

Dec. 10, 1929.

L. G. BOWMAN

1,738,559

LOOPER MECHANISM FOR SEWING MACHINES

Filed Feb. 15, 1928

2 Sheets-Sheet 1

Fig. 1

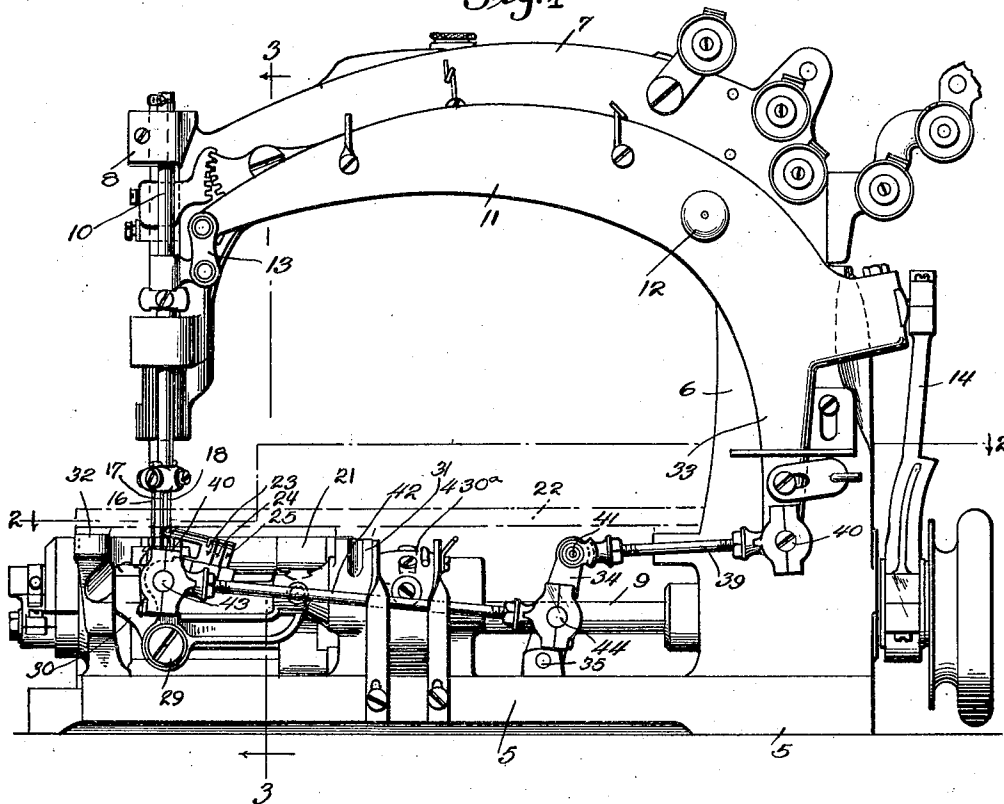
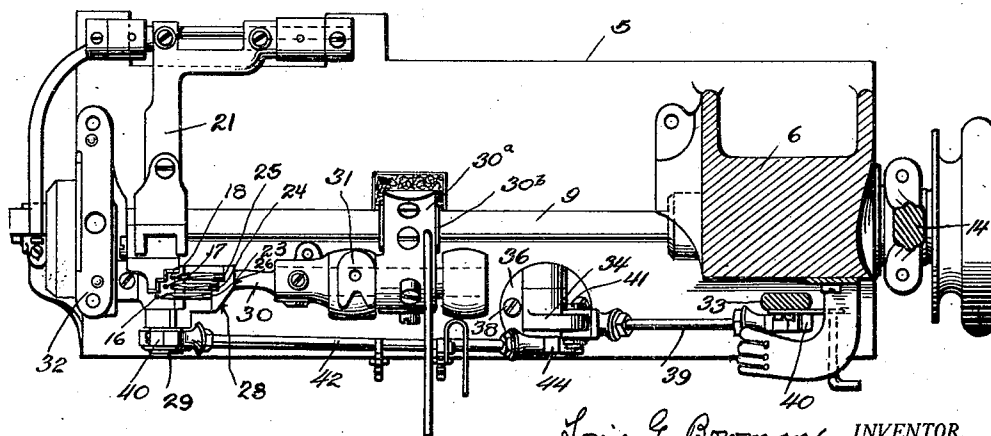


Fig. 2.



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Fig. 3

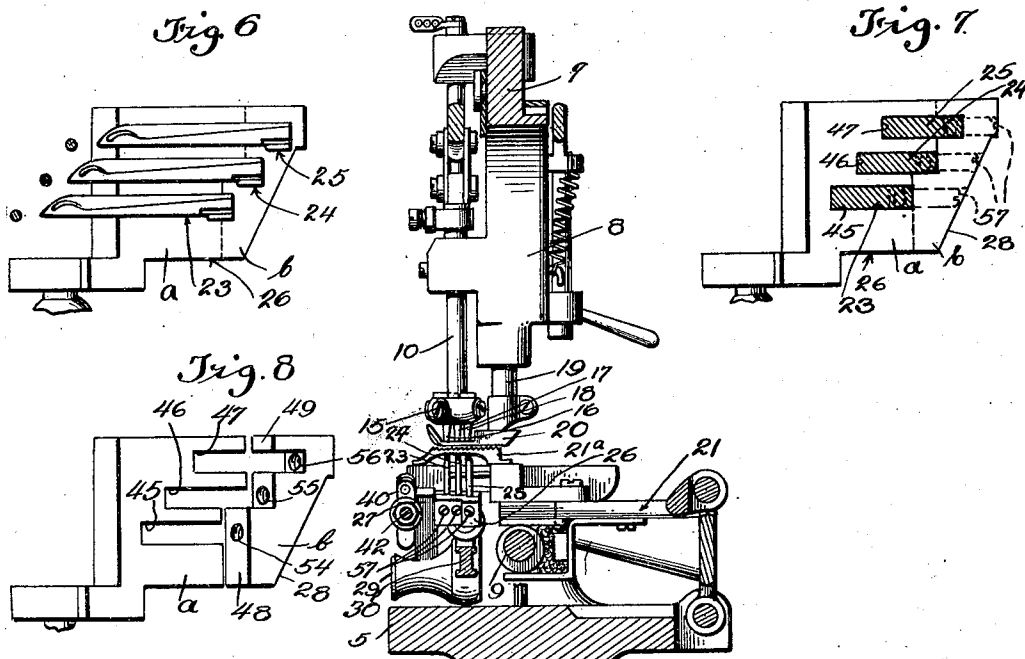


Fig. 6

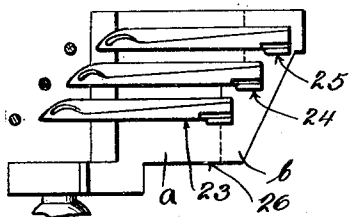


Fig. 7

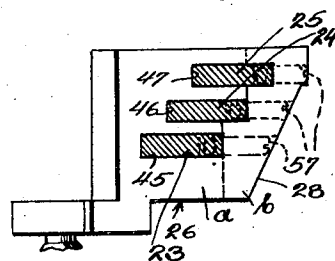


Fig. 8

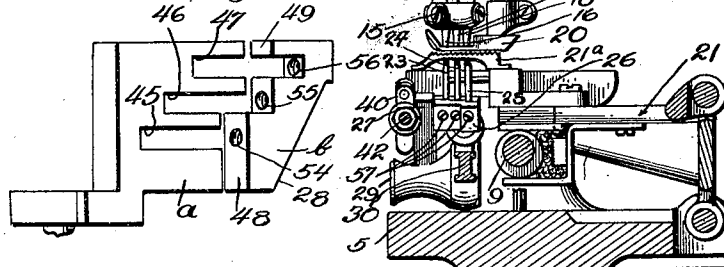


Fig. 4

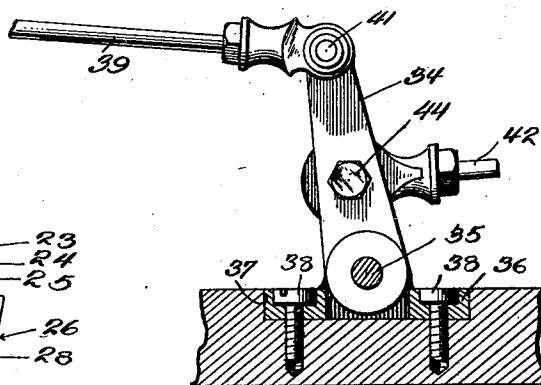


Fig. 5

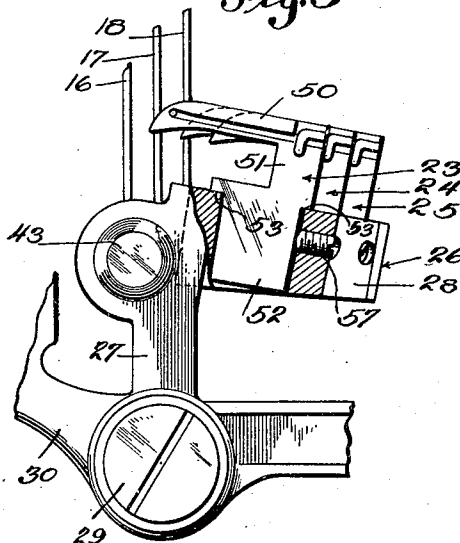
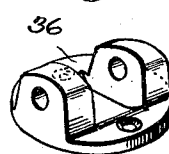


Fig. 9 Louis G. Bowman
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UNITED STATES PATENT OFFICE

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LOOPER MECHANISM FOR SEWING MACHINES

Application filed February 15, 1928. Serial No. 254,506.

This invention relates to new and useful improvements in sewing machines generally, and more particularly to a looper mechanism employed in the formation of multiple lines of Grover and Baker stitches.

Heretofore, in sewing machines of this type, it has been the common practice to impart travels of substantially the same lengths to the needles and to the cooperating threaded loopers, i. e., the needles reciprocated in a vertical plane for a distance approximately one and one-eighth inches and the loopers travelled back and forth for a distance of approximately one inch. It has been thought necessary in order for the needle to cooperate properly with the loopers and looper threads, to either impart such a long travel to the loopers, or to provide an extended period of dwell to the looper at the forward end of the looper travel. I have proved by actual tests that the looper travel may be greatly reduced without the use of a variable travel mechanism and without impairing the efficiency of the stitch forming mechanism. This shorter looper travel embodies two distinct advantages in that it eliminates the hard driving variable mechanism, and avoids the pulling off of excess looper thread from the supply which heretofore required extra thread handling such as special thread take-up devices. It is well understood by those skilled in this art, that the least amount of thread handling should be done in the practical high speed sewing machine.

Furthermore, in multiple line machines particularly, much difficulty has been heretofore experienced in supporting the several loopers on a single holder whereby the points of the loopers will, when the loopers are tightened in the holder, remain in properly spaced relation for cooperation with the associated needles. For instance, each looper holder has been formed with drilled (circular) openings for respectively receiving the round shanks of the loopers. These shanks have been formed with "flats" for engagement by set screws threaded into the holder. It will be readily appreciated that if the "flat" is not positioned at the exact angle, or if during the hardening process the angular rela-

tion between the beak of the looper and the "flat" is varied, or if the set screw holes are not drilled in exact predetermined locations, the spacing distance between the points of the loopers will become varied and as a result the loopers will not cooperate properly with the respective needles. Any one of these conditions results in the necessity of hand filing the "flats" until the ideal condition is obtained.

Furthermore, it has been thought necessary to construct the loopers with shanks offset from the beaks in order to locate a plurality of these loopers within a narrow space on a single holder.

Among the several objects of my invention are to provide a looper mechanism for imparting a much less travel to the loopers and without the necessity of utilizing any variable looper mechanism, and whereby a lesser amount of thread will be pulled from the supply and a resultant less handling of the threads will be effected; to provide loopers and holder therefor which will insure the proper positioning of the loopers relative to the needles, and to provide loopers and holder of a construction which will avoid making the offset shank construction above described and which will permit of greater production at less cost of said loopers and holders.

With these and other objects in view which will more fully appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

In the accompanying drawings which embody one form of my invention:

Fig. 1 is a front elevation of a sewing machine equipped with my invention, the feed dog being omitted and the cloth plate being shown by dotted lines for sake of clearness,

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1,

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1, showing the feed dog in position,

Fig. 4 is an enlarged detail view of the in-

intermediate lever for reducing the looper travel,

Fig. 5 is an enlarged side elevation of the looper holder, showing the loopers thereon and the needles in cooperative relation thereto, the holder being shown partly in section,

Fig. 6 is an enlarged top plan view of the looper holder and the loopers mounted thereon,

Fig. 7 is a similar view but with the loopers removed,

Fig. 8 is a plan view of the looper holder showing the parts in separated relation, and

Fig. 9 is a perspective view of the pivot plate for the intermediate lever.

Like reference numerals designate corresponding parts throughout the several figures of the drawings.

Referring to the drawings in detail, the sewing machine is constructed to form a plurality of parallel lines of Grover and Baker stitches which are otherwise known in the trade as "doubled-locked" stitches and "double-chain" stitches.

The machine generally is of the usual flat bed type except for my construction of looper operating mechanism which forms the subject matter of this application.

The machine embodies a frame consisting of a base 5, a standard 6, and an overhanging arm 7 which terminates at its free end in a head 8. A main rotary shaft 9 is journaled in the frame under the overhanging arm 7 and parallels the latter. The stitch forming mechanism includes a vertically reciprocatory needle bar 10 which is journaled in the head 8 and is reciprocated by a needle lever 11 journaled on the overhanging arm 7 at 12. The left hand end of the lever 11 is connected to the needle bar 10 by a link 13, and the other end of the lever is operatively connected with the main shaft 9 through the medium of an eccentric and connecting rod 14. Fixed to the lower end of the needle bar 10 by means of a needle clamp 15 is a plurality of needles 16, 17 and 18 which are arranged in a vertical plane extending diagonally to the line of feed as shown in Figure 2. Supported by the head 8 and disposed in rear of the needle bar 10 is a presser bar 19 having a presser foot 20 attached to the lower end thereof. Cooperating with the under face of the presser foot 20 to feed the material rearwardly past the needles is a feeding mechanism 21 of the usual 4-motion type and including a feed dog 21^a. A flat and horizontally disposed work support or cloth plate 22 of usual construction is indicated by dotted lines in Figure 1, and is supported on the machine frame. The presser foot 20 and the work support are respectively formed with the usual openings for the needles.

Cooperating with the respective needles 16, 17 and 18 below the cloth plate 22, for the purpose of forming three separate lines of

Grover and Baker stitches are three thread-carrying loopers 23, 24 and 25, each being constructed to carry a looper thread. These loopers are supported and are actuated in a manner to move the same simultaneously about an elliptical path of travel in a substantially horizontal plane. Inasmuch as the movements of the loopers are identical, I will describe the movement of one looper only. Four motions are imparted to the looper, viz., a forward and backward movement known as the looper travel, and a transverse to and fro movement known as the looper side throw. These four movements are compounded to produce the elliptical path of movement referred to above. The looper travel is in a direction or plane at right angles to the line of feed. The looper at the beginning of its cycle is positioned to the right of the associated needle; the looper then moves forwardly while the needle is rising and enters the needle thread loop at the rear of the needle; the looper continues its forward movement and simultaneously the needle continues its upward movement; the looper then returns to its initial position and simultaneously the needle is moved downwardly to its lowermost position. While the needle is above the material being sewed, the feed mechanism 21 functions to feed the material a stitch length.

The three loopers are removably attached to a looper holder 26 which includes a vertically disposed supporting shank 27 and a laterally extending head 28. The lower end of the shank 27 is pivotally connected as at 29 to a looper rocker 30 which is pivoted to upstanding lugs 31, 32 formed on the base 5, whereby said rocker may swing about an axis parallel with the main shaft 9 for the purpose of imparting to the loopers their needle avoiding movements. The pivot 29 of the looper holder has its axis extending at right angles to the longitudinal axis of the main shaft 9, or in other words, in a plane parallel to the line of feed so as to permit the looper holder to be oscillated in a direction for the purpose of imparting the looper travel movement to the loopers. In order to impart the looper travel movement to the loopers, I have connected the looper holder to a downwardly extending arm 33 of the needle lever 11 through the medium of a reducing connection which is disposed under the cloth plate 22. This driving connection includes a vertically disposed lever 34 which is fulcrumed at its lower end on a horizontal pin 35 carried by a plate 36 which is fitted within a recess 37 and held therein by screws 38. The axis 35 of the lever 34 is disposed in a plane parallel to the fulcrum 29 of the looper holder. A connection rod or link 39 is pivotally connected at one end as at 40 to the lower end of the needle lever extension arm 33 and pivotally connected at its other end as at 41 to the upper end of the intermediate lever 34.

A connection rod or link 42 is pivotally connected at one end as at 43 to the looper holder 26 and is pivotally connected at its other end as at 44 to the lever 34 at a point intermediate the fulcrum 35 and the pivotal connection 41 of the driving link 39. By reason of the distance between the fulcrum 35 and the pivot 44 being less than the distance between the fulcrum 35 and the pivot 41, it will be readily apparent that the distance of looper travel will be considerably less than the distance travelled by the pivot 40.

The looper holder 26 is formed with three elongated angular openings or slots 45, 46 and 47. The openings are of uniform size and their major axes are disposed in parallelism extending in planes at right angles to the line of feed. The openings are disposed one behind the other in a plane extending diagonally to the line of feed. In order to easily and accurately manufacture a looper holder of this construction, I form the holder of two parts *a* and *b*, the inner wall of the end portion *b* being formed with offset faces 48 and 49. The face 48 forms an end wall for the opening 45, and the offset face 49 forms an end wall for the opening 46. By this method, it will be apparent that the slots or openings 45, 46 and 47 may be easily formed on a milling machine. After the openings or slots are thus machined, the portions *a* and *b* are united in any suitable manner such as by brazing or the like.

Each looper comprises a beak 50, a neck 51 and a shank 52. The neck and the shank are disposed in the same vertical plane and in the plane of the beak. The shank 52 is angular in cross section to fit within the corresponding opening of the looper holder. The upper end of the shank 52 is provided with spaced shoulders 53, 53 for limiting the downward movement of the shank within the opening of the looper holder, and the shoulders therefore serve to engage the upper surface of the looper holder and thereby accurately position the looper on the holder. The looper holder is formed with three threaded openings 54, 55 and 56 which extend inwardly from the right hand edge of the holder to the respective openings 45, 46 and 47, and mounted in each of said threaded openings is a set screw 57 for engagement with the shank of the associated looper.

From the foregoing, it will be observed that I have provided a looper mechanism for imparting a shorter travel to the loopers; that the looper holder is oscillated from the needle lever extension arm through the medium of a driving connection including an intermediate reducing lever; that I have provided a looper holder and loopers of a construction which will insure the loopers properly cooperating with the needles after the loopers have been originally assembled in the holder without the necessity of refitting

the loopers relative to the holder, and the looper holder is constructed by a method which is not only simple but which insures the utmost accuracy in the formation of the openings for receiving the loopers.

It is of course to be understood that the details of structure and arrangements of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim:

1. In a looper operating mechanism for sewing machines, the combination with a vertically reciprocatory needle, of a lever for reciprocating the needle and provided with a looper-operating arm, a reciprocatory looper cooperating with the needle, a carrier for the looper, and means for reciprocating the looper for imparting forward and backward movements thereto comprising an intermediate reducing lever, a link directly connected to the looper carrier and to the intermediate lever, and a link directly connected to the intermediate lever and to the looper-operating arm of the needle lever, the point of connection between the second link and the intermediate lever being located intermediate the fulcrum of the lever and the point of connection between the first link and the lever.

2. In a looper operating mechanism for sewing machines, the combination with a frame including a base, a standard, and an overhanging arm carried by the standard, of a work-support mounted on the frame between the base and arm, a needle mounted on the arm for vertically reciprocatory movements, a lever fulcrumed on the arm for reciprocating the needle and including a looper-operating arm extending downwardly to a point below the work support, a reciprocatory looper cooperating with needle below the work support, and means for imparting forward and backward movements to the looper comprising an intermediate reducing lever fulcrumed on the base, and links respectively connected to the looper and to the lower end of the looper-operating lever and having direct pivotal connections with the intermediate lever at different distances from the fulcrum thereof.

3. In a looper mechanism for sewing machines, the combination of a feeding mechanism and a stitch forming mechanism including a plurality of needles arranged in a vertical plane diagonal to the line of feed, a looper holder formed with a plurality of angular openings arranged side by side and in a vertical plane parallel to the plane of the needles, thread-carrying loopers respectively provided with angular shanks fitting within the angular openings of the looper holder, and means for moving the loopers into and out of the respective needle thread

loops in a direction at right angles to the line of feed.

4. In a looper mechanism for sewing machines, the combination of a feeding mechanism and a stitch forming mechanism including a plurality of needles arranged in a vertical plane diagonal to the line of feed, a looper holder formed with a plurality of angular openings arranged side by side and in a vertical plane parallel to the plane of the needles, thread-carrying loopers respectively provided with beaks and shanks, the shanks being arranged in the same general planes as the beaks and being angular in cross-section for fitting within the angular openings of the looper holder, set screws threaded into the holder and respectively arranged in alinement with the openings for clamping the loopers against movement relative to the holder, and means for moving the loopers into and out of the respective needle thread loops in a direction at right angles to the line of feed.

In testimony whereof I hereunto affix my signature.

LOUIS G. BOWMAN.