(No Model.) 3 Sheets—Sheet 1.

C. H. WILLCOX & J. E. A. GIBBS.

FEED MECHANISM FOR SEWING MACHINES.

No. 354,590. Patented Dec. 21, 1886.

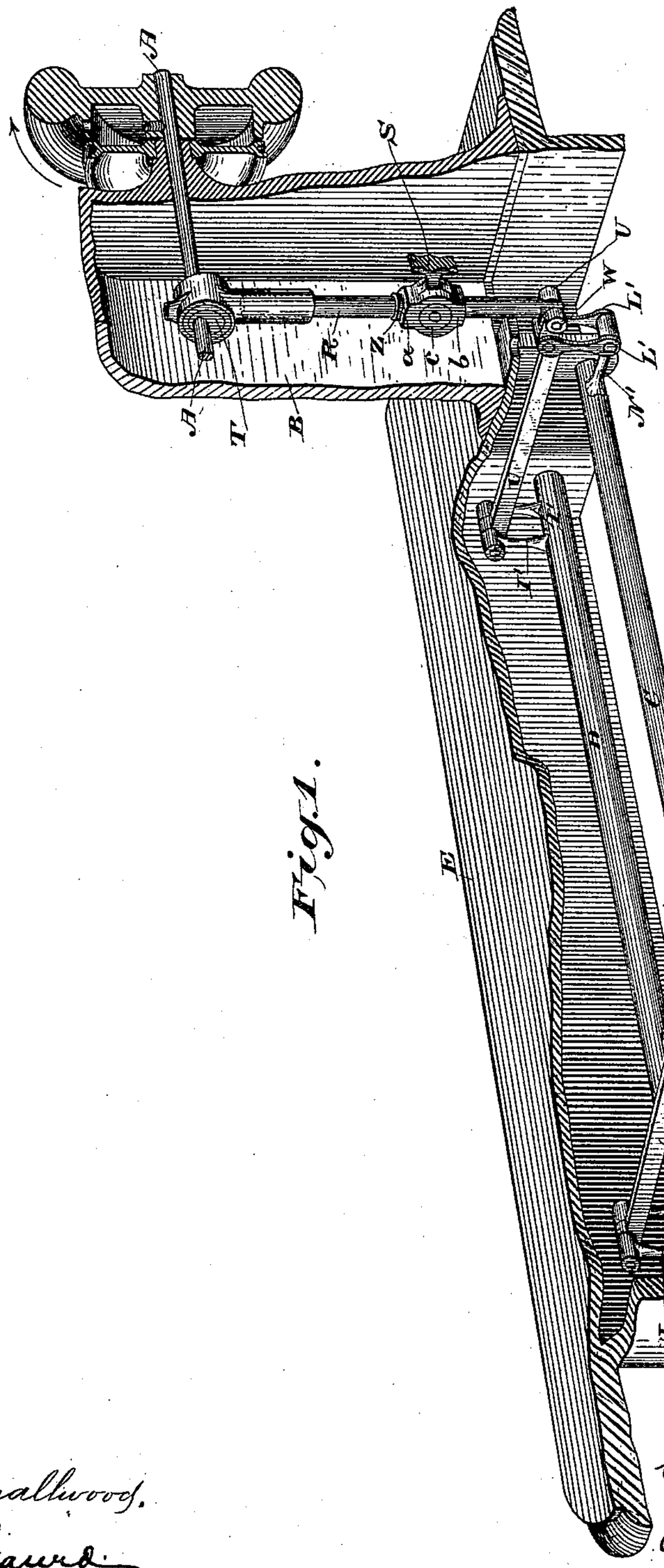

Fig. 1.

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Philip Pollock

Inventors.
Charles H. Willcox and
James E. A. Gibbs
by A. Pollock
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(No Model.) 3 Sheets—Sheet 2.

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FEED MECHANISM FOR SEWING MACHINES.

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Fig. 2.

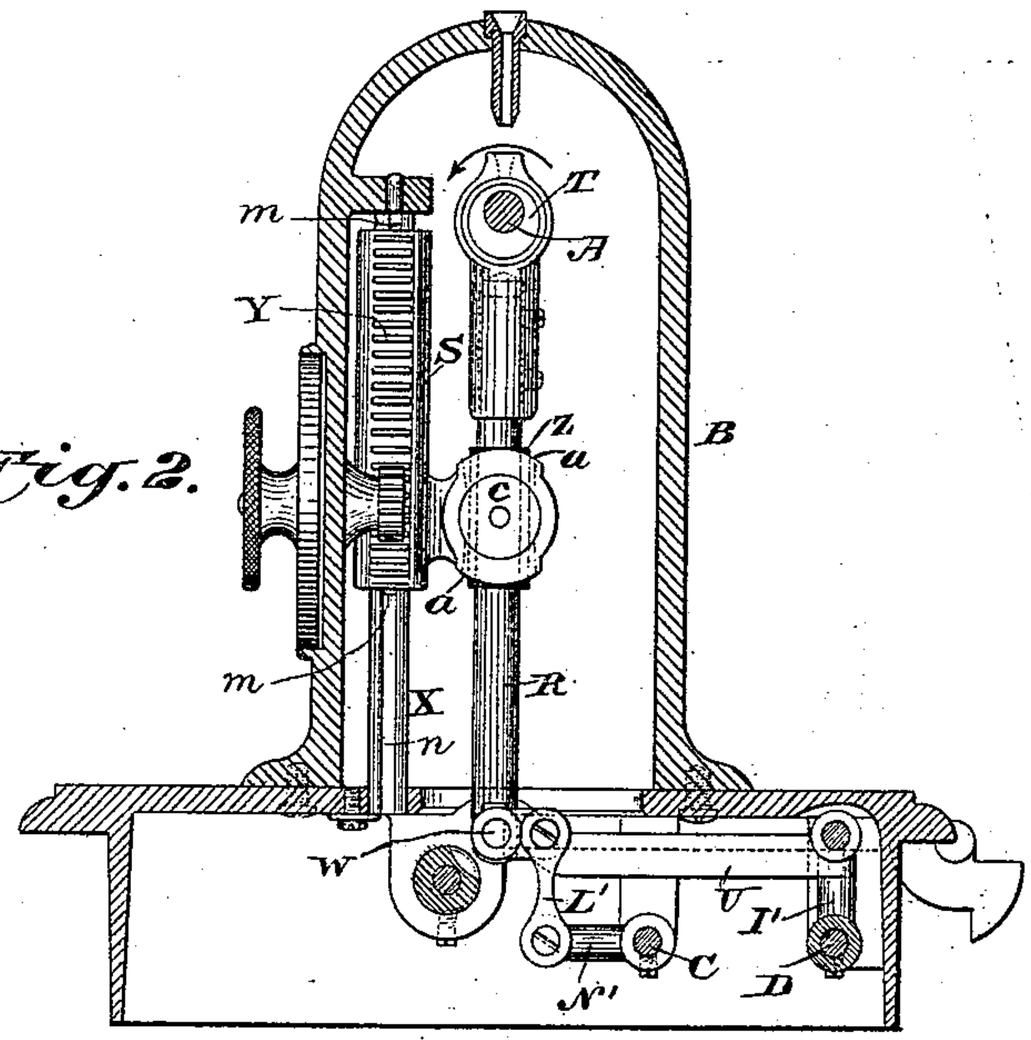


Fig. 3.

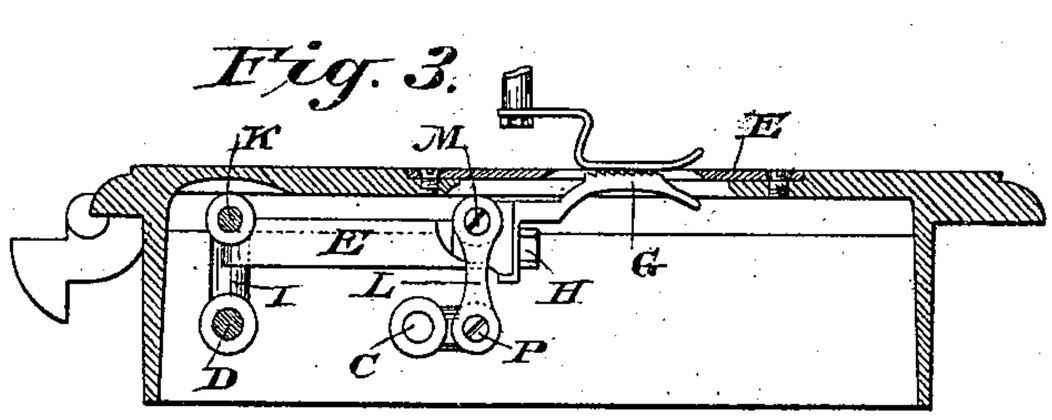


Fig. 4.

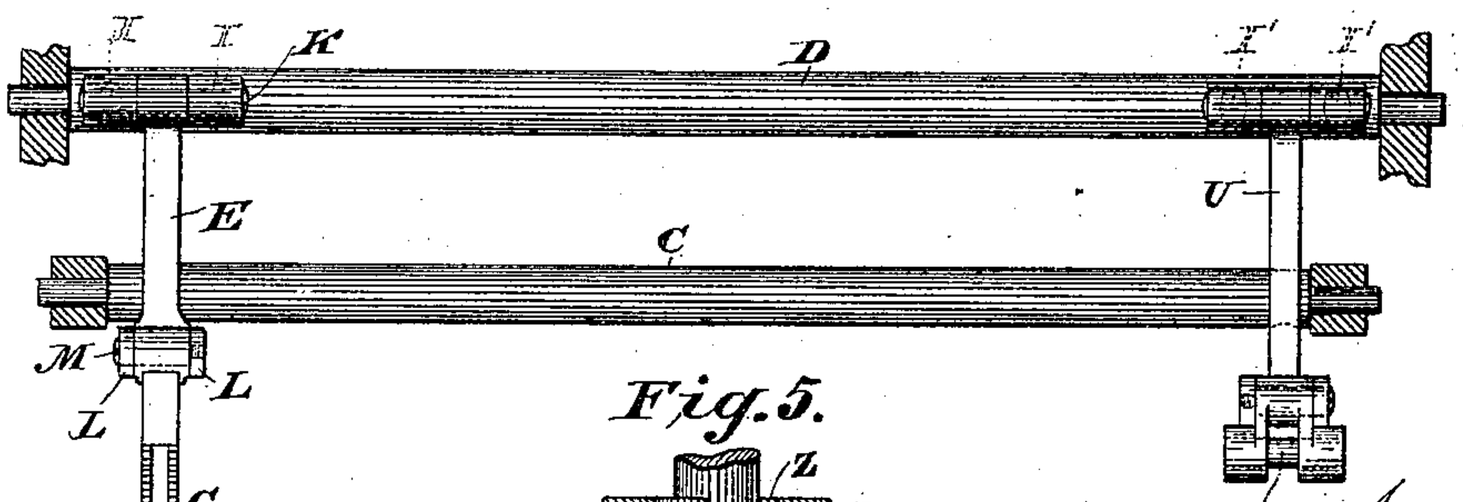
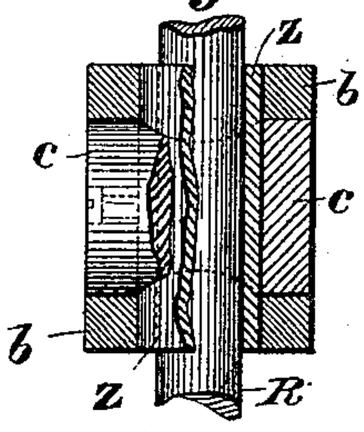


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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FEED MECHANISM FOR SEWING MACHINES.

No. 354,590. Patented Dec. 21, 1886.

FIG. 7.

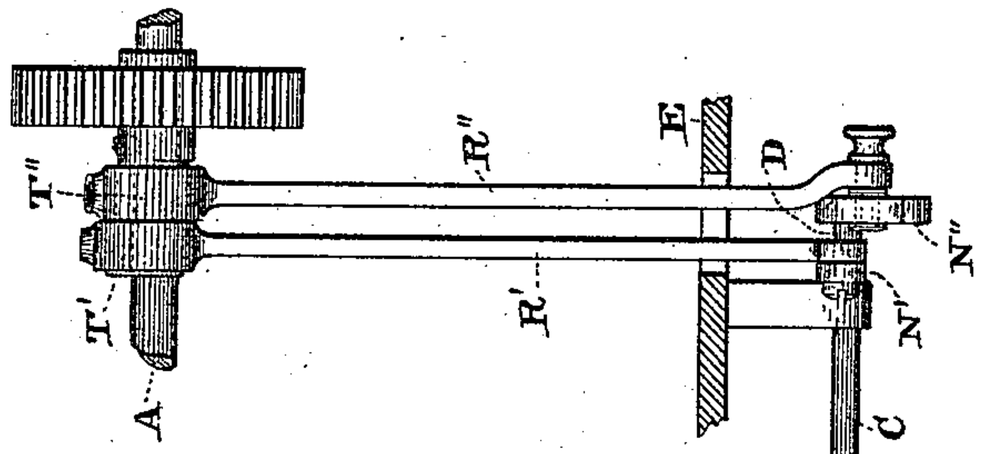


FIG. 8.

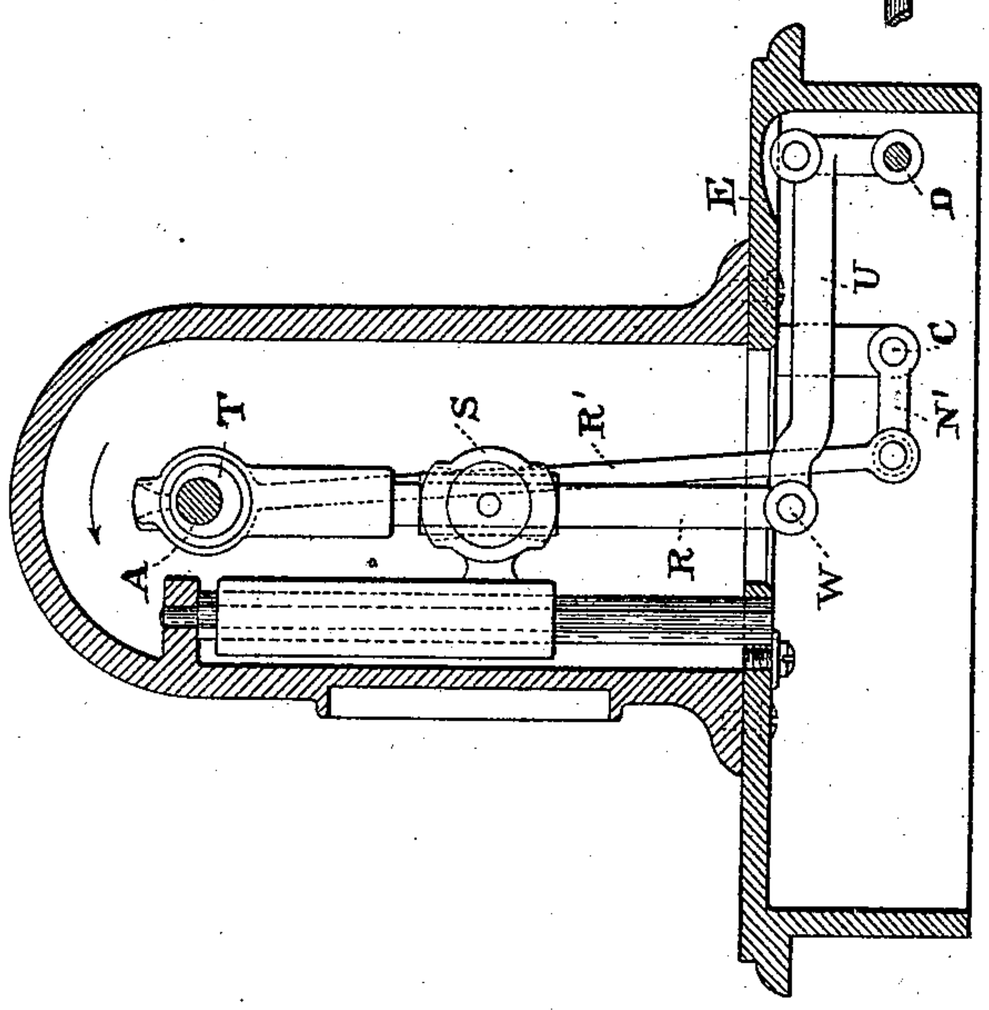
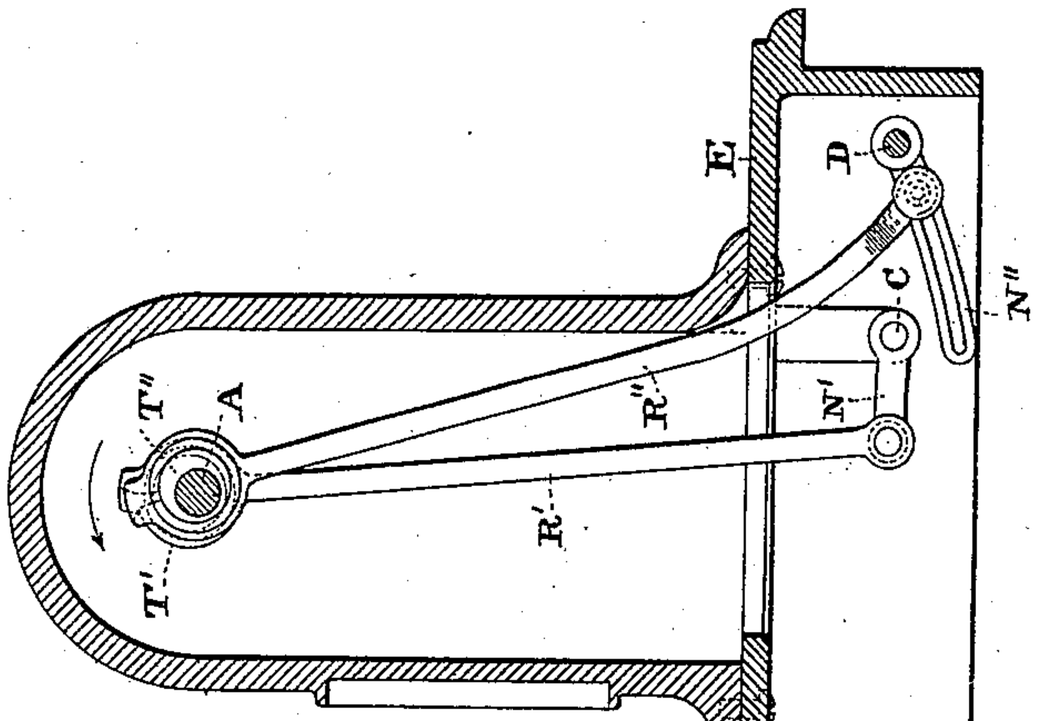


FIG. 6.



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Inventors:

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James E. A. Gibbs

By A. Pollok atty.

UNITED STATES PATENT OFFICE.

CHARLES H. WILLCOX, OF NEW YORK, N. Y., AND JAMES E. A. GIBBS, OF RAPHINE, VIRGINIA, ASSIGNORS TO THE WILLCOX & GIBBS SEWING MACHINE COMPANY, OF NEW YORK.

FEED MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 354,590, dated December 21, 1886.

Application filed July 31, 1883. Serial No. 102,438. (No model.)

To all whom it may concern:

Be it known that we, CHARLES HENRY WILLCOX, of New York city, in the county and State of New York, and JAMES E. A. GIBBS, of Raphine, in the county of Rockbridge and State of Virginia, have invented a new and useful Improvement in Feed Mechanisms for Sewing-Machines, which improvement is fully set forth in the following specification.

This invention relates more particularly to that class of feed mechanism in which the motions are conveyed from an eccentric on the main shaft in the goose-neck or stationary arm of the machine to a feed-bar under the cloth or work plate; but it may be used in whole or in part in other feed mechanisms, whether the feed-bar derives all its motions from a single eccentric or from more than one eccentric.

It has for its object to produce a very light-running high-speed machine which shall be durable, or not liable to excessive wear.

The first part of the invention is confined to feed mechanism in which both the rise and fall of the feed-bar and its back-and-forth movements are derived from a single eccentric; and it consists in an arrangement of devices whereby the motion of the eccentric for raising and lowering the feed-surface is reduced in transmission to the feed-bar, so that the stroke of the eccentric is greater than the rise and fall of the feed-surface, and is or may be equal or nearly equal to the back-and-forth motion of the feed-bar for the longest stitches. When the throw of the eccentric is not materially greater than the rise and fall of the feed-bar, it is necessary either to make the latter excessive with a consequent waste of power and increase of wear at the bearings, besides the difficulty which would arise from limited space under the throat-plate, or to multiply the stroke of the eccentric in order to secure a sufficient feed in sewing long stitches, the multiplication being attended with an increased strain and wear on the eccentric and a greater disturbance to the operation on account of such wear.

The second part of the invention consists in supporting and operating the feed-bar or carrier for the feed-surface by means of two rock-shafts, which, being vibrated, impart to said bar or carrier the one a back-and-forth movement and the other a rise and fall. The vibrations are of course so timed as to give to the feed-surface the proper succession of motions. The feed-bar is preferably jointed at one end to an upright arm of one rock-shaft, and at the other is supported by a link jointed to a horizontal arm of the other rock-shaft. This part of the invention is independent of the particular devices employed to vibrate the rock-shafts, since it is obvious that various devices could be used for that purpose. For the sake of distinction the rock-shaft for imparting the back-and-forth movement to the feed-bar will be hereinafter called the "feed-advancing" shaft, the other the "feed-lifting" shaft.

The third part of the invention consists in vibrating the feed-advancing shaft by means of a lever having a shifting fulcrum and connected by a link or connecting-rod to an upright arm on said shaft. This part of the invention is independent of the specific means for vibrating the feed-lifting shaft.

The fourth part of the invention consists in connecting the two rock-shafts with the same lever, so that one eccentric imparts through said rock-shafts all the four motions to the feed-bar.

The invention further comprises certain particular constructions and combinations of parts, as hereinafter particularly pointed out.

The accompanying drawings represent feed mechanism constructed in accordance with the invention, Figure 1 being a perspective; Figs. 2 and 3, views of opposite ends in sectional elevation; Fig. 4, a plan, and Fig. 5 a detail view. Figs. 6, 7, and 8 are views of mechanism for vibrating the rock-shaft, in which two eccentrics are employed instead of a single eccentric, as in the former.

The main shaft A turns in bearings in the stationary arm or goose-neck B of the machine. The rock-shafts C D, which are parallel to each other and to the main shaft A, are journaled in bearings below the cloth or work plate E, and extend nearly the full length of the machine from the standard of the goose-neck to the throat-plate. The feed-advancing shaft D is placed near the rear of the work-plate, the

feed-lifting shaft between it and the middle line of the plate. The feed-bar F, to the front end of which the feed-surface G is fastened by the bolt H, is supported at its rear end by and between the vertical arms I of shaft D by means of a journal-pin, K, on which it is free to turn, and at its front end is upheld by the link L, which embraces the feed-bar, and is connected with the same by a journal-pin, M, passing through the feed-bar and capable of turning freely therein, and which at the bottom embraces the end of the horizontal arm N of shaft C, and is connected therewith by the journal-pin P.

At their opposite ends, which are below the standard of the goose-neck, the shafts C D are connected with the lower end of a vertical feed-lever, R, which has its fulcrum in the slide S, and at its upper end carries a strap encircling the eccentric T on the main shaft. The vertical lever and the slide are within the hollow of the arm or goose-neck.

The feed-advancing shaft D is connected with the feed-lever by means of a horizontal rod, U, which at its rear is jointed to and supported by the vertical arms I′, and at its front end is forked and embraces the flattened end of the lever, and is connected therewith by the journal-pin W. A vertical link, L′, similar to link L, connects the end of the horizontal arm N′, of the shaft C with the horizontal rod U, and through it with the feed-lever. The effective length of the arm N′ is, as shown, nearly double that of arm N. The slide S surrounds and is guided by the rod X, which is fixed to the machine-frame. It is adjusted by a pinion engaging a rack, Y, on the side of said slide. The slide is held by friction in the position to which it may be adjusted. The friction is obtained by a flat spring, *m*, confined between the slide and rod in the groove *n* in said rod. The feed-lever (the lower part of which is cylindrical) passes freely through the sleeve Z, which fits the feed-lever inside, and is contained within a recess, *a*, in the bracket *b*, attached to and forming part of the slide S. This sleeve passes through and is fixed in the cylinder *c*, which fits within cylindrical recesses in the bracket *b*, and forms the journals of the sleeve Z. The recess *a* is enlarged at top and bottom, as shown in Fig. 2, so that the sleeve may vibrate on its journals.

The main shaft being turned in the direction of the arrow, the eccentric vibrates the feed-lever, and also reciprocates it vertically. The vertical reciprocation is constant, and is conveyed to the feed-bar F and feed-surface G, carried thereby, through the feed-lifting shaft C, its arms N′ N, and links L′ L. The arm N′ being longer than the arm N, the vertical stroke of the feed-lever, which is the same as the throw of the eccentric, is greater than the rise and fall of the feed-surface. The vibration of the feed-lever, which is varied at will by shifting the fulcrum-slide up and down, imparts a back-and-forth movement to feed-bar F through the connecting-rod U, feed-advancing shaft D, and its arms I′ I. The links L L′, owing to the joints at the ends, do not interfere with the transmission of motion to the feed-advancing rock-shaft. The feed-bar F and connecting-rod U, being connected by journal-pins with arms I I′, do not interfere with the rocking of the feed-lifting shaft.

As shown, the eccentric is of such size that its throw is about equal to the longest stitch which it would be desirable to make, so that the motion of the eccentric would ordinarily be reduced in both directions in operating the feed.

The parts of the machine not shown are or may be such as shown and described in Letters Patent No. 239,998, dated April 12, 1881, the new feed mechanism being substituted for that shown therein, or such as shown and described in our application for improvement in sewing-machines filed of even date herewith, officially numbered 102,437; or they may be of any ordinary or suitable construction.

The mechanism is applicable as well to shuttle machines, chain-stitch and other machines, as to rotary-hook lock-stitch machines.

Portions of the invention may be used separately. For example, the two rock-shafts being connected with the feed-bar, as described, it is evident that each could be vibrated by an eccentric, T′ T″, Figs. 6 and 7, respectively on the main shaft, through a connecting-rod, R′ and R″, respectively jointed at its lower end to a horizontal arm, N′ N″, respectively, on the rock-shafts; also, that the feed-lifting shaft could be vibrated by such means, (see Fig. 8, wherein the mechanism for vibrating the feed-lifting shaft is lettered as in Figs. 6 and 7,) while the feed-advancing shaft is operated from an eccentric, T, through a feed-lever, R, with shifting fulcrum. In Fig. 6 the arm N″ is slotted, and the journal-pin at the lower end of the rod R″ is adjustable in the slot, in order to regulate the feed movement, and so other changes could be made.

The length of the rock-shaft will be proportioned to the distance of the eccentric to the side of the feed-bar.

We wish it distinctly understood that the means for operating the rock-shafts shown in Fig. 6 are not equivalents for or a modified form of the operating means in the other figures; also, that an arrangement employing two eccentrics is not an equivalent for or modification of the arrangement employing a single eccentric. On the contrary, the operating mechanism employing the feed-lever of the other figures, and also that employing a single eccentric, as shown in Figs. 1 and 2, has special advantages, and is made the subject of special claims, which do not include the arrangements shown in Fig. 6, or which do not include the arrangements of either Fig. 6 or of Figs. 7 and 8. These figures (to wit, 6, 7, and 8) are given to illustrate how separate use

may be made of a part of the invention, which in its entirety is illustrated in Figs. 1 to 5.

Having now fully described our said invention and the manner in which the same is or may be carried into effect, what we claim is—

1. The combination, with a feed-bar, of an eccentric having a throw greater than the rise and fall of the feed-bar, and reciprocatory mechanism connecting said eccentric with the feed-bar, for giving to the latter both a rising-and-falling and a back-and-forth movement, said mechanism comprising means—such as lever-arms of unequal length, the longer arm connected with the eccentric, the shorter arm with the feed-bar—whereby the throw of the eccentric is reduced in giving the rise and fall to said feed-bar, substantially as described.

2. The combination, with the feed-lifting and the feed-advancing rock-shafts, of a feed-bar supported wholly thereby, having one end pivoted to a vertical arm of the feed-advancing shaft and the other connected with a horizontal arm of the feed-lifting shaft by a link pivoted at its upper end to the feed-bar and at its lower end to said arm, substantially as described.

3. The combination, with the feed-lifting and feed-advancing rock-shafts, each journaled in stationary bearings, and the feed-bar connected with said shafts, of an eccentric, an upright feed-lever whose upper end encircles said eccentric, the connecting-rod between the lower end of said feed-lever and an arm of the feed-advancing rock-shaft, and the adjustable fulcrum at an intermediate point on said feed-lever, substantially as described.

4. The combination of the single eccentric, feed-lever, feed-lifting and feed-advancing rock-shafts, feed-bar, and connections whereby said eccentric imparts the four motions to said feed-bar through said rock-shafts, substantially as described.

5. The combination, with the single feed-eccentric, the feed-lifting and feed-advancing rock-shafts, and the feed-bar, of connections through which and the said rock-shafts both a back-and-forth and a rising-and-falling motion are imparted from said eccentric to said feed-bar, said connections comprising lever-arms of unequal length, the longer arm on the side of the eccentric, the shorter arm on the side of the feed-bar, for reducing the motion of the eccentric in transmitting the rise and fall to said feed-bar, substantially as described.

6. The combination of the main shaft turning in bearings in the goose-neck, the single feed-eccentric thereon, the feed-lever engaging said eccentric, the feed-lifting and feed-advancing rock-shafts under the work-plate, both connected with the lower end of said feed-lever, and the feed-bar connected with said rock-shafts, substantially as described.

7. The combination, with the feed-bar, the single feed-eccentric, the feed-lever, the adjustable fulcrum-piece, the feed-advancing rock-shaft, and the connections between it and the said feed-lever and the said feed-bar, respectively, of the feed-lifting rock-shaft having a short arm connected with the said feed-bar and a longer arm connected with the said feed-lever, so as to reduce the motion of the said feed-eccentric in producing a rise and fall of the feed-bar, substantially as described.

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

CHAS. H. WILLCOX.
JAS. E. A. GIBBS.

Witnesses:
PHILIP MAURO,
GEO. T. SMALLWOOD.