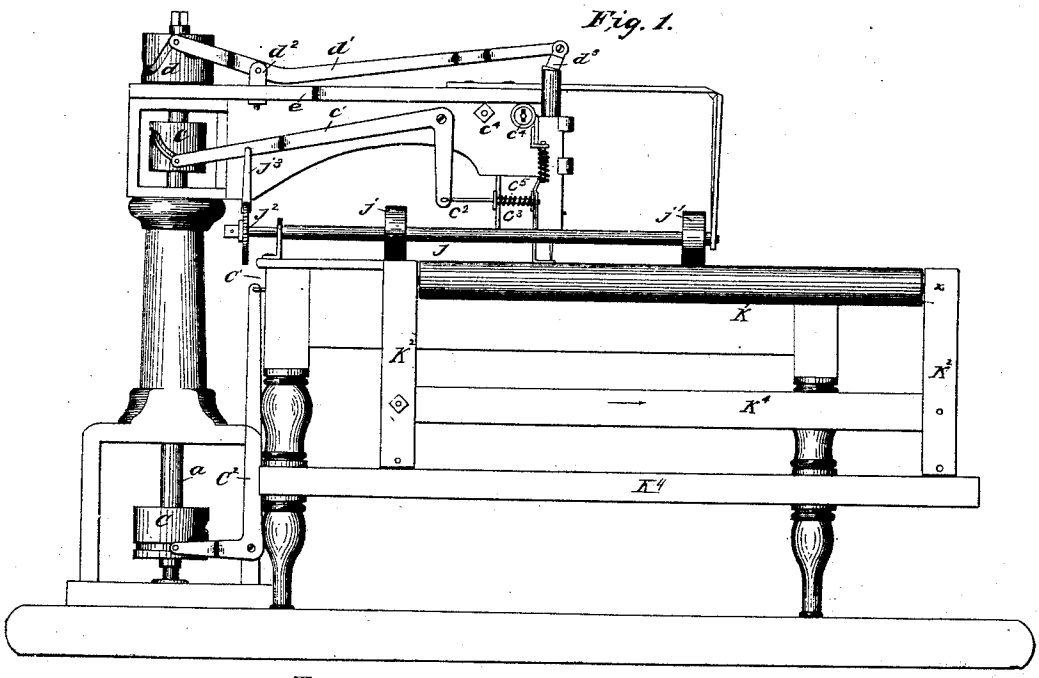
2 Sheets—Sheet 1.

D. C. AMBLER.

SEWING MACHINE.

No. 11,884. Patented Nov. 1, 1854.

Fig. 1.



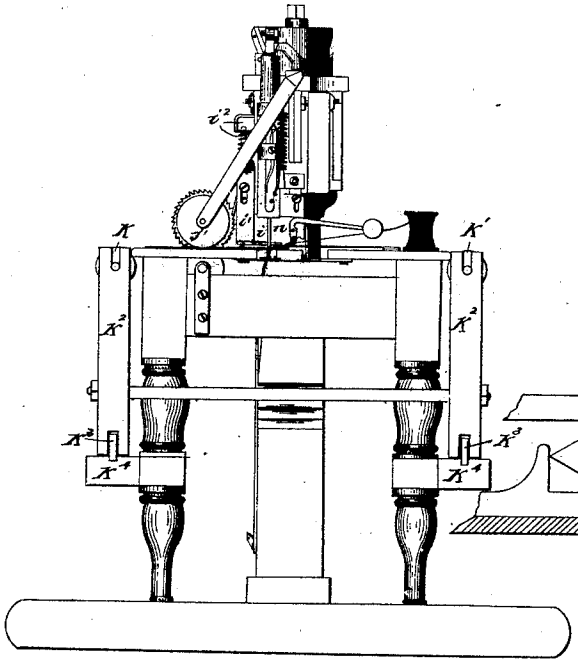


Fig. 2

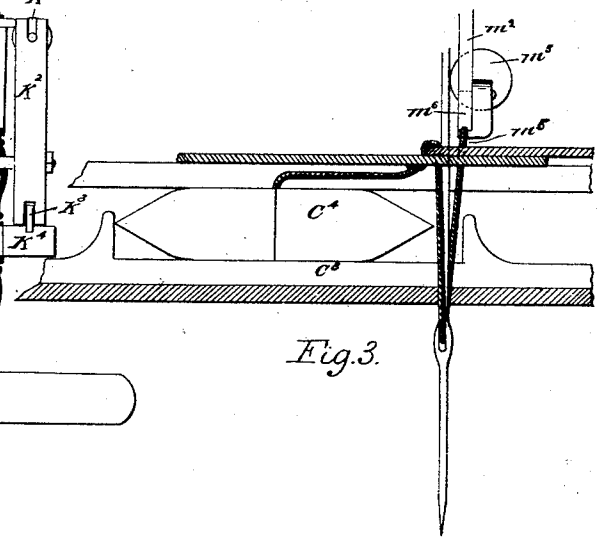


Fig. 3.

2 Sheets—Sheet 2.

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Fig. 5.

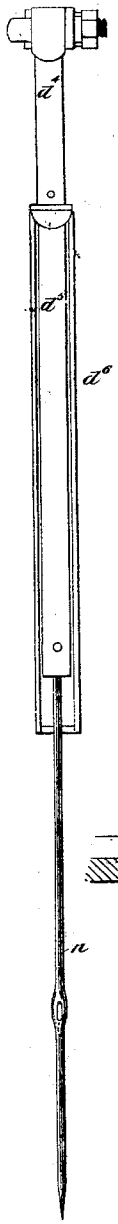


Fig. 4.

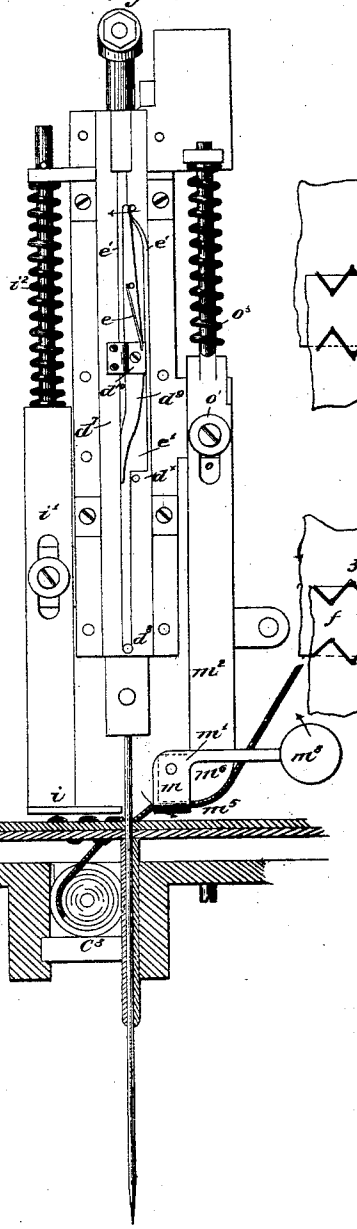


Fig. 6.

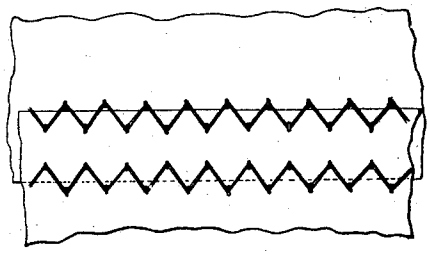
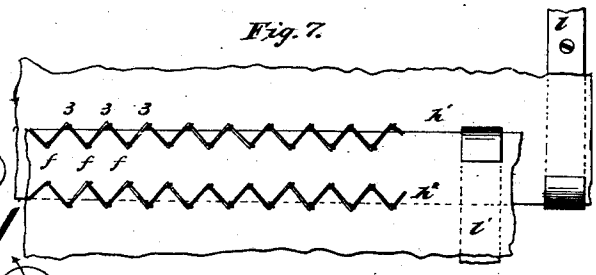


Fig. 7.



UNITED STATES PATENT OFFICE.

DANIEL C. AMBLER, OF NEW YORK, N. Y.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **11,884**, dated November 7, 1854.

To all whom it may concern:

Be it known that I, DANIEL C. AMBLER, of the city, county, and State of New York, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following specification, taken in connection with the drawings, is a full and fair description thereof.

The object of my invention is to produce a felling-down stitch, by means of which I can sew together two pieces of heavy stuff whose edges overlap each other, as in the seams of sails or awnings, &c.

In order to effect these objects, I have been led to invent improvements on the sewing-machines usually employed, overcoming successively the various difficulties as they presented themselves in an experimental machine.

The machine improved by me is of that class which employs a needle making a loop, and a shuttle which throws another thread through said loop, the eye of my needle being near the center thereof in the direction of its length. Some of my improvements are, however, applicable to any of the known kinds of sewing-machines.

The nature of the first part of my invention, therefore, consists in supporting the needle upon a carriage, which is at each stitch forced to vibrate in such manner that the needle passes alternately through a single thickness and then through a double thickness of cloth, thereby attaching the two pieces which overlap each other by a felling-down stitch, in the manner substantially as hereinafter described.

The nature of the second part of my invention consists in combining with a needle having such a motion a shuttle whose throw is transverse or perpendicular to a line passing along the seam in the direction of the length thereof, whereby I am enabled to employ a stationary in place of a vibrating shuttle-race, as hereinafter set forth.

The nature of the third part of my invention consists in clamping the thread automatically upon the upstroke of the needle, either to the needle itself or to some fixed point between the needle and the spool, whereby the needle takes a strong pull upon each and every stitch, dragging the two pieces of fabric firmly together, as is essentially necessary in sails, &c.

The nature of the fourth part of my invention consists in imparting a quarter-revolution upon its own axis to the needle on the upstroke thereof, whereby the needle does not drag up such parts of the loop as it is in contact with, but pulls firmly upon that portion only of the thread which passes through the eye, thereby making a firm and perfect stitch in thick cloth, and not jamming a portion of the needle-thread and leaving another portion slack when the stitch is completed.

The nature of the last part of my invention consists of an adjustable connection between two needle-carriages, by means of which one needle may receive vibrating motion from another, and they may be set at such distance apart as to sew both seams of a compound seam at any required interval each from the other, and both at the same time.

In the drawings the same letters refer to the same parts in all the figures, and Figure 1 is a side elevation of the machine, including the carriage which supports the take-up and give-off rollers. Fig. 2 is an end elevation of the same. Fig. 3 is a section, on a large scale, through the shuttle-driver and race. Fig. 4 is a front elevation, on a large scale, of a needle-carriage, thread-clamping apparatus, and holding-down clamp, showing the shuttle-race, &c., in cross section. Fig. 5 is a sectional view through a needle and its spring attachment, and Figs. 6 and 7 exhibit views of a sewed seam and the selvage-adjusting clamps.

In my machine the needle and its accessories are attached to a vibrating carriage, which has transmitted to it an oscillating motion perpendicular to the general direction of a seam, and I intend, usually, to employ two needles and two shuttles, thus sewing the two seams of a compound seam at the same time. The shuttles travel perpendicularly to the general direction of the seam, instead of parallel thereto, as is more usually the case, and each needle has a rotating motion on its own axis imparted to it on the upstroke, while the needle-thread is clamped fast also on the ascending stroke. The whole apparatus is supported upon a strong frame or table, with an upright shaft at one end, from which, by means of cams and bent

levers, &c., all the necessary motions are derived. This shaft a may receive a revolving motion in any appropriate manner, and has firmly keyed upon it three cams, b, c, and d, the lower of which, b, by means of a bell-crank, c', and link c^2, imparts a reciprocating motion to the shuttle-driver c^4, in which is located the shuttle c^4. When two needles are employed, these parts, except the cam, are duplicated, or one shuttle may receive motion directly from the driver of the other.

The middle cam, c, imparts motion to a bent lever, c', which is connected to the nearest of the two needle-carriages, c^3 c^3, which are pivoted at c^4 c^4. Both these carriages are shown in the drawings; but these needles and the turning and clamping apparatus are, to avoid unnecessary complication of the drawings, only exhibited upon one of them. The upper cam, d, gives reciprocating motion to a lever, d', pivoted at d^2, and the other end of this lever is, by means of a link, d^3, connected to the needle through the intervention of a spring attachment. These parts, except the cam, are duplicated on the other side of the bracket e in a working-machine. The link d^3 takes hold of a rod, d^4, to which is attached a spring, d^5, and to the lower end of this spring is secured the needle n. These parts are clearly shown in Fig. 5. Around the spring d^5 is secured a tube, d^6, which slides in guides d^7, firmly secured upon the needle-carriage. Upon this tube is fastened a pin, d^8, and both tube and pin can revolve through an arc of about ninety degrees on the axis of the tube, while d^5 is moving up and down without any movement of rotation. The pin d^8 projects through a slot, e', in the guides, shaped substantially as is shown in the drawings, and level, or nearly so, with the surface of the slot is attached a vibrating lever or switch, d^9, pivoted at d^{10}. A light spring, e, holds the lower end of d^9 in contact with the straight side of the slot. When d^3 descends, it carries with it the tube d^6, spring d^5, and needle n, the pin d^8 passing vertically down through the slot, and the needle piercing one or both thicknesses of the cloth, the pin d^8 opening the switch; but when d^3 rises, carrying with it the needle, &c., the pin d^8 passes up the straight lower part of the slot until it reaches the point marked $d^\times$, where it remains stationary for an instant until the shuttle is thrown through the loop. It (d^8) then proceeds up along the convex side of the switch, rotating the needle until the pin d^8 arrives as high as d^{10}, or thereabout. The spring d^5 then rotates the needle in the contrary direction against the force of the light spring e, moves the switch in the direction of the arrow, and the pin finally arrives again in the straight part of the slot. These motions are repeated on each up-and-down stroke of each needle, which therefore reciprocates on its own axis as it rises.

I use a needle deeply grooved upon two sides thereof, with an eye nearly in the center of the needle and passing from groove to groove. The thread is thus protected from being cut or chafed, and the point of the needle never rises far above the surface of the cloth, thereby avoiding danger of entangling loose parts of the thread. My needle, moreover, has a long stroke, as the shuttle is large and bulky, and the loop formed is necessarily a large one.

In the act of sewing, the front and rear sides of the needle are kept highly polished, while the grooved sides thereof, being protected by the thread, are comparatively rough, and, when waxed thread is used, sticky. When heavy or waxed thread is employed or the cloth is thick, a needle having the usual motion only does not drag its eye over the thread, but lifts both parts of the loop simultaneously, or nearly so, thus destroying the shape of the loop, interfering with the action of the shuttle, loosening the previous stitch, and even when it makes a stitch forming an imperfect one. This difficulty was encountered by me, and to obviate it I gave to the needle the movement of rotation above set forth, whereby the polished sides of the needle are presented to the thread upon the upstroke. When this is done, the thread slides freely through the eye, not being bound upon the rough or unpolished sides of the needle, the shape of the loop is not impaired, the shuttle does its work properly, and a good tight stitch is the result.

The cam c is so shaped that the link c^2 makes a motion either from or toward the shaft a when the needle is nearly at the end of its upstroke. The needle-carriage is thereby slanted, so that the needle enters the cloth first at $f\,f\,f$ and then at $g\,g\,g$, passing at one time through both thicknesses, and then through a single thickness, thereby felling down the edge, and while one needle is sewing the seam h' the other is sewing h^2. As each needle forms its loop, the appropriate shuttle throws the shuttle-thread through said loop.

It is clear that the shuttles will pass through the loops without being affected by the motion which either needle derives from cam c; but if the shuttles were thrown in the direction of the length of the seam, their races would be obliged to vibrate as the needles vibrated, and it would be necessary to secure the needle to its stock in such manner that the direction of the axis of its eye would be perpendicular to that represented in the drawings. It will therefore appear that the combination of a shuttle thrown perpendicularly to the general direction of the seam with a vibrating needle materially simplifies the machine for sewing felling-down seams by means of a zig-zag stitch.

Where two needles acting simultaneously are employed, they may, as is represented and described, have their carriages vibrated by a single lever, c'. This is effected by connecting one carriage to the other by means of a link, c^5. This link is surrounded in the present machine by a light spiral spring, and has cut on one end a screw, to which a proper nut is adapted, by turning which the effective

length of c^5 is altered, and the carriages kept at a greater or less distance apart. This feature enables me to regulate the distance between the two needles, thereby forming the two seams h' and h^2 at any required distance from each other.

To my machine is adapted the ordinary spring steadying-clamp, which prevents the lifting of the cloth on the upstroke of the needle. This clamp, &c., is attached to the carriage, and is clearly shown at i i' i^2 of Fig. 2. Any known feed apparatus may be employed. I, however, have devised a simple one, composed of a rotating shaft with friction-wheels thereon, said shaft being moved by a ratchet attached to c'. The shaft j, friction-wheels j', and ratchet-wheel j^2, with ratchet j^3, are clearly shown in the drawings.

In order to preserve the proper overlapping of the two breadths and their rectilinear motion under the needles, I have devised clamps l l', attached to the table, each hooking over one selvage of the cloth, as shown clearly in Fig. 7. When canvas is rolled first from one side of the table and then from the other, two sets of these clamps should be employed, both sets so fastened that they may be turned out of the way; and I intend usually to make these clamps adjustable upon the table, so that they may be fitted to any required width of lap.

My endeavors to sew heavy goods would have been unavailing unless I had devised some method of making a taut stitch which should hold the two pieces in close contact when sewed together. I knew that a friction-drag had been attached to the spool of needle-thread; but this did not answer a good purpose where heavy goods were to be sewed. I therefore devised a method of clamping the thread firmly either to some fixed point or to the needle itself upon the upstroke of the latter, so that the needle might pull the loop taut, one end thereof being fast in the cloth and the other in the clamp. This clamp, also, must be automatic, or driven by a positive motion derived from the machine. Many forms and arrangements of clamps for effecting this purpose have been invented by me, and a very simple one is represented in the drawings. (Best shown at Figs. 3 and 4). A small bent lever, m, pivoted at m', is attached by means of a hanger, m^2, to the needle-carriage. One end of this lever is weighted, as at m^3, or has pressing thereon a light spring. The other end of m is bent at right angles, as at m^5, under a projection of the hanger m^6, and the needle-thread passes from the spool between m^5 and m^6 to the needle. As the needle descends, the drag on the thread pulls m^5 down and lifts m^3, (see arrows,) permitting the thread to pass freely; but when the needle ascends, the direction of the drag is altered, and the thread has no tendency to lift m^3, which therefore holds it fast between m^5 and m^6 until the upstroke is completed. In case of some accidental jamming of the thread this clamping, where the thread is strong, might break some portion of the machine. I have therefore supported m^2 by means of a screw, o', which passes through a slot, o, and applied a pretty strong spring, o^3, in such manner that hanger, clutch, and all may be lifted upon the upstroke in the event of accidental jamming of the thread.

I do not deem it necessary to describe further the operation of the machine, as I believe that sufficient on that head has already been said, but would state that many modifications may be made in all the contrivances herein described without departing from the principles my invention, and that such modifications would be mere modifications. For instance, the ultimate vibrating and up-and-down motions of the needles may be derived through any known train of motions, instead of those described by me. The partial reciprocating revolving motion of the needle may be effected by any mechanism which will perform that duty, and this revolution may be through an arc greater or less than ninety degrees.

The clamp to fasten the thread on the upstroke may be attached on any convenient spot, or to the needle; and, finally, the needles may have no vibrating motion, and such motion may in various ways be imparted to the cloth. The stationary would then become the movable, and vice versa, and the imparting of a vibrating motion to the cloth would be clearly the equivalent of imparting the same motion for the same purpose to the needle. Moreover, any known shuttle motion may be used; or the numerous equivalents of the shuttle employed in sewing-machines may be used in connection with the vibrating needles or their equivalents. A secondary needle upon the opposite side of the cloth, either passing through it or not, is deemed by me to be an equivalent of the shuttle. Many other modifications might be described, and will no doubt readily present themselves to the mind of the ingenious mechanic.

I would further state that I do not claim as of my invention a shuttle whose throw is perpendicular to the general direction of the seam; but

What I do claim as of my own invention, and desire to secure by Letters Patent of the United States, is—

1. The method substantially as herein described of sewing a felling-down or zigzag seam by means of vibrations in a line perpendicular to the seam, or nearly so, imparted either to the needle or to the cloth, substantially in the manner herein described.

2. The combination, with a needle having such motions or the equivalent thereof, of a shuttle thrown in a direction perpendicular, or nearly so, to the general direction of the seam, substantially in the manner and for the purposes herein specified.

3. An automatic lever for clamping the thread upon the upstroke of the needle, constructed and operating substantially in the manner and for the purposes herein described.

4. Imparting to the needle a partially-reciprocating rotating motion upon its own axis, substantially in the manner and for the purposes set forth.

5. Connecting two vibrating needles each to each, substantially in the manner herein set forth, whereby one vibrating mechanism serves for both needles, and said needles may also be adjusted so as to sew seams simultaneously at any required distance apart, substantially in the manner herein described.

In witness whereof I have hereunto subscribed my name in the city of New York.

DANIEL C. AMBLER.

In presence of—
SYLVESTER LAY,
GEORGE A. GILLESPIE.