4 Sheets—Sheet 1.

G. H. CORLISS.

Sewing Machine.

No. 3,389. Patented Dec. 27, 1843.

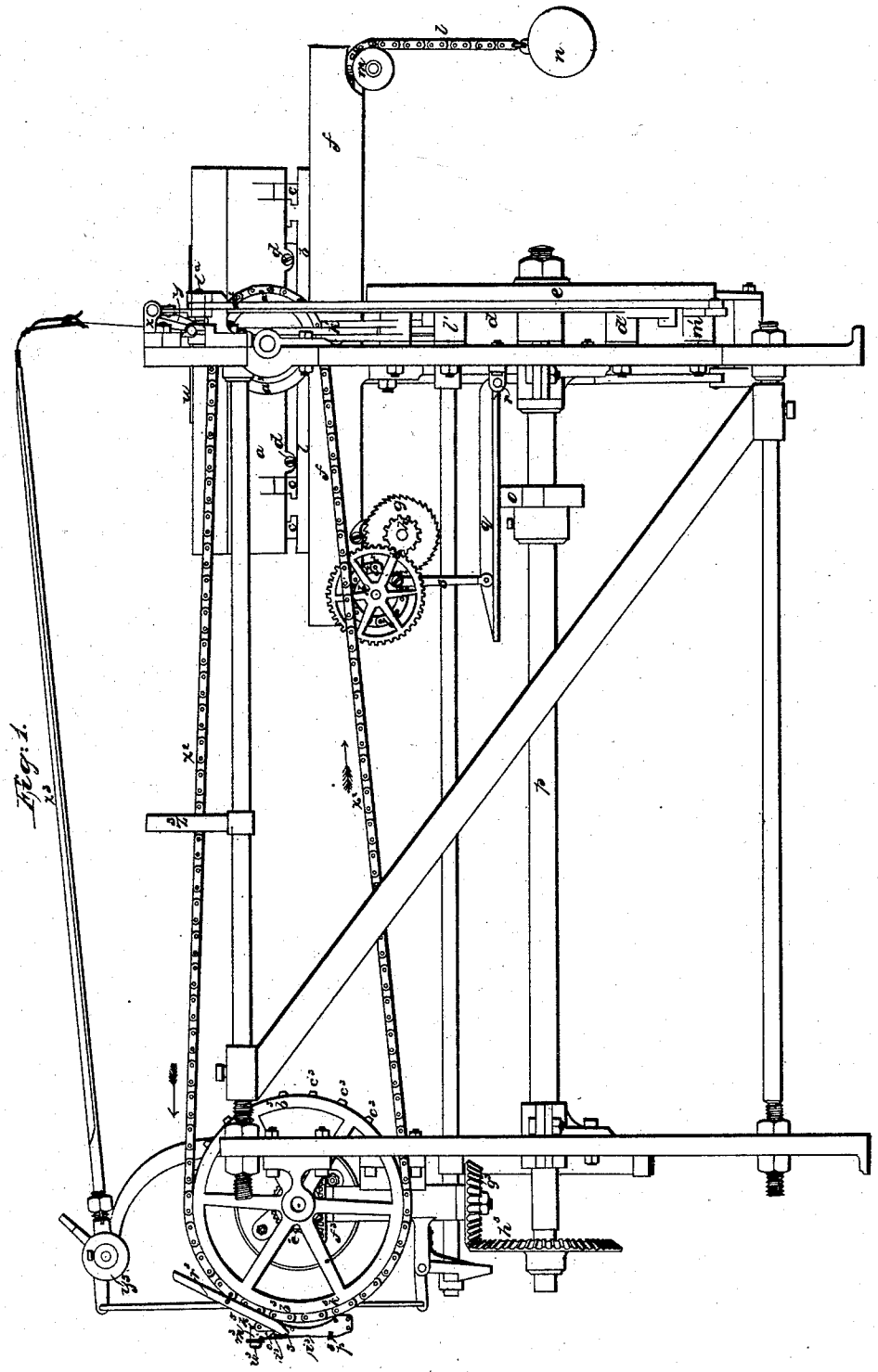


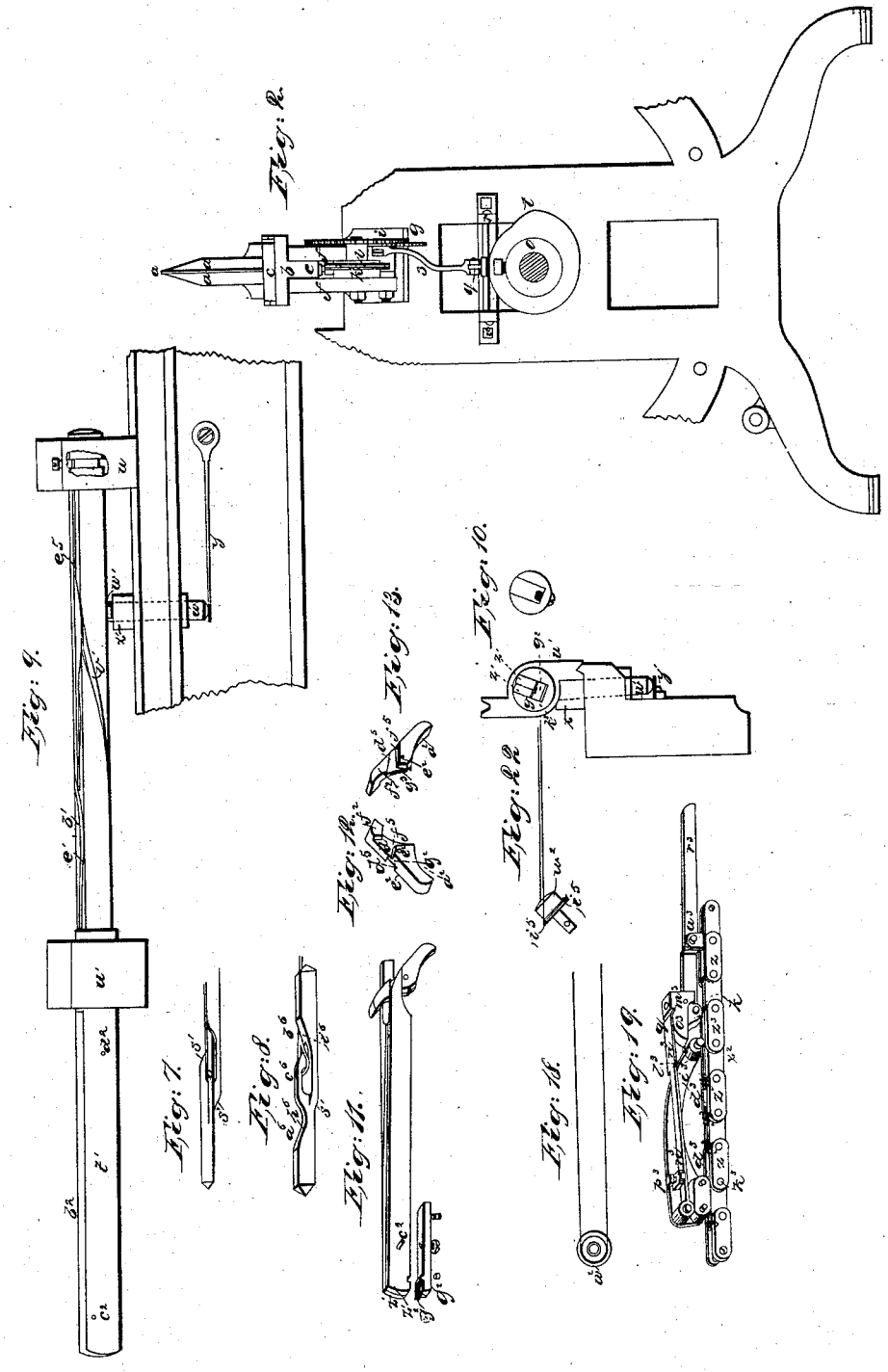
Fig. 1.

4 Sheets—Sheet 2.

G. H. CORLISS.

Sewing Machine.

No. 3,389. Patented Dec. 27, 1843.



4 Sheets—Sheet 3.

G. H. CORLISS.

Sewing Machine.

No. 3,389. Patented Dec. 27, 1843.

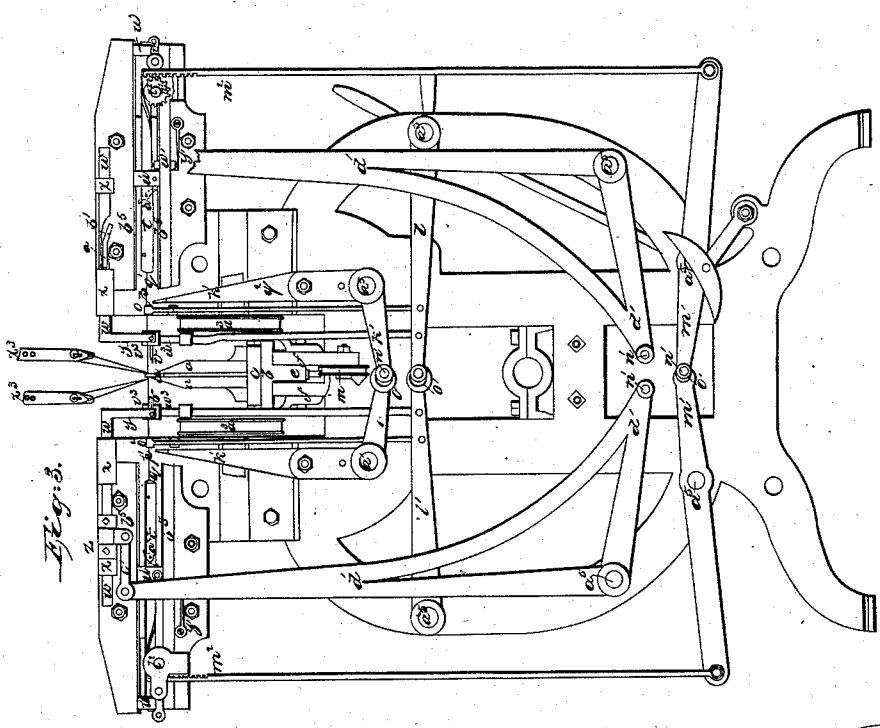


Fig: 3.

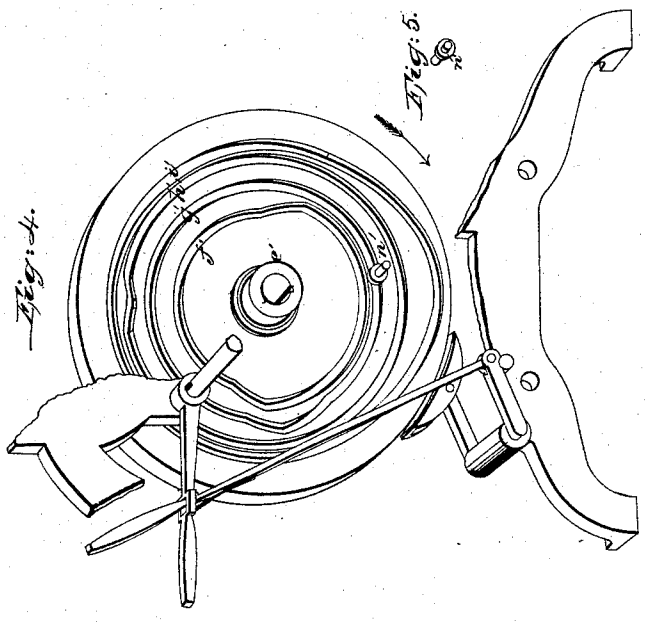


Fig: 4.

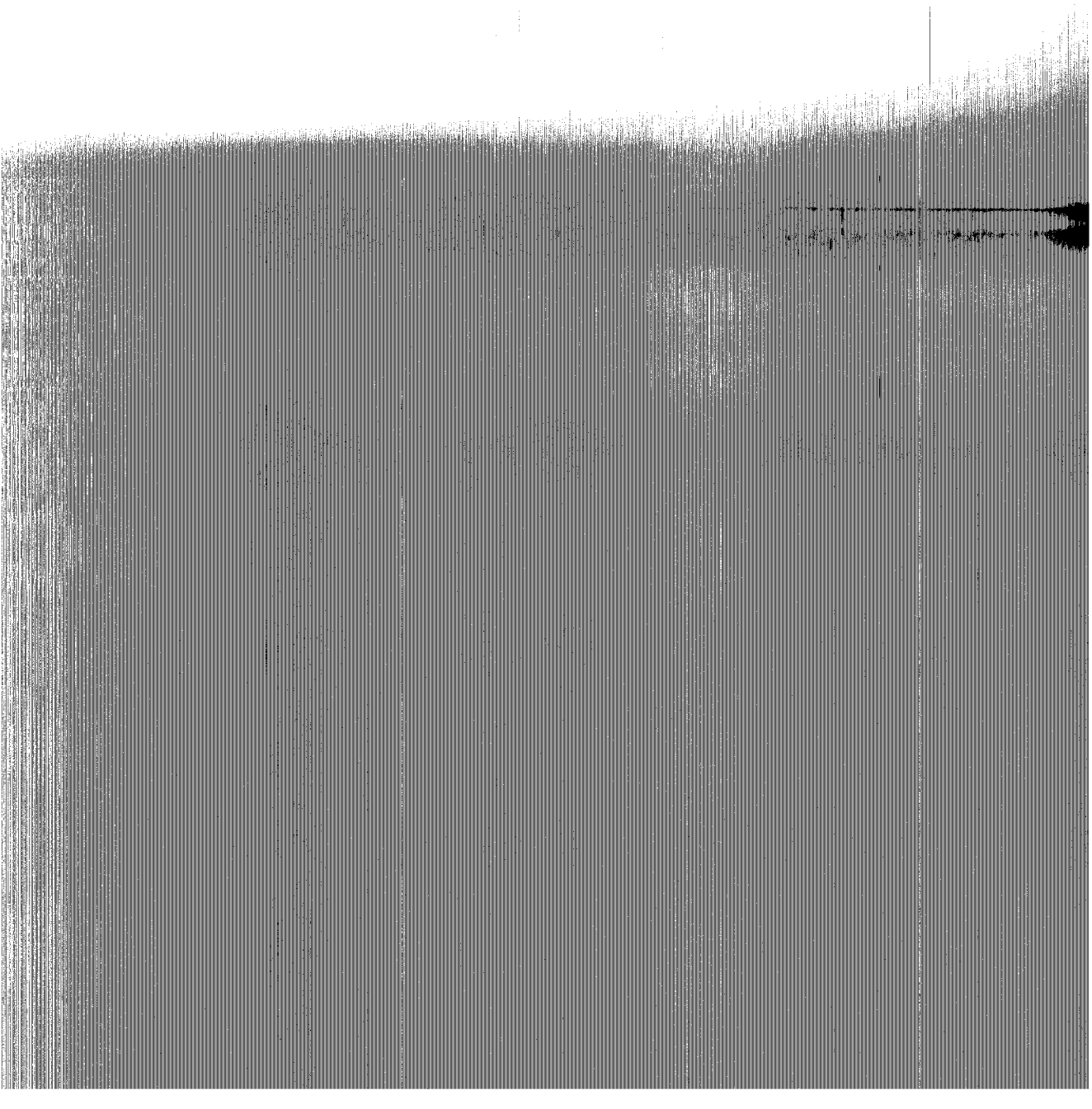
Fig: 5.

4 Sheets—Sheet 4.

G. H. CORLISS.

Sewing Machine.

No. 3,389. Patented Dec. 27, 1843.



UNITED STATES PATENT OFFICE.

GEO. H. CORLISS, OF GREENWICH, NEW YORK.

IMPROVEMENT IN THE MACHINE FOR SEWING.

Specification forming part of Letters Patent No. **3,389**, dated December 27, 1843.

To all whom it may concern:

Be it known that I, the undersigned, GEORGE H. CORLISS, of the town of Greenwich, in the county of Washington and State of New York, have invented a new and useful machine called a "Sewing-Engine," of which the following is a full and exact description, reference being had to the annexed drawings, which form a part of this description, in which a machine is exhibited as adapted to sewing leather with a waxed thread.

Of the drawings above mentioned, Figure 1 represents a side elevation of the machine. Fig. 2 is a transverse vertical section thereof, taken about in the middle of it, and with the eye of the observer directed toward the front or right-hand end. Fig. 3 is an elevation of the right-hand end, or what may be termed a "front elevation." Fig. 4 is a representation of the grooved side of the cam-plate to be hereinafter described. Fig. 5 is a view of one of the lever-pins which operate in the grooves of the cam-plate, the said pin being shown as detached from its lever. Fig. 6 denotes the manner of connecting two of the levers *k' k'*. Figs. 7 and 8 are representations of the needle used in this sewing-engine. Fig. 9 is a side view, on an enlarged scale, of one of the needle-shafts, and Fig. 10 is an end view thereof. Fig. 11 is an enlarged view of the finger-levers and mechanism which grasps the needles and confines them to the shafts. Figs. 12 and 13 are representations of the transverse tripping-levers which elevate and depress the finger-levers. Figs. 14, 15, 16, 17 are detached views of the pliers which grasp the thread. Fig. 20 is an elevation of the left-hand end or rear side of the machine. Figs. 18 19, 21, 22, 23, 24, 25 are hereinafter described.

In order to explain more clearly the different parts of the machinery, I have in the following description occasionly made use of the terms "front" and "rear," intending that the right-hand end of the machine in Fig. 1 shall be considered as the front and the left-hand end the rear end, and designating the parts front or "rear" according as they are situated with respect to the said ends. As the mechanism situated on both sides of the middle of the machine, or the vertical and longitudinal plane passing through the article to be stitched, is similar in character and operation, I have generally confined myself to the description of that on one side.

Like the common process of sewing by hand, it is provided in this machine that the article under operation be perforated for each stitch, and that the perforation be filled with a thread passed through it from each side. The instruments by which this is effected repeat their operations always at the same point. The article to be sewed is therefore moved at each stitch. For this purpose a clamp is provided of convenient length, composed of two jaws, *a a*, Figs. 1, 2, 3, elevated upon a sliding table, *b b*. The connection between the jaws and table is made by means of transverse slides *c c*, which serve to keep the jaws in their proper upright positions, while they are subjected to the pressure required to hold the work with sufficient firmness. Screws *d d* are used to open and close the jaws. A deep vertical projection, *e*, is formed on the under side of the table and extends its whole length. A horizontal slide, *f f*, is then provided to support and guide the clamp thus formed. It has a vertical recess to receive the projecting part *e* of the table, and is secured in a position to carry the clamp in a direction at right angles with the front of the machine.

A ratchet-wheel, *g*, Figs. 1, 2, is used to gradate the motions of the clamp, and is for this purpose connected by wheel-work *h i* with a revolving cylinder, *k*, placed near the inner end of the slide *f f*. The revolutions of this cylinder wind up a chain, *l l*, which is passed over a pulley, *m*, Figs. 1, 3, at the front end of the slide, and there suspends a counter-weight, *n*. The clamp is made fast to this chain, and thereby receives its required motion as the said chain winds upon the cylinder *k*. The ratchet-wheel is propelled by a cam, *o*, fixed upon the main horizontal shaft *p*. A vertical motion is obtained from the cam by means of a horizontal lever, *q*, placed above the shaft and parallel to it, and being jointed to the frame-work of the machine or having its fulcrum at *r*, Fig. 1. The lever operates or turns the ratchet-wheel by means of a pawl, *s*, properly applied thereto. The cam O is formed, for the most part, concentric, and the eccentric section *t* is fixed in such position on the shaft as to give motion to the clamp at such intervals as will not interfere with other

operations. The length of the stitch is graduated by sliding the eam *o* upon the shaft under the horizontal lever, for as the cam is brought nearer the fulcrum of the lever motion is increased, and vice versa.

The leather *u*, or article to be sewed, being held in the manner described, or as seen in Figs. 1, 2, 3, and properly presented for operation, two awls, *v v*, Fig. 3, acting at the same point successively and approaching it from opposite directions, are employed to make the requisite perforation. The awls are for this purpose fixed in handles *w w w w*, which are supported and guided in permanent boxes *x x x x*, in which they are made movable on a horizontal axis parallel with the front of the machine, and also movable in the direction of that axis. An arm, *y*, at right angles to the handle, is formed upon the inner end of each handle, the same being inclined downward. An awl, *v*, is fixed into the extremity of said arm and held in a direction parallel with the axis of the handle. Each handle is also provided with an arm, *z*, Figs. 3, 21, to regulate its rotary movements. This is placed between the boxes *x x*, and is inserted in a groove, *a'*, which is shown on one side of the machine in Fig. 3, where a part of the handle is represented as removed. This groove is formed through the most of its length in a direction parallel with the axis of the handle, which (handle) is thereby held immovable, except in the direction of its axis, while the awls are passing through the leather. The groove also has a section, *b'*, sufficiently inclined to give a lateral motion to the awl, which shall carry it out of the way of interfering operations, after it has performed its office. Each handle is then connected, by means of a rod, *c'*, and flexible joints, with the vertical arm of a rectangular lever, *d' d'*, which is actuated by a grooved circular plate, *e'*, provided for the purpose, and formed also to operate other parts of the machine which require intermissive movements.

The plate *e* is shown in its proper position in the machine in Fig. 1, and is more fully exhibited in Fig. 4. It is fixed upon the main horizontal shaft *p*, Fig. 1, and without the frame-work, and is made to revolve uniformly in the same direction, performing a revolution at each stitch. The face of the plate, or that surface which has the grooves formed upon it, is placed inward and parallel with the front of the machine, and is sufficiently removed from the frame-work to admit the levers with which it communicates. The grooves *f' g' h' i'* in said plate are formed mostly concentric, and also have sections more or less eccentric. The concentric parts of each groove serve to keep the levers *k' k'*, *l' l'*, *m' m'*, *d' d'*, Fig. 3, with which they are connected, in a state of rest. The eccentric sections give motion to the levers, and are arranged in such positions as to operate them at the required intervals. The grooves thus formed are connected with the respective levers which they are intended to actuate by means of cylindrical pins *n' n' n' n' n'*, one of which is shown in Fig. 5 as detached from one of the levers. One end of said pin is inserted in the end of the lever and the other is placed within the groove. Each of the levers is made movable upon its axis or fulcrum, which is arranged parallel with the axis of the main shaft *p*. When a like simultaneous motion is required on opposite sides of the machine, two levers of similar form are used, which are placed in opposite positions, and are each made movable upon its axis, the said axis being equally distant from the center of the grooved cam-plate *e'*. They are then connected by a joint, as seen in Fig. 6 at *o'* and in Fig. 3 at *o' o' o'*. Said joint is formed by inserting the end of one lever between projections which terminate that of the other. The inserted arm is then connected with the groove by means of the cylindrical pin *n'*, as above described. The perforation being made as above specified, the ends of the threads *p' p'*, Fig. 3, are passed in opposite directions through the same by means of needles *q' q'*, each of which has two points, and is so formed at the eye as to give protection to the thread. Said needle is represented on an enlarged scale in Figs. 7 and 8, the former figure being a side view and the latter a perspective elevation of the same. The eye *r'* is situated in a curved depression or cavity, a^6 b^6, Fig. 8, formed in the central part of the needle, the said eye being an oblong aperture cut through a flange or projection, c^6, elevated within the curved depression. Both portions of the needles which extend from the extremities a^6-b^6 of the central depression toward the points or ends are rectangular in cross-section, and terminate in pyramidal points. The lower side of one of the rectangular ends of the needle is arranged in the plane of the lower side of the projection c^6, produced as will be seen by inspection of Fig. 7, while the upper side of said rectangular end is elevated somewhat above the plane of the upper side of the projection c^6, and extends rearward or beyond the eye, and is rounded off or curved downward, as seen at *s'*, so as to meet the plane of the upper side of the other rectangular end of the needle, which upper side of said rectangular end is arranged in the plane of the upper side of the eye projection c^6, produced as seen in Fig. 7. The lower side of the last-named rectangular portion of the needle is somewhat below the plane of the lower side of the eye projection, and is carried back therefrom and curved off in a similar manner to the other portion before described. Curved recesses h^6 i^6, Fig. 8, are also formed in the eye projection c^6, between the eye and the terminations a^6 b^6 of the central depression. This peculiar construction of the needle has for its object the protection of the thread *p'* from injury or wear during the performance of the sewing operation. When the needles are passing through the aperture made by the awls, the threads *p'*, Figs. 7, 8, will lie within the curved recesses

h^6 i^6, and upon one of the flat sides, (of either rectangular portion of the needle,) which may be in the plane of either the upper or lower side of the projection c^6. Therefore, by further inspection of Fig. 7, it will be observed that the thread, or that part of the same in proximity with the eye, is fortified or protected from injury by the needle-point in advance of it. The same occurs when the needle is moved in a reversed direction in the manner hereinafter to be described. Two needles of the above description are used in the operation, and they are passed simultaneously through the aperture made by the awls.

In Fig. 9 a cylindrical shaft is represented, which is employed in operating the needles. Two shafts of this description are used, as seen in Fig. 3 at t' t', the said shafts being placed in opposite positions, as seen in the figure, and made movable upon one common horizontal axis, which is parallel with the front of the machine, and intersects the point at which the perforation is made in the leather u. The shafts are also movable back and forth in the direction of their axis, and are each supported by two boxes, which are fitted to suitable guides, b^5 b^5, Fig. 3. Thus supported the shafts are made to approach and recede from each other simultaneously, and are each provided with two suitable helical grooves, v' v', Fig. 9, which cause them to revolve while they are moved in the direction of their axis. There are also two straight grooves formed upon opposite sides of the shaft in a direction parallel with its axis, one of which is shown at e^5, Fig. 9, they being connected by the two others, (viz., v' v',) which are extended half round in a helical form on opposite sides of the shaft. Each helical groove, at its inner termination, is made somewhat deeper than the straight one with which it connects, and each straight groove is made deeper than the helical groove where it connects with the outer termination of the said helical groove. A cylindrical pin, w', Figs. 3, 9, 10, flattened and fitted for the purpose, is inserted in one of the grooves thus formed in each of the shafts. It is made movable in two directions—viz., on an axis at right angles with the axis of the shaft and in the direction of its own axis—it being, for this purpose, placed in a permanent hollow cylinder or barrel, x'. It is then borne toward the axis of the shaft by means of a horizontal spring, y'. Thus, as the shafts recede from each other, the inserted ends of the pins, being forced into the deeper paths, are kept in the straight grooves e^5 thereof; but when the shafts return the pins are made to follow the helical grooves, and thereby the required motion is produced. The needles are held at the center of the inner ends of these shafts, and for this purpose each shaft is provided with two finger-levers, z' z', Figs. 10, 11, and a transverse lever, a^2, Figs. 12, 11, 13, which are all inclosed in a longitudinal recess, b^2, Figs. 9, 10, formed in the shaft to receive them. The finger-levers are employed in direct communication with the needle, and are actuated by the transverse lever a^2, which gives them an alternate motion by which they are made to grasp and release the needles successively. The finger-levers are placed side by side, and the plane which separates them intersects the axis of the shafts. They are then made movable upon a fulcrum or pin, c^2, Figs. 9, 11, placed near the inner end of the shaft, from whence they are extended longitudinally to communicate with the transverse lever a^2, which, (lever,) crossing the center of the shaft transversely, is projected a short distance beyond its surface equally on opposite sides, and is made movable upon a fulcrum, d^2, which intersects the axis of the shaft at right angles, and is parallel with the axis of the finger-levers. The transverse lever is made to incline at each operation at an angle of forty-five degrees with the axis of the shaft, it being moved in opposite directions alternately. Alternate motions are thereby given to the finger-levers by means of rectangular projections formed by extending a recess, d^5, Figs. 12, 13, across each side of one of the arms of the transverse lever. The inner projections, e^2, Figs. 11, 12, 13, are employed to raise the levers, and are each terminted by two planes, f^5 g^5, which are formed at right angles with each other, as seen in Figs. 12, 13, one being near the axis of the lever and the other as much more distant as the motion to be communicated to the finger-levers requires. The positions of the near and remote planes on each side of the lever are transversely opposite to those of the other side. The outer projections, f^2, are used to depress the lever, and their planes which effect this are on each side parallel with the plane of the inner projection, which is nearest the axis of the lever. The end of a finger-lever is then placed between the inner and outer projections of each side of the lever, as seen in Fig. 11. Thus, as the position of the transverse lever is reversed, the finger-levers receive an alternate movement, and are both actuated simultaneously in opposite directions. Each shaft is also provided with an appendage, g^2, Figs. 10, 11, which is employed to sustain and guide the needles when under the action of the finger-levers. It is placed at the inner end of the shaft, and, being fitted to the recess, which incloses the several levers above described, is made capable of adjustment by means of screws. It is then formed with recesses g^5 h^5, for receiving the needles, the inward extent of each recess being limited by a projecting shoulder, h^2, formed transversely across the termination of them. Said recesses are made to fit the needles, and are extended in a direction parallel with the axis of the shaft for the purpose of holding the needle in that direction. They are also placed near the axis of the shaft, and are separated by the same plane which separates the finger-levers. One of the recesses thus located is formed deeper than the other, and the extent of its depth is determined by the difference of width between the

middle and ends of the needle. The shafts $t' t'$, (formed with these provisions,) being placed on opposite sides of the machine and made movable on one common axis, as before described, are brought also into such relative positions to each other that the corresponding levers of both shall move in one common plane. The two needles to be used in the operation are then inserted into the inner ends of the shafts, and in diagonally-opposite positions, the eye of each being placed outward from their common axis, which (axis) intersects the plane which separates the needles as they are thus inserted and arranged. The shafts then receive a simultaneous inward movement, and as they reach their inward terminations the projecting ends of the needles are inserted into opposite shafts. An interval then occurs in the movements of the shafts, during which the position of each transverse lever is changed, and the finger-levers of each shaft are thereby actuated, so that the ends of the needles last inserted are grasped, while the ends before held fast are released. Thus an exchange of needles is effected and the shafts return to their outward positions. The needles thus receive a rectilinear reciprocating motion, by which they are passed through the aperture made by the awls, and are alternately carried to opposite sides of the machine. They also have a circular reciprocating motion, which they derive from the rotary movements of the shafts, each of the shafts being made to perform a half-revolution at every operation, and being made to traverse in opposite directions to each other. The needles are thereby alternately transferred to opposite sides of the plane which separates them as first inserted. This motion takes place as the shafts are returning to their outward positions, as before described, and the several parts which produce it are so arranged that the eye of each needle shall pass over or above the axis upon which they vibrate. Thus the shafts take their needles from opposite sides of the aperture, and at each succeeding operation each returns its needle in the side of the aperture opposite to that from which it was taken. By means of these provisions the threads are crossed in each aperture in uniformly the same manner, and the stitches are thereby made to present a uniform appearance.

The alternate movements of the transverse levers are produced by means of rectangular levers $k' k'$, Fig. 3, which are jointed together and connected with the grooved circular plate, and thereby actuated in the manner before described. The form of these levers is more fully exhibited in Fig. 6, where they are shown as detached. The upward extremity of the vertical arm of each is placed at the point where the inward end of the transverse lever is carried when the shafts have reached their inward terminations. An outward movement of the vertical arm of each lever then takes place at the proper interval, and the same movement is repeated as opposite ends of the transverse lever are alternately presented to their operation by means of the half-revolutions of the shafts.

The shafts are each moved in the direction of their common axis by means of a crank, i^2 i^2, and connecting-rod k^2 applied to one of its boxes, $u' u'$. Each crank is made movable upon an axis, l^2, which is placed at right angles with the front of the machine, and is also placed upon a level with the point at which its connecting-rod is applied to the box of the shaft. It is then made to perform a half-revolution alternately in opposite directions by means of a rack, m^2 m^2, and pinion n^2, Fig. 3, and the several parts thus employed are so arranged that the arm of the crank and its connecting-rod shall lie in a position parallel with the axis of the shaft when the crank has reached either extremity of its movements.

The threads used in the process, being attached to needles which are subjected to the several movements before specified, are thereby passed from each side into the aperture made by the awls, and are drawn through it a short distance on each side of the clamp. The ends of the threads thus attached to the needles are then secured in a fixed position by means of pliers O^2 O^2, Fig. 3, while the stitch is being perfected. The pliers provided for this purpose are shown as detached in Figs. 14, 15. They are each composed of two blades, p^2 p^2, which are actuated by a vertical working-rod, q, and are supported in a handle, r, made fast to the frame-work. The working-rod is placed between the blades, and is provided with oblique projections s^2 s^2 s^2 s^2, Fig. 15, which are formed to operate upon the blades above and below their fulcra t^2 t^2 in the manner of wedges. Jaws u^2 u^2 are formed upon the upper terminations of the blades, one of which, Figs. 16, 17, is lined with leather, and is otherwise formed so as to prevent wear upon the thread. An inclined shoulder, v^2, is formed upon the inner side of the upper arm of each blade, against which the upper projections of the working-rod are made to operate when the rod is moved downward. An upward movement of the working-rod brings its lower projections into operation, and the lower arms of the blades are thereby forced apart. Thus the pliers are opened and closed by the alternate vertical movements of their working-rods, which are for this purpose jointed to the horizontal levers $l' l'$, Fig. 3, and these levers are actuated in a vertical direction by the innermost groove of the cam-plate, being connected therewith in the manner before described. Thus the pliers are opened to admit the passage of the needle-shafts as the said shafts approach each other, and are closed when they have reached their outward positions. The ends of the threads being passed through the aperture made by the awls and made fast in pliers in the manner before described, the stitch is perfected by means of pulleys w^2, Fig. 1, each of which, being borne against one of the threads as they are extended between

the clamp and pliers, carries it out in a doubled form, as shown in Fig. 18, until the whole length of the thread is drawn through the aperture, and the loop of thread which forms the stitch on each side of the work under operation is properly embedded in the leather. The pulleys provided for this purpose have each a projecting flange or guide, i^5, formed upon its lower edge, and are each subjected to rotary, inclining, and traversing movements. Their rotary movements are produced by the friction of the thread upon their surfaces. Their inclining movements are caused by a direct draft of the thread upon them, which occurs as the stitch is embedded in the leather, and it is this motion which enables them to accommodate themselves to the varying lengths of the threads. They derive their traversing movements from endless chains, by which they are carried through the machine from end to end, being each made to perform a revolution at every stitch. Each of said endless chains x^2 x^2 is formed of thin flat links, as seen in Fig. 19, of equal form and proportions, the same being fastened together by flexible joints. Each division of the chain is formed of two of these links placed parallel to each other, and the links of every alternate division, being separated by a circular washer, as shown at y^2 y^2 y^2, Fig. 19, placed at each end, are inserted between the ends of the links of the intervening divisions z^2 z^2 z^2, so that the same pin intersects the ends of both divisions. The chains thus formed, being stretched across the machine and passed over pulleys at the front end, are propelled by cog-wheels placed at the back end. The said pulleys are shown at a^3 a^3, Figs. 1, 3. The cog-wheels b^3 b^3, Figs. 1, 20, are provided with teeth c^3 c^3 c^3, which enter the spaces left in every alternate division of the chain d^2 d^3, Fig. 19, between the ends of the divisions y^2, which are separated by the washers. The said cog-wheels are connected by means of beveled wheels e^3 f^3 g^3 h^3, and a vertical shaft with the main horizontal shaft. The several wheels thus employed are so proportioned that the chain shall perform a revolution at each revolution of the main shaft p, and they are so arranged that the chains shall move inward from the top of the pulleys at the front end of the machine.

The pulleys employed to draw out the thread in the manner before described are supported in their proper positions by means of carriages i^3, Figs. 1, 19. The front parts of the carriage are taken off in Fig. 19 to show its internal construction. The carriages are, at their rear ends, attached to their respective chains by a flexible joint, k^3, while a vertical link, l^3, and flexible joints form their connection with the chain near their front ends. Thus the carriages are made to accommodate the variations of the chain which occur as they are bent to the curvature of the wheels over which they are passed. The carriages, considered in the position in which they are found when brought into action upon the thread, are extended upon the chain in a horizontal direction, and are each provided with a vertical lever, m^3, Figs. 1, 19, which is placed at the front end and connected with a horizontal spring, n^3. The pulley w^2 of each carriage is placed upon the top of the lever, and is made movable upon a vertical axis. The lever m^3 is made movable upon an axis, k^5, which is placed at its lower termination, and is formed with a projection, o^3, upon its rear side, which operates upon the horizontal spring in the manner of a cam. The horizontal spring is fastened to the rear end of the carriage, and is pressed against the projecting part of the lever by means of a screw, p^3, which is used to graduate the resistance of the spring. The end of the spring which is in connection with the lever is bent downward and inserted in a notch, q^3, formed in the projection of the lever. The projection is then so formed that the spring shall be raised from its position in the notch q^3 as the lever is inclined forward, and it is also so formed that the lever shall incline but slightly from its vertical position until a sufficient amount of power is spent upon it to give it an inclination of an angle of about forty-five degrees. Thus the plane which raises the spring is formed abrupt at the notch, while it has only a gradual inclination through the remainder of its length; but a sufficient inclination is given to every part of the projection upon which the spring operates to enable the lever, when disengaged, to regain its vertical position by means of the elasticity of the spring. Each carriage is provided with a horizontal stay, r^3, which is used to increase the length or bearing of the carriage upon the chain. The stays may be formed of two flat bars placed parallel to each other, and having their rear ends resting upon pins s^3 projecting from the sides of the carriage, while their front ends lie upon the chain. They are then connected with the carriage a short distance from their rearward terminations by a flexible joint, t^3, and are also connected with the chain near the middle of their length by means of a vertical flat link, u^3, and flexible joints. The carriages thus formed being made to conduct the threads in a direction parallel with the clamp, friction-wheels v^3 v^3, Fig. 3, are placed back of the threads, between the paths of the carriages and the clamp, for the purpose of keeping the threads, during their passage out of the aperture, in their proper direction. The friction-wheels v^3 v^3 are for this purpose made movable upon the upper extremities of vertical rods w^3 w^3, which communicate with the horizontal levers l' l', employed to operate the pliers, as before described. The rods thereby receive a vertical motion, by means of which the friction-wheels are borne down out of the way of the needle-shafts at the required intervals, and are then raised to a level with the aperture when required for the purposes before described. Thus the pulleys, which are supported by the carriages, as before set forth, take the threads as first extended by the needle-

shafts and carry them off between the pliers and friction-wheels in a double form, as shown in Fig. 18, until their whole length is drawn through the aperture. The force then required to draw the threads with the proper degree of tension to set the stitch overcomes the resistance of the horizontal springs n^3 n^3, and the pulleys are thereby sufficiently inclined to disengage the threads, as seen in Fig. 22. The pulleys then regain their vertical positions by means of the elasticity of the springs, as before described. The threads, having become disengaged from the pulleys in the manner before described, are taken up and prevented from becoming entangled by means of two slender levers, x^3 x^3, Figs. 1, 3, which are each made movable upon an axis placed at the rear end of the machine, from whence they are extended to the front end, and are made movable in vertical planes, which intersect the threads between the friction-wheels v^3 v^3 and the clamp. Each lever is provided with a weight or spring of sufficient power to overbalance it upon its axis, so that the front end shall always be inclined upward. A plan for operating it by means of a spring is exhibited in the drawings, Fig. 23, in which a spiral spring, y^3, is shown, the same being inclosed in a barrel, y^5, Fig. 20, made fast to the frame-work. One end of said spring is properly secured to the arm x^3, while the opposite end is suitably connected with the barrel or socket y^5. The downward movements of the arms are limited by a prop, z^3, Figs. 1, 20, which is attached to the frame-work within the machine at a convenient distance from the axes of the levers. The forward end of each lever x^3 being bent downward at right angles, is divided below its bend into two elastic branches, l^5 m^5, which are shown on an enlarged scale in Figs. 24, 25. Said branches are placed at such distance from the axes of the levers that they shall vibrate in a circle which shall intersect the thread between the clamp and friction-pulleys, so that the thread shall pass between the branches when the levers are brought into a horizontal position. A pulley, a^4, Figs. 24, 25, is then placed between the branches near their lower terminations, and is made movable upon a pin, n^4, which is attached to the inner branch. An inclined guide, b^4, is placed over the front end of the pulley a^4, and is connected at one end with the pin upon which the pulley moves, while the other end is attached to the lower termination of the inner branch. The forward branch is formed with an aperature for receiving the end of the pulley and the upper end of the inclined guide. The two branches are then made to diverge from each other near their lower terminations. The levers being thus formed, the threads are passed over the pulley of each, between the branches thereof, and are thereby elevated, as shown in Figs. 1, 3. Thus, when the pulleys which are attached to the carriages of the chains are brought into operation, the levers being drawn down by the threads are made to approach the aperture in the leather, and when brought near it the threads assume a direction more and more oblique, until one side of each of the loops of the threads, being conducted up the inclined guide b^4 and forcing apart the elastic branches of the levers, is drawn off the end of the pulley. The impetus which the levers acquire in their descent enables them to fasten themselves upon the threads which are passing out of the aperture before these latter threads are disengaged from the chain-pulleys. The method by which the said levers catch the threads is by the momentum of their descent, causing the threads to pass up the inclined guide b^4 and over the pulley in the extremity of the lever. The elevation of the end of the lever then takes place, and the thread is carried with it, thereby removing it out of the way and effecting the object desired.

Having thus set forth my invention, I shall claim—

1. The particular combination of mechanism by means of which the rectilinear and lateral movements of the awls are produced—viz., the grooved plate e and retangular lever d', in connection with the arm z, applied to the awl-handle, and groove in the standard between the guide-boxes of the awl-handle—the said awls being inserted in the bent arms y of their handles, and the whole being otherwise arranged substantially as before specified.

2. The particular mechanism by means of which the peculiar movements of the needles are produced and by which they are introduced and drawn through the aperture made by the awls—viz., the needle-shafts t' t'—the same operating, being constructed and actuated, substantially in the manner above described.

3. The peculiar combination of levers which is employed in the needle-shafts—viz., the finger-levers z' z' and transverse lever a^2—the same being constructed and operating in the manner hereinbefore set forth.

4. The peculiar method of forming stitches after the ends of the threads have been passed through the aperture made by the awls—viz., by confining said ends in a fixed position, as by the pliers o^2, and then drawing the threads out in a doubled form by means of the pulleys w^2, which are made capable of yielding to a given force, in the manner hereinbefore set forth, and thus accommodate themselves to the varying lengths of the threads, being for this purpose attached to the tripping-levers m^3, and said tripping-levers being connected with the springs n^3—the whole being arranged and constructed, as above set forth, and applied upon endless chains, or operated in substantially the same manner by mechanism of similar character.

5. Making the needle with recesses h^6 i^6 and depressions a^6 b^6, and one point of the needle below the other, as represented in Fig. 7, the same being for protecting the thread in direct proximity with the eye, as described.

6. The particular mechanism which pre-

vents the entanglement of the threads during the progress of the sewing operation—viz., the vibrating levers x^3 x^3—the same being actuated in one direction by a weight or spring, or both combined, while in a contrary direction they are actuated by means of the threads which are passing into the aperture, and also by their own impetus, the said levers being provided at their front ends with guides and springs or elastic branches which enable them to fasten themselves upon the threads which are passing out of the aperture, and also permit the threads to extricate themselves from the levers at the proper juncture, the whole being arranged and constructed substantially as set forth in the above description.

In testimony that the above is a correct specification of my said improvement, I have hereunto set my signature this 6th day of December, 1843.

GEORGE H. CORLISS.

Witnesses:

DANIEL FROST,
TITUS BAILY.