

May 28, 1968

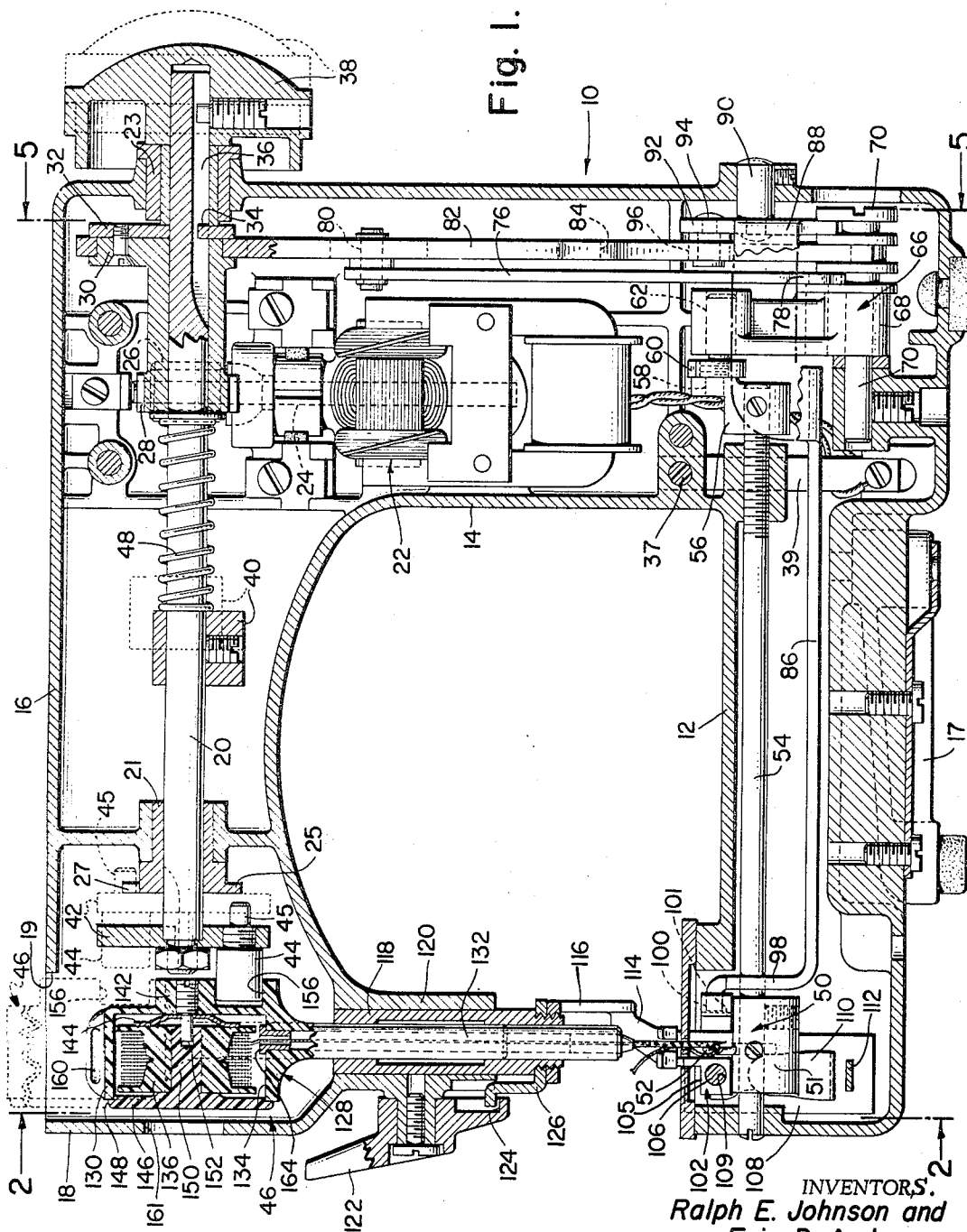
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3,385,247

SEWING MACHINES

Filed Dec. 13, 1965

3 Sheets-Sheet 1



WITNESS

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3 Sheets-Sheet 2

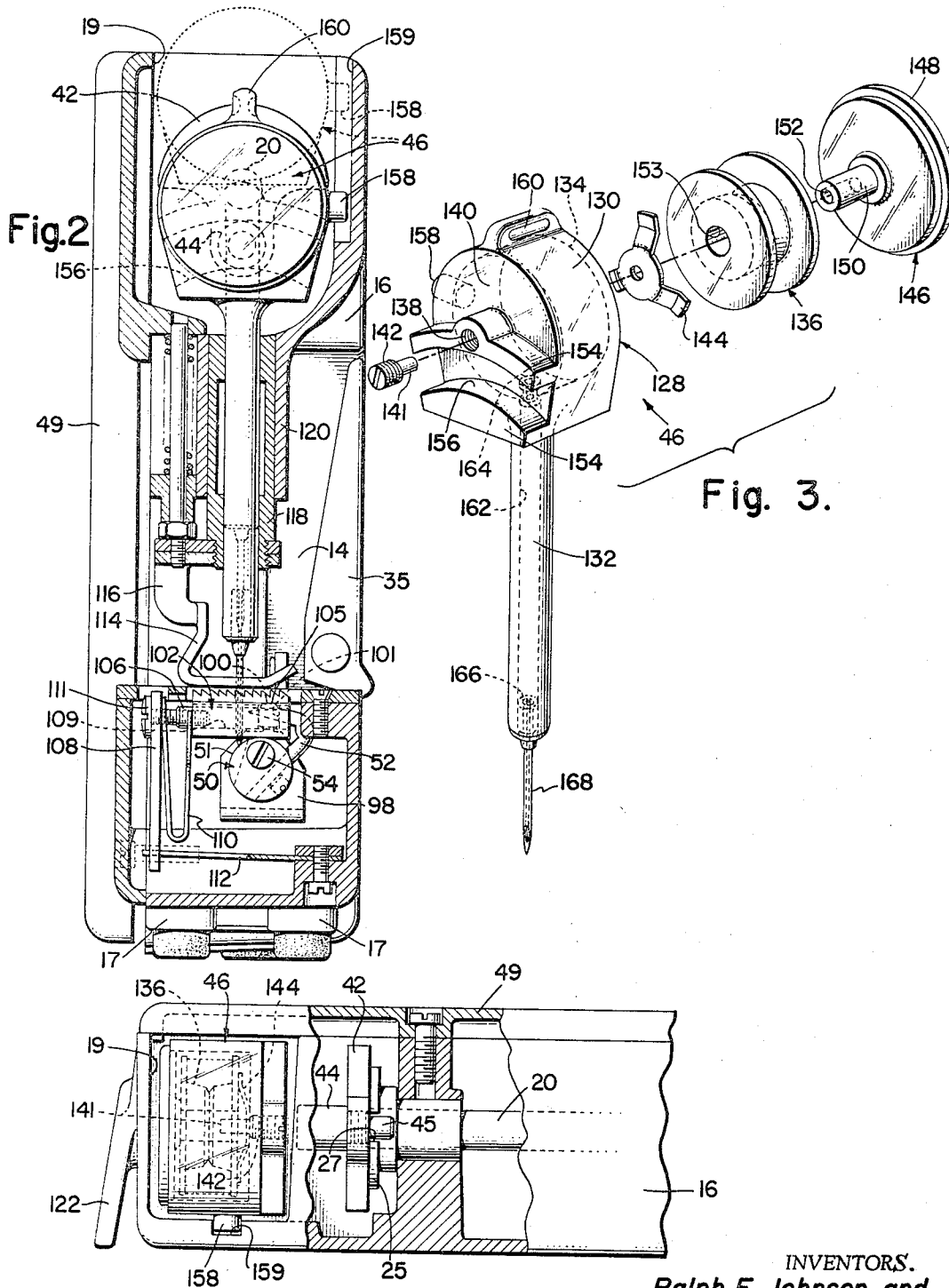


Fig. 4.

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SEWING MACHINES

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3 Sheets-Sheet 3

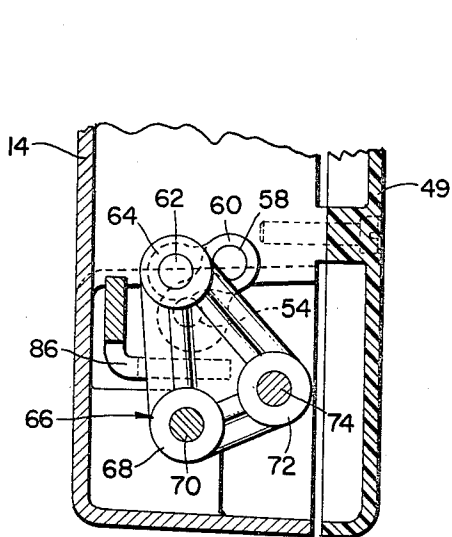


Fig. 6.

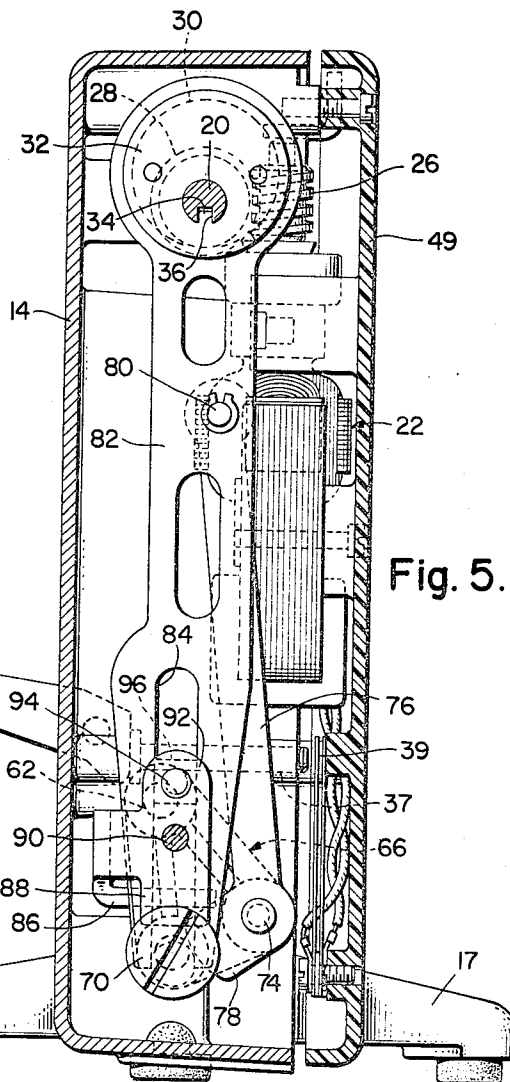


Fig. 5.

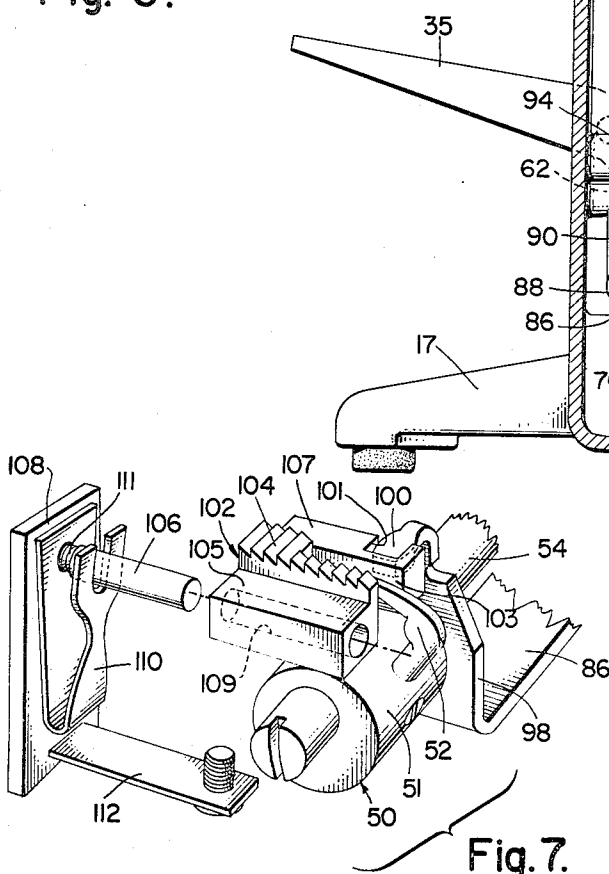


Fig. 7.

WITNESS

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3,385,247

SEWING MACHINES

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4 Claims. (Cl. 112-218)

ABSTRACT OF THE DISCLOSURE

A disposable unitary cartridge formed with a needle thread support and a needle bar and mounted in the head of a sewing machine for endwise reciprocation. The cartridge is constructed of a nonmetallic material and includes a needle thread carrying bobbin rotatably mounted thereon, the cartridge being driven in endwise reciprocation by connection to a shaft rotatably journaled in the bracket arm.

This invention relates to sewing machines and more particularly to a novel combination needle thread spool holder support and needle thread delivery apparatus.

An object of this invention is to provide an improved, compact needle thread supply support and container.

Another object of this invention is to provide a needle supply container formed as part of a disposable unitary capsule that includes a hollow sewing needle, for use with a sewing machine.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings in which:

FIG. 1 is a vertical sectional view longitudinally of a sewing machine embodying the present invention,

FIG. 2 is a sectional view taken substantially along line 2-2 of FIG. 1,

FIG. 3 is an exploded perspective view of the thread cartridge unit of the present invention,

FIG. 4 is a plan view, partly in section of the head end of the sewing machine of the present invention,

FIG. 5 is a sectional view taken substantially along line 5-5 of FIG. 1,

FIG. 6 is a sectional view of a portion of the drive mechanism for the looper and feed dog of the present invention, and

FIG. 7 is a partially exploded perspective view of a portion of the feed and looper mechanisms of the present invention.

Referring to the drawings, in which similar reference numerals identify corresponding parts throughout the several views, 10 represents a sewing machine that includes a metallic frame having a bed 12, a standard 14, and a bracket arm 16 that terminates in a head 18 having formed in the top wall thereof a cartridge opening 19. Pivotaly secured to the underside of the bed 12 are a pair of machine support legs 17. Journaled longitudinally of the bracket arm 16 in bushings 21 and 23 is a main shaft 20 which shaft is also longitudinally slidable in the bushings. The bushing 21 includes a flange 25 having an open slot 27.

The shaft 20 is driven by a compact electric motor 22 (FIGS. 1 and 5) through a motor shaft 24 having a worm 26 that meshes with a worm wheel 28 formed on one end portion of a feed eccentric 30 which is secured to a driv-

ing plate 32 having a key 34 that engages an elongated slot 36 formed in one end portion of the main shaft 20. A starter handle 35 is adapted selectively to move the free end of a plunger 37 into or out of engagement with electrical contacts 39 thereby to complete or interrupt the electrical circuit for the electric motor 22 and activate or deactivate the same. Appropriate electrical leads (not shown) provide for an electrical path to a power supply.

To the standard end of the main shaft 20 is secured a handwheel 38 while intermediate the shaft ends is secured a counterbalance collar 40. To the other or head end of the main shaft 20 is secured a crank disc 42, which carries a crank pin 44 having a stud 45 force fitted in an axial hole in the crank pin. The crank pin 44 is adapted to drive a thread supply cartridge unit 46 (described more fully hereinbelow) in vertical endwise reciprocation in the head 18. Mounted on the main shaft 20 between the counterbalance collar 40 and the end of the worm wheel 28 is a coil spring 48 which biases the main shaft axially in the bushings 21 and 23 toward the full line position as illustrated in FIG. 1. A plastic cover plate 49 is removably secured to the metallic frame of the sewing machine 10 to provide convenient access to various elements within the machine.

Turning now to a description of the looper and feed mechanisms, reference should be made to FIGS. 1, 2, 5, 6 and 7 for an understanding thereof. Secured to one end portion of a looper drive shaft 54 journaled in the bed 12 on an axis parallel to the axis of the main shaft 20 is a block 50 having an eccentric surface 51 that supports a looper blade 52. To the other end of the looper drive shaft 54 is secured a crank 56 supporting a pin 58 pivotally engaged by a link 60 in turn supporting a pin 62 that pivotally engages one arm 64 of a bell crank 66. The bell crank 66 is formed with a second arm 68 fulcrumed on a stud 70 secured to the bed 12, while a third arm 72 of the bell crank 66 is pivoted on a pin 74 secured to a link 76. The link 76, having a guide spur 78, is pivotally mounted at its upper end on a pin 80 secured to a pitman 82 which at the upper end embraces the feed eccentric 30 on the mainshaft 20. The pitman 82 is formed in its lower end portion with an elongated bifurcate slot 84 that slidably engages the fulcrum stud 70 for the bell crank 66 which arrangement helps to guide the pitman as it reciprocates. From the foregoing it will be understood that as the main shaft 20 is rotated the pitman 82 will be reciprocated, thereby rocking the bell crank 66 on the fulcrum stud 70 through the link 76. The rocking movement of the bell crank 66, in turn, will oscillate the looper drive shaft 54 through the intermediacy of the link 60 and the crank 56, thereby oscillating the block 50 and the looper blade 52.

The feed mechanism of the present invention includes a rock frame 86 extending lengthwise in the bed 12 and having beneath the standard 14 a leg 88 that is pivotally mounted on a fulcrum pin 90 secured to the rear wall of the standard 14. An upward extension 92 of the leg 88 is connected by means of a pin 94 to a slide block 96 which slide block is adapted slidably to engage the slot 84 in the pitman 82. The other end of the rock frame 86, at the free extremity of the bed, includes an upstanding leg 98 which is apertured to embrace the looper drive shaft 54 and terminates in a feed dog engaging pin 100 that engages a notch 101 in a bifurcate feed dog 102. The feed dog 102 includes a looper slot 103 formed by two arms 105 and 107 and work engaging serrations 104. The undersurface of the arms 105 and 107 are slidably engaged by the eccentric surface 51 of the block 50. The arm 105 includes a bore 109 which slidably receives a stud 106 (FIGS. 2 and 7) secured to a plate 108 by a screw 111. A bow spring 110 embracing stud 106 and screw 111

serves to bias the feed dog 102 laterally while a leaf spring 112 connected at one end to the plate 108 and at the other end to the bed 12 provides the feed dog 102 with a vertical bias thereby to insure a smooth and efficient feed dog operation. The feed mechanism as described above imparts to the feed dog 102 the standard four motion movement, i.e., upwardly into engagement with the work, then a forward work feeding motion, downwardly out of engagement with the work, followed by a return motion. Thus, the rock frame 86 drives the feed dog 102 to-and-fro through the upstanding leg 98 and the pin 100 while the rotation of the looper shaft 54 drives the feed dog up-and-down through the action of the eccentric surface 51 of the block 50 on the undersurface of the arms 105 and 107.

A spring biased presser foot 114 has integrally formed therewith a shank 116 that threadedly engages a needle-bar bushing 118, which bushing is vertically slidable in neck 120 of the head 18. The elevation of the presser foot 114 is controlled by a presser foot lifting lever 122 pivotally mounted on the neck 120. The lever 122 includes a camming surface 124 that is tracked by the arm of a plate 126 which threadedly engages the needle-bar bushing 118.

Referring now to the thread supply cartridge unit 46, it is, at the outset, emphasized that the unit is designed to be manufactured at such a minimal cost that it can be utilized as a disposable or "throw away" unit. Thus, the sewing machine operator would normally purchase a quantity of the units, each preloaded with a supply of the desired color and type of thread, and dispose of each unit when its thread supply is exhausted. However, the unit 46 may readily be adapted to allow the operator to reload the unit when the thread supply is exhausted or exchange one thread supply for another.

The thread supply cartridge unit 46 includes a unitary plastic body portion 128 formed with a bobbin container 130 and a hollow cylindrical needle-bar 132 which needle-bar is received by the needle-bar bushing 118. The bobbin container 130 has formed therein a chamber 134 adapted to receive a plastic bobbin 136. A threaded hole 138 in a wall 140 of the bobbin container 130 is engaged by a set screw 142 whose shank 141 protrudes into the chamber 134 and supports a triple legged thread tension spring 144. The bobbin 136 and spring 144 are held within the chamber 134 by a transparent plastic disc-shaped cover 146 having a flange 148 and an axle 150 formed with an axial hole 152. The bobbin 136 formed with a bore 153 is adapted to rotate freely on the axle 150 while the axle itself is supported by the shank 141 of the set screw 142 which is received by the hole 152 in the axle, as seen more clearly in FIG. 1. By turning the screw 142 in the threaded hole 138 the operator may adjust the pressure exerted by the spring 144 on the bobbin 136 thereby adjusting the tension which will resist unwinding of thread from the bobbin 136. The outer surface of the wall 140 of the bobbin container 130 has formed thereon a pair of spaced ledges 154 which define a crank pin groove 156, while the outer surface of the cylindrical portion of the bobbin container has formed on one side a horizontally extending cartridge guide pin 158, adapted to ride in a vertical groove 159 on the inside surface of the head 18, and on the top a cartridge removal finger grip 160. An opening 161 in the head 18 permits the operator to view the thread supply on the bobbin 136 through the transparent cover 146.

Extending the length of the needle-bar 132 is a cylindrical passage 162 which opens through the floor of the chamber 134 in the bobbin container 130. A small, cylindrical needle thread bushing 164 is force fitted in the upper end of the passage 162 at the openings thereof and extends into the chamber 134 while the lower end of the passage 162 is adapted to receive a needle bushing 166. The needle bushing 166, in turn, is adapted to receive a hollow needle 168.

The sewing machine 10 and the thread supply cartridge

unit 46 are designed to permit an operator to load and unload the unit with a modicum of physical and intellectual effort. Removing the unit 46 from the sewing machine 10 when the unit is settled in its operating position as shown in FIGS. 1 and 2 requires but two steps. First, the operator must grasp the handwheel 38 and rotate it until the unit is raised to its sewing cycle high point as illustrated by the dotted lines in FIGS. 1 and 2, and then pull the handwheel to the right, as viewed in FIG. 1, thereby sliding the attached shaft 20 to the right against the bias exerted by the spring 48 and removing the crank pin 44 from within the crank pin groove 156. With the crank pin 44 clear of the crank pin groove 156 the final step merely requires the operator to grasp the cartridge removal finger grip and lift the unit 46 out of the head 18 of the sewing machine 10. To load the unit 46 into the machine 10, again, the operator must grasp the handwheel 38 and rotate it until the stud 45 is axially aligned with the slot 27 in the flange 25 of the bushing 21 and pull the handwheel to the right thereby moving the crank pin 44 out of the path of the unit 46. The operator may then slide a thread loaded cartridge unit down into the head 18 until the crank pin groove 156 is aligned with the crank pin 44 at which point the handwheel 38 is released allowing the spring 48 to exert its bias on the shaft 20 through the counterbalance collar 40 whereupon the shaft 20 slides to the left, as viewed in FIG. 1, and the crank pin 44 is received by the groove 156. With the cartridge unit 46 in place the machine 10 is ready to operate. Activation of the electric motor 22 rotates the shaft 20 and the crank pin 44 thereby driving the unit 46 in endwise reciprocation in the head 18.

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

1. A sewing machine having, in combination, a frame including a bed having a work-support and an overhanging bracket arm terminating in a head, a unitary assembly mounted in said head for movement toward and away from said work-support, driving means for actuating said assembly, a thread carrying needle and a thread supply for said needle carried solely by said unitary assembly, means for directing the thread from said supply to said needle, a loop taker movably mounted on said bed and disposed to concatenate thread loops presented by said needle, means for interconnecting said needle and loop taker so that said needle and loop taker operate in timed relationship, said unitary assembly including a body portion and a hollow needle bar member extending from said body portion, said needle being hollow and secured to the free end of said hollow needle bar, said unitary assembly being removably mounted in said head, said thread directing means being disposed to direct the thread from said thread supply through said hollow needle bar and into and through said hollow needle, said unitary assembly being constructed of non-metallic material and said means for actuating said assembly including a shaft rotatably journaled in said bracket arm and means for operatively connecting said shaft to said unitary assembly to drive the unitary assembly in endwise reciprocation when said shaft is rotated.

2. A sewing machine having, in combination, a frame including a bed having a work-support and an overhanging bracket arm terminating in a head, a unitary assembly mounted in said head for movement toward and away from said work-support, driving means for actuating said assembly, a thread carrying needle and a thread supply for said needle carried solely by said unitary assembly, means for directing the thread from said supply to said needle, a loop taker movably mounted on said bed and disposed to concatenate thread loops presented by said needle, means for interconnecting said needle and loop taker so that said needle and loop taker operate in timed relationship, said unitary assembly being disposable and constructed of a nonmetallic material, said unitary assembly including a body portion and a needle bar extending from said body portion said means for actuating said

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unitary assembly including a shaft rotatably journaled in said bracket arm, a crank connected to one end of said shaft, said body portion of said unitary assembly formed with an elongated slot extending laterally relatively to said needle bar, and means for operatively connecting said crank to said elongated slot to drive said unitary assembly in endwise reciprocation as said shaft is rotated.

3. A disposable unitary needle thread supply cartridge adapted for use on a sewing machine having a frame including an overhanging bracket arm terminating in a head and a work-supporting bed disposed beneath said head, first actuating mechanism in said bracket arm and extending into said head, said first actuating mechanism including a rotatable shaft journaled in said bracket arm and a crank connected to one end thereof, said crank including a crank pin, movable loop taking means located in said bed, and second actuating means located in said bed and operatively connected to said loop taker and to said first actuating means, said disposable unitary needle thread supply cartridge comprising a body portion, a needle bar extending from said body portion and adapted to be disposed in endwise reciprocating operative relation in said head, said needle bar including means for supporting a needle and means for directing the thread from said thread supply to the needle, said unitary cartridge being constructed of a nonmetallic material and said body portion including an elongated slot extending laterally relatively to said needle bar, said needle thread cartridge being mounted in the sewing machine head to provide an operative driving connection between said slot and the crank pin so that as the shaft is rotated the crank will drive the needle thread supply unitary cartridge in endwise reciprocation in the head.

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4. A sewing machine having, in combination, a frame including a bed having a work-support and an overhanging bracket arm terminating in a head, a unitary assembly mounted in said head for movement toward and away from said work-support, driving means for actuating said assembly, said unitary assembly including a thread carrying needle and a thread supply for said needle carried solely by said assembly, means for directing the thread from said supply to said needle, a loop taker movably mounted on said bed and disposed to concatenate thread loops presented by said needle, means for interconnecting said needle and loop taker so that said needle and loop taker operate in timed relationship, a shaft journaled in said bracket arm, said shaft having a crank connected to one end thereof, means for detachably connecting said unitary assembly to said crank, said last named means including said shaft adapted to be longitudinally slidable in said bracket arm and means for biasing said shaft longitudinally of said bracket arm.

References Cited

UNITED STATES PATENTS

1,258,594	3/1918	Miller	112—169
2,506,432	5/1950	Philip	112—221 X
2,883,952	4/1959	Meloy et al.	112—221
2,988,028	6/1961	Alcamo	112—169

FOREIGN PATENTS

16,158	1909	Great Britain.
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