W. A. SUTTON.

Sewing Machine.

2 Sheets—Sheet 1.

No. 29,202.

Patented July 17, 1860.

Fig. 1,

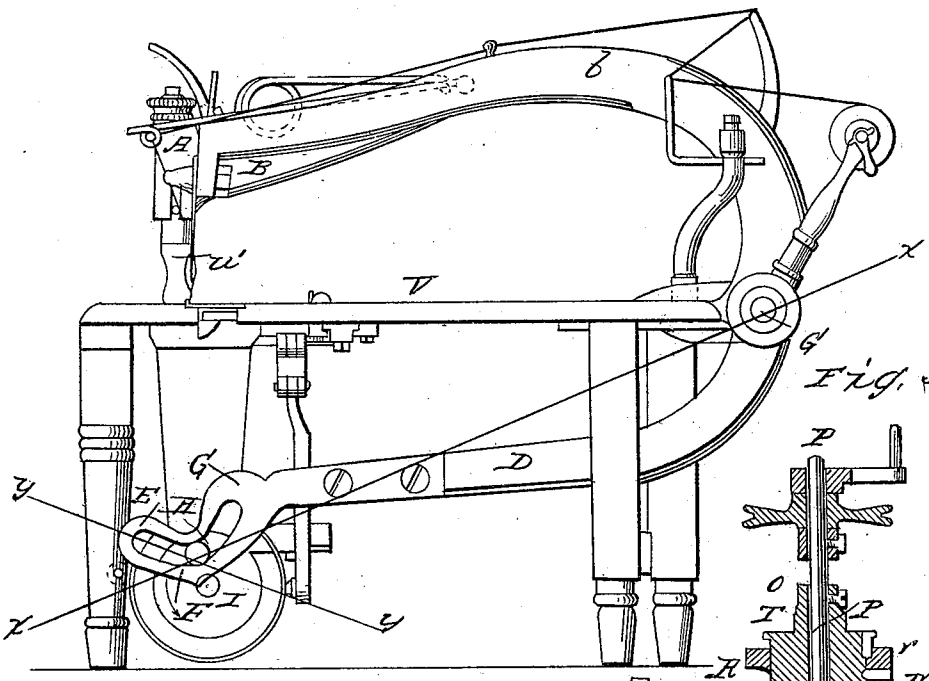


Fig. 5,

Fig. 2,

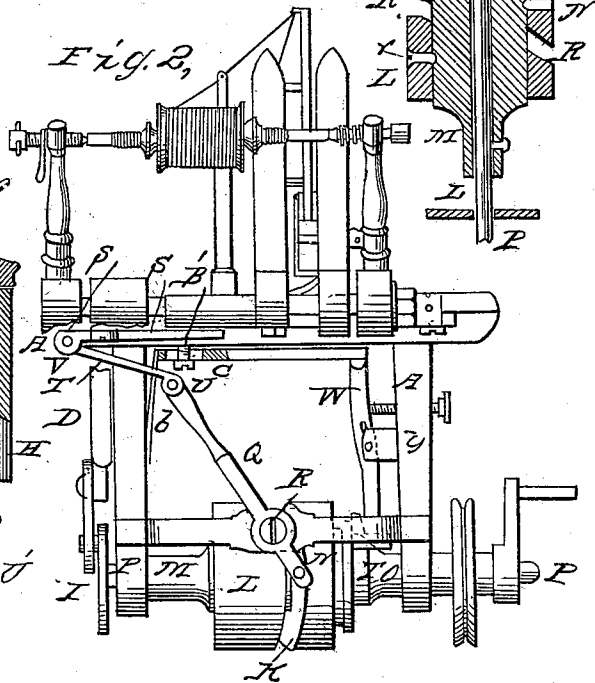
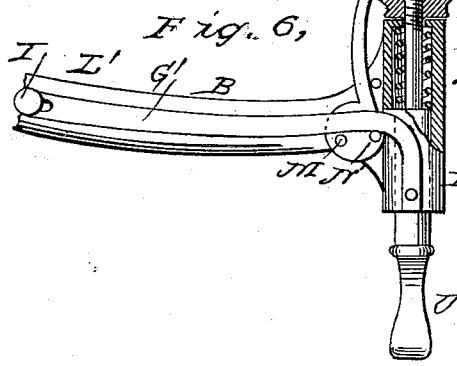


Fig. 6,



WITNESSES:

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INVENTOR:

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2 Sheets—Sheet 2.

W. A. SUTTON.

Sewing Machine.

No. 29,202. Patented July 17, 1860.

Fig. 3.

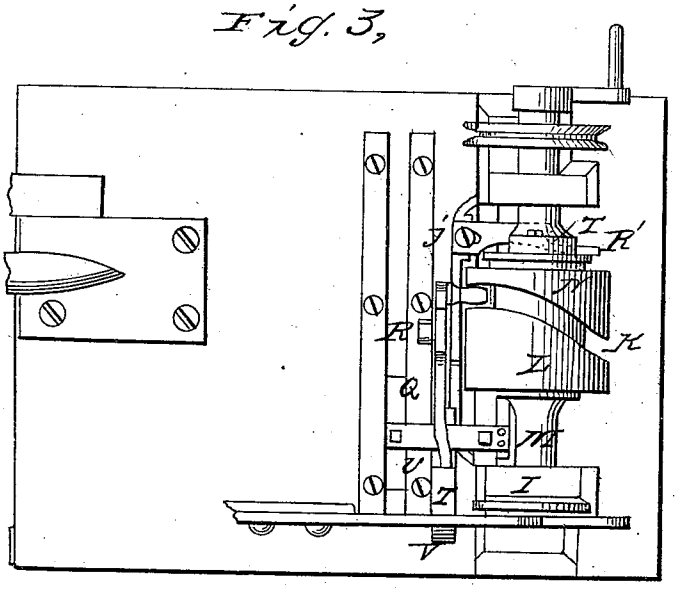


Fig. 7.

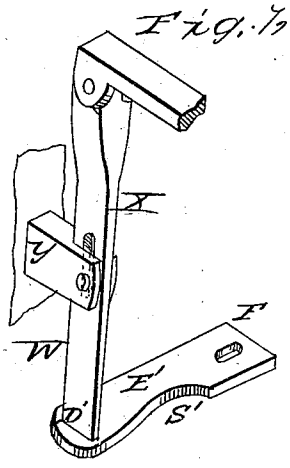
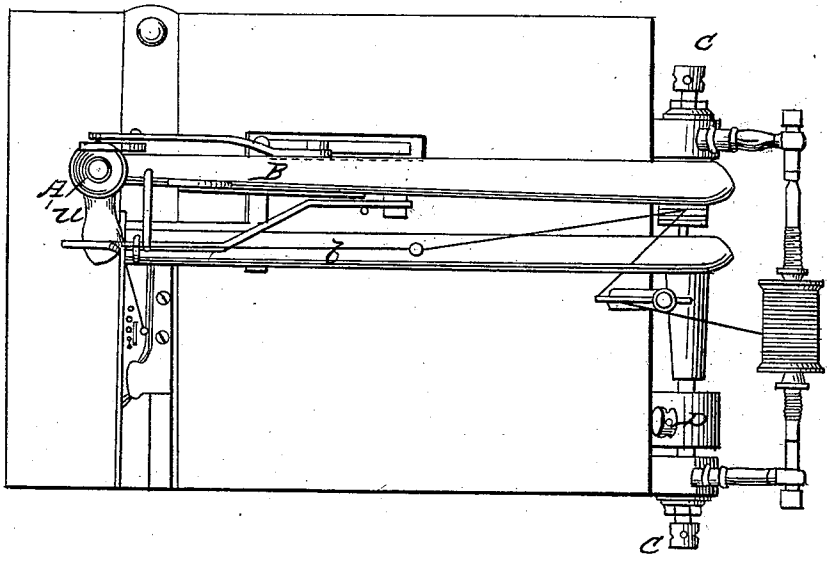


Fig. 4



WITNESSES:

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INVENTOR:

Wm. A. Sutton

UNITED STATES PATENT OFFICE.

WM. A. SUTTON, OF NEW YORK, N. Y.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **29,202**, dated July 17, 1860.

To all whom it may concern:

Be it known that I, WILLIAM A. SUTTON, of the city, county, and State of New York, have invented a new and useful Improvement in Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side view of a sewing-machine constructed with my improvements. Fig. 2 is a rear view. Fig. 3 is a bottom view. Fig. 4 is a top view of the machine. Fig. 5 is a longitudinal section through the cam. Fig. 6 is a side view of and partial section through the needle-carrier, and Fig. 7 a view of a portion of the feed device.

Similar letters of reference in each of the several figures indicate corresponding parts.

One of the main objects of my invention is to produce a shuttle-machine which shall combine simplicity of construction and lightness with great efficiency, so that it may do the finest work as well as the heaviest—such as sewing thick cloth or leather—with ease and without noise, or putting undue strain on any of its component parts without using gearing (which makes machines heavy and produces a very objectionable noise) or adding any more parts than what would be required if the machine were to do only light work. I obtain the necessary leverage for performing the heaviest kind of work by placing the driving-shaft P near the front end of the machine and extending the lever D from the rock-shaft C, which operates the needle-carrier, forward. This arrangement of the driving-shaft allows also the cams which operate the cloth-feeder and shuttle-driver to be placed right underneath and close to both these devices, according to the principle that in machinery the driving-power should be applied as near to the work to be performed as possible, thereby insuring simplicity of construction and diminishing the liability of parts to get out of order. The outer end of the driving or cam shaft P carries a disk, I, with an eccentric pin, H. This pin works in a slot, E F G, (of peculiar shape, hereinafter to be described,) in the forward end of the lever D, which latter is fastened to the rock-shaft C at its rear end. The rock-shaft is provided with an arm, *b*, to the forward end of which the needle is fastened in the usual manner. When the driving-shaft P is revolved in the direction of the arrow in Fig. 1, the eccentric pin H, working in the slot E F G backward and forward, imparts to this end of the lever D a vertical reciprocating motion, and by means of rocker shaft C and needle-carrier arm *b* a similar movement is imparted to the needle. The slot and eccentric pin are so arranged that by the time the pin is at the foremost end of the slot, and consequently the leverage actuating the rock-shaft C greatest, the needle enters the cloth. Besides, in consequence of the direction *y y* of that portion E F of the slot through which the pin moves while the needle descends being (in the position shown in Fig. 1) oblique to a mathematical line, *x x*, connecting the center of the pin H and the rock-shaft, the descent of the lever end, and consequently of the needle, will be quite rapid, while the pin H moves from F to E much more so than what it would be if the direction of the part E F of the slot were coincident or nearly coincident with line *x x*, which represents the lever D. By this means the needle-carrier is made to acquire an additional momentum by the time the pin H arrives at the end E of the slot and the needle-point. It will be understood that these two causes (the lengthening of the leverage and increase of momentum) coming simutaneously into play while the needle descends toward the cloth, the needle is made to enter and pass through the cloth with great force; and for this reason my machine does the heaviest work with the same ease as light work. The portion F G of the slot is an arc the radius of which is equal to the radius of the circle the pin H describes, and is so arranged as to coincide with this circle when the pin H has reached the point F in its return from E to F. Thus the lever D and needle-carrier will stand still while the pin moves through the slot upward from F to G. The cam L K N, operating the shuttle-carrier, as will be described hereinafter, is arranged upon shaft P, in combination with and in such relation to the eccentric pin H and slotted end of lever D that the shuttle is made to pass through the needle-thread loop while the pin H passes upward from F to G, and the needle stands still in its lowest or nearly its lowest position, as above set forth. While the pin H passes through the slot from G to F the needle is made to ascend until at its

greatest height above the cloth, ready for the next descent, as will be understood from the drawings.

The cam T′ and pin R′, which operate the cloth-feeding device, as will be described hereinafter, are arranged upon shafts P in such relation to the eccentric pin H and slotted end of lever D that the feeder is made to move the cloth forward, while the eccentric pin moves through that portion of the slot E F G which corresponds to the position of the needle above the cloth. By thus constructing and arranging the rock-shaft lever and its slotted end, the eccentric pin, the driving-shaft, and the cloth-feeding and shuttle-driving devices in relation to each other, as above described and represented in the accompanying drawings, I obtain a simple, effective, and easily-working shuttle-machine suitable for the lightest as well as heaviest work. The slotted end of the rock-shaft lever D is a separate piece attached to the main lever by two clamp-screws, as shown in Fig. 1. The screws have sufficient play in the holes in the slotted piece through which they pass to allow of that nice adjustment in relation to the eccentric pin which is required to insure the perfect working of the parts and compensate for the wearing of the slot. It will be understood that such an adjustment is absolutely necessary, as it would be impossible for any workman to make the slot in the end of a long lever and fix the lever on the rock-shaft with such accuracy that it would be exactly in its true position. When the slot is too much worn, a new slotted piece can be substituted without altering or removing the main lever D. It will be understood that the eccentric pin will work the easier in the slot the greater the eccentricity of the pin and the longer the slot is, according to a well-known principle which applies to all similar movements. The smaller the eccentricity of the pin and the shorter the slot is the harder will the mechanism work and the greater will be its wear, while at the same time the wear and consequent change of form of the slot would have the more effect toward destroying the true working of the mechanism the smaller the slot is. This is a self-evident fact which needs no further demonstration. To obtain a considerable eccentricity of the pin H, and corresponding length of the slot, the slotted end of the lever must be as far from the fulcrum of the lever as possible, and in this respect the arrangement of the shaft P near the forward end of the machine, as above described, is of the greatest advantage.

The shuttle-driving cam is made in two parts, L N, so as to form a cam-groove between them. The two parts L N are attached to the cam-shaft by means of clamp-screws *r r*, as seen in Fig. 5, so that they can be set nearer together or farther apart for the purpose of adjusting the cam-groove properly and compensating for its gradual wearing.

The lower end of a lever, Q, pivoted to the frame of the machine at R, is provided with a pin which works in the cam-groove. Thus the lever Q receives the reciprocating motion necessary for moving the shuttle-carrier S backward and forward, which latter is connected to the upper end of the lever Q by means of a hinge, T. By thus hinging the lever to the shuttle-carrier the sliding friction (which would be consequent upon letting the lever end work in a slot in the shuttle-carrier) is done away with, and there is only rotary friction in the pivot-holes V U. As, according to the laws of mechanics, the coefficient for rotary friction is considerably smaller than for sliding friction, my hinged shuttle movement will work with greater ease and less expense of power than any other shuttle movement which is attended by sliding friction.

The cloth-feeder is attached to the middle portion of a horizontal bar, Z. One end of this bar is slotted, as seen at B′, which slot plays over a pin, C′, projecting from the frame of the machine. Its other end is pivoted to the upper end of an upright lever, W. This lever has a variable fulcrum consisting of a slot, X, through which a fulcrum-pin, Y, extends, which is fastened to a bracket extending from the frame of the machine. The lower end of lever W is formed into a pivot, which fits loosely in a hole in the forward end of a bearer, E′, the rear end of which is pivoted to the frame of the machine at *j*, so as to form a kind of universal joint. One end of this arm is slightly curved, as seen at S′. The forward end of arm E′ rests upon a cam, T, upon driving-shaft P. A pin, R′, projects from the cam T′. As the shaft P revolves, the raised portion of cam T′ raises the forward end of arm E′, and with it the lever W, the fulcrum-slot X permitting such a motion of the lever. Thus the bar Z will be raised, the pin C′ serving as its fulcrum, and the feeder will be caused to press the cloth upward against the pressure-pad U′. The cam T′ is arranged in relation to the slotted end of rock-shaft lever D and eccentric pin H so that the cloth will be held tight between the feeder and pressure-pad in the manner just described while the stitch is being performed. By the time the needle withdraws from and rises above the cloth the pin R′ strikes the curved edge S′ of the arm E′, so as to push the front end of the arm, and with it the lower end of lever W, to one side. The upper end of the lever, and with it the bar Z and the cloth-feeder, moves a corresponding distance to the other side, and the slot B′ allowing of such a movement of the bar Z. Thus the cloth is fed forward. The pin R′ is arranged in such relation to the cam T′ that the pin will slip off the edge of the arm E′, and thus allow the cloth-feeder to return to its original position after the raised portion of the cam T′ has passed from underneath the forward end of the arm E′ and the cloth-feeder has dropped down and relieved the cloth from its pressure. By this means the cloth-feeder is made to be in contact with the cloth only while moving forward for the purpose of feeding the cloth. The return motion of the

feed device is caused by a spring, *l*, pressing against the slotted end of bar Z. The set-screw A′ serves to adjust and limit the lateral or feed motion of the feeder, as will be understood from the drawings.

The advantage of pivoting the lower end of the feed-lever W to arm E′, instead of operating it directly by the cam T′, as is usual in other sewing-machines, consists in the fact that the lever thus arranged is not exposed to the twist in its fulcrum which would be likely to result if the lever were directly operated upon by the cam.

The pressure-pad U′ is arranged upon the lower end of a vertical shaft which fits into and has vertical play in the hollow end A of the arm B of the frame of the machine. The shaft is pressed downward by a spiral spring in the hollow A, as represented in Fig. 6. The bent end of a lifting-lever, G′, is pivoted to that shaft at H′, while the other end of this lever is made with a slot, L′, through which latter extends a fulcrum-pin, I′. The lifter N′ is provided with a handle, P′, is pivoted at M′, and has a pin, O′, arranged at some distance from the center M′. The lever G′ rests upon this pin O′, and by operating the handle the pin is made to rise, and thereby the forward end of the lever G′, and with it the pad U′, can be lifted. By means of the fulcrum-slot L′ the lever G′ is free to move backward while its forward end (pivoted to the shaft of the pressure-pad) is lifted, and thus the simple lever, without any additional hinge or other complication, is made to answer all the requisites of the lifting device.

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

Combining a rocking lever, D, which has a curved slot, E F G, near its forward end, with the eccentric pin H upon cam-shaft P, which latter is arranged near the front end of the machine, underneath and near the shuttle and the cloth-feeder, with the cams L K N T′, pin R′, hinged shuttle-driving device Q T, and cloth-feed mechanism E W Z, substantially as and for the purposes set forth.

WM. A. SUTTON.

Witnesses:
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