(No Model.) 3 Sheets—Sheet 1.

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

FEED MECHANISM FOR SEWING MACHINES.

No. 413,699. Patented Oct. 29, 1889.

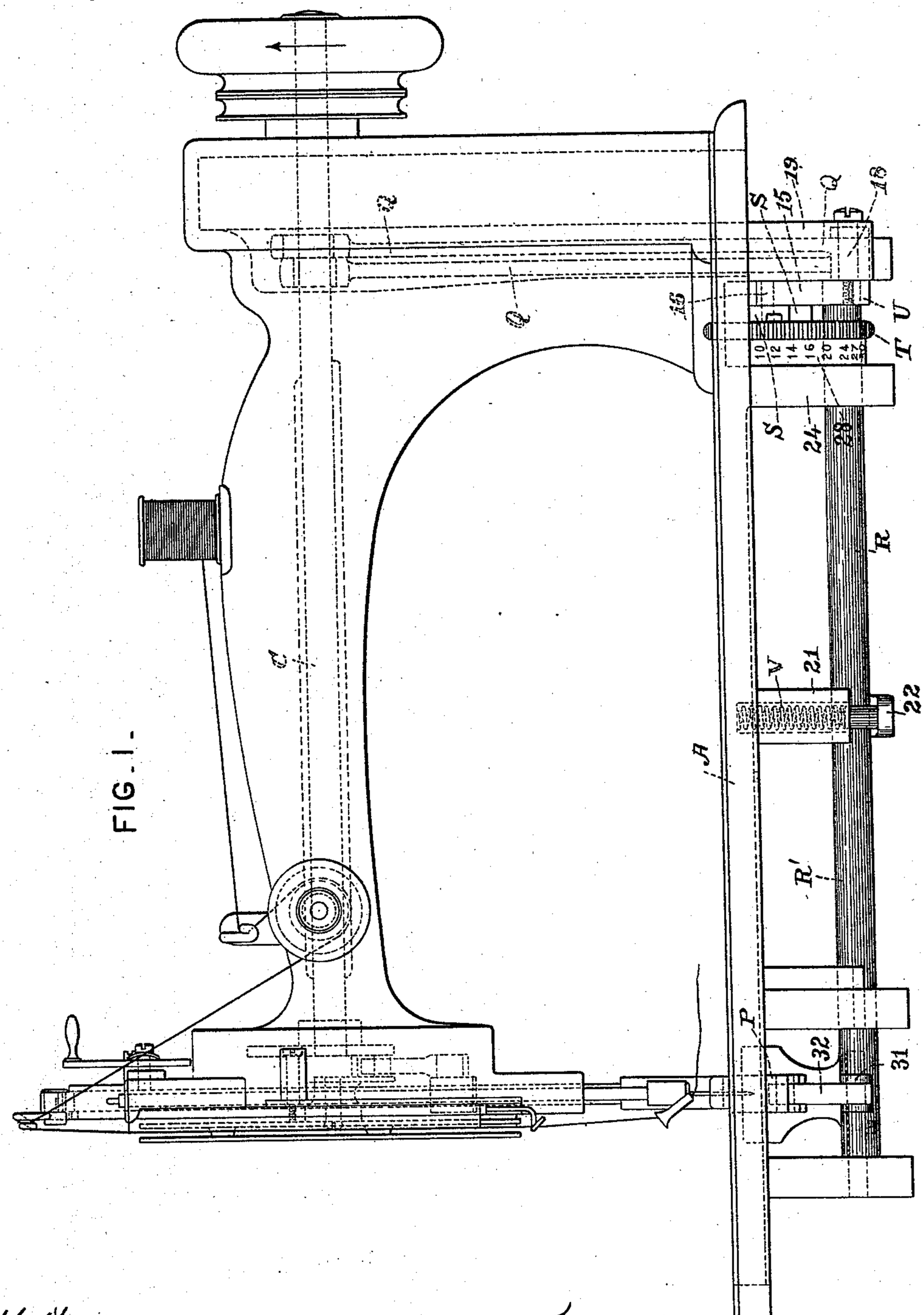

FIG. 1.

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Philip Mauro

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by A. Pollok
their attorney.

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FIG. II.

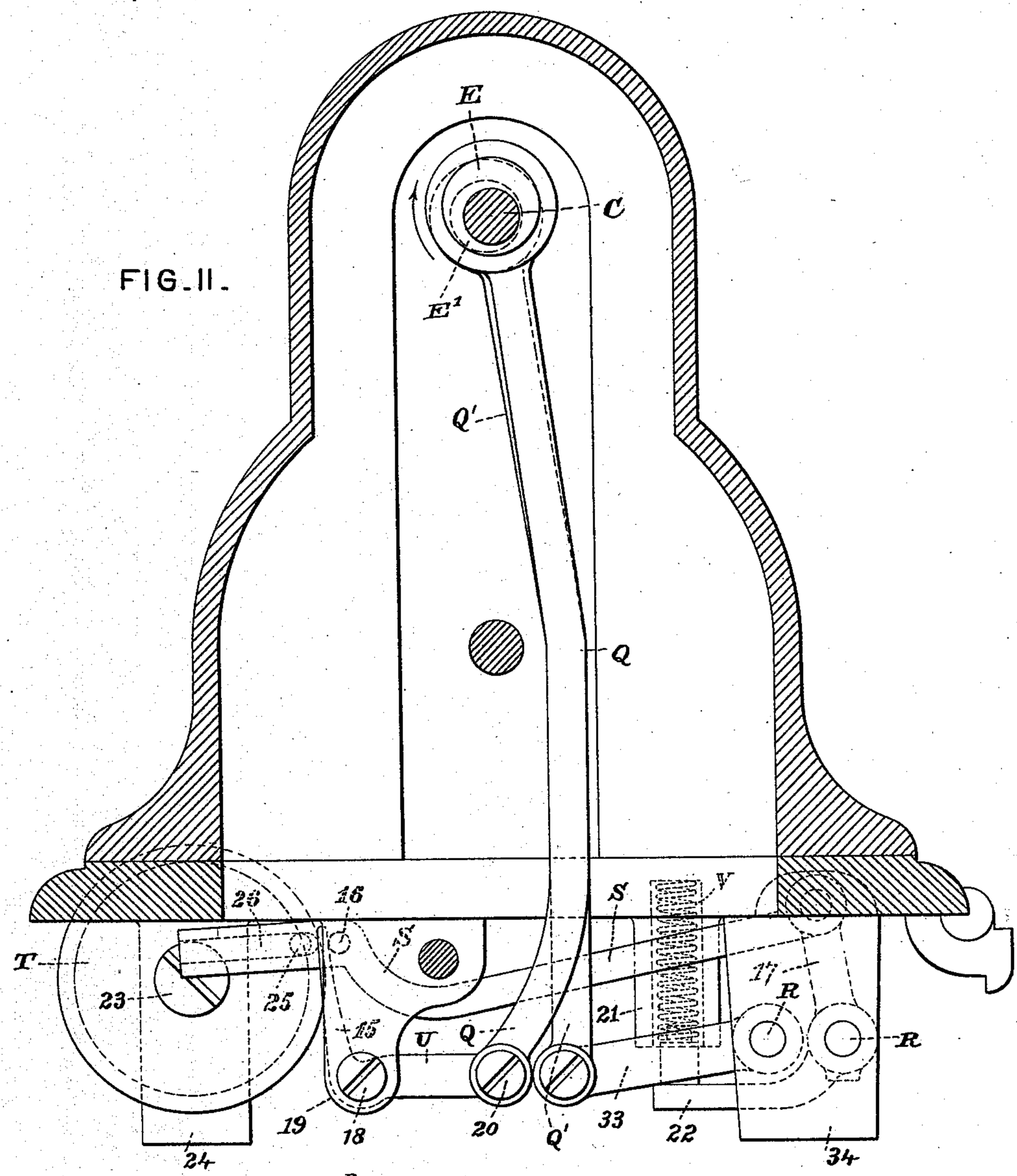

FIG. III.

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FIG. IV.

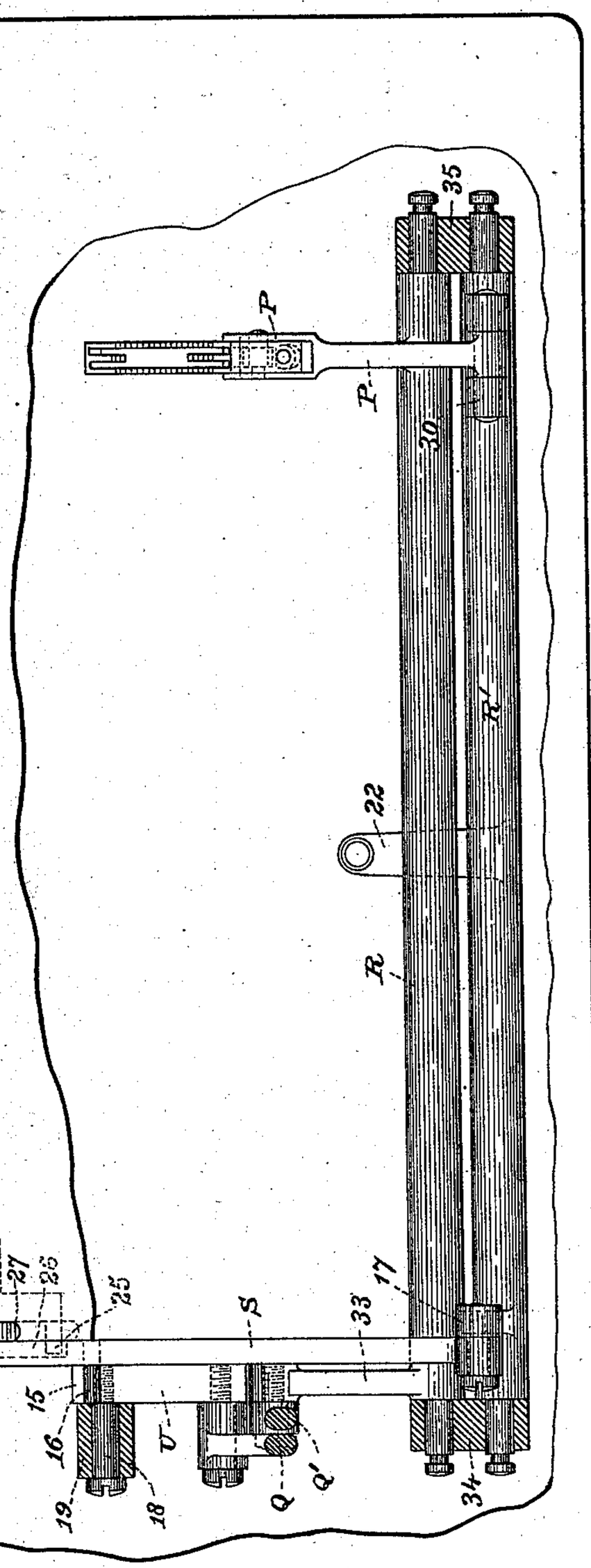
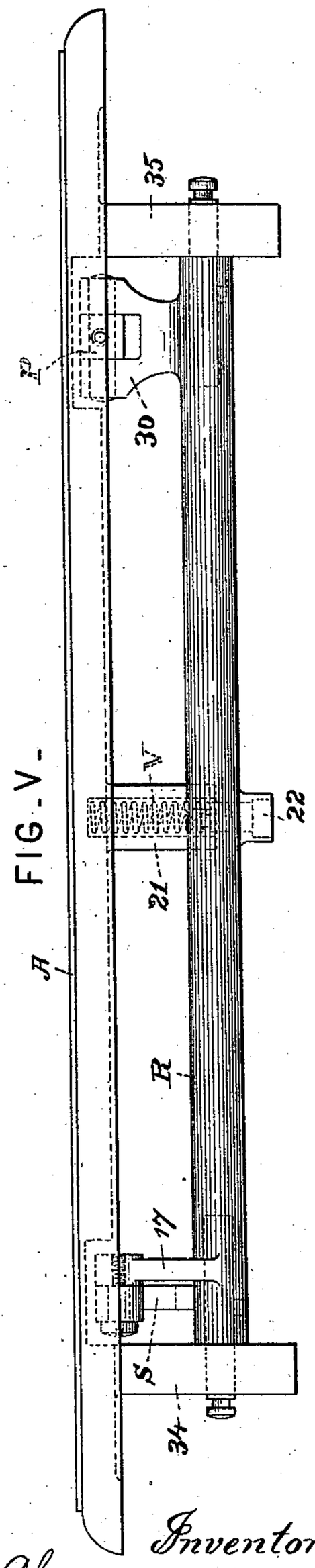


FIG. V.



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Philip Mauro

Inventors
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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, N. Y.

FEED MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 413,699, dated October 29, 1889.

Application filed June 18, 1888. Serial No. 277,454. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. 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 Mechanism for Sewing-Machines, which improvement is fully set forth in the following specification.

This invention relates more particularly to sewing-machines (the form of stitch is not important) which operate a feed-bar under the work-plate from a main shaft in the goose-neck or overhanging arm of the machine through suitable vertical and horizontal connections, and may be considered as an improvement upon that form of feed mechanism described in our patent, No. 354,590, dated December 21, 1886, which employs two eccentrics on the main shaft and two connecting-rods for communicating motion from said eccentrics through two rock-shafts to the feed-bar, one of said eccentrics imparting a rising and falling motion to the feed-surface or operative portion of the feed-bar and the other imparting the forward and backward motion thereto. As described in said patent, the reciprocatory connecting-rod of the last-mentioned or feed-advancing rock-shaft has at its lower end a journal-pin which is adjustable in a slotted arm on said rock-shaft and can be set nearer to or farther from the axis of vibration, so as to impart a greater or less stroke to the feed-bar. This means for conveying an adjustable stroke to the feed-bar is objectionable on account of the inaccessible position of the adjustable reciprocatory piece or journal-pin, through which the motion is conveyed, (the machine having to be turned over to give access to said pin,) and also on account of the mode of retaining it in position, which renders it not easy to adjust and necessitates the stoppage of the machine when an adjustment is to be made.

The present invention, while employing a feed-bar, and rock-shafts under the work-plate, and connections (direct or indirect) for imparting vibratory motion from the main shaft, (or it might be from any continuously-revolving shaft,) provides, in combination with such elements, means for giving an adjustable stroke to the said feed-bar, which can be adjusted readily, and, if necessary, while the machine is running, and which are or may be so placed as to be readily accessible. Said means comprise, in connection with a vibratory arm, first, a reciprocatory piece (particularly a link) provided with a projection, shoulder, or other device in the path of said vibratory arm, so as to be moved by (or to move) said arm transversely to the length thereof for conveying motion between said arm and other parts of the feed mechanism, and adjustable lengthwise of said arm for bringing the said projection, shoulder, or other device nearer to or farther from the axis of vibration, so as to vary the motion conveyed; and, second, a hand-actuated regulator (particularly a crank disk or wheel) mounted (directly or indirectly) on the machine-frame and provided between itself and said reciprocatory piece (or link) with a pin and groove or other joint, whereby the adjustment is effected without interfering with the reciprocation of said link or other piece.

The invention extends to the combination generally of said means with the feed-bar and rock-shafts under the work-plate, and with connections for imparting motion to said feed-bar from the main shaft in the goose-neck (or from a revolving shaft generally) through said means and said rock-shafts irrespective of the precise means of supporting the feed-bar or connecting it with the rock-shafts, of the precise means for conveying motion from the shaft in the goose-neck to the parts under the work-plate, and of the precise arrangement of the vibratory arm aforesaid and the feed-advancing rock-shaft; but the invention specially covers such combination when the vibratory arm is formed on a lever having an arm jointed to a connection-rod by which motion is conveyed thereto from the main shaft in the goose-neck, (or an operating-shaft in general,) and the reciprocatory piece or link is arranged between the said lever and an arm of the feed-advancing rock-shaft, said connection-rod and a second connecting-rod

jointed to an arm of the feed-lifting rock-shaft being operated each by an eccentric on the main shaft or other suitable means, and the feed-bar being supported, as described in said patent, wholly by the feed-advancing and feed-lifting rock-shafts, with 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 vertical link, or being otherwise suitably supported and connected with said rock-shafts. By having the hand-actuated regulator (say the rim of the crank-disk, if this be used,) project through the work-plate (or other suitable part of the machine-frame) it is made accessible, so that the feed-stroke or length of stitch can be adjusted with the greatest readiness.

The following is a description of what is considered the best mode of applying the principle of the invention, reference being had to the accompanying drawings, which form part of this specification.

Figure I is a front view of a sewing-machine, which may be otherwise of any ordinary or suitable construction, provided with a feed mechanism constructed in accordance with the invention, certain parts of the sewing-machine under the work-plate being omitted. Fig. II is a vertical section of such machine through the standard of the goose-neck, looking toward the head of the machine. Fig. III is an end view, partly in vertical section, of the feed mechanism below the work-plate at the operating end of the machine, looking toward the goose-neck. Fig. IV is a plan, partly in horizontal section, showing the feed mechanism below the work-plate; and Fig. V is a back view of the same.

The main shaft C turns in bearings of the goose-neck or overhanging arm of the machine and is driven by a belt on a fast pulley (or it may be by any suitable means) in the direction indicated by the arrow. The feed-surface is on the four-motion feed-bar P below the work-plate A, and is operated from the main shaft through connections, which comprise, among others, the connection-rods Q Q′ and the horizontal rock-shafts R R′. The means for giving an adjustable stroke to the feed-bar P (see Fig. II) consist of the vibratory arm 15, the reciprocatory piece S, provided with a projection 16 in the path of the arm 15 and adjustable lengthwise of said arm, and the hand-actuated regulator T. The rock-shafts R R′ are journaled in pendent bearings 34 and 35 of the machine-frame. As shown, the reciprocatory piece S is in the form of a link, and is arranged between the vibratory arm 15 and the upright arm 17 of the feed-advancing rock-shaft R, the rear end of said link being jointed to the upper end of said arm 17. The vibratory arm 15 forms part of a lever U fulcrumed on a stud 18, which is tapped into the lever, as indicated in dotted lines in Fig. I, and turns in a bearing 19 of the machine-frame, and the connecting-rod Q at its upper end encircles the eccentric E on the main shaft C, and at its lower end is connected by a journal-pin 20 with a horizontal arm of said lever U. As the shaft C rotates, therefore, the eccentric E reciprocates the connecting-rod Q and vibrates the lever U, whose arm 15, acting on the projection 16, moves the reciprocatory piece S and feed-advancing rock-shaft R. The motion thus imparted to the rock-shaft R is in one direction only, as it is preferred to return said shaft by means of a spring. The spring for this purpose is shown at V in the form of a spiral compression-spring set in a hollow boss 21 on the under side of the work-plate A, and interposed between the body of the work-plate and a horizontal arm 22 of the rock-shaft R. The hand-actuated regulator T is shown in the form of a crank-disk mounted on a stud 23, screwed into a projection 24 on the bottom of the machine-frame, and the crank-pin 25 fits in the groove 26 in the front end of the reciprocatory piece or link S. By turning the crank-disk regulator T the pin 25 raises or lowers the reciprocatory piece or link S, so as to adjust the projection 16 lengthwise of the vibratory arm 15 nearer to or farther from its axis of vibration, while it does not interfere with the reciprocation of said piece or link by the said vibratory arm. The adjustment of said projection 16 of course regulates the movement communicated through the piece S to the rock-shaft R. The hand-actuated regulator T is retained by friction in the position to which it may be adjusted. As shown, (see Figs. II and IV,) the edge of the said regulator (which is or may be roughened) projects through an opening 27 in the work-plate of the machine, and there is also a flange 28, with numbers thereon, one of which is exposed through the slot 29, the numbers being so arranged as to indicate the length of stitch (or feed-stroke) determined by the position of the regulator T. The feed-bar P, as shown, is connected with the upright arm 30 of the feed-advancing rock-shaft R through a journal-pin, and with the horizontal arm 31 of the feed-lifting rock-shaft R′ by an upright link 32, and the feed-lifting rock-shaft is vibrated by the connecting-rod Q′, whose upper end encircles the eccentric E′, and whose lower end is connected by a journal-pin with the arm 33 of said feed-lifting rock-shaft R′.

The operation is as follows: The revolution of the eccentric E′ lifts the connecting-rod Q′, and turns the feed-lifting rock-shaft R′ in the direction to lift the feed-surface or operating end of the feed-bar P. The eccentric E next forces down the connecting-rod Q, turning the lever U, so that its vibrating arm, acting against the projection 16, forces the reciprocatory piece S backward and turns the feed-advancing rock-shaft R in the direction to advance the feed-surface, so as to feed the work which has been engaged by the turning of the feed-lifting rock-shaft R′. The eccentric E′ then forces down the connecting-rod Q′ or allows it to fall and turns the rock-

shaft R′ in the direction to lower the fed surface, and finally the eccentric E lifts the connecting-rod Q and turns the lever U, so as to withdraw the vibratory arm 15 and allow the spring V to return the feed-bar P, the feed-advancing rock-shaft R, and the reciprocatory piece or link S. It will be understood that the motions imparted by the two eccentrics E E′ respectively overlap each other—that is to say, the eccentric E commences to advance the feed-surface before the eccentric E′ has finished lifting the same. The effect is to give an elliptical motion to the said feed-surface, The feed mechanism can be used with a shaft turning in either direction. If the arrangement shown is to be employed with a shaft turning opposite to the arrow, the position of the eccentrics E E′ on the shaft C is altered, so as to give the proper lead to the feed-advancing eccentric. The length of stitch (or feed-stroke imparted to the feed-surface) is regulated by turning the regulator T by means of the projecting portion of the rim or otherwise, this action adjusting the projection 16 lengthwise of the vibratory arm 22.

Although the invention is not restricted to the forms and arrangements of the elements as shown, or as described with reference to the drawings, yet it particularly includes these as the best examples or as constituting special features of the invention.

We claim as our invention or discovery—

1. The means for giving an adjustable stroke to the feed-bar, consisting of the vibratory arm, the reciprocating piece or link provided with a projection in the path of said arm and adjustable lengthwise thereof, and the hand-actuated regulator or crank-disk mounted on the machine-frame and provided with a pin-and-groove joint between itself and said reciprocatory piece or link, in combination with the feed-advancing rock-shaft, the feed-bar, the feed-lifting rock-shaft, means for returning the feed-bar, and connections whereby motion is imparted from the main shaft to said feed-bar through said stroke-adjusting means and said rock-shafts, substantially as described.

2. The combination, with the feed-bar, means for returning said feed-bar, and the feed-advancing and feed-lifting rock-shafts connected with said feed-bar, of the lever having a vibratory arm, the reciprocatory piece or link connected with an arm of said feed-advancing rock-shaft, provided with a projection in the path of said vibratory arm and adjustable to shift said projection lengthwise of said arm, the hand-actuated regulator or crank-disk mounted on the machine-frame and provided with a pin-and-groove joint between itself and said reciprocatory piece or link, the connecting-rods jointed one to an arm of said lever and the other to an arm of said feed-lifting rock-shaft, and the eccentrics on the main shaft for said connecting-rods, substantially as described.

3. The means for giving an adjustable stroke to the feed-bar, consisting of the vibratory arm, the reciprocatory piece or link provided with a projection in the path of said arm and adjustable lengthwise thereof, and the hand-actuated regulator, having a portion extending through the machine-frame to the outside thereof and provided inside the said frame with a pin-and-groove joint between itself and said reciprocatory piece or link, in combination with the feed-advancing rock-shaft, the feed-bar, the feed-lifting rock-shaft, means for returning said feed-bar, and the connections whereby motion is imparted to said feed-bar from the main shaft through said stroke-adjusting means and said rock-shafts, 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 to signature of C. H. Willcox:
PHILIP MAURO,
C. J. HEDRICK.

Witnesses to signature of J. E. A. Gibbs:
C. P. BOWMAN,
E. ALEXANDER.