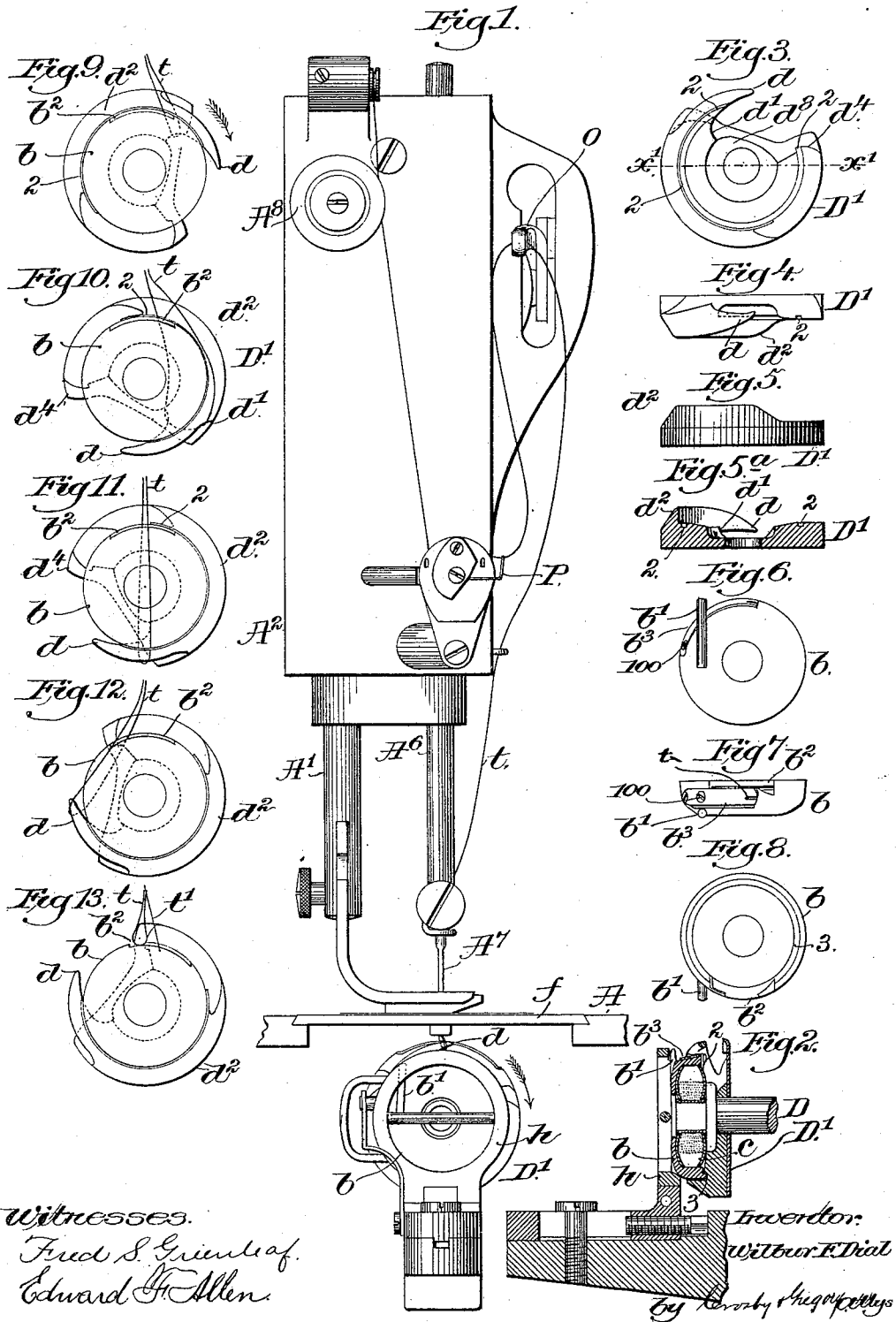


(No Model.)

W. F. DIAL.
SEWING MACHINE LOOP TAKER.

No. 480,182.

Patented Aug. 2, 1892.



Witnesses.
Fred S. Grunleaf.
Edward G. Allen.

Inventor:
W. F. Dial
by Crosby & Heycox, attys

UNITED STATES PATENT OFFICE.

WILBUR F. DIAL, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE
WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

SEWING-MACHINE LOOP-TAKER.

SPECIFICATION forming part of Letters Patent No. 480,182, dated August 2, 1892.

Application filed June 4, 1891. Renewed June 13, 1892. Serial No. 436,420. (No model.)

To all whom it may concern:

Be it known that I, WILBUR F. DIAL, of Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates more especially to that class of sewing-machines wherein a circularly-moving loop-taker engages the needle-thread, draws it from the eye of the needle to form a loop, and finally the loop-taker, without passing through the loop of needle-thread, casts the said loop off and about a bobbin-thread contained within a suitable bobbin-case.

One form of machine which I aim to improve is shown in United States Patent to N. Wheeler No. 420,847, dated February 4, 1890. In this class of machines the loop of needle-thread cast from the loop-taker has to pass about the bobbin-case and its contained under thread, and in its passage the thread has to make a path for itself between the bobbin-case and the inner cavity of the loop-taker, and this is done by the direct pull of the thread on the bobbin-case, the strain being sufficient to move the bobbin-case radially with relation to the center of motion of the loop-taker, and also laterally away from the face of the loop-taker. In the formation of the stitch the first strain put upon the thread being drawn from the eye of the needle to make the loop is exerted immediately after the point of the loop-taker takes the thread and commences to draw the same into loop form, and this strain continues and increases until the loop-taker discharges the loop about the bobbin-case, and it will be obvious that this intermittent strain on the needle-thread during the formation of each loop will be increased as the speed of the machine is increased. It will be remembered that the cavity in the face of a loop-taker of the class described presents a broken surface, there being an open space between the throat and the heel of the loop-taker; and it will also be remembered that the loop of needle-thread as it

is being carried about the bobbin-case has both to move the bobbin-case away laterally or horizontally from the face of the loop-taker and also to move the bobbin-case radially from the inner wall of the cavity in the loop-taker. It will be understood that the bobbin-case which carries the bobbin and under-thread tension is and must be of sufficiently-less diameter than the cavity in the loop-taker to enable the loop of needle-thread to pass about the bobbin-case and between it and the loop-taker. In practice, therefore, owing to the looseness of fit and the irregularity of the acting walls of the loop-taker it results that the bobbin-case has imparted to it a jumping movement which increases with the speed of the machine, the jumping acting to pinch and abrade the needle-thread more or less according to the speed, the jumping manifesting itself audibly, the noise increasing with the speed.

I have aimed in my experiments to reduce the strain upon the needle-thread during the formation of the loop and to relieve the said needle-thread from the duty of moving the bobbin-case aside in order to make a passage for the said loop.

In accordance with my invention the only strain put upon the needle-thread loop during its formation by the loop-taker is that produced by the throat of the loop-taker as it acts to draw the loop to the proper length, or, in other words, the two halves of the loop extended from the throat of the loop-taker to the material are not called upon, as heretofore, to displace the bobbin-case to effect a passage for the loop. I have been enabled to accomplish this result by providing the bobbin-case with a rearwardly-extended flange having an open notch at its inner edge next the face of the loop-taker, into which notch one-half of the loop of needle-thread is put as soon as the point of the loop-taker enters the loop thrown out by the needle, that half of the said loop remaining in the said notch until, as will be described, the take-up draws the said loop out of said notch.

Loop-takers of the class referred to, it will be remembered, have an outer wall or curb extended substantially from the point of the

loop-taker to its heel, the inner face or wall of the said curb being a necessity, for otherwise the bobbin-case could not be kept in the loop-taker cavity. I provide the inner face or side of the loop-taker with a track, shown in this embodiment of my invention as a groove which embraces the flange or projection from the rear edge of the bobbin-case, the said projection being a full circle less the length of the notch referred to, the track being a full circle less the clearance-space for the needle, said clearance-space, as herein shown, being equal to the distance between the throat and heel of the loop-taker; but this track or groove cut, as described, in the face of the loop-taker would not alone constitute a practical hook, for were the outer wall of the track and the inner wall of the shedder in the same plane, one being a continuation of the other, then the thread passing about the bobbin-case would not have proper clearance and would be injuriously pinched between the bobbin-case and the inner wall of the rapidly-moving shedder, and a coarse thread could not be used, and this pinching of the thread would be increased, as is obvious, as the thread was increased in diameter. So to make my invention available for practical sewing, besides providing the track, as described, I have cut away the inner wall of the shedder so that it occupies a circle of larger diameter than the circle occupied by the track, thus leaving ample clearance between the periphery of the bobbin-case and the inner wall of the shedder, thus making it impossible to impinge, pinch, or injure the thread being used, this being true in any and every position of the loop-taker throughout its rotation. It will be understood that the groove constituting the track referred to is formed in the face of the hook, and the projection entering the said raceway or track is extended from the rear side or edge of the bobbin-case holder rather than from its periphery or at right angles to the axis of rotation of the loop-taker. By the employment of this track to position the bobbin-case centrally with relation to the center of movement of the loop-taker shaft the curb common to the old form of loop-taker in so far as it acts to keep the bobbin-case in place is not needed and is therefore removed.

My improved loop-taker has a shedding lip or projection extended backwardly from its point for about one hundred and eighty degrees from said point, said lip overhanging but not touching the bobbin-case, said projection being of sufficient length back from the throat of the loop-taker to shed the front or active half of the loop down over the bobbin-case. In the formation of the stitch about as the loop-taker throat passes a vertical line intersecting the center of motion of the loop-taker shaft the take-up begins to act on and take up the outer or active side of the loop, the inner or inactive side of the loop yet remaining in the notch in the bobbin-case; but in the further movement of the loop-taker the

needle-clearance space comes uppermost, and as the shoulder or end or edge of the said clearance-space and consequently the end of the said track nearest the heel of the loop-taker comes opposite the notch in the said bobbin-case a space is left for the final discharge of the inner side of the loop, which up to this time has remained in the notch in the bobbin-case, in which notch it was put, as described, when the formation of the loop so discharged was commenced. The take-up as it completes its ascent draws up fully the loop so released and completes the stitch.

This invention is not to be limited to the particular bobbin shown, as instead I may supply in the bobbin-case any usual mass of thread.

Figure 1 in front elevation represents a sufficient portion of a sewing-machine of well-known construction with my improvements added to enable my invention to be understood. Fig. 2 is a section through the loop-taker, bobbin-case, and bobbin-case holder. Fig. 3 is a face view of the loop-taker; Fig. 4, an upper edge view of the loop-taker shown in Fig. 3. Fig. 5 shows the loop-taker represented in Fig. 1 as inverted by turning the same over to the front. Fig. 5^a is a section in the line *x*, Fig. 3. Fig. 6 is a front side view of the bobbin-case detached. Fig. 7 is a top edge view of the bobbin-case. Fig. 8 shows the bobbin-case of Figs. 6 and 7 as turned over to the front and inverted. Figs. 9 to 13 show different positions assumed by the loop-taker and the needle in the formation of the stitch, the said figures showing the bobbin-case; but I have omitted the finger represented in Figs. 1 and 6 to avoid confusion of lines, the clearance-space for the needle being shown by dotted lines behind the bobbin-case.

The head A², containing the presser-bar A¹, and needle-bar A⁶, the needle A⁷, the tension device A³, the slack-thread controller P, the take-up O, the throat-plate *f*, (it in practice containing the needle-hole and slots for the pronged parts of the feeding device,) the shaft D, and the bobbin-case holder *h* are and may be all as common to United States Patent No. 424,237, to N. Wheeler, dated March 25, 1890, so that said parts need not be herein further particularly described more than to say that the needle-bar, take-up, and shaft may be actuated by devices common to said patented machine or to other well-known sewing-machines.

I have not shown the cloth-feeding mechanism; but the machine will and may contain any usual feeding device.

The bobbin-case *b* has a finger *b*¹, which co-operates with a part of the bobbin-case holder to prevent the rotation of the bobbin-case, as is well understood. This bobbin-case, as improved by me, has at its rear side next the face of the loop-taker D¹ a flange or projection 3, which constitutes an annulus, except where the said flange or projection is cut out or notched, as at *b*², to leave a space

into which one-half of the loop formed from needle-thread t between the eye of the needle or the take-up and the cloth enters, as in Fig. 9, as the point d of the circularly-moving loop-taker D' enters the loop of needle-thread to draw and expand the same.

The flange or projection 3 in nowise prevents the movement of the bobbin-case in the direction of the length of the shaft D , carrying the loop-taker; but the said bobbin-case is prevented from such movement by a suitable shoulder or ring slide h , thus doing away with any radial projections on the bobbin-case to enter grooves in the inner wall of the loop-taker, as provided for in United States Patent No. 391,666 to S. W. Wardwell, Jr., dated October 23, 1888.

The bobbin-case has a tension device b^3 for the under thread, said tension device being shown as a spring made adjustable by a screw 100, Fig. 7, showing the thread t .

The bobbin-case is shown as containing a disk bobbin c , which carries the under thread; but instead of pulling off the under thread on a disk bobbin, as shown, it may be wound into any other usual form.

The loop-taker D' , carried by the shaft D , has a point d , a throat d' , and a loop-shedder d^2 , the latter being a sort of lip extended backwardly from the point which takes the loop of needle-thread. This shedding-lip will preferably be extended about the periphery of the loop-taker for about one hundred and eighty degrees, more or less; but its inner side does not touch the bobbin-case, and such shedding-lip by its inner wall in nowise serves to keep the bobbin-case in place. The face of the loop-taker has a track 2, concentric to the center of motion of the loop-taker. This track in the plan in which my invention is herein embodied is shown as a groove, and this groove receives a thin lip or projection 3 at the inner edge of the bobbin-case, (see Fig. 2,) the said lip and track co-operating in the movement of the loop-taker to insure the correct relative positions of the bobbin-case and loop-taker, it actually precluding any and all radial movement of the bobbin-case or any movement of said bobbin-case transverse or radial to the shaft D or at right angles to its center of motion, the lip and track preventing contact between the bobbin-case and the interior of the shedding-lip. The face of the loop-taker is cut away in the formation of the point d and heel d^4 , and the cut is carried past and about the center of the loop-taker, leaving a space d^3 , which constitutes what is called the "needle-clearance." Making the needle clearance and heel and point necessitates cutting through the track, leaving one end near the throat and the other near the heel d^4 . (See Fig. 3.)

Fig. 1 shows the point of the loop-taker as engaging the needle-thread between the cloth and the eye of the needle. In its further movement in the direction of the arrow the

point draws down the needle-thread and forms a loop; but in this operation one-half of the loop is immediately put into the notch b^2 of the bobbin-case, and it remains there until drawn up by the take-up operating at the usual time to take up the loop. Putting one-half of the loop into the notch in the bobbin-case, as has been heretofore stated, obviates the necessity of the loop of needle-thread pushing the bobbin-case aside to make a passage for itself about the bobbin-case, and by relieving the needle-thread loop from the duty of pushing the bobbin-case aside in the cavity at the face of the loop-taker, as heretofore practiced, the strain and abrasion on the said loop is reduced to the minimum, the noise resulting from a jumping bobbin-case is materially reduced, and the practical speed of the machine is greatly increased.

To enable the loop-taker to draw and spread the loop in the best manner for the work to be done at speed, the throat of the loop-taker is so shaped that immediately after the point d has taken the loop and while the loop-taker moves from the position Fig. 1 to Fig. 9 the loop is elongated and the throat draws the bight of the loop far enough toward the center of the loop-taker to put the said bight within the field of the loop-taker bounded by the track and with one-half of the loop in the notch b^2 of the bobbin-case. In the further movement of the loop-taker from the position Fig. 9 to Fig. 10 the half of the loop put into the notch b^2 of the bobbin-case remains there, protected and without abrasive contact with any part and engaged only by the throat of the hook, the other half of the loop being laid upon the outer inclined portion of the loop-shedding lip d^2 . As the loop-taker starts from the position Fig. 10, the loop-shedder acts to cast off the loop over the bobbin-case supported next the face of the loop-taker.

Fig. 11 shows the loop of thread as about to pass the center of the bobbin-case, the half of the loop put into the notch in the bobbin-case yet remaining there, the bight of the loop yet being engaged and advanced by the loop-taker, the half of the loop not in the said notch lying at such time between the outer face of the bobbin-case and the bobbin-case holder. When the loop-taker reaches the position Fig. 11, the take-up begins to ascend, and in the further movement of the loop-taker the take-up, continuing to rise, draws up the loop at a speed greater than the surface-speed of the loop-taker and the loop is drawn off of the point of the loop-taker, as in Fig. 12.

In the position Figs. 11 to 13 the clearance-space for the needle is in such position as to enable the loop to be drawn up toward the goods by the rising take-up.

Fig. 12 shows the loop as just ready to leave the point of the loop-taker; but in the position Fig. 11 if the loop-taker should be arrested and the upward movement of the take-up be continued the loop could not be dis-

charged from the loop-taker, for the two shoulders at each side the notch b^2 in the bobbin-case are yet contained in the groove 2 of the loop-taker. In the further movement of the loop-taker from the position Fig. 12 to Fig. 13 the clearance-space in the loop-taker comes into such position with relation to the shoulders of the notch b^2 in the bobbin-case as to afford a free open space through which the loop by the further upward movement of the take-up may be drawn and discharged, as shown in said Fig. 13, wherein the loop of needle-thread is shown as nearly drawn up, and in this position the under thread will lie in the said loop and extend from the tension device of the bobbin-case to the under side of the cloth.

In Figs. 9 to 13 I have shown the needle-clearance space by dotted lines as behind the bobbin-case, and I have omitted the under-thread-tension device to better show the notch or recess b^2 , and in Fig. 13 I have shown the under thread u' as extended up to the stitch-making point.

I am aware that a hemispherical book or bowl has been provided at its inner side near its rim with a groove to receive a radial fin extended outwardly from a cam-shaped ring-like spool-case, the said fin extending at right angles or radially from the center of motion of the shaft carrying the said hemispherical or bowl-shaped hook, as in United States Patent No. 391,666, and I disclaim this latter invention.

I am aware that United States Patent No. 25,043 to William F. Pratt, dated August 9, 1859, shows an oscillating hook having a long point extended about the hook for nearly its entire peripheral distance and that the said point at its inner side has been provided with a shoulder against which was pressed a bobbin-case; but in said patent the periphery of the bobbin-case contacts directly with the inner wall of the point and clearance is not left between the periphery of the bobbin-case and the interior of the point or inner side of the walls of the hook.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A sewing-machine containing the following instrumentalities, viz: an eye-pointed thread-carrying needle, a loop-taker shaft, a circularly-moving loop-taker actuated thereby and having a point to take the needle-thread, and a track, and a loop-shedder the inner wall of which occupies a position in a circle outside the circle of the said track, a bobbin-case holder, and a non-rotating bobbin-case adapted to contain an under thread and provided at its rear side next the face of the loop-taker with a notched flange or projection, as 3, to co-operate with the track in the face of the loop-taker, the said projection and track preventing radial movement of the bobbin-case with relation to the center of motion of the loop-taker, the location of the inner wall of the shedder outside the track

affording clearance for the thread between the periphery of the bobbin-case and the inner wall of the said shedder in order that the needle-thread may be passed freely about the bobbin-case while one part of it is contained in the notch in the said flange or projection, the needle-thread being free from impingement or pinching action throughout the entire rotation of the loop-taker, substantially as described.

2. A sewing-machine containing the following instrumentalities, viz: a reciprocating eye-pointed thread-carrying needle, a loop-taker shaft, a circularly-moving loop-taker actuated thereby and provided with a point and having a loop-shedder at the rear thereof, and a throat, and a track having its walls located wholly within a circle smaller in diameter than the circle occupied by the inner wall of the shedder and having a clearance-space for the said needle cut radially through the said track, and a non-rotating bobbin-containing case having at its rear side or edge next the loop-taker a notched flange or projection co-operating with the said track and adapted to be restrained thereby against lateral movement with relation to the center of motion of the said loop-taker, the notch in the said flange or projection receiving in it and between it and the face of the loop-taker one half of the loop of needle-thread, retaining it there during the formation of the said loop and while it is being carried about the bobbin-case, the other half of the loop being simultaneously carried over the bobbin-case into the needle-clearance space, further rotation of the loop-taker uncovering the thread-receiving notch and permitting the two halves of the loop to come together in the said notch and rise therefrom, substantially as described.

3. A sewing-machine containing the following instrumentalities, viz: a reciprocating eye-pointed thread-carrying needle, a loop-taker shaft, a circularly-moving loop-taker actuated thereby and provided with a point and having a loop-shedder at the rear thereof extended around substantially one-half the periphery of the loop-taker and a throat and a track having its walls located wholly within a circle smaller in diameter than the circle occupied by the inner wall of the shedder and having a clearance-space for the said needle cut radially through the said track, and a non-rotating bobbin-containing case co-operating with the said track and adapted to be restrained thereby against lateral movement with relation to the center of motion of the said loop-taker and having a thread-receiving notch, substantially as described, at its inner side or edge next the face of and entering the raceway in the face of the loop-taker, in which notch and between it and the face of the loop-taker one half of the loop of needle-thread is contained during the formation of the said loop and while it is being carried about the bobbin-case, the other half of the

loop being simultaneously carried over the
bobbin-case into the needle-clearance space,
further rotation of the loop-taker uncovering
the thread-receiving notch and permitting
5 the two halves of the loop to come together
therein, the said bobbin-case having a ten-
sion device attached thereto, substantially as
described.

In testimony whereof I have signed my
name to this specification in the presence of 10
two subscribing witnesses.

WILBUR F. DIAL.

Witnesses:

GEO. W. GREGORY,
A. S. WIEGAND.