

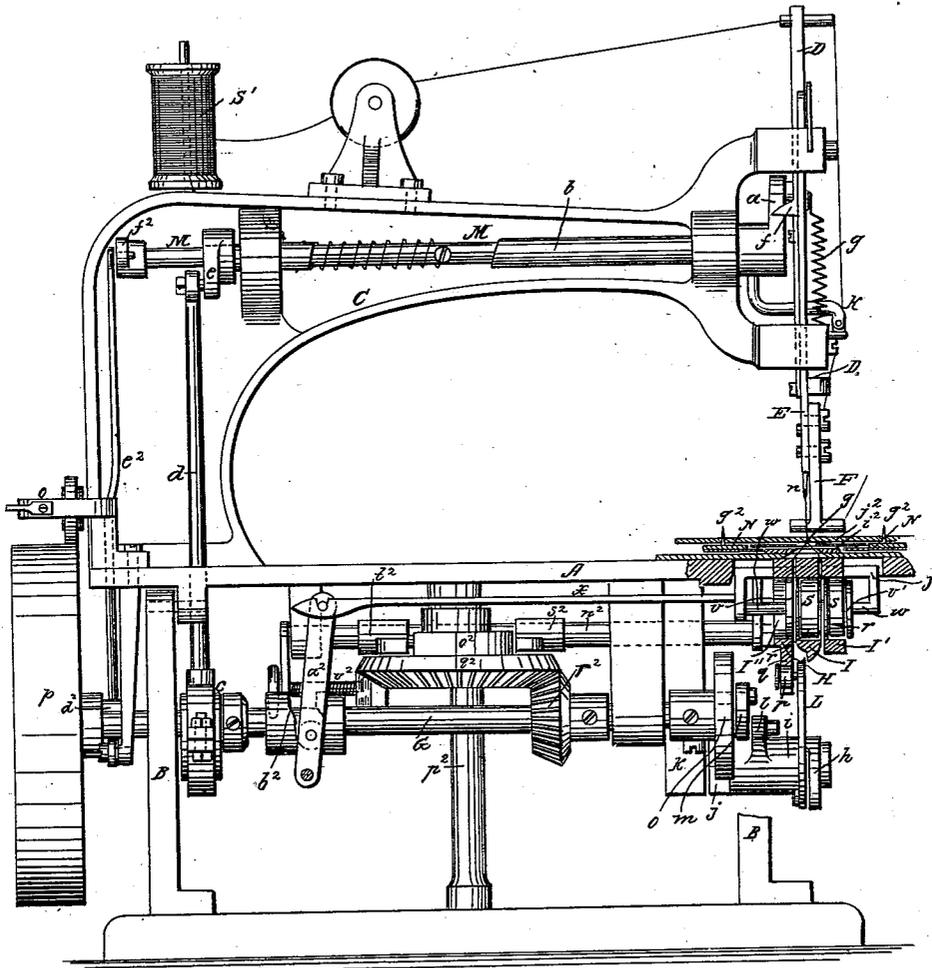
E. CAJAR.

Button Hole Sewing Machine.

No. 61,711.

Patented Feb. 5, 1867.

Fig. 1.



Witnesses:  
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Fig. 2.

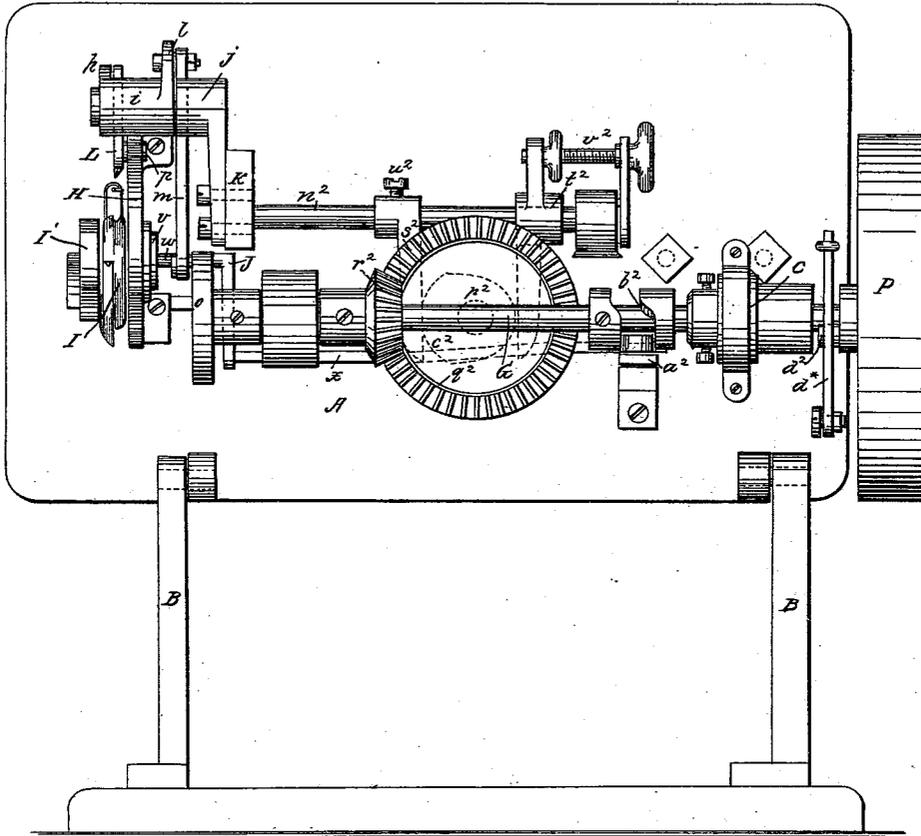


Fig. 6.



Fig. 7.

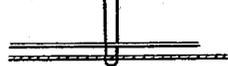


Fig. 9.



Fig. 10.

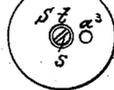
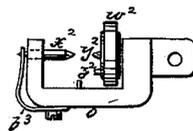


Fig. 11.



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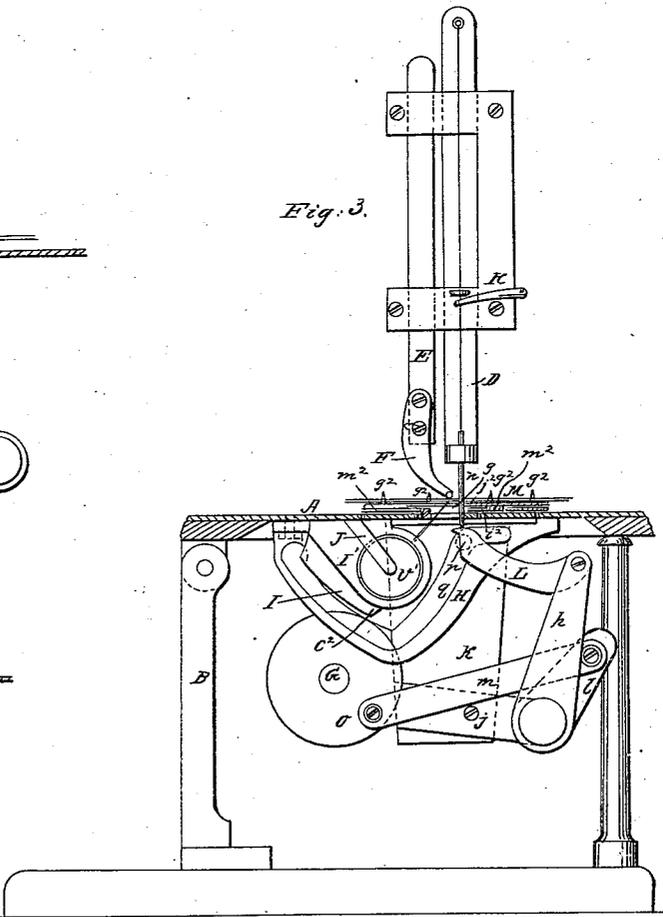
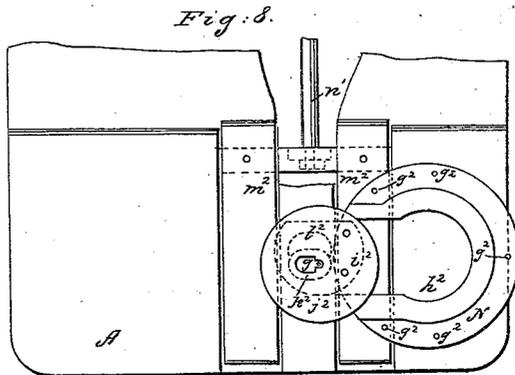
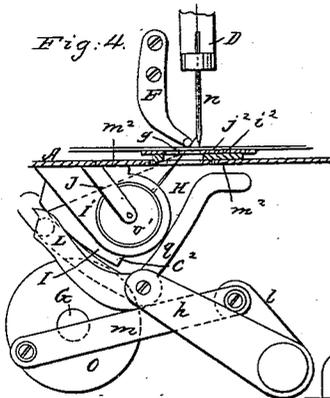
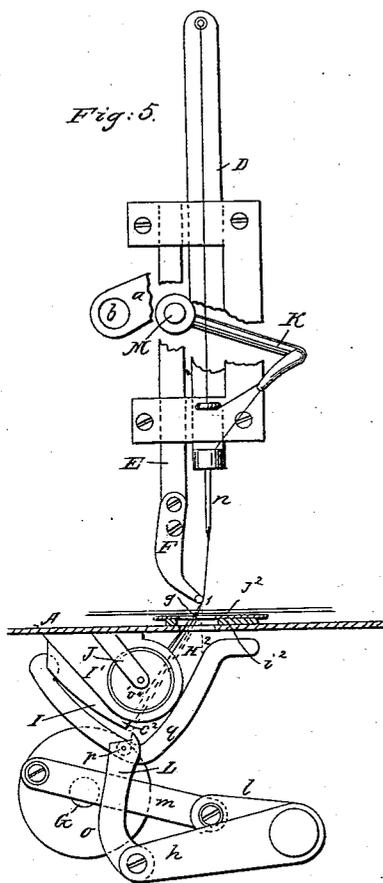
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Inventor:  
 Emil Cajar

# United States Patent Office.

EMIL CAJAR, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND CHARLES SICHEL, OF SAME PLACE.

Letters Patent No. 61,711, dated February 5, 1867; antedated January 28, 1867.

## IMPROVEMENT IN BUTTON-HOLE SEWING MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, EMIL CAJAR, of the city, county, and State of New York, have invented a new and useful Improvement in Sewing and Button-Hole Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, enabling those skilled in the art to fully understand and use the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a sectional side elevation of this invention.

Figure 2 shows the cloth-plate of the machine turned up so as to expose the mechanism attached to its under surface.

Figures 3, 4, and 5, are transverse sections of the same, showing the stitch-making mechanism in different positions.

Figures 6 and 7 are diagrams illustrating the stitch produced by this sewing machine.

Figure 8 is a plan or top view of the feed mechanism required in sewing button-holes.

Figure 9 is a central section of the shuttle with its barrel.

Figure 10 is a plan or top view of the same.

Figure 11 is a detached plan or top view of the spooling or winding mechanism.

Similar letters of reference in the figures indicate like parts.

This invention consists, first, in a stitch regulator which is secured to a rising and falling slide, occupying the place of the presser-foot in ordinary sewing machines, and which acts in conjunction with the needle-thread in such a manner that the feed of the fabric to be sewed is produced by the action of the needle-thread, and that the ordinary feed mechanism can be dispensed with; second, in the arrangement of two longitudinally sliding bobbins, one of which carries the lower thread and the other the gimp, in combination with a hook or looper, and with suitable spool-holders, in such a manner that by the combined action of the hook and spool-holders the loop of the needle-thread is first drawn over one and then over the other bobbin, and the lower thread and the gimp are interlaced with the loop of the needle-thread, forming a stitch of great firmness and durability; third, in the arrangement of a cam-groove and double crank, in combination with the looper and with the bobbins, in such a manner that the required motion is imparted to the looper to carry the loop of the needle-thread successively over the two bobbins; fourth, in the arrangement of a case surrounding each bobbin, and provided with a central screw which turns in the case with the bobbin, and which is provided with a tension spring, and with two centres, one in each end, in such a manner that the bobbin is fully protected by the case, and furthermore, the winding up of the thread on the bobbin is materially facilitated; fifth, in the arrangement of a sliding-yoke in combination with the bobbins and with three spool-holders, in such a manner that by said yoke the desired reciprocating motion is imparted to the bobbins; sixth, in the arrangement of an oscillating arm, in combination with the needle, the looper, and one or two bobbins, in such a manner that a positive strain is exerted on the needle-thread at the proper moment for the purpose of drawing up the surplus thread; seventh, in the arrangement of a longitudinally sliding and revolving cloth-holder, in combination with the transversely moving slide and with the cloth-plate of the sewing machine, in such a manner that by means of said cloth-holder a revolving motion can be imparted to the fabric to be sewed, and the eyelets of the button-holes can be sewed as well as the rectilinear parts thereof, and furthermore, button-holes of any desired length can be sewed without requiring any change in the mechanism.

A represents the cloth-plate of this sewing machine, which is made of iron or any other suitable material, and connected to the legs B by means of hinge-joints, so that the same can be turned up to the position shown in fig. 2 of the drawing, and so that convenient access can be had to the mechanism which is secured to the lower surface of the cloth-plate. From the cloth-plate rises the standard C, the outer end of which forms the bearing for the needle-slide D, and for the slide E, to the lower end of which is secured the stitch regulator F. A reciprocating motion is imparted to the needle-slide by an arm, *a*, which extends from a rock-shaft, *b*, that has its bearings in two lugs extending from the standard C, and which receives its motion from an eccentric, *c*, mounted on the main shaft G of the machine, and connecting with the rock-shaft *b*, by a rod, *d*, and arm, *e*, as shown particularly in fig. 1 of the drawings. As the arm *a* rises it comes in contact with a nose, *f*, projecting from the inner surface of the slide E, thus carrying up said slide together with the stitch regulator at the proper intervals. A spring, *g*, which is connected to the regulator slide E, depresses the same as soon as the arm *a* releases the nose *f*. The stitch regulator F occupies the place of the ordinary presser-foot, but it is raised after every stitch from the position which it occupies in figs. 3 and 4 to that which it occupies in fig. 5. This motion of the stitch regulator produces the feed-motion of the fabric to be sewed in the following manner: At the moment just before the stitch regulator begins to rise, the needle-thread extends from the eye of the needle

across the bobbin-carrier to the looper, as shown in fig. 4, and when the needle and the stitch regulator have reached their highest position, the needle-thread runs as shown in fig. 5. The direction of the path traversed by the extreme point of the stitch regulator, (which forms the bearing point of the needle-thread,) is indicated by a dotted line, 1-2, in fig. 5, and if the stitch regulator bears on the fabric, the needle-thread extends from the point 1, where the line 1-2 meets the fabric, to the looper, as shown in black dotted lines, but as the stitch regulator rises, the thread (which remains taut) advances to the position shown in full red lines in fig. 5, and as the thread advances it carries the fabric along and produces the feed motion. The length of the stitch can thus be easily seen in fig. 5, and said length can be regulated by moving the point of the stitch regulator closer to or further from the needle, said stitch regulator being connected to the slide F in such a manner that it can easily be adjusted towards or from the needle. The closer it is brought up to the needle the coarser the stitch will be, and by removing it further and further, the stitch can be reduced more and more until finally the feed motion ceases and the needle passes up and down through the same hole in the fabric. In order to permit this feed motion, the hole *g*, through which the needle passes down, is oblong, as seen in fig. 8. The stitch is produced by the combined action of the looper L, and of the needle *n*, the looper being so arranged that it carries the loop of the needle-thread in its forward motion over the shuttle or bobbin S' containing the gimp, and in its backward motion over the shuttle or bobbin S containing the lower thread. The looper consists of a hook which is hinged to an arm, *h*, extending from a rocking-thimble, *i*, which has its bearings on a pin fastened in a bracket, *j*, that is secured to a pendent, *k*, on the under side of the cloth-plate, a rocking motion being imparted to the thimble, *i*, by an arm, *l*, which connects by a rod, *m*, with an eccentric wrist-pin secured in a disk, *o*, that is mounted on the end of the main shaft G. The arm *l*, however, is longer than the distance of the eccentric wrist-pin from the centre of the disk *o*, and consequently the thimble *i*, instead of making a complete revolution, rocks back and forth through an arc of about ninety degrees (more or less.) The looper L is provided with a roller-stud, *p*, which projects from its inner surface and catches in a cam-slot, *q*, in a bracket, H, which is secured to the under side of the cloth-plate, as seen in figs. 1 and 3. By the peculiar form of the cam-slot and by the rocking motion of the arm *h*, the looper moves first a short distance in a rectilinear direction towards the needle, which at that moment has slightly ascended from its lowest position so as to form a loop of its thread. This loop is caught by the point of the looper, which immediately afterwards descends in the cam-slot, and passing the lowest point thereof rises on the opposite side to the position in which it is shown in fig. 4. It then recedes nearly to the lowest point of the cam-slot, as shown in fig. 5, at which point the arm *h* has reached its lowest position. As this arm rises, the looper advances once more to the position which it occupies in fig. 4, and then it rapidly recedes until it reaches again the rectilinear portion of the cam-slot ready for the next succeeding stitch. As the looper advances it carries the loop of the needle-thread over the bobbin S' which contains the gimp. This bobbin is contained in a case or barrel, *r*, (see figs. 9 and 10,) and it is mounted on a centre pin, *s*, which is provided with a square fitting nicely in one of the heads of the bobbin, and which is so arranged that it revolves freely in the head of the barrel. A suitable nut, *t*, and tension spring, *u*, serve to regulate the friction of the pin *s* in its bearing, and consequently the tension of the thread contained on the bobbin. The barrel *r* containing the bobbin S' is placed loosely in a stationary spool-holder, I, which is secured to the under surface of the cloth-plate, and the edges of which are chamfered off so that the loop of the needle-thread will slip over it without difficulty. The bobbin S' is placed close to and side by side with the bobbin S, (see fig. 1,) which contains the lower thread, and which is constructed precisely like the bobbin S' being enclosed in a similar case or barrel, and if the bobbin S occupies the spool-holder I, the bobbin S' is supported by the additional spool-holder I', but if the bobbin S' is moved into the spool-holder I, the bobbin S, passes in a socket I'' in the bracket H, which is provided with the cam-slot *q*. The two bobbins are held close together by two disks, *vv'*, which are secured to the ends of pins, *w*, projecting from a yoke, J, which straddles the several spool-holders I I' I'', and is secured to a rod, *z*, to which a reciprocating motion is imparted by a lever, *a*<sup>2</sup>, and cam-groove, *b*<sup>2</sup>, (see fig. 1.) This cam-groove is cut in the circumference of a drum that is mounted on the main shaft G, and it is so shaped that the bobbin S' will occupy the spool-holder I until the looper L has passed the loop of the needle-thread over said spool-holder, and has reached its highest point in the cam-slot *q*. At that moment the bobbins are moved so as to bring the bobbin S into the spool-holder I'', and as the looper recedes the loop of the needle-thread passes back over the bobbin S, while the needle keeps ascending and the stitch is drawn tight by the shape of the spool-holder. On reaching the lowest point of the cam-slot, the looper drops the loop of the needle-thread on a shoulder, *e*<sup>2</sup>, formed on the bottom part of the spool-holder, and it then ascends a second time, leaving the loop on said shoulder, until an arm, K, through which the needle-thread passes on its way from the spool S\* to the eye of the needle, begins to rise, causing the loop of the needle-thread to slip back over the spool-holder I, and to draw up the surplus thread. By these means, the loop of the needle-thread is caused to pass over the gimp contained on the bobbin S' in one direction, and over the bobbin S containing the lower thread in the opposite direction, and a stitch is formed such as shown in figs. 6 and 7; fig. 7 representing a single stitch, and fig. 6 a succession of stitches. From these figures it will be seen that the lower thread and the gimp are interlaced with the needle-thread, and if the stitch is drawn tight the needle-thread is caused to twist in the fabric, and a stitch is produced of great firmness and applicable particularly for button-holes. The arm K, which draws in the surplus thread, extends from a shaft, M, which has its bearings in suitable lugs projecting from the side of the standard C, and it runs parallel to the rock-shaft *b*, which imparts motion to the needle-slide and to the stitch regulator. A rocking motion is imparted to the shaft M by a cam, *a*<sup>2</sup>, on the main shaft G, which acts on a lever, *d*<sup>2</sup>, from which extends a rod, *e*<sup>2</sup>, to an arm, *f*<sup>2</sup>, secured to the end of the shaft M, and the cam *a*<sup>2</sup> is so shaped that it imparts to the arm K the desired motion in one direction, while a spring coiled about the shaft imparts to it motion in the opposite direction. For the purpose of sewing button-holes, the fabric in which the button-hole is cut is secured to a circular cloth-

guide, N, which is provided with points,  $g^2$ , which serve to retain the fabric, and with a pear-shaped slot,  $k^2$ , by means of which it can be slipped over a segmental projection,  $x^2$ , which is shown in dotted lines in fig. 8, and in section in various figures. This projection is situated under a disk,  $j^2$ , that rises from the cloth-plate A, being rigidly connected to the same by a ring,  $h^2$ , both the disk and ring being perforated with an oblong hole,  $g$ , to let the needle pass down and allow the needle-thread to produce the feed motion as previously described. The segmental projection  $x^2$  passes freely over the ring  $h^2$ , and it is provided with an oblong slot,  $l^2$ , so as to allow said projection to move back and forth in a direction at right angles to the ordinary feed motion of the fabric to be sewed. The reciprocating motion of the segmental projection is produced by a slide,  $m^2$ , to one part of which it is firmly connected, said slide being attached to a rod,  $n^2$ , to which a reciprocating motion is imparted by means of a cam,  $o^2$ . This cam is mounted on a vertical shaft,  $p^2$ , to which a revolving motion is imparted by a bevel-gear,  $q^2 r^2$ , from the driving-shaft, and said cam acts on two arms,  $s^2 t^2$ , one of which is adjustable on the rod  $n^2$ , by a set-screw,  $u^2$ , while the other is set in the desired position by a regulating screw,  $v^2$ , which is connected to the rod  $n^2$ , and to the arm  $t^2$ , in such a manner that by its action said arm is caused to slide on the rod and it is brought closer to or further from the centre of the vertical shaft  $p^2$ . By means of the regulating screw  $v^2$ , therefore, the throw of the slide  $m^2$ , and consequently that of the parts attached thereto, can be adjusted, and, if desired, said throw can be reduced to nothing, leaving the slide  $m^2$  stationary. By thus imparting to the circular cloth-guide N a reciprocating motion in the direction at right angles to the ordinary feed motion of the fabric to be sewed, the needle is caused to pass down alternately through the button-hole, and then again through the fabric, and a stitch is produced imitating closely the ordinary hand-stitch for button-holes.

In sewing a button-hole the operation is commenced at the point thereof, the fabric being attached to the circular cloth-guide in such a position that the same is free to move with the cloth-guide in the direction of the ordinary feed motion, just far enough to allow of sewing up the eye of the button-hole. At that point, the circular part of the slot in the cloth-guide has come close up to the segmental projection  $x^2$ , and it can now be turned together with the fabric attached to it for the purpose of sewing round the eye of the button-hole. This turning motion is produced partly by hand and partly by the feed motion of the needle-thread, or, if desired, a suitable mechanism may be applied to produce the same. By this arrangement the sewing of a button-hole is rendered easy and simple, and the sewing machine can be readily changed for doing plain or ornamental sewing or for making button-holes, simply by turning the regulating screw  $v^2$ . The spool  $S^*$  which contains the needle-thread is an ordinary spool, and requires no rewinding, but the lower thread, and the gimp contained on the bobbins  $SS'$ , have to be wound thereon from a common spool, and in order to facilitate this operation the centre pin  $s$  of each bobbin, (see fig. 9,) is provided with concave centres so that the same, together with its bobbin and barrel, can be placed between two centre points  $x^2 y^2$ . These centre points have their bearings in a U-shaped bracket or head, O, which is secured to the back part of the cloth-plate, and a detached plan of which is shown in fig. 11. The centre  $y^2$  revolves in its bearing and it carries a disk or face-plate  $w^2$ , which also forms a pulley, the periphery of which is made of India rubber or other elastic material, and so adjusted that it bears against the circumference of the driving-pulley P, on the main shaft G, thus imparting to said disk  $w^2$  a rapid revolving motion. From this disk projects a stud,  $z^2$ , which is intended to catch in a hole,  $a^2$ , in the exposed head of the bobbin, (see figs. 9 and 10,) so that said bobbin is compelled to revolve with the disk. The centre  $x^2$  slides back and forth in its socket, being subjected to the action of a spring,  $b^3$ , which has a tendency to force the same in towards the centre  $y^2$ . The centre  $x^2$  is intended to sustain that end of the centre pin  $s$  which turns freely in the head of the barrel  $r$ , and the barrel is provided with an oblong aperture,  $c^2$ , in its circumference, through which the thread passes into the bobbin. If the end of the thread is secured to the core of the bobbin and the disk  $w^2$  is caused to revolve, a rapid revolving motion is imparted to the bobbin, the barrel being retained by a stud which projects from the bracket O, (see fig. 11,) and which catches in a hole in the barrel, and a large quantity of thread can be wound on the bobbin quite easily and in a short time, and by having the aperture  $c^2$  extend the full width of the bobbin the thread can be wound evenly and regularly. The pin  $s$  has a screw-thread thereon, and is provided with a nut,  $t$ , which bears on a spring, so that by turning the nut the bobbin can be made to bear with more or less power against the head of the barrel, and thereby the tension of the bobbin-thread can be regulated.

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

1. The stitch regulator F to act in conjunction with the needle-thread, substantially as and for the purpose set forth.
2. The arrangement of two longitudinally sliding bobbins  $SS'$ , in combination with the looper L, constructed and operating substantially as and for the purpose described.
3. The cam-groove  $g$ , and double crank  $h l$ , in combination with the looper L, constructed and operating substantially as and for the purpose set forth.
4. The barrel  $r$ , surrounding the bobbin S or  $S'$ , in combination with the central tension screw  $s$ , which is provided with concave centres, substantially as and for the purpose described.
5. The sliding-yoke J, with disks  $v v'$ , in combination with the bobbins  $SS'$ , and spool-holders  $II' I''$ , constructed and operating substantially as and for the purpose set forth.
6. The oscillating arm K, in combination with the two bobbins  $SS'$ , spool-holders I, needle  $n$ , and looper L, constructed and operating substantially as and for the purpose described.
7. The longitudinally sliding and revolving cloth-holder N, in combination with the slide  $m^2$ , and with the cloth-plate A, constructed and operating substantially as and for the purpose described.

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