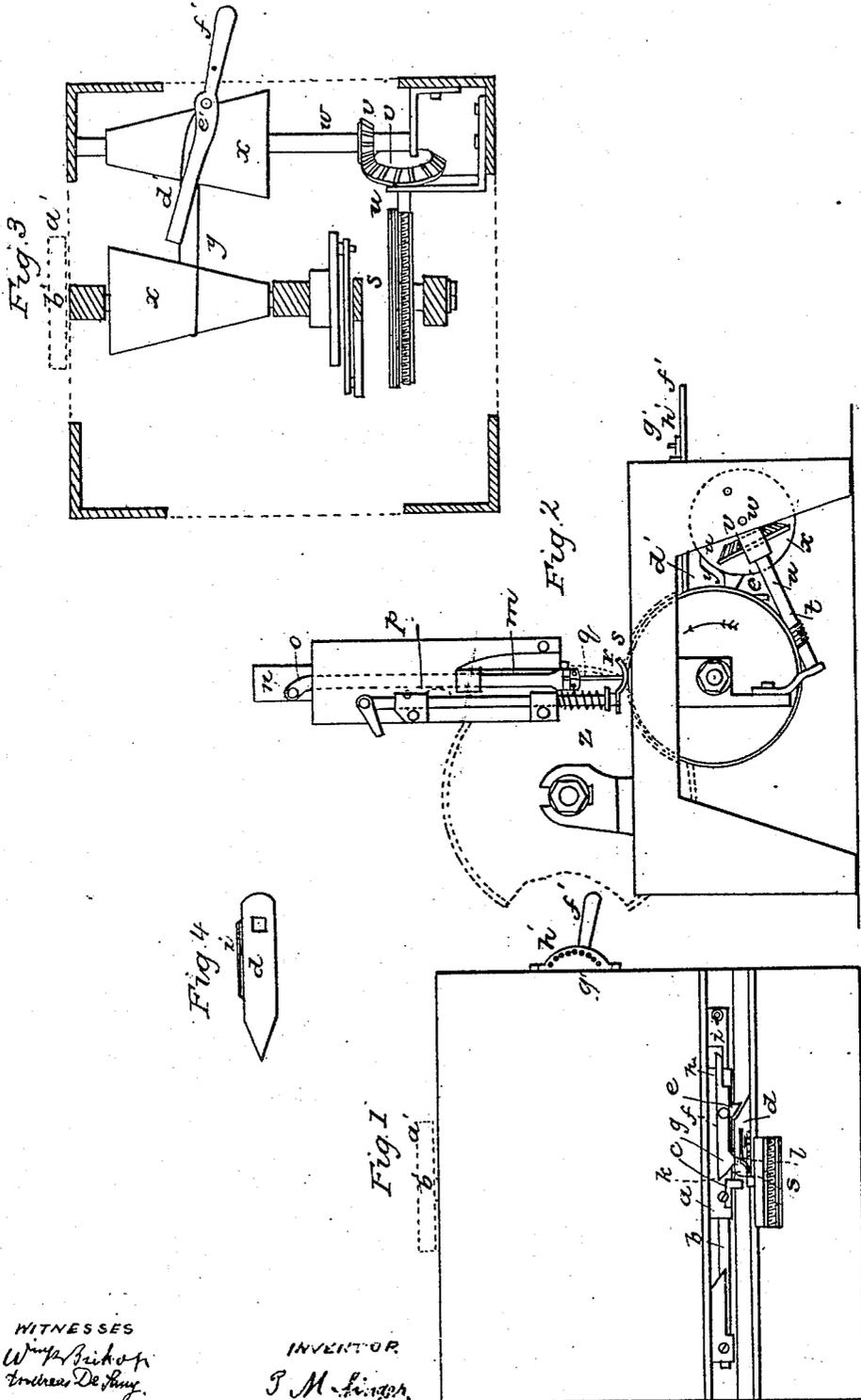


I. M. SINGER.  
Sewing Machine.

No. 13,661.

Patented Oct. 9, 1855.



WITNESSES  
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## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 13,661, dated October 9, 1855.

*To all whom it may concern:*

Be it known that I, ISAAC M. SINGER, of the city, county, and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the table or bench of the machine with the covering of the shuttle-race removed; Fig. 2, a front elevation; Fig. 3, a horizontal section taken in a plane just below the bench or table, and Fig. 4 a separate elevation of the shuttle.

The same letters indicate like parts in all the figures.

The first part of my invention, which relates to a method of controlling the shuttle-thread, is intended to overcome or avoid the difficulties arising from the shuttle-thread being loose between the cloth or other substance to be sewed and the hole in the shuttle through which it passes. From this loose condition of the shuttle-thread it often happens that the thread gets in the way of the needle, which pierces it, and when this does not happen it gets sometimes on one side and then on the other, producing unevenness in the stitches.

The first part of my invention, to avoid this defect, consists in attaching to the upper surface of the shuttle a spring thread-guide, attached at one or both ends to the shuttle and extending nearly the whole length thereof and making pressure on the thread, the rear end being curved for a short distance and then straight or in a line parallel with the line of the motion of the shuttle, so that when the shuttle advances the thread shall be drawn back under the spring and back to the curve, and when the shuttle moves back the thread shall be held by the curve of the said guide, by which it is held in a straight line until after the needle enters the cloth, and then it slips off from the curved part of the guide, preparatory to the other operations; and the second part of my invention, which relates to the feed motion for spacing the stitches, consists in giving a continuous feed motion in combination with a vibratory needle, that the needle may follow the feed motion while it remains in the substance to be sewed, and be restored to its original position by a spring

or its equivalent the moment it leaves the substance, preparatory to another stitch. By this combination I am enabled to avoid the irregularity in the spacing of the stitches due to the necessity of overcoming friction and the inertia of all the moving parts when operating with an intermittent feed motion, which irregularity is marked when sewing heavy articles, such as ships' sails, traces, and other parts of harness-work, &c.

In the accompanying drawings, which represent a well-known sewing-machine with my improvements added, *a* represents the shuttle-carrier, sliding in the shuttle-race *b* in the bench and operated in the usual manner. Near one end of the carrier is secured the shuttle-driver *c*, which is simply an arm extending out from the carrier to a sufficient distance to act against the rear end of the shuttle *d*, to drive the shuttle through the loop of the needle-thread. There is a projection, *e*, on the carrier, the edge of which is beveled to correspond with the bevel of the forward end of the shuttle, and the position of this projection on the carrier relative to the shuttle-driver is such that when the shuttle is in place between them it will have sufficient end-play to allow the needle-thread to pass freely between the rear end of the shuttle and the driver when the shuttle is forced forward against the beveled edge of the projection *e*. The object of the projection *e* is not to drive back the shuttle, but simply to act as a guard to prevent the shuttle from moving forward beyond certain limits. The mode of imparting the back movement to the shuttle will be described hereinafter.

The shuttle is forced through the loop of the needle-thread by the driver acting against the rear end of the shuttle, and when the loop passes off at the rear end of the shuttle, as the machines have heretofore been made, the carrier stops and the shuttle is carried forward a short distance by the impetus, to permit the thread to escape; but as the shuttle is immediately after driven back by the other driver it often happens that the thread is caught between the end of the shuttle and the rear driver. To obviate this I put a lever, *f*, on the carrier, with a spur, *g*, projecting from it, which enters a recess in the shuttle, and the forward edge of this spur is beveled so that when this end of the lever is forced toward

the shuttle the beveled face of the projection, acting against the edge or face of the recess in the shuttle, forces it (the shuttle) forward, and as this lever is connected to and moves with the carrier as well as the driver the motion thus imparted to the shuttle is in addition to any motion derived from the driver, and, in consequence, the shuttle is driven forward and clear of the driver, to permit the free passage of the thread.

The motion above described is communicated to the lever *f* toward the end of the forward motion of the shuttle-carrier, which brings the end *h* of the said lever which is beveled against a bevel-surface or fixed cam, *i*, attached to the bed in the shuttle-race. The rear edge of the spur *g*, as it is forced into the recess to give the required forward motion, above described, to the shuttle, is brought into contact with the rear face of the recess in the shuttle, and is thus enabled on the return motion to perform in addition the office of shuttle-driver to carry the shuttle back to its starting-place.

To the upper surface of the shuttle I secure a spring, *j*, made of fine wire, the two ends of which are secured to the upper surface of the shuttle, with its under surface in such proximity to the surface of the shuttle as to permit the thread *k* from the shuttle to pass under it and press it gently onto the surface of the shuttle and yield to any inequality. From that end nearest the point of the shuttle the spring extends in the line of the length of the shuttle to within a short distance of the other or rear end, where it is curved, as at *l*. From under this spring the shuttle-thread passes to the cloth or other substance to be sewed, and as the shuttle moves forward the thread slides under the spring to the rear end thereof, where it is curved, and as it moves back the thread is held by the curve *l* and the tension of the spring to take up the slack which otherwise would be formed, and thus keeps it (the thread) distended from the seam to the curve of the spring until the point of the needle enters the cloth, and then it slips around the curve *l*, to be ready for the other operations. In this way it will be seen that the shuttle-thread is always drawn in the same direction and out of the way when the point of the needle enters the cloth, so that all the stitches will have the same appearance, instead of being inclined sometimes in one direction and sometimes in another, and the thread can never be pierced by the needle.

The needle-bar *m* is connected with the sliding needle-carrier *n* by a joint-pin, *o*, at the upper end, so that it can vibrate in the direction of the motion of the shuttle, and it is provided with a delicate spring, *p*, (represented by dotted lines in Fig. 2,) the tension of which tends constantly to carry the needle *q* to the extent of its range of motion in the direction the reverse of the feed motion, to be presently described.

The cloth or other substance placed on the

table is pressed by the usual pressure-pad, *r*, down onto the periphery of the feed-wheel *s*, which presses up through a mortise in the table or bench. This feed-wheel receives a continuous motion in the direction of the arrow, to move the cloth or other substance continuously by a worm, *t*, the thread of which engages the cogs of a worm-wheel on the shaft of the feed-wheel. The worm *t* is on a shaft, *u*, which receives motion by bevel-wheels *v v* from the shaft *w* of one of a pair of cones, *x x*, connected by a belt, *y*, the other cone deriving motion from the master-wheel *z* by a cog-wheel, *a'*, on its shaft *b'*. The belt *y* of the pair of cones is controlled by a belt-shipper, *c'*, on the end of a lever, *d'*, that turns on a fulcrum-pin, *e'*, the other arm, *f'*, of the said lever having a hole to receive a pin, *g'*, which can be set in any one of a series of holes in a sector, *h'*, attached to the bench or table. As one of the cones has a positive motion corresponding with the motion of the needle and shuttle, and the belt which connects the pair of cones can be shifted and set by the shipper at any part of the length of the cones, it follows that the motion of the feed-wheel can be increased or decreased relatively to the motion of the needle and shuttle at pleasure to lengthen or shorten the stitches. Now, as the feed motion is continuous, the moment the point of the needle enters the substance to be sewed it begins to move with the feed motion and continues to move along with it during the entire operation of forming the stitch, and until it comes out again, the needle-bar admitting of this motion by reason of its connection with the carrier, above described, by a joint-pin, and the moment the needle rises out of the substance to be sewed it is carried back to its original position by the tension of the spring *p*, before described. In this way I am enabled to make the feed motion continuous, and to regulate the length of the stitches at pleasure.

It will be obvious from the foregoing that instead of the gearing described for giving the continuous feed motion equivalent means may be substituted, and that instead of moving the cloth or other substance by a continuous motion relatively to the sewing mechanism, which remains in a fixed position, the said substance can be retained in a fixed position, and the continuous feed motion imparted to the sewing mechanism; and it will also be obvious that the form and construction of the spring for controlling the shuttle-thread and the mechanism for clearing the rear end of the shuttle from the driver may be varied within the range of my invention by the substitution of equivalent means; and, therefore, I do not wish to be understood as limiting myself to the special construction herein specified, so long as the same ends are attained by equivalent means having substantially the like mode of operation.

I claim—

1. In combination with the shuttle, and at-

tached thereto, the employment of a spring-pressure guide, substantially as specified, to control the shuttle-thread as the needle enters the cloth or other substance to be sewed, as set forth, and for the purpose specified.

2. The continuous feed motion for spacing the stitches, substantially as specified, in combination with the vibratory motion of the nee-

dle, imparted in one direction by the feed motion and in the opposite by a spring or any equivalent therefor, substantially as and for the purpose specified.

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Witnesses:

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