Jan. 11, 1938. J. V. POOLE 2,105,097

SEWING MACHINE WITH ROLLER FEED

Filed June 12, 1935 2 Sheets-Sheet 1

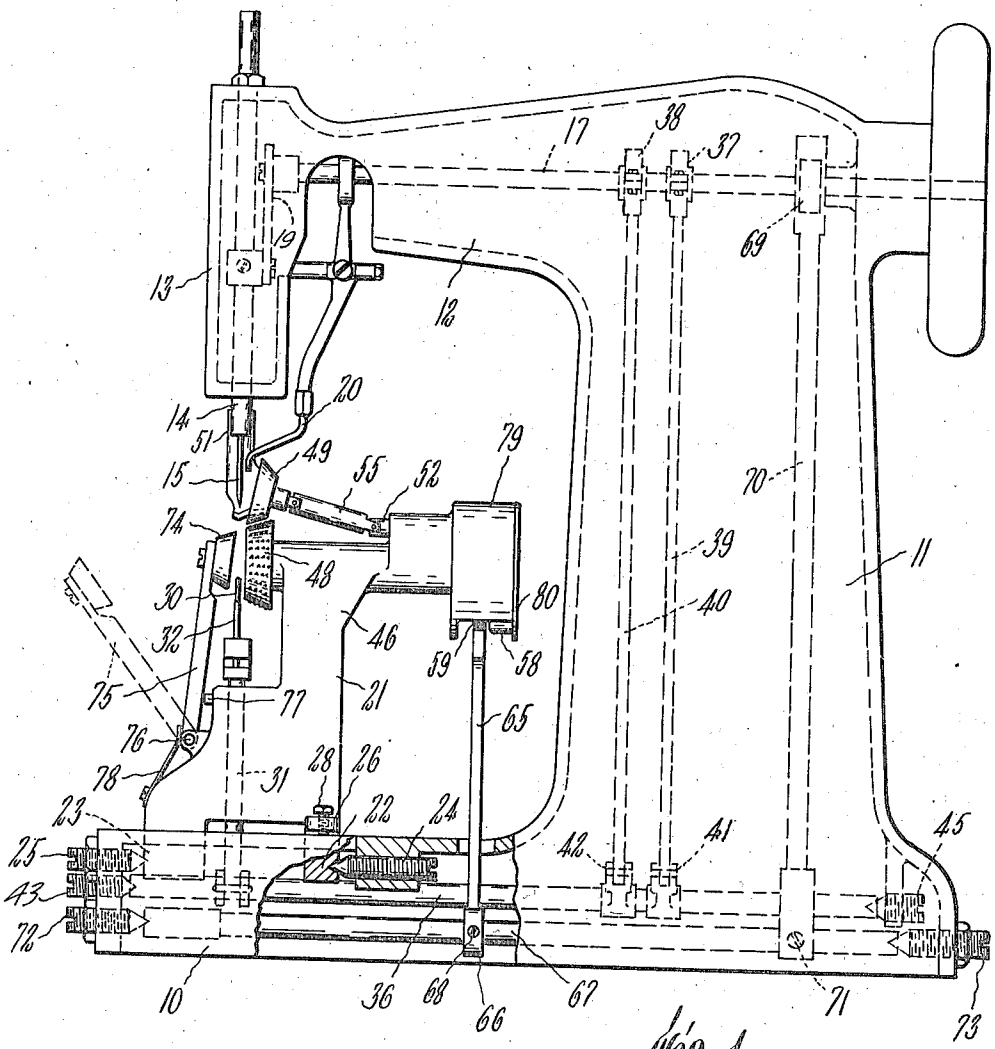


Fig. 1.

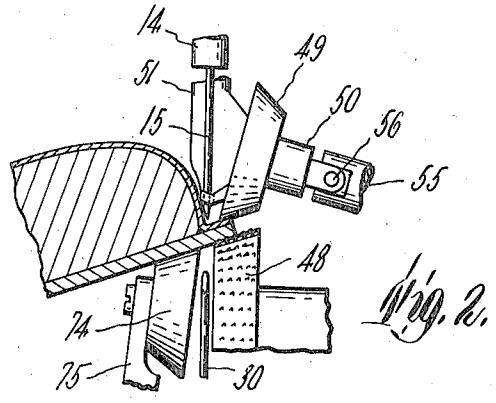


Fig. 2.

Inventor
Jesse V. Poole
by Wright, Brown, Quinby & May
Attys.

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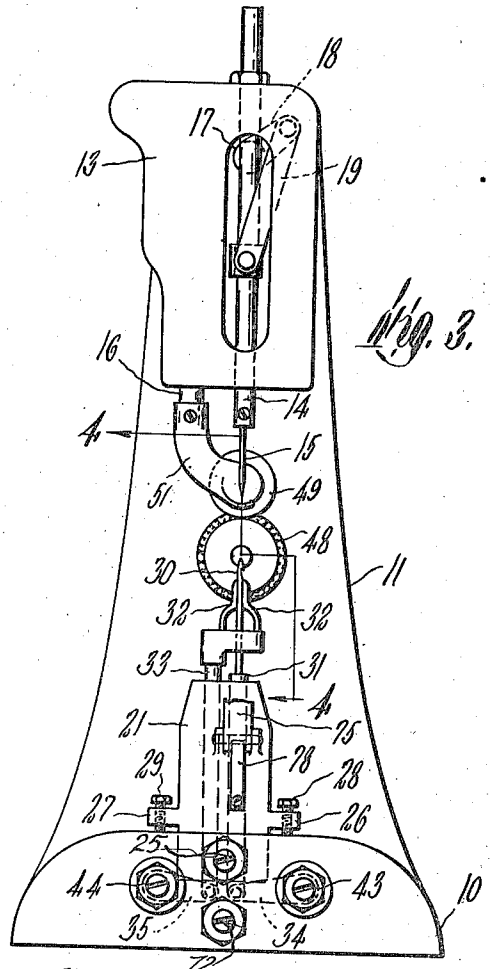


Fig. 3.

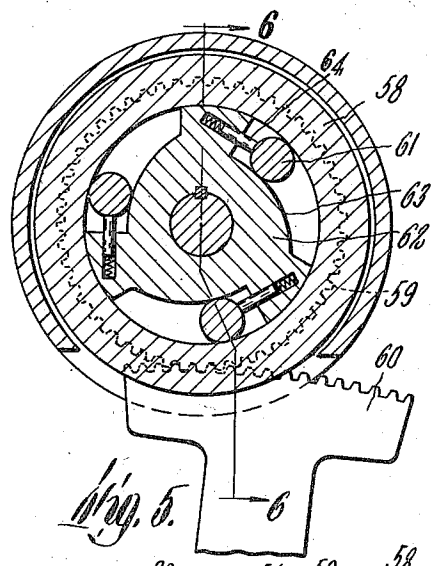


Fig. 5.

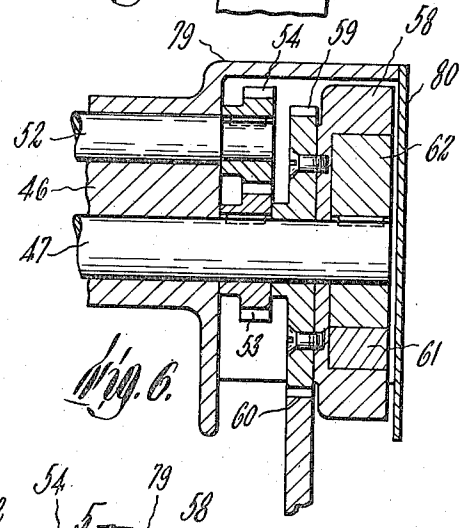


Fig. 6.

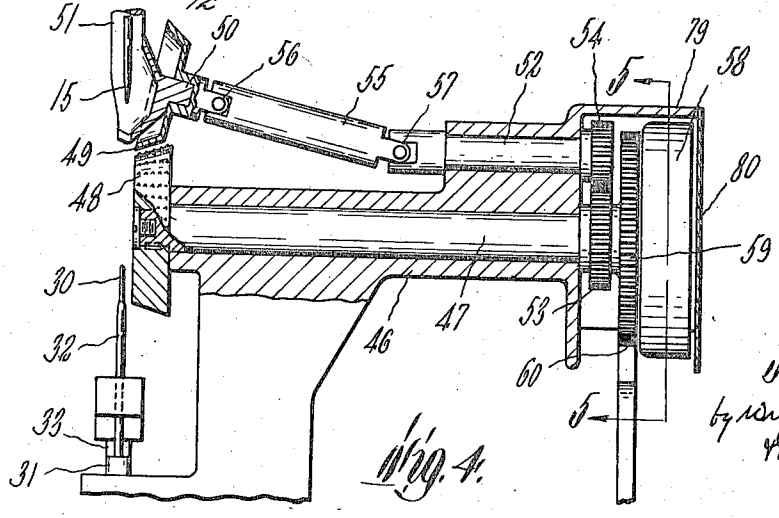


Fig. 4.

Inventor
Jesse V. Poole
by Wright, Brown, Quinby & May
Attys.

UNITED STATES PATENT OFFICE

2,105,097

SEWING MACHINE WITH ROLLER FEED

Jesse V. Poole, Abington, Mass., assignor to Puritan Manufacturing Company, Boston, Mass., a corporation of Massachusetts

Application June 12, 1935, Serial No. 26,173

9 Claims. (Cl. 112—47)

This invention relates to sewing machines. Its general object is to provide an improved roller feed for the work in combination with stitch-forming mechanism. A further and more specific object is to furnish an attachment capable of being applied to commercial sewing machines of a type now widely used, in order to substitute an intermittent roller feed in place of the feed heretofore effected by means of the needle.

The type of commercial machine above referred to is one that has long been made and sold by the Puritan Manufacturing Company, which embodies principles of the patent to Heber C. Peters, No. 711,909, dated October 21, 1902, with improvements in design. The work supporting means of that machine comprises a stationary standard with a table or work engaging surface on its upper end. A presser foot above the table intermittently grips the work while the awl and needle pass through it and the awl withdraws. The needle and cast-off operate beneath the work supporting surface, being carried by an oscillating frame, in which they have endwise movement for their stitch-forming function, and the frame is moved back and forth laterally for feeding the work while the needle is engaged with it, and returning the needle to starting position after withdrawal.

The embodiment of the present invention hereinillustrated comprises a support adapted to be substituted for the work support and oscillating needle carrier of the commercial machine. Such support holds feed rolls and part of the means for rotating such rolls, and it guides the needle and cast-off in the movements by which the latter cooperate with a thread looper in forming stitches. The invention comprises not only the specific embodiment thus outlined but also all novel equivalents thereof embodied in work feeding rolls and the combination of such rolls with stitch-forming mechanism, work clamping presser foot, etc.

In the drawings,—

Figure 1 is a side elevation, with parts broken away and shown in section, of a standard chain stitch sewing machine having my roller feed mechanism applied thereto.

Figure 2 is a fragmentary elevation on a larger scale of the feeding rolls, the awl and the needle of the sewing machine in operation on a work piece.

Figure 3 is a front elevation of the sewing machine as seen from the lefthand side of Figure 1.

Figure 4 is a detail sectional view of the feed mechanism taken on line 4—4 of Figure 3 and shown on a larger scale.

Figure 5 is a section taken on line 5—5 of Figure 4.

Figure 6 is a section taken on line 6—6 of Figure 5.

Like reference characters designate the same parts wherever they occur in all the figures.

The standard sewing machine to which I have applied this invention comprises a base 10, a standard 11, and an overhanging arm 12 having a head 13 on its end. An awl bar 14 carrying an awl 15, reciprocates vertically in the head and is driven by a main shaft 17 through a crank 18 on the shaft and a connecting rod 19. A presser bar 16 is also mounted in the head and is spring-pressed downward. It may be lifted to permit insertion and removal of the work, by means not here shown and not necessary to be shown, because well understood by all of those acquainted with the art. A looper 20 is operated by a cam on the main shaft to cooperate with the needle in forming the stitches of a chain stitch seam.

In place of the work support and oscillating needle carrier of the commercial machine, I have provided a standard 21 having lugs 22 and 23 on its lower end which are adapted to be passed through openings in the upper side of the base 10 and to be engaged and held by cone pointed screws 24 and 25 mounted in the base, as shown in Figure 1. These are the screws which detachably secure the work support of the commercial machine. The standard is also provided with laterally projecting lugs 26 and 27 through which pass adjusting screws 28 and 29 arranged to bear on the upper surface of the base for adjusting the standard angularly about the axis of the screws 24 and 25 as needed to bring the needle 30 into correct alinement with the awl.

The needle above mentioned is mounted on the upper end of a bar 31 adapted to reciprocate endwise in a guideway formed in the standard. The cast-off fingers 32 embrace the needle and are carried by a bar 33 which reciprocates in the standard 21 beside and parallel to the needle bar 31. These bars are thus reciprocated by arms 34 and 35 (see Fig. 3) carried respectively by parallel shafts, one of which is shown at 36 in Figure 1. These shafts are oscillated independently of one another by cams or eccentrics 37 and 38 on the main shaft acting through links 39 and 40 coupled to arms 41 and 42. One of the latter arms is secured to the shaft which carries arm 34 and the other to the shaft which carries arm 35. The latter shafts are supported at their ends

by cone pointed screws 43 and 44 in the front of the base, and corresponding screws at the rear, one of which is shown at 45 in Figure 1.

The upper part of standard 21 includes a bearing sleeve 46 in which is mounted a shaft 47 extending horizontally in a front to rear direction. The forward end of this shaft carries a feed roll 48. A co-acting feed roll 49, which may be considered also as a rotary gripper or presser foot, and the only presser foot of the machine, is carried by a pivot stud 50 on the rear side of a shank 51 which is secured to the presser bar 16. The roll or presser 49 is coupled by flexible driving connections with a shaft 52 mounted in the standard 21 parallel to shaft 47, in driven connection with the latter by gears 53 and 54. Such flexible driving connections in this illustration comprise an intermediate shaft section 55 connected at one end to the roll 49 by a universal joint 56 and at its other end to shaft 52 by a universal joint 57.

Intermittent rotation is imparted to the shaft 47 by a one-way clutch 58, a gear 59 connected to one end of the clutch and a gear segment 60 enmeshed with gear 59. Among the various known types of clutch which might be used for this purpose, I have chosen one of the roller type consisting of a centrally recessed disk, designated by the numeral 58, clutch rollers 61 and an inner disk 62. Disk 58 is secured to gear 59 and turns freely on the shaft. Its rim surrounds disk 62, which is keyed to the shaft. The rollers co-act between the cylindrical inner surface of this rim and eccentric surfaces 63 of disk 62, depressed within its circumference, in which the rollers are confined. Spring pressed plungers 64 bear on the rollers pushing them toward the contracted ends of the chambers in which they are respectively located. It will be appreciated from the foregoing that the feed rolls are rotated in one direction only and that they are so rotated intermittently at each alternate swing of the gear segment 60.

Such gear segment is carried on the end of an arm 65 having a hub 66 which is clamped detachably by a set screw 68 on a shaft 67 in the base. Shaft 67 is oscillated by a cam 69 on the main shaft 17 through an intermediate transmission mechanism indicated diagrammatically at 70. This mechanism is adjustable to vary the angle of oscillation of the shaft 67 and thereby adjust and regulate the length of the stitches produced by the intermittent motion of the feed rolls. I have not shown the mechanism in detail because it is a part of the standard machine, not involving anything original with this invention, and it has long been in common use. That part of the mechanism which is connected to shaft 67 is detachably clamped thereto by a set screw 71; and the shaft is supported at its ends in the base by removable cone pointed screws 72 and 73.

The standard 21 is so designed as to locate the feed rolls where they will grip the work between them in the correct operative position with respect to the awl and needle, as illustrated by Figure 2. There is also a supplementary supporting roll 74 mounted on an arm 75 and located where it will support the work at the opposite side of the awl path from the supporting feed roll 48. This arm is pivoted at 76 to the forward side of the standard, and is normally held against a stop 77 by a spring 78 which permits it to be moved out of the way, as shown by broken lines in Figure 1.

From the foregoing description of mechanism, the operation may be readily understood. It hardly needs saying that the awl, needle, cast-off, and looper are operated in proper sequence to puncture the work and form stitches in the well known manner, and that the arm 65 is moved in one direction at the proper time to feed the work while the awl and needle are both clear, and is returned during the phases of the cycle when the awl and needle pass through the work and withdraw. Indeed, the sequence of operations is much the same as in the standard machine, with these exceptions; that the needle is not in the work when the feed motion takes place, and that the presser bar and presser feed roll are not raised at any time except when work is inserted and removed. At such times the presser bar is raised by the hand- or foot-operated lifter with which the machine is equipped.

An important factor of the invention is the ease with which the roller feeding means may be applied to standard machines in substitution for the work supporting and feeding means of such machines. To make such substitution, the oscillating arm of the standard machine, which carries the needle and cast-off bars and is secured to the shaft 67, is removed; the stationary work support is removed; the standard 21 is connected in the manner shown in place of the former work support; the arm 65 is secured to the shaft 67 in substitution for the displaced carrier; and the needle and cast-off bars are placed in their guideways in the standard and re-connected with their respective operative arms 34 and 35. As the segment 60 on arm 65 meshes with the under side of the clutch driving gear 59, while the upper side of the feed roll supports and propels the work, it follows that the feed movement of the work is in the direction opposite to the movement of the arm which causes the feeding step. This arrangement produces feeding movements in the same direction as before, but when the needle is clear of the work, without necessitating any change in the movements and timing of the shaft 67 with respect to the means which operate the needle and cast-off bars. In other words, conversion of the standard commercial machine to the roller feed machine here described involves no other changes than the substitutions above specified.

It is part of my contemplation to provide for changing the gears 53 and 54 so as to vary the relative speeds of the feed rolls 48 and 49, whereby to drive roll 49 either with the same peripheral speed as the roll 48, or with greater or less speed. These gears and the clutch are contained in a housing 79 which has a detachable rear cover 80. The clutch 58 with its associated parts may be slipped from the shaft 47, giving access to the gears 53 and 54, whereby the latter may be removed and gear pairs of other ratios substituted for them.

What I claim and desire to secure by Letters Patent is:

1. A sewing machine comprising a base, a standard rising from said base, a feed roll mounted on said standard in position to support and propel the work, an element of stitch-forming mechanism guided in said standard to act in forming stitches in work supported by said roll, a cooperating press roll arranged to bear against work supported by the first-named roll, a one-way clutch coupled to one of said rolls, and oscillative driving means in driving engagement with one member of said clutch.

2. An attachment for chain stitch sewing ma-

chines having an oscillative needle carrier, a detachable work support, and an oscillative shaft to which the needle carrier is detachably secured; said attachment comprising a standard connectible with the machine in substitution for the before-named work support, and having a needle bar guideway, a gear segment connectible with the before-named oscillative shaft, a feed roll mounted rotatively in said standard and a one-way clutch in driven connection with said gear segment and in driving connection with said roll.

3. A sewing machine including in its construction a base and an overhanging head, a standard supported on said base, a work supporting and feeding roll rotatably mounted in the upper part of said standard, a presser bar in guided connection with the overhanging head, a press roll carried by said presser bar in position to co-act with the first-named roll in gripping and feeding work and constituting the only presser foot of the machine, stitch-forming means in guided engagement with said standard and in cooperative relation with said rolls, means for operating said stitch-forming means, and mechanism including a one-way clutch for intermittently rotating the first-named roll in one direction.

4. A sewing machine comprising a base and overhanging head, a downwardly projecting and reciprocating awl guided in said head, a spring-actuated presser bar mounted in the head and movable downward under spring pressure, a standard rising from the base, a needle guided to reciprocate in such standard in line with the awl, a cast-off supported and guided by the standard, a feed roll mounted on the standard and a cooperating feed and press roll carried by the presser bar, arranged to grip work penetrated alternately by the awl and needle, a shaft connected to said feed roll, a second shaft in geared engagement with the first shaft, flexible coupling means between the second shaft and the presser roll, a one-way clutch coupled to the first-named shaft and including a rotatable member having a gear element in connection with it, a shaft oscillatively mounted in the machine base, and a gear segment carried by said oscillative shaft in mesh with the gear element of the one-way clutch.

5. In a sewing machine of the type having cooperating awl, needle, cast-off and presser bar, a standard mounted on the frame structure of the machine, a shaft rotatably mounted in said standard with its axis transverse to the paths of movement of the awl and needle, a roll secured to said shaft with its upper side in position to support work between the needle and awl and across the paths in which the needle and awl travel, intermittent means for rotating said roll step by step in one direction for feeding the work, a cooperating feed and press roll arranged to grip the work supported by the first-named roll, and a shaft in geared connection with the first-named shaft and including a flexible portion coupled to said cooperating roll.

6. A standard having means for connection with the base of a sewing machine and having in its lower part upright guideways for a needle bar and a cast-off bar and having a horizontal shaft bearing in its upper part, a shaft located in said bearing, a feed roll secured to one end of said shaft in a position higher than the upper terminations of said guideways and at one side of the spaces in which the needle and cast-off of the machine are intended to operate, a second shaft rotatably mounted in the standard parallel with the first shaft and in geared connection therewith, a second roll coupled flexibly with the second shaft to be rotated thereby and arranged to cooperate with the first roll in gripping and feeding work, and a one-way clutch coupled with the first shaft for driving it intermittently in one direction.

7. An attachment for sewing machines comprising a standard adapted to be secured to the base of such a machine having parallel shaft bearings and a guideway for a needle bar or the like transverse to said bearings, two shafts, each mounted in one of the bearings and one of said shafts having a flexible extension, rolls mounted on contiguous ends of the first shaft and the flexible extension of the other, means for rotating one of said shafts intermittently, and an auxiliary supporting roll on the standard; the last-named roll having a work supporting portion in substantial alinement with the work supporting portion of the first roll, and these rolls being on the respectively opposite sides of the path of a needle guided by the before-named guideway.

8. In a sewing machine having a reciprocative needle bar and oscillative shafts for respectively reciprocating the needle bar and feeding the work, a standard fixed to a stationary part of the machine having guiding means for the needle bar, a feed roll rotatably mounted on said standard adapted to be engaged by the work at one side of its axis, a one way clutch operatively associated with said feed roll for turning the latter when rotated in one direction and including a gear coaxial with the feed roll, and an arm secured to the work feeding shaft having a segment meshing with said gear at the opposite side of the feed roll axis from the side of the feed roll with which the work is engaged.

9. In combination with a sewing machine having an oscillative shaft forming part of work feeding mechanism, a gear segment connected to said shaft and oscillated thereby, a standard on a stationary part of the machine, feed rolls one of which is mounted on said standard, a gear in driven mesh with said segment, and means including a one-way clutch for transmitting rotation in one direction only from said gear to the last-mentioned feed roll.

JESSE V. POOLE.