July 11, 1933. W. MYERS 1,917,771

SEWING MACHINE

Filed Nov. 3, 1932 2 Sheets-Sheet 1

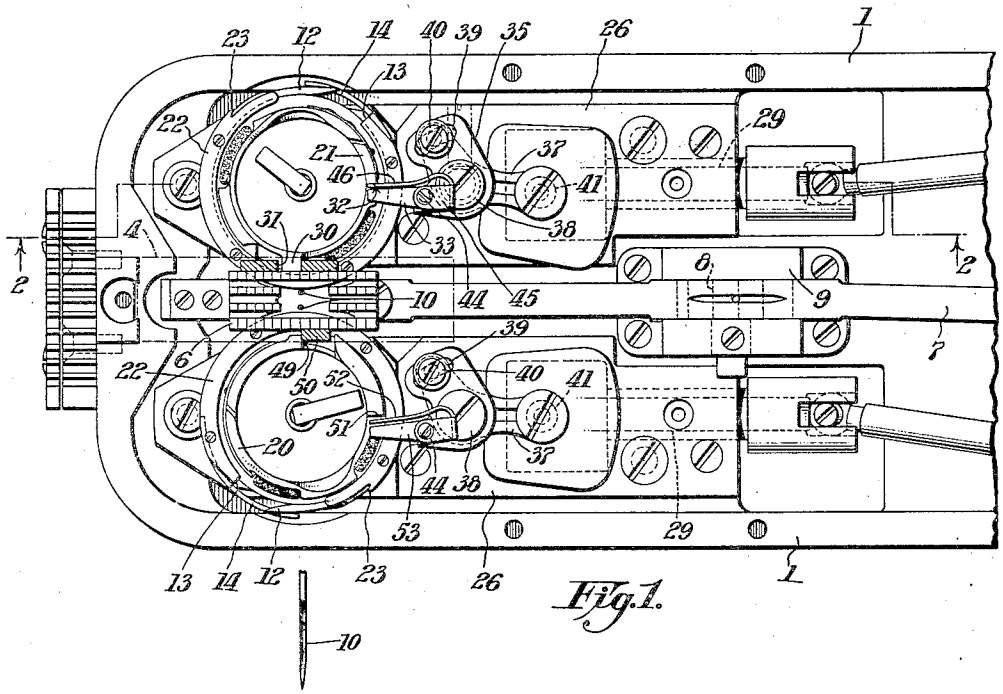


Fig. 1.

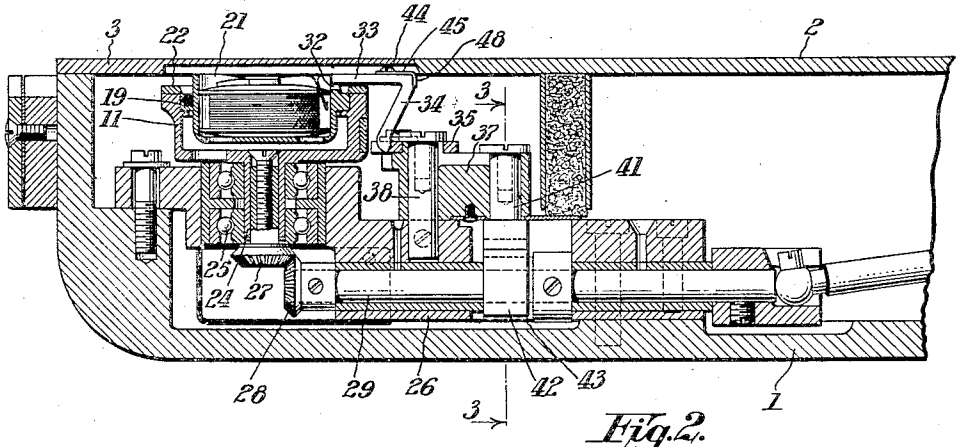


Fig. 2.

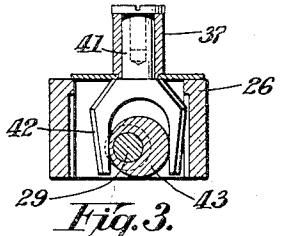


Fig. 3.

Witness:
Godfrey Peirce

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SEWING MACHINE

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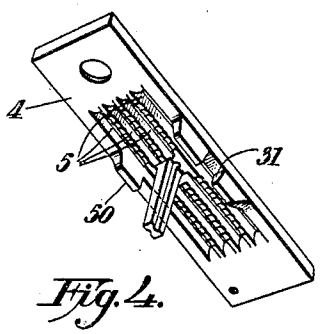


Fig. 4.

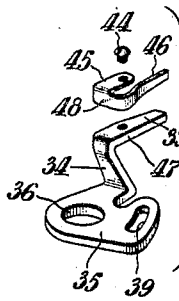


Fig. 5.

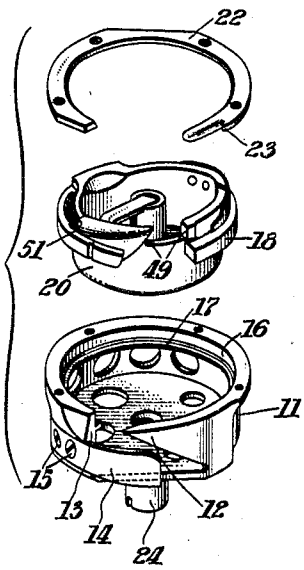


Fig. 6.

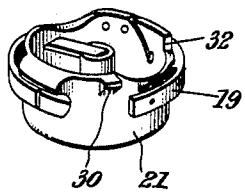


Fig. 7.

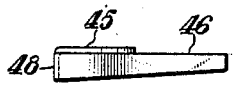


Fig. 8.

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Patented July 11, 1933 1,917,771

UNITED STATES PATENT OFFICE

WALTER MYERS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, OF ELIZABETH, NEW JERSEY, A CORPORATION OF NEW JERSEY

SEWING MACHINE

Application filed November 3, 1932. Serial No. 640,928.

This invention relates to improvements in sewing machines, and more particularly in devices employed in connection with sewing machine loop-takers for providing an unobstructed passage around a bobbin-carrier for needle-thread loops cast thereabout by the loop-taker, the invention having for its primary object to better adapt devices of this character to meet the requirements of high speed operation.

With the above and other objects in view, as will hereinafter appear, a preferred embodiment of the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings in which:

Fig. 1 is a top plan view of the loop-taker and feeding mechanism within the free end of a sewing machine work-supporting arm from which the cover-plate has been removed. Fig. 2 is a longitudinal vertical section on the line 2—2 of Fig. 1. Fig. 3 is a transverse vertical section of the opener-finger actuating mechanism on the line 3—3 of Fig. 2. Fig. 4 represents a perspective view of the throat-plate. Fig. 5 represents perspective views of the bobbin-case opener finger and of its spring detached therefrom. Fig. 6 represents a disassembled perspective view of one of the two rotary loop-takers of the machine and its bobbin-carrier. Fig. 7 represents a perspective view of the bobbin-carrier of the other rotary loop-taker. Fig. 8 is a view in side elevation of the opener-finger spring.

The present improvement has been embodied in the high speed lock-stitch feed-off-arm sewing machine forming the subject of my prior patent application Serial No. 627,409, filed Aug. 4, 1932, but it is to be understood that the invention is not limited to the specific loop-taker mechanism therein disclosed.

Referring to the drawings, a sewing machine containing a preferred embodiment of the invention has a hollow work-supporting arm 1 closed at the top by a detachable cover-plate 2 and 3 and a throat-plate 4, provided with feed-slots 5. The work is advanced lengthwise of the arm 1 and toward the free end thereof by a feed-dog 6 operating through the throat-plate feed-slots 5, said feed-dog being carried by a feed-bar 7 fulcrumed to rock and slide upon an eccentric-pin 8 adjustably secured in a fulcrum-block 9 rising from the bottom of the work-arm 1. The feed-bar 7 may be actuated by any suitable mechanism to impart work-advancing movements to the feed-dog 6.

Cooperating with a pair of vertically reciprocatory needles 10, arranged abreast with respect to the direction of feed, are a pair of loop-takers in the form of vertical axis rotary hooks, each having a cup-shaped hook-body 11, with a portion of its wall cut away to form a loop-seizing beak 12 directed toward and spaced from a loop-discharging tail 13. A needle-guard 14 is detachably secured by screws 15 upon the outer face of the hook-body at the tail end thereof to extend below the hook-beak 12, said needle-guard being of a character such that it may be suitably flexed for guiding different sizes of needles into proper position with respect to the hook-beak. As the needle-guard is detachable from the hook-body, it may be readily replaced in the event of breakage.

Each hook-body 11 is formed within its rim with a bobbin-carrier race comprising a vertically cylindrical bobbin-carrier bearing wall 16, below which is an inwardly extending bearing ledge 17 supporting an interrupted bearing rib 18 or 19 of the respective left and right hand bobbin-carriers 20 and 21. The bobbin-carriers are each retained in their hook-body raceways by means of a flat gib 22 which is screwed to the top of the hook-body rim and is formed adjacent the base of the hook-beak 12 with a loop-detaining spur 23.

The hook-bodies 11 each have a vertical spindle 24 journaled in ball-bearings 25 seated in the respective loop-taker carriers or bearing-blocks 26 suitably supported within the work-arm 1. Each hook-spindle 24 has fixed to its lower end a bevel-gear 27 with which meshes a bevel-gear 28 fixed to a driving shaft-section 29 journaled in the respective bearing-blocks 26. By means of suitable mechanism, the driving shaft-sec-

tions 29 are actuated to perform two rotations for each complete needle reciprocation, whereby the loop-takers have a loop-casting and an idle rotation during the formation of each stitch.

The right hand bobbin-carrier 21 is formed with a rotation-restraining lug 30 in the wall thereof above the level of its bearing rib 19, said lug 30 loosely entering a rotation-restraining notch 31 provided at the under side of the throat-plate 4. The bobbin-carrier 21 is also formed in its loop-cast-off side with a shoulder 32 intermittently engaged by an opener device for the purpose of slightly oscillating the bobbin-carrier in a direction opposite to the clockwise direction of rotation of the loop-taker and to thereby open a passage for the needle-thread loop between the bobbin-carrier lug 30 and a wall of the notch 31, as said loop is being initially cast about the bobbin-carrier. The present invention resides primarily in the character of the opener-device employed, so as to better meet the conditions of high speed operation. In opener devices of prior construction, there has been commonly employed a hardened steel finger vibrated to engage a hardened shoulder upon the bobbin-carrier, resulting in a resilient impact initiating such a rapid reverse oscillation of the bobbin-carrier that its lug engaged the opposed wall of the throat-plate notch with a rebounding action, causing an undesirable noise and developing an overheated condition of the parts. Various efforts have heretofore been directed toward overcoming the above noted overthrow, in the line of effecting a wiping action of the opener-finger upon the bobbin-carrier or by designing the opener-finger actuating mechanism to effect a more gentle engagement of the bobbin-carrier. However, the prior efforts have been largely nullified by the frequency of action of the opener-finger at the higher speeds of operation of the sewing machine. According to the present improvement, the opener device is constructed to insure a gentle initial engagement of the bobbin-carrier at any speed of operation of the machine and nevertheless effect a positive reverse rotation of the bobbin-carrier without overthrow thereof.

To this end, the present invention comprehends the provision of a spring which is interposed between a vibratory opener member and the shoulder 32 of the bobbin-carrier, whereby the bobbin-carrier is initially urged yieldingly by the spring into reverse rotation, but is positively shifted by said vibratory member in the event of any tendency to lag on the part of the bobbin-carrier. In its preferred embodiment, the spring is carried by the vibratory member, which latter comprises a horizontally disposed arm 33 overhanging the loop-taker adjacent to the bobbin-carrier shoulder 32 and extending laterally from an upstanding arm-shank 34 rising from a base 35. The base 35 has a bearing aperture 36 adjustably journaled upon a boss of a lever 37 fulcrumed upon a vertically disposed pivot-pin 38 suitably secured in the bearing-block 26 of the loop-taker, said base 35 also having a segmental slot 39 concentric with the pivot-pin 38 and entered by a holding screw 40 threaded into said lever 37, thereby providing for horizontal adjustment of the free end of the vibratory arm 33 relatively to the shoulder 32 of the bobbin-carrier. The lever 37 is apertured vertically to receive the pin-shank 41 of a follower-fork 42 embracing an eccentric 43 fixed to the driving shaft-section 29, whereby vibratory movements are imparted to the arm 33 and preferably in a path intersecting the bobbin-carrier shoulder 32.

Secured upon the upper face of the vibratory arm 33, by a screw 44, is the shank 45 of a spring-finger 46 having its free end extending along a side edge of said arm in spaced and substantially parallel relation thereto. The free end of said spring-finger is disposed between the bobbin-carrier shoulder 32 and said side edge of the arm 33, and is spaced from the shoulder 32 in the retracted position of the arm 33. The spring-finger 46 is preferably tapered in width toward its free end, and bows outwardly away from the side edge 47 of the arm 33 adjacent to the shank 45 where it merges into a depending finger-shank flange 48 engaging the flattened elbow of the arm 33. The described construction of the spring-finger 46 provides a desirable distribution of the flexibility thereof throughout the length of the finger to minimize fatigue effects during operation.

The left hand bobbin-carrier 20 is formed with a rotation-restraining notch 49 in the wall thereof above the level of its bearing rib 18, said notch loosely embracing a rotation-restraining lug 50 depending from the under side of the throat-plate 4. The bobbin-carrier 20 is also formed in its loop-cast-on side with a shoulder 51 intermittently engaged by an opener device comprising a spring-finger 52 which is similar to the spring-finger 46 and is carried by a vibratory arm 53 actuated by mechanism similar to that described in connection with the vibratory arm 33. It will be understood, however, that while the opener device 46, 33 functions to open a thread passage on the loop-cast-on side of the bobbin-carrier lug 30, the opener device 52, 53 acts to open a thread passage on the loop-cast-off side of the throat-plate lug 50, and that the two opener devices are consequently differentially timed in their engagement of the respective bobbin-carriers during synchronous stitch-forming cycles as illustrated in Fig. 1 of the drawings. It will also be apparent that the present improvement is equally adapted for employment with

either of the described bobbin-carrier dogging means.

In the operation of the machine, the opener arms 33 and 53 are vibrated to carry the spring-fingers 46 and 52 into yielding engagement with the bobbin-carrier shoulders 32 and 51 in advance of said arms, to thereby inititate counterclockwise oscillation of the bobbin-carriers for the purpose of providing the necessary open thread-passageways referred to above. As the opener-arms 33 and 53 back up the yielding spring-fingers, the initiated oscillation of the bobbin-carriers is positively continued with a minimum of impact effect.

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

1. In a sewing machine, a reciprocatory thread-carrying needle, a rotary loop-taker cooperating with said needle in the formation of stitches, a bobbin-carrier journaled in said loop-taker, means for restraining rotation of said bobbin-carrier with said loop-taker, and means for opening a thread passage past said rotation-restraining means including an opener device constructed and arranged to yieldingly engage said bobbin-carrier to initiate oscillation of the bobbin-carrier in a direction reverse to the direction of rotation of said loop-taker.

2. In a sewing machine, a reciprocatory thread-carrying needle, a rotary loop-taker cooperating with said needle in the formation of stitches, a bobbin-carrier journaled in said loop-taker, means for restraining rotation of said bobbin-carrier with said loop-taker, and means for opening a thread passage past said rotation-restraining means including a vibratory member, and a spring interposed between said member and bobbin-carrier to yieldingly initiate oscillation of the bobbin-carrier in a direction reverse to the direction of rotation of said loop-taker.

3. In a sewing machine, a reciprocatory thread-carrying needle, a rotary loop-taker cooperating with said needle in the formation of stitches, a bobbin-carrier journaled in said loop-taker, means for restraining rotation of said bobbin-carrier with said loop-taker, and means for opening a thread passage past said rotation-restraining means including a vibratory member, and a spring carried by said member in position to engage said bobbin-carrier in advance of said arm to thereby yieldingly initiate oscillation of the bobbin-carrier in a direction reverse to the direction of rotation of said loop-taker.

4. In a sewing machine, a reciprocatory thread-carrying needle, a rotary loop-taker cooperating with said needle in the formation of stitches, a bobbin-carrier journaled in said loop-taker and having a shoulder, means for restraining rotation of said bobbin-carrier with said loop-taker, and means for opening a thread passage past said rotation-restraining means including a vibratory member having a path of movement intersecting said shoulder, and yielding means interposed between said member and bobbin-carrier shoulder.

5. In a sewing machine, a reciprocatory thread-carrying needle, a rotary loop-taker cooperating with said needle in the formation of stitches, a bobbin-carrier journaled in said loop-taker, means for restraining rotation of said bobbin-carrier with said loop-taker, and means for opening a thread passage past said rotation-restraining means including a vibratory arm, and a spring having its shank secured upon said arm and having a bobbin-carrier engaging free end disposed in substantial parallelism with said arm, said spring being bowed away from said arm adjacent to its shank.

6. In a sewing machine, a reciprocatory thread-carrying needle, a rotary loop-taker cooperating with said needle in the formation of stitches, a bobbin-carrier journaled in said loop-taker, means for restraining rotation of said bobbin-carrier with said loop-taker, and means for opening a thread passage past said rotation-restraining means including a vibratory arm, and a spring extending from said arm in position to yieldingly engage the bobbin-carrier in a direction reverse to the direction of rotation of said loop-taker, said spring being tapered in width toward its bobbin-carrier engaging portion.

7. In a sewing machine, a vertically reciprocatory thread-carrying needle, a vertical-axis rotary loop-taker cooperating with said needle in the formation of stitches, a bobbin-carrier journaled in said loop-taker and having a shoulder, a vertical axis vibratory arm overhanging said loop-taker and having a path of movement intersecting said bobbin-carrier shoulder, a widthwise vertically disposed spring-finger extending from said arm and having its free end disposed between said arm and said bobbin-carrier shoulder, and means for vibrating said arm to thereby oscillate said bobbin-carrier in a direction reverse to the direction of rotation of said loop-taker.

In testimony whereof I have signed my name to this specification.

WALTER MYERS.