Feb. 20, 1962 R. E. JOHNSON 3,021,801

SPOOL WINDING MECHANISM FOR SEWING MACHINES

Filed Feb. 17, 1960

2 Sheets-Sheet 1

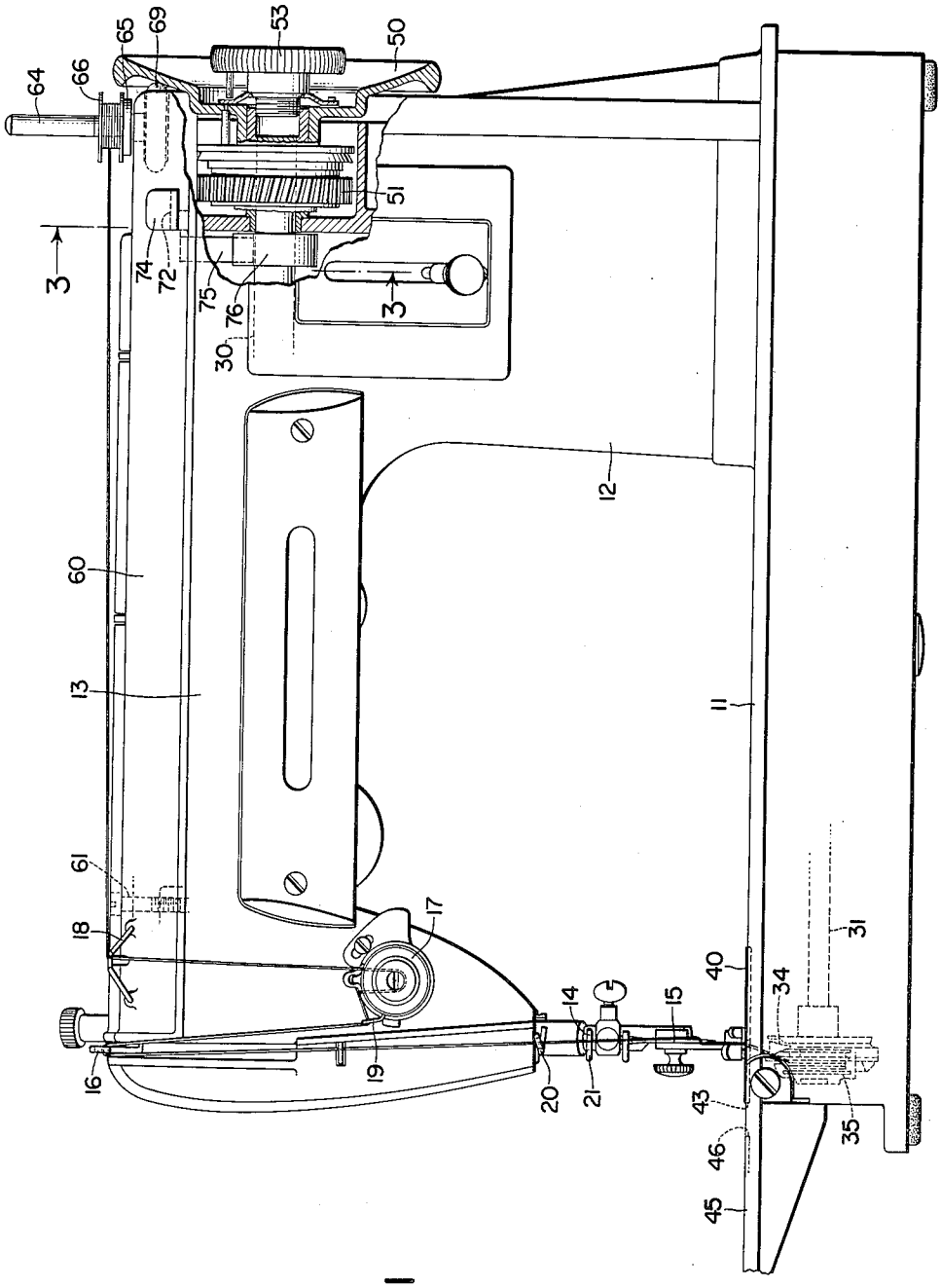


Fig. 1

WITNESS

William Martin

INVENTOR.

Ralph E. Johnson

BY

Marshall J. Breen

ATTORNEY

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2 Sheets-Sheet 2

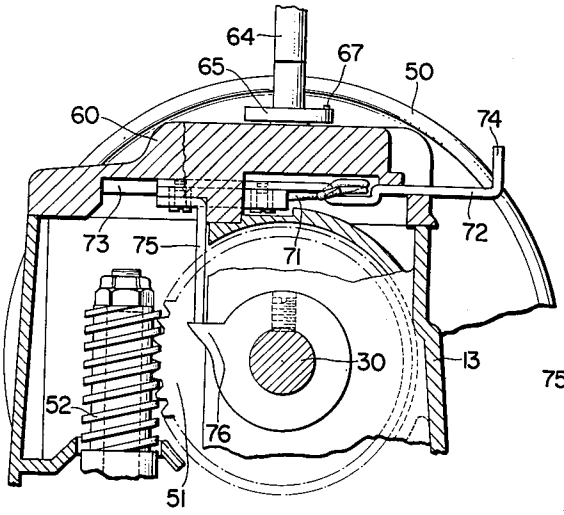


Fig.3

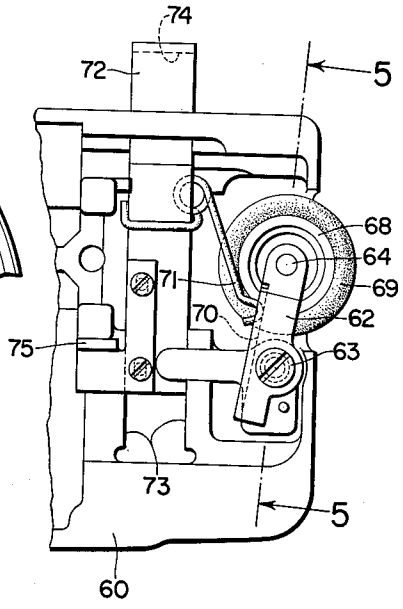


Fig.4

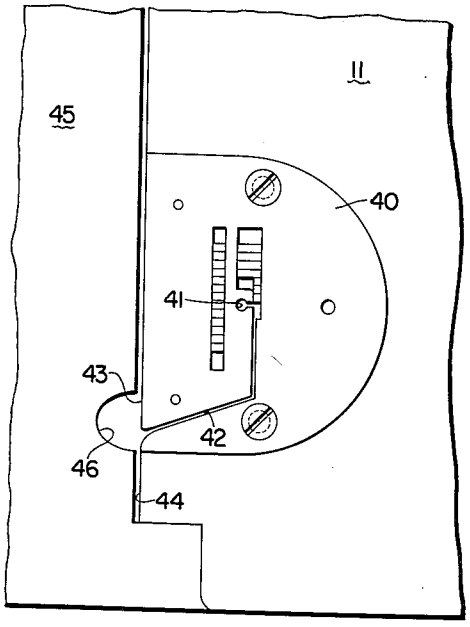


Fig.2

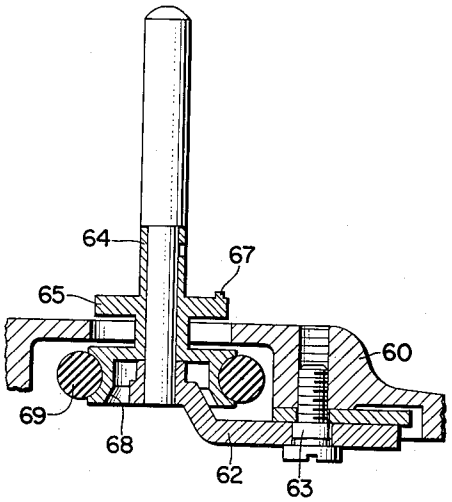


Fig.5

WITNESS

William Spratlin

INVENTOR.

Ralph E. Johnson

BY

Marshall J. Breen

ATTORNEY

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SPOOL WINDING MECHANISM FOR SEWING MACHINES

Ralph E. Johnson, Mountainside, N.J., assignor to The Singer Manufacturing Company, Elizabeth, N.J., a corporation of New Jersey

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This invention relates to lock stitch sewing machines of the type having a reciprocatory needle and a loop-taker in which is journaled a thread carrying bobbin, and more particularly, to a spool winding mechanism for winding a supply of thread for the needle directly from the bobbin in the loop-taker.

It is an object of this invention to provide a novel spool winding mechanism for lock stitch sewing machines with which seams may be stitched readily and conveniently using only a single original source of thread supply on the bobbin in the loop-taker.

It is also an object of this invention to provide a novel means for immobilizing the needle and loop-taker, during the winding of bobbin thread on a spool, in a position favorable for passage of the bobbin thread to the spool.

Another object of this invention is to provide a novel and convenient means for directing a thread from the bobbin in the loop-taker to the spool winding mechanism.

With the above and other objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

FIG. 1 represents a side elevational view of a sewing machine with a portion of the machine frame broken away and having the spool winding features of this invention applied thereto,

FIG. 2 represents an enlarged top plan view of a portion of the work supporting bed of the sewing machine of FIG. 1 at the stitching point,

FIG. 3 is an enlarged cross sectional view taken substantially along line 3—3 of FIG. 1,

FIG. 4 is an enlarged plan of a portion of the top cover of the sewing machine of FIG. 1, viewed from the underside, and illustrating the spool winding mechanism carried by the top cover plate, and

FIG. 5 is an enlarged cross sectional view of the spool supporting spindle taken substantially along line 5—5 of FIG. 4 and illustrated in the upright position as occupied in FIG. 1.

Referring particularly to FIG. 1 of the drawings, this invention is embodied in a sewing machine having a frame including a bed 11 adapted to support work fabrics during stitching. Rising from the bed is the standard portion 12 of a bracket arm 13 which overhangs the bed. Carried for substantially vertical reciprocation in the bracket arm is a needle bar 14 having secured thereto a thread carrying needle 15. Also carried in the bracket arm are needle thread controlling means including a thread take-up lever 16, a thread tensioning device 17, which is preferably of the type in which the tension applied to the thread may be adjusted and released completely, and a series of thread guides including a guide 18 for directing a thread between a source of supply and the thread tension device, a guide 19 between the tension device and the take-up, and guides 20 and 21 for directing the thread between the take-up and the needle.

An arm shaft 30 journaled in bearings in the bracket arm is operatively connected to actuate the endwise reciprocatory needle bar and the oscillating take-up lever. A driving connection (not shown) is provided between the arm shaft 30 and a bed shaft 31 for turning the bed shaft

at twice the speed of rotation of the arm shaft. Secured to the bed shaft for cooperation with the needle in the formation of lock stitches is a loop-taker 34 preferably of the type known in the art as a rotary hook in which a thread carrying bobbin 35 is journaled therein and about which bobbin the loop-taker carries successive loops of thread from the endwise reciprocating needle in the formation of lock stitches.

Referring to FIGS. 1 and 2, the sewing machine bed in the vicinity of the stitching point is preferably fitted with a replaceable throat plate 40 formed with a needle aperture 41 through which the endwise reciprocable needle penetrates. The needle aperture could be formed directly in the bed but for the considerable wear at this point which dictates the use of a replaceable throat plate. The throat plate is also formed with a thread accommodating slot 42 leading from the exposed edge 43 thereof, which is flush with the front edge 44 of the bed, to the needle aperture 41. A hinged extension 45 pivoted to the front edge of the bed may be provided to augment the work supporting surface in which case an excess recess 46 for the operators finger tips is provided adjacent to the opening of the thread accommodating slot in the throat plate.

In accordance with the objects of this invention the thread from the bobbin which is in place in the loop-taker may be directed conveniently through the thread accommodating slot and into the needle aperture in the throat plate for threading through the eye of the needle and through the thread controlling means in a direction opposite that which the thread controlling means is usually threaded.

For winding bobbin thread on a spool to be used subsequently as needle thread in the formation of lock stitches, the mechanism of this invention utilizes the hand wheel 50 of the sewing machine as a driving device. The hand wheel is journaled on the arm shaft 30 and carries a worm wheel 51 which is in mesh with a worm 52 on a motor shaft in the machine standard. A clutch device controlled by a clamping screw 53 serves for at will locking or unlocking the hand wheel on the armshaft 30. The clutch device may be of the type disclosed in detail in the United States patent of Peets No. 2,617,375, November 11, 1952, to which reference may be had for a complete understanding of its operation.

Carried in the bracket arm 13, and preferably in a top cover plate 60 which is secured on the bracket arm by screws such as that illustrated at 61, is a lever 62 which is fulcrummed on the top cover plate by a fulcrum screw 63. Journaled in one extremity of the lever on an axis parallel to that defined by the fulcrum screw is a spool supporting spindle 64. A platform 65 is formed on the spindle for sustaining a spool 66, and a locking pin 67 is provided on the platform for locking a spool for rotation therewith. A driving wheel 68 is formed on the spindle and accommodates a flexible ring 69 adapted to contact the hand wheel to drive the spindle.

The lever 62 is formed with a spring receiving track 70 extending on each side of the fulcrum screw 63. Slidable along the track is the rounded extremity of a spring finger 71 which is anchored on a control member 72 that is slidable transversely across the top cover plate in ways 73. The spring finger bears against the track 70 with substantially point contact and may be shifted selectively by the machine operator by way of a finger grip 74 on the control member to one side or the other of the fulcrum screw 63 to turn the lever and bias the spool supporting spindle selectively either into or out of engagement with the hand wheel.

Also carried by the control member 72 is a depending stop finger 75 which is shiftable into and out of operative

engagement with a stop cam lug 76 secured for rotation with the arm shaft 30. The stop finger is positioned on the control member so as to occupy a position in interlocking relation with the stop cam lug when the spring finger 71 bears against the lever 62 between the fulcrum screw 63 and the spool supporting spindle, as shown in FIG. 4, so that the actuating mechanism for the stitch forming instrumentalities will be locked in stopped position when the spool supporting spindle is in driven engagement with the hand wheel. Furthermore the stop cam lug 76 is preferably secured angularly on the arm shaft 30 in a position such that in the stopped position, the needle will occupy a raised position out of the needle aperture 41 in the throat plate.

The sewing machine of this invention may be operated in the conventional manner, that is, by threading the needle and needle thread controlling means with thread from a prewound spool and inserting a prewound bobbin in the loop-taker.

The sewing machine may also be operated in a novel manner which is highly advantageous for many sewing operations. Starting with only a prewound bobbin 35 which is inserted into the loop-taker, the operator shifts the control member 72, by means of the finger grip 74, into the position illustrated in FIGS. 3 and 4. The spring 71 will thus be shifted toward the spool supporting spindle 64 and the spindle will be moved into driving relation with the hand wheel, and the stop finger 75 will move into the path of the stop cam lug 76 on the arm shaft. The stitch forming instrumentalities of the sewing machine will thus be stopped in the position illustrated in FIG. 1 in which the needle is raised out of the needle aperture in the throat plate. The bobbin thread leading from the bobbin in the loop-taker may then be threaded through the throat plate slot 42 into the needle aperture 41 therein, through the needle eye, the thread controlling means and onto a spool 66 on the spool supporting spindle. By releasing the hand wheel clutch on loosening of the knurled clamp screw 53, the stitch forming instrumentalities will remain at rest and the hand wheel may be rotated under power to wind thread directly from the bobbin 35 on the spool 66. The stopped position of the stitch forming instrumentalities is that most favorable for the passage of thread therethrough and the thread tensioning device may also be released in a known manner, as by fully raising the presser-foot, to favor passage of thread from the bobbin to the spool.

When sufficient thread has been wound on the spool to complete the contemplated stitching operation, the control member 72 is shifted to a position in which the spring 71 contacts the track 70 at the opposite side of the fulcrum pin from the spindle 74, thus shifting the spindle out of driving relation with the hand wheel. Simultaneously, the stop finger 75 will be shifted out of the path of the stop cam lug 76 on the arm shaft. The hand wheel clutch is re-engaged by tightening the clamp screw 53 and the tension device 17 is reestablished. The sewing machine is then ready for resumption of a stitching operation in the conventional manner.

This invention provides for particularly advantageous use in domestic type sewing machines of pre-wound bobbins. Heretofore, the domestic sewing machine user has been obliged to purchase spools of thread and each sewing operation required winding of thread from a selected spool onto a bobbin and threading of the loop-taker and the needle with separate threads from the bobbin and the spool respectively. With a sewing machine built in accordance with this invention however, the operator need only insert a prewound bobbin of desired color and size thread into the loop-taker, direct the thread to the spool winding mechanism, and by operation of the machine as above described, ready the machine for sewing without the necessity for further manipulation of the thread.

A further advantage of this invention resides in the fact that since one continuous thread exists from the bobbin to the spool when the machine of this invention is in readiness for sewing operations, seams which begin at the edge of a fabric or garment will not have thread ends at the beginning of the seams.

Having thus set forth the nature of the invention, what I claim herein is:

1. In a sewing machine having an endwise work penetrating needle, a loop-taker, actuating means operatively connecting said needle and said loop-taker for cooperating movement in the formation of lock stitches, a thread carrying bobbin journaled in said loop-taker, and a drive means separable at will from said actuating means, means for rotatably supporting a thread spool on said sewing machine, an operator influenced control member shiftable into and out of a position operatively connecting said drive means to rotate said thread spool supporting means, operator influenced means for positively stopping said actuating means in a predetermined position of said needle and loop-taker, and means for rendering said positive stopping means effective, simultaneously with movement of said operator influenced control member into a position operatively connecting said drive member to rotate said thread spool supporting means.

2. In a sewing machine having an endwise work penetrating needle, a loop-taker, actuating means operatively connecting said needle and said loop-taker for cooperating movement in the formation of lock stitches, a thread carrying bobbin journaled in said loop-taker, and a drive means separable at will from said actuating means, means for rotatably supporting a thread spool on said sewing machine, an operator influenced control member shiftable into and out of a position operatively connecting said drive means to rotate said thread spool supporting means, interlock means for positively stopping said actuating means in a predetermined position of said needle and loop-taker, and means under the influence of said control member for rendering said interlock means effective when said control member is shifted into a position operatively connecting said drive member to rotate said thread spool supporting means.

3. In a sewing machine having an endwise work penetrating needle, a loop-taker, actuating means including a shaft operatively connecting said needle and said loop-taker for cooperating movement in the formation of lock stitches, a thread carrying bobbin journaled in said loop-taker, a driven wheel journaled on said shaft, and operator influenced clutch means for operatively connecting and separating said driven wheel and said shaft, means for rotatably supporting a thread spool on said sewing machine, an operator influenced control member shiftably supported on said sewing machine, means on said control member for drivingly connecting said driven wheel and said spool supporting means in one position of said control member, a cam lug fast on said shaft, and a stop finger associated with said control member and dis posed in the path of said cam lug in said one position of said control member for locking said needle and loop-taker in a predetermined position while said spool supporting member is drivingly connected with said driven wheel.

4. In a sewing machine having a frame, a work supporting throat plate carried on said frame and formed with a needle aperture therein, a needle supported in said frame at one side of said throat plate for endwise reciprocation through the needle aperture in said throat plate, a loop-taker journaled in said frame at the opposite side of said throat plate, a thread carrying bobbin journaled in said loop-taker, actuating means including a shaft operatively connecting said needle and said loop-taker for cooperating movement in the formation of lock stitches, and driving means for said actuating means, a spool supporting spindle carried on said sewing machine frame, an operator influenced control member carried on said frame, means on said control member effective in one extreme position of adjustment thereof for establishing an opera-

tive connection between said driving means and said spool supporting spindle, and means for facilitating the winding on said spool supporting spindle of thread directly from the bobbin in said loop-taker comprising a stop cam fast on said shaft, and a stop finger associated with said control member and disposed in interlocking relation with said stop cam in said one extreme position of said control member to lock said shaft in a position in which said needle is out of said throat plate aperture.

5. In a sewing machine having a frame, a work supporting throat plate carried on said frame and having an exposed edge disposed flush with one edge of said sewing machine frame, said throat plate formed with a needle aperture therein and with a thread accommodating slot extending from said, needle aperture to said exposed edge thereof, a thread carrying needle supported in said frame at one side of said throat plate for endwise reciprocation through the needle aperture in said throat plate, needle thread controlling means carried on said frame, a loop-taker journaled in said frame at the opposite side of said throat plate, a thread carrying bobbin journaled in said loop-taker, actuating means including a shaft operatively connecting said needle and said loop-taker for cooperating movement in the formation of lock stitches, and driving means for said actuating means, a spool supporting spindle carried on said sewing machine frame, an operator influenced control member carried on said frame, means on said control member effective in one extreme position of adjustment thereof for establishing an operative connection between said driving means and said spool supporting spindle, and means for facilitating the winding on said spool supporting spindle of thread directly from the bobbin in said loop-taker comprising a stop cam fast on said shaft, and a stop finger associated with said control member and disposed in interlocking relation with said stop cam in said one extreme position of said control member to lock said shaft in a position in which said needle is out of said throat plate aperture to facilitate introduction and passage of a thread from said bobbin in said loop-taker through said throat plate needle aperture, the thread carrying needle and the needle thread controlling means to said spool supporting spindle for winding thereon.

6. In a sewing machine having a frame, an actuating shaft journaled in said frame, a hand wheel journaled on said shaft, drive means operatively connected to rotate said hand wheel, and operator influenced clutch means for at will locking said shaft for rotation with said hand wheel, a spool winding mechanism comprising, a lever, means defining a fulcrum axis for said lever relatively to said sewing machine frame, a spool supporting spindle journaled on said lever at one side of said fulcrum axis for bodily movement of said spindle into and out of driving engagement against said hand wheel upon turning of said lever, spring means bearing against said lever, means for at will shifting said spring means into engagement with said lever on a selected side of said lever fulcrum axis, said last named means including an operator influenced control member shiftably supported on said sewing machine

frame, means on said control member supporting said spring means for movement therewith, and interlock means on said control member and on said shaft providing a predetermined stop position of said shaft when said control member occupies a position in which said spring means biases said spool supporting spindle into driving engagement with said hand wheel.

7. In a sewing machine having a frame including a bed and a bracket arm overhanging said bed, a thread carrying needle carried for endwise reciprocation in said bracket arm, a loop-taker journaled in said bed, a thread carrying bobbin journaled in said loop-taker actuating means including an armshaft journaled lengthwise in said bracket arm operatively connecting said needle and said loop-taker for cooperating movement in the formation of lock stitches, a hand wheel journaled on said armshaft, means for driving said hand wheel, and clutch means for at will locking said arm shaft for turning movement with said hand wheel, means for obtaining a supply of needle thread from said bobbin in said loop-taker comprising, a lever, means defining a fulcrum axis for said lever relatively to said bracket arm, a spool supporting spindle journaled on said lever at one side of said fulcrum axis for bodily movement of said sprindle into and out of driving engagement with said hand wheel upon turning of said lever, a track formed along one side of said lever, said track extending on both sides of said fulcrum axis, an operator influenced slide member confined for movement across said bracket arm adjacent to that side of said lever, spring means carried by said control means and bearing against said lever track, a stop cam fast on said arm shaft, and a stop finger carried by said slide member and disposed in the path of said stop cam when said slide member is shifted to position the point of spring contact along said lever track between said fulcrum axis and said spool supporting spindle.

8. A sewing machine as set forth in claim 7 in which said stop cam and said stop finger are timed to lock said arm shaft in stopped position with the needle in raised position of reciprocation.

9. A sewing machine as set forth in claim 8 in which the bed is formed with a needle aperture for penetration by the needle in cooperating with the loop-taker in the formation of lock stitches, and the bed is also formed with a slot terminating at one end at said needle aperture and at the other end at an edge of said bed for convenient accommodation of a thread from said bobbin in said loop-taker through said needle aperture and to said needle.

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