G. STACKPOLE.

Sewing Machine.

3 Sheets—Sheet 1

No. 112,747.

Patented March 14, 1871.

Fig 1

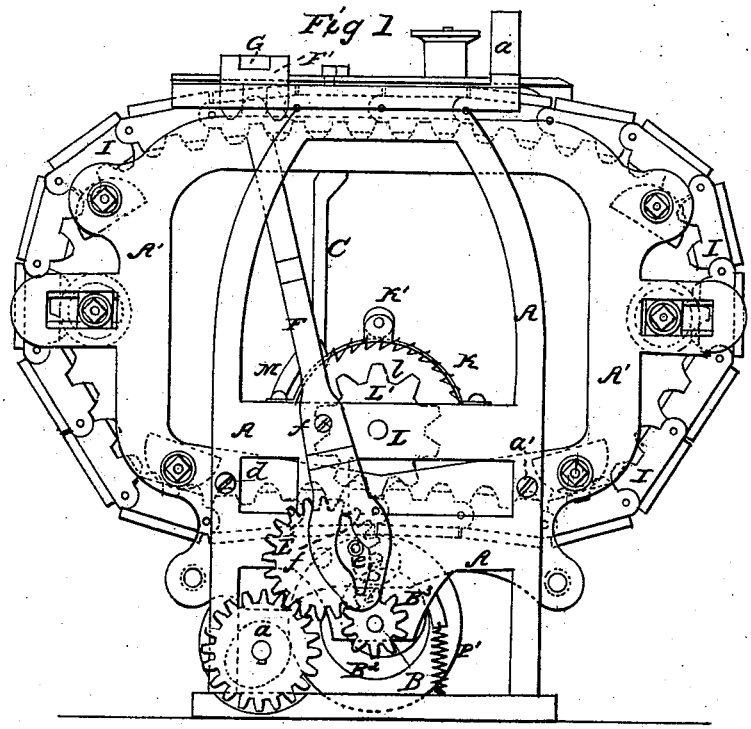
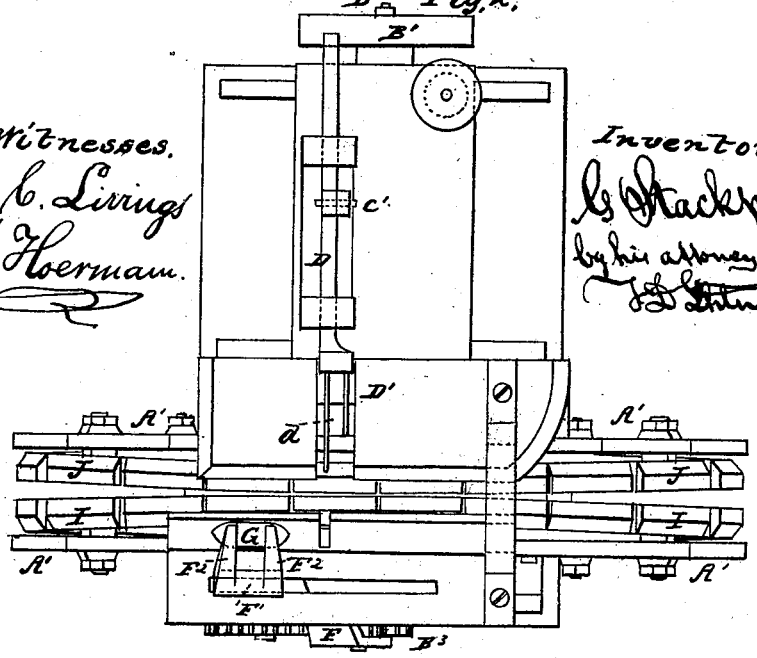


Fig. 2.



Witnesses.

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A. Hoermann.

Inventor.

G. Stackpole

by his attorneys

3 Sheets—Sheet 2.

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Fig. 3.

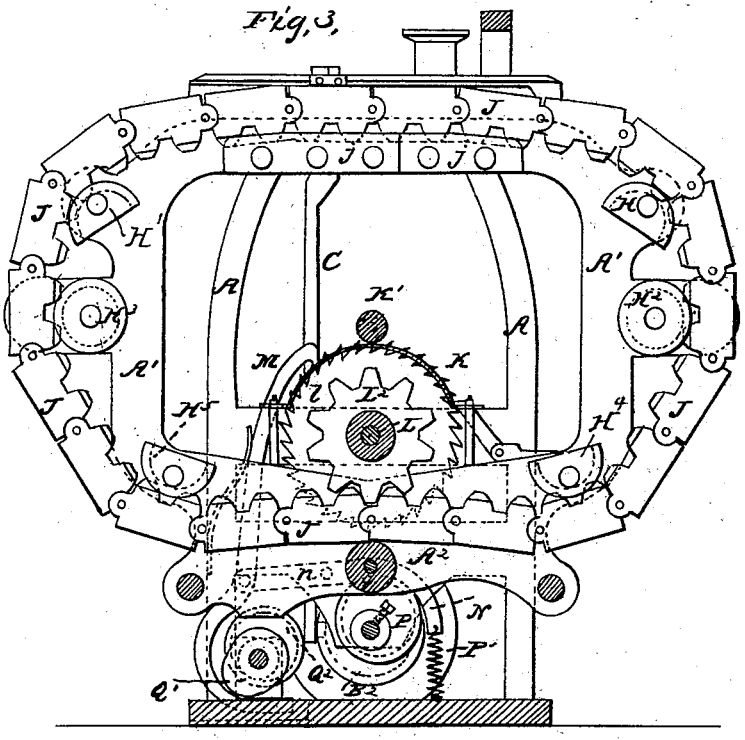
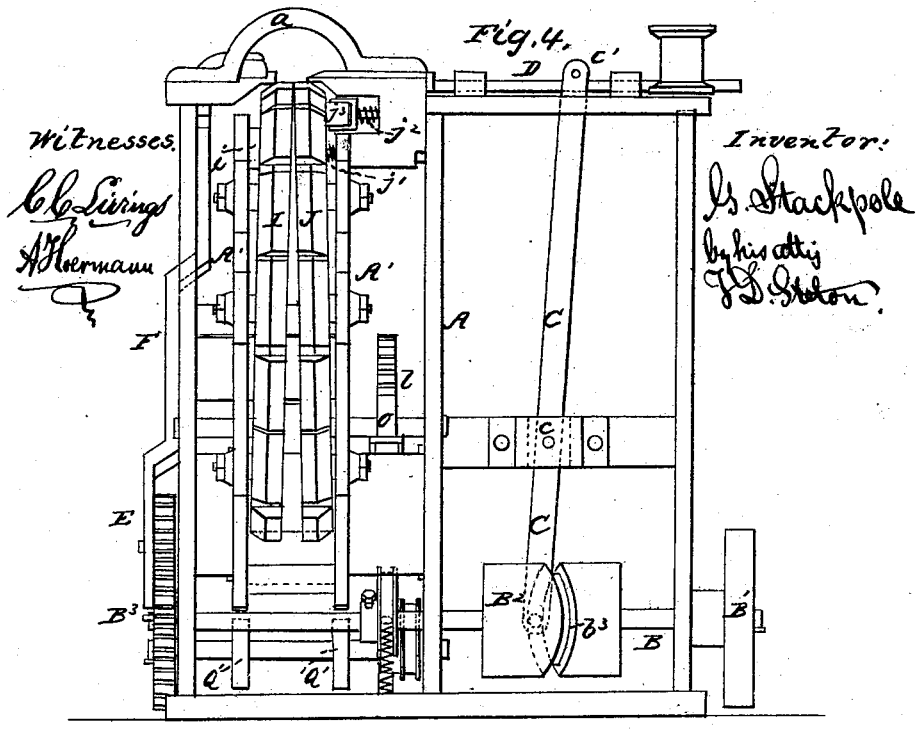


Fig. 4.



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G. STACKPOLE.

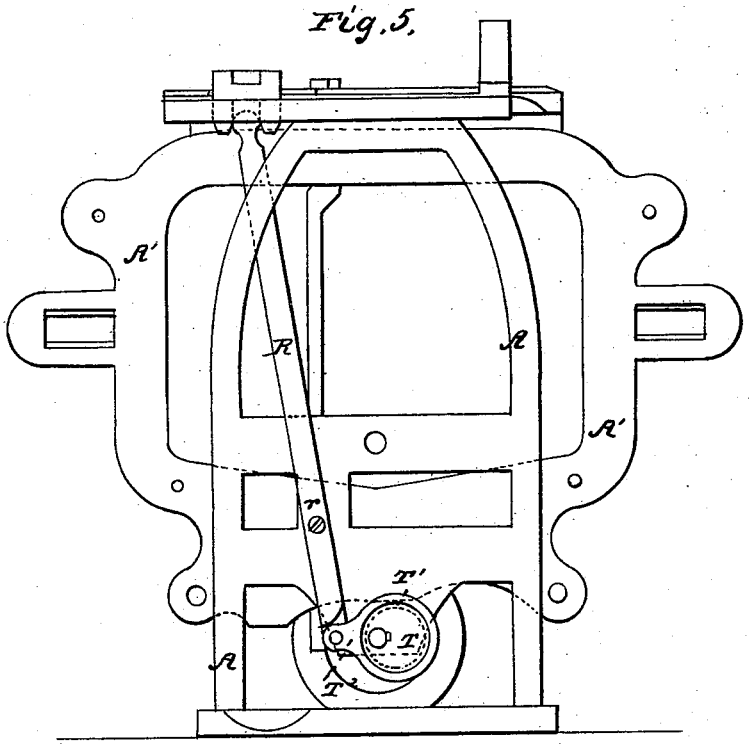
Sewing Machine.

3 Sheets—Sheet 3.

No 112,747.

Patented March 14, 1871.

Fig. 5.



Witnesses:

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J. L. Stetson

UNITED STATES PATENT OFFICE.

GREENLEAF STACKPOLE, OF ELIZABETH, NEW JERSEY.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **112,747**, dated March 14, 1871.

To all whom it may concern:

Be it known that I, GREENLEAF STACKPOLE, of Elizabeth, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following is a full and exact description thereof.

My machine is intended more especially for sewing together breadths of carpeting and analogous heavy work; but it may be used with a great variety of fabrics and in the production of different kinds of work. I propose to construct the machine on a much larger frame than ordinary sewing-machines adapted exclusively for fine fabrics, and to allow room for moving through the lower portion a large quantity of carpeting or analogous material in the act of being sewed. I feed forward the material and hold it in the proper position for sewing by the aid of two endless chains, which move together and embrace the goods with an elastic pressure between them. I operate the shuttle so that a half-motion or a half-reciprocation thereof serves to complete each stitch, passing the shuttle-thread through the loop of the needle-thread by a motion in one direction for one stitch, and resting there while the needle is withdrawn to tighten the stitch and returns, and then putting the shuttle-thread again through the loop in the needle-thread by a return motion to complete another stitch. Although I have denominated these two series of movements as producing two stitches, I preferably make the needle traverse two times through the same hole in the fabric, or, in other words, feed forward the goods at alternate movements of the needle, and allow it to rest during the intermediate movements of the needle, so that it shall feed once, then rest during two stitches, then feed forward another stitch, and repeat the two stitches. I operate the needle and shuttle in such a manner that the needle-thread and the shuttle-thread, by their mutual relations to each other, tie a square knot at each double reciprocation of the needle, and I preferably so conduct the operation that the square knot thus produced shall be sunk into the body of the fabric, or, in other words, shall lie entirely within instead of projecting beyond either face of the goods. I provide means for exchanging this peculiar feed and substituting therefor an ordinary feed, which shall move forward the goods equally after each thrust and return of the needle.

I will proceed to describe what I consider the best means for carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a side view. Fig. 2 is a plan view. Fig. 3 is a vertical section in the plane between the two feed-chains; and Fig. 4 is a front view of the machine as I prefer to adjust it for most uses. Fig. 5 is a side view corresponding to Fig. 1, but showing an adjustment by the removal of certain small parts and the substitution of others. This figure shows only a small portion of the machine, many of the essential parts being omitted, but enough being shown to indicate clearly the relation and arrangement of the whole. The parts not shown in Fig. 5 are as in Fig. 1.

Similar letters of reference indicate corresponding parts in all the figures.

A is a fixed frame-work, of cast-iron or other suitable material.

B is the driving-shaft, operated by a belt (not represented) driven by a steam-engine or other suitable power, and B′ is the pulley on which it runs.

B^2 is a cam-wheel having a groove, b^2, extending around it in the position represented, and adapted to give a proper motion to the needle by means of the lever C, which is hung on a fixed center at *c*, and is connected to the needle-bar at *c′*.

D is the needle-bar, and *d* the needle.

D′ is an awl, which is maintained either in a fixed or in an adjustable position in the needle-bar, and adapted to prick a hole in advance of the needle to facilitate the operation of the needle when it is subsequently thrust into the goods. This awl allows the use of a smaller needle than would be otherwise practicable.

B^3 is a gear-wheel keyed or otherwise fixed on the overhung end of the shaft B, so that it may be removed when required, as will presently appear. When firmly keyed on, as represented in Figs. 1, 2, and 4, it gives motion to the larger gear-wheel, E, which has twice the number of teeth, and consequently turns once for every two revolutions of the main shaft B. This slow-wheel E carries a crank-pin, *e*, which traverses in a peculiar slot, *f′*, in the shuttle-lever F, which latter is hung on the fixed pivot *f* and reciprocates backward and for-

ward in a slot in the framing above, as will be understood. This shuttle-lever operates the shuttle-driver F′, which has arms F^2 and F^2, which take hold loosely of the shuttle G, which traverses on a smooth raceway or track in the proper position relatively to the needle *d*. The shuttle G is rounded and pointed at each end, and can take the loop of the needle-thread by a motion in either direction. The contact of the arms F^2 F^2 with the shuttle G is sufficiently loose to allow the needle-thread to pass easily over the shuttle and between it and these driving-arm.

I and J are "pitch-chains," some would term them, composed of rigid links banded together by pivots, which make the chains flexible, without much room for lost motion. The inner surfaces of these pitch-chains are geared or provided with teeth, two teeth on each link, as represented in Figs. 1 and 3. The points of the teeth are also adapted to fit and be guided in grooves in guiding-ways and guiding-pulleys.

Guiding-ways *i* and *j* are mounted at a proper distance below the path of the needle to allow for the links of the pitch-chains I and J above.

H and H′ are guiding-blocks at a little distance from each end of these guiding-ways *i* and *j*, to support and steady the chains as they approach to and recede from the vicinity of the needle.

H^2 H^3, &c., are further guide-blocks and guide-rollers, each performing the same important functions and keeping taut the pitch-chains I and J. The guide-rollers are adjustable in position to allow them to be shifted from time to time, so as to take up any slack in the chains. It will be observed that each is adjustable independently of the other, so that in case one chain wears more than the other, or from any cause becomes loose while the other remains taut, the pulleys on which it runs may be moved without moving the other.

The chains I and J approach closely together and run strictly parallel for a little distance before reaching the needle and in passing and after passing it. Below this they diverge, and are held at a sufficient distance apart to allow the goods to be crumpled up or folded regularly or irregularly and to be drawn freely through the machine.

K is a guard or shield, which defends the goods as they are drawn through against any possibility of contact with the driving gear-wheels L′ and L^2, which are mounted on the shaft L and impart the proper intermittent motion to the feed-chains I and J.

K′ is an anti-friction roller which facilitates the movement of the fabric through the machine. There may be more of these anti-friction rollers, so as to form a continuous series, if desired.

The shaft L is provided with a ratchet-wheel, *l*, which is operated by the hook-pawl M, and is held after each movement by the pawl O.

The moving pawl M is operated by a lever, N, which turns on a fixed pivot, *n*, and receives motion in one direction from the eccentric P and in the other from the spring P′.

The lever N is continued and bent downward and backward, as represented in Fig. 3. This allows it and its connections to be worked by another means.

The eccentric P may be removed, and the eccentric Q^2 being applied, the gearing (shown in Fig. 1) causes it to work only half as often as before. This substitution is necessary so as to feed only at alternate thrusts of the needle when it is desired to make two thrusts in the same place and tie the square knot in the center of the thickness of the goods.

The guideway *i* is firmly fixed, and is incapable of movement in any direceion. The guideway *j* is supported against any rising and sinking motion, but is allowed to move laterally under the action of the spring *j*, which by yielding allow the chain J to move away from the opposite chain, I, and to return again by the elastic action of the spring to allow for the irregularities in the thickness in the material being sewed.

It will be understood that the pitch-chains I J, which I sometimes denominate simply "feed-chains," may be held much wider apart in the lower portion of their path than is here represented. I assume it important to hold them at a sufficient distance apart to allow the goods being sewed to be drawn through the space thus provided without clogging. Beyond this I do not esteem it beneficial to increase the divergence of the chains; but it may, if desired, be increased until the chains traverse in planes which are nearly horizontal. Such an extraordinary divergence of the lower portion of the chains would, however, involve a reconstruction of the machine.

There is an arched brace, *a*, which connects the framing above the chains. It is important to arch it at a sufficient height to allow for the edge of the material being sewed, even when the stitches are placed at a considerable depth on the fabric, or, in other words, when the edges project up above the path of the needle. This brace may be omitted altogether, if desired, provided the framing of the machine be made sufficiently stiff to support itself firmly without such assistance.

The provision for spools, tensions, and various other important functions and parts of sewing-machines will not, it is believed, require particular description. I propose to sew with any kind of thread or twine, or in some cases with fine wire. In short, I propose to use any ordinary or suitable material as a thread and to sew any ordinary or suitable work.

In overseaming it is necessary to raise and lower the work at each stitch, or rather at alternate stitches or thrusts, of the needle. My invention allows admirably for this by providing for making a portion of the framing movable up and down within the main framing. This portion is designated A′. All the sup-

ports for the feed-chains, and consequently the feed-chains themselves, are carried thereon, and in consequence a vertical movement of the framing A′ carries the feed-chains and the fabric inclosed therein with a corresponding motion up and down. There are slides on the framing A adapted to guide the framing A′ smoothly and steadily in any vertical movement which may be imparted to it, and there are pinching-screws or set-screws a', which are capable of holding the framing A′ firmly in its most elevated position when it is desired. In ordinary sewing the set-screws a' are tightened and the framing A′ is held immovably, so that it forms in effect a part of the main framing A.

When it is desired to overseam, the set-screws a' are slackened and entirely loosened, which causes the framing A′ and its attachments to slide up and down as it is impelled alternately upward and downward under the influence of the eccentrics or cams Q′, carried on the shaft Q, and receiving motion from the gear-wheel E, so as to revolve once for each two strokes or thrusts of the needle. This overseaming arrangement I esteem merely a modification of the provisions for overseaming in a patent granted to me dated June 22, 1869. The square knot is tied in the threads by the mutual action of the needle and shuttle.

The employment of the awl D′ to punch a hole in advance of the needle allows the needle to be quite blunt, and also allows it to be beveled in one direction or the other, so as to be pretty certain to go over or under a thread previously laid in its path. The needle, as has been already explained, is thrust twice through the same hole in the goods. The first time it enters and returns the thread passes through it in the same direction the goods are fed, and leaves a thread lying properly in the loop thus formed, which, by employing a proper tension on the needle, is drawn partly or entirely into the fabric. Now, the next thrust of the needle into the same hole passes over this thread previously laid, crossing its path, and on returning and forming a slack in the needle-thread, as usual, the shuttle in its return movement—to wit, the movement opposite to that in which the goods are fed—again passes the shuttle-thread through the needle-thread to form another loop; but, as it is obvious that there is nothing remaining to hold the slack of the shuttle-thread, it will drag along behind the shuttle, and there being a proper amount of tension on the shuttle-thread, there will be but very little slack thus traveling behind. The result, in short, is a loop of thread traveling behind the shuttle, which, when the shuttle has reached the end of its backward motion, is drawn up quite to the path of the needle. Now, on the return of the needle the slack of the needle-thread is a second time drawn back through the goods, and it is found that as it tightens the tension and draws this compound loop thus formed into or near the center of the thickness of the goods there is formed a complete square knot at that point between the shuttle-thread and the needle-thread—that is to say, the needle-thread reaches from one face of the goods into and a little past the center of the thickness of the goods, and there forms a bight in the shape of a small rounded loop of a horseshoe form, and returns, while the shuttle-thread is found lying drawn in from the opposite face of the goods, passing through that small loop of the needle-thread, and bending thence quite around the doubled needle-thread and back again through the small loop of the needle-thread, and emerges from the goods.

It is desirable, under some circumstances, to work the machine with a shuttle having the ordinary motion—that is to say, performing a complete reciprocation for each reciprocation of the needle. I have provided for readily changing my machine from the one condition to the other by simply changing a few of the parts. I provide a spare lever, R, adapted to fit and turn upon the pin r and to take hold of the shuttle at its upper extremity. Before applying this lever I remove the shuttle-lever F, previously described, and also remove the large gear-wheel E and the small gear-wheel B^3, and apply the eccentric T and eccentric-strap T′, which latter is connected by a short arm, T^2, to the lower end of the substituted shuttle-lever R. Now, as thus changed, the machine will be found to throw the shuttle (not, as before, simply in one direction for each thrust and return of the needle, but to throw the shuttle) forward and return, or, in other words, to produce a complete reciprocation of the shuttle for each reciprocation of the needle. When working in this condition an ordinary and single-pointed shuttle may be used, and is on some accounts preferable, and the sewing, due attention being paid to other points, will be the shuttle-stitch of the ordinary long-approved character.

Although I have described the machine as sewing carpets and analogous soft fabrics, I do not intend to limit its use thereto. I propose to sew any material which is capable of being so treated.

My machine is especially adapted to sewing paper in many thicknesses in joining the leaves of books, and is especially useful in sewing together the parts at the backs of pamphlets. The stitching in this class of work as ordinarily conducted, and knotted by hand after each operation, is liable to give out from the loosening of the knots.

My machine allows a number of stitches, each firmly knotted, to be placed rapidly and with little expense for material or labor along the back of each pamphlet. I can sew a lot of such work as fast as the successive books can be made to follow each other between the feed-chains I and J. There being a knot in each stitch, the failure of one knot does not perceptibly weaken the fastening of the pamphlet.

Though I have described the overseaming movement as effected by the raising and lowering of the feed-chains I J and their several

attachments, by moving the frame A′ vertically in the frame A, it will be obvious that a similar result will be effected by working the feed-chains I J and their attachments in fixed paths and giving a corresponding up-and-down motion to the portion of the frame which guides the needle-bar D.

It is easy to make in separate parts that portion of the frame-work which guides the needle-bar D and the shuttle G, and to give it, and consequently the needle and shuttle, corresponding changes of level at alternate strokes or thrusts of the needle. I can, if necessary in any particular work, make both these parts movable, so that the necessary changes of level at the alternate thrusts of the needle may be effected partly by lowering the feed-chains, and thus lowering the work which has been sewed, and partly by raising the needle and shuttle, and on the succeeding thrust correspondingly raising the work and lowering the needle and shuttle.

I have spoken of employing spring-pressure to force the feed-chains together. Fig. 4 shows springs j^2 acting through the medium of rolls j^3. I prefer one such roll a little before the needle, so as to act against the goods before they are sewed, and another just behind the needle. These, being at a higher level, hold the feed-chains firmly together at the upper edge at these points and give firmness and certainty to the feed.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with sewing-machines, of the feeding-chains adapted to receive the material between their faces, hold it firmly while passing beyond the needle, and discharge it.

2. The combination of feeding-chains and the horizontally-reciprocating needle, when operated, substantially as described, to form stitches alternately through the material and over the edge.

3. The gear-wheels B^3 E and their connections, communicating a slower movement to the shuttle mechanism than to the needle, so as to perform only a half-reciprocation of the shuttle for each complete reciprocation of the needle, as specified.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

G. STACKPOLE.

Witnesses:

THOMAS D. STETSON,

C. C. LIVINGS.