

E. E. KILBOURN.

Machine for Sewing the Seams of Looped Fabrics.

No. 59,746.

Patented Nov. 20, 1866.

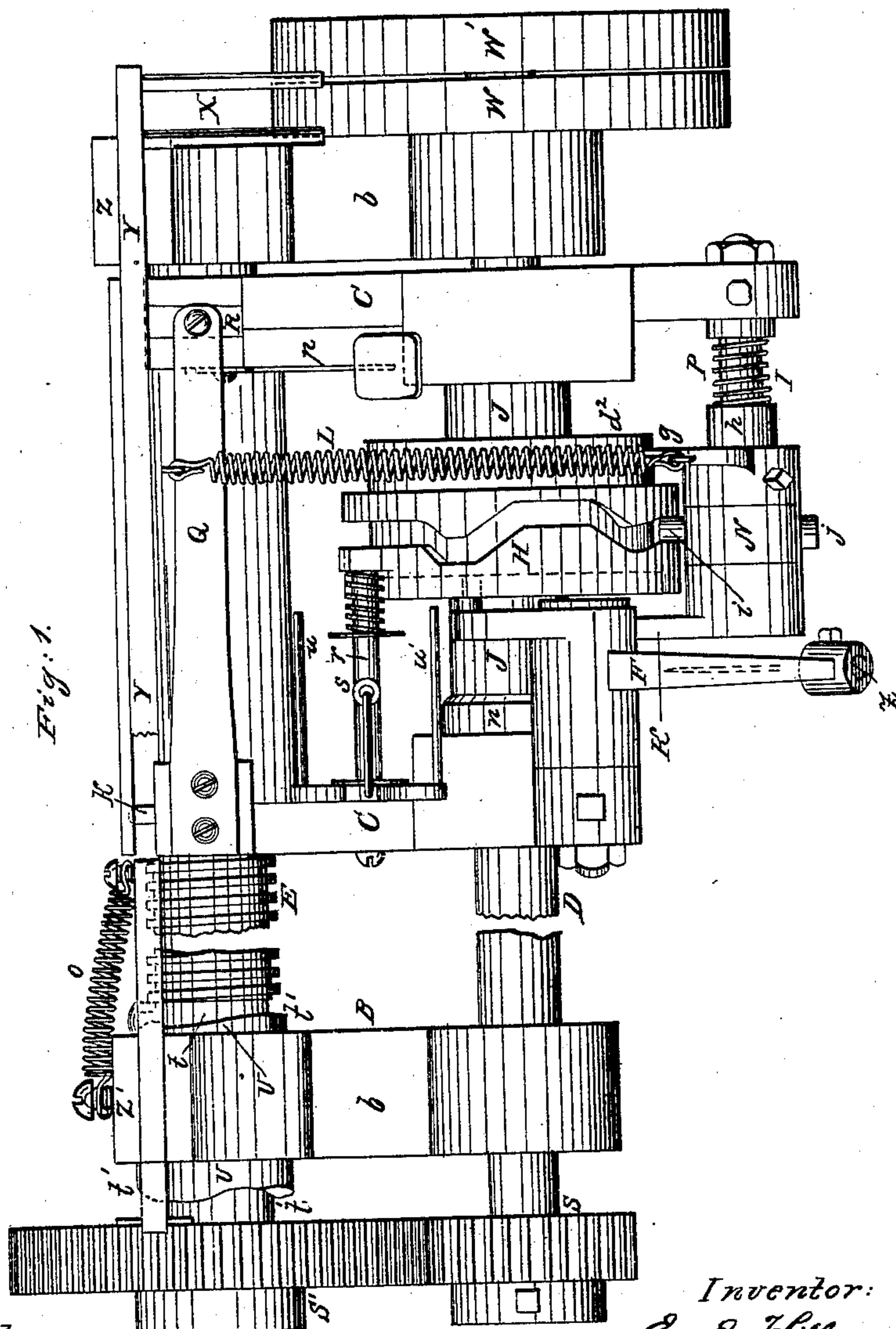


Fig. 1.

Witnesses:  
W. L. Bourne.  
J. W. Warster.

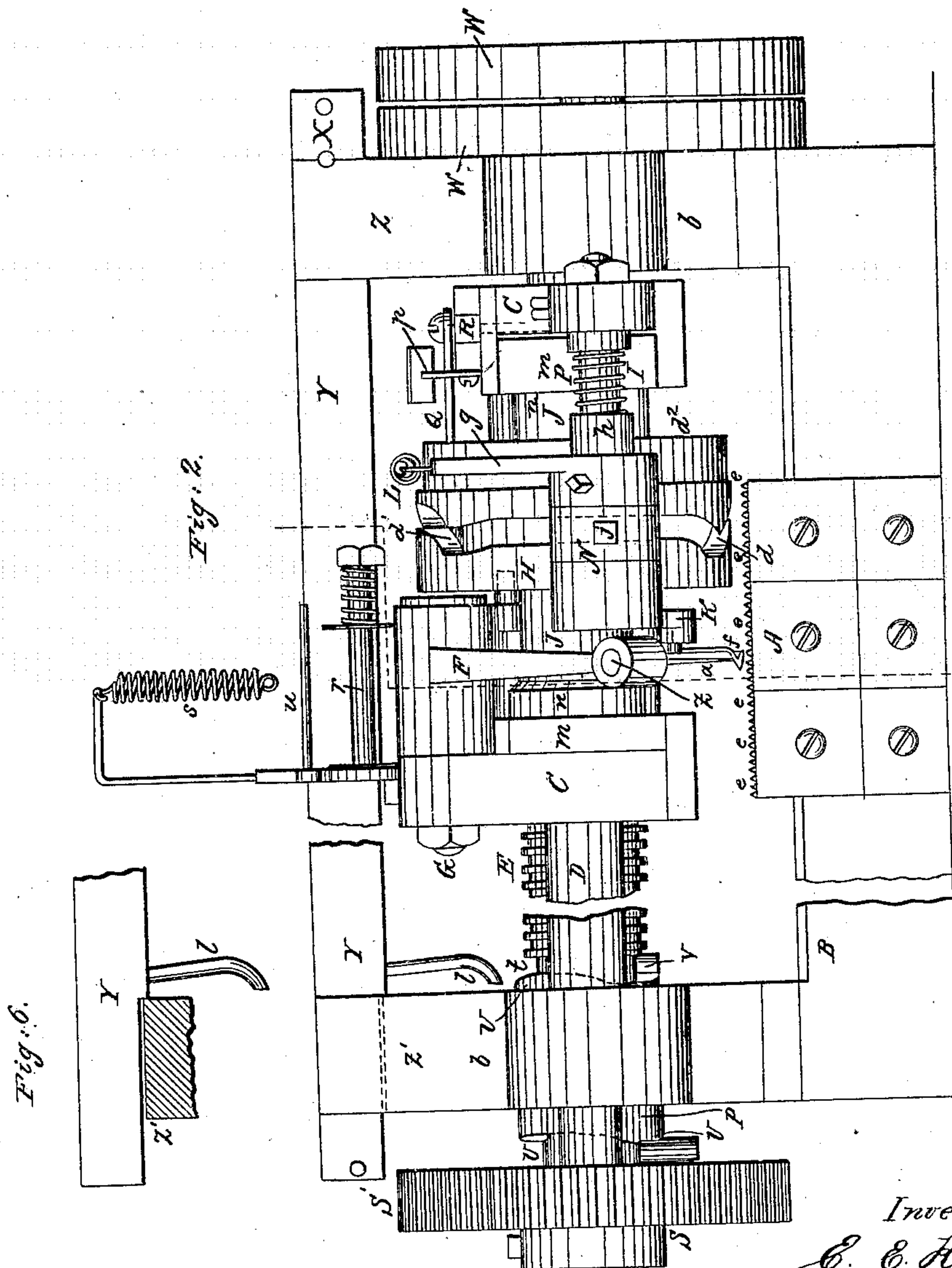
Inventor:  
E. E. Kilbourn.  
by his Attorney  
C. P. Burwick

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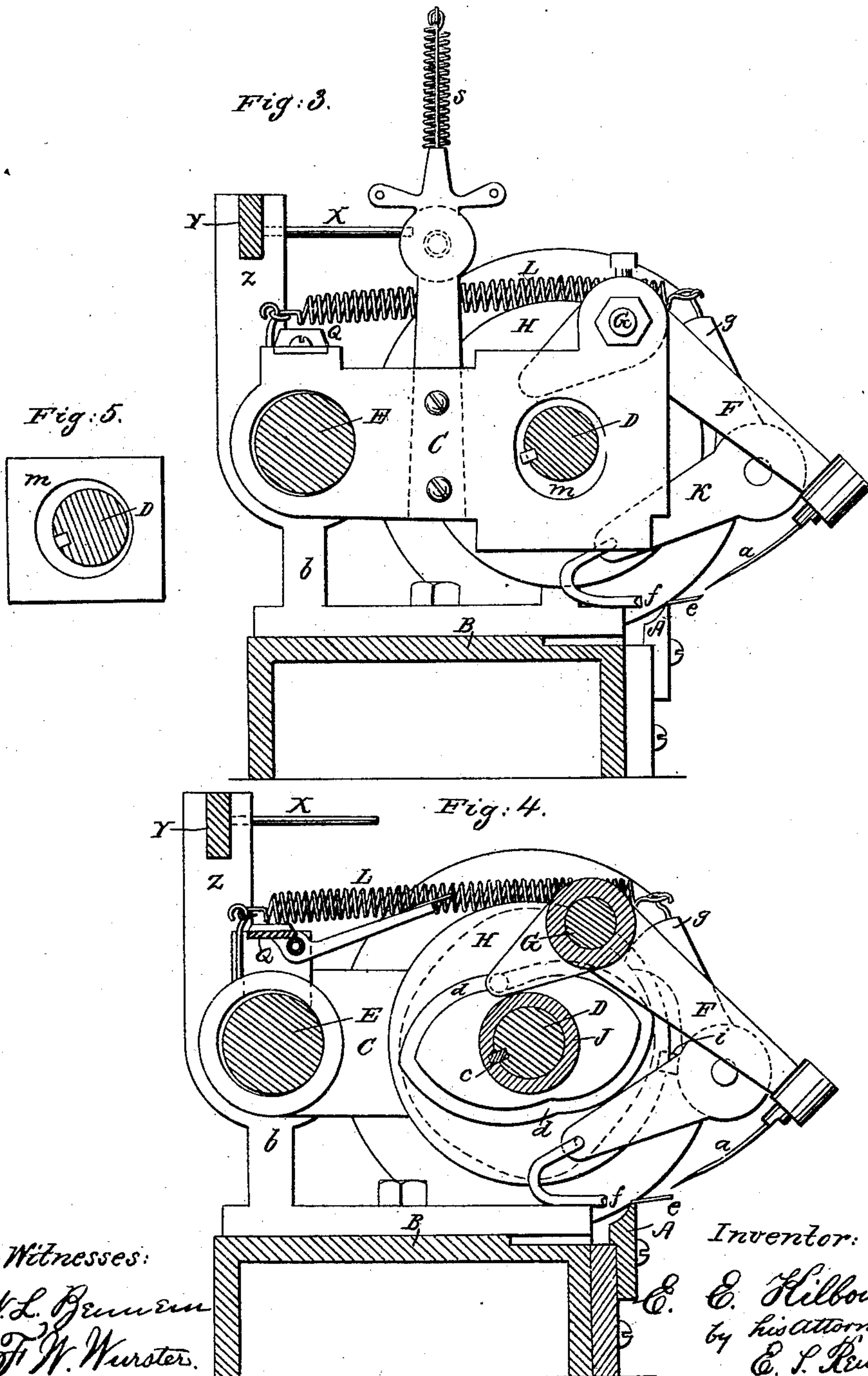
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E. E. Kilbourn.  
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# UNITED STATES PATENT OFFICE.

EDWARD E. KILBOURN, OF NEW BRUNSWICK, NEW JERSEY, ASSIGNOR TO THE NORFOLK AND NEW BRUNSWICK HOSIERY COMPANY, OF SAME PLACE.

## IMPROVEMENT IN MACHINES FOR SEWING THE SEAMS OF LOOPED FABRICS.

Specification forming part of Letters Patent No. 59,746, dated November 20, 1866.

*To all whom it may concern:*

Be it known that I, EDWARD ELISHA KILBOURN, of New Brunswick, in the State of New Jersey, have invented certain new and useful Machines for Seaming Knitted Goods; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan of a machine embodying my invention. Fig. 2 represents a front elevation of the same. Fig. 3 represents an end view of the same. Fig. 4 represents a vertical transverse section of the same at the line *x x* of Fig. 2; and Figs. 5 and 6 represent fragmentary parts of the machine, denoted by the same letters as the corresponding parts in the other figures.

The object of the machine which constitutes the subject-matter of this patent is to form the seam which connects the two selvage-edges of pieces of knitted or looped fabrics—such, for example, as the leg-seams of a pair of knitted drawers. In doing this work the needle must be passed through the loops of the edges. Previous to my invention this work was done principally by hand, and as it is practically impossible to draw each stitch of the seam by hand to precisely the same degree of tightness, or to give the proper elasticity to the seam, the work was quite irregular.

A machine was long since contrived for connecting pieces of ribbed fabric to pieces of plain fabric; but the difficulties attending its employment have been such as to prevent it from coming into general use. In that machine the work is supported upon a series of points secured to a disk which is caused to rotate past a reciprocating needle.

In the present machine I have used a straight supporting-plate, fitted with a series of points, on which the work is set up, and have secured the seaming mechanism to a carriage, which is caused to move progressively along the stationary supporting-plate as the stitches are formed.

My invention, therefore, consists of certain novel combinations of devices for the purpose of producing the seam in looped fabrics, one of the distinguishing characteristics of some of which combinations is the straight support-

ing-plate fitted with a supporting-point for every loop of fabric through which the needle is to be passed in forming the seam.

The accompanying drawings represent a machine in which my improvements are embodied. In it the supporting-plate *A* is secured to a frame, *B*, which also sustains the other parts of the machine. This supporting-plate is fitted with a row of points, *e*, set at suitable distances apart, for holding the stitches or loops at the selvage-edges of the pieces of knitted work, and each point is grooved in order to facilitate the passage of the point of the needle into the loop. The seam is formed by a needle and a looper, both of which are carried along the supporting-plate by a carriage, *C*, which is supported upon and guided by a slotted shaft, *D*, and a feed-screw, *E*, that are arranged to turn in suitable boxes formed in the end plates *b b* of the frame *B*.

The needle *a* is secured to a needle-arm, *F*, which is constructed to vibrate upon a stud, *G*, secured to the carriage, and the needle is curved, is eye-pointed, and has grooves in its sides to receive and protect the thread. The needle is caused to enter the fabric and withdraw from it by means of a cam-groove, *d*, in the head of a cam, *H*, that is secured to a sleeve, *J*, which is mounted upon the shaft *D*, and is connected with it by a feather, *c*, sliding in the slot of the shaft, so that the cam may slide along the shaft with the carriage, but is compelled to turn with the shaft. This sleeve has two journals, which turn in boxes *m m*, secured to the carriage, and have collars *n*, which bear against the inner faces of these boxes, so that the cam-block *H* is always held in the same position relatively to the carriage and its appurtenances, however the two may be moved along the row of supporting-points *A e e*.

The looper *f* has a head suitable for catching and holding the loop of thread carried through the fabric by the needle. This looper is secured to a looper-arm, *K*, which is constructed to both vibrate and slide upon a stud, *I*, secured to the carriage, so that a compound movement may be imparted to it, which causes it to enter the loop of needle-thread on the concave side of the needle, by moving cross-wise thereto, and to pull it from the work as



the needle withdraws; then to move toward the work as the needle returns, and to present the loop for the entrance of the needle; and, finally, to withdraw from the loop, by passing across the convex side of the needle previous to entering the new loop carried by the needle. This compound movement is effected by the concurrent operation of a cam-groove,  $d^1$ , formed in the barrel of the cam H, and a cam-grade,  $d^2$ , formed at one of the ends thereof, the former operating to move the looper crosswise to the needle, and the latter to move it toward and from the work.

The cam-grade  $d^2$  operates upon an arm,  $g$ , secured to a sleeve,  $h$ , which turns freely upon the looper-stud I, and has the looper-arm K secured to it. The cam-grade  $d^2$  thus operates to rock the looper-arm in one direction, and a spring, L, is provided to rock it in the opposite direction, as the form of the cam-grade permits. The cam-groove  $d^1$  operates upon the looper-arm through the intervention of a pin,  $i$ , projecting from a hub, N, which is fitted upon the sleeve  $h$ , between the hub of the looper-arm K and the hub of the cam-arm  $g$ . This hub N is prevented from rocking with the looper-sleeve  $h$  by means of a pin,  $j$ , which passes through an opening in the sleeve into a longitudinal slot in the stud I, which permits the sleeve to slide freely along it without rocking. The object of this contrivance is to prevent the pin  $i$  from changing its radial position relatively to the cam-groove  $d^1$  by rocking. In order that there may be no backlash, a spring, P, is provided to keep the pin  $i$  in constant contact with the driving side of the cam-groove  $d^1$ .

The looper, the needle, and the cam, and its connections, that operate both, constitute the seaming mechanism of the machine, and as they are all connected with the carriage C, they operate in the same manner relatively to each other in whatever position the carriage may be placed.

In order that the carriage may be moved along the work, it is provided with a section of a nut, R, which is constructed to slide toward and from the screw E in a socket in the carriage, and is held in engagement with the threads of the feed-screw E by means of a spring, G, so that the turning of the screw moves the carriage along the row of points  $e e e$ . This screw is turned by means of cog-wheels S S', which connect it with the cam-shaft D; and the cog-wheel S' on the screw-head is double the size of that upon the cam-shaft D, so that the screw revolves but once for two revolutions of the cam-shaft. This arrangement is advantageous, because it permits the screw to be made of coarser pitch than would be necessary if the screw turned with the same speed as the cam-shaft. The pitch of the screw is equal to double the distance between the centers of the supporting-points, so that every complete revolution of the cam-shaft D and corresponding half-revolution of the feed-screw E places the needle

at a new supporting-point. The screw turns continuously, while the needle should remain stationary until it withdraws from the stitch it has entered. In order to cause it to remain at rest, notwithstanding the continuous turning of the feed-screw, the screw is caused to move endwise in its bearings, at the time the needle is in the work, by means of inclines  $t t$ , formed upon cam-collars U, secured to the frame of the machine, the inclination of the collars being the same as the pitch of the screw, so that the screw is moved endwise in one direction just as fast as it tends to move the carriage in the opposite direction. Hence, as the one movement counterbalances the other, the carriage and needle remain for the time stationary.

The cam-collars act upon pins V, secured to the feed-screw, and the inclined grades  $t$ , for counterbalancing the feed-motion, alternate with reversed grades  $t'$ , for moving the screw endwise in the same direction as the screw moves the carriage, so that when the needle is not in the work the carriage is moved by the conjoined action of the screw and cam-grades.

In seaming the selvage-edges of knitted goods it is customary to make each stitch through the loops of the fabric. This mode of proceeding does not give the seam sufficient elasticity for many purposes. In order to form a seam with the requisite elasticity, I make the stitches alternately through the loops and over them; and in order that the stitches may be so alternately made by the present machine, the cam-grooves and cam-grade for operating the needle and looper are so formed as to operate them twice for each revolution of the cam-shaft D. The journals of the sleeve, also, which turn in the boxes  $m$  of the carriage, are eccentric, and the boxes are constructed to slide horizontally in their seats in the carriage. Hence, when the cam-sleeve is turned by the cam-shaft, its eccentric-journals cause the carriage to rock upon the feed-screw as an axis, and the eccentricity is sufficient to raise the needle above the edge of the fabric, so that each alternate stitch is formed over the two edges of the fabric which are supported upon the row of points  $e e e$ . In forming the stitches over the edges it is expedient to carry the needle and looper a greater distance in the direction of the feed than the length of the feed, and then to carry them back to that supporting-point at which the next through-stitch is to be formed. The effect of such lateral movement is to cause the thread proceeding from the needle-eye to the last stitch to diverge to a greater extent from the needle when the looper moves to take it; consequently such movement insures the proper action of the looper. This movement to and fro is readily effected in my machine by giving the requisite form for that purpose to the inclined grades of the cam-collars U U, which effect the endwise movement of the feed-screw.

The machine is conveniently driven by a



belt applied to a belt-pulley, W, that is made fast to the cam-shaft D. A loose pulley, W', is mounted upon the same shaft to receive the belt when the machine is to be stopped, and the belt is guided upon one or other pulley by a belt-shipper, X. The stock Y of this belt-shipper is arranged to slide longitudinally in standards Z Z', erected upon the frame of the machine. It has a notch near one end, so as to engage, when depressed, with one side of one of the standards, Z', and when it is so engaged the prongs of the belt-shipper guide the belt on the fast pulley. A spring, O, is provided to move the belt-shipper and transfer the belt to the loose pulley whenever the notch of the stock is disengaged from the standard Z'.

In order that the machine may be stopped automatically when the seam is sewed, a pin, k, is secured to the carriage in a proper position to act upon the under inclined side of a hanger, l, that projects down from the stock of the belt-shipper. Hence, when the carriage reaches the end of its track, this pin is forced against the inclined side of the hanger by the movement of the carriage, and, raising the stock, disengages the notch, and permits the spring O to shift the belt to the loose pulley, whereupon the machine stops.

In order that the nut-section R may be readily disengaged from the feed-screw, to permit the carriage to be quickly moved backward to its starting-point previous to commencing a new seam, a lever, p, is provided to disengage the section of the nut R from the feed-screw, whereupon the carriage may be slid along the screw and cam-shaft to its starting-point, after which the nut is permitted to be re-engaged with the feed-screw by the spring Q.

The row of supporting-points is made long enough to hold the edges to be seamed together without stopping the machine; and in practice I find it expedient to make it long enough to support the leg of a pair of drawers, so that the whole seam may be formed without stopping to shift the work. The distance between the end plates of the frame and the lengths of the feed-screw and cam-shaft must then be sufficient to permit the needle to be moved with the carriage from end to end of the row of supporting-points.

The spool of thread may be conveniently supported upon a spool-standard, r, secured to the carriage. The requisite tension may be imparted to the thread by a spring borne against the head of the spool by an adjusting-nut; and the slack formed in sewing may be taken up and given back, as required, by means of a spring, s, having an eye at its lower end, through which the thread is passed on its way to the needle. This spring operates in connection with a pair of bars, u u, across which the thread is extended. The thread is guided to the needle by a thread-guide, consisting of a hole, z, drilled in the end of the needle-arm. Any suitable thread-tension and take-up may be used in place of those above described.

The work to be seamed is set up upon the sup-

porting-points of the supporting-plate A, in the same manner as knitted work is set up upon the needles of the knitting-machine, there being a point for every loop through which the needle is to be passed at the place of such passage, and these peculiarities of the supporting-plate distinguish it from the old baster-plates which were used in early sewing-machines for the purpose of holding the fabric to be sewed, and which had needle-points arranged at intervals to hold the work, without reference to the passage of the needle. If all the stitches are to be made through the loops of the fabric, the cam grooves and grade should be arranged to operate the needle and looper but once for each revolution, the journals of the cam-sleeve should be cylindrical instead of eccentric, and the grades U of the cam-collars U U must be changed so that they will impart the required movement to the carriage; or, in place of altering the cam-grooves, the feed-screw may be arranged to feed the carriage along twice as fast as it is in the machine represented in the drawings.

In place of rocking the needle-carriage so as to make the alternate stitches over the edge of the fabric, and of moving the carriage to and fro for the purpose of making the over-stitch at a slight distance laterally from the preceding through-stitch, I produce the elastic seam by making the alternate stitches between the through-stitches, and without raising the seaming mechanism for the purpose. In this case the journals of the cam-sleeve are made cylindrical instead of eccentric, so that the carriage is not rocked, and the grades of the cam-collars are so formed as to compensate the action of the feed-screw, while the needle is advancing and retreating past the plane of the fabric, and to give the carriage at other times the whole effect of the movement of the feed-screw. The alternate operations of the needle will then be made between the supporting-points. The cams, grooves, and grade for operating the needle and looper will, in this case, operate in the same manner as when the alternate stitches are made over the edge of the fabric. In both cases the seaming mechanism is combined with half as many supporting-points as there are stitches made, and this feature of my invention may be applied to the old seaming-machines having a series of supporting-points secured to a disk.

Having thus described the best mode which I have thus far devised of embodying my invention, I declare that I am aware that previous to my invention a sewing-machine has been caused to travel along the edge of the work, which was held stationary in clamps, and therefore I do not claim that combination. On the other hand, I do not restrict the combinations in which the seaming mechanism enters as a member to the precise construction of such seaming mechanism, as it may be varied to suit the views of constructors.

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



1. The combination, in a seaming-machine, of the following devices, viz: the seaming mechanism, straight supporting-plate, and feed-screw, all operating in the combination substantially as set forth.

2. The combination, in a seaming-machine, of the devices recited in the preceding claim with cam-collars operating upon the feed-screw, substantially as set forth.

3. The combination, in a seaming-machine, of the needle, the looper, the cam that operates them, the carriage, and the mechanism for causing the carriage and its appurtenances to vibrate, all these devices operating in the combination substantially as set forth.

4. The combination, in a seaming-machine, of a series of points for holding the loops of fabric to be traversed by the needle with the reciprocating needle and the looper, and with a cam so formed as to cause the looper, after the passage of the needle through a loop of the fabric to be seamed, to take the loop of needle-thread at one side of the needle and withdraw from

it at the opposite side thereof, all operating in the combination substantially as set forth.

5. The combination, in a seaming-machine, of the devices recited in the first claim with a section of a nut that can be disengaged from the feed-screw, to permit the carriage to be moved quickly back to its starting-point, all said devices operating in the combination substantially as set forth.

6. The combination, in a seaming-machine, of the seaming mechanism with a supporting-plate provided with half as many supporting-points as the number of stitches made by the seaming mechanism, so that the stitches are made in regular succession through the loops of the fabric and out of them, substantially as set forth.

In testimony whereof I have hereunto set my hand this 14th day of May, A. D. 1866.

EDWARD ELISHA KILBOURN.

Witnesses:

GEO. W. DAVIES,

NICH. S. WINCKLEE.