

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 11,531, dated August 15, 1851.

To all whom it may concern:

Be it known that I, SYLVESTER H. ROPER, of Worcester, in the county of Worcester and State of Massachusetts, have invented new and useful Improvements in Machinery for Sewing Cloth and other Material; and I do hereby declare that the same is fully described and represented in the following specification and the accompanying drawings, letters, figures, and references thereof.

Of the said drawings, Figure 1 represents a top view of the machine containing my invention. Fig. 2 is an elevation of one side of it, or that on which the fly-wheel is situated. Fig. 3 is an elevation of the other side of it. Fig. 4 is vertical central and longitudinal section of it. Fig. 5 is a transverse and vertical section of it, this latter section being taken through the operating-needles. Such other figures as may be necessary to a complete illustration of my invention will be hereinafter referred to and described.

My improved machine is calculated to produce either what is generally termed "back-stitch sewing," or that ordinarily called the "running stitch." By back-stitch sewing I mean that in which a thread, after being carried through a piece of cloth from the front to the rear side of said cloth, is moved backward the length of the stitch, is next again carried through the cloth from the rear to the front side of said cloth, is next carried forward double the length of the stitch or some other suitable distance, and is next passed through the cloth from the front to the rear side of said cloth. Such operations, being successively repeated, form what is termed "back-stitch sewing." By the ordinary running stitch or stitching I mean that in which a thread is passed through the cloth from the front to the rear side of said cloth, is next moved forward the length of the stitch, is next carried through the cloth from its rear to its front side, is next carried forward the length of a stitch, and is again passed through the cloth from the front to the rear side of the cloth. These operations, being repeated, form what is frequently called the "running" or "basting" stitch. My machine is exhibited in the drawings as prepared for sewing the running stitch. In sewing with this machine I do not make use of a continuous thread in the manner in which those machines do which produce chain-stitch sewing, but I employ short pieces of thread,

such as a person uses when sewing by hand with the ordinary sewing-needle. Such short pieces, however, may be successively taken in the manner to be hereinafter described, from one continuous thread wound on a bobbin.

In the drawings above mentioned, A denotes a column or frame for supporting the operative parts of the machine, such column having a shelf or table, B, extended from it and for the purpose of carrying the endless belt C, on which the cloth or material to be sewed is sustained during the operations of the needles therein, such cloth being moved by said belt with an intermittent motion, such as may be necessary to enable the needles to perform the function of sewing.

The two needles used in the machine are exhibited at D and E, D being the superior or upper, and E the inferior or lower, one. A side view of one of these needles is given in Fig. 6, and a longitudinal section of it, together with the closing slide of its hook, represented in Fig. 7, said Figs. 6 and 7 being drawn on an enlarged scale. Each needle is extended from a movable carriage, G or H, which slides vertically on a dovetailed guide, as seen at I K. Each of the carriages G H is connected to a long lever, L or L', by means of a short connecting-rod, M or M', which connecting-rod is so jointed both to the carriage and lever that when the lever is made to move in a vertical plane and turn on its fulcrum N or N' the needle-carriage shall be made to play or move vertically on its dovetailed guide.

The arrangement of the two levers L and L', their two fulcra N N', their connecting-rods M M, and the two needle-carriages G H is particularly represented in Fig. 3 of the drawings. To these two levers two long connecting-rods, O P, are respectively jointed at their outer ends, such connecting-rods at their inner ends being made to embrace a crank-pin, Q, that projects from the side of a cam-wheel, R, which is fixed upon the main driving-shaft S, such shaft being caused to carry a fly-wheel, T, and to be put in rotation by means of power applied to crank U or to said shaft in any proper manner. In Fig. 8 I have represented a sectional view taken through the two connecting-rods O P and the crank-pin on which they work, such section being made transversely of the axis of said crank-pin. In Fig. 9 I have exhibited another section of the same, such section being taken longitudinally through the

axis of the crank-pin. Fig. 10 represents a front view of one of the connecting-rods. Each connecting-rod is curved or hollowed out, so as to rest against and straddle the crank-pin, and it has extended from it projections *a*, which are curved and made to rest superficially against the crank-pin, the arrangement of these projections being exhibited in the drawings. Over these two projections, and so as to inclose them and be concentric with the crank-pin, a tube or ferrule, *b*, is placed, it being confined in position by means of a screw, *c*, screwed into the end of the crank-pin. By so forming the two connecting-rods O P, and providing them with projections *a a* and an inclosing-tube, *b*, such two connecting-rods may be made to play on and be simultaneously moved by one crank-pin. Each needle is caused to move within a groove or tube, V or V', which groove or tube I term the "thread-passage," the object of such passage being to prevent the thread of the needle from kinking or snarling up or injuriously springing back toward the cloth when such thread is released from the needle, and it performs such a function by reason of the support which it gives the thread under such circumstances. Each needle is what is termed a "hooked needle," it having a hook or barb, *c*, and a point, *d*, as seen in Figs. 6 and 7. Its shank *e* is made tubular or hollow, and receives within it a small rod or closing-slide, *f*, whose office is to close the opening of the hook while the barb of the needle is being drawn through the cloth. This closing-slide is forced against the barb by a spring, *g*, arranged on the needle-slide and below the tubular shank of the needle, and made to be supported by an arm, *h*, projected from the support-piece *i* of the needle. The closing-slide *f* has a projection, *k*, extended from it, the spring being made to bear against said projection. While a needle is being driven forward into the cloth, and immediately after it has passed fully through the cloth, the projection *k* is carried into contact with a stationary stud, *l* or *m*, situated as seen in Fig. 4, and made to project into the thread passage or groove. This stud serves to arrest the forward movement of the closing-slide in the needle, the needle continuing to move forward. Such operation causes the hook of the needle to be opened for the reception of the thread. After the thread has been laid in the opening of the hook of the needle, the needle is drawn backward through the cloth, the barb of the needle closing up on the slide *f*, so as not only to prevent said barb from catching in the cloth, but to insure the draft of the thread through the cloth.

We next come to a description of the mechanism by which the thread is bent horizontally, laid into the opening of the needle, and drawn closely into the cloth; and I would here take occasion to remark that such an apparatus or mechanism is applied to operate with each needle, that which belongs to the lower needle being arranged above the table B, while that

which operates in connection with the upper needle is disposed underneath the said table B.

The two devices used for bending a portion of the thread into a horizontal position or into angles with respect to the rest of the thread are seen at *n o*, a rear view of them on an enlarged scale and as applied to the bar W, in which the thread-passage is formed, being exhibited in Fig. 11. Fig. 12 is a front view (on an enlarged scale) of such thread-benders and mechanism immediately adjacent thereto. Fig. 13 is a top view of the hook-bender *n*. Fig. 14 is a top view of the eye-bender *o*. Fig. 15 is a rear view of the hook-bender *n*, and Fig. 16 is a rear view of the eye-bender *o*. These benders are levers, formed as seen in the drawings, and made to play together on a common stationary fulcrum, *p*, as do the blades of a pair of scissors, their two upper arms being connected together by a spring, *q*, whose ends are respectively attached to the arms, such spring operating to draw the two arms toward one another, and thereby to move the thread-benders in directions opposite to those in which they are moved by the action of the lever *r*. The front arm of said lever, an end-view of which is given in Fig. 17, extends between the benders *n o* and just below their fulcrum *p*. The fulcrum of the lever is supported by a post or projection, *s*, while the rear arm, *t*, of the lever is made to extend backward and within the path of a cam, *u*, fixed on the inner side of the cam-wheel R, (the said cam being as represented in Fig. 18, which is a view of the inner side of the cam-wheel R.) The office of this cam *u* is to move the lever *r* so as to cause its front arm to move downward and separate the lower arms of the benders, which, while being so separated, mutually strike against the thread and bend it, so that the part of the thread extending from one bender to the other shall stand horizontally, or thereabout, or at right angles, or nearly so, with respect to the path of the needle. After the cam has performed this function the front arm of the lever *r* will be moved in an opposite direction by means of a spring, *v*, and into notches or curved recesses *w x* made in the benders *n o*, and so as to cause the lower arms of the benders to approach and cross one another. The bender *n* is formed with a small hook, *y*, while the bender *o* has an elongated eye, *z*, extended from it and for the purpose of keeping the thread always in a proper position with respect to the benders, such thread being made to work through such eye. There is also a small projection, lip, or nipper, *a*², extended from the lower arm of the bender *o*, and made to operate in connection with a spring-nipper, *b*², affixed to the side of the bar W. During the movement of the bender *o* toward the thread it carries the nipper *a*² against the thread, and so as to force the thread against the part or jaw of the spring-nipper *b*², such operation being performed somewhat previous to the completion of those movements of the thread-benders necessary to the completion of

the bending of the thread. Now, while the thread is thus held between the nippers, the needle catches it, and during its descent draws the thread of the hook y , and the nippers still holding the thread it during the farther descent of the needle will be drawn through the nippers, and with friction sufficient to cause the stitch taken to be drawn closely into the cloth or material to be sewed. The thread so held by the bends is next to be moved back, in order that it may be laid into the hook-opening of the needle, and in order to accomplish this the benders must be moved backward, such a movement of them being effected by means of a small cam, c^2 , affixed to the lever r , and made to work against a curved or inclined surface or part of the bender o , there being a small spring, g^2 , so applied to the benders as to move them in an opposite direction, while the front arm of the lever r is being elevated. The benders beneath the table are seen at $n' o'$. Their operating-lever is exhibited at r' , such lever being actuated or moved in one direction by the cam u and in the opposite one by a spring, v' . The spring-nipper b^3 of the lower benders is seen in Fig. 5.

In the drawings, h^2 represents a bobbin for carrying the thread, which bobbin is made to rotate on a spindle, i^2 , projected from the bar W . A friction-washer, m^2 , and screw-nut n^2 are applied to the spindle i^2 , and made to operate against the bobbin, in order to prevent too much freedom of rotation. In applying a thread from the bobbin to the machine it is drawn downward into a notch, p^2 , formed in the end of a projection or arm, q^2 , applied to the bar W . From this notch the thread is extended horizontally by the side of the needle and under and around the hook y of the bender n , such thread being made to rest against a small shoulder, r^2 , formed on the bender and under its hook, so that when the needle is drawn downward the thread will slip into the opening of the hook and be caught in and by the needle. When the needle is drawn through the cloth, it carries the thread with it in a doubled state, and if the thread drawn through the cloth by the needle is of a length less than the extent of the motion of the needle the thread will be drawn entirely out of the needle by the needle, and at a proper time the benders of the other needle are put in motion, so as to bend the thread and prepare it to be received by the other needle and again drawn through the cloth. Thus the operation of sewing is carried on by the two needles operating alternately, and as the sewing is carried on the thread which extends from the cloth into the notch p^2 will be carried against a small knife or cutting-edge, s^2 , affixed to the cloth-presser t^2 , and will be separated or cut by such knife. The movement of the feeding-belt and cloth carries the said portion of thread against the said knife. Thus it will be seen that, although in the operation of sewing by my machine I use short pieces of thread, each of which is taken in the manner above described from a

long thread wound on a bobbin, the cloth-presser t^2 is forced downward by means of a spring, u^2 , arranged on the shank of a lifter, v^2 , and made to bear against a projection, w^2 , through which said lifter slides. Said cloth-presser carries a small friction-roller, x^2 , that rests on the upper surface of the cloth, and holds the cloth down to or upon the endless feeding-belt C while the belt is in movement.

The next portion of the machinery to be described is that by which the endless feeding-belt is operated. The said feeding-belt is supported by two rollers or cylinders, $b^3 p^3$, arranged on opposite sides of the table B , the upper portion of the belt resting on the table. A ratchet-wheel, c^3 , is fixed on the axle of the roller b^3 , and receives an impelling-pawl, d^3 , which is arranged underneath the table B , as seen in Fig. 19, which represents an under side view of said table. Said impelling-pawl is jointed to one arm of a bent lever, e^3 , which plays upon a fulcrum, f^3 , and has its other arm resting against the periphery of the cam R , said cam being intended and properly formed for operating the lever, so as to cause the pawl d^3 to turn the ratchet c^3 at such times and to such extent as may be necessary to give motion to the endless feeding-belt in order to insure proper movement of the cloth. The impelling-pawl is drawn backward by the action of a spring, g^3 , the backward movement of the front arm of the lever e^3 being regulated by a stop-screw, f^4 . By means of a slide-rod, i^3 , provided with a bent or inclined surface, as seen at k^3 , and arranged as seen in the drawings, the impelling-pawl d^3 may be thrown out of action upon the ratchet-wheel whenever necessary. This is effected by pressing inward the slide i^3 by applying the hand to a knob, l^3 , (fixed upon its front end,) and pressing said slide inward so as to carry its inclined plane or cam k^3 against the under side of the pawl d^3 .

Fig. 20 is a bottom view, and Fig. 21 a side, of the hook-bender n . Fig. 22 is a side view of the eye-bender o , and Fig. 23 is a side view of the end of the lever r , showing the cam c^2 .

Having thus described my improved sewing-machine, what I claim therein as of my invention is as follows:

1. The groove, tube, or thread-passage V or V' , in combination with a needle made to operate a thread essentially as described, said passage being for the purpose of supporting the thread and preventing it from kinking or injuriously springing back or toward the cloth immediately after the release of the thread from the needle, as described.

2. I do not claim the invention or employment of a slide or an equivalent contrivance to close down on the barb and over the opening of the hook of a needle; nor do I claim the application of such closing-slide to a hook-needle in such manner that said slide shall play or move in a groove made in the side of the needle, as the same does in the machine patented by William Wickersham on the 19th day of

April, of the year 1853; but what I do claim is my improved mode of applying the closing-slide to the needle—that is, the making the shank of the needle tubular and inserting the closing-slide within the same—whereby such closing-slide is better protected from accident, or being broken by catching in the cloth or thread, or otherwise broken, as it is liable to be when made to run in a groove formed in the side of the needle.

3. In combination together and used with a hook-needle, the two thread-benders *n o*, as made to operate on the thread and lay it in the opening of the needle, substantially as specified; and in combination with the thread-benders, the lip or nipper *a*² and the spring-nipper

*b*², the same being for the purpose of seizing the thread and enabling the needle to draw it closely into the cloth in the manner substantially as specified.

4. The above-described improved mode of connecting the two connecting-rods *O P* to one crank-pin, *Q*—viz., by the projections *a a* from the rod and the covering tube or ferrule *b*, the same being substantially as specified.

In testimony whereof I have hereunto set my signature this 26th day of January, A. D. 1854.

SYLVESTER H. ROPER.

Witnesses:

C. HAMILTON,
NATHL. PAINE.