

May 31, 1960

R. P. GRAHAM ET AL

2,938,477

BAR-TACKER TRIMMING MECHANISMS

Filed May 22, 1957

4 Sheets-Sheet 1

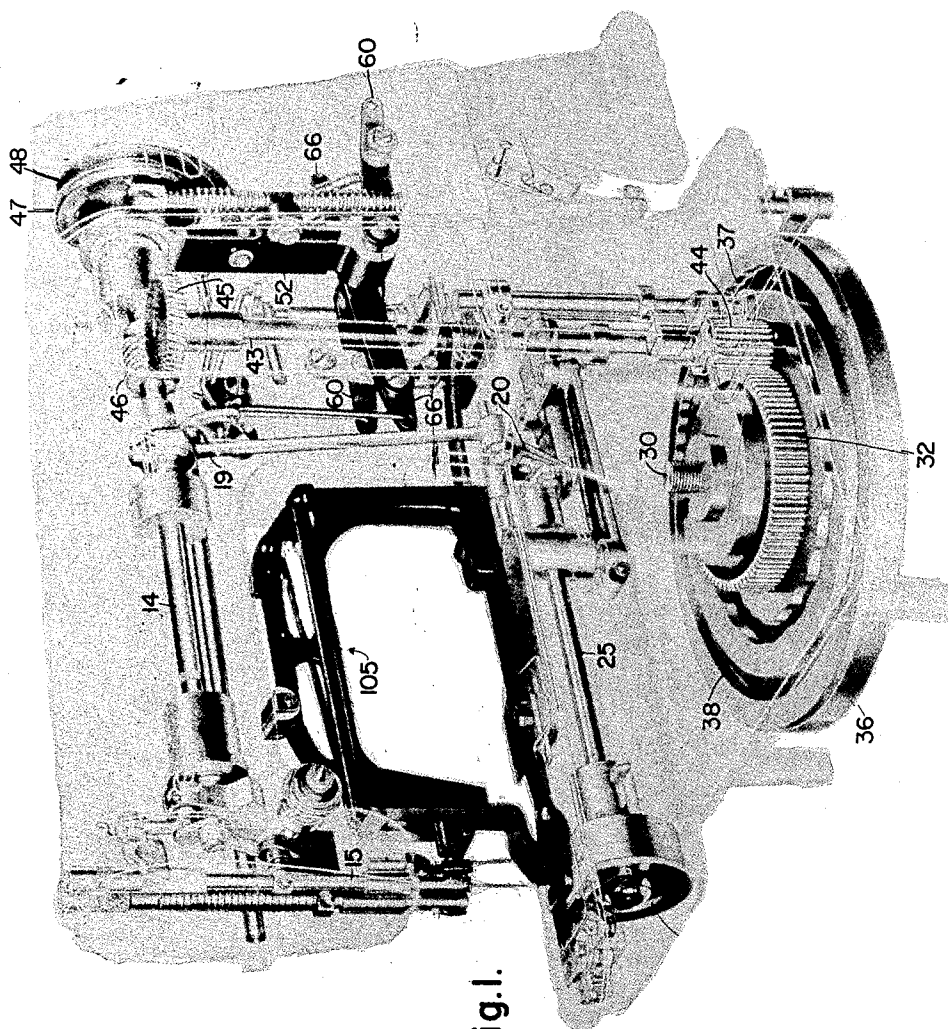


Fig. 1.

WITNESS

Nicholas Leszczak

INVENTORS

Michael F. Ivanko
Richard P. Graham

BY

Marshall J. Breen
ATTORNEY

May 31, 1960

R. P. GRAHAM ET AL

2,938,477

BAR-TACKER TRIMMING MECHANISMS

Filed May 22, 1957

4 Sheets-Sheet 2

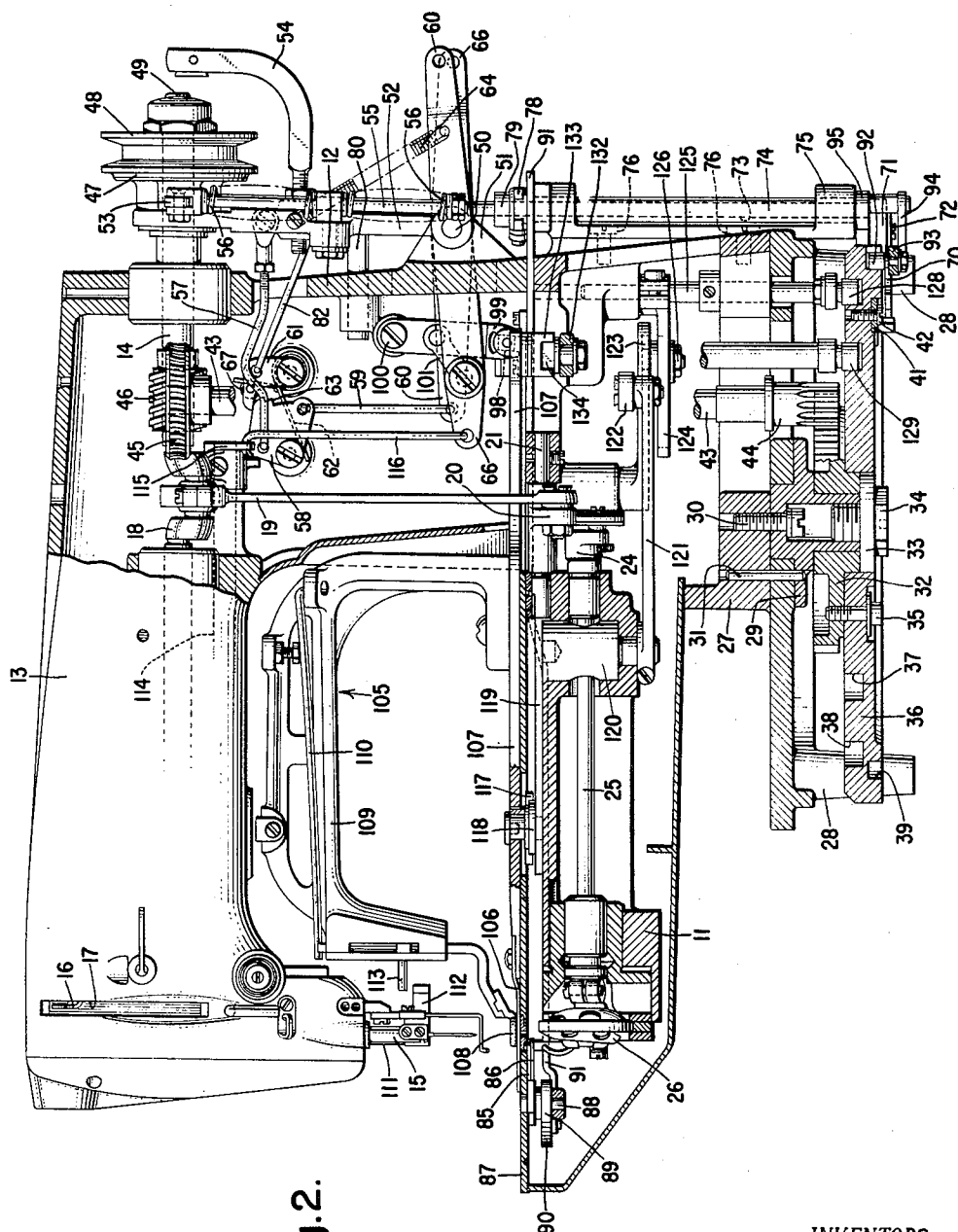


Fig. 2.

WITNESS

Nicholas L. Zyzanski

INVENTORS
Michael F. Ivanko
Richard P. Graham

BY

Marshall J. Breen
ATTORNEY

May 31, 1960

R. P. GRAHAM ET AL
BAR-TACKER TRIMMING MECHANISMS

2,938,477

Filed May 22, 1957

4 Sheets-Sheet 3

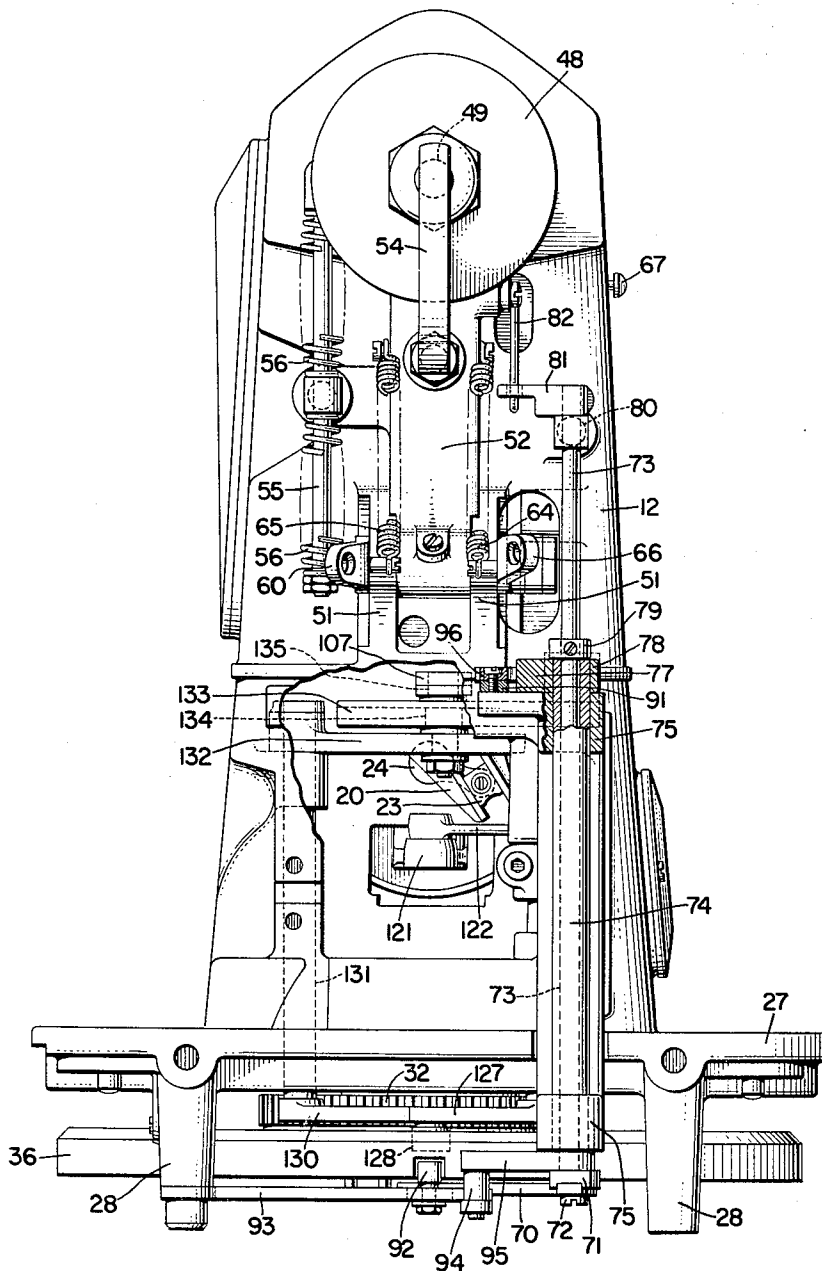


Fig. 3.

WITNESS

Nicholas Lezogh

BY

INVENTORS
Michael F. Ivanko
Richard P. Graham
Marshall J. Breen
ATTORNEY

May 31, 1960

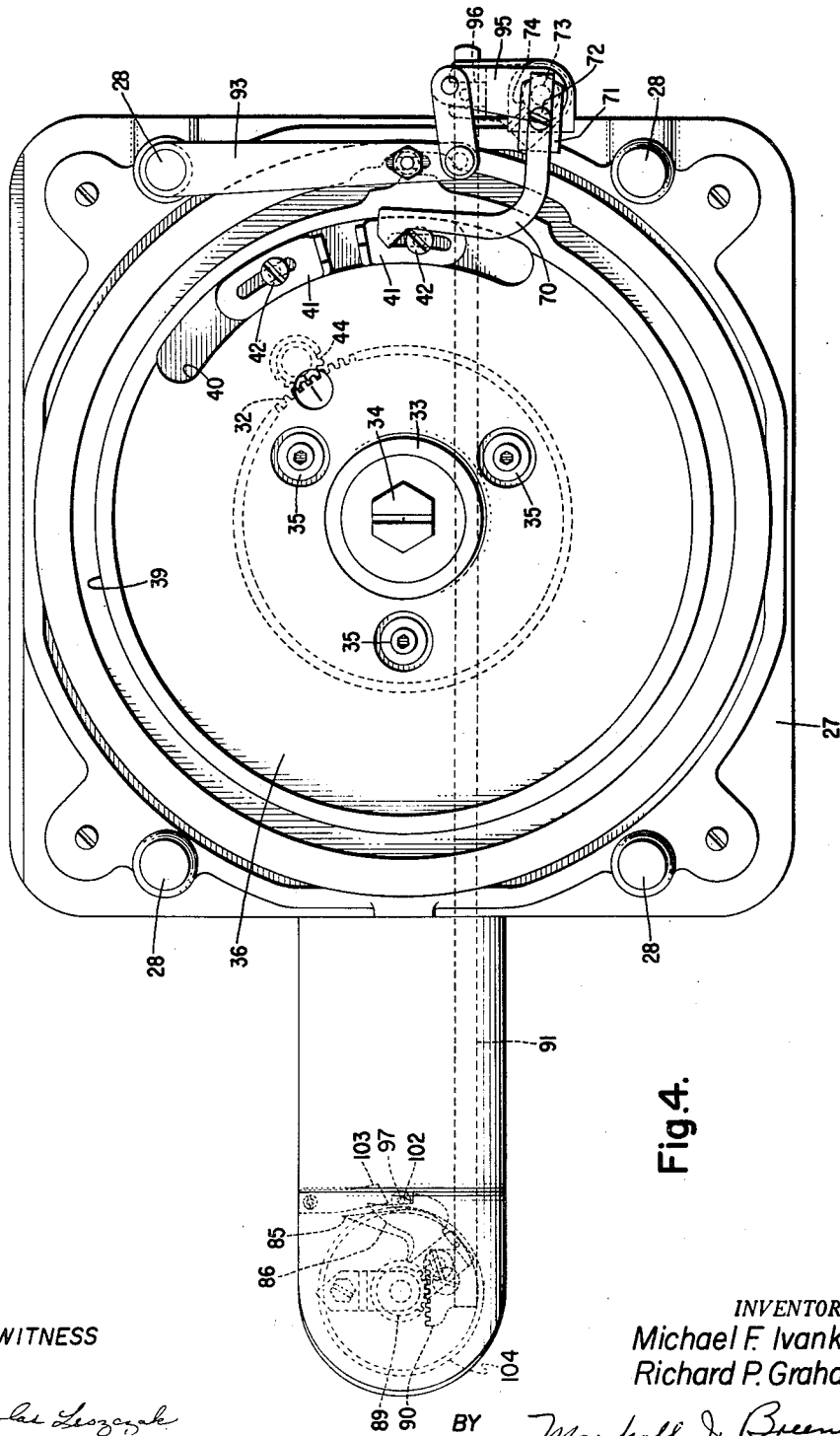
R. P. GRAHAM ET AL

2,938,477

BAR-TACKER TRIMMING MECHANISMS

Filed May 22, 1957

4 Sheets-Sheet 4



1

2,938,477

BAR-TACKER TRIMMING MECHANISMS

Richard P. Graham and Michael F. Ivanko, Stratford, Conn., assignors to The Singer Manufacturing Company, Elizabeth, N.J., a corporation of New Jersey

Filed May 22, 1957, Ser. No. 660,779

3 Claims. (Cl. 112—67)

This invention relates to cyclically operated sewing machines, and more particularly to a cyclic sewing machine of which the operation is pattern cam controlled.

It is an object of this invention to provide a single pattern cam member in a cyclically operated sewing machine for controlling the operation of a plurality of mechanisms appurtenant to the sewing machine.

It is another object of this invention to provide a single pattern cam member arranged advantageously in a sub-base beneath a cyclically operated sewing machine, and novel cam follower mechanisms carried by the sewing machine for transmitting motion derived from said pattern cam to a plurality of different mechanisms forming a part of said sewing machine.

In the accompanying drawings which illustrate a preferred form of this invention:

Fig. 1 is a front perspective view of a sewing machine having this invention applied thereto,

Fig. 2 represents a side elevational view of the sewing machine of Fig. 1 with portions of the machine frame, sub-base, and mechanism therein being broken away and illustrated in vertical cross-section,

Fig. 3 represents a rear or standard end elevational view of the sewing machine of Fig. 1; and,

Fig. 4 represents a bottom plan view of the sewing machine of Fig. 1.

Referring to the drawings, this invention is illustrated as applied to a cyclic or group stitch sewing machine; that is, a sewing machine capable of producing a tack of stitches of a predetermined number and arrangement such as would be useful in sewing on buttons, clips and the like or in producing ornamental or reinforcing tacks of stitches. The sewing machine illustrated in the drawings is of the so called "cylinder bed" variety in that the machine frame includes a free ended work supporting bed 11 of generally cylindrical cross-section on which tubular articles may be stitched conveniently. The bed is formed to extend from a hollow vertical standard 12 formed with a bracket arm 13 which overhangs the bed.

A main drive shaft 14 journaled in the bracket arm and standard is operably connected in conventional manner to reciprocate a needle bar 15 carried in the bracket arm and a needle thread take-up lever 16 which extends through a slot 17 formed in the bracket arm. A crank 18 formed on the main drive shaft 14 is embraced by a pitman 19 pivoted to a bell crank 20 journaled on a pivot pin 21 at the juncture of the standard and the bed. The bell crank 20 is bifurcated as illustrated in Fig. 2 and embraces a slide block 23 carried on a rock arm 24 fast on a bed shaft 25 journaled lengthwise in the bed. The bed shaft which is thus oscillated, drives a loop taker 26 of conventional construction arranged in the bed to cooperate with the needle in the formation of stitches.

2

The frame of the sewing machine is carried upon a sub-base 27 formed with depending feet 28 adapted to provide a stable support for the sewing machine. A flanged bearing spindle 29 is seated in an aperture in the sub-base and secured to the machine standard by means of a fastening bolt 30. A locating pin 31 prevents the bearing spindle from turning and also locks the frame sub-base and bearing spindle against relative turning movement. A gear 32 is journaled for turning on the bearing spindle and maintained on the spindle by a flanged head 33 of a fastening screw 34. Secured to the gear by fastening bolts 35 is a single pattern cam disc 36 formed in the top surface with a pair of cam grooves 37, 38 and formed in the bottom surface with a cam groove 39 and with a shallow arcuate groove 40 adapted loosely to accommodate a pair of cam lug members 41 each slotted to accommodate a fastening screw 42. The pattern cam 36 is driven by a shaft 43 journaled vertically in the standard and carrying a pinion 44 arranged in mesh with the gear 32. A worm wheel 45 fast on the top of the shaft 43 is in mesh with a worm gear 46 fast on the main drive shaft 14.

Figs. 1 and 2 illustrate a stop motion device applied to the main drive shaft 14 of the sewing machine by which a driving belt (not shown) may be established in driving relation with the main shaft or the driving relation discontinued, the stop motion device also provides for a positive interlock between the machine frame and the main drive shaft so that the sewing machine may be stopped in a predetermined position in a stitching cycle. The stop-motion mechanism is preferably of the type disclosed in the U.S. patent of Ivanko 2,721,526, Oct. 25, 1956, to which reference may be had for a more complete description thereof. For an understanding of the present invention, the following brief description of the stop motion mechanism will suffice. Fast on the main shaft 14 outside the standard of the machine frame is the hub and inside flange 47 of a two part pulley of which the outside flange 48 is freely journaled and axially shiftable on the main shaft and is provided with a thrust bearing 49. Pivoted on a pin 50 carried between lugs 51 formed on the standard is a stop motion controlling frame 52 which embraces a stop lever 53 slidably journaled on the main shaft between the frame and the hub of the pulley flange 47. Fixed to the frame 52 is an upturned arm 54 which extends to a position opposite the thrust bearing 49. When the frame 52 is swung in a clockwise direction to the position as illustrated in Fig. 2, the arm 54 is shifted away from the thrust bearing allowing the outside flange of the pulley to separate from the inside flange, thus discontinuing the driving relation between the belt and pulley. The stop lever 53 is also shifted into interlocked relation with a stop notch (not shown) in the hub of the inside flange to lock the main shaft in a definite stopped position. The stop lever 53 is pivoted to a plunger 55 which is resiliently centered with respect to the frame 52 by means of a pair of coil springs 56.

The stop motion controlling frame 52 is connected by a rod 57 to a latch block 58 pivoted within the machine frame. The latch block is connected by a rod 59 to a starting lever 60 pivoted on the pin 50 and also cooperates with a latch finger 61 pivoted within the machine frame and biased by a spring 62 to play over a pair of notches 63 formed in the latch block. The starting lever 60 may thus be used to shift the latch block in a counter clockwise direction as viewed in Fig. 1 and this movement, by way of the rod 57, will also shift the stop

3

motion controlling frame in a counter clockwise direction to release the positive interlock and to establish driving relation between a driving belt and the pulley. The stop motion frame 52 is spring biased in a clockwise direction and toward the position illustrated in Fig. 1 by a coil spring 64 extending between the frame and the starting lever 60 and a second coil spring 65 arranged between the frame and a clamp opening lever 66 carried on the pivot pin 50 as will be described hereinafter. The latch finger 61, however, constrains the frame 52 in a counter clockwise or running position. The machine will operate, therefore, until the latch finger is tripped out of both of the notches 63 of the latch block, the deepest notch corresponding to the operative or running position of the parts and the second notch corresponding to an intermediate position of the parts in which the machine will coast since the driving relation of the belt is discontinued but the stop lever 53 is not shifted against the notched hub of the fast pulley flange 47.

The latch finger 61 is also provided with a handle in the form of a pin 67 which projects outwardly through the standard wall and provides for a manual release of the latch finger.

The latch finger 61 is tripped out of the notches 63 in the latch block by the cam lug members 41 carried beneath the pattern cam disc. A cam follower arm 70 disposed in the path of travel of the cam lug members 41 is seated in the free extremity of a rock arm 71 by means of a fastening screw 72. The rock arm is fast on a rock shaft 73 arranged coaxially within a tubular rock shaft 74. These coaxially arranged rock shafts 73 and 74 being journaled substantially vertically in a bracket 75 secured at the rear of the machine standard by the screws 76. A rock arm 77 rigidly secured by the split clamp 78 to the tubular rock shaft 74 above the bracket 75 maintains the rock shaft 74 in the bracket 75, while the rock shaft 73 is supported in the tubular rock shaft by means of a collar 79. The rock shaft 73 extends upwardly to a point opposite the stop motion controlling frame 52 and is journaled near the upper extremity in a support pin 80 fixed in the machine standard. Fast on the upper extremity of the rock shaft 73 is a rock arm 81 which is operably connected by means of a rod 82 to the latch finger 61. Preferably, the pattern cam is driven in a clockwise direction as illustrated in Fig. 1, and the cam lug members 41 are disposed to engage the cam follower arm 70 in seriatim and are formed to trip the latch finger in seriatim out of the notches 63 of the latch block. Thus, after one cam lug member engages the cam follower arm, operative relation between the machine pulley and a driving belt will be discontinued and the machine will begin to coast. The second cam lug member 41 is formed to shift the cam follower arm an additional amount sufficient to trip the latch finger completely out of the notches 63 so that during the succeeding revolution of the main drive shaft of the machine will be stopped in a positive manner. By loosening the fastening screws 42 and shifting the cam lug members 41 in the arcuate groove 40 the distance between the cam lug members may be changed which will have the effect of varying the coasting period before the machine reaches the predetermined stopped position.

As best illustrated in Figs. 2 and 4, the sewing machine is provided with a thread trimming mechanism operable at the end of each stitching cycle to sever the sewing threads. The form and arrangement of the cutting surfaces of the thread cutter are substantially as disclosed in the U.S. patent of Horton 807,676, December 19, 1905, to which reference may be had for a more complete description thereof. In general the cutter comprises two pointed thread engaging fingers 85 and 86 mounted beneath the throat plate 87 on the bed 11 for turning movement together about pivot pin 88. Secured to the fingers 85 and 86 is a gear 89 which meshes

4

with a rack 90 carried on a slide bar 91 slidably mounted in the bed 11 and extending through the hollow standard. In the operation of the thread cutting mechanism, two slight increments of turning movement must be imparted to the thread engaging finger at precisely timed intervals during the final cycle of stitch formation in the group of stitches comprising the tack being formed. The first of these movements must occur as the needle is beginning to descend for the last stitch at which time the point of the thread engaging finger 85 must be moved across the path of the needle in order to engage the limb of thread leading from the bobbin within the loop taker to the work. Immediately after the needle has risen from the work for the final time in the cycle and before the take up can remove the needle thread loop from the loop taker, the thread engaging finger 86 must be moved across the path of the needle to engage the needle thread loop. The extent of these two slight movements and the timing of them is of such a critical nature that manual operation thereof would be impossible. The cam groove 39 beneath the pattern cam disc is, therefore, provided for this purpose. The cam groove 39 is tracked by a roller follower 92 carried on a lever 93 fulcrumed on one of the sub-base feet 28. A link 94 pivotally interconnects the lever 93 with the free extremity of a rock arm 95 fast on the lower end of the tubular rock shaft 74. The rock arm 77 at the upper extremity of the tubular rock shaft is bifurcated and embraces a slide block 96 pivotally secured to the slide bar 91.

When the machine reaches the stopped position as illustrated in the accompanying drawings, the pointed ends of the thread engaging fingers 85 and 86 will have been shifted across the path of the needle as is indicated by the needle aperture 97 shown in Fig. 4 and each of the fingers will have picked up a loop of thread. Further actuation of the thread trimming mechanism to sever one of the limbs of each of the thread loops is accomplished manually during operation of the clamp opening lever 66 pivoted on the standard. A slide block 98 pivotally secured to the trimmer actuating slide rod 91 is embraced by the bifurcated extremity of a lever 99 pivoted as at 100 within the standard. A link 101 pivotally interconnects the lever 99 with the clamp opening lever 66. The thread engaging finger 86 is formed with an outwardly extending knife edged projection 102 which cooperates with a ledger blade 103 fixed beneath the throat plate to sever the thread limb carried by the thread engaging finger 86. The finger 85 has a knife edge disposed in the throat plate groove 104 to sever its thread limb.

The predetermined pattern of stitches in the tack produced by this sewing machine is effected by shifting of the work fabric with respect to the axis of reciprocation of the needle. For this purpose, the machine is fitted with a work clamp, indicated generally as 105, provided with a flat lower jaw 106 carried on a base plate 107 disposed on the work supporting bed and extending within the hollow standard. An upper jaw 108 slidably vertically in an arched bracket 109 is secured to the base plate 107. A leaf spring 110 carried by the arched bracket bears downwardly on the upper jaw 108 biasing the work clamp jaws together in work gripping relation. For opening the work clamp jaws to remove and replace work fabrics therebetween, a bar 111 slidably journaled in the bracket arm behind the needle bar in Fig. 1 carries a finger 112 which underlies a pin 113 fixed in the upper jaw of the clamp. By means of a rock shaft 114 in the bracket arm, a rock arm 115 on the rock shaft and a connecting rod 116, the bar 111 is operatively connected to the clamp opening lever 66 so that depression of the free end of the lever 66 will effect opening of the work clamp jaws.

The work clamp is slidably pivoted with respect to the machine frame for freedom of movement both transversely across the work supporting bed as well as length-

5

wise along the bed so that any desired pattern of stitches may be formed. For this purpose, a slide block 117 is rigidly secured to the base plate of the clamp and confined in a slot formed in a guide block 18 freely journaled in the free end of a lever arm 119 carried on the fulcrum stud 120 journaled in the work supporting bed. Clamped to the fulcrum stud 120 beneath the bed is a lever arm 121 extending into the hollow standard where it is connected by means of a pivoted link 122 to a slotted lever 123 fulcrumed in the machine frame. Another slotted lever 124 clamped fast on a rock shaft 125 journaled in the machine standard is pivotally connected to the lever 123 by means of a connecting pivot pin 126 which is adjustably secured in the slotted lever 124 and may be positioned at any selected position along the slot therein. The rock shaft 125 extends from the standard downwardly and within the confines of the sub-base 27 and is formed with a rock arm 127 which carries a roller follower 128 arranged to track the pattern cam groove 38. Movement derived from the cam groove 38 is imparted to the clamp, therefore, in a direction transversely across the work supporting arm.

A roller follower 129 carried by a rock arm 130 fast on a rock shaft 131 journaled in the machine standard is arranged to track the cam groove 37 in the pattern cam. A slotted lever 132 clamped on the rock shaft 131 and a cooperating slotted lever 133 fulcrumed in the machine frame are interconnected by a slide block 134 which is secured in selected position along the slot in the lever 132. The slotted lever 133 has secured thereto a pivot pin 135 which is embraced by the base plate 107 of the work clamp. Movement derived from the cam groove 37, therefore, is supported to the work clamp in motion lengthwise along the work supporting arm. It will be appreciated that the type of stitch pattern will be dictated by the shape of the cam grooves 37 and 38 and that the size and proportion of any particular pattern of stitches may be changed by adjusting the pivot pins 126 and 133 which changes the mechanical advantage in the cam follower linkage.

This invention thus provides a novel arrangement of mechanism whereby the control of all of the automatically operated devices of a cyclically operated sewing machine may be derived from a single pattern cam arranged in a sub-base beneath the sewing machine frame. The present construction provides for a pattern of stitches by means of the work clamp shifting mechanism, control of the stop motion mechanism, and control of other mechanisms appurtenant to the sewing machine operation such as the thread trimming mechanism in a manner practically obviating any timing problems by virtue of a novel arrangement enabling a single pattern cam member to control all of these mechanisms.

The construction of the present invention has the advantage that it utilizes a pattern cam arranged in a sub-base beneath the sewing machine thus conveniently accommodating a pattern cam of larger size than could otherwise be used and improving the balance and vibrational characteristics of the entire sewing machine and pattern cam construction.

Another advantage of the present invention resides in the ease and efficiency with which the machine may be readied to produce a completely different tack or pattern of stitches. If the number of stitches in the tack is not to be changed other than to an even multiple of the existing number of stitches, then all that is required is that the single pattern cam 36 be removed and replaced and possibly that the upper jaw of the work clamp be changed to suit the shape of the tack. The number of stitches in the tack may also be changed quickly and easily by removing and replacing the gear—and meshing pinion—when the pattern cam is changed.

Having thus described the nature of the invention, what we claim herein is:

1. In a cyclic sewing machine having a frame includ-

6

ing a work supporting bed, a hollow standard rising from said bed, and a needle supporting bracket arm carried by said standard and disposed to overlie said bed, a drive shaft journaled in said frame, stop motion mechanism associated with said drive shaft including latch means for maintaining said stop motion mechanism out of action, a shiftable work clamp carried by said frame, and a movable thread cutting mechanism, a sewing machine supporting sub-base disposed underlying said standard and beneath said work supporting bed, a pattern cam disk journaled in said sub-base and formed on each side with cam surfaces, pattern cam actuating means extending through said hollow standard and into said sub-base operatively connecting said drive shaft with said pattern cam, cam follower mechanism carried by said sewing machine frame and extending downwardly into operative engagement with said cam surfaces at one side of said pattern cam disk, means operatively connecting said cam follower mechanism with said work clamp, a pair of pattern cam followers disposed for operative engagement with said cam surfaces at the opposite side of said pattern cam disk, a pair of rock arms each carrying one of said pair of pattern cam followers, a pair of rock shafts journaled on said sewing machine standard and depending beneath said sewing machine frame, said pair of rock arms fast one on each of said rock shafts, and means operatively connecting a first of said rock shafts to said movable thread cutting mechanism and a second of said rock shafts to said stop motion latch means.

2. In a cyclic sewing machine having a frame, a drive shaft journaled in said frame, stop motion mechanism associated with said drive shaft including latch means for maintaining said stop motion mechanism out of action, mechanism carried by said frame for cutting the sewing threads at the end of each cycle of machine operation, and a shiftable work holding clamp carried on said machine frame, a sewing machine supporting sub-base disposed underlying said standard and beneath said sewing machine frame, a pattern cam disk journaled on a substantially vertical axis beneath said sub-base and formed on each side with cam surfaces, means carried within said sewing machine frame and extending downwardly into said sub-base for drivingly interconnecting said sewing machine drive shaft with said pattern cam disk, cam follower mechanism operatively connected to shift said work clamp, said follower mechanism carried by said sewing machine frame and extending downwardly into said sub-base in operative engagement with said cam surfaces on the upper side of said pattern cam disk, a pair of concentrically arranged rock shafts journaled substantially vertically along the outside of said sewing machine frame standard and extending to a point beneath said pattern cam disk in said sub-base, a pair of cam followers fast one on each of said rock shafts beneath said pattern cam disk and extending into operative engagement with said cam surfaces on the lower side of said pattern cam, means operatively connecting a first of said rock shafts to said thread cutting mechanism and means operatively connecting a second of said rock shafts to said stop motion latch means.

3. In a sewing machine having a frame including a standard, a work supporting arm projecting from said standard, and a bracket arm extending from said standard and overhanging said work supporting arm, stitch forming mechanism carried in said work supporting arm and in said bracket arm, means for actuating said stitch forming mechanism in timed relation in the formation of stitches, a stop motion mechanism associated with said actuating means for rendering said sewing machine cycle in operation, a work shifting clamp carried on said frame, and thread trimming mechanism carried in said work supporting arm for severing the sewing threads after each cycle of stitching, means for controlling the position of said stop motion mechanism, the operation of said thread trimming mechanism, and the movement of

7

said work shifting clamp comprising, a sub-base, means on said sub-base for supporting said sewing machine frame thereon, a single pattern cam member carried in said sub-base, a plurality of cam follower means carried by said sewing machine frame and extending downwardly beneath said sewing machine frame and into said sub-base in operative engagement with said pattern cam, said cam follower means including a first cam follower means operatively connected to shift said work holding clamp, a second cam follower means operatively connected to

5

10

8

drive said thread cutting mechanism, and a third cam follower means operatively connected to control the position of said stop motion mechanism.

References Cited in the file of this patent

UNITED STATES PATENTS

1,878,091	Allen et al.	Sept. 20, 1932
1,930,637	Allen	Oct. 17, 1933
2,334,569	Lyons	Nov. 16, 1943