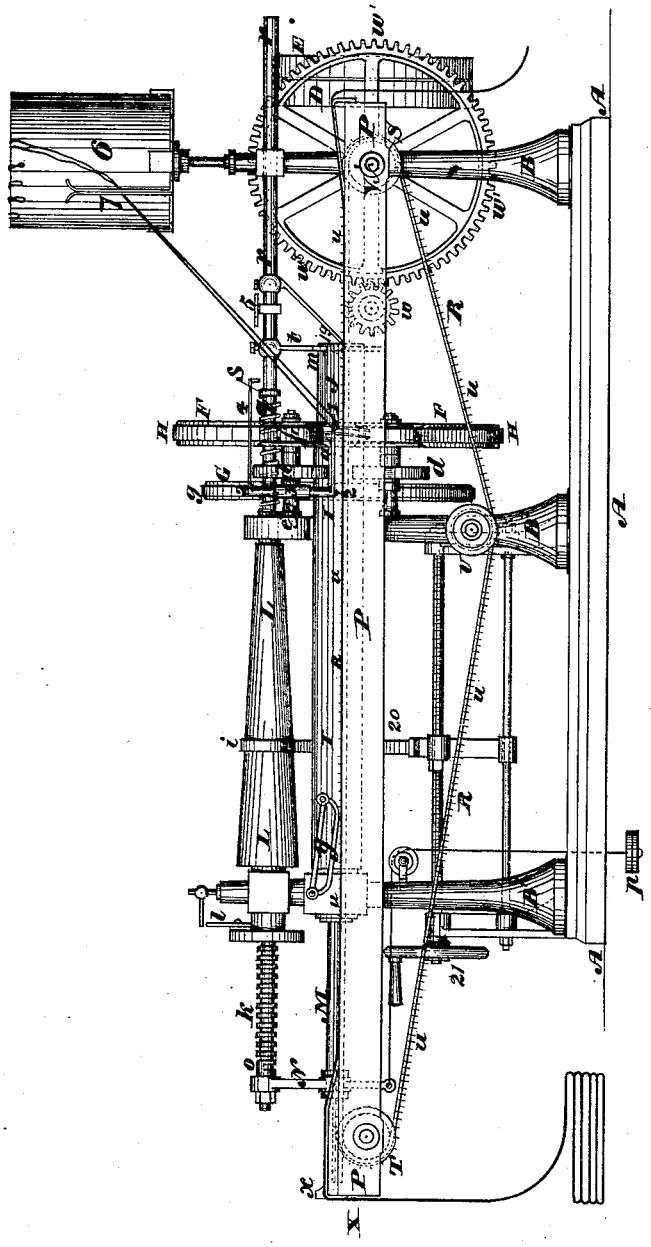
4 Sheets--Sheet 1.

J. LAING.

Sewing-Machine.

No. 162,665. Patented April 27, 1875.



Witnesses.

George Macaulay Cruickshank

David Drysdale Austin

Inventor:

James Laing

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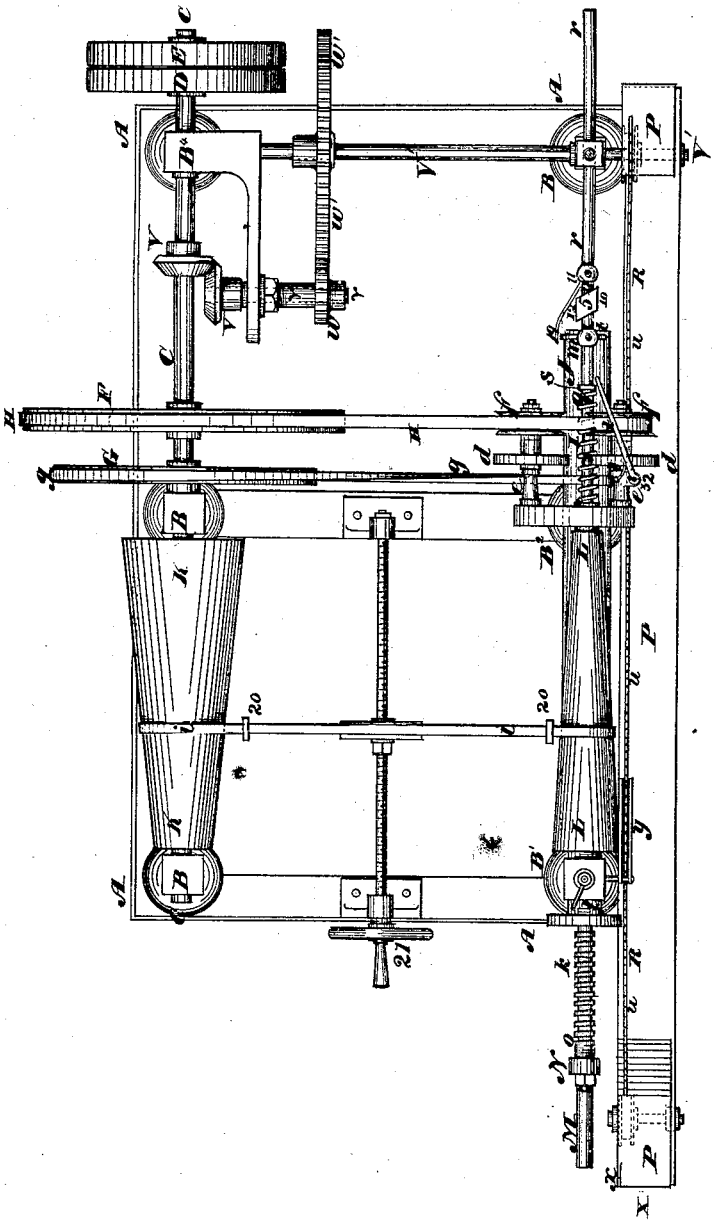
4 Sheets--Sheet 2.

J. LAING.

Sewing-Machine.

No. 162,665. Patented April 27, 1875.



Witnesses:

George Macaulay Luckshank

David Drysdale Austin

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4 Sheets--Sheet 3.

J. LAING.

Sewing-Machine.

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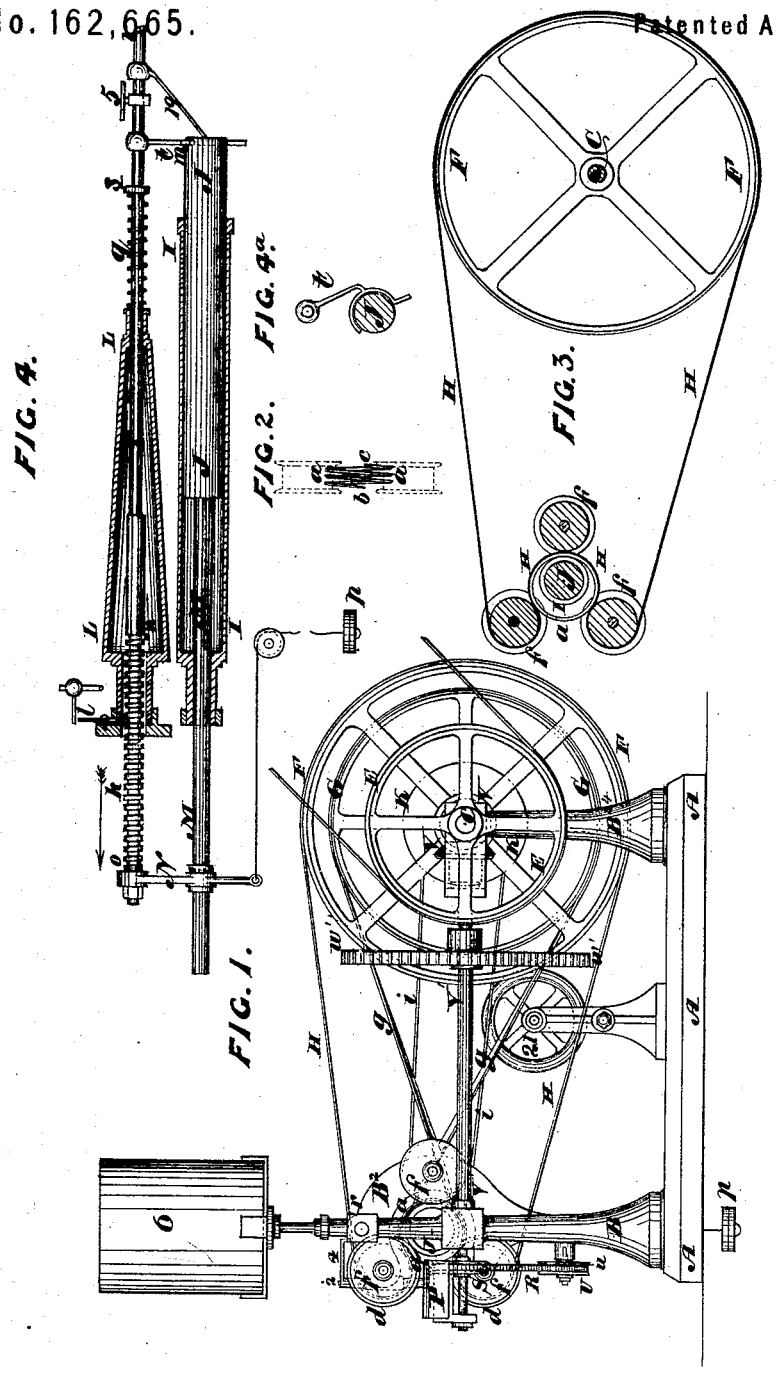

FIG. 4.

FIG. 4a.

FIG. 2.

FIG. 3.

FIG. 1.

Witnesses:

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Inventor:

James Laing

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

4 Sheets--Sheet 4.

J. LAING.

Sewing-Machine.

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FIG. 6.

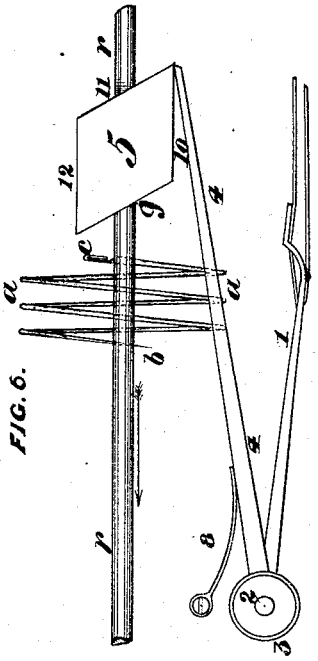


FIG. 7.

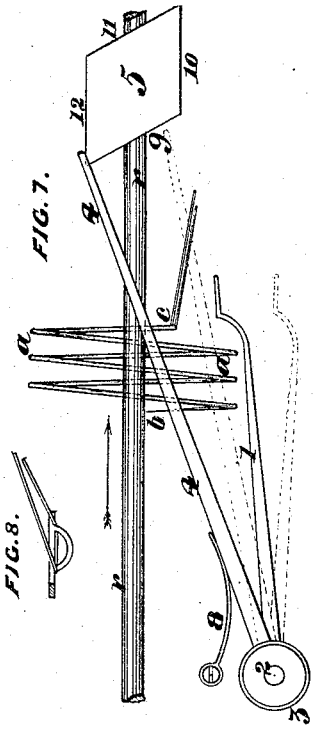


FIG. 8.

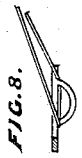


FIG. 1.

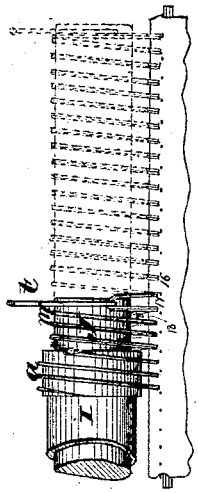


FIG. 3.

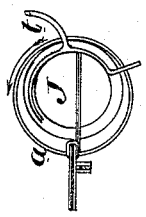


FIG. 5.

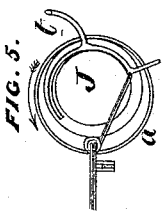


FIG. 2.

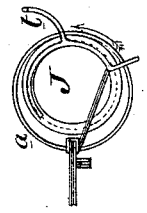
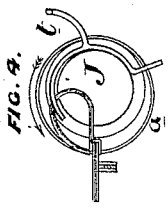


FIG. 4.



Witnesses:

George Macaulay Cruickshanks

David Drysdale Austin

Inventor:

James Laing

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE

JAMES LAING, OF DUNDEE, NORTH BRITAIN.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **162,665**, dated April 27, 1875; application filed January 29, 1875.

To all whom it may concern:

Be it known that I, JAMES LAING, of Dundee, in the county of Forfar, North Britain, have invented a new and Improved Overseam Sewing-Machine, of which the following is a specification:

My said invention relates to a new and improved overseam sewing-machine, in which the operation of sewing is effected by a spiral hook or needle, pointed at one end so as to pierce the cloth, while at the other end it is provided with a hooked eye, by which the thread, string, or cord is held.

The figure on Sheet 1 of the drawings hereunto appended is a side elevation, the figure on Sheet 2 a plan, and Figure 1, Sheet 3, an end elevation, of the sewing-machine as constructed in accordance with my said invention.

As shown by these figures, the mechanism or apparatus consists of a rectangular framework or base, A, at each side of which a number of standards, B, supporting the moving parts of the mechanism, are fixed. On the columns or standards, at one side of the machine, a driving-shaft, C, is supported, on which fast and loose pulleys D and E, respectively, are placed at one end, the shaft being driven by a belt or band passed around the pulley D, and communicating with a prime mover; or, in lieu of this arrangement, a wheel may be situated at the position of the fast and loose pulleys D and E, through which the machine may be driven by hand. On the driving-shaft C other pulleys F and G are also fixed, from the larger one F of which motion is communicated, by a band or belt, H, to a cylindrical spiral hook or needle, *a*, (seen on Sheet 1,) and more particularly by the detailed views, Figs. 2 and 3, Sheet 3, of the drawings. The spiral hook or needle *a* is that by which the sewing is effected, and for that purpose it is formed pointed at that end, *b*, which first pierces through the cloth or fabric, and at the opposite end, *c*, it is formed with a hooked eye, by which the thread, cord, or string used in the sewing is held. Immediately in front of the hooked eye the spiral needle *a* is slightly enlarged, as shown at Fig. 1, Sheet 4, so as to clear or widen the hole through the cloth or fabric, and so prevent the hook with the thread from catching in the hole. Within the circumference of the spiral needle *a* a tube, I, is situated, and which is supported at one end by the pillar B^1, and at its other end by frictional rollers *d*, placed on studs or shafts *e* fixed in the projecting or bracketed upper portion of the middle pillar B^2, at the front side of the machine, as more particularly seen at Fig. 1, Sheet 3. The band H, which rotates the needle *a*, is, besides being passed round a portion of the pulley F and of the needle, also passed round and against stenting-pulleys *f*, arranged round the spiral needle, as shown more particularly at Fig. 3, Sheet 3, which pulleys, being provided with flanges, also serve to prevent lateral motion of the needle. The pulleys *f* are situated on the same shafts or studs *e* with the frictional rollers *d*, hereinbefore mentioned. The belt or band H presses the needle *a* against the periphery of the cylinder or tube I, as shown at Fig. 3, Sheet 3, and, besides the motion which the needle derives from the said belt, uniform motion is communicated thereto by the revolution of the cylinder or tube I, which revolution is effected by a crossed belt, *g*, passed round the cylinder or tube, and also round the pulley G, situated on the driving-shaft C. The cylinder or tube I is bored to receive and fit a cylindrical barrel, J, as shown at Fig. 4, Sheet 3, of the drawings, on which is coiled the thread, cord, or string necessary to form a seam, the said thread, cord, or string being wound on the barrel J by the hook or needle *a*, after being passed through the portions of the cloth or fabric to be joined or sewed together, as illustrated by the detailed view of the barrel J and needle *a* at Fig. 1, Sheet 4, of the drawings. The thread-barrel J, which partakes of the rotatory motion of the cylinder or tube I, has also a horizontal sliding or reciprocal motion into and out from the cylinder or tube, and which is effected by the employment of two differential belt-cones, K and L, the larger one K of which is fixed on the driving-shaft C, and communicates motion to the other cone L by means of the belt *i*, (the figure on Sheet 2.) From the cone L horizontal motion is transmitted to the thread-barrel J by a screw, *k*, passing through the hollow bearing of the cone L, and geared therewith by an adjusta-

ble catch, *l*, which is attached to the cone by a pin or stud passing through a slotted hole in the catch *l*, as shown at Fig. 4, Sheet 3, of the drawings.

The outer end of the screw *k* is attached to the similar end of the thread-barrel spindle M by a cross-head or link, N, so that when the cone L is rotated by the belt *i*, and the screw moved outward in the direction of the arrow, Fig. 4, Sheet 3, by the catch *l*, which is carried round with the cone L gearing with the screw-thread, the thread-barrel J is correspondingly moved until the part thereof marked *m* is brought up to or within the end of the tube or cylinder I, at which time a heel or projection, *n*, formed on the inner end of the screw *k*, raises the catch *l*, and the screw *k* and thread-barrel J, being thereby thrown out of gear with the cone L, are drawn backward to their normal position—that is to say, those parts of the mechanism are moved sufficiently backward to bring the end *o* of the screw *k* under the catch *l* by a weight or other suitable device attached to the cross-head, the instantaneous action of which weights is accelerated or assisted by the spring *q*, placed on the continuation *r* of the screw *k*, and pressing at one end against the bearing of the cone L, and at its other end against a collar, *s*, fixed on the shaft *r*, as shown at Sheets 1, 2, and at Fig. 4, Sheet 3, of the drawings. As shown at Fig. 4, Sheet 3, the spindle of the thread-barrel J is slotted or grooved, and into the said groove a feather formed on the interior of the cylinder or tube I enters, whereby the barrel is keyed to the cylinder or tube, and is carried round with it, while, at the same time, the length of the slot or groove permits of the horizontal movement of the barrel J. In lieu of forming the feather on the cylinder or tube it may be formed on the spindle, or, instead of a feather, a pinching-screw or equivalent mechanism may be employed to key the barrel J and cylinder or tube I together.

On the end of the spindle *r*, opposite to that at which the screw *k* is formed, a drag or catch, *t*, is situated, the construction of which is more particularly seen at Fig. 4ª, Sheet 3 of the drawings. The thread, cord, or string, as it unwinds from the barrel J, passes in between the periphery of the barrel and the drag or catch *t*, as shown at Fig. 2, Sheet 4, whereby each succeeding stitch is pulled tight, as hereinafter more particularly referred to.

A feeding-table, P, is placed along the front of the machine, and supported on the columns or pillars B, and through a groove or slot formed in the said table a pitch-chain, R, or its equivalent, provided with spikes *u*, passes. The chain R is passed round guide-pulleys S and T, and also under a stenting-pulley, U, and it is driven from the driving-shaft C by the bevel-pinions V, one of which is situated on the said shaft and the other on a shaft or stud, *v*, supported in an arm or bracket formed on the upper end of the pillar B⁴, as more particularly seen by the figure on Sheet 2. On the shaft or stud *v* a spur-pinion, *w*, is also fixed, which gears into a corresponding spur-wheel, *w'*, situated on a cross-shaft, V', whereon the chain-pulley S is also fixed. The cloth or fabric to be sewed is fed to the machine at the end of the feeding-table marked X, whereat an incline is made, down which the cloth is passed onto the spikes *u* of the pitch-chain R, and as the said chain is traversed the cloth or fabric is drawn along parallel to the axis of the spiral hook or needle *a*, and, after being sewed by the said needle, it passes up another inclined plane at the opposite end of the table P, whereby it is released from the teeth of the chain R, and is thereafter delivered from the machine. The amount of "gripe" embraced by the stitches in sewing the fabric is regulated by an adjustable fence, *x*, placed at the feeding end of the table P, as shown on Sheets 1 and 2 of the drawings, and the fabric is held down to the table by a presser, *y*, whose tension is regulated by a screw or spring.

In operating with the sewing-machine hereinbefore described the needle is threaded by an automatic threader, which places a new thread in the hook or eye of the needle *a* without stopping the machine or interrupting the progress of the work. The automatic threader, which is shown at Sheets 1, 2, at Fig. 1, Sheet 3, and more particularly in detail at Figs. 6 and 7, Sheet 4, of the drawings, consists of a thread-arm, 1, centered on one end of an upright shaft, 2, which is supported by a sleeve, 3, formed on or attached to the stud *e*, whereon one of the friction-rollers *d*, hereinbefore described, is placed. At the opposite end the thread-arm 1 is formed with a bent or curved eye, as shown at Fig. 8, Sheet 4, of the drawings, over which the thread, cord, or string to be delivered to the needle is placed, as shown. On the end of the shaft 2, opposite to the thread-arm 1, a lever, 4, is centered, whose outer end is bent at right angles, as shown at the figure on Sheet 1, and on the screwed spindle *r* a plate, 5, (the configuration of which, in plan, is shown at Sheets 2 and 4,) is fixed by means of a pinching-screw, or other equivalent means. The plate 5 is so arranged as at the proper instant to deliver the bight or loop of thread, cord, or string, from the bent eye of the arm 1 to the eye or hook of the needle *a*. The thread or cord is cut into any desired lengths, and these are doubled and placed in a suitable receptacle with the doubled portion hanging over the side of the said receptacle, and in preparing to thread the needle *a* the doubled portion of one length of thread or cord is passed through between tension-wires 7, and thence over the eye formed on the automatic threader 1 while in its normal position—that is to say, while the needle *a* is sewing with a thread formerly supplied to it, and while the screwed spindle *r* and thread-barrel J are being moved toward the feeding end of the machine, the automatic threader is in the position shown in dotted lines at Fig. 7, Sheet 4, being drawn thereunto, against the

action of the spring 8, by the tension of the cord or thread passed over the eye of the arm 1. When the screw-spindle *r* has nearly completed its outward stroke the inclined side 9 of the plate 5 comes in contact with the bent end of the lever 4, which is thereby caused to move through an arc outward until the bent portion bears against the side 10 of the plate 5. Immediately on the completion of the said outward or backward stroke of the spindle *r* and thread-barrel J (at which time all the thread previously supplied to the needle *a*, and coiled on the barrel J, is exhausted) the lever 4 returns to its normal position; but at that part of the plate 5 marked 11, immediately on the revulsion of the barrel J and spindle *r* being effected by the weights *p* and spring *q*, as hereinbefore described, causes the lever 4 to assume the position shown at Fig. 7, Sheet 4, of the drawings, in which position it is retained a length of time sufficient to enable the revolving spiral needle *a* to hook the bight or loop of thread off from the bent eye of the thread-arm 1, which being effected the arm falls over the end of the side 12, and is pushed back by the spring 8 into the position shown in dotted lines at Fig. 7, Sheet 4, and another bight or loop of thread is, by the operator, placed over the eye thereof, ready for the next threading of the needle *a*, without stopping the action of the machine. The needle thus threaded pierces the cloth or fabric and carries the thread through the same and around the barrel J, which is filled with thread, as shown in dotted lines at Fig. 1, Sheet 4, by the continuous revolution of the needle, and the progressive movement of the fabric and pitch-chain R. Each coil of thread, on reaching the rear end of the thread-barrel J, is, by the progressive movement of the fabric, and by the receding movement of the barrel J, thrown off therefrom and caught between the thread-drag *t* and the rounded edge of the barrel J. The thread passes in between the barrel and the drag *t*, at the position shown on Fig. 2, Sheet 4, and, by the rotary motion of the barrel J, the point of contact of the thread or cord with the barrel is carried around to the position shown at Fig. 3, Sheet 4, whereby the stitch 16, Fig. 1, Sheet 4, next preceding that passing round between the barrel and the drag, is tightened and completed.

After so pulling the preceding stitch tight, the point of contact of the thread or cord with the barrel J is, by the revolution of the latter, passed into the position shown at Fig. 4, Sheet 4, after which that portion of the thread or cord leaves the barrel, and the slack-stitch 17, so produced on the thread or cord, is, by the rotation of the needle *a*, drawn tight over the barrel J, whereby the stitch 17 is partly tightened or drawn up, the completion of the said stitch being effected by the receding of the barrel J, whereby the part 18 of the thread is thrown off, and, passing in between the barrel and the thread-drag, performs the completion of the stitch 17, as hereinbefore described in reference to the stitch 16. A similar succession of operations takes place in reference to each succeeding stitch, until all the thread on the barrel J has been exhausted, at which time a knife-edge, 19, Sheets 1, 2, and at Fig. 4, Sheet 3, secured on the screw-spindle *r*, cuts or severs the portion of thread remaining between the eye of the needle *a* and the seam, such severance being effected against the end of the tube or cylinder I, and close to the eye of the needle. The needle being free from thread, the barrel J and spindle *r* are immediately thrown back to the opposite end of their stroke, and the needle during such movement is rethreaded by the automatic threader, as hereinbefore described, and continues the seam at the position of the next stitch.

In sewing with the machine now under reference, the width between each stitch is regulated by the speed at which the pitch-chain R draws the cloth or fabric along the feeding-table P, the needle *a* being made sufficiently elastic to accommodate itself to any desired width of stitch. The speed of the chain R is adjusted by changing the spur-pinion *w* on the shaft *r*, Sheets 1 and 2. The speed of movement of the thread-barrels J toward the feeding end X of the machine is adjusted according to the breadth or gripe of cloth through which the seam is made—that is to say, the barrel is caused to unwind the thread or cord faster or slower according as a broader or narrower gripe is required, by shifting the driving-belt *i* on the cones K and L by means of a belt-shifter.

I claim as my invention—

1. The sewing-mechanism, substantially herein described, consisting of the needle *a*, tube or barrel I, belt H, and supporting-pulleys *f*, in combination with work-feeding mechanism.

2. The combination of the needle *a*, tube I, thread-barrel J, belt H, and supporting pulleys *f*, with mechanism for advancing and retracting the thread-barrel, as set forth.

3. The combination of the screw-rod K, pulley L, catch *t*, and spring *q*, with the thread-barrel J, and drag *t*.

4. The combination of the catch *t* and knife 19, with the barrel J and needle *a*, for finishing the stitches.

5. The combination of the arms 1 and 4, spring 8, and the striker 5, on the rod *r*, with the hook eye needle *a*.

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

JAMES LAING. [L. S.]

Witnesses:

GEORGE MACAULAY CRUIKSHANK,
DAVID DRYSDALE AUSTEN.