

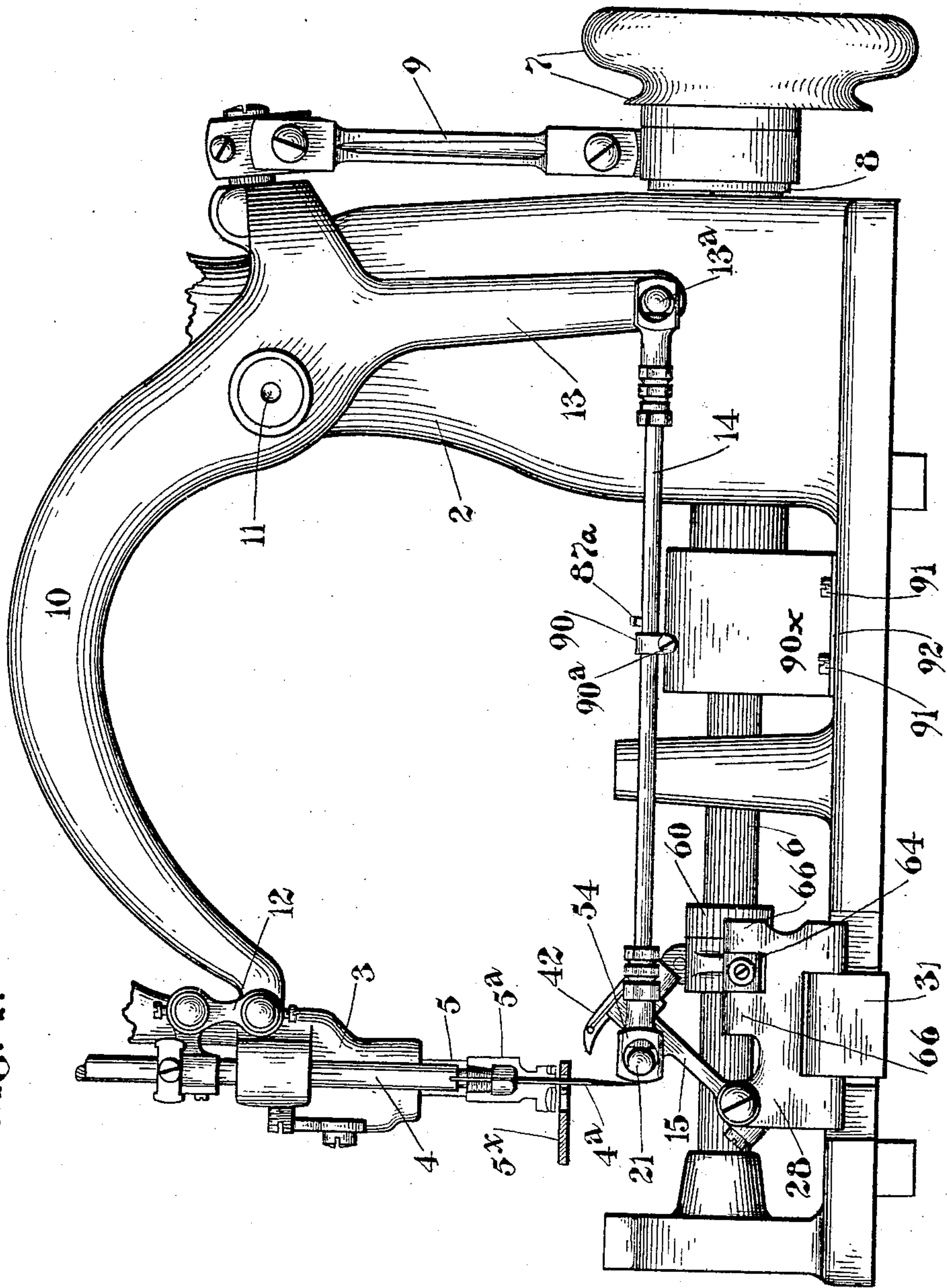
W. V. MILLER.
 LOOPER MECHANISM FOR SEWING MACHINES.
 APPLICATION FILED DEC. 26, 1903.

903,749.

Patented Nov. 10, 1908.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:
 Lindsay Schepmoes
 M. Hershkovitz

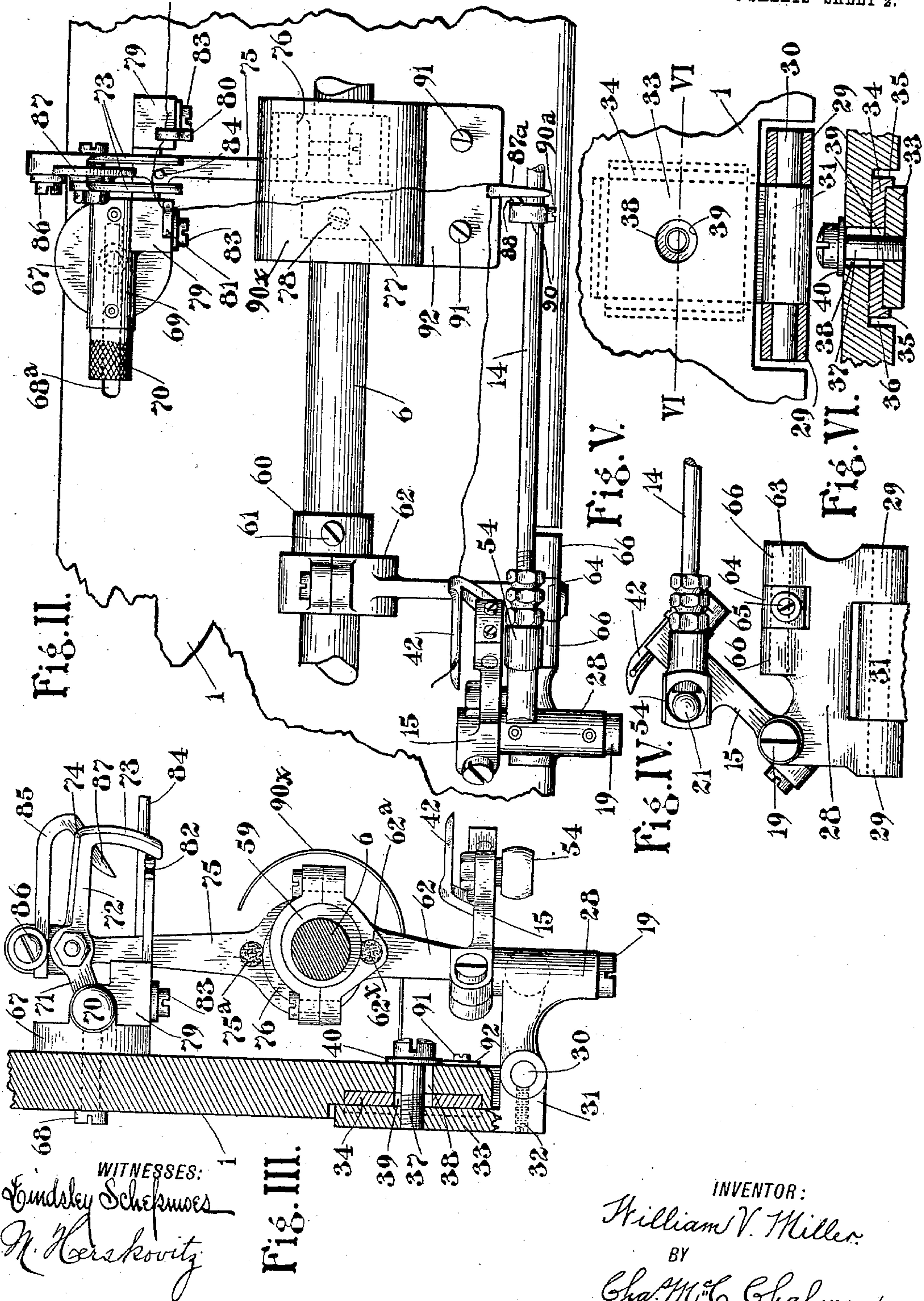
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3 SHEETS—SHEET 2.



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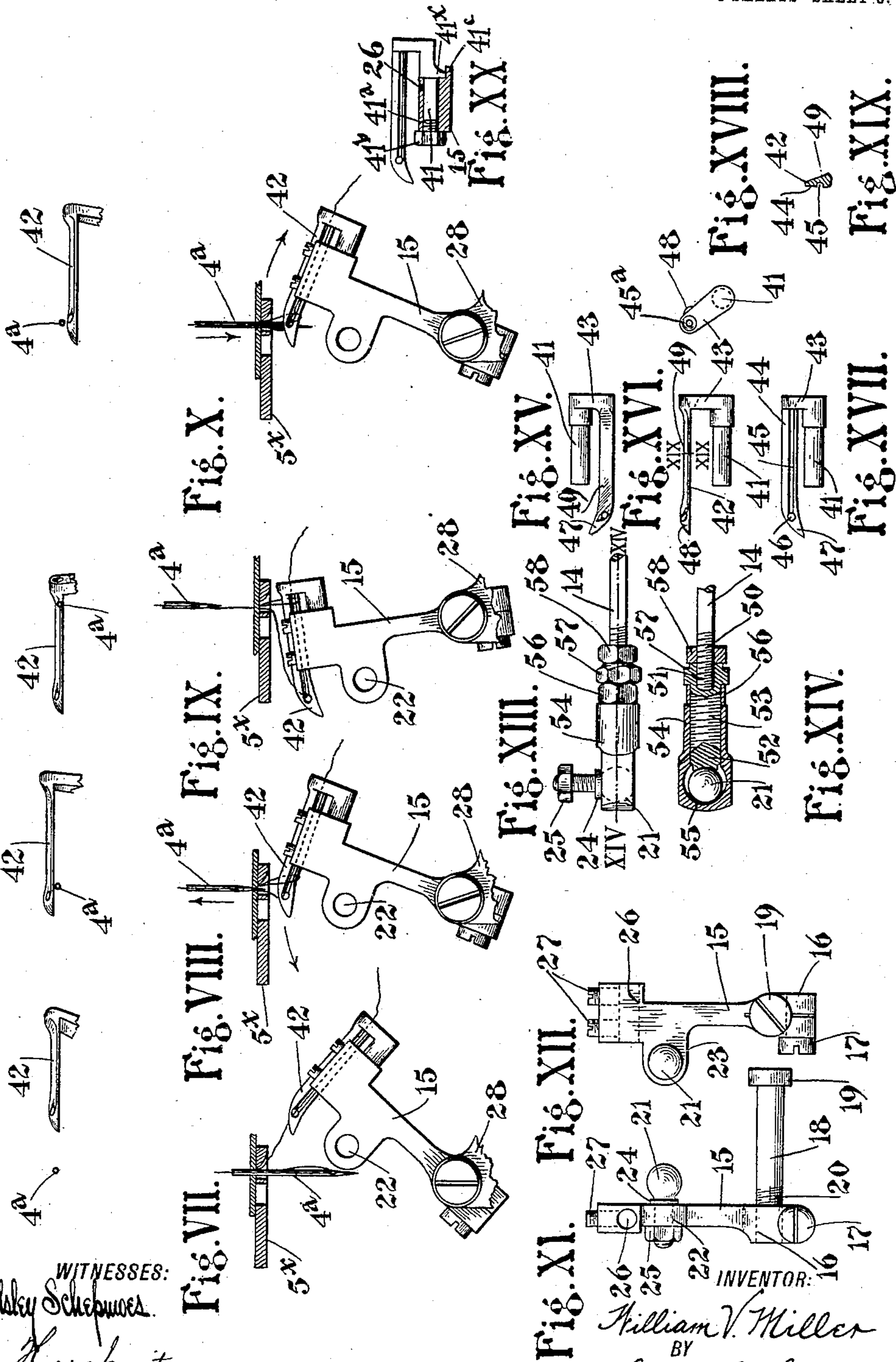
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3 SHEETS—SHEET 3.



WITNESSES:
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Fig. XI. Fig. XII.
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UNITED STATES PATENT OFFICE.

WILLIAM V. MILLER, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE MANHATTAN MACHINE SUPPLY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

LOOPER MECHANISM FOR SEWING-MACHINES.

No. 903,749.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed December 26, 1903. Serial No. 186,586.

To all whom it may concern:

Be it known that I, WILLIAM V. MILLER, a citizen of the United States, residing in Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Looper Mechanism for Sewing-Machines, of which the following is a description.

This invention relates to sewing machines of the chain-stitch type; and particularly to the looper mechanism thereof.

An object of my invention is to provide a chain-stitch sewing machine wherein the looper mechanism is adapted for making either a single or double chain-stitch.

Another object of my invention is to provide a looper mechanism, for chain-stitch machines, which can be adjusted, relatively to the path of reciprocation of the needle, so as to cause the same to cooperate with the needle, in taking the loop, irrespective of the timing of the needle, or the depth of the thrust of the same.

Another object of my invention is to provide a stitch-forming organization with a looper mechanism which can be regulated and adjusted so as to cause the looper to enter the needle-thread loop, retain the same and recede therefrom in accordance with the demands of the various kinds of chain-stitch organizations.

Other objects of my invention will be pointed out during the course of this description and with them all in view, my invention consists in the parts, features, elements and combinations of elements and mechanism hereinafter described and claimed.

Referring to the drawings, illustrating one form of my invention, Figure 1 represents in side elevation so much of the bed and overhanging arm of a chain-stitch sewing machine as is deemed necessary to properly portray my invention, the upper portion of the arm and head of the machine having been removed, as also the work-plate, in order not to confuse the illustration; Fig. 2 represents in top plan a portion of the machine shown in Fig. 1, this view being enlarged in order to clearly portray the essential elements of the take-up and looper mechanisms, these being the principal mechanisms of the stitch-forming organization of my present invention; Fig. 3 is a front end elevation of the parts illustrated in Fig. 2, the figure being disposed on the sheet in

such manner as to enable the relative position of the parts to be quickly carried from one figure to another; Fig. 4 is a front elevation of the looper mechanism shown in Fig. 2, the detail being intended to portray the essential elements of said mechanism together with its adjusting means; Fig. 5 is a plan view of a portion of that corner of the bed-plate which is adjacent the looper mechanism, the figure illustrating the means for adjusting the position of the supporting frame for the looper carrier; Fig. 6 is a section on the line 6—6 of Fig. 5; Figs. 7, 8, 9 and 10 illustrate diagrammatically the cooperation of the needle and looper in the four principal positions thereof, said figures each showing in front elevation the looper and carrier, and the needle, the throat-plate and work in section, and in top plan a portion of the looper and its position relatively to the needle, corresponding with the position illustrated in the elevation; Fig. 11 is a front end elevation of the looper carrier; Fig. 12 is a front elevation of the looper carrier; Fig. 13 is a top plan of the front end of the looper actuating rod or pitman; Fig. 14 is a longitudinal section of Fig. 13, on the line 14—14; Fig. 15 is a bottom plan view of the looper; Fig. 16 is a top plan view of the looper; Fig. 17 is a front elevation of the looper; Fig. 18 is a rear end elevation of the looper; Fig. 19 is a cross-section of the looper body taken on the line 19—19 of Fig. 16; and Fig. 20 is a detail of another form of means for holding the looper in its carrier.

Primarily, it is to be understood that, while a single thread-carrying looper has been illustrated in the embodiment of my invention made the subject of this application, a plurality of loopers and carriers can be adapted to cooperate with a plurality of needles to form a gang machine, and that, irrespective of the number of loopers employed, the same may carry a thread or not, accordingly as single or double chain-stitches are desired. The take-up illustrated in this connection is capable of handling one or more threads.

In the drawings, 1 is the bed-plate, 2 the arm supported thereby, 3 the head in which the needle-bar 4, and presser-bar 5, are supported and operate. The needle-bar carries one or more needles 4^a and the presser-bar supports a foot 5^a which cooperates with the throat-plate 5^x to engage the work as usual.

The driving shaft is indicated by 6, the same carrying at its rear end the driving pulley and hand-wheel 7, and adjacent thereto the eccentric 8, which actuates the strap 9, pivotally connected at its upper end to the needle actuating lever 10, pivoted at 11, to the arm 2, and pivotally connected at its forward end by means of link 12, to the needle-bar 4. The lever 10, is provided with the depending arm 13, suitably connected at 13^a, to the looper actuating rod or pitman 14, by means of a universal joint; the front end of the pitman is connected by a like universal joint to the looper carrier 15.

Viewing Figs. 11 and 12, the looper carrier will be found to comprise the body portion, generally indicated by 15, having at its lower end a suitably formed clamping socket 16, the separate portions of which are caused, by means of the screw 17, to tightly clamp and hold the laterally extended journal or pin 18, having the head 19, and the end of which is screw-threaded at 20, for the purpose of screwing into the socket 16. Between its ends the carrier 15, is provided with the ball-pin 21, which is held and clamped in the bore 22, which may be formed in an extension 23, of said carrier. The pin is provided with the shoulder 24, which engages one side of the extension 23, and the clamping nut 25, screws upon the pin and engages the other side of the extension 23, thus holding the ball-pin rigidly in place. At or near its upper end the carrier 15, is provided with the socket 26, formed by boring the carrier, and in which socket the stem of the looper is inserted and there clamped by one or more binding screws 27, tapped through the carrier into the bore 26, and thus binding the looper adjustably and properly in place.

Referring to Figs. 1, 3 and 4, it will be seen that the looper carrier 15, is journaled in the rocking frame or support 28, pivoted by means of the depending journals 29, upon the journal-pin 30, fixed to the bearing 31, of bracket 33, by means of the set-screw 32, tapped through the same, see Fig. 3. The bracket 33, is made angular, as shown, and the bottom portion is held to the bottom of the bed-plate 1 and is adjustable longitudinally and transversely thereon by means of the bracket-plate 34, having a way in the bottom thereof provided by the flanges 35,—see Fig. 6,—in which the bottom of the bracket 33, is adapted to slide transversely of the bed-plate. The bracket-plate 34, is set in an enlarged depression 36, in the bed-plate, so as to have movement longitudinally of the latter, and said bracket-plate 34, and the bracket 33, are held and tightly clamped together in the depression 36, by means of the clamping screw 37, extending through the enlarged hole 38, in the bed-plate, and corresponding hole 39, in the bracket-plate

34, and screwed into the bracket 33. A washer or plate 40, spans the hole 38, and lies under the head of the screw 37, so as to tightly clamp the several parts together, as described. From this construction it will be seen that the rocking frame or support 28, is adjustable longitudinally and transversely of the bed-plate, such adjustments enabling the looper carrier to be disposed in the proper manner, relatively to the path of reciprocation of the needle, for the purposes hereinafter described, and also to enable the looper to have an adjustment, generally speaking, relatively to the needle.

Referring to Figs. 15, 16, 17 and 18, it will be seen that the looper is formed with its shank 41, extending parallel, or substantially so, with the looper body 42, the extension or connecting portion 43, resulting in properly off-setting the looper body from its stem. This gives the looper an angular U-shape and renders the same compact, easily made and cheap of production in quantities. The looper body 42, is made substantially flat on its face 44, and in said face is provided with the longitudinal groove 45, for conveying the thread from the rear end of the looper body to the eye 46, thereof. The thread groove 45, begins in the flared aperture 45^a, at the heel of the looper body, this formation enabling the looper to be quickly threaded. The toe of the looper 47, is flat on its face and is deflected or depressed slightly in the plane of said face, thus giving the looper toe a beak formation which enables the same, when properly adjusted in the machine, to enter the needle-loop in substantially a horizontal plane. On its back the looper body, at its toe, is provided with the swell 48, and in its body, between the eye and the heel, with the depression 49, which provides the enlargement or bulge around and adjacent the eye for the purpose of momentarily and properly retaining the loop in its movement toward the toe of the looper (which occurs during the backward movement of the looper) to prevent engagement of the same by the needle, as will be hereinafter explained. In cross-section the looper body, see Fig. 19, is substantially a right-angle triangle, the base being, however, slightly rounded and the back slightly concaved to make the depression 49.

Another form of means for securing the looper in the carrier 15, is shown in Fig. 20. Therein the looper shank 41, is screw-threaded at 41^a, for the reception of the locking nut 41^b, the latter firmly holding the looper in place by contact with the carrier 15, and drawing the shoulder 41^x of the looper also against said carrier. The shoulder 41^x, is in the form of a flange which extends laterally into a recess formed in the carrier 15, adjacent one end of the socket

26, said recess producing a projection 41^c, against which the flange or shoulder 41^x rests, the said flange and shoulder thus interlocking and preventing any circular movement of the looper until the flange 41^x is entirely withdrawn from the projection 41^c.

To impart the loop-taking movement to the looper, the usual pitman 14, is employed, operated as described, and provided at its forward end, see Figs. 13 and 14, with the screw-threads 50, which are adjustably engaged with the screw-threaded socket 51, of the ball-bearing 52, which is depressed at its forward end to engage the ball 21, clamped to the carrier 15, as previously described. The bearing 52, is externally screw-threaded at 53, to be adjustable in the longitudinal bore of the pitman-head 54, the latter being provided in its forward end with the rounded depression 55, which affords a bearing opposite the bearing 52, for the ball 21. Adjustments of these parts are made and held by means of the jam-nut 56, screwed on to the bearing 52, and set against the end of the pitman-head 54, the locking nut 58, holding the pitman 14 and bearing 52 in adjusted position.

The looper is given its lateral or needle avoiding movement by means of the eccentric 59, which is adjustably set upon the shaft 6, by means of the extended collar 60, and set-screw 61. An eccentric strap 62, is adjustably clamped upon the eccentric 59, by any suitable means, and extends to, and is pivotally connected with, the rocking frame 28, by means of a journal-pin 63, clamped in the socket end 64, of the pitman 62, by the set-screw 65. The journal-pin 63, extends oppositely into the journal bearings 66, of the rocking frame 28, this structure producing a pivotal connection and preventing accidental separation of the parts, as shown in Fig. 4. It will be noted upon reference to Fig. 3, that the eccentric 59, is not extensive, giving to the rocking frame 28, and the looper, but a slight lateral movement. Hence, the throw and movement of the parts are not extensive, producing ease of action and permitting high speed. As shown in Fig. 2, the eccentric 59, is longer than the width of the surrounding strap 62, this providing for the lateral adjustments of the looper carrier 15 and its supporting frame 28, without changing the position of the eccentric 59, on the shaft 6.

For lubricating the eccentric 59, and adjacent parts, the strap 62, is provided with the transverse bore 62^a, having a side open on the eccentric, said bore being filled with a wick 62^x for absorbing and applying the lubricant.

It will be seen, from the above description, that a looper mechanism is provided which is compact, consists of comparatively few and simple parts, has its necessary move-

ments imparted to it by means which are simple and permit of ease of action and high speed, because the extent of the several movements is very small. That is to say, the rocking frame or carrier support 28, which conveys to the looper its lateral or needle avoiding movements, is extended parallel with the driving shaft and derives its movement from the easiest of actuating mechanisms; and the looper carrier by being pivoted upon the rocking frame 28, can be very much shortened and the actuating rod or pitman 14, can be disposed so as to operate in substantially a horizontal plane, thus enabling its thrust to be imparted and transmitted substantially along the line of its longitudinal axis, thereby preventing flexing or twisting and consequent binding at the connections with the needle actuating lever and the looper carrier. Moreover, by providing for the several adjustments of the rocking frame or carrier support 28, the position of the pivotal connection between the looper carrier 15, and the rocking frame 28, can be accurately adjusted.

The several adjustments will have the following effects upon the looper and its positions relatively to the needle: Generally speaking, the looper must have a certain relation to the path of reciprocation of the needle, viz., the looper must be so disposed as to have a lateral movement sufficient to pass in rear of the needle and clear or avoid the same, in its forward or loop-taking movement, and in its backward or loop-leaving movement must have a sufficient lateral movement in the opposite direction to enable it to pass in front of the needle and carry its thread about the body of the needle as will be described. By the means described, the rocking frame and the looper carrier can be quickly applied to any machine and accurately adjusted to provide the necessary clearance and dispose the looper so that its field of lateral vibration will accord with the path of reciprocation of the needle of any machine in which it is placed. Furthermore, it is always necessary, in adapting a looper mechanism to a given machine, (the actuation of the needle-bar of which is given in a certain time and with certain variations,) to dispose the axis of oscillation of the looper so that the looper toe will enter the needle-loop at a given time and at a given speed. This timing may differ in different machines, and in order to be able to secure the proper timing between the needle of a given machine and my looper mechanism, the adjustment of the rocking frame 28, longitudinally of the bed-plate, is provided; that is to say, the axis or pivotal connection 18, of the looper carrier may be adjusted, relatively to the path of reciprocation of the needle, so as to be to a considerable extent on either the one side or the other of said path

or so as to be directly in said path. Hence, the primary position of the looper, viz., its extreme backward position illustrated in Fig. 7, can be fixed with certainty so that in its primary position the toe of the looper will be located as close to or as far from the needle as may be deemed necessary in order to cause the same to properly cooperate with the needle to take the loop therefrom; that is to say, the toe of the looper can be disposed so as to enable it to enter the needle-loop very early in its movement and at most any speed desired. This will be apparent when we consider the fact that by disposing the axis 18, of the looper, to the left of the path of the needle,—see Fig. 7,—the toe of the looper will reach the path of the needle very soon after it has started forward, and with this adjustment the speed of the looper will be comparatively high at the commencement and finish of its oscillation. If, however, the axis of the looper be adjusted to the right of the path of the needle, the toe of the looper will be disposed close to said path and the speed of the looper at the commencement and finish of its oscillation will be comparatively low. Intermediate adjustments will produce obvious variations in both the speed at the commencement and finish of oscillation of the looper and the disposition of the toe of the looper relatively to the path of reciprocation of the needle. The advantages of the above adjustments will now be apparent, and additional advantages will be obvious when it is considered that the extent of reciprocation of the needle-bar in different machines varies considerably, some having a very short reciprocation and others having a long reciprocation, and some having short and others having long needles. It becomes important, therefore, to have a looper mechanism capable of adjustments to meet the various requirements of the various machines, and which is adaptable to any and all chain-stitch machines, irrespective of the timing of the needle-bar or the extent of reciprocation thereof, or the length of the needle carried thereby.

At this point it should be noted that the adjustments of the looper, relatively to the path of reciprocation of the needle, are accomplished by means of the two plates and binding screw 33, 34 and 37 respectively, and that these parts are so located as to be readily accessible for adjustments and convenient for application to different machines. Moreover, all the adjustments are obtained without disturbing the looper in its carrier, and said looper, when its proper position in the carrier is obtained, need never be changed. This is an important feature, and its essentiality can be appreciated when it is understood that the position of the toe and body of the looper relatively to the point and body of the needle is of para-

mount importance for accurate stitching, and that when the looper is once properly set in its carrier for cooperation with a certain size and length of needle, adjustments which will disturb the position of the looper in its carrier will often result in lack of proper cooperation between the needle and looper and the skipping of stitches.

I have combined with my looper mechanism above described a special form of take-up, the details of which are not claimed herein because the same are made the subject-matter of an application filed concurrently herewith, Serial No. 186,587. This take-up mechanism, however, bears an important relation to my looper mechanism and a stitching organization in which the latter is used, in that it is capable of handling the looper-thread properly at all times and under any adjustment of the looper in cooperation with the needle. For this purpose, the parts of the take-up mechanism have been rendered adjustable so as to control the looper-thread to a nicety in all the several adjustments of which the looper is capable. Hence, the take-up mechanism and the looper mechanism are to a certain extent dependent one upon the other, cooperate with each other and interact so as to properly handle the thread carried by the looper at all stages of movement of the latter and at all periods of the stitch formation. It is not to be understood, however, that this take-up mechanism is limited to cooperation with the looper mechanism of this application or that the looper mechanism depends upon the take-up herein disclosed; for, the take-up mechanism is capable of being used in connection with the thread of other looper mechanisms and also in connection with the needle-thread of any machine by mere mechanical changes, all within the scope of my invention, which would adapt it to the bed-plate, arm or any other portion of the sewing machine frame, and the looper mechanism can be used in any chain-stitch machine. Therefore, I purpose in this application to claim only the looper mechanism, leaving the stitch-forming organization and the broad features and elements of individual structure of the take-up for claim in my concurrently filed application above referred to.

Sufficient of the take-up mechanism to show its operation and cooperation with the looper mechanism is illustrated in Figs. 2 and 3. The take-up consists of the base or bracket 67, which is shown in this embodiment of my invention as being circular, and as being adjustably secured to the bed-plate 1, by means of the clamping screw 68, extended through the elongated slot 68^a, in the bed-plate and into the bracket, its head engaging the bottom of said plate, thus rendering it possible to dispose the take-up mechanism in any operative position de-

sired on the bed-plate. The bracket 67, has the journal-bearing 69, in which is journaled a shaft having formed upon one end an enlarged knurled head 70, and set upon the other end the take-up lever 71, suitably fixed thereto. The take-up lever 71, has the short arm, as shown in Fig. 3, and the long angular arm 72, said arm being substantially L-shaped and the upper portion of which is bifurcated to form the arms 73, which are longitudinally curved in the arc of a circle struck from the axis 70, as a center. The angle or junction of the arms 73, with the arm 72, is rounded as at 74, this construction being desirable and preferable to avoid fraying the thread. The take-up lever 71, is pivotally connected near its fulcrum to the rear end of the eccentric strap 75, said strap surrounding the eccentric 76, adjustably fixed upon the shaft 6, by means of the collar 77, and set-screw 78. By this construction it will be seen that the actuating mechanism can be adjusted to any position corresponding with the adjustment of the take-up proper.

The eccentric strap 75, is clamped upon its eccentric in substantially the manner described in connection with the strap and eccentric for the looper mechanism and the same kind of lubricating device 75^a, is provided for these parts. The bracket 67, or the bearing 69, is suitably extended to provide the bearings or supports 79, for the thread-guides 80 and 81, said guides being disposed on opposite sides of the take-up lever and in a position near the end of its forward movement. Each of the guides 80 and 81, is provided with a thread-eye, into which extends a slot 82, from one edge of the guide, as shown in Fig. 3. These guides are disposed, relatively to the take-up lever, so that the one 80, presents its thread-eye at an angle to the path of oscillation of the take-up, while the other 81, presents its eye substantially parallel with the path of oscillation of the take-up, this disposition causing the threading-slot of the guide 80, to extend substantially parallel with the path of oscillation of the take-up and the threading-slot of the guide 81, at an angle to the path of oscillation of the take-up. This disposition of the thread-guides 80 and 81, renders it unnecessary to provide thread-retaining springs to hold the thread in the eyes, of the guides, and permits open-end threading-slots to extend to said eyes. This facilitates threading and simplifies and cheapens the construction. The guides 80 and 81, are each adjustably clamped to its respective bracket 79, by means of the clamping screw 83.

The eccentric strap 75, adjacent its connection with the take-up lever, has set therein a thread-holding or stop-pin or post 84, the same extending vertically from the strap between the arms 73, of the take-up lever, and

above the plane of operation of the latter. This pin or post 84, is so disposed that during the oscillation of the take-up, the ends of the arms 73, of the latter, never cross the vertical plane in which the pin stands, and which plane passes through said arms at a right-angle to their length, thus preventing the thread leaving the arms 73. This pin is not shown adjustable. In rear of its pivotal connection with the take-up lever, the eccentric strap 75, has adjustably fixed thereto the controlling arm 85, by means of the clamping screw and washer 86. Said controlling arm extends substantially parallel with the arm 72, of the take-up lever, and has a forwardly projecting and downwardly depending end 87, which extends between the arms 73, of the take-up lever. From this construction it will be seen that rotation of the shaft 6, will impart longitudinal reciprocation and transverse oscillation to the eccentric strap 75, this movement being practically a gyratory movement. The strap 75, will impart oscillation to the take-up lever on its fulcrum and also impart movement to the controlling arm 85, the movement of which latter will be substantially that of the eccentric strap 75. The oscillating movement of the take-up will carry the angle 74, toward and from the plane of the end 87, of the arm 85, and in its extreme forward movement the angle or heel 74, of the take-up, will pass the plane of the pin or post 84, and the thread will run down the long arm 72, of the take-up and between the same and the end 87, of the controlling arm and into engagement with the latter. In thus running down the take-up arm 72, the thread extending between the guides 80 and 81, will engage the end of the controlling arm which will support the same and prevent it from going too far down the take-up arm, the angle or heel 74, of the take-up at this time, being slightly forward of the guides 80 and 81, so that the thread will run practically free from guide to guide to the looper. As the take-up moves rearwardly, the thread is caused, by the combined action of arm 72, of said lever and the controlling end 87, of arm 85, to ascend the inclined end 87, and ultimately pass over the angle 74. This is the take-up action and occurs during the rearward movement of the looper and the downward movement of the needle in order that the stitch may be properly set. It will further be seen that as the thread passes over on to the arms 73, the looper will be moving forward and will require thread to enter into the next stitch to be formed, the take-up at this time controlling the thread in its passage to the looper to prevent slack forming or occurring at the time the looper is entering the needle-loop, the thread thus extending from eye to eye of the guides and over the arms 73, at an angle, see Fig. 2. Thus,

while the thread is given up to the looper, it is given up gradually, and to the extent required by the looper and always under absolute control.

- 5 The angle of the thread from guide 80, over arms 73, to guide 81, may be increased or decreased according to the adjustment of said guides, thus providing means whereby additional control of the thread is secured.
- 10 The looper-actuating means and the take-up actuating means are so timed that the take-up will give up thread to the looper as the latter moves forward and will control and take up the slack of the thread as the looper
- 15 is moving back. And in order that the thread may go in a direct line through the looper without reeving in the eye or thread-groove thereof and also in order that an excess of thread may be avoided between the
- 20 take-up and the looper, a combined auxiliary take-up and controller is adjustably secured to the looper-actuating pitman 14, said guide being designated by 87^a, and consisting of a loop around which the thread runs
- 25 from the guide 81, to the looper.

The loop 87, has the angular shank 88, which is driven into a socket in the clamping piece 90, held to the pitman 14, by means of the screw 90^a, passing through the extensions

30 of said clamping piece 90. By interposing this controller and disposing the same as described, the slack of the thread is absolutely controlled, and during the movements of the looper the said thread is prevented from

35 reeving in the looper; and in combination with the action of the take-up the controller aids in controlling the slack so that the take-up has only to take up a small amount of slack and set the stitch. This renders it

40 possible to give but little pitch to the eccentric and comparatively small movement to the take-up lever, thus obtaining a great deal of take-up action with a small amount of take-up movement. Obviously, as the looper

45 moves forward the controller 87, gives up the thread, thus decreasing the angle of the latter between the guide 81, and the looper.

To prevent the thread, in its passage to the looper, from being soiled by oil or contact

50 with moving parts of the machine, a guard is disposed so as to cover the eccentric 76, shaft 6 and end of strap 75, the same consisting of the curved plate 90^x, secured to the bed-plate by means of the screws 91, passing through

55 the flat portion 92, and into the bed-plate 1. The curved portion is sufficiently extensive to cover the parts noted and prevent contact of the thread therewith.

Having thus described the details of my

60 invention including the specific arrangements, individual adjustments and parts, I will now describe the operation of the looper, referring particularly to four principal positions of the latter during its cycle of move-

ment in taking and shipping a loop of the 65 needle-thread. It will, of course, be understood that the vertical reciprocation of the needle is imparted from the eccentric 8, carried by the main shaft through the pitman 9, lever 10, and link 12; that the loop-taking 70 movement, or the longitudinal oscillation of the looper, is imparted through its connection with the pitman 14, suitably joined to the depending arm 13, of the lever 10; and that the lateral vibration, or needle-avoiding 75 movement, is imparted through the eccentric 59, on the driving shaft, and the strap 62, connected to the rocking looper-supporting frame 28.

Referring particularly to Figs. 7 to 10 in- 80 clusive, it will be understood that the needle, after having reached the limit of its downward movement, is slowly retrograded to cause the same to throw out its loop. When the needle has reached its lower limit, the 85 looper has reached its rear extreme and moved laterally toward the rear of the needle and is in position to move forward behind the needle. As the needle retrogrades and throws out its loop, the looper moves forward 90 and enters the latter, which begins to slide back upon the body of the looper, as shown in Fig. 8. In this position the toe of the looper has entered the needle-loop and the latter has slid back upon the body of the looper beyond 95 the bulge or enlarged portion 48, and the looper is still moving forward, the needle having risen to a position almost free of the work.

It will be understood that the needle- 100 thread extends from the eye of the needle down through the work, around the body of the looper and up to the work again; and that the looper-thread extends from the work down through the eye of the looper 105 and back on the face of the looper inside the needle-loop, as shown in Fig. 8. The continued movement of the looper carries it to its forward extreme shown in Fig. 9, the needle rising to its upper extreme, the loop 110 of needle-thread having passed to the heel of the looper and the looper-thread having been supplied to the looper to an extent sufficient to avoid drag of the said thread in the work. At its forward extreme the 115 looper is given a lateral movement which brings it toward the front of the needle so as to cause said looper, in its backward movement, to pass in front of the needle, this lateral movement making the looper 120 avoid the needle in the downward movement of the latter and enabling the looper to wrap its thread about the shank of the needle and about the loop of needle-thread which is next to be formed. The rearward 125 movement of the looper in front of the needle and the downward movement of the needle to carry the thread down a second

time, bring the needle and looper into the co-operative position of Fig. 10, which shows the previously formed needle-loop as having slid forward upon the body of the looper to the enlargement 48, which momentarily retains the loop and prevents the needle in its descent from engaging the said previously formed needle-loop. In this position the point of the needle has passed the body of the looper and as the latter recedes, or continues its backward movement, it wraps its own thread around the shank of the needle and slips out of the needle-loop, thus carrying its own thread through the said previously formed needle-loop. The looper continues to move to its rearward extreme and the needle to its lower extreme, thus reaching the position of Fig. 7. This operation of the needle and looper, coöperation of the looper with the needle, and manipulation of the loop of needle-thread and the looper-thread result in the production of the well-known lock-chain stitch, or one wherein a loop of the looper-thread passes through a loop of the needle-thread and encircles the next adjacent loop of the needle-thread; or in other words, making a stitch wherein a loop of the needle-thread extends through a loop of the looper-thread and passes around a second loop of the looper-thread. This is a desirable form of stitch and is useful in many relations inasmuch as it is ornamental, lies flat upon the work and when used as an edging for bindings is found to be quite durable.

Having thus described my invention, what

I claim and desire to secure by Letters Patent is:

1. A sewing machine having a driving shaft, a rocking frame extending parallel therewith and journaled to the bed-plate, a looper, a looper-carrier journaled to the frame, means for actuating the carrier, means for actuating the frame, and means whereby the carrier may have a compound adjustment relatively to the shaft.

2. A looper mechanism for sewing machines comprising two adjusting plates, means for connecting and adjusting the two plates whereby to adjust the looper in different directions, a rocking frame journaled upon one of said plates, a looper, a looper-carrier journaled on the frame, means for actuating the carrier, and means for actuating the frame.

3. A looper mechanism for sewing machines comprising a looper-carrier having a socket therein for supporting the looper, a looper having a shank off-set therefrom and extending substantially parallel with the body thereof, said shank having a shoulder, and means for clamping the stem of the looper in said socket and binding said shoulder and means against said carrier.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM V. MILLER.

Witnesses:

JOHN E. BARKER,
CHAS. McC. CHAPMAN.