

(No Model.)

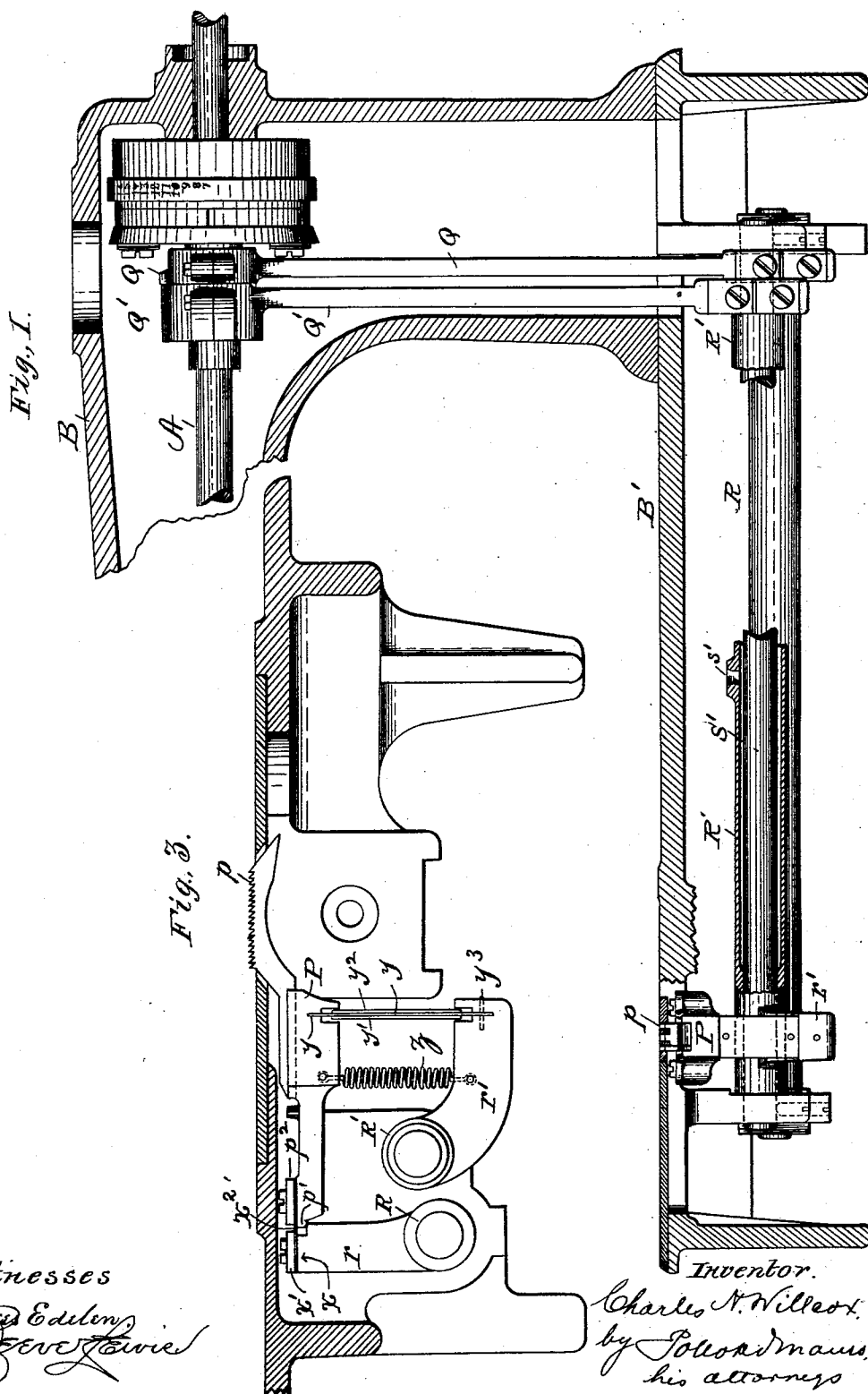
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C. H. WILLCOX.

FEED MECHANISM FOR SEWING MACHINES.

No. 572,039.

Patented Nov. 24, 1896



Witnesses
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

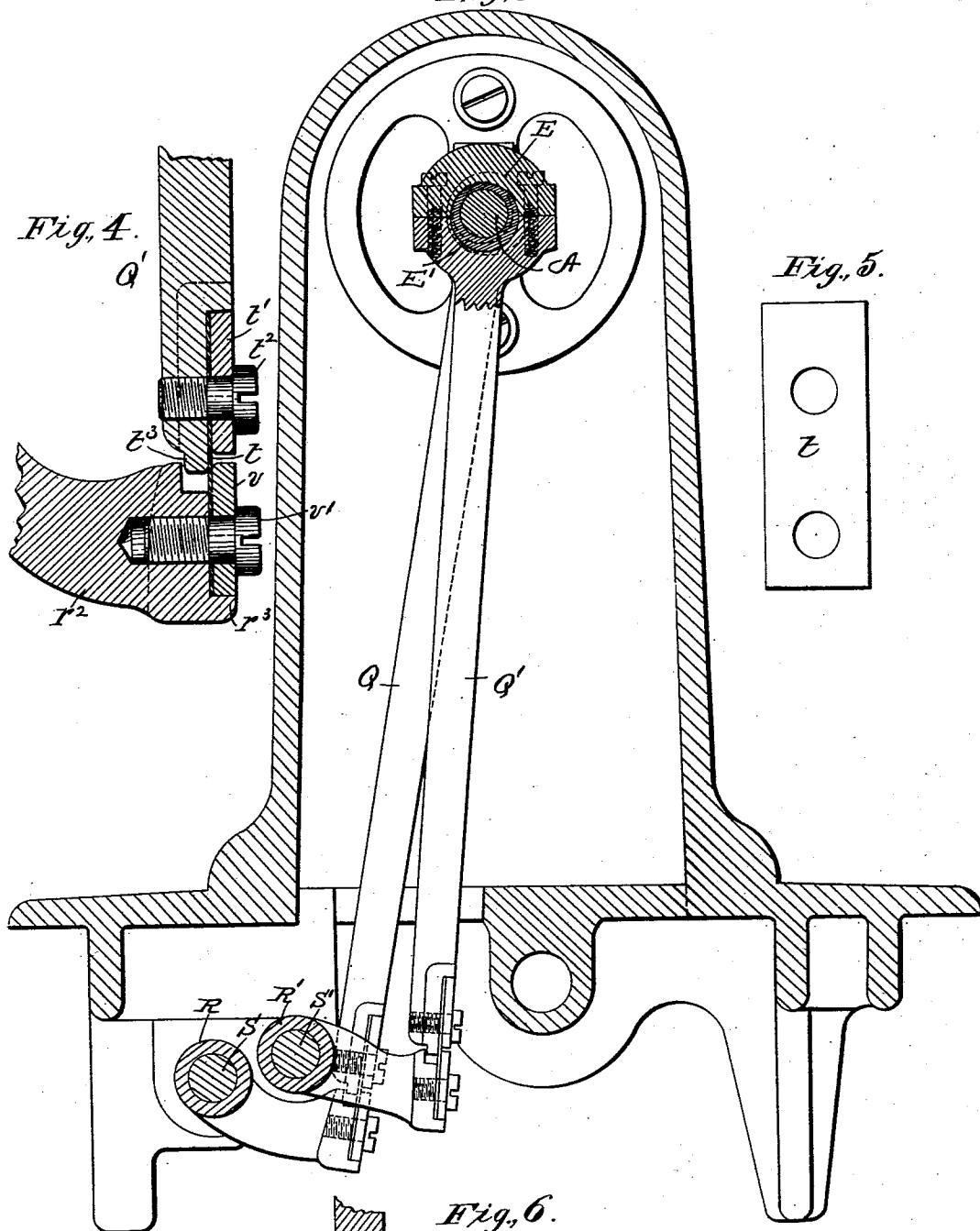


Fig. 4.

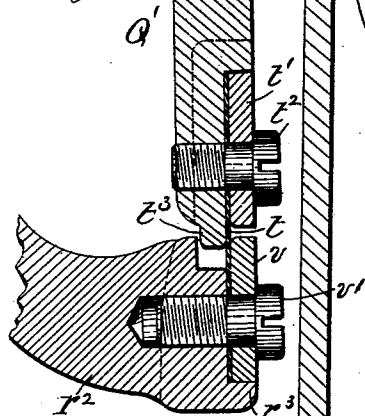


Fig. 5.

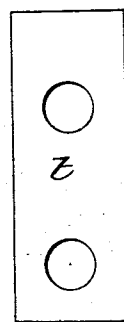
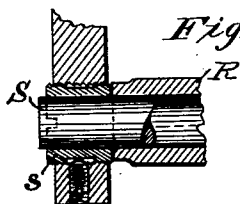


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES H. WILLCOX, OF NEW YORK, N. Y., ASSIGNOR TO THE WILLCOX & GIBBS SEWING MACHINE COMPANY, OF SAME PLACE.

FEED MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 572,039, dated November 24, 1896.

Application filed August 10, 1895. Serial No. 558,851. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. WILLCOX, of New York, N. Y., have invented new and useful Improvements in Feed Mechanism for Sewing-Machines, which improvements are fully set forth in the following specification.

This invention relates more particularly to sewing-machines which operate a feed-bar under the throat-plate from a main shaft in the gooseneck or overhanging arm through eccentrics on the main shaft, vertical connecting-rods, and horizontal rock-shafts under the work-plate.

Reference may be made to the feed mechanism described in Letters Patent No. 413,699, granted October 29, 1889, to the Willcox & Gibbs Sewing Machine Company, which show feed mechanism of the type to which the present invention relates. It will, however, be understood that the improvements herein described, or some of them, may be used in feed mechanisms of any approved type.

Heretofore the different elements of the feed-actuating mechanism which move relatively to each other in changing the direction of the transmitted motion have been connected together by means of journal-pins or pivots, so that one part moves upon the other. In connections of this sort wear is inevitable and lost motion is a consequence. This it is very desirable to avoid, both to save the cost of replacing the worn parts and to avoid the effect of the lost motion upon the action of the feed, the feed movement being so slight that a small amount of wear produces a perceptible effect.

According to the present invention the relatively-movable elements of the feed-driving mechanism are connected together by flexible spring-joints, so that there is no wear and consequently no lost motion. Thus the lower end of the pitman connects with the crank on its rock-shaft through a broad flat spring, and the rock-shaft is connected with the feed-bar by a similar flexible joint, the slight oscillatory movement being permitted by the resiliency of the spring, which is sufficiently rigid lengthwise to impart without loss the thrust and pull of the connected elements. Preferably the joints are formed by a tongue on one of the connected elements entering a

slight distance into a groove in the other element, the spring projecting from the end of the tongue into a slit cut in the bottom of the groove. These rigid parts protect the spring from breaking or buckling under the end thrust and from undue deflection, but do not interfere with the necessary vibration.

The feed rock-shafts are in the form of long sleeves having bearings upon inclosed rods, which are supported at their ends in bushings tapped into depending brackets on the frame of the machine. These bushings constitute the end bearings of the rock-shafts, holding the latter from endwise displacement. They are screwed into threaded sockets, permitting endwise adjustment in the initial assembling of the machine to bring the feed-surface into exact relation with the needle-hole plate and other parts.

In the accompanying drawings, which form part of this specification, Figure 1 is a front elevation, partly in section, of a sewing-machine, which may be otherwise of any ordinary or suitable description, provided with a feed mechanism constructed in accordance with this invention, certain parts of the machine not germane to the present invention being omitted. Fig. 2 is a vertical section of said machine through the standard of the hollow arm. Fig. 3 is an elevation, partly in section, of the feed mechanism at the operating end of the machine. Fig. 4 is an enlarged detail in section of the joint between one rock-shaft crank and its driving-pitman. Fig. 5 is a detail of the spring forming the joint, and Fig. 6 is a detail of the end bearing of one of the rock-shafts.

In its general principle and mode of operation the feed mechanism shown and described is similar to that of Patent No. 413,699, already referred to.

The main shaft A turns in bearings of the overhanging arm B. The feed-surface *p* is on the four-motion feed-bar P, and the latter receives its horizontal or back-and-forth movement from an eccentric E and its rising-and-falling movement from an eccentric E', both these eccentrics being on the main shaft of the machine. The connections to the feed-bar are from the eccentric E through pitman Q to rock-shaft R, and from a vertical crank-

arm r on the forward end of the latter to the feed-bar by a flexible connection hereinafter described, and from eccentric E' through pitman Q' to rock-shaft R' , and from an approximately horizontal crank-arm r' thereon to the feed-bar.

Rock-shafts R R' are long tubes or sleeves surrounding each a rod S S' , fixed in sockets formed by hollow bushings s in the frame beneath bed-plate B' , Fig. 6. The bearings for the rock-shafts are near the ends of these rods, the latter between the bearings being reduced in diameter, forming annular chambers through which oil spreads in both directions to the bearings from the oil-holes s' , placed about midway of the rock-shafts. In this way the oil is supplied all around the bearing; but this arrangement for oiling the bearings of the hollow rock-shaft is not claimed herein, not being of my invention.

It is necessary in assembling the machine to adjust the feed-surface p relatively to the openings in the throat-plate with great nicety. For this purpose the bushings s , which constitute the end bearings of the rock-shafts, are screw-threaded exteriorly and tapped into threaded sockets, Fig. 6. By turning the bushings in one direction or the other the desired adjustment can be effected with accuracy. As the amount of adjustment will in any case be very slight, it will suffice that one only of the rock-shafts be provided with the adjustable bushings.

The connections between the pitman Q Q' and rock-shafts R R' and between the latter and the feed-bar will now be described.

Figs. 4 and 5 show in detail the construction of the flexible connection between the pitman Q and its rock-shaft R , the connection of the other pitman and rock-shaft being of the same construction. At the lower end of the pitman and projecting beyond the same is a broad but thin spring t , attached to the pitman by a clamp-plate t' and a screw t'' , passing through the clamp and through a perforation in the spring into the side of the pitman. The crank-arm r^2 of shaft R has a shoulder r^3 , against which the end of the spring rests, and a flat face against which the spring is clamped by a clamp-plate v and screw v' . The ends of the spring are thus held between rigid surfaces on the two connected parts, respectively, leaving between them a small portion of the spring, which gives the joint its flexibility. The spring is in the direct line of the thrust and pull of the pitman, and therefore, though of very thin metal and bending readily in a transverse direction, it transmits the reciprocating movement of the pitman and stands the strain without incurring wear. In a word, it is rigid in the direction of the reciprocating movement of the pitman, and therefore avoids lost motion, but is highly flexible in the transverse direction, and therefore readily accommodates itself to the slight relative changes of position between the connected parts which occur during their operation.

Owing to the fact that the spring lies in the plane of the reciprocating movement which it transmits and to the further fact that it is clamped at both ends between clamping devices which approach closely to each other, leaving only a short length of the spring exposed, the latter is effectually protected from buckling and from injury during the running of the machine, and the joint possesses great durability. As an additional safeguard a tongue t^3 is formed on one of the connected parts, entering a groove in the other part, and as the spring lies along one side of this groove it is reinforced for practically its entire length and protected from undue deflection in handling the parts when assembling the machine. There is sufficient clearance between the tongue and groove to permit the bending of the spring as the connected parts change their relative positions. The joints at the other end of the rock-shafts, between them and the feed-bar, are constructed on the same principle and call for little additional explanation.

Arm r on the feed-advancing shaft R has a shoulder x at its upper end, which shoulder, with the overhanging clamp-plate x' , forms a groove, the spring x^2 being clamped between this plate and the top of arm r . The adjacent end of feed-bar P has a tongue p' entering this groove and a clamp-plate p^2 . There are two joints between arm r' on the feed-lifting shaft R' and the forward end of feed-bar P . These are formed by a single spring y , clamped between two plates y' y^2 and projecting beyond them at its ends, which enter grooves formed in arm r' and bar P , respectively, and extend into slits in the bottoms of these grooves. The lower end of the spring is fastened to arm r' by a pin y^3 , but the feed-bar simply rests on the upper end of the spring by its own weight. To supplement gravity and insure that the parts do not separate when the crank-arm moves downward, a spiral tension-spring z is attached at its opposite ends to the bar and arm, respectively.

It is obvious that in matters of detail the constructions specified may be varied without departing from the spirit of the invention, and that some of the improvements may be used without others.

Having now particularly described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a feed mechanism for sewing-machines, the combination with a feed-eccentric and its shaft, and with the feed-bar, of connecting mechanism for transmitting motion from the former to the latter including a rock-shaft in the form of a tube or sleeve having bearings upon a rod extending through the same and secured at its ends in the frame of the machine, substantially as described.

2. In a feed mechanism for sewing-machines, the combination with the feed-bar of a rock-shaft for imparting motion thereto, said shaft being in the form of a tube, a rod extending through said shaft and having

bearings therefor, and bushings in the frame supporting the ends of said rod and constituting end bearings for the rock-shaft, said bushings being adjustable in their supports in the line of the shaft, substantially as described.

3. The combination with the feed-bar, of a rock-shaft for reciprocating said feed-bar, and a joint or connection between the shaft and bar formed by a flat spring rigidly attached at its respective ends to the two connected parts, said spring being in the line of the transmitted motion so as to be practically rigid in such line and flexible transversely substantially as described.

4. The combination with the feed-bar of the feed-advancing rock-shaft, and the feed-lifting rock-shaft, each of said shafts being jointed to said bar by means of a flat spring secured at its ends to the two connected parts respectively, the spring being in each case in the line of the transmitted motion and practically rigid in such direction while flexible transversely thereto, substantially as described.

5. The combination with the feed-bar, of driving mechanism for vibrating said feed-bar, the elements of said driving mechanism being jointed together by means of flat springs disposed in the line of the transmitted motion so as to be rigid in that direction but flexible in the transverse direction, substantially as described.

6. The combination with the feed-bar, a rock-shaft for vibrating the same, and a feed-

eccentric, of a pitman receiving motion from said eccentric, a flat spring attached firmly at one end to said pitman and disposed in the line of its reciprocating movement and at the other to a crank-arm on said rock-shaft, substantially as described.

7. The combination with the feed-bar, of driving mechanism comprising two elements connected by a joint formed of a flat spring held at its ends between clamping-surfaces on the respective elements, the two pairs of clamping-surfaces approaching to within a short distance of each other, substantially as described.

8. In mechanism for transmitting vibratory motion, the combination with a reciprocating element, such as a pitman, and an oscillatory element, of a flat spring forming the connection between the two, said spring being held at its ends between clamping-surfaces on the respective elements, one of said elements having a tongue and the other a groove into which the tongue slightly enters, the intermediate portion of the spring between the opposite clamping-surfaces being inclosed by the walls of said groove, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHAS. H. WILLCOX.

Witnesses:

J. PARMLY,
S. BORTON.