W. C. HICKS.

Sewing Machine.

No. 23,577. Patented April 12, 1859.

Fig. 1.

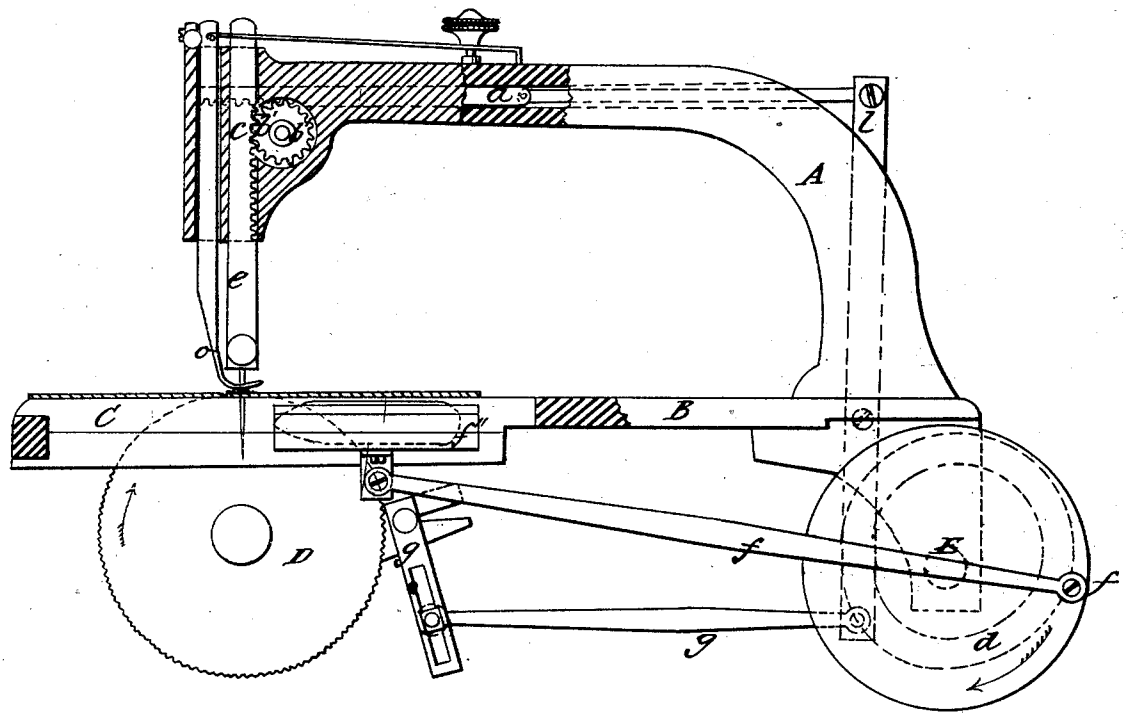


Fig. 2.

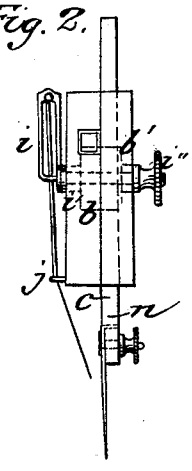


Fig. 4.

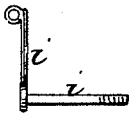
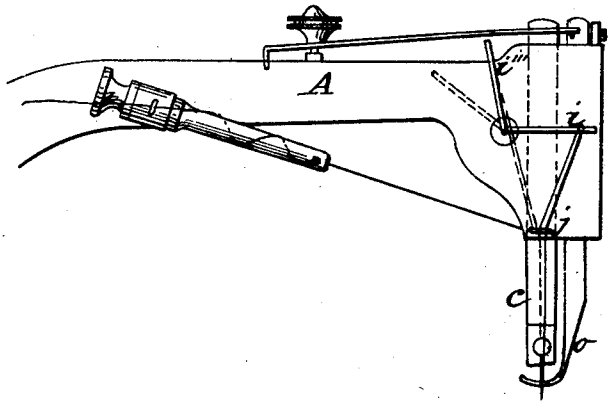


Fig. 5.

Fig. 3.



Witnesses:

A. Pollock

Saml. Reamer.

Inventor.

W. C. Hicks.

UNITED STATES PATENT OFFICE.

WM. CLEVELAND HICKS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **23,577**, dated April 12, 1859.

To all whom it may concern:

Be it known that I, WILLIAM CLEVELAND HICKS, of Boston, county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being made to the annexed drawings, making a part of this specification, in which the figures are all fully described herein.

Similar letters indicate similar parts throughout.

My improvements in sewing-machines consist, first, in setting the feed-wheel or other feeding mechanism and the shuttle-race in such position beneath the sewing-table that the direction in which the materials to be sewed will be fed and sewed shall be in a line parallel with the bracket-arm and toward or into the bight formed by said arm and the table, as hereinafter set forth.

My invention consists, secondly, in an improved tension apparatus whereby I am enabled to throw off a large amount of slack thread for the passage of the shuttle, and can thus use shuttles of large size. I also draw up the slack by a motion which decreases in speed as the slack approaches the tension-point, and thus lessen the risk of breaking the thread.

My invention consists, thirdly, in transmitting the motion to the needle-stock from that cam or crank on the main shaft which drives the said stock by means of a pinion interposed between the connecting-rod and the needle-stock, and in combining the two by rack-teeth cut on each and meshing into said pinion, whereby I am enabled to impart to the needle-stock the precise motions of said cam or crank, as hereinafter set forth.

The general character of the sewing-machine which I shall employ in describing my various improvements is that of a shuttle-machine having a needle reciprocating vertically, a roughened surface wheel-feed, and reciprocating shuttle. The bracket or bent arm which supports the needle-stock and spring-presser for the upper part of the feed is seen at A. The table for supporting the materials, and to which also all the mechanism is attached, is shown at B, the shuttle-race at C, the feed-wheel at D, and the main driving-shaft at E. The positions of these, respectively, to each other, it will be seen, are novel.

First, the position of the bracket A is in a line parallel with the direction of the feed, instead of standing at a right angle to it, as in the old machines. The feed-wheel D is placed so as to direct the cloth in a line toward the upright column or post supporting A, and into the bight of the overhanging bracket. The main or driving shaft E is placed so as to stand parallel with the shaft upon which D revolves. The object of this arrangement is to be enabled to transmit the motions from the cams, cranks, &c., upon E for driving the feed-wheel and shuttle by means of connecting-rods, which shall have the motions all given them in lines parallel with that of the feed. Thus the table B might be lengthened out to any other distance, and the feed-wheel and the shuttle removed for a like distance in the same line of direction, and be operated from the main shaft without other adjustment than that of increasing the length of the connecting-rods. The means I have adopted for transmitting the motions to the needle have the like property. The bracket-arm A is shown as being hollow. Through this a connecting-rod passes and transmits the motion from the cam or crank on the driving-shaft to the needle-stock. This rod is seen at *a*, traversing the entire length of the arm. It moves the needle-stock by having rack-teeth cut upon its under side, as shown. These engage a pinion-wheel, *b*, and this, again, is engaged or geared with the needle-stock *c* by means of like rack-teeth, as shown. Reciprocating motion is given to the connecting-rod *a* by means of a cam (shown in dotted lines at *d*) acting through a lever, *e*, as shown. The exact motions given by the cam at all parts of its revolution are thus imparted to the needle-stock. Instead of a cam a crank may be substituted. The shuttle is driven by a connecting-rod, *f*, extending from the crank-pin *f'* on the main shaft to the yoke *f''*, by which the shuttle is embraced. The feed-wheel is driven by a connecting-rod, *g*, one end of which is attached to the bottom of the lever *e* and the other to the rocking lever *g'*, by which the gripping-toe on the feed-wheel is moved in a common manner to turn said feed-wheel. It will now be seen that the table may be lengthened out to any required dis-

tance, and the needle, feed apparatus, and shuttle be moved accordingly to the distant end of said table, while the driving-shaft remains at the opposite end, without requiring any new adjustment or alteration of parts other than the lengthening of the bracket-arm and the several links *a*, *f*, and *g*.

The mode of operating the needle by a traversing connecting-rod reciprocating in the direction of its length is a very important feature, especially in machines wherein the needle is to be operated at a considerable distance from the driving-shaft, for as said rod works in guides and operates by a direct pull and thrust, its diameter for different lengths need not be increased, and the power required to maintain the reciprocation of the rod itself is reduced to the smallest possible, contrasting very favorably in this particular with the bell-crank mode of driving the needle-stock. The arms of that, in large machines, have to be so heavy, in order not to bend or break, as seriously to diminish the speed at which the machine can be run, as also to add in like manner to the power requisite to drive it. The same objections occur, to some extent, in the case of a revolving shaft for driving the needle-stock at the end of the bracket-arm, for when this has to be long it is necessarily required to be of large diameter to resist torsion, and in order to drive the needle with firmness and steadiness of motion.

The device for giving off the thread and taking up the slack is seen at *i* in Figures II and III, and shown in a modified form detached in Fig. IV. It consists of a crank having an eye in its end, through which the thread is rove on its way from the spool to the needle. The axis *i'* of this crank passes through the center of the axis *b'* of the pinion *b*, and is made to turn with the pinion by means of a clamping-nut, *i''*, on the end of *i'*, which, when screwed up, sets against the end of the axis *b'*, and thus the two are joined together by friction. The object of thus attaching the two is to be able to set the crank in its proper position for correctly delivering off and taking up the thread. As the pinion *b* does not make a complete revolution, so the eye in the end of the crank *i* describes an arc of corresponding extent, and it is necessary to be able to place the arm in that position of the circle in which the arc is to be traversed.

At *j*, Figs. II and III, is shown the guiding-eye for the thread to pass through on its way to the take-up-crank and to the needle. Thus it will be seen that the vibration of *i* toward *j* allows the thread to be slackened, so in the reverse motion it is taken up and tightened. As the thread must be fully drawn up before the needle has finished its upstroke, provision is made that no more thread shall be drawn off by the crank than is required by setting it by its pinch-nut, so that the eye in the end of said crank, the axis thereof, and the guide-eye *j* shall be in line, as shown in dotted lines at *i'''* in Fig. III; hence, although the crank continues to move onward with the needle's ascent, the thread will merely be held tight, and be no longer drawn up.

The detached crank, Fig. IV, exhibits an alteration in shape, whereby the thread when fully drawn up will not be held against its axis, but as the rotation continues will pass by said axis and suffer a slight slackening up again, because then the eye in the end of the crank, having passed the central line, is once more approaching the point *j*. This slight slackening up is important in sewing in some kinds of materials. One advantageous feature in the herein-described position of the bracket-arm, feed, and shuttle-race consists in the ability to set the needles always so that, whatever be their size, they shall stand flush with that edge or face of the shuttle-race against which the flat face of the shuttle plays. This is accomplished by dividing the bracket into two parts longitudinally and setting one of these halves always so as to be in the same plane with said face of the shuttle-race. The needle-stock, playing against this face as a guide, will bring that side of the needle which is clamped against said stock always in line with the same.

The operation is as follows: The materials, being placed upon the fore part of the table, are advanced under the spring presser-foot *o* to the place where the sewing is to commence. This foot is then let down to clamp the work upon the roughened surface beneath in the usual manner. The main or driving shaft E is now started, thus communicating motion to the several parts. As the needle is at its upstroke when the cloth is inserted, the first action from the cam *d* will be to push the connecting-rod *a*. This, by its rack, turns the pinion *b*, and this, again, drives down the needle-stock *c*, thus sending the needle through the cloth. The slack thread and take-up crank *i* are also turned down, and thus throw down the slack thread, ready for allowing the shuttle to pass through. The respective positions of the parts will then be shown as in Fig. I. The crank-pin *f'*, from which the shuttle is driven, is seen to be on its center. As E turns in the direction of the arrow, the shuttle will commence to move forward by its connecting-rod *f'* pushing the yoke *f''*. The point will thus enter the loop thrown off by a slight retreat of the needle, then, passing through the usual way, the cam *d* commences to draw up the needle-stock by reversing the motion of *a*. As the crank *f'* approaches its opposite center the motion of the shuttle becomes gradually slower up to the dead-point of the crank. The cam *d* is so set and shaped as to cause the needle to begin to be moved a little before the shuttle has arrived at the end of its stroke, and to complete its movement a little after the commencement of its return. Thus there is only time allowed for drawing up the thread and returning the shuttle. The slack is taken up by the crank *i* as the needle rises, but it must arrive at its maximum height before the needle has com-

pleted its ascent, in order to take up and tighten the stitch before the shuttle commences its return—*i. e.*, the thread must be drawn up tight while the shuttle is at the end of its stroke, and is for the instant stationary. The pinch-nut *i''* must be loosened and the take-up *i* moved round until the adjustment is accomplished. The shuttle being driven by a crank motion, and the upper thread drawn up by a like motion, produces a very superior tension, and always insures the drawing up of the stitch, so that the lock will be in the center of the materials being sewed; and it also enables me to have what has been so much desired in the old machines, like tensions upon both threads, and for the reason that as the shuttle is approaching the end of its stroke, and thus produces tension upon its thread, the take-up crank *i* is also arriving at a corresponding position. Now, if the upper thread is tightened a little in advance of the shuttle's tension, the thread of the latter may be drawn into the cloth the more easily. The adjustments are capable of such a nice set as to insure that the tension shall be given on both threads at the same instant—viz., when the shuttle thread has arrived at the center of the cloth.

It will be seen that both threads are drawn up at the moment when the shuttle and take-up have their slowest motion, and just previous to their stroke being finished, and hence these threads are not broken by the highest speed at which the machine is capable of being run.

The other parts of the machine are as common to sewing-machines.

I claim—

1. Transmitting the motion to the needle-stock from that cam or crank on the main shaft which drives the said stock by means of a pinion interposed between the connecting-rod and the needle-stock, and combining the two by rack-teeth cut on each and meshing into said pinion, whereby I am enabled to impart to the needle-stock the precise motions of said cam or crank, as set forth.

2. Setting the feed-wheel or other feeding mechanism and the shuttle-race in such position beneath the sewing-table that the direction in which the materials will be fed and sewed shall be in a line parallel with the bracket-arm and toward or into the bight formed by said arm and the table, as set forth.

3. The herein-described apparatus for giving out and taking up the slack of the thread, consisting of a partially-revolving crank or arm placed and operated substantially as set forth.

In witness whereof I have hereunto subscribed my name.

WM. CLEVELAND HICKS.

Witnesses:

J. P. PIRSSON,

S. H. MAYNARD.