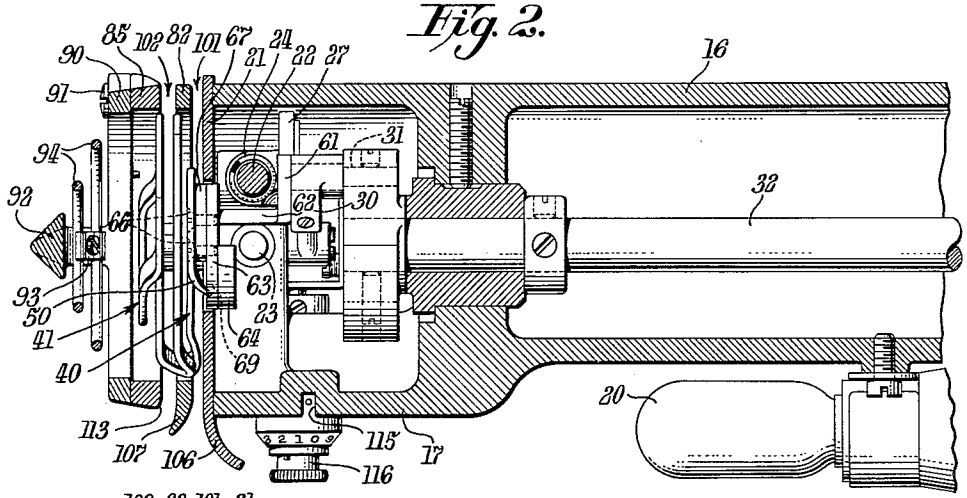
Aug. 23, 1955 E. O. MAYER 2,715,883

ROTARY THREAD TAKE-UPS FOR SEWING MACHINES

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Fig. 2.



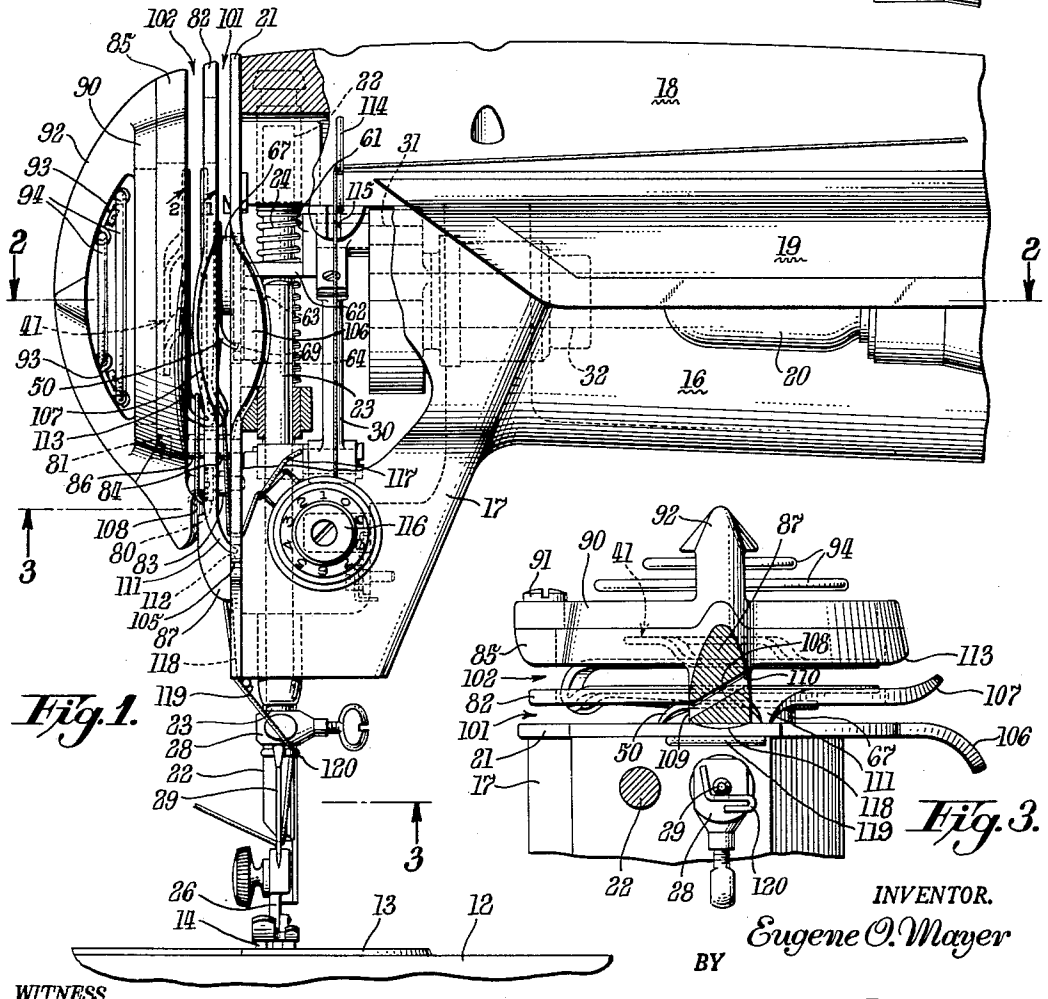


Fig. 1.

Fig. 3.

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ROTARY THREAD TAKE-UPS FOR SEWING MACHINES

Filed March 23, 1953 3 Sheets-Sheet 2

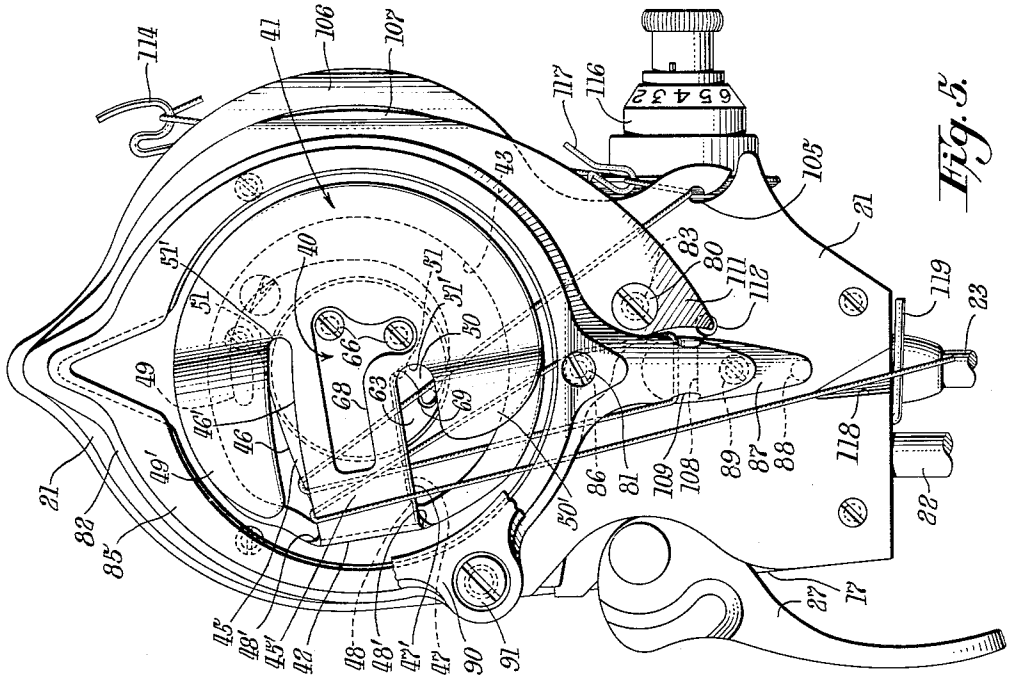


Fig. 3.

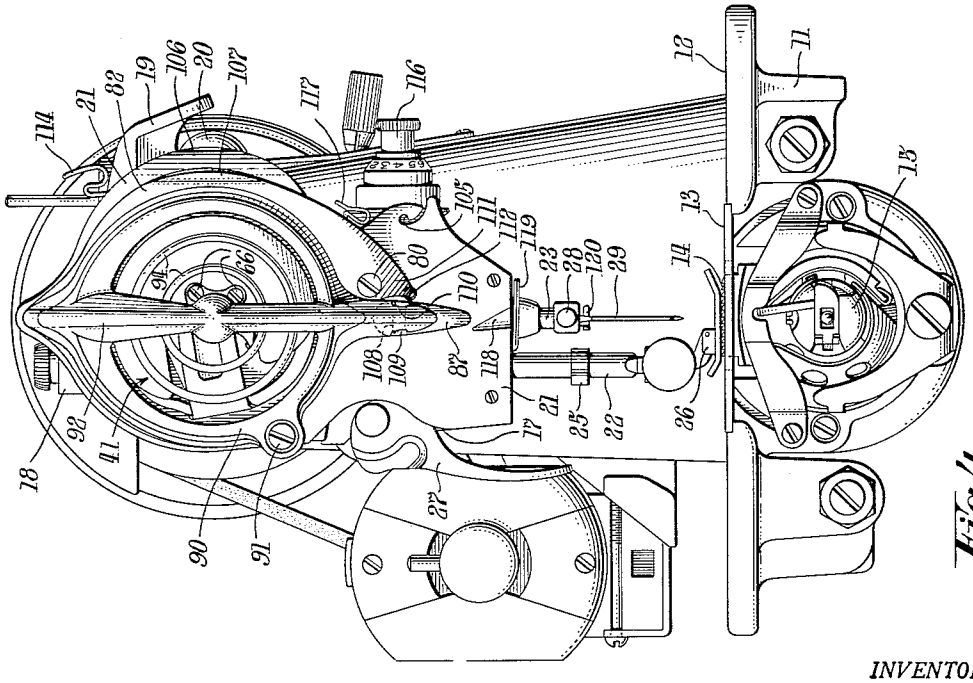


Fig. 4.

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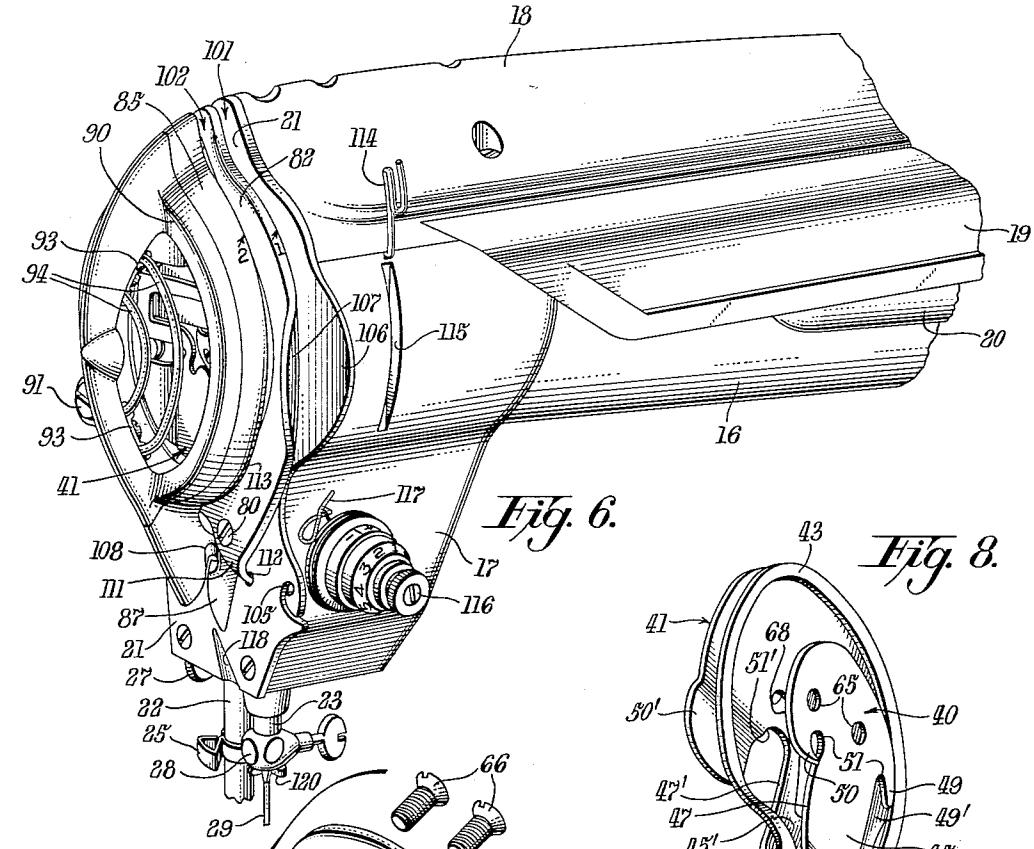


Fig. 6.

Fig. 8.

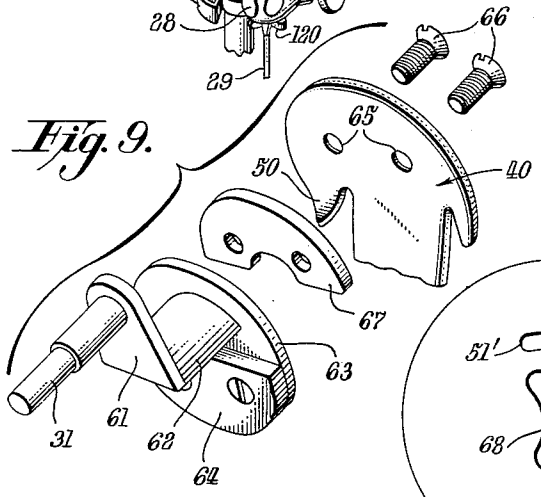


Fig. 9.

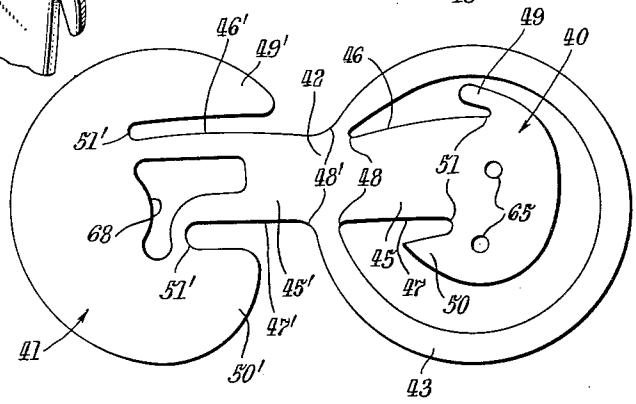


Fig. 7.

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2,715,883

ROTARY THREAD TAKE-UPS FOR SEWING MACHINES

Eugene O. Mayer, South Norwalk, Conn., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application March 23, 1953, Serial No. 343,822

7 Claims. (Cl. 112—248)

This invention relates to sewing machines, and more particularly to an improved rotary thread take-up for a sewing machine.

It is a primary object of this invention to provide a small and unobtrusive rotary take-up which is arranged to effect a proper control of the needle thread of a lock-stitch sewing machine. More particularly, this object encompasses provision of a novel thread take-up construction adapted for convenient accommodation of a plurality of successive loops of a single needle thread.

A further object is to provide an arrangement of guard means disposed so as to protect the machine operator from injurious contact with the rotary thread-engaging portions of the take-up, the guard means also being formed and arranged to facilitate proper introduction of the plurality of successive loops of the thread into the take-up.

With these 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 its preferred embodiment in the accompanying drawings, in which:

Fig. 1 is a front side elevational view, partly in section, of a sewing machine bracket-arm having my invention applied thereto and in which portions of the bracket-arm have been broken away.

Fig. 2 represents a horizontal cross-section taken substantially along line 2—2 of Fig. 1.

Fig. 3 represents a cross-section taken substantially along line 3—3 of Fig. 1.

Fig. 4 is an end elevational view of the sewing machine.

Fig. 5 is an enlarged end elevational view of the bracket-arm and thread take-up of Fig. 4 with a portion of the take-up guard means broken away to reveal the thread path through the take-up.

Fig. 6 is a perspective view of the sewing machine head and the take-up mechanism.

Fig. 7 is a top plan view of a sheet metal blank as it is formed during manufacture of the rotary thread take-up element of this invention.

Fig. 8 is a perspective view of the take-up element after it has been bent into final form.

Fig. 9 is an exploded perspective view of the take-up driving crank-pin extension, the spacing disk and a portion of the take-up element.

Referring more particularly to Figs. 1, 2 and 4 of the drawings, in which the rotary take-up is best illustrated in its relation to the other portions of the sewing machine, the bed **11** of the sewing machine frame is formed with a cloth plate **12** apertured to receive a throat-plate **13**. Carried by the bed beneath the cloth plate **12** is a work-feeding mechanism including a feed-dog **14** arranged to project upwardly through slots in the throat-plate. Also carried beneath the cloth plate is a loop taker **15** which, in the illustrated embodiment of the invention, comprises an oscillatory shuttle. Figs. 1 and 2 best illustrates the hollow bracket-arm **16** of the machine frame which overhangs the bed **11** and terminates in a hollow sewing head **17**. The top of the bracket-arm is closed by a cover **18** formed with a forwardly extending reflector portion **19** which overlies a lamp **20**. The

free end of the sewing head **17** is closed by an end cover-plate **21**.

Journalled for vertical reciprocation in the sewing head is a presser-bar **22** and a needle-bar **23**. The presser-bar is biased downwardly by a coil-spring **24** and may have secured to its lower extremity a thread-severing device **25** together with a presser-foot **26** which is arranged in opposition to the feed-dog **14**. A presser lifting lever **27** is pivoted to the sewing head **17**.

The needle-bar **23** carries at its lower extremity a needle clamp **28** which supports a needle **29** in position to cooperate with the shuttle **15** in the formation of stitches. The needlebar is reciprocated in timed relation with oscillations of the shuttle by means of a driving link **30** which embraces a crank pin **31** carried by a main-shaft **32** journaled for rotation in the bracket-arm **16**.

The construction and arrangement of the present invention is adapted particularly to accommodate a thread-engaging element which is capable of simultaneously manipulating a plurality of successive loops of a single needle-thread. In the preferred embodiment as shown in the drawings, a "duplex" rotary take-up element is illustrated. The term "duplex" is used to indicate that two successive loops or bights of one needle-thread are separately manipulated by the take-up. An advantage of a rotary take-up which can accommodate a plurality of successive loops in a thread is that the dimensions of the take-up may be reduced. This reduction in size permits greater freedom in the design of the appearance of the machine, will be less objectionable as a barrier to the machine operator's visibility of the work being stitched, and will result in appreciable reduction of the peripheral speed of the take-up, thus serving to minimize objectionable windage and undesirable inertia forces.

One advantage of the particular "duplex" take-up element of the preferred embodiment resides in its ease and economy of construction. Fig. 7 illustrates a flat sheet metal stamping which is the first step in the fabrication of the thread-engaging element. Fig. 8 illustrates the thread-engaging element in its final form which is accomplished simply by bending the blank shown in Fig. 7 into the illustrated configuration. The take-up element, in its final form comprises two substantially parallel take-up plates **40** and **41** joined by a peripheral bridge portion **42** from which extends a dividing ring **43** which is disposed in a plane extending between and substantially parallel to each of the take-up plates **40** and **41**.

Each of the take-up plates **40** and **41** serves to control one of the successive loops or bights of the needle thread in a manner similar to the single loop take-up disk which is disclosed in the VanWagener et al. patent application Serial No. 189,528, filed October 11, 1950. Only a brief description, therefore, will be given here of the structure and operation of each of the take-up plates since reference may be had to the VanWagener et al. application for a detailed explanation thereof. Furthermore, similar portions and surfaces of the take-up plates **40** and **41** will be indicated with similar numerals, with those of take-up plate **41** being indicated with prime numbers.

The takeup plates are each formed with a relatively narrow trunk portion **45**, **45'** defining at one side, a thread-controlling cam edge **46**, **46'** effective during take-up or stitch tightening operation of the thread-engaging element, and at the opposite side with a thread controlling cam edge **47**, **47'** effective during the giving up or thread-slackening portion of the take-up cycle. The inturned dividing ring **43** merges at each side with both trunk portions **45**, **45'** to define thread-confining throats **48**, **48'** one at the base of each of the thread-controlling cam edges **46**, **46'** and **47**, **47'**. The take-up plates at the free extremity of the trunk portions are formed at

each side with inwardly extending guard fingers **49**, **49'** and **50**, **50'**, the guard fingers **49**, **49'** are disposed opposite the cam edges **46**, **46'** and guard fingers **50**, **50'** are disposed opposite cam edges **47**, **47'** respectively to define thread-confining throats **51**, **51** terminating each of the thread-controlling cam edges. The guard fingers, with the exception of guard finger **49**, are each bent out of the plane of the respective take-up plates so as to engage the thread limbs at each rotation of the take-up member and thus to prevent escape of the thread loops from the trunk portions **45**, **45'**.

As best shown in Figs. 1 and 2, the thread-engaging element is secured for rotation with the main shaft **32** by means of a connection with the needle-bar driving crank pin **31**. This connection is best illustrated in Fig. 9 and is shaped to travel in a rotary motion about the axis of the main-shaft **32** without interfering with the presser-bar **22** and needle-bar **23**. The connection comprises an L-shaped extension having a leg **61** extending toward the axis of rotation of the main-shaft **32** and a leg **62** extending toward the free end of the sewing head **17**. The orbit of circular movement of the leg **62**, therefore, is sufficiently small so as to clear the presser-bar **22** and the presser-bar coil spring **24**, as shown in Fig. 2, and yet is sufficiently large so as to clear the needle-bar at the top of its stroke, as illustrated in Fig. 1. At its free extremity, leg **62** of the crank-pin extension is formed with a disk **63** to which a counterbalance **64** is secured. Take-up plate **40** of the thread-engaging element is formed with spaced fastening screw apertures **65**—**65** for the passage of screws **66**—**66** by which the thread-engaging element and a spacing disk **67** are secured to the disk **63** of the crank-pin extension. Take-up plate **41** is formed with an L-shaped opening **68** disposed, as best shown in Fig. 5 to provide access from the free end of the sewing head to the fastening screws **66**—**66**. As shown in Figs. 1 and 2, the disk **63** of the crank pin extension is formed with an aperture **69** into which the free extremity of the guard finger **50** extends so as to insure that the thread limb will not escape the guard finger **50**.

In order to protect the sewing machine operator from injurious contact with the rotary thread-engaging element, and for the additional purpose of facilitating proper introduction of successive loops of thread to the take-up, a take-up guard means is provided which will now be described. The end cover-plate **21** of the sewing head is a part of this guard means since the cover-plate extends outward radially beyond the periphery of the take-up path. Secured to the end cover-plate **21** by screws **80** and **81** is a first guard-ring **82** which is maintained in spaced relation with the end cover-plate by means of ring-like spacers **83** and **84** through which the screws **80** and **81**, respectively, pass. Screw **81** also serves to secure to the end cover-plate **21** a second guard-ring **85** which is maintained in spaced relation to guard-ring **82** and to the end cover-plate by means of a ring-like spacer **86** arranged between the rings **82** and **85** and through which screw **81** passes, and also by the bridge-piece **87** which extends from the guard-ring **85** into abutting relation with the outer face of the cover-plate **21**. As best shown in Fig. 5, the bridge piece **87** is formed with an inwardly extending lug **88** which enters a suitably formed aperture in the end cover plate to lock the guard ring **85** securely in position. As shown in Fig. 5, the bridge-piece is further secured to the end cover plate **21** by means of a fastening screw **89** which is threaded into the bridge-piece from the inside of the end cover-plate. The guard means also includes a ring-like end cover **90** which is pivoted as at **91** to the second guard-ring **85** so that it may be turned back to provide convenient access to the thread-engaging element. The ring-like end cover **90** is formed substantially similar in size to that of guard-ring **85** and is provided with a diametrically arranged arched rib portion **92**. Secured to the rib portion **92** by the clips **93**—**93** are spaced wire rings **94**—**94** which further shroud the thread-engaging element from accidental contact by the sewing machine operator.

As best illustrated in Figs. 1, 2 and 3, the end cover-plate and the guard-rings **82** and **85** define spaced thread-accommodating slots which are marked with indicia #1 and #2 on the guard means. The first slot **101** defined between the end cover plate **21** and the guard-ring **82** is substantially coplanar with the spacing disk **67** at the inside face of the take-up plate **40**. It will be noted, as hereinbefore described, that the guard-finger **50** of take-up plate **40** bridges the space between the take-up plate **40** and the disk **63** of the crank extension which is disposed substantially in the plane of the end cover plate **21** so that any limb of thread which is introduced into the slot **101** will automatically be engaged by the guard-finger **50** when the machine is operated and will thus be shifted laterally thereby to a position between the take-up plate **40** and the dividing ring **43**. The second slot **102** defined between guard-rings **82** and **85** is arranged substantially coplanar with the space between the dividing ring **43** and the take-up plate **41** of the thread-engaging element so that any limb of thread which is introduced into the slot **102** will fall automatically between the take-up plate **41** and the dividing ring.

In order to facilitate introduction of two successive loops of a single needle thread into the take-up, i. e. a first loop into the slot **101** of the guard means and a second loop into the slot **102**, the end cover-plate **21** is formed beneath the take-up with a "self-threading" eyelet **105** which provides an introductory thread guide for the take-up. Since it is formed in the end cover-plate, the eyelet **105** delivers the thread into the plane of slot **101** defined between the end cover plate and the guard ring **82**.

Vertically above the eyelet **105** and on the side of the take-up facing the normal position for the operator, the end cover-plate **21** and the guard ring **82** are both formed with outwardly flared lip portions **106** and **107**, respectively, to provide a thread-receiving mouth which facilitates introduction of the thread from eyelet **105** into the slot **101**. A second thread guide is provided in the bridge-piece **87** of guard-ring **85** in the form of a "self-threading" thread channel **108** which, as best illustrated in Fig. 3, is angularly arranged with respect to the guard rings **82** and **85**, having a thread receiving extremity **109** beginning in the vertical plane containing the slot **101** and a delivering extremity **110** in the vertical plane containing the slot **102**. It will be appreciated, therefore, that the thread channel **108** serves to switch the lead of the thread from slot **101** to slot **102**. Vertically above the delivery extremity of thread-guiding slot **108** and on the side of the take-up facing the normal position for the sewing machine operator, the guard-rings **82** and **85** are oppositely flared to provide a thread-receiving mouth for convenient introduction of the second loop of thread from the thread channel **108** into the slot **102**. To further facilitate the proper introduction of the thread into the slot **102** the guard-ring **82** is formed with an outwardly flared finger **111** which extends into an aperture **112** formed in the end cover-plate **21**, and the guard-ring **85** is chamfered, as at **113**, opposite the finger **111**.

In Figs. 1 and 5, the thread path through the take-up is illustrated. The complete path of the thread, as illustrated, is from the supply (not shown) along the bracket-arm **16** to a wire thread guide **114** on the sewing head, then downwardly through an open thread slot **115** in the sewing head, as best illustrated in Fig. 6 to the usual tension device **116** and check spring **117** and then to the eyelet **105** in the end cover-plate **21**. From eyelet **105** the thread is directed upwardly and introduced between the flared lips **106** and **107**. Since these lips are disposed facing the normal position for the sewing machine operator, the thread is introduced into the slot **101** at a point which is in the direct line of the operator's vision, and therefore, the thread introduction is accom-

plished quickly and easily. Once in the slot 101 the thread is cammed automatically by the inturned guard finger 50 into a position around the trunk portion 45 of take-up plate 40, and then downwardly between the take-up plate 40 and the dividing ring 43 into the angularly arranged thread-guiding channel 108 in the bridge-portion 87 of guard-ring 85. The channel 108 automatically shifts the lead of the thread into the vertical plane of the slot 102 and the second loop of thread is introduced into the slot 102 from the channel 108 between the flared finger 111 of the guard ring 82 and the chamfered portion 113 or the guard ring 85, again at a point which is in the direct line of the operator's vision. Once in the slot 102, the thread will fall automatically between the dividing ring 43 and the take-up plate 41 of the thread-engaging element. The thread is then directed around the trunk portion 45' of take-up plate 41 and downwardly into a thread-accommodating notch 118 in the end cover plate, over a replaceable finger 119 which is preferably formed of wear resistant material and serves to protect the notch 118 from undue wear, then to the usual thread guide 120 carried by the needle clamp, and finally to the eye of the needle.

It will be understood from the above that in threading the take-up the needle-thread is grasped by the operator, introduced into the self-threading guide 105, raised vertically upwardly, and then by a continuous rotary motion of approximately 2 revolutions in a counterclockwise direction, as viewed in Fig. 5, the needle-thread is directed between the outwardly flaring lips 106 and 107 and into the first thread slot 101, then into the angularly disposed thread-channel 109 which switches the lead of the needle-thread from the plane of the thread slot 101 to that of the thread-slot 102, then into the second thread slot 102, and then to the needle.

Although the preferred embodiment of the invention as illustrated in the drawings is applied to a duplex rotary take-up, the concept disclosed herein of a take-up guard means formed with a plurality of substantially parallel thread-accommodating slots, together with thread guides disposed to direct successive loops of thread to the slots each from the side facing the sewing machine operator, may be readily applied to a rotary take-up capable of accommodating more than two successive thread loops.

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

1. In a sewing machine having a duplex rotary take-up member, guard means surrounding said take-up member and having two parallel thread-accommodating slots formed therein, an introductory thread guide fixed with respect to said guard means and disposed to deliver thread into the plane of the first of said slots, and an intermediate thread guide arranged at an inclination to the parallel planes of said slots and disposed to receive the thread in the plane of said first slot and deliver said thread into the plane of the second slot.

2. In a sewing machine having a duplex rotary take-up member, guard means surrounding said take-up member and having two parallel upwardly open thread-accommodating slots formed therein, an introductory thread guide fixed with respect to said guard means at a point beneath the axis of rotation of said rotary take-up member, said introductory thread guide arranged to deliver thread into the plane of the first of said upwardly open slots, and a thread guiding channel formed in said guard means and arranged to extend between said slots at a point beneath the axis of rotation of said take-up member.

3. In a sewing machine having a duplex rotary take-up member, guard means surrounding said take-up member and having two parallel thread-accommodating slots formed therein, each of said thread accommodating slots being formed with a flared thread receiving mouth portion at one side of said take-up member, and a pair of thread guides fixed with respect to said guard means, said thread guides having delivery extremities open each to the plane of one of said thread accommodating slots and disposed each beneath one of said flared mouth portions.

4. In a sewing machine having a frame including a bracket-arm, a main shaft journaled lengthwise in said bracket-arm, and a duplex rotary thread take-up member secured for rotation with said main shaft adjacent the free extremity of said bracket-arm, guard means secured to the free extremity of said bracket-arm and formed to surround said take-up member, said guard means having two parallel thread accommodating slots formed therein, each of said slots being formed with a flared thread-receiving mouth portion on the side of said bracket-arm facing the normal position for the sewing machine operator, and a pair of thread guides fixed with respect to said guard means, said thread guides having delivery extremities open each to the plane of one of said thread-receiving slots.

5. In a sewing machine having a frame including a bracket-arm, a main shaft journaled lengthwise in said bracket-arm, and a duplex rotary thread take-up member secured for rotation with said main-shaft adjacent the free extremity of said bracket-arm, guard means formed to encase said take-up member comprising an end cover-plate secured to the free extremity of said bracket-arm, a pair of guard rings disposed to encircle said take-up member and means securing said guard rings to said end cover-plate in spaced relation to said end cover-plate and to each other, means facilitating threading of said duplex rotary take-up comprising a fixed introductory thread guide formed in said end cover-plate, cooperating outwardly flared lips formed on said end cover-plate and the guard ring adjacent thereto defining a mouth arranged to admit therebetween a first limb of thread from said introductory thread guide to said duplex rotary take-up member, and a second thread-guide arranged between said guard rings, said guard rings being formed with co-operating outwardly flared lips arranged to admit therebetween a second limb of thread from said second thread guide to said duplex rotary take-up member.

6. In a sewing machine having a rotary thread take-up member, means facilitating introduction of a plurality of successive loops of a single needle thread to said rotary take-up member, said means comprising a plurality of take-up encompassing guard rings each disposed substantially transverse to the axis of rotation of said take-up member, means supporting said guard rings in spaced relationship with each other and with said sewing machine thereby defining a series of substantially parallel thread accommodating slots each opening to said rotary take-up member, and a plurality of thread guides equal in number to said slots, said guides being fixed with respect to said guard rings and each having a delivery extremity open to the plane of a respective one of said thread accommodating slots.

7. In a sewing machine having a needle-thread take-up including a plurality of side-by-side movable thread-engaging members operating in spaced parallel planes, guard means housing said thread-engaging members and having thread-accommodating slots disposed in co-planar relation with said thread-engaging members and each having a thread-receiving mouth located at the front side of the machine, a fixed introductory thread-guide disposed below the level of said thread-receiving mouths and arranged to deliver thread into the first of said thread-accommodating slots, and a second thread-guide located intermediate the first and second of said thread-receiving slots and below the level of the thread-receiving mouths about which second guide and thread travels in its passage from the first to the second of said thread-slots.

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