

Aug. 20, 1935.

F. ASHWORTH

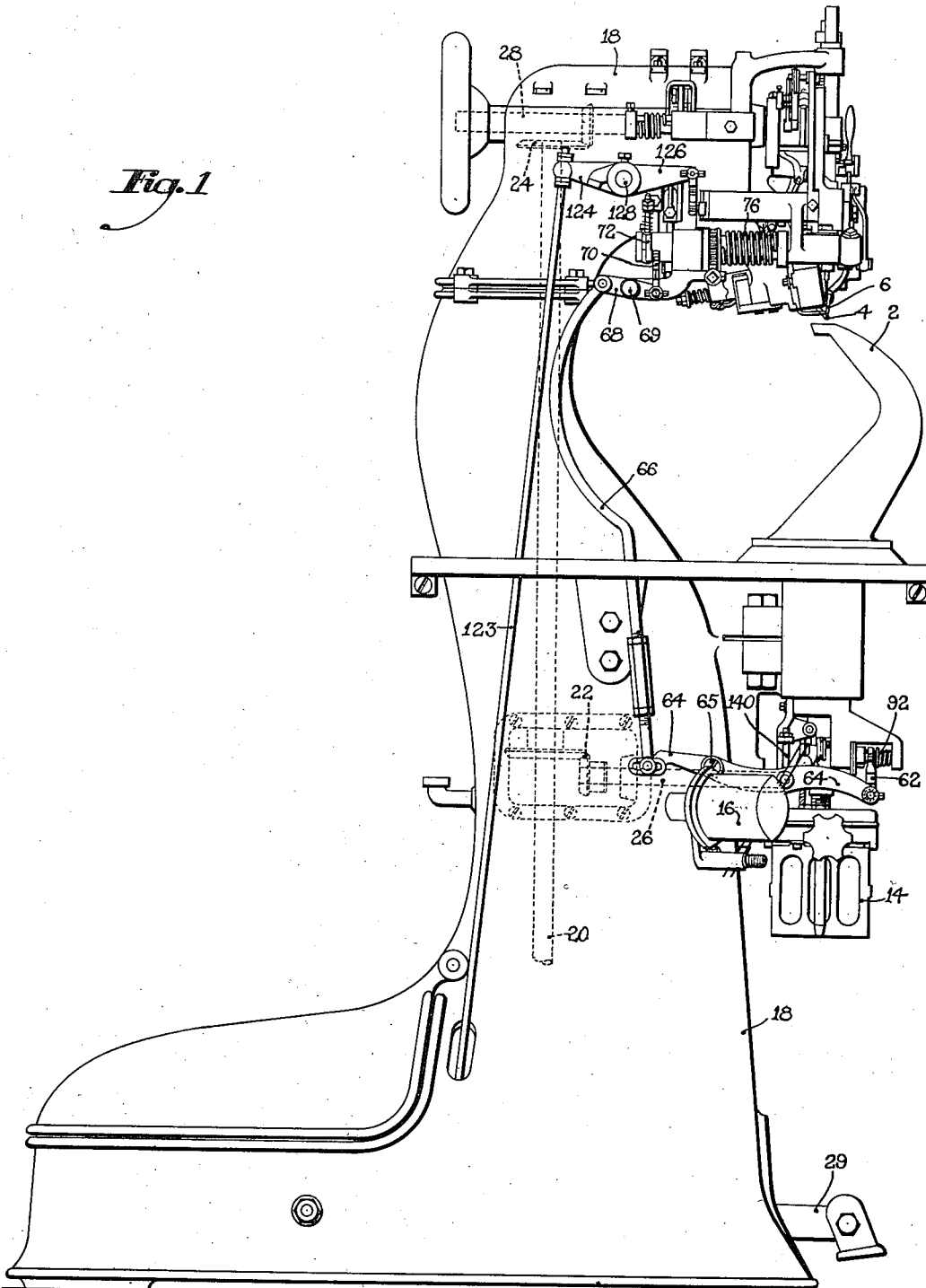
2,011,604

SEWING MACHINE

Filed Nov. 10, 1932

5 Sheets-Sheet 1

Fig. 1



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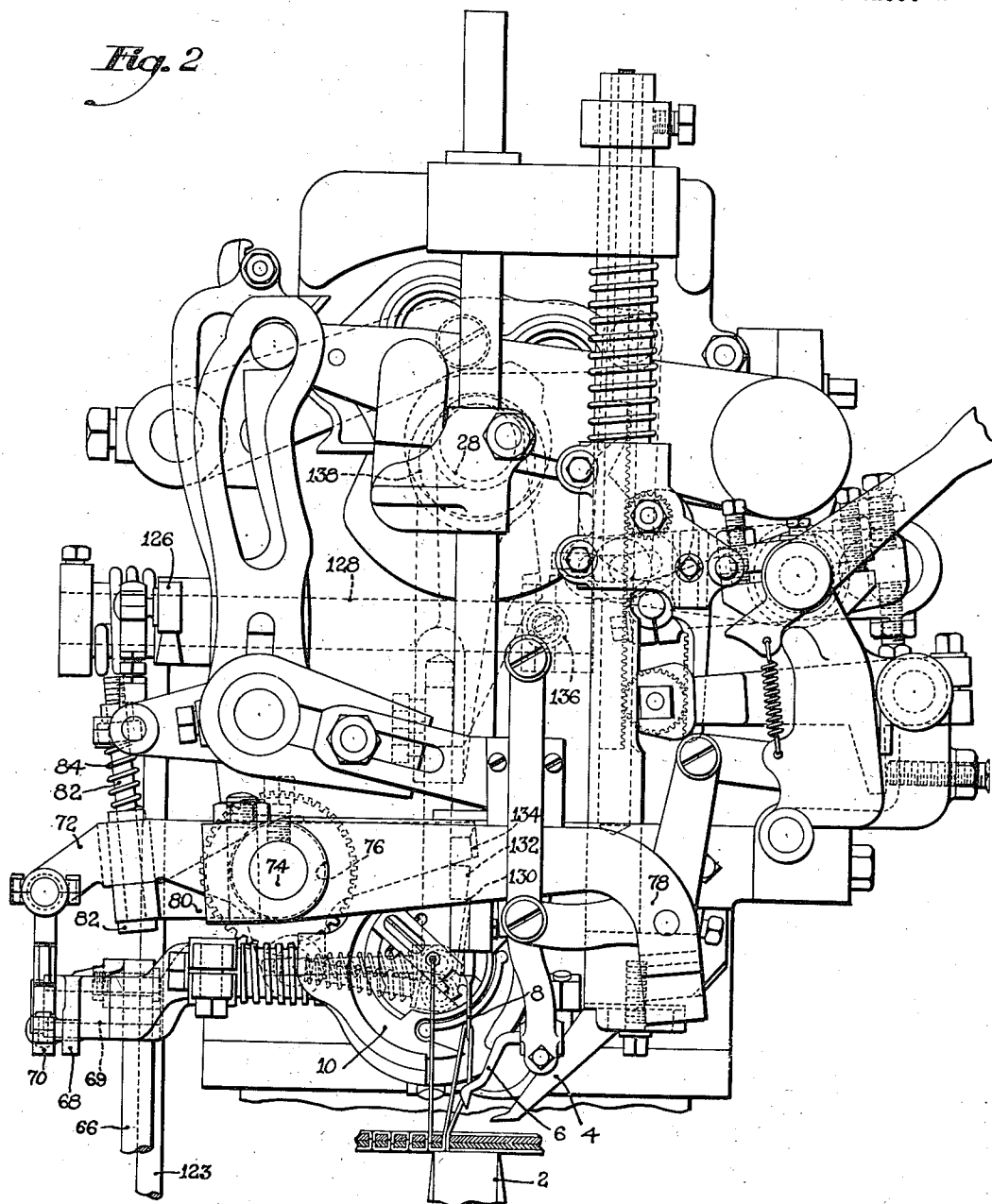
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SEWING MACHINE

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Fig. 2



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SEWING MACHINE

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Fig. 3

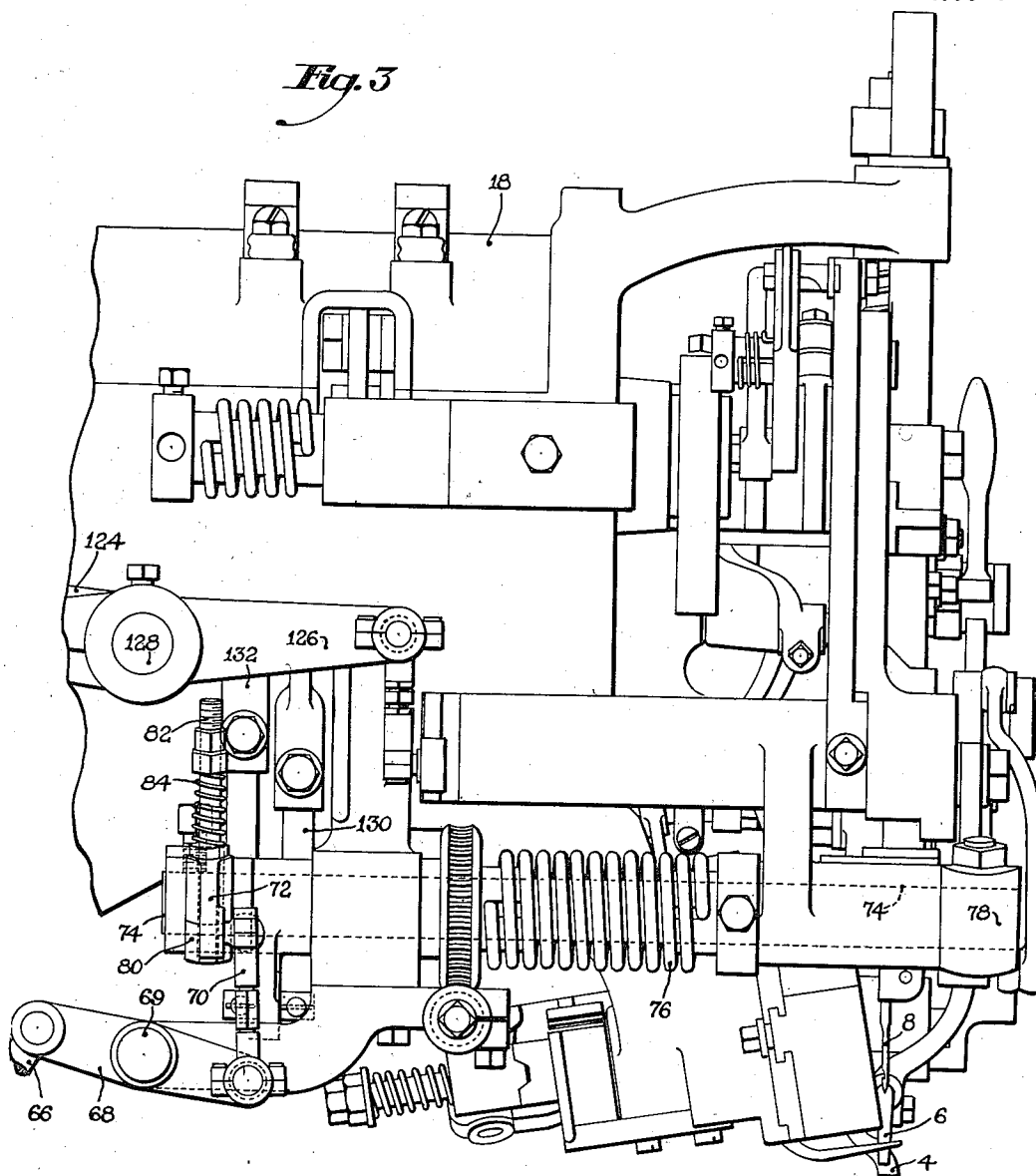
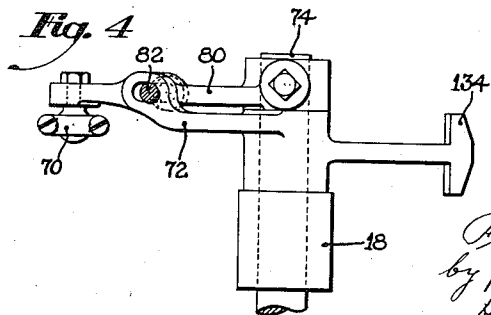


Fig. 4



Witness

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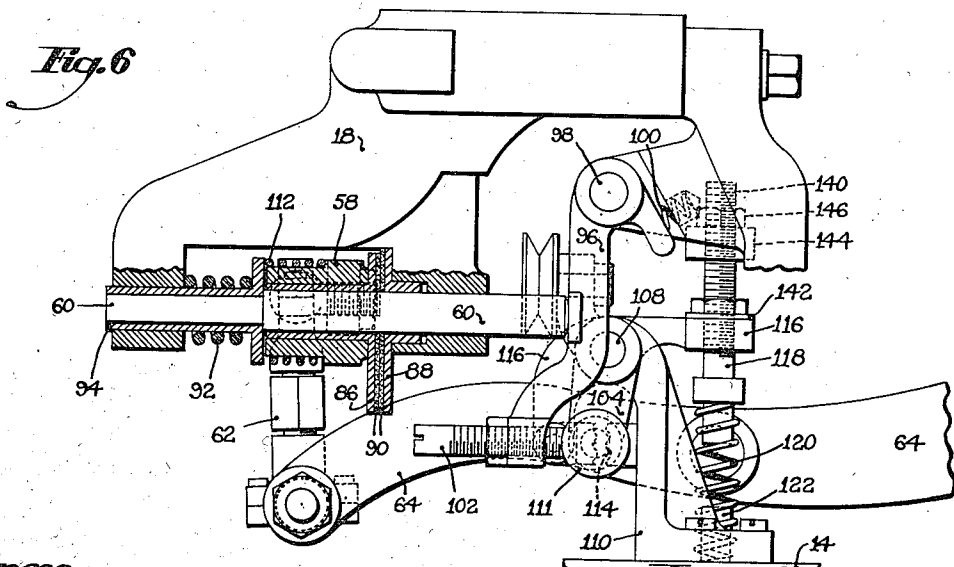
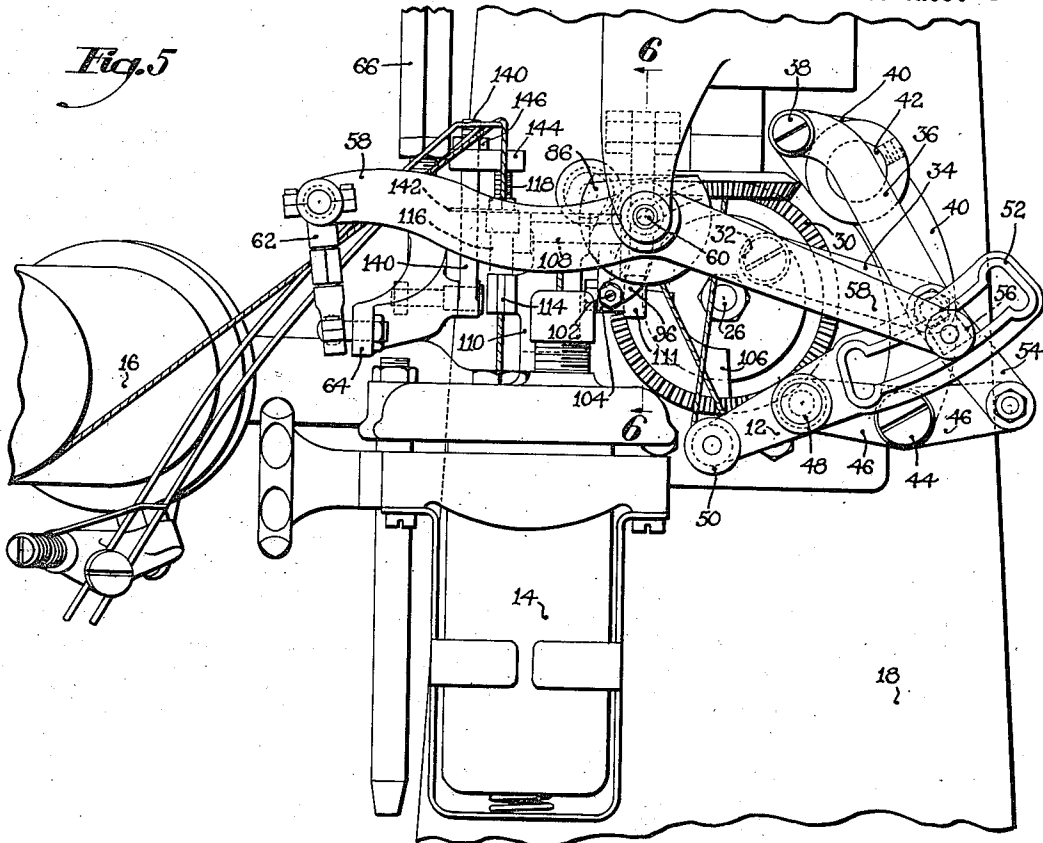
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SEWING MACHINE

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SEWING MACHINE

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Fig. 8

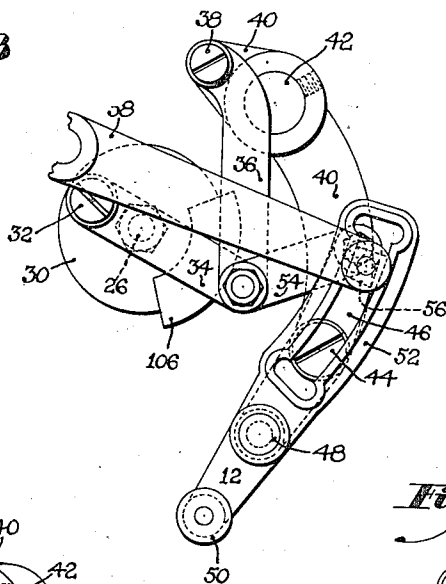


Fig. 9

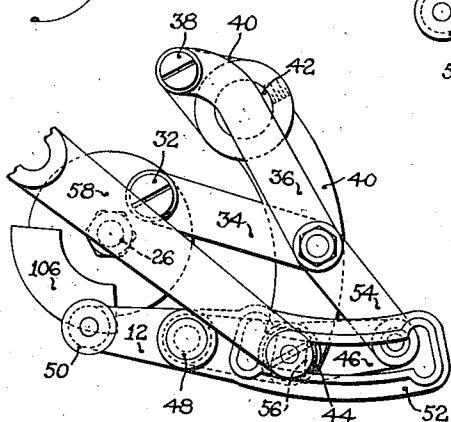


Fig. 10

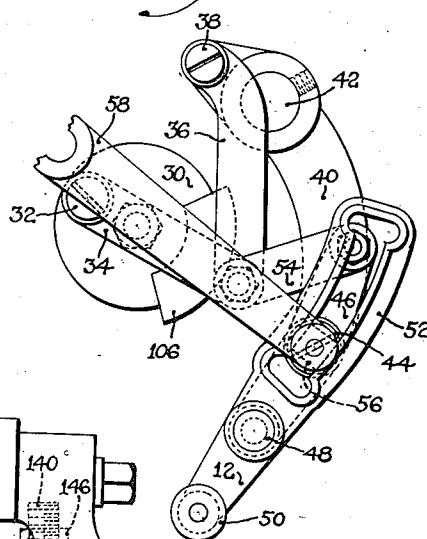
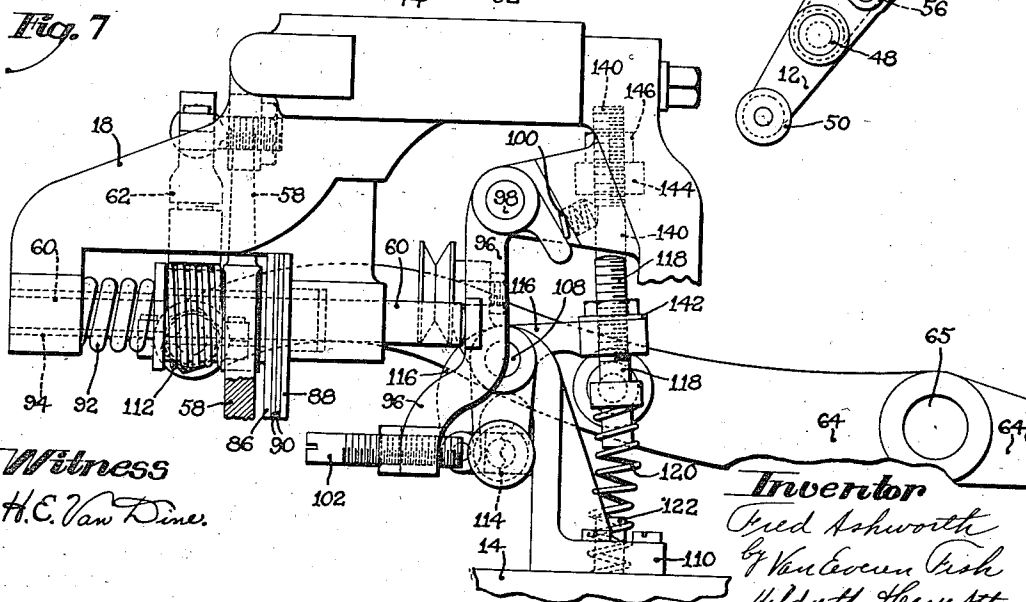


Fig. 7



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UNITED STATES PATENT OFFICE

2,011,604

SEWING MACHINE

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Application November 10, 1932, Serial No. 642,057

14 Claims. (Cl. 112—57)

The present invention relates to lockstitch shoe sewing machines and is herein shown as embodied in a sole sewing machine of the so-called McKay type, the stitch-forming devices of which comprise a straight hook needle, a shuttle and a take-up, and the work support of which consists of a rotatable horn arranged to extend within the shoe and provided with a needle threading device for laying the thread in the hook of the needle. Some of the features of the invention, however, are of more general application, being susceptible to advantageous use in other types of sewing machines.

The object of the invention is to simplify and improve the mechanism for operating the stitch-forming devices, particularly with relation to the take-up, so that the stitches may be formed and set uniformly in the work, regardless of variations in thickness.

With this object in view, one of the features of the invention contemplates the provision in a sewing machine having a hook needle, a loop taker and a take-up, of a new and improved arrangement for measuring the thread in accordance with the thickness of the work by varying the action of the take-up in withholding thread while the thread is being drawn from the take-up and the supply by others of the stitch-forming devices. Broadly considered, this feature of the invention includes the use of any suitable means for varying the action of the take-up in yielding up thread. In the construction hereinafter described, operating mechanism for the take-up is provided which may be regulated to vary the action of the take-up at that time during each stitch-forming cycle of the machine in which the minimum quantity of thread is withheld from the other stitch-forming devices.

So far as applicant is aware, it is new also to vary the actual movement of a positively operated take-up during the continued operation of a sewing machine without regard to the function performed, whether it be for drawing off thread, setting the stitch, or for other operations. From this aspect, the invention, as embodied in the machine described hereinafter, comprises means for changing automatically the stroke of the take-up as the work varies in thickness.

Preferably the thread is drawn from the supply by the loop taker in passing the locking thread through the needle loop. The action of the take-up, according to the present arrangement is controlled by connections to the presser-foot and a thread lock may be provided to cause the stitch to be set by the take-up while in its lowermost or

maximum thread withdrawing position. In the form shown, the connections from the presser foot to the take-up actuating mechanism may be rendered inoperative while the work is being fed. For this purpose the connections are arranged to yield, and means is provided for locking the connections to prevent change in the movement of the take-up while the presser foot releases the work.

As is usual in sewing machines when brought to rest, the presser foot is raised a considerable distance from the work in order to release it. In the illustrated machine, means are provided for permitting the connections for varying the take-up movement to operate when the machine is stopped so that upon restarting the machine the take-up may cause a suitable length of thread to be drawn from the supply for the initial stitch.

These and other novel combinations and arrangements of parts hereinafter described and claimed will be readily understood by those skilled in the art from the following description in connection with the accompanying drawings, in which; Fig. 1 is a view in side elevation of a machine embodying the features of the present invention; Fig. 2 is a view in front elevation on an enlarged scale of the sewing head of the machine illustrated in Fig. 1; Fig. 3 is a view in side elevation on the same scale as Fig. 2 of the front part of the sewing head; Fig. 4 is a detail plan view of the arrangement of certain levers in the sewing head; Fig. 5 is a view in front elevation on an enlarged scale of the take-up and thread supply devices; Fig. 6 is a view in side elevation and on a still further enlarged scale and partly in section of a portion of the mechanism along the line 6—6 in Fig. 5; Fig. 7 is a view of the parts shown in Fig. 6 in a slightly different position; and Figs. 8, 9 and 10 are views in front elevation of the take-up actuating mechanism in different operating positions.

The machine illustrated in the drawings is a lockstitch shoe sewing machine of the McKay type, similar in many respects to the machines illustrated and described in the application of Bernard T. Leyeque, Serial No. 169,203, filed February 18, 1927 upon which Patent No. 1,885,927 issued November 1, 1932, and in the application of the present applicant Serial No. 394,770, filed September 24, 1929 upon which Patent No. 1,914,936 issued June 20, 1933. In this machine the shoe is supported upon a rotary horn 2 arranged to extend within the shoe which is held in engagement with the horn by a presser foot 4 acting alternately with a feed point 6 to grip and

feed the shoe while the stitch-forming devices act to form a seam. The stitch-forming devices comprise a straight hook needle 8, a loop taker in the form of a shuttle 10, and a take-up 12, the needle thread being passed through a wax pot 14 from a supply reel 16 arranged substantially the same as in applicant's co-pending application for U. S. Patent Ser. No. 623,386, filed July 19, 1932.

The main frame of the machine, indicated at 18, supports the various stitch-forming and work holding devices and their actuating mechanisms, the actuating mechanisms being operated through a vertical driven shaft 20 connected by gears 22 and 24 to horizontal shafts 26 and 28, respectively. Rotation of the shaft 20 is controlled by a foot treadle 29 through suitable driving and stopping mechanisms.

The stitch-forming devices in the machine illustrated act to form a lock-stitch by passing the needle through the work and into the tip of the horn where it receives the thread from a whirl (not shown) thereafter retracting with a loop of thread which is spread and engaged with the beak of the shuttle. The shuttle then draws a further supply of thread through the work and passes the needle loop about the locking thread contained in the shuttle. After the shuttle has substantially passed through the needle loop the take-up acts to draw the thread from the shuttle back towards the work, and as the take-up reaches its lowermost thread retracting position the stitch is drawn into the work and set.

According to the present invention, the actuating mechanism for the take-up lever is arranged to be regulated automatically and to cause the stitch to be set a uniform distance below the surface of the work regardless of the thickness of the work. The upper thread yielding position of the take-up is varied, but the lowermost thread retracting position of the take-up in which the stitch is set is always the same, so that if a length of thread is drawn from the supply in sufficient amount to form a stitch with the lock at a uniform depth in the work according to the thickness of the work, then the stitch will be set at the proper point in the lowermost position of the take-up. This arrangement permits the take-up to function for two purposes, namely, to set the stitch and to cause the thread to be measured off for the succeeding stitch, by the action of the other stitch-forming devices in passing the needle loop about the shuttle when the take-up is in its upper position, thus obviating the necessity for a separate pull-off and reducing the friction of thread engaging the thread manipulating devices between the supply and the work.

The take-up 12 is actuated in timed relation with the movements of the other stitch-forming devices by a system of levers connected to be operated by the horizontal shaft 26. The shaft carries at its outer end a gear 30 on one side of which is threaded a screw 32 acting as a crank for operating the take-up mechanism. The screw 32 passes loosely through one end of a link 34 pivotally connected at its other end to an arm 36 rotatable about a screw 38, threaded into one arm of a fixed bracket 40. The bracket 40 is secured by any suitable means to a fixed shaft 42 mounted in the frame 18, and the other arm of the bracket carries a fulcrum screw 44 for a lever 46. The lever 46 carries on one arm a stud 48 forming the fulcrum for the take-up 12 which is in the form of a lever having a take-up pulley 50 at one end and an arcuate slotted portion 52 at the other end. The other arm of the lever 46 is connected

by a link 54 to the pivot between the link 34 and the arm 36. As the shaft 26 is rotated, the links 34 and 54 move towards and from a position of alinement and thereby cause the lever 46 to actuate the take-up to retract the thread as it is released from the shuttle. The slotted end of the take-up lever is restrained against movement by a block 56 sliding in the slotted portion 52 and pivoted to one end of a lever 58. The lever 58 is fulcrumed on a shaft 60 loosely mounted in a fixed part of the frame of the machine, and while no variation occurs in the thickness of the work, the block 56 is held stationary, causing the lever 12 to rock and slide about the block 56 at the end of the lever. The arcuate slot of the portion 52 of the take-up is so arranged that its center of curvature will coincide with the center of the shaft 60 about which the lever 58 is fulcrumed when the take-up is in its lowermost thread retracting position, as shown in Figs. 8 and 10. The take-up will, therefore, always move to the same lowermost position regardless of the position of the lever 58.

The stroke of the take-up is varied by rocking the lever 58 about the shaft 60 to cause the block 56 to be shifted along the slotted portion 52 of the take-up. Accordingly, the arm of the lever 58 opposite the pivoted block 56 is connected by a link 62 to one arm of a lever 64 pivoted at 65 on the machine frame. The other arm of the lever 64 is connected by a link 66 to a lever 68 fulcrumed on a fixed stud 69 in the sewing head and operated by the movement of the presser-foot. The lever 68 is connected to move with the presser-foot as it approaches the surface of the work by a link 70 connected between the lever 68 and a lever 72 (see Fig. 4) fulcrumed loosely on a horizontal shaft 74. The shaft 74 carries the usual spring 76 for resiliently maintaining the presser-foot in engagement with the work through an arm 78 fixed to the shaft 74 and connected at its outer end with the presser-foot as described in Patent No. 1,914,936.

A yielding connection is provided between the shaft 74 and the lever 72, so that when the presser foot 4 is raised from the work the lever 58 for changing the stroke of the take-up will not be rocked. This connection comprises an arm 80 fixed to the shaft 74 and underlying the outer arm of the lever 72, a bolt 82 passing through the end of the arm 80 and a portion of the lever 72, and a compression spring 84 surrounding the bolt 82, the arrangement being such that the arm 80 engages the lever 72 while the presser-foot engages the work, but the presser-foot may be raised from the work without operating the lever 72 on account of the yielding action of the spring 84.

To prevent rocking of the lever 58 while the work is released from the presser-foot and the feed point 6 is acting to feed the work, friction means are brought into operation for locking the lever 58 against movement while the presser-foot releases the work. For this purpose a pair of disks 86 and 88 loosely surround the shaft 60 and are provided with inter-engaging friction facings 90. The disk 86 is formed with a bushing extending through and acting as a bearing secured to the lever 58 and the disk 88 is formed with a collar portion fixed to the frame portion of the machine. The disks are thrust into locking engagement with each other by a coiled spring 92 on a slidable sleeve 94 surrounding a reduced end of the shaft 60 and acting between the bearing for the shaft and a collar at the end of the

sleeve 94 to compress the disk 86 against the disk 88.

To release the lever 58 for operation, the shaft 60 is provided with a shoulder at the end of the reduced portion (see Fig. 6) and the shaft is shifted longitudinally of its axis, forcing the shoulder against the sleeve 94 to compress the spring 92 by an arm 96 actuated in timed relation to the operation of the other stitch-forming devices. The arm 96 is pivotally mounted on a pin 98 carried by the frame of the machine and is maintained yielding in engagement with the inner end of the shaft 60 by a spring 100 compressed between a portion of the arm and a part of the frame of the machine. The free end of the arm 96 carries an adjustable set screw 102 for engaging an arm 104 operated by a cam projection 106 on the gear 30. The arm 104 is fixed to a short shaft 108 journaled in a bracket 110 mounted on the cover of the wax pot 14. The free end of the arm 104 carries a roller 111 for engaging the cam 106 and for shifting the shaft 60 longitudinally in accordance with the operation of the other stitch-forming devices. To prevent displacement of the lever 58 along the shaft 60 when the pressure of the spring 92 is released, a comparatively weak spring 112 surrounds a reduced portion of the hub of the lever 58 and is compressed between the lever and the collar on the sleeve 94 so that as the sleeve is moved away from the lever, the lever is maintained in position by the spring 112 and a slight frictional drag between the disks 86 and 88 prevents erratic movements of the lever 58. The uppermost positions of the take-up are by this means definitely determined by the position of the presser-foot on the work during each stitch-forming cycle of the machine.

A length of thread is, therefore, measured during each cycle of operation of the machine for the succeeding cycle of operation according to the position of the take-up 12, and is drawn from the supply by the shuttle in passing through the needle loop. The shuttle requires a fixed length of thread for this operation and acts to draw thread through the wax pot 14 and from the supply 16 in an amount depending upon the thread used in the previous stitch and the position of the take-up in its upper position. Since this position of the take-up is varied by connections to the presser-foot, the length of thread will be measured by the thickness of the work beneath the presser-foot.

A thread lock against which the stitches are set is provided between the thread supply reel 16 and the wax pot 14 at 114. This thread lock comprises a pair of grippers, one of which is fixed to the bracket 110 and the other of which is secured to one arm of a lever 116 fixed on the shaft 108 to be operated by the cam arm 104. The other arm of the lever 116 carries an adjustable set screw 118, the lower end of which is formed with an enlargement and is surrounded by a spring 120 compressed between the enlargement on the set screw and a stud 122 on the wax pot cover to maintain the thread lock 114 in locking position (see Fig. 7). The thread lock is released by the cam projection 106 when it engages the roller 111 on the arm 104, so that the necessary length of thread for each stitch may be drawn from the supply reel 16 by the shuttle in passing the locking thread through the needle loop. At this same time the take-up is in its upper thread releasing position and may assume an intermediate position between the limits of its variation. When the

work is of maximum thickness the greatest amount of thread is drawn from the supply and the take-up is in the lowest thread releasing position shown in Fig. 5, and while work of minimum thickness is being operated upon, or the presser-foot rests directly upon the upper surface of the horn, the take-up occupies an extreme upper position, as shown in Fig. 9.

When the machine is brought to rest at the end of a seam, the presser-foot is raised from engagement with the work, as shown in Fig. 2, and the lever 58 for regulating the stroke of the take-up is released from the locking effect of the friction disks 86 and 88. The machine is brought to rest by releasing the treadle 29, disconnecting the driven shaft 20 from the driving connections as described in Patent No. 1,885,927, above referred to. The release of the treadle 29 also causes the presser-foot to be raised through connections from the treadle, including a link 123, an arm 124 and a lever 126 on a shaft 128, a retracting hook member 130, a retaining hook member 132, both suspended from the shaft 28 in the sewing head, and a T-shaped arm 134 of the lever 72 loosely supported on the shaft 74. The lever 126 is made fast to the shaft 128, and when the arm 124 loose on the shaft is raised through the release of the foot treadle 29, a projection on the arm engages a portion of the lever 126 and causes the shaft 128 to be rocked in a clockwise direction to a position shown in Fig. 1. The inner end of the shaft 128 carries a roll 136 which, during sewing, engages a cam surface on the retaining member 132 and holds both the retracting member 130 and the retaining member 132 out of engagement with the T-shaped arm 134 of the lever 72 substantially as in the construction disclosed in Patent No. 1,885,927. When the shaft 128 is rocked by release of the treadle, the retracting member 130 which is suspended from an eccentric 138 mounted on the shaft 28 is permitted to engage the T-shaped arm 134 of the lever 72. During the continued rotation of the shaft 28 the retracting member rocks the lever about the shaft 74 and causes the outer end of the lever to engage the arm 80 fast on the shaft 74, thus rocking the shaft. Rocking of the shaft 74 raises the presser-foot by reason of the arm 78 on the outer end of the shaft connected with the presser-foot and the presser-foot is retained in raised position by the retaining member 132, as shown in Fig. 2. The movement of the lever 72 is also transmitted to the take-up actuating mechanism through the connections comprising the link 70, the lever 68, the link 66 and the lever 64 to cause the outer end of the lever 64 to be depressed.

For releasing the pressure of the spring 92 against the friction disks 86 and 88, at the end of a seam, the lever 64 is provided with a stud bolt 140 pivotally connected at its lower end to an intermediate portion of the lever 64 and guided at its upper end by an opening in a plate 142 (see Fig. 5) secured to the adjusting bolt 118 carried by the lever 116 for operating the thread lock. On the upper end of the bolt 140 is threaded a block 144 secured in place by a lock-nut 146 on the bolt. The block 144 projects laterally from the bolt 140 to overlie the upper end of the bolt 118 carried by the lever 116 for operating the thread lock so that when the outer end of the lever 64 is depressed, the block 144 will engage the bolt 118 and cause the thread lock 114 to be released. The shaft 108 carrying the lever 116 is also rotated when the block 144 moves downwardly, and the cam arm 104 is rocked

against the set screw 102 carried by the arm 96. This movement causes the shaft 60 to be shifted longitudinally by the arm 96 to release the pressure of the spring 92 from the friction disks 86 and 88, as previously described, so that the lever 58 for regulating the stroke of the take-up is free to move. Since the connections operated as the machine is brought to rest do not include the spring 84, this releasing action is a positive one and the engagement of the friction disks 86 and 88 do not present sufficient drag to prevent the movement of the lever 58.

When the machine is restarted by depressing the treadle 29, the connections from the treadle operate to withdraw the retracting member 130 and the retaining member 132 from engagement with the T-shaped arm 134 of the lever 72, which permits the presser-foot to engage the work and causes the lever 58 to move into such position as will produce the proper movement of the take-up to cause thread to be measured for the initial stitch. Subsequently, the connections between the presser-foot and the take-up actuating mechanism operate in the same way as previously indicated.

The nature and scope of the invention having been indicated and an embodiment of the invention having been specifically described, what is claimed is:

1. A sewing machine having, in combination, stitch-forming devices including a hook needle, a loop taker, and a take-up for drawing a loop of thread from the loop taker, and means acting as the work operated upon varies in thickness to vary from one stitch-forming cycle to the next, the quantity of thread withheld by the take-up while the thread is being drawn from the supply by others of the stitch-forming devices.

2. A sewing machine having, in combination, stitch-forming devices including a hook needle, a loop taker, and a take-up for drawing a loop of thread from the loop taker, and means acting as the work operated upon varies in thickness to vary from one stitch-forming cycle to the next, the position of the take-up in which the minimum quantity of thread is withheld from the other stitch-forming devices in the respective cycles.

3. A sewing machine having, in combination, stitch-forming devices including a hook needle, a loop taker, and a take-up for drawing a loop of thread from the loop taker towards the work, and means acting during operation of the machine for varying the movement of the take-up relatively to that of the loop taker to cause the quantity of thread held aside thereby to change between successive cycles of operation of the machine.

4. A sewing machine having, in combination, stitch-forming devices including a hook needle, a loop taker, and a take-up for drawing a loop of thread from the loop taker towards the work, and means acting during operation of the machine to vary the movement of the take-up relatively to that of the loop taker as the work operated upon varies in thickness.

5. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a thread supply, a loop taker, a take-up for drawing a loop of thread from the loop taker towards the work, a thread lock acting during the thread drawing stroke of the take-up to cause the stitch to be set, and means for causing the loop taker to draw thread from the supply

through the thread lock varying in amount as the work operated upon varies in thickness.

6. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a work support and a presser foot, a loop taker, and a take-up comprising a single thread engaging member, mechanism for actuating the take-up to draw a loop of thread from the loop taker towards the work, and connections between the presser foot and the take-up actuating mechanism for varying the movement of the take-up as the position of the presser foot is varied by engaging different thicknesses of the work.

7. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a work supporting horn and a presser foot, a loop taker, a take-up and means for releasing the presser foot from the work and for feeding the work while the presser foot is released, mechanism for actuating the take-up to draw a loop of thread from the loop taker towards the work, connections between the presser foot and the take-up actuating mechanism for varying the thread drawing stroke of the take-up as the position of the presser foot is varied by different thicknesses of the work, and means for rendering the connections to the take-up actuating mechanism inoperative to vary the thread drawing stroke of the take-up while the presser foot is released from the work.

8. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a work support and a presser foot, a loop taker, a take-up, and means for releasing the presser foot from the work and for feeding the work while the presser foot is released, mechanism for actuating the take-up to draw a loop of thread from the loop taker towards the work, yielding connections between the presser foot and the take-up actuating mechanism for varying the thread drawing stroke of the take-up as the position of the presser foot is varied by engaging different thicknesses of the work, and means for locking the connections to the take-up actuating mechanism against movement while the presser foot is released from the work.

9. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a work support and a presser-foot, a loop taker, a take-up, and means for releasing the presser-foot from the work and for feeding the work while the presser-foot is released, mechanism for actuating the take-up to draw a loop of thread from the loop taker towards the work, connections between the presser-foot and the take-up actuating mechanism for varying the thread drawing stroke of the take-up as the position of the presser foot is varied by engaging different thicknesses of the work, means for rendering the connections to the take-up actuating mechanism inoperative while the presser foot is released from the work and for rendering the said connections operative when the machine is brought to rest with the presser-foot disengaged from the work.

10. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a loop taker, and a take-up comprising a single thread engaging member for drawing a loop of thread from the loop taker towards the work and a thread lock acting during the thread drawing stroke of the take-up to cause the stitch to be set and to maintain a grip on the thread until the take-up reaches an extreme posi-

tion in its movement, and thereafter to permit a length of thread for the succeeding stitch to be drawn from the supply by the other stitch-forming devices.

5 11. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a loop taker for passing a loop of needle thread about the locking thread, and a take-up, said take-up being movable to two extreme positions, and mechanism for operating the take-up to set the stitch as it reaches one extreme position and to cause sufficient needle thread for the succeeding stitch to be drawn from the supply by the loop taker in passing the loop of thread about the locking thread while the take-up is in its other extreme position.

10 12. A lockstitch sewing machine having, in combination, stitch-forming devices including a hook needle, a thread lock, a loop taker for passing a loop of needle thread about the locking thread, and a take-up, said take-up being movable to two extreme positions, and mechanism for operating the take-up to set the stitch as it reaches one extreme position while the thread lock grips the thread and to cause sufficient needle thread for the succeeding stitch to be drawn from the supply by the loop taker in passing the loop of needle thread about the locking thread while the take-up is in its other extreme position.

15 13. A lockstitch sewing machine having, in combination, stitch-forming devices including a

shoe supporting horn arranged to extend within the shoe, a straight hook needle, a loop taker for passing a loop of needle thread about the locking thread, and a take-up, said take-up being movable to two extreme positions, and mechanism for operating the take-up to set the stitch as it reaches one extreme position in its movement and to cause sufficient needle thread for the succeeding stitch to be drawn by the loop taker in passing the loop of needle thread about the locking thread while the take-up is in its other extreme position.

14. A lockstitch sewing machine having, in combination, stitch-forming devices including a shoe supporting horn arranged to extend within the shoe, a presser-foot, a straight hook needle, a loop taker for passing a loop of needle thread about the end of the locking thread, and a take-up movable to two extreme positions, mechanism for operating the take-up to set the stitch as it reaches one extreme position in its movement and to cause sufficient needle thread to be drawn by the loop taker in passing the needle loop about the locking thread while the take-up is in its other extreme position, and connections between the take-up actuating mechanism and the presser-foot to cause the amount of thread drawn off by the loop taker to vary as the position of the presser foot is varied by engaging different thicknesses of the shoe.

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