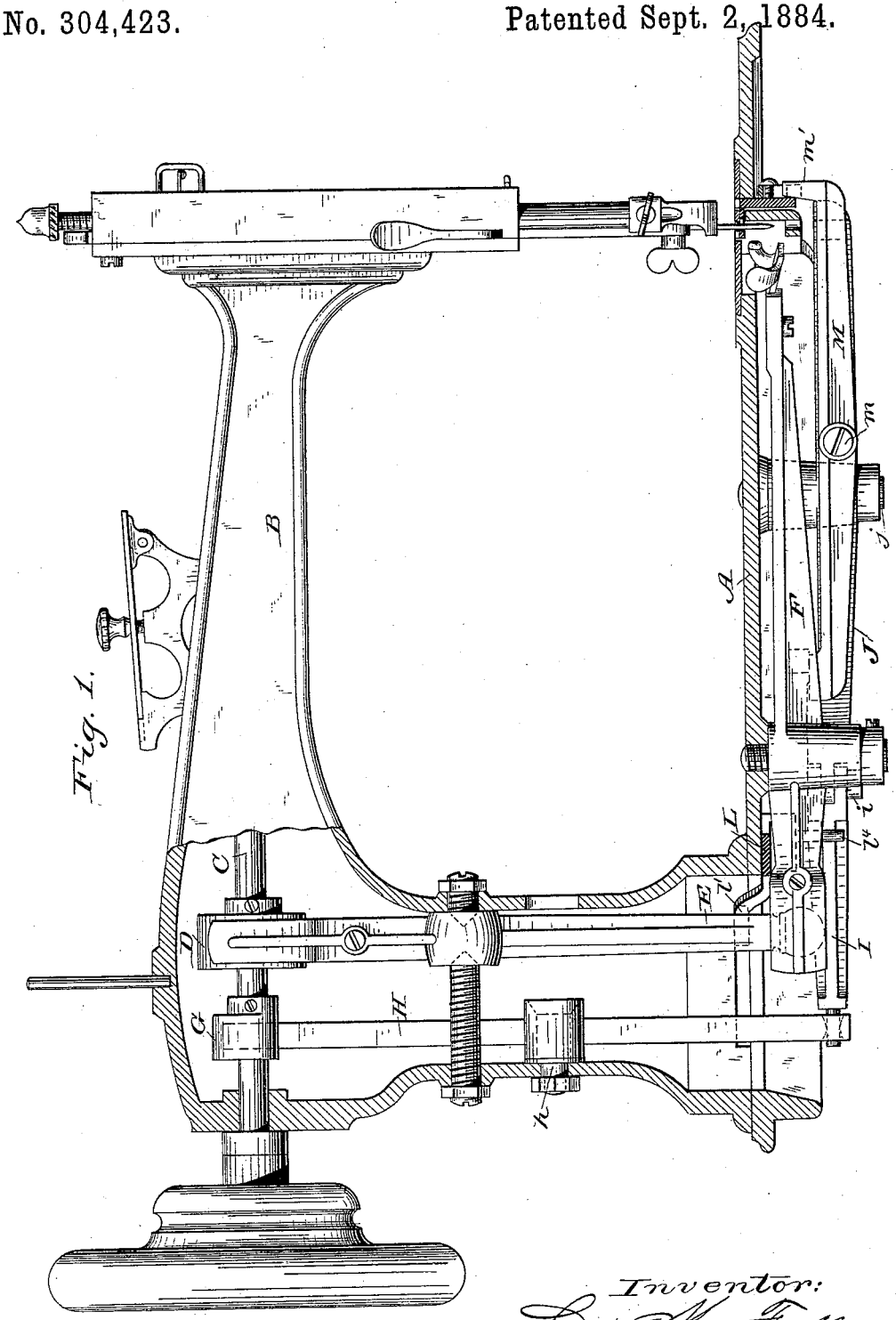
(No Model.) 3 Sheets—Sheet 1.

L. K. FULLER.

FEED OPERATING MECHANISM FOR SEWING MACHINES.

No. 304,423. Patented Sept. 2, 1884.



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(No Model.) 3 Sheets—Sheet 2.

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FEED OPERATING MECHANISM FOR SEWING MACHINES.

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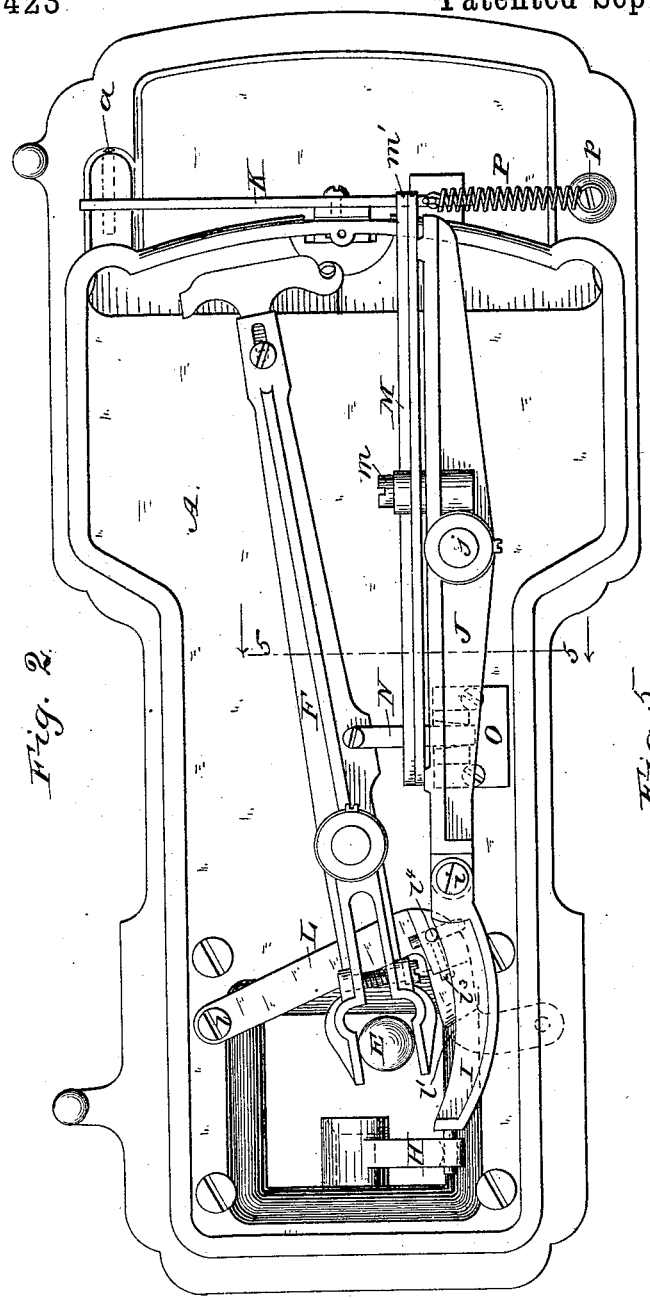

Fig. 2.

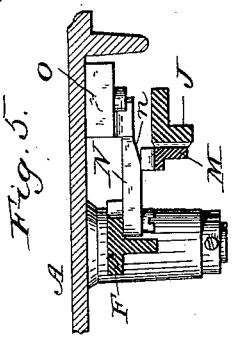

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

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FEED OPERATING MECHANISM FOR SEWING MACHINES.

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Fig. 4.

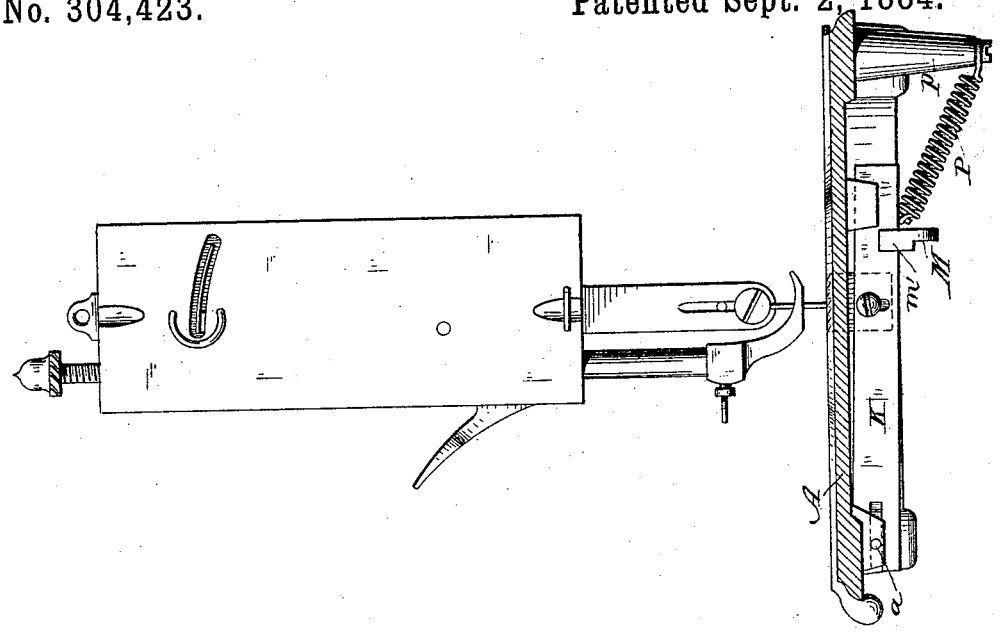
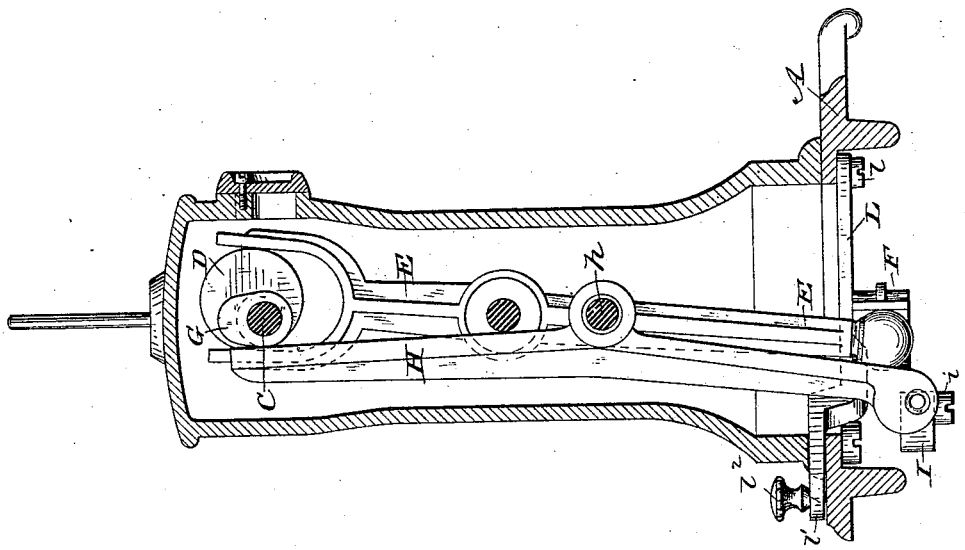


Fig. 5.



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UNITED STATES PATENT OFFICE.

LEVI K. FULLER, OF BRATTLEBOROUGH, VERMONT.

FEED-OPERATING MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 304,423, dated September 2, 1884.

Application filed May 6, 1884. (No model.)

To all whom it may concern:

Be it known that I, LEVI K. FULLER, a citizen of the United States, residing at Brattleborough, in the county of Windham and State of Vermont, have invented certain new and useful Improvements in Feed-Operating Mechanism for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of my invention is to produce a simple and effective feeding mechanism for sewing-machines capable of being easily and conveniently regulated.

In the drawings, Figure 1 is a sectional side elevation of a sewing-machine embodying my invention. Fig. 2 is a bottom plan view of the same. Fig. 3 is a section through the vertical portion of the bracket-arm. Fig. 4 is a front end elevation with the bed-plate in section; and Fig. 5 is a detail sectional view on the line 5 5, Fig. 2, looking in the direction of the arrows.

A indicates the bed-plate, and B the bracket-arm secured thereto in any suitable manner.

C is the driving-shaft journaled in bearings in the horizontal portion of the bracket-arm, and carrying at its forward end the usual appliances for operating the needle-bar.

D is an eccentric secured to the driving-shaft and embraced by the upper forked end of the vertical shuttle-operating lever E, a ball on the lower end of the latter being embraced by a fork on the rear end of the horizontal shuttle-lever F, which is thus operated in a well-known manner.

G is the feed-cam secured to the driving-shaft adjacent to the shuttle-operating eccentric.

H is a vertical feed-operating lever, having its fulcrum on a pin, *h*, secured to the vertical portion of the bracket-arm. The upper end of the lever H bears against the feed-cam G, and its lower end is loosely connected to the rear end of a link-lever, I, the forward end of the latter having a pivotal connection at *i* to the rear end of the main horizontal feed-lever J, pivoted on a stud, *j*, secured to the bed-plate A. The lever J serves to move the feed-bar K horizontally, and for this purpose the forward end of said lever is suitably connected with said bar, as will be presently described.

L is the feed-regulating lever, which is pivoted at *l* (see Fig. 2) to the bed-plate, the free end of said lever having an offset portion, *l'*, projecting through a slot at the base of the bracket-arm. A set-screw, l^2, (see Fig. 3,) tapped through the portion *l* and impinging against the bed-plate, serves to secure the lever L in any position to which it may be adjusted.

Secured to the lever L by a set-screw, l^3, is a bent pin, l^4, which projects downward in contact with the link-lever I, serving as a fulcrum therefor, and rendering the same a lever of the first order. The part of the link-lever I against which the pin l^4 bears is curved, so that the latter will always be in contact with said link-lever in whatever position said pin may be adjusted. Thus by moving the feed-regulating lever L on its pivot *l*, the pin l^4 may be adjusted toward or from the pivotal connection *i* of the link-lever I with the lever J, and as the leverage of the former on the latter will be increased as the said pin recedes from said pivotal connection and decreased as it approaches thereto, it is obvious that a variable horizontal movement may be imparted to the lever J from the lever H by means of the link-lever L and its adjustable fulcrum. In other words the feed, and consequently the length of stitches, will be increased by moving the pin l^4 away from the pivotal connection *i*, and decreased by moving said pin toward said connection.

M is the auxiliary or lifting lever, connected by a pivot, *m*, to the main horizontal feed-lever J, and having, preferably, at its forward end a projection, *m'*, entering a recess in the feed-bar K. The feed-bar is thus supported at one end on said lever M, its opposite end being slotted to embrace a pin, *a*, passing through one of the guides for the feed-bar in a well-known manner. As the lever M is pivoted to and carried by the lever J, the horizontal movements of the latter will be communicated to the former, which thus serves, by means of its connection with the feed-bar, to transmit the horizontal movements of the lever J to said bar. To move the lever M vertically for the

purpose of lifting the feed-bar a slide, N, pivoted to the shuttle-lever F, and provided with a cam or incline, *n*, is arranged to engage with the rear end of the lever M, said incline being so placed as to engage the said lever at the proper moment to raise the feed-bar, while the thicker horizontal part of said slide will hold the lever stationary until it is time for the feed-bar to be lowered. The free end of the slide N is guided in a recess formed in a projection, O, secured to or formed integral with the bed-plate A. A spring, P, preferably secured to the feed-bar K and to a lug or post, *p*, on the bottom of the bed-plate A, serves to move the feed-bar downward and backward, and by means of the above-described connection of the feed-levers M and J with the feed-bar said levers are respectively moved downward and backward by the stress of said spring. The force of the said spring communicated through the lever J and link-lever I to the lever H also serves to hold said link-lever in contact with its fulcrum-pin and the upper end of the said lever H in contact with its operating-cam G.

Although I have shown and described the main horizontal feed-lever as being connected with the feed-bar through the auxiliary feed-lever, it will be understood that these levers may be separately and independently connected with said feed-bar, if desired. It will also be obvious that my feeding mechanism may be rendered positive throughout by providing the upper end of the vertical feed-lever with a fork or yoke to embrace the feed-cam by forming the link-lever I with an inclosed slot for the adjustable fulcrum-pin *i* to move in, by making the slide N with inclines on its upper and lower faces and providing the rear end of the lever M with an inclosed slot for said slide to work in, and by connecting the levers J and M with the feed-bar by means of an inclosed slot in the latter.

The operation of my mechanism will be readily understood from the foregoing: As the driving-shaft is rotated, the eccentric thereon will impart the usual vibrating motion to the shuttle-levers, while the feed-levers H, I, and J will be vibrated intermittingly by the feed-cam and the co-operating spring, thus giving the requisite intermittent forward and backward movements to the feed-bar, the latter being raised and lowered at proper intervals by the auxiliary lever M, and the spring, thereby producing the well-known "four motion" feed.

I do not claim, broadly, in this application the combination, with a feed-bar, of a main feed-lever, an auxiliary feed-lever pivoted thereto, and means for intermittingly operating said levers, such claim being reserved to my application filed simultaneously herewith.

I claim as my invention—

1. In a sewing-machine, the combination, with a vertical feed-lever and mechanism for operating the same, of a feed-bar, a horizontal feed-lever, a link-lever arranged beneath the bed-plate of the machine, and serving as a connection for said vertical and horizontal levers, and an adjustable fulcrum for said link-lever, substantially as described.

2. In a sewing-machine, the combination, with a vertical feed-lever and mechanism for operating the same, of a feed-bar, a main horizontal feed-lever, a link-lever serving to connect said vertical and main horizontal levers, an adjustable fulcrum for said link-lever, an auxiliary horizontal feed-lever, and means for operating said auxiliary lever, substantially as described.

3. In a sewing-machine, the combination, with a vertical feed-lever and mechanism for operating the same, of a feed-bar, a main horizontal feed-lever, a link-lever serving to connect said vertical and main horizontal levers, an adjustable fulcrum for said link-lever, an auxiliary horizontal feed-lever pivoted to said main lever, and moving horizontally therewith, and means for vibrating said auxiliary lever vertically, substantially as set forth.

4. In a sewing-machine, the combination, with the bed-plate and a main feed-lever, an auxiliary feed-lever, and a shuttle-lever, all arranged beneath said bed-plate, of means for vibrating said main feed-lever horizontally, a slide pivoted to said shuttle-lever, and provided with a cam or incline for moving said auxiliary feed-lever vertically, and a feed-bar to which a four-motion is thus imparted by the said feed-levers, substantially as set forth.

5. The combination of the driving-shaft C, eccentric D, vertical and horizontal shuttle-levers E and F, feed-cam G, vertical feed-lever H, link-lever I, an adjustable fulcrum for said link-lever, levers J and M, slide N, feed-bar K, and spring P, substantially as set forth.

6. The combination, with the bed-plate, bracket-arm, feed-bar, and its retracting-spring, of the feed-levers H, I, J, and M, and their operating mechanism, the feed-regulating lever L, having an adjustable fulcrum-pin, *l'*, and pivoted beneath said bed-plate, with its free end projecting through an opening in said bracket-arm, and a set-screw for securing said regulating-lever in any position to which it may be adjusted, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

LEVI K. FULLER.

Witnesses:
W. H. CHILDS,
J. E. HALL,