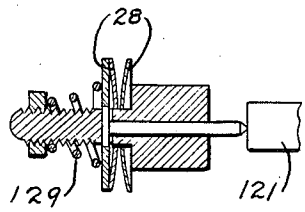


FIG. 4.

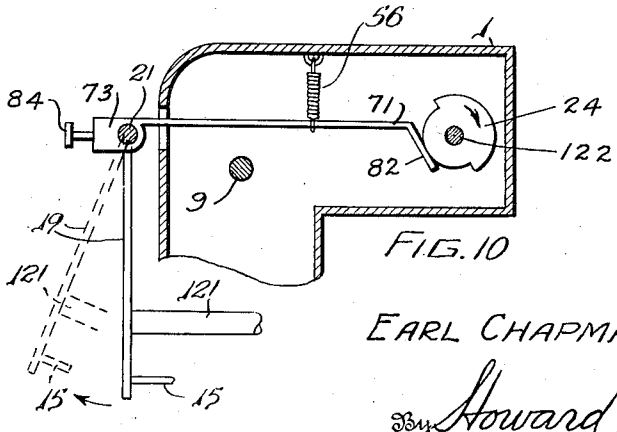


FIG. 10

Inventor

EARL CHAPMAN COVELL.

By Howard J. Whelan.

Attorney

Oct. 24, 1939. E. C. COVELL 2,176,957

TUFTING MACHINE

Filed Nov. 20, 1937 3 Sheets-Sheet 3

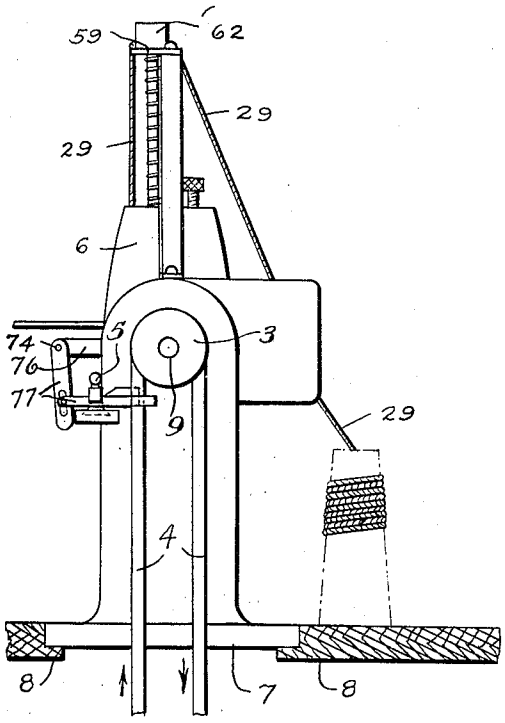


FIG. 7.

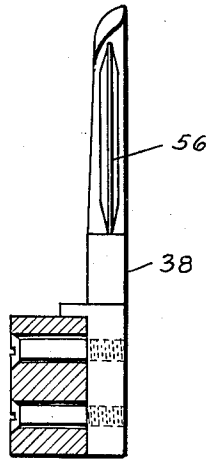


FIG. 8.

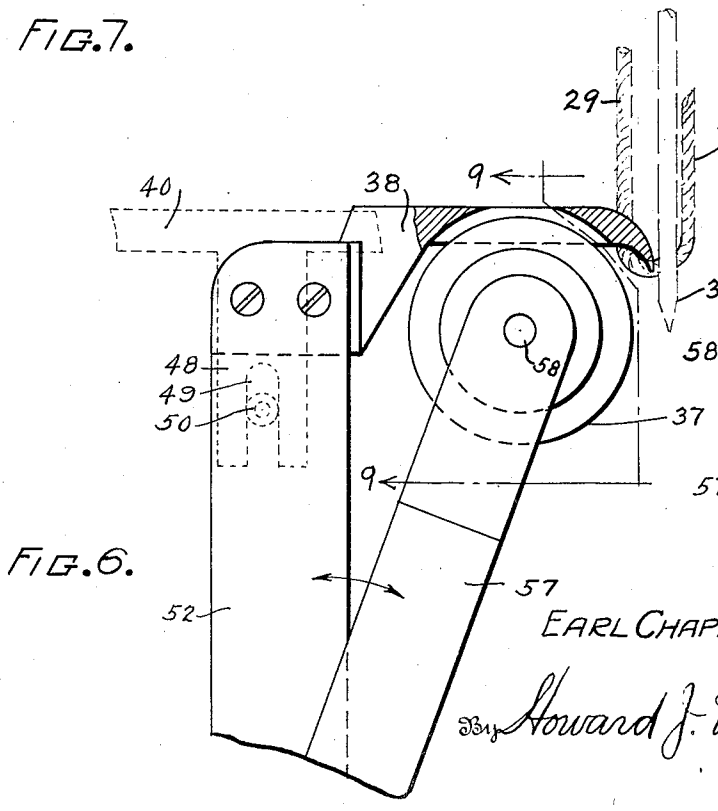


FIG. 6.

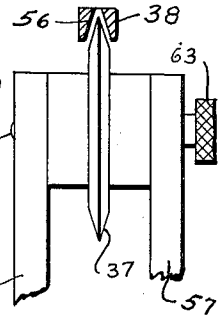


FIG. 9.

Inventor

EARL CHAPMAN COVELL.

By Howard J. Whelan.

Attorney

Patented Oct. 24, 1939

2,176,957

UNITED STATES PATENT OFFICE

2,176,957

TUFTING MACHINE

Earl Chapman Covell, Baltimore, Md., assignor of fifty per cent to Joseph Colvin, Baltimore, Md.

Application November 20, 1937, Serial No. 175,583

2 Claims. (Cl. 112—79)

This invention refers to sewing machines and more particularly to a machine that will do tufting, chenille and snowball work on cloth and fabrics. It has among its objects to provide a machine that will stitch with a thread and produce and reproduce a mechanical reproduction of hand tufting known as candlewick, chenille work, tufting, snowball work and work of a similar character on cloth; to have such a machine arranged that it will cut the loops individually as they are made and avoid bundling bunches of loops of the thread in a manner susceptible to entangling and unintentional breaking; to have such looping as may be required in the chenille or other work, done without wasting thread not required or desirable between bunches of the tufting or having such included in the work connecting the bunches and destroying the individuality desirable above and below the cloth; to have the machine adapted for producing a variable number of arrangements and designs in the doing of this type of cloth work, including the control of the length of the threads or yarn used in the loops; varying the spacing between tufts. and varying the type of tufts; to have the machine arranged that hand removal of pieces of unnecessary and undesirable pieces of thread or yarn, afterwards is avoided; to provide for the economical and profitable doing of this work on the device; and other objects that will become apparent as the invention is more fully set forth.

In this invention, the device functioning similarly to that of a conventional sewing machine in general operation will take a yarn or thread and loop it through cloth, cut each individual loop as soon as made, until the predetermined number are made, and then jump the spaces required without carrying a yarn or thread across the cloth, and proceed to repeat the stated work. In other types of machines used heretofore, the loops were cut several at a time, and the yarn was carried from one set of loops to the next across the cloth underneath. This arrangement served to cause a snagging of the yarn and the use of an extra piece of yarn, which when added for the complete coverlet amounted to a considerable length. This new invention economizes by avoiding the losses entailed in using this extra yarn and avoids the incidental objections to the loose pieces stringing from one set of loops to the next. In this invention, the yarn is cut as soon as the last loop in each set is stitched, leaving the set complete and allowing the needle to withdraw any stray amount of yarn left, for use when the needle is operated again. Since this machine permits the loops to be cut individually, it allows snowballs to be placed on the coverlet, by using a yarn of a large number of strands. The strands are spread out after the loop is cut and forms the snowball. Other features can be developed from the use of the machine by reason of its individuality in doing its work and the fact that it has no loops or loose portions to entangle same. It uses a rotary knife that is preferably running continuously, for providing a positive and efficient manner of cutting the threads and for providing a knife that will more effectively cooperate with the other mechanisms of the machine.

In the accompanying drawings are shown details of a device embodying this invention, in which:

Figure 1 is a side elevation of a sewing machine embodying this invention, portions being broken away to indicate the general construction and operation of incidental mechanisms within it,

Figure 2 is a plan view of the machine indicated in Figure 1, portions being broken away to clarify its operation, and construction,

Figure 3 is an end view in elevation at the needle mechanism, in section, of the machine,

Figure 4 is a detail in section of the tensioning device used with the machine,

Figure 5 is a detail of a portion of the needle bar used in the machine, the end cover being removed,

Figure 6 is a detail in section of the cutter mechanism and looper used in the machine,

Figure 7 is an end elevation partly in section of the cutter mechanism and looper,

Figure 8 is a view looking up under the slotted looper,

Figure 9 is a sectional elevation of cutter and looper taken along line 9—9 of Figure 6,

Figure 10 is a sectional elevation of cam and mechanism taken along line 10—10 of Figure 2.

Similar reference characters refer to similar parts throughout the drawings.

In the construction shown in the drawings 1 represents the main body of a sewing machine with its rear end 2 provided with an operating pulley 3 of the tight and loose type. For power purposes this pulley is provided with a belt 4 and a shifter 5. The needle end housing 6 is of the conventional T-shape formed internally for the functioning of the needle mechanism. The body is supported on a bed-plate 7 which sets over its box 8 hollowed out to permit the functioning of the underneath sewing machine construction. The body supports a main crank shaft 9 through

it as indicated and well known. The pulley 3 is mounted on this shaft at the rear end. The shaft also operates an eccentric or crank member 10, at the needle mechanism end portion. This crank member has a crank block 11 attached to it for providing a reciprocating vertical travel to the needle bar 12 of the machine. This block is guided suitably in the needle end housing and the needle bar 12 in holes 14 drilled in the same. A clutch casing 13 is mounted on the side of the block and arranged with a plunger 15 suitably tensioned with a spring 16 for insertion and withdrawal from a slot 17 in the needle bar. This plunger serves to tie-up the crank member with the needle bar so they will operate together, when the plunger is in the slot 17. The needle bar is released from such operation when the plunger is pulled away from the slot, and against the tension of the spring 16. The plunger has an adjustable head 18 exteriorly provided for attaching same to a control arm 19, which arm pulls the plunger out from the slot at predetermined moments, during the operation of the machine. This arm has a slot 20 in which the head portion of the plunger can reciprocate vertically as the needle bar moves up and down. This arm, however, is subject to a sidewise movement that will press on the plunger head and cause it to pull the plunger from the slot. This is done as its supporting spindle 21 rotatingly rocks counter clockwise under the action of the periodic gear mechanisms which are connected with it. The gear mechanism is supported on the sewing machine body 1 and connects with the main shaft 9 through suitable transmission gears 23 arranged to operate it. In addition, the common shaft 122 mounts cams 24, 27 and 25 that respectively cause the machine to make any determined number of stitches during its stitching period; and causes the number of stitches to be set to suit and the spaces determined to be arranged between "sets" and to shut off the needle. The cam 27, is used for continuous operation of the stitching functions of this device. The cam 24 raises the shaft piece 71 once every revolution. This raising movement is small and makes the arc of movement of the shaft piece 71 give the spindle 21 a torsional movement that is like a rocking movement. After the cam has raised and continued its rotation, the shaft piece 71 rotates through the arc backwards under the action of spring 56. An indicator handle 26 is provided for showing visually the status of the gearing. The spindle in the position indicated is operated by the cam 24. The spindle 21 is supported to the side of the body 1 by journal members 43 in a horizontal position. The spindle rotates or oscillates through a small arc and the arm 71 is raised and lowered under the action of the cam 24. As the spindle moves, it carries the rod 121 attached to the control arm 19 with it. When the direction of the movement of this rod 121 is to the right of Figure 3 and Figure 4 it allows the split pulley pieces 28 to come together under the pressure of the spring 129, and thereby tighten up on the thread 29 passing through same. This keeps the thread from feeding to the needle of the machine and prevents wasting the thread between tufts. The lower portion of the control arm 19 also carries the plunger 15 with it at the same time, against the tension of the spring 16. This pulls the plunger out of the slot 17, in the needle bar 12 and allows the bar to be stationary, and incidentally stop the needle also. When the cam 24 continues its rotation and permits the arm 71 with the spindle, control arm 19, and plunger 15 to return to the normal position, with the plunger in the slot 17, then the needle bar is reciprocated by the mechanism of the machine and the needle proceeds again in its work. During this time, the rod 121 is operated to loosen the pulley pieces 28 and permit same to release the thread 29. The needle being connected to and operating with the needle bar reciprocates and stitches through the cloth 31 on the throat plate 36. A suitable support 32 secures the pieces 28 to the cover 34. The cloth is held in position on the throat plate by the conventional clamping mechanism 33. The throat plate has the usual toothed rack 35 provided for moving the cloth along after each stitch, and functioning in a conventional manner.

The transmission section of the device with the gears 23, cams 24 and 25, and shaft 122, have the connecting parts to operate, which consists of the eccentric arms 70 and 71 which operate the intermittent shifter 72 and tensioning coupler 73, which in turn connect the oscillating bar 74 and rod 21 respectively. The oscillating bar 74 is connected by hand to the shifter 72 through the use of a manual plunger 75, and when connected turns its crank arm 76 and throws the clutch member 77 which has control of the power for operating the sewing machine. When this clutch is thrown out, it shuts off the machine and stops the same. The gears 23 are arranged to give a variable range of gear motions to the transmission and are manipulated to suit through the shifter arm 78 in a conventional manner. When the manual plunger 75 is set, the gears 23 operate until they move the shifter arm 70 and shut off the machine after the proper cycle of stitches are made by the gears 23 making the selected number of turns. The flexible shaft 63 is operated by the use of the beveled gears 79 and 80. The eccentric arm 70 is operated by the cam 25 by providing a bent piece 81 for it to contact; while the eccentric arm 71 has a similar bent piece 82 for the cam 24 to contact and operate as described. A cam 27 is provided for the purpose of giving a continuous stitching action and is connected with the arm 71 by moving same over to the slot 83 and tying it to the shaft 21 through the insertion of the plunger 84. This operation detaches the arm 71 from the cam 24.

The gear trains 23 and 23' transmit power at variable speeds from the main crank shaft 9 to the shaft 122 when the clutch, which is slidably connected to shaft 122 engages with the face of the selected gear train. This rotates the stitch timing cams 24, 25 and 27 and their respective mechanism. The main crank shaft 9 operates the parts 10 and 11 and incidentally the needle mechanism. The thread 29 feeds from the spool through the pulley pieces 28 to the ring 62 down to the eye of the needle.

Under the throat plate 36 and secured suitably to the bed plate 7 are the shafts that support the cutter wheel 37, the looper hook 38 and the incidental parts. The looper hook 38 is operated from a conventional feed rocker shaft 39 connected with the feed forked connection 40 on the head end of the machine, and actuated by the rocker 41 with its pin 42. This pin 42 secures the cross plate 44 and oscillates it back and forth on a wave-like stroke in conjunction with the rocker crank 45 with its pin 46 in the slot 47. This closs-plate is preferably of the form indicated in the drawings, having a downward pointing U-piece 48 with a slot 49 for the pin 50; and with the horizontally placed U-

piece 51. The pin 50 is mounted in the bell-crank 52 which pivots on the pin 53, and is adjustable in the slot 54 in the underpost 55. The upper portion of the bell-crank 52 holds the looper 38. The looper is slotted at 56 in order that the circular cutter may pass into same and without hitting the looper. This permits the looper and cutter wheel to work in similar planes without interfering with each other. The cutter wheel is held in place by the arm 57 in the central pin 58.

The upper portion of the needle bar has an extended flat spring member 59 secured to it to raise the bar out of the way when the yarn is cut and thereby keep the end of the latter away from the cloth after being cut. This spring is sufficiently strong to overcome the lighter coil spring 60 used to keep the needle bar down. The needle for the yarn is held to the needle bar by the collar and set screw 61. The spool of yarn is supported on the side of the body and its yarn passes through the ring 62 to the pulley tensioning device 28 to the needle. As the needle is operated by the needle bar, it raises and lowers the needle. The needle passes through the throat plate and cloth, and where the moving forward motion of the looper catches the yarn as the needle is coming up. This holds a loop of the yarn which is carried along the looper spread out by the widening sides of same until the slot 56 is reached. At this point the cutter wheel is moved on a curve into the looped yarn and by reason of its high rotation caused through the use of a flexible shaft 63, cut the loop through and leaves the ends and strands of the yarn hanging down from the face of the coverlet. The stitches continue, bent over on the inside face of the coverlet for holding the yarn to the cloth, and hanging down on the outside face. The adjustment of the looper and cutter wheel arm permits the cutter wheel and looper to place themselves where they can cut the yarn for various lengths.

This process continues until four or more stitches are made in the coverlet and the loops cut. At the cutting of the last loop, the needle bar is disconnected from the plunger by reason of the movement of the spindle 21, and raised by the action of the flat spring 59. This movement raises the needle and its yarn, the yarn in the ring 62 also rising to prevent its looping around the throat plate and cloth on the machine. At the same time, the connecting stitch is taken out of the cloth, ready for the next operation of stitching. In the meanwhile the cloth is carried by the rack the number of stitch distances selected before the next set of loops are put in the coverlet.

While but one form of the invention is indicated in the drawings, it is not desired to limit this application for patent to this particular form otherwise than limited by the prior art, as it is apreciated that other constructions could be used that would employ the same principles and come within the scope of the appended claims.

Having thus described the invention what is claimed is:

1. A sewing machine for tufting, comprising in combination, a base, a sewing machine body, a needle, a needle driving means, a disconnectible connection between the needle and driving means, a feed mechanism located in the base and body, a controlling mechanism for connecting and disconnecting the needle from said driving means for predetermined periods, a mechanism operated by the controlling mechanism for tensioning the yarn in the needle when its mechanism is disconnected from its driving means, cutter and looper mechanism and driving means therefor for looping and cutting the yarn.

2. A sewing machine for tufting, comprising in combination, a base, a sewing machine body attached to the base, a needle operating in said body, a needle driving mechanism for operating the needle, a disconnectible connection between the needle and said mechanism, a resilient member for said connection for keeping same in cooperative attachment with each other, a fabric feed mechanism disposed in said base and body, a controlling mechanism operated through the driving mechanism for operating the said resilient member so as to connect and disconnect the needle from said driving mechanism for predetermined periods, a yarn holding mechanism mounted on the body interconnected with the controlling mechanism and in the line of travel of the yarn of the machine for tensioning the latter in the needle when the controlling mechanism is disconnected from its driving mechanism, cutter and looper mechanism and operating means therefor for looping and cutting the yarn.

EARL CHAPMAN COVELL.