

(Model.)

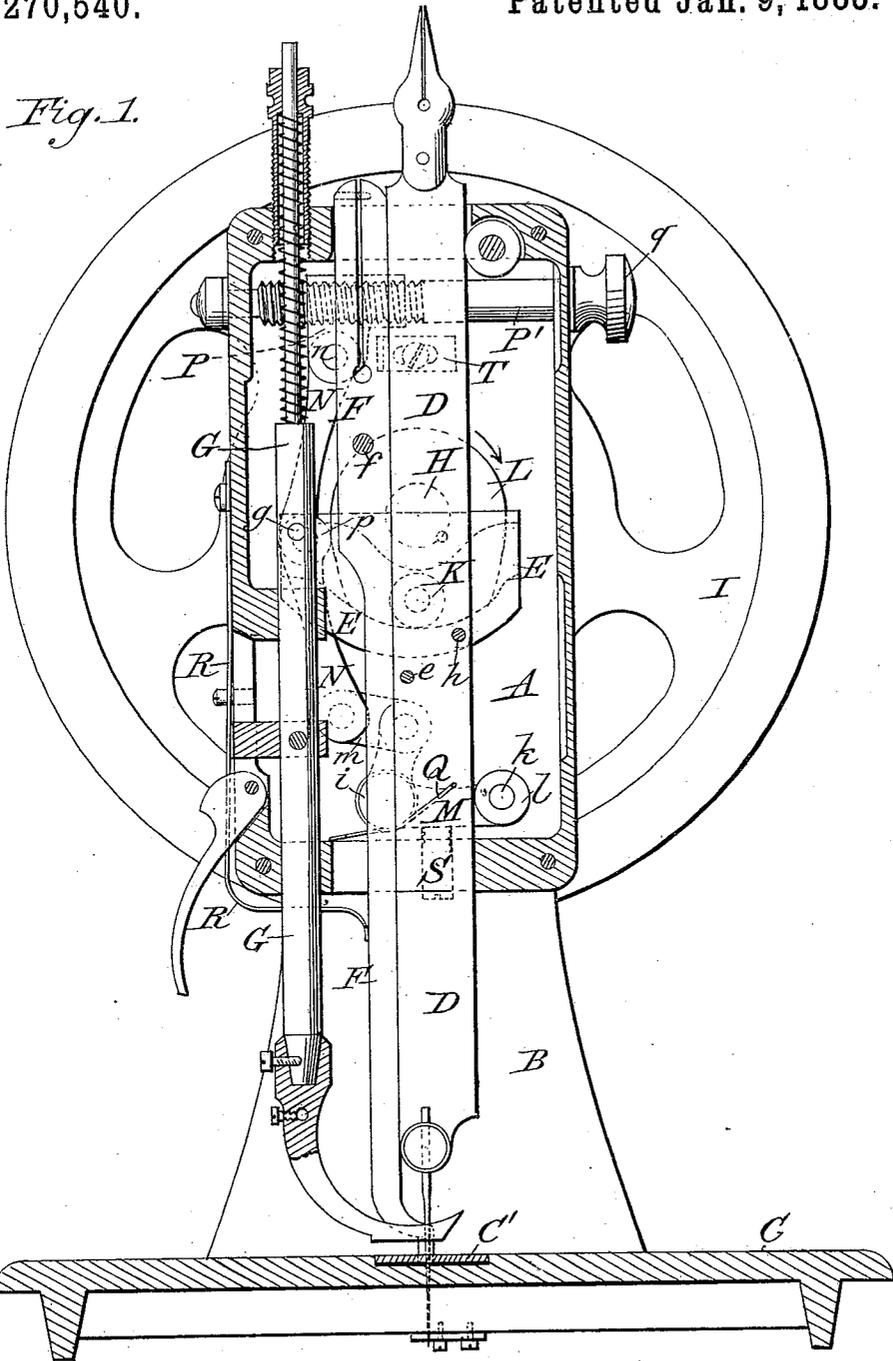
2 Sheets—Sheet 1.

W. S. CARLISLE.

SEWING MACHINE.

No. 270,540.

Patented Jan. 9, 1883.



*Attest:*  
*J. H. Schott*  
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*Inventor:*  
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Fig. 2.

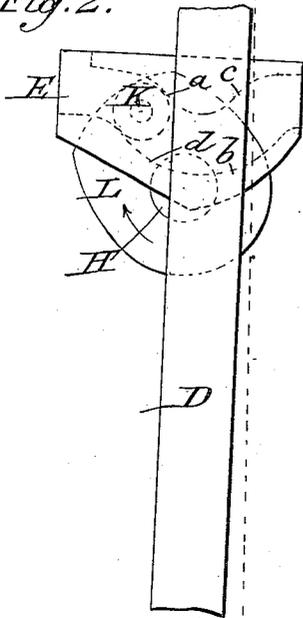


Fig. 3.

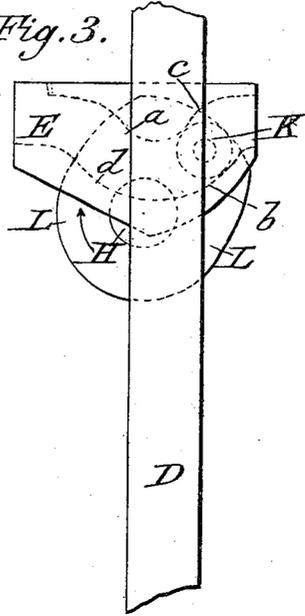
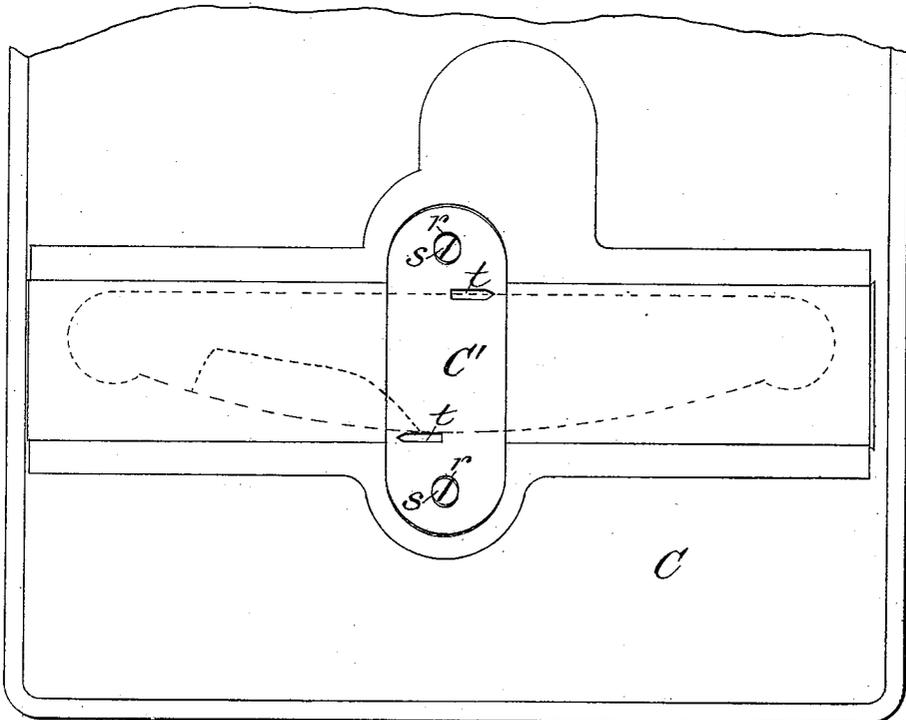


Fig. 4.



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# UNITED STATES PATENT OFFICE.

WILLIAM S. CARLISLE, OF WATERTOWN, NEW YORK, ASSIGNOR TO THE  
DAVIS SEWING MACHINE COMPANY, OF SAME PLACE.

## SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 270,540, dated January 9, 1883.

Application filed October 5, 1882. (Model.)

*To all whom it may concern:*

Be it known that I, WILLIAM S. CARLISLE, of Watertown, Jefferson county, New York, have invented a new and useful Improvement in Vertical or Top Feed Sewing-Machines, which improvement is fully set forth in the following specification.

This invention, although applicable, in part at least, to other machines, has reference more particularly to sewing-machines in which the work is fed by the conjoint action of the needle and needle-bar and of an auxiliary vertical feed-bar or helper-bar; and it is intended as an improvement on the well-known Davis sewing-machine. In the class of machines indicated the lateral movement for feeding is imparted to the needle after it has penetrated the work and passed through the work-plate. Obviously it is important that after each advance of the work the needle-bar should be returned to the same position, and that in its descent it should be held from side movement in order properly to penetrate the work at the right point. Heretofore it has been found necessary for this purpose to use special devices, which have complicated the feed mechanism, thereby enhancing the cost and rendering the apparatus less easy to run, less durable, and more liable to get out of order than would otherwise be the case. In the present invention the result is accomplished in a simple and efficient manner by utilizing the action of the revolving pin or roll upon the heart-cam commonly employed to reciprocate the needle-bar—that is to say, the pin or roll acting upon the inclined surfaces of the cam tends to move it laterally as well as vertically, and this tendency is utilized for the purpose named. In machines having an under feed or feed working from below through the cloth-plate the needle slides in fixed guides in the head, and these guides resist the tendency toward side motion, and the only effect is a slight increase of friction. In the original Davis sewing-machine a special cam-bar, which worked in fixed guides, and on the face of which the needle-bar was pivoted, was employed. The tendency toward lateral motion being resisted by the fixed guides had no effect upon the needle-bar. In the machine de-

scribed in Letters Patent No. 250,053, granted to Thomas Carey, November 29, 1881, the special cam-bar is dispensed with, and a dog with cam for acting thereon is employed to insure the positive return of the needle-bar and to hold it in its descent. The roll or pin acting upon the inclined surfaces of the cam tends to move the needle-bar in the opposite direction to the movement imparted to the feed-cam—that is to say, during the return of the needle-bar and its descent it tends to advance it, and thus throw it out of true, and the dog resists the tendency and holds the needle in its proper position. In the present invention the cam is attached to the needle-bar, and the parts are so arranged that the roll or pin acting against the inclines tends to return the needle-bar at the proper time and to hold it in place during its descent. To accomplish this, the shaft carrying the roll or pin is run backward or in the opposite direction to the shaft in the Carey patent. The different feeding and stitch-forming devices are of course adapted to conform to the new direction of rotation of the shaft which operates the needle, being suitably modified or changed in position, or both.

This improvement can be used in machines of otherwise ordinary or suitable construction, and in connection with any suitable feeding mechanism—as, for example, in connection with feeding means such as described in the Patent No. 58,614, to Job A. Davis, October 9, 1866, or in the Carey patent referred to—the feed-cams being of course modified to impart the advance movement when the needle has descended, and the return movement when it is above the work-plate and clear of the work. The dog shown by Carey for insuring the positive return of the needle-bar, and the cam for operating said dog, could, when the said improvement is used, be omitted without disadvantage to the machine. The present invention, moreover, comprises special improvements in the feed mechanism, as follows: Lateral movement is imparted to the vertical feeding devices by means of a lever which acts upon the said devices through the intermediary of a roller or other device having a small bearing-surface. Preferably a bell-crank lever turning on a fixed center is used, and the arm

which acts directly upon the feeding devices is horizontally placed. Motion is imparted to the aforesaid lever from a cam on the main shaft through an auxiliary lever of the third order, and the length of stitch is varied by shifting the center on which said auxiliary lever turns. Combined with the levers and vertical feed devices are springs to return the latter after an advance, and adjustable stops, for purposes to be hereinafter explained.

The invention further comprises an improved throat-plate which is capable of a side adjustment, to enable the needle-slots readily to be brought into their proper position.

The accompanying drawings, which form a part of this specification, represent a machine constructed in accordance with the invention.

Figure 1 is a sectional elevation, looking toward the standard of the goose-neck, the section being immediately in front of the needle-bar and helper-bar, and at right angles to the length of the main shaft and goose-neck; Figs. 2 and 3, partial views in elevation, illustrating the manner of operating the needle-bar; and Fig. 4, a plan of the work-plate.

A is the cam house or head of the machine; B, the goose-neck or stationary arm; C, the work-plate and lower part of the machine-frame; C', the throat-plate; D, the needle-bar; E, the needle-cam; F, the helper or vertical feed bar; G, the presser-bar; H, the main shaft, turning in bearings in the goose-neck; I, the driving-pulley and fly-wheel; K, the needle-cam roll or driver for reciprocating the needle-bar; L, the feed-cam; M, the main feed-lever or bell-crank; N, the auxiliary feed-lever; P, the adjustable piece, carrying the fulcrum of lever N; P', the feed-adjusting screw; Q R, springs, and S T adjustable stops.

The helper-bar F and needle-bar D are placed edge to edge, the former behind the latter, as usual, and their upper ends are held in fixed guides, which allow the said bars to rise and fall, but prevent other movement, while their lower ends play in a slot.

The needle-cam E has the ordinary irregular or heart shape groove, and is fixed to the needle-bar. The needle-cam roll or driver K revolves with the shaft H (being attached to the dish of feed-cam L, which is keyed or shrunk on said shaft) and works in the aforesaid groove in the needle-cam. The direction of revolution is indicated in Figs. 1, 2, and 3 by the arrow. As the roll or driver K rises and lifts the needle-bar D, it acts upon the inclined surface *a*, and therefore tends to move the lower part of the needle-bar and the needle fixed thereto in the opposite direction to the feed movement, and to bring the bar to a vertical position, (indicated by the broken line in Fig. 2.) During the descent of the needle-bar the roll or driver K is acting against the inclined surface *b*, and therefore still tends to move the needle in the opposite direction to the feed movement. The roll or driver acts for a portion of the time against the surfaces

*c d*, and tends to move the needle with the feed; but this takes place after the said needle has penetrated the fabric, and does not interfere with the working of the machine, but, so far as it has any effect, assists the feed-cam in advancing the work.

It is obvious that if the roll or driver K be revolved, as is customary, in the direction opposite to the arrow, it would act upon the surfaces *c d* while the needle is out of the work, and would tend to prevent the needle-bar from resuming its vertical position, or, if it should become vertical, to displace it.

As customary in the Davis machine, the helper or vertical feed bar F is held down and the presser-foot raised by a pin, *e*, on the needle-bar working in a cam groove or slot in the arm of a bent lever, pivoted at *f* to the bar F, and having the other connected with the presser-bar G through a pin, *g*, on said bar, fitting in a slot in the second arm of the bent lever. This lever and the take-up, which is operated by a stud, *h*, on the needle-bar, are not shown, because they are or may be of the ordinary well-known construction long used in the Davis machine. Lateral motion in the direction of the feed movement—*i. e.*, to the left, Fig. 1—is imparted to the lower ends of the bars D F by the bent lever or bell-crank M, which is rocked by means of the feed-cam L and intermediate connections. The lever or bell-crank M turns on a stud, *i*, fixed to the wall of the head or cam-house A. Its horizontal and longer arm is provided at its end with a pin, *k*, carrying a roller, *l*, which makes contact with the front edge of the needle-bar. The shorter vertical arm is connected by the link *m* with the auxiliary lever N, the latter having its pivot or fulcrum at *n* in the adjustable piece P. The auxiliary lever is moved in the direction of the feed movement (to the left, Fig. 1) by the action of the feed-cam L, (which makes contact with the roller *p* about the middle of said lever N,) and conveys its motion through the link *m* to the main lever or bell-crank M, rocking it on the stud *i*, and imparting to the needle-bar and vertical feed or helper bar the lateral motion required for feeding. After the bars D F have been lifted by the action of the cam roller or driver K on the needle-cam E, the feed-cam L leaves the roller *p*, and spring Q returns the levers M N to their first position, and the spring R, aided by the action of the needle-cam roll or driver on the heart-cam, returns the needle-bar and helper-bar.

The proper position of the main feed-lever or bell-crank M when it returns is determined by the stop S, with which the horizontal arm then comes in contact. This stop is adjustable, in order that the roller *l* may without difficulty be made to occupy the proper position to hold the needle-bar vertical in its descent. The operating-arm or arm of lever M, which acts directly upon the needle-bar, being arranged to be horizontal, or nearly so, when thrown back, the pressure of the needle-bar

against the roller *l* is lengthwise of said arm, and is carried directly upon the fixed stud *i*, whereby it is firmly resisted.

The fulcrum-piece *P* is formed of a sleeve 5 screw-threaded internally. It is carried by the screw *P'*, which is supported in journal-bearings and adapted to be turned by the milled head *q*, and the thread of said screw is engaged by the internal thread of sleeve *P*. 10 By turning the screw *P'* in one direction or the other, the sleeve *P* and the roller *p* are moved toward or away from the main shaft, so that the said roller *p* will be struck by the feed-cam *L* sooner or later, and, the lower end 15 of the auxiliary lever *N* being consequently moved a greater or less distance to the right, and the main lever or bell-crank *M* turned through a greater or less angle, the stroke of the vertical feeding devices—to wit, the needle 20 and helper bars—and the consequent length of stitch, will be longer or shorter.

It is obvious that if the fulcrum-piece or sleeve *P* were moved a sufficient distance to the right, the main feed-lever or bell-crank *M* 25 would be held at all times clear of the stop *S*, and the needle-bar thus kept from becoming vertical, and that the practical operation of the machine would otherwise be disturbed. The stop *T* limits the movement of the said 30 piece or sleeve in this direction and prevents the user of the machine from accidentally moving it too far.

The throat-plate *C'*, which fits in a recess in the work-plate, is made shorter than said recess, and the holes *r*, for the attaching-screw *s*, 35 are elongated, so that a slight adjustment from side to side is allowed to the throat-plate, in order that the needle-slots *t* may be brought exactly to the right position, notwithstanding 40 slight variations in the parts arising from the manufacture.

As usual in the Davis sewing-machine, there are two slots, so that when one side is worn the throat-plate may be reversed and the other 45 slot employed.

Motion is imparted to the shuttle from the main shaft of the machine by any ordinary or suitable means, the movement being properly 50 timed with respect to the reciprocation of the needle, as well understood by those skilled in the art.

Modifications may be made in the details of construction without departing from the spirit of the invention, and portions of the invention 55 may be used separately. For example, the arrangement of levers described could be used to impart a lateral movement to a needle-bar pivoted on the face of a cam-bar, or a bell-crank arranged with the arm which acts upon the 60 feeding devices vertical or at an inclination between the vertical and horizontal could be used. Forms of lever other than the bell-crank could be used.

The term "vertical feeding devices" is used 65 in this specification to include one or more such devices. The lateral-moving needle-bar

is a vertical feeding device, and so also the vertical feed or helper bar. They are shown as used together; but one or the other could be used alone, and could be operated by means 70 in whole or in part like those described.

Having now fully described my said invention and the manner of carrying the same into effect, what I claim is—

1. The combination, in a vertical-feed sewing- 75 machine, with the needle-bar movable laterally as well as vertically, of a feed-cam and co-operating mechanism for moving said needle-bar laterally, and separate devices, such as the needle-cam and revolving cam roll or driver, 80 for reciprocating the said bar vertically, arranged and operating as explained, so that the said devices tend to move the lower end of the needle-bar while the needle is above the work in a direction opposite to the feed movement, 85 substantially as described.

2. The combination of the backwardly-revolving shaft and cam roll or driver carried thereby with the needle-bar supported in guides and adapted to reciprocate vertically 90 and to swing on a center above said shaft, and the grooved heart-cam fixed to said needle-bar, substantially as described.

3. The combination of the needle-bar, needle-cam fixed thereto, the helper or vertical 95 feed bar, the backwardly-revolving shaft, the needle-cam roll or driver carried thereby, the feed-cam also carried by said shaft, and mechanism operated or controlled by said feed-cam for moving said needle-bar and helper or feed 100 bar laterally, substantially as described.

4. The combination, with vertical feeding devices, of a lever placed between said feeding devices and the inner wall of the cam house or head of the machine, and pivoted to the said 105 wall, a pin projecting from the face of the lever in front of said feeding devices, and a roller carried by said pin and bearing against the edge of said devices, substantially as described. 110

5. The combination, with the vertically and laterally movable needle-bar and helper-bar having their upper ends held between fixed guides, the needle-cam fixed to the said needle-bar, the shaft, and the needle-cam roll or 115 driver carried thereby, of a feed-lever placed in the lower part of the cam house or head, and acting upon the needle-bar through a device carried by or forming part of said lever, and bearing against the needle-bar, the said 120 device being a roller or its equivalent, substantially as described.

6. The vertical feeding devices, comprising a laterally-movable needle-bar, the feed-lever turning on a fixed center for moving said devices laterally, and the back contact-stop for 125 said lever, in combination with independent means for regulating the stroke of the said lever, substantially as described.

7. The combination of a feed-cam, a feed-le- 130 ver, a feed-adjusting screw, and a fulcrum-piece threaded and engaging said screw, said

lever being pivoted to said fulcrum-piece, so that the adjustment thereof regulates the position of the lever with respect to the feed-cam, substantially as described.

5 8. The combination of the vertical feeding devices, the mechanism for reciprocating the same vertically, the main lever or bell-crank, the auxiliary lever, the adjustable fulcrum-piece, the feed-cam, and the spring for returning the vertical feeding devices, substantially  
10 as described.

15 9. The throat-plate provided with needle-slots and having elongated holes for the attaching-screws, in combination with the work-plate having a recess for said throat-plate slightly longer than the latter, so that said throat-plate is adjustable at right angles to the length of the said needle-slots, substantially  
as described.

10. In a vertical-feed sewing-machine, the 20 combination of the main shaft revolving backward, the feed-cam and needle-cam roll or driver, both carried by said shaft, the needle bar and helper or vertical feed bar, both movable vertically and laterally, the needle-cam 25 fixed to said needle-bar, the main feed-lever or bell-crank, the auxiliary feed-lever, the adjusting means, and the springs, substantially as described.

In testimony whereof I have signed this speci- 30 fication in the presence of two subscribing witnesses.

WM. S. CARLISLE.

Witnesses:

LEVI A. JOHNSON,  
JAMES C. BURT.