T. L. MELONE.

Sewing Machine.

2 Sheets—Sheet 1.

No. 95,499.

Patented Oct. 5, 1869.

Fig. 1.

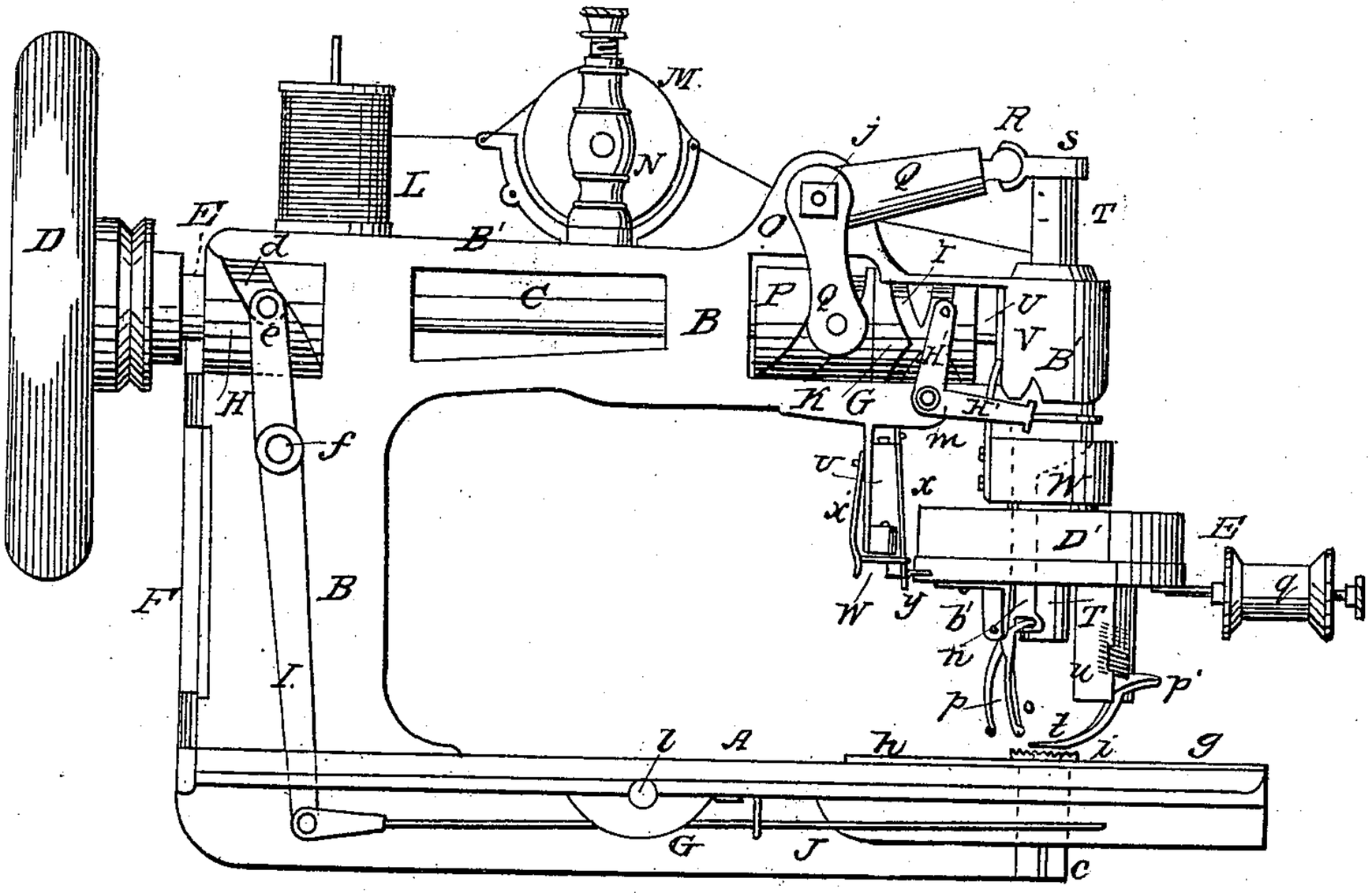


Fig. 2

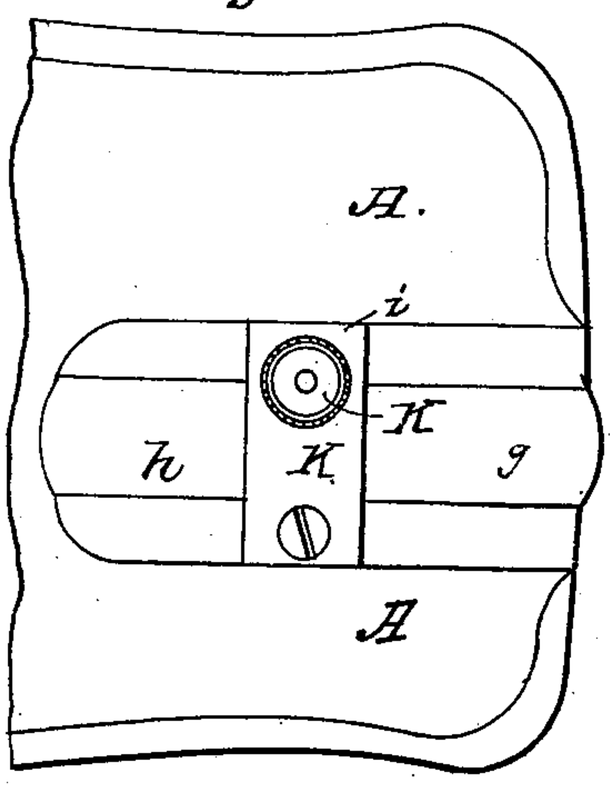


Fig. 4 Fig. 5

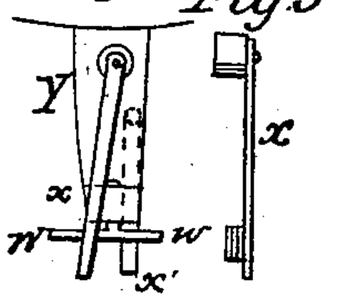


Fig. 3

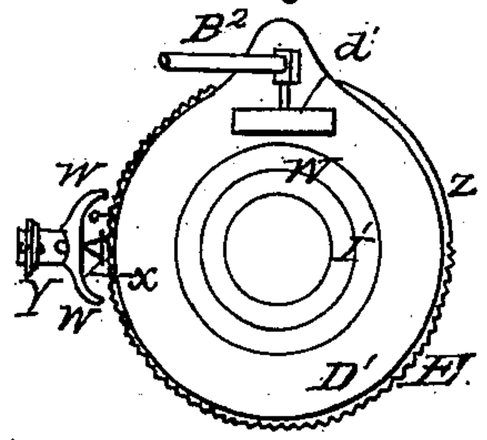
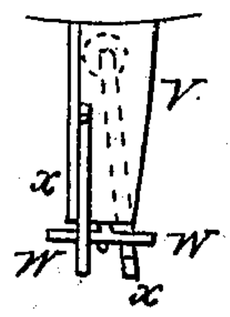


Fig. 6



Witnesses

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T. L. MELONE.

Sewing Machine.

2 Sheets—Sheet 2.

No. 95,499.

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Fig. 7.

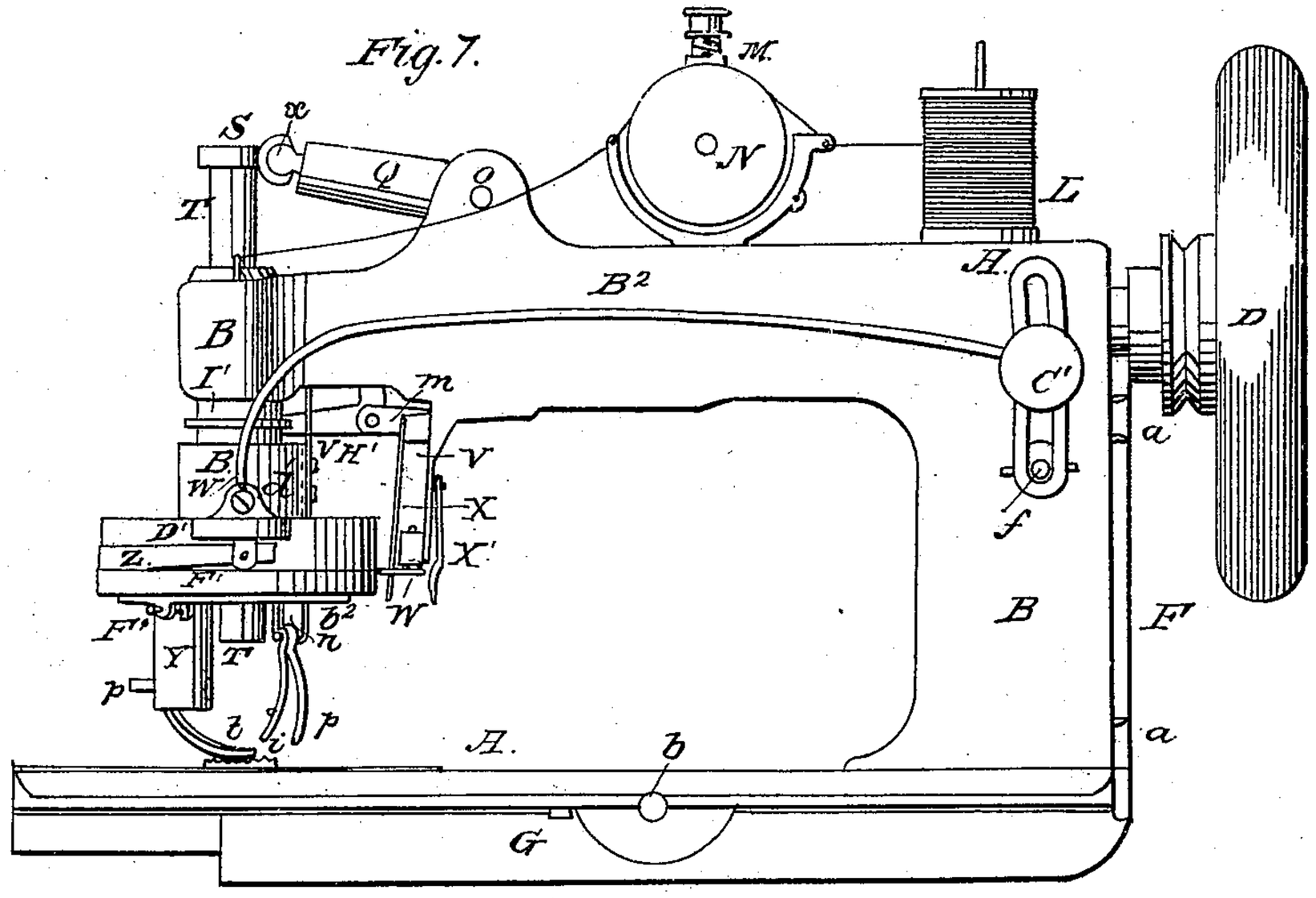


Fig. 8

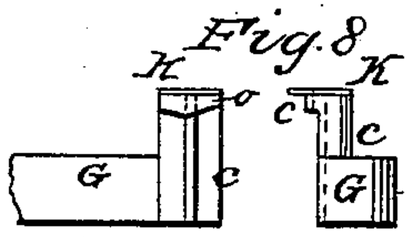


Fig. 9

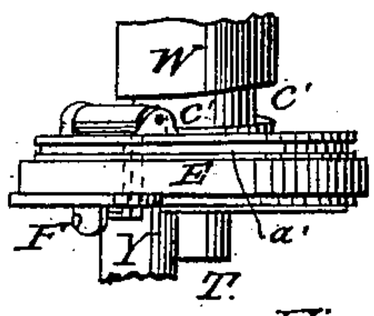


Fig. 10

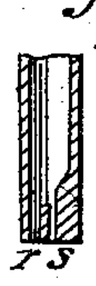


Fig. 11

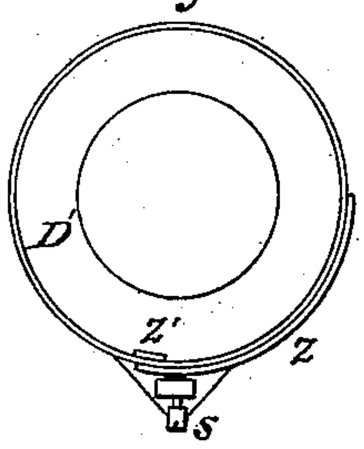


Fig. 12

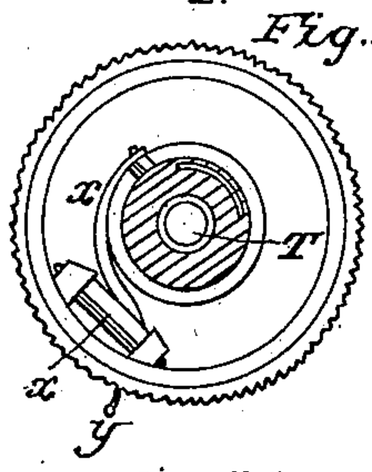


Fig. 13

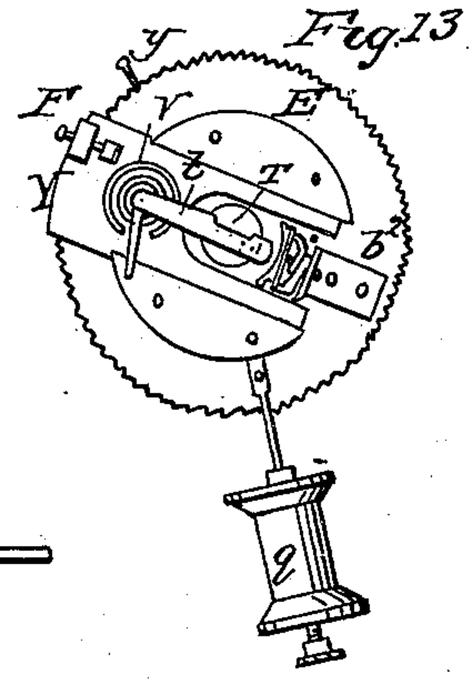


Fig. 14.

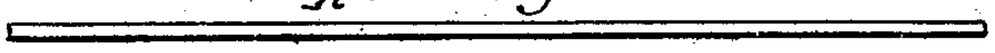
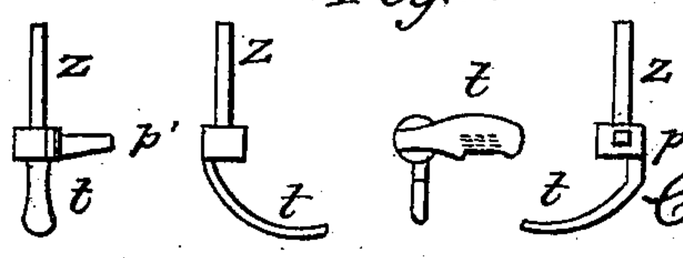


Fig. 15



Witnesses

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UNITED STATES PATENT OFFICE.

THOMAS L. MELONE, OF MOUNT GILEAD, OHIO.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **95,499**, dated October 5, 1869.

To all whom it may concern:

Be it known that I, THOMAS L. MELONE, of Mount Gilead, in the county of Morrow and State of Ohio, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my machine. Fig. 2 is a top view of a portion of the bed-plate, showing the cloth-plate and feed-points and tablet in their proper relation to the cloth-plate. Fig. 3 is a top view of the ratchet-wheel with the friction-cap in place. Figs. 4, 5, and 6 are respectively front, side, and back views of the pawl and its attachments. Fig. 7 is a side elevation of the opposite side of the machine to that shown in Fig. 1. Fig. 8 is a detail view on a larger scale of the toe of the lever G, which supports the feed-tablet. Fig. 9 is a side view of the ratchet-wheel E′ and adjacent parts with the cap D′ removed. Fig. 10 is a vertical section of the lower end of the needle-bar. Fig. 11 is a bottom view, looking upward, of the friction-cap D′. Fig. 12 is a top view of the ratchet-wheel and adjacent parts with the cap D′ removed. Fig. 13 is a bottom view of the feed mechanism. Fig. 14 is a side view of the threader. Fig. 15 presents front, bottom, and side views of the cloth-presser and its foot *t*.

The same part is marked by the same letter of reference in the several figures where it occurs.

My invention relates to those sewing-machines which are intended to change the direction of the seam as often as may be required to follow a serpentine pattern.

It consists mainly of a peculiar construction and arrangement of parts and devices by which I am enabled to revolve the feeding mechanism around the needle as a center, either partially or wholly, and as many times as may be required, in the same direction, or in opposite directions, without entangling the thread or affecting the relations of the needle to the other parts of the mechanism, so that the line of the seam can be changed without moving the cloth upon the cloth-plate and without any rotation of the needle, the needle and the other portions of the machine remaining, as to their construction and general mode of operation, the same as in ordinary sewing-machines of the class to which they belong.

My invention further consists in various details of improvement in the construction and operative mechanism hereinafter more particularly set forth.

In my machine the capability of changing the direction of the feed is absolutely without limit, and there is no interference between the feed mechanism and the thread, the latter being carried down through the needle-bar out at one side of the needle and inserted in the eye of the needle near the surface of the cloth, and thus entirely removed from the possibility of interference by the revolving feed mechanism.

To enable others skilled in the art to make and use my improvements, I will proceed to describe the construction and operation of my machine, referring to the drawings by the letters of reference marked thereon.

The base of the machine is a flat bed-plate, A, to the rear of which is attached a stout standard, B, having a long fixed arm, B′, projecting toward the front end of the machine, and forming the support of the arbor C, which is the main shaft of the machine. This arbor has upon its rear end the band-pulley D, to which the driving-power is applied.

Immediately in front of the pulley D, on the arbor C, is a cam, E, which gives vertical reciprocating motion to a sliding bar, F, the lower end of which abuts against the rear end of a rock-lever, G, hung on a transverse rock-shaft working in lugs *b* in the bottom of the bed-plate. The rear arm of the lever G is the longer. On the end of the forward arm of said lever is a toe (shown in front and side view in Fig. 8) perforated and grooved for the passage of the needle, and supporting on its upper surface the smooth circular tablet K, which forms an important part of the feed mechanism. The center of this tablet is perforated for the passage of the needle. The function of the lever G is to raise and lower the tablet K.

Attached to arbor C, in front of cam E, is the grooved cam H, the groove in the face of which receives a roller, *e*, on a pin on the end of the upper and shorter arm of lever I. This groove is so arranged as to give to the lever I a back-

and-forth movement at each revolution of the cam, so timed as to impart the proper motions to the shuttle.

To the lower end of lever I is pivoted the rod J, which operates the shuttle in the ordinary way. The shuttle moves in a race below the cloth-plate, and is uncovered by the removal of the slides *h g* in the common manner. Above the shuttle is the holding-plate K′, from the upper surface of which the circle of points *i* (see Figs. 1, 2, and 7) projects upward around the hole in plate K′, through which the tablet K has a vertical reciprocating motion.

On top of the fixed arm B′ are placed the spool L, tension-pulley M, and thread-guides, all of which operate in the usual way in supplying thread to the needle.

On the arbor C, near its forward end, is the needle-bar cam P, having a groove in its surface, which receives a roller turning on a pin attached to the end of the lower and shorter arm of the bent lever Q, whose fulcrum *j* is attached to the stud O, projecting from the upper surface of the arm B′, as shown in Figs. 1 and 7. The cam P is so constructed as to give one stroke to the needle at each revolution of the arbor C, and that so timed with reference to the throw of the shuttle as to secure the proper harmony between the operations of the two parts. The long arm of lever Q is hollow near its end to receive the shank of a coupling-pin, R, which is hinged to a similar pin, S, on the upper end of the needle-bar T. This arrangement allows the needle-bar to reciprocate in a vertical line without being drawn aside by reason of its connection with lever Q.

The needle-bar T is a hollow cylinder working vertically through the extreme end of the fixed arm B′ and through the collars W and I′, hereinafter described. The needle is attached to the center of the lower end of the bar in the usual way, and the thread passes down through the bar and alongside of the needle, and is threaded into the eye near its point after passing out of the hole *r* in the lower end of the bar. The construction of the lower end of the needle-bar is clearly shown in Fig. 10. The thread is passed through the needle-bar by the aid of a threader, K^2, Fig. 14, which is a wire with a fork in its lower end to catch the end of the thread and force it through the bar. The threader is guided in its passage to the thread-opening *r* by the peculiar form given to the interior of the lower end of the needle-bar, as shown in Fig. 10. The needle-hole in the center of the bar T is marked *s*.

On the arbor C, in front of the cam P, is another cam, G′, with grooves *l* in its face, receiving a pin projecting into them from the end of the upper and shorter arm of the bent lever H′, which has its fulcrum at *m*. The grooves in this cam are so arranged as to give an up-and-down stroke to the lever H′ at every two revolutions of the arbor C. The end of the horizontal arm of lever H′ has a fork in it, which engages with a flange on the upper end of a cylinder or collar, I′, to the lower edge of which is attached a rod, *n*, which operates the braiders *o p*, hung to a bracket, *b′*, attached to the lower side of the ratchet-wheel E′. Any number of braid-spools *q*, attached to the same wheel, supply material to the braiders. These braiders operate in the usual way; but the peculiar arrangement for driving them is adopted in order to adapt the braiders to my revolving feed mechanism.

In front of cam G′ on arbor C, and inserted in the forward end of said arbor, is a crank-pin, U, which is received by a horizontal slot in the upper end of a bar, V, to the lower end of which is attached the collar W, which has a vertical reciprocating movement at each revolution of the arbor. This collar is outside of the collar I′, and moves independently of it. A groove in this collar receives the end of the upper arm of a bent lever, X, which operates the sliding plate Y, to which the upper end of the cylinder Y′, in which the cloth-presser Z works, is attached. As the collar W is moved up and down the lever X moves the sliding plate Y back and forth to produce the feed movement of the cloth-presser. The extent of this movement is regulated by set-screw F.

On the lower end of the presser Z is the presser-foot *t*. (Shown in Figs. 1, 7, and 13, the latter figure showing a bottom view.) A portion of its under surface is roughened to produce friction, and there is a recess through which the needle works. The shank of the presser is held in the cylinder Y′, in which a spiral spring with a downward reaction is coiled around it. It is held upward against the force of this spring by a pin projecting from its shank and working in a slit and recess in the cylinder Y′ after the manner of a bayonet-joint.

The shaft *f*, which forms the fulcrum of the lever I, runs through the standard B, and on that side of the machine represented in Fig. 7 receives on its end the curved slotted arm A′, which is rigidly fixed to it. To this arm is attached the rod B^2 by the set-screw C′, which regulates the distance from the center *f* at which the end of the rod is placed. The forward end of the rod B^2 is pivoted to a lug, *d′*, on the friction-cap D′, which is operated by the rod.

The cap D′ fits snugly on top of the ratchet-wheel E′, being held on by a pin which projects from the inside of the cap into a groove, *a′*, in the side of the wheel, and by a spring, *z*, having a friction-dog, *z′*, on its free end, which is pressed against the edge of the wheel by the set-screw *s′*, (Fig. 11,) which regulates the amount of friction between the cap D′ and the periphery of the wheel E′. The throw of the slotted arm A′ regulates the amount of motion imparted to the wheel E′ by the friction-cap D′ at each revolution of arbor C. When the rod B^2 is so attached to the arm A′ that the center of the set-screw C′ coincides with the center of the axle *f* no motion is imparted to the wheel

E′ as the arbor C rotates. When, on the other hand, the rod B^2 is attached to the arm A′ at its free extremity, the maximum of motion is given to the wheel E′ at each revolution of the arbor. Between these limits the motion is susceptible of any required gradation. As the wheel E′ carries the feed mechanism and operates it, the adjustments just referred to regulate the character of the feed.

The ratchet-wheel E′ has teeth on its periphery, which receive either arm of the double pawl *w*, according as one or the other is thrown into gear with them in operating the machine. The direction in which the wheel E′ will revolve in obedience to the impulses of the friction-cap D′ depends on which arm of the pawl *w* is engaged with the teeth of the wheel.

The pawl *w* and its attachments are clearly shown in Figs. 3, 4, 5, and 6. The pawl is pivoted to a bracket, *v*, and the arm that is to engage the ratchet-teeth is determined by the position of a pendulous spring, *x*, operated by pins *y*, projecting from the periphery of the wheel E′. When one of these pins strikes the pendulous spring *x* the position of the pawl is reversed and the direction in which the wheel E′ is rotating is instantly changed. A spring, *x′*, attached to the back of the bracket *v*, counteracts the spring *x* and aids in controlling the position of the pawl and holding it to its work.

A peculiarity will be observed in the construction of the toe-piece *c*, which supports the tablet K. It is fully shown in Fig. 8. The object of supplementing the thickness of the tablet-plate by the short tube *c* is that in whatever direction the thread may pass from the shuttle through that plate it will, by reason of passing through the tube *c*, be subjected, as nearly as possible, to an equal degree of friction and tension, whereas if the thread passed immediately from the shuttle through a thin plate the tension and friction on it would, in one position of the shuttle, amount almost to nothing, while in the opposite position they would be quite considerable, thus producing uneven work. The shuttle is cut away sufficiently to pass the tube *c* without contact.

It will be observed that, the cam P being fixed near the end of the arm B′ in a definite and unchangeable relation to the needle-bar, the arm B′ may be indefinitely lengthened without affecting the operation of the machine or requiring any increase in the size and weight of the operative parts, except that which relates to the length of the arbor. The working parts can therefore be kept as light as possible, while the extension of the arm B′ affords large space under it for the manipulation of the cloth or other work.

The operation of the machine is as follows: Power being applied to the pulley D, revolution is imparted to the arbor C, by which all the operative parts of the machine are driven. The needle-bar and shuttle are operated in their proper relation to each other, as in ordinary shuttle machines, by the cams and levers which govern their respective movements.

The first peculiarity in the operation of the machine is in the mode of effecting the feed. The round smooth tablet K rises and falls in the opening provided for it in the cloth-plate, and is alternately above and below the level of the circle of points *i*, by which the opening is surrounded. It therefore by its operation alternately raises the cloth out of contact with the points *i* and into a position to be moved readily in any direction on the cloth-plate, and then lets it fall upon the points *i*, which, entering its under surface, prevent it from being turned or moved in any direction.

Co-operating with the tablet K in producing the feed is the cloth-presser Z, the rough under surface of whose foot *t* comes into contact with the cloth to be moved when this is lifted from the cloth-plate and off the points *i* by the upward movement of the tablet. The presser-foot *t* at the same instant receives the proper impulse to produce the feed movement. While the presser-foot, after effecting the feed, is moving back preparatory to a repetition of the feeding movement, the tablet K has descended and allows the cloth to be again caught by the points *i* and fixed in its position on the cloth-plate. Thus we have a feed produced by holding the cloth between a rough and smooth surface, the cloth being always either between a smooth surface below and a rough surface above or between a rough surface below and a smooth surface above, the cloth being moved forward while in the former position by the impulse of the presser-foot, and held stationary while in the latter to allow of the retraction of the presser. This method of feeding is applicable to machines which do not embrace the other peculiarities of my invention, or use a feed mechanism capable of revolving around the needle-bar as a center.

The other peculiarities of the operation arise out of the nature of the feed mechanism, by which it is made capable of revolving around the needle-bar, in the manner and for the purpose hereinbefore set forth. This requires that whatever parts are obliged to sustain a fixed position relatively to the feed mechanism must revolve with it. Hence the braiders *o p*, instead of being operated in the usual way, are worked by a rod attached to the lower edge of the collar I′, which rotates with the wheel E′, the flange on the upper rim of the collar slipping through the fork on the end of the arm of the lever H′, by which the collar is raised and lowered to work the braiders. The working of the braiders does not therefore interfere with their revolution with the wheel E′, to which they, as well as the feed mechanism, are attached. They thus maintain in every position of the feeding device their proper relation to the line of seam.

The revolution of the feed mechanism is effected as follows: The cam H imparts a rocking movement to the shaft *f* of the lever I. On the rear end of that shaft is attached the slotted arm A′, which has the same oscillating movement as the upper arm of lever I. By

rod B^2 this motion is transmitted to the friction-cap D′ which embraces the wheel E′, as before described, and imparts its motion to it. In whichever direction the wheel E′ is moved by the cap D′ the arm of the pawl *w*, which is in gear with the ratchet on its periphery, prevents the return of the wheel, and keeps it moving in the same direction as long as the cap is driven and the same arm of the pawl continues in gear. When the opposite arm of the pawl is thrown into gear the wheel E′ is rotated in the opposite direction. To reverse the motion of the wheel, therefore, it is only necessary to change the arm of the pawl that is in gear with the ratchet. Both pawls may, when desired, be thrown out, and in that case the motions of wheel E′ can be controlled or arrested by hand. While the pawl is in gear the motion of the wheel E′ can, owing to the frictional character of the driving-power, be at any time arrested by hand.

The cloth-presser, the position of which in relation to the needle-bar governs the direction of the feed, is held in cylinder Y′, attached by its upper end to a plate sliding within the wheel E′. It receives the feeding movement from the bent lever *x*, worked by the collar W, which is raised and lowered by the crank U, the wrist of which works in a slotted yoke on the top of the rod V, to which the collar W is attached. This movement is entirely independent of the revolving movement of wheel E′, so that the feed goes on whether the wheel E′ revolves or not. When a straight seam is desired the set-screw C′ is loosened, and the rear end of rod B^2 is lowered in the slotted arm A′ until the center of the set-screw coincides with the center of shaft *f*. In this position no rotation of wheel E′ takes place, while yet the feed goes on without interruption, and a straight seam is produced. By raising the rear end of rod B^2 in the arm A′ the straight seam is instantly changed to a curved one, turning either to the right or left, according as one or the other arm of the pawl *w* is in gear with the ratchet on wheel E′. Thus by raising and lowering rod B^2 and altering the pawl *w* any combination of straight and curved lines of seam can be produced without any limit but the will of the operator. Pins *y y*, set in the periphery of the ratchet-wheel, will reverse the pawl automatically as often as may be desired, and thus a serpentine seam of any degree or frequency of curvature may be produced continuously without the intervention of the operator. This principle of the automatic production of predetermined patterns is believed to be capable of large and important development.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The wheel E′, arranged about the needle-bar and supporting the feed-foot when provided with pins *y* for the purpose of operating automatically the pawl *w* and reversing the direction of rotation of that wheel, as specified.

2. The combination of the friction-cap D′ with the wheel E′, rod B^2, and slotted arm A′ on shaft *f*, all constructed and operating as and for the purpose set forth.

3. The mechanism described for effecting the feed by having the cloth at all times between a rough and smooth surface, said surfaces being in contact alternately with the upper and lower surfaces of the cloth, and operating alternately to free the cloth while being fed and to fix it while the stitch is being made and the feed-foot retracted preparatory to a renewed impulse, in the manner specified.

4. The vertically-reciprocating smooth circular tablet K, operated as described, in combination with the circle of stationary points *i* and the reciprocating feed-foot *t*, arranged and operating as set forth.

5. The combination of one or more braid-spools with the revolving feed mechanism for the purpose of maintaining the proper relation between the braid-supply and the braiders during the revolution of the feed, as specified.

6. The combination of the cam G′, lever H′, collar I′, and rod *n*, in the manner described, for the purpose of operating the braiders *o p*, as set forth.

The above specification of my said invention signed and witnessed at Washington this 11th day of January, A. D. 1869.

THOMAS L. MELONE.

Witnesses:
H. G. POLLOCK,
CHAS. F. STANSBURY.