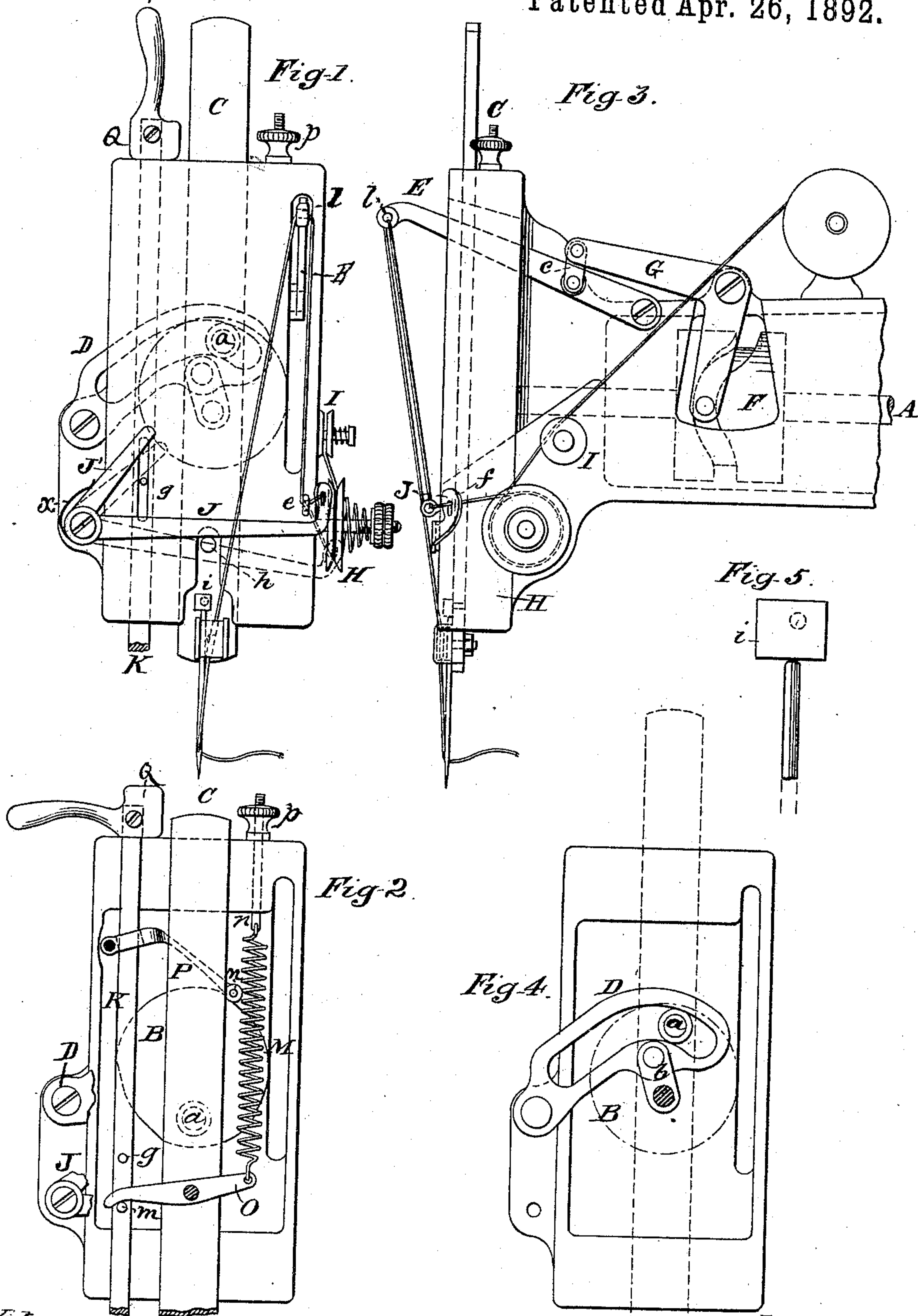


(No Model.)

E. H. SMITH.
SEWING MACHINE.

No. 473,894.

Patented Apr. 26, 1892.



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SEWING-MACHINE.

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To all whom it may concern:

Be it known that I, EARLE H. SMITH, of the city, county, and State of New York, have invented certain new and useful Improvements in Sewing-Machines, whereof the following is a specification.

My improvements relate to machines forming the lock-stitch in connection with a suitable shuttle or like device and are especially adapted for sewing with waxed threads.

Referring to the annexed drawings, Figure 1 is a front view of the face-plate of a sewing-machine embodying my improvements. Fig. 2 shows the same as if transparent and exhibiting the needle-bar, presser-foot bar, spring, &c. Fig. 3 shows a side view of the face-plate with a fragment of the bracket-arm of a sewing-machine, containing the tension devices and other parts. Fig. 4 shows the parts used in operating the needle-bar to impart certain movements thereto. Fig. 5 shows, enlarged, the stop, against which the head of the needle abuts.

In the drawings, A indicates a rotating shaft mounted in the bracket-arm, and B is a crank-disk having the usual crank-pin a thereon, which in this machine runs in a cam-groove formed in a lever D, whereby motion is communicated to the needle-bar C, the lever and needle-bar being suitably connected, as by a link b .

E is a lever pivoted to the bracket-arm, whose office is to manipulate the thread independently of the needle-bar, giving it down when needed and pulling it up to draw in and finish the stitch. It is termed the "drawing-in lever" to distinguish it from the take-up hereinafter referred to. It has a positive motion derived from a suitable cam, as F, on the rotary shaft A.

G is an intermediary lever, whose function is to take motion from the cam F and transfer it to the drawing-in lever. The lever G in this instance is of bell-crank form to suit the location of the parts, one arm being acted on by said cam F, while the other arm is suitably connected, as by a link c , with said drawing-in lever E near its pivot or fulcrum. By this arrangement a long sweep of the lever E is obtained from a cam of small diameter, while the abrupt turns in the cam-groove, otherwise required, are avoided.

For controlling slack thread forming below the needle's point in the descent of the needle to the work I use a take-up, in this instance in form of a lever J, pivoted to the machine-head, made self-acting by a spring x in the drawings, which, as here arranged, tends to force it downward, and the strain of the thread in the final upward action of the drawing-in lever will lift it against the force of the spring x . I prefer, however, to relieve the thread of the force of this spring when drawing it up from below the work, and for this purpose I employ a device for positively retracting said take-up in readiness to repeat its operation. With the take-up I combine a means for arresting its action on the thread, which means is also arranged for adjustment, so as to stop the action of the take-up earlier or later, according to the thickness of material under the presser-foot. The adjusting means consists in this instance of a stud g . As shown, the take-up is placed horizontally and has another member consisting of an arm J', making a device comprising two members connected to each other and to the machine-head. In the take-up action the arm J' strikes against the stud, arresting the lever J at the moment such action should cease. The placing of this stud higher or lower will stop the movement of the lever J earlier or later in the descent of the needle to the work, and by fixing the stud g in the presser-bar, as shown, it will rise and fall therewith, and thus change automatically the action or extent of movement of the lever J and the time when the take-up action shall cease, according to the thickness of material under the foot, said action ceasing earlier when the work is thick and later when the work is thin.

I am aware that the presser-bar has been used to influence the action of the spring take-up, but not in the connection I am describing, with a separate lever, as E, to give down thread and draw in the stitch independently of the take-up and needle movements and while the needle is above the work. In the herein combination and arrangement of parts when the action of the take-up is arrested by the stop g it remains at rest and does not give up the slack thread as the needle enters the work, that being effected not

by the needle-bar nor by the take-up, but by a partial downward motion of the lever E as produced by the cam F, which said downward motion is completed and furnishes the thread required for the operation of the shuttle after the needle rises above the work.

For retracting the take-up lever J after its take-up action, as before mentioned, the simplest means is a stud *h*, set in the needle-bar C, which begins to retract the take-up during the last part of the downward motion of the lever E, the needle now being above the work, and continues to do so until the needle completes its upward motion and begins to descend, so that while the thread is being drawn up through the work by the lever E it is practically relieved from the spring force of the take-up.

To give time for the proper action of the drawing-in lever while the needle is above the work, the lever D is pivoted to the machine at the rear side of the head. The crank-pin or roller *a* on the disk B revolves up and forward toward the operator, and the cam-groove in lever D is made arching upward in form, whereby the crank-pin *a*, running in said groove, is made to pass nearest the fulcrum of this lever when moving upward in its circuit. The effect of this is to draw the needle quickly out of the work when the loop has been engaged, as by the point of a shuttle or hook, carry the needle-bar to its highest place, and hold the needle above the work while the lever E gives down thread for the shuttle and until said lever rises again and draws up the loop from below, operations which occupy about one-half revolution of the driving-shaft A. If it is desired to have the shaft to revolve in the direction opposite to that herein set forth, then the lever D will be pivoted at the front side of the head. The lever D, fulcrumed as aforesaid and having the upwardly-arched cam-groove in connection with the crank-pin *a*, moving as stated, also improves the action of the needle in driving it through the material being sewed, since the crank-pin *a*, when the needle is entering the material, is pressing on the outer end of the cam-lever beyond the pivot connection with the needle-bar, thus exerting a powerful leverage on the needle when it is most needed, a feature especially valuable in wax-thread machines, as they are often required to sew material over half an inch in thickness.

H represents any ordinary tension device, through or over which the thread is led on its way to the needle, passing through the take-up and the eye *l* at the end of the drawing-in lever E. The eye *f* at the end of the take-up is between the tension and the lever E. The tension holds the thread against the pull of said lever, and a guiding-eye *e*, fixed in the head, aids in so holding the thread.

In the drawings, Figs. 1 and 3, is shown a device for adjusting the height of the needle, consisting of an eccentrically-pivoted polygonal gage-stop *i*. (Seen enlarged in Fig. 5.)

The head of the needle abuts against any one of the several surfaces of this stop. Each face is at a different distance from its pivot-axis, thus giving as many graduations of height for the needle as there are sides or faces.

Any suitable clamp may be used in connection with the stop for holding the needle to the needle-bar.

The presser-bar spring M is preferably arranged within the face-plate in the head of the machine and, for convenience, on the side opposite to the presser-bar. The spring shown acts by contractile force and communicates with the presser-bar by a lever O, pivoted to the face-plate. One end of the spring is connected with said lever and at the other or upper end with a means of adjusting its power, consisting of a stem *n*, threaded at its upper end and receiving a thumb-nut *p* on top of the machine-head. The opposite end of the lever O rests on a pin *m*, set in the presser-bar.

To compensate for the variation in the strength of the spring M, as it is more or less strained according to the thickness of the work, the lever O is provided with a cam-surface at the presser-bar end thereof which rests on the pin *m*, which surface is so shaped that a greater leverage is exerted on the presser-bar by the spring when least strained or weakest and less when it is strongest, as when thick material is under the foot, thereby equalizing the pressure automatically on all thickness of work.

A lever P, Fig. 3, is employed to grip the presser-bar at certain times to prevent the foot from lifting, as when withdrawing the needle from the work and at other times. The bar passes through an opening or slit in which it is embraced by the lever. The grip is obtained by the impingement on the sides of the bar of the corners of the slit that are obliquely opposite each other. The bar is grasped and released by a slight vibratory movement of the lever, effected in this instance by means of the crank-disk B. As shown in said figure, the periphery of the disk is formed with two cam-surfaces, so located in relation to the position of the crank-pin *a* as to cause the lever P to grip the presser-bar immediately upon the completion of the needle's descent, so that the presser-foot is held when the needle starts upward and thereby prevents it from lifting the work as it withdraws therefrom; also, to grip the presser-bar at the last part of the upward or drawing-in movement of the lever E, so as to resist the pull of said lever on the thread and close the stitches uniformly in the material. The lever P is made flexible and elastic, so that its action shall not be arbitrary, thereby avoiding the friction and stiffness in the movement of the machine, which accrue when the gripping device is unyielding.

In the foregoing improvements I do not confine myself to specific details or to form an arrangement where the same may be varied within the invention.

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

1. The mechanism for operating the needle-bar, consisting of a lever connected with the needle-bar and pivoted to one side of the machine-head, the said lever having an upwardly-arched cam-groove, in combination with a rotating crank-pin traversing the cam-groove in the part nearest the fulcrum in its upward motion.

2. The revolving shaft in the bracket-arm, the needle-bar and needle actuated therefrom, a drawing-in lever acting to give down thread and draw in the stitch while the needle is above the work, and means on the shaft for operating said lever, in combination with a spring take-up acting in connection with the needle and said lever, a thread-holder against which said lever draws the thread, and means carried by the needle-bar for retracting the spring take-up to relieve the thread during the operations of the drawing-in lever.

3. A needle, needle-bar, presser-bar, and needle-actuating shaft, a positively moved drawing-in lever, a cam for operating said drawing-in lever to give down thread and draw in the stitch while the needle is above the work, and mechanism operated from said shaft for holding the needle above the work during the operations of said lever, in combination with a spring take-up acting in connection with the needle and said lever, a thread-holder against which said lever draws the thread, and means governed by said presser-bar for arresting and automatically varying the action of the take-up with respect to the needle and said lever and according to the thickness of material under the foot.

4. A needle and needle-bar, a needle-actuat-

ing shaft, the drawing-in lever, and a cam on said shaft operating said lever to give down thread and draw in the stitch while the needle is above the work, the spring take-up acting in connection with the needle and said lever, a thread-holder against which said lever draws the thread, a stud or stop for arresting and varying the action of the take-up, and means for retracting the take-up during the action of the drawing-in lever, as set forth.

5. The positively-moved drawing-in lever, means for operating the same, the two-armed spring take-up lever J J', and a thread-holder against which said lever pulls, in combination with the presser-foot and bar, and the governing-stop on said bar acting on one arm of the take-up, the other arm of the take-up serving to control the slack.

6. In combination, the drawing-in lever, means for positively moving the same, the two-armed spring take-up lever, the stop g on the presser-bar, and a stud on the needle-bar for retracting the take-up to relieve the thread of the spring force of the take-up lever.

7. In combination with the presser-bar and its spring, means for adjusting the power of the spring, and a compensating-lever, one end of which is connected with the spring and the other is provided with a cam-bearing surface acting on a stud in the presser-bar.

8. The combination, with the presser-bar, of the flexible spring gripping-lever arranged transversely to and embracing the presser-bar, and a cam acting on said lever to hold and release the presser-bar, substantially as set forth.

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Witnesses:

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