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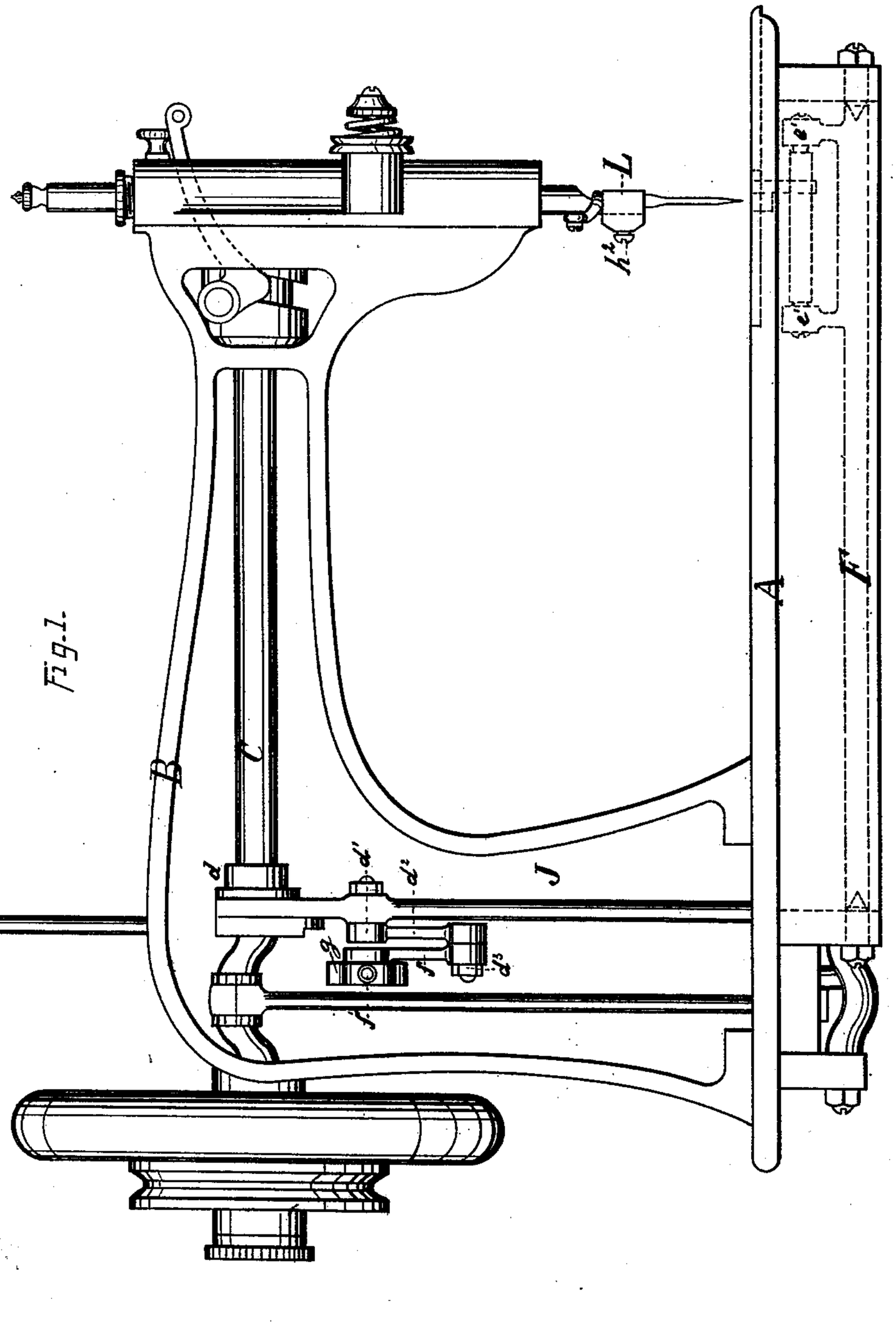
L. B. MILLER & P. DIEHL.

Sewing Machine.

No. 229,629. **Patented July 6, 1880.**



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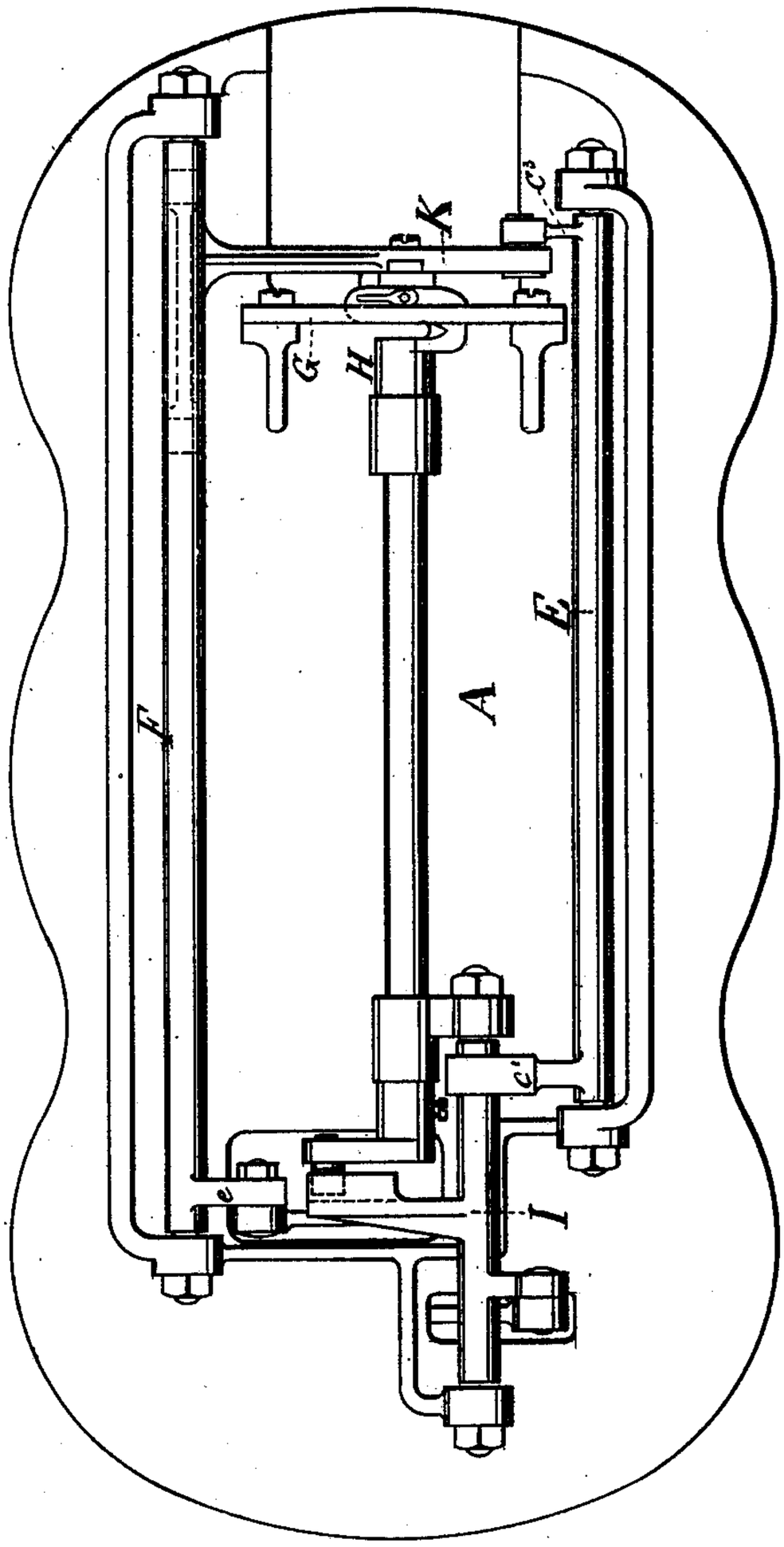

Fig-2.

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Fig. 3.

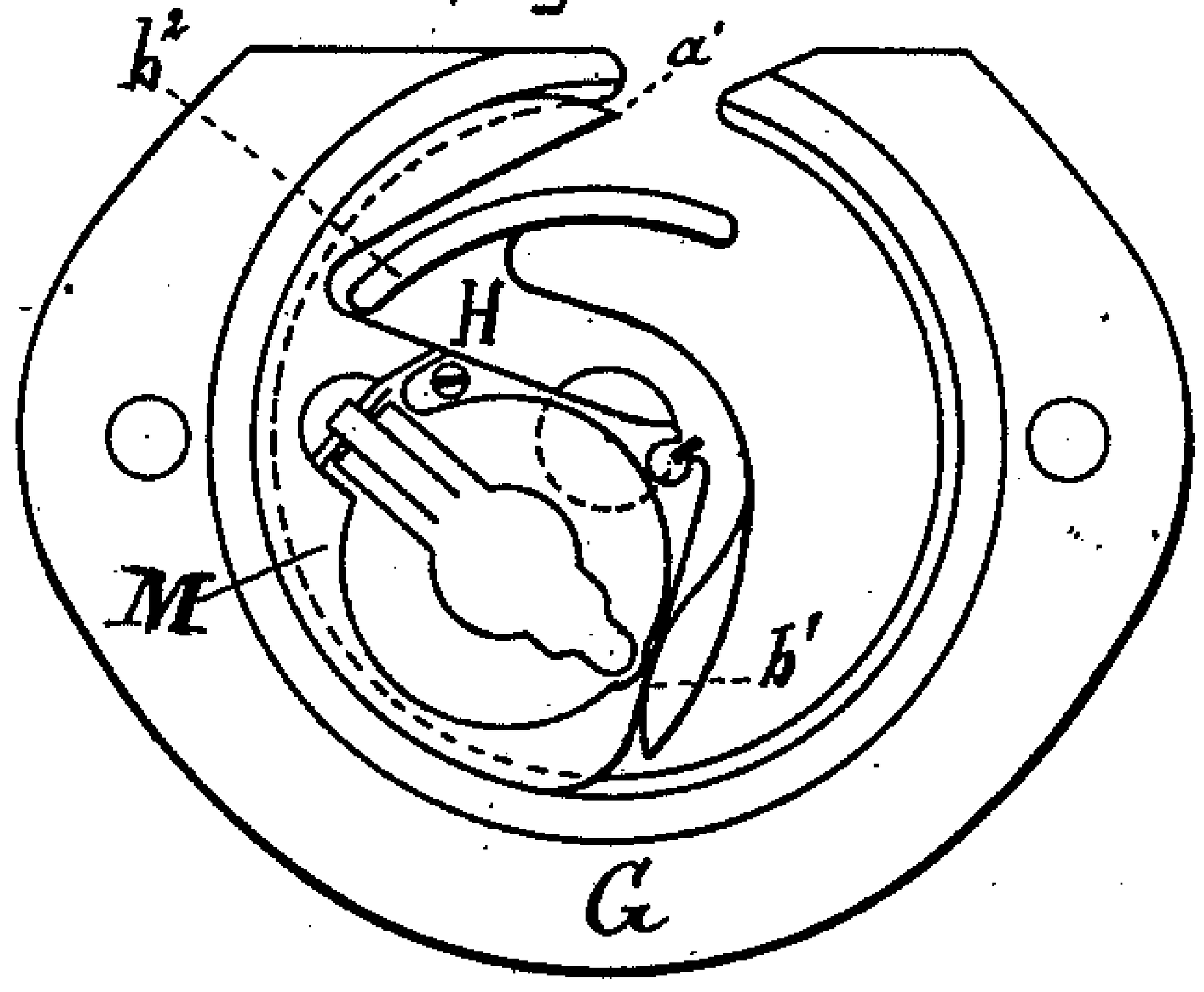


Fig. 5.

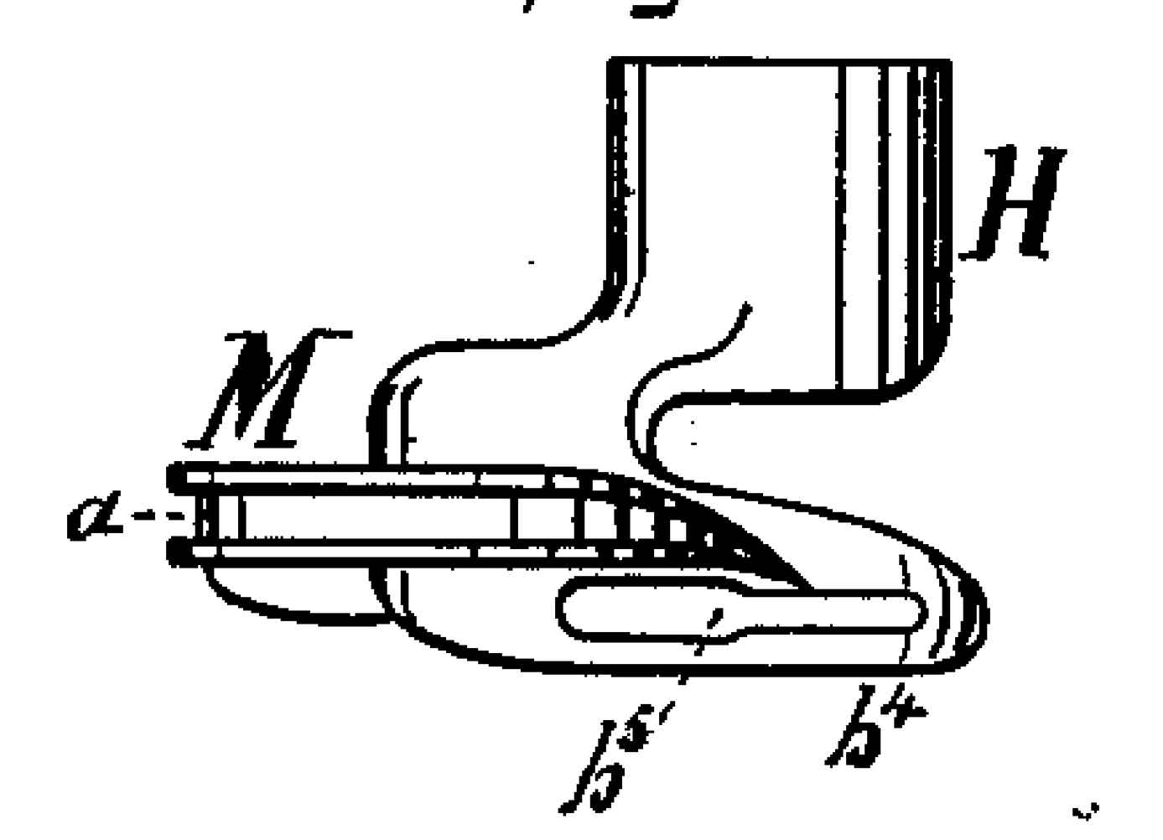


Fig. 7.

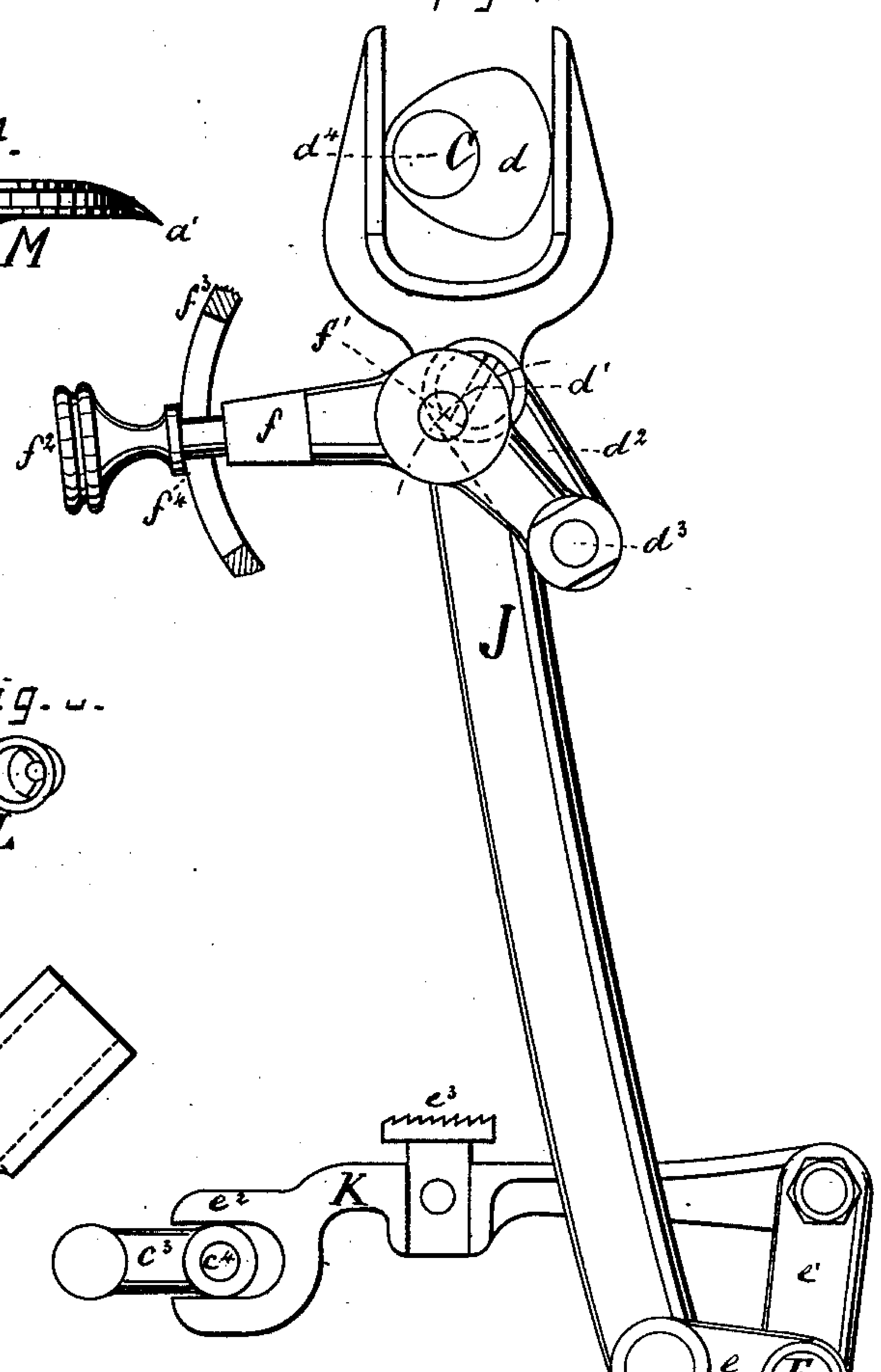


Fig. 8.

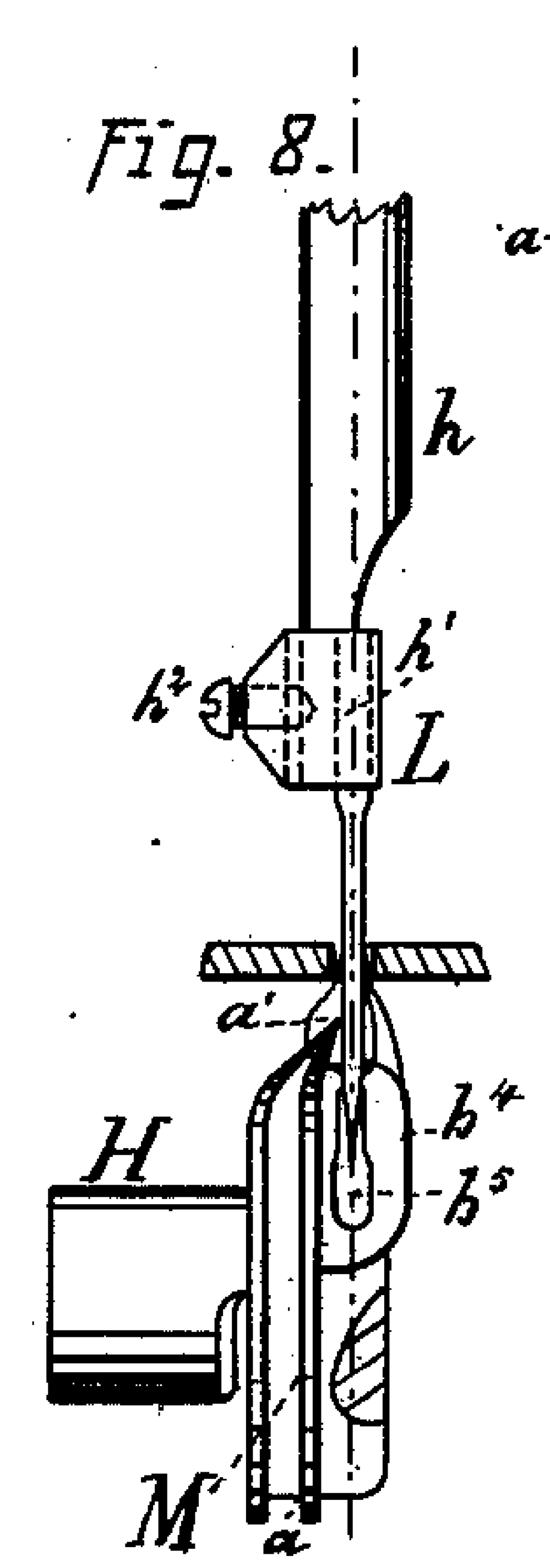


Fig. 4.

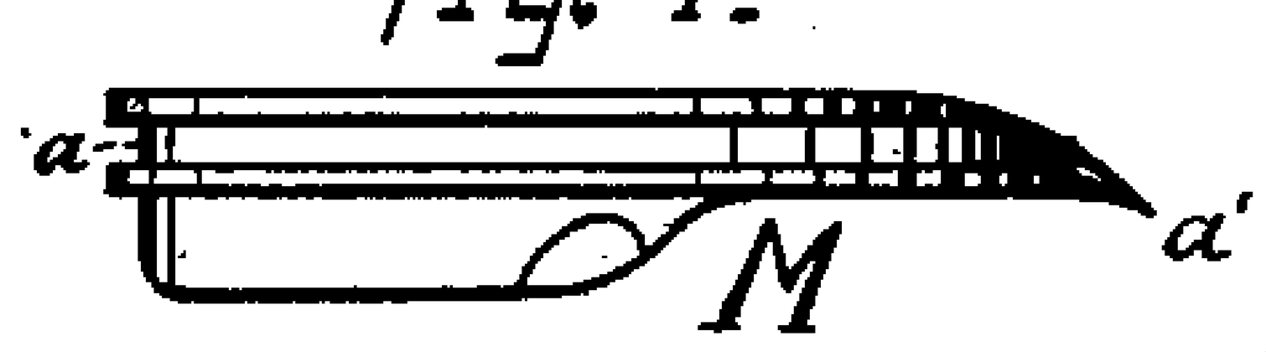


Fig. [illegible]

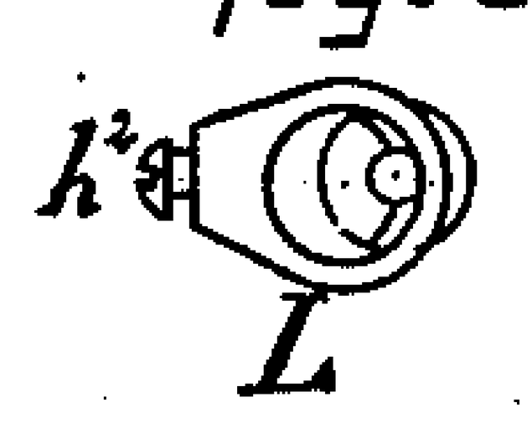
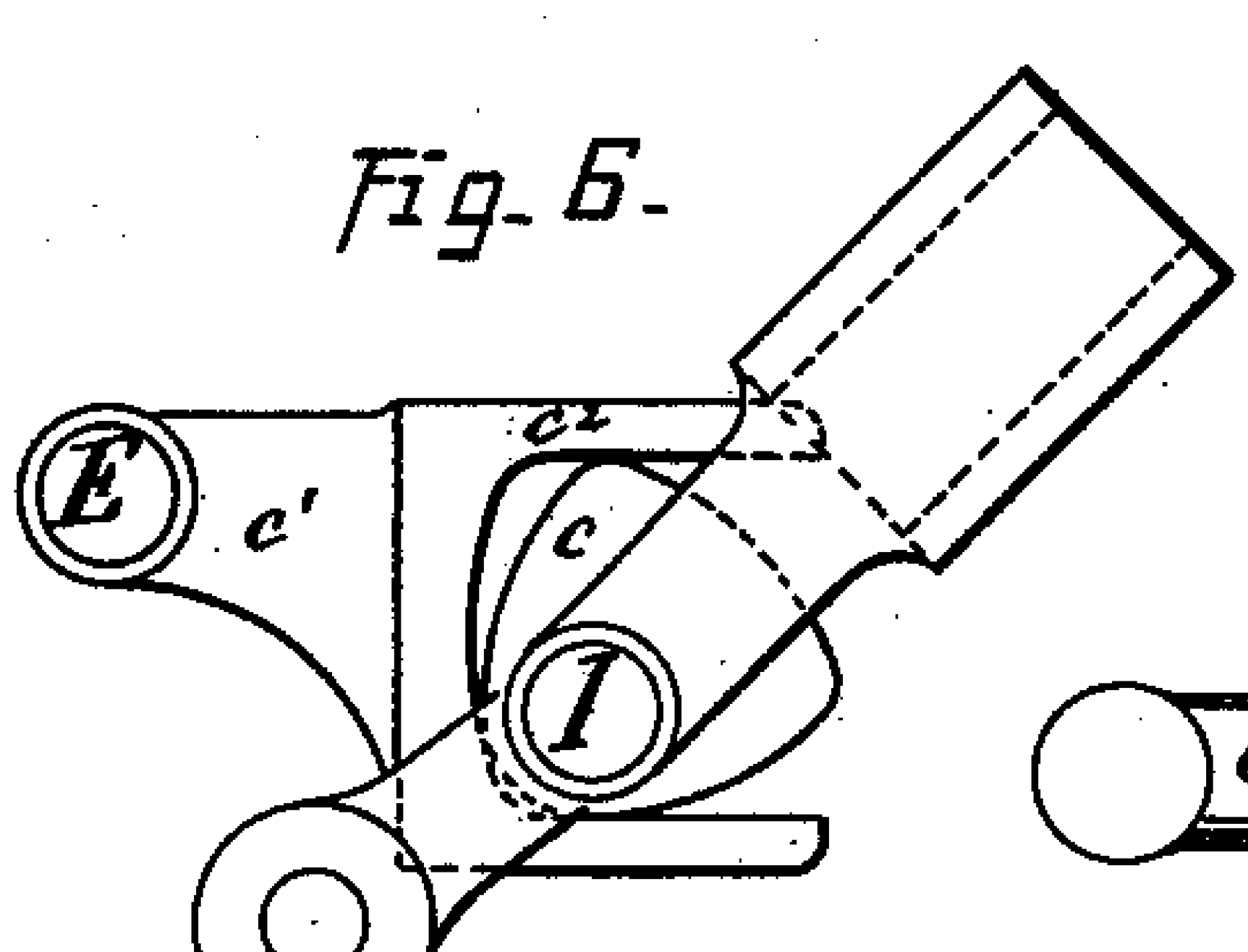


Fig. 6.



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UNITED STATES PATENT OFFICE.

LEBBEUS B. MILLER AND PHILIP DIEHL, OF ELIZABETH, N. J., ASSIGNORS TO THE SINGER MANUFACTURING COMPANY OF NEW JERSEY.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 229,629, dated July 6, 1880.

Application filed January 29, 1880.

To all whom it may concern:

Be it known that we, LEBBEUS BALDWIN MILLER and PHILIP DIEHL, both of Elizabeth, in the county of Union and State of New Jersey, have made an invention of certain new and useful Improvements in Sewing-Machines; and we do hereby declare that the following is a full, clear, and exact description and specification of the same.

The invention has reference to the shuttle-driving mechanism of sewing-machines and the feed mechanism thereof; and it consists of certain constructions and combinations of mechanical devices, which are set forth in detail in the claims at the close of this specification.

All of the said features of invention need not be embodied in the same machine; but in order that the invention may be fully understood we have represented in the accompanying drawings, and will proceed to describe, some of the principal parts of a sewing-machine embodying all of the said features in the best form in which we have embodied them at the present date.

In the said drawings, Figure 1 represents a side view of said sewing-machine with the side plate of the bracket-arm removed. Fig. 2 represents a bottom view of the said sewing-machine; and Figs. 3 to 9, inclusive, represent views of parts of the machine detached from the residue.

Similar letters of reference indicate like parts in all the figures.

The general form of the said sewing-machine does not differ materially from that of many shuttle-machines in common use, and is similar to that shown and fully described in Letters Patent of the United States granted to us under date of October 8, 1878, and numbered 208,838. It has a bed-plate, A, Figs. 1 and 2, with which the other parts are connected; a bracket-arm, B, Fig. 1, to support the needle and presser-bars above that portion of the bed-plate A on which the material to be sewed will rest; a main driving-shaft, C, extending through the bracket-arm B, to drive the needle-bar, which is arranged to slide up and down in the head of said bracket-arm, and also, by means of a crank-connection and oscillating and rock shafts, to oscillate the shuttle-driver H, which carries the shuttle M, Figs. 3 and 5.

The general manner of looping the needle and shuttle threads to form the stitch is the same as that fully described in the patent above referred to.

The shuttle is held in and carried by a shuttle driver or carrier, H, Figs. 2, 3, 5, and 8, having two horns, b' and b^2, Fig. 3, as in the patent before referred to, one of which, b', bears against the butt of the shuttle M when driving it forward, and the other, b^2, bears against the forward end of the bobbin-case of the shuttle M, and acts to drive the said shuttle backward; but in order to avoid practical difficulties hereinafter indicated, we now extend the horn b^2 in the direction of the shuttle-beak, so that the front or outer side, b^4, Figs. 5 and 8, of said horn or projection will form a guard to keep the shuttle-thread from interfering with and displacing the loop of the needle-thread as the shuttle-point is about to enter said loop, and also to prevent the said shuttle-thread from being thrown over the point a' of the shuttle M as said shuttle commences its forward motion, as shown in Fig. 8. In this extended projection we make a slot, b^5, Figs. 5 and 8, wider at one end, so that the needle in descending will be sure to enter it, which slot b^5 serves as a guide and guard to the needle in its descent, first, to keep it from being strained or diverted toward the shuttle so as to encounter and damage the shuttle-point a', and, second, to keep said needle from being strained or diverted away from the shuttle, carrying with it the loop of its thread, so that said shuttle-point will fail to enter said loop.

In the patent above referred to our device caused the feed-bar to rise and fall crosswise to its length by the intervention of a cam attached to the main driving-shaft, a connecting-rod the upper end of which received motion through said cam, while its lower end was connected with the projecting arm of a rock-shaft, the other end of which rock-shaft also carried an arm provided with a pivot, which acted for this purpose in a slot of said feed-bar.

We now improve and simplify this construc-

tion by dispensing with said connecting-rod, placing a cam, *c*, Fig. 6, directly on the driving rock-shaft I, Figs. 2 and 6, and making the arm *c'*, Figs. 2 and 6, of the feed-lifting rock-shaft E (farthest from the feed-bar K, Figs. 2 and 7, and which formerly connected with said rod) with a fork, c^2, Fig. 6, at its outer end, to fit and work on said cam *c*, thus communicating the motion by the rocking of said cam *c* on the driving rock-shaft I direct to said feed-lifting rock-shaft E, the other end of which shaft is provided with an arm, c^3, Figs. 2 and 7, fitted at its outer end with a roller-stud, c^4, which is received in a slot formed in the end e^2 of the feed-bar K, Figs. 2 and 7. The rocking of the cam *c* on the driving rock-shaft I will alternately raise and depress the arm *c'* of the feed-lifting rock-shaft E, and thus give a corresponding motion to the arm c^3, which carries the roller-stud c^4, received and acting in the slot of the feed-bar K, and will thus alternately elevate and depress the end e^2 of the feed-bar K, causing said bar to rise and fall crosswise to its length, thereby alternately raising and depressing the feed-surface e^3.

Also, in said former patent the longitudinal movement of the feed-bar was secured by the intervention of a cam on the main driving-shaft, a connecting-rod the upper end of which received motion through said cam and the lower end of which was connected by a pivot to two toggle-links working on an adjustable elbow-joint, one end of one of which links operated through a projecting arm to impart a rocking motion to a horizontal rock-shaft provided with arms, to which the feed-bar was pivoted.

We now improve and simplify this device by using a cam, *d*, Figs. 1 and 7, on main driving-shaft C, as before, but substituting for the former connecting-rod a connecting-piece, J, Figs. 1 and 7, the upper end of which is forked and fitted to work on said cam *d*, and the lower end of which is attached directly to an arm, *e*, on the horizontal feed rock-shaft F, Figs. 2 and 7, and which connecting-piece J is also hinged at a point, *d'*, Figs. 1 and 7, near its forked end, to a link, d^2, the other end of which link works on an adjustable fulcrum-pivot, d^3.

It is very desirable that the movement of the feed-surface should always start from and return to the same point, and that the variation in the extent of its movements, by which a longer or shorter stitch is produced, should be only on the side at which the advance movement—which carries the material—ends. To secure this point with a feed in which every movement is positive, and in order that the extent of the longitudinal movement of the feed-bar K may be varied for the purpose of varying the length of feed, this fulcrum-pivot d^3 is not fixed, but is secured to an adjusting-lever, *f*, Figs. 1 and 7, formed, for convenience, as a bent or bell-crank lever, and pivoted at *f'* to a fixed projecting lug, *g*, inside of the upright portion of the bracket-arm B.

The action of the cam *d* as it revolves on the main driving-shaft C vibrates the forked end of the connecting-piece J, and as this piece J is hinged at the point *d'* to the connecting-link d^2 and the other end of link d^2 is hinged to the adjusting-lever *f* at d^3, (the lower end of said piece J being fixed laterally to the arm *e* of the feed rock-shaft F,) such vibration of the piece J must carry the point *d'* in a line with the circumference of a circle whose center is the adjustable fulcrum-pivot d^3. When at one extreme of motion the center of the axis of the hinge-pivot *d'* and the center of the axis *f'* of the lever *f* are set on, or nearly on, the same horizontal plane, and as the position of the adjusting-point d^3 is varied to form a greater or less angle with a vertical line drawn from the center of the main driving-shaft C at the point d^4, Fig. 7, and the center of the pivot *f'*, the point *d'* of the connecting-link d^2 must be more or less elevated or depressed by the vibrating motion of the cam *d*, before referred to, the longer or shorter will be the rocking motion imparted to said arm *e* of the feed rock-shaft F, and, as the other end of this feed rock-shaft F is provided with two arms, *e' e'*, Figs. 1 and 7, to which the feed-bar K is pivoted, consequently the longitudinal movement of said feed-bar will be correspondingly increased or diminished by raising or lowering the pivot d^3 of the said adjusting-lever *f*. In order that this adjusting-lever *f* may be moved conveniently on its central pivot, *f'*, for the purpose of varying the length of the feed, its end is fitted to receive a thumb-screw, f^2, the screw end of which enters it through a slot in the casing f^3 of the machine, and the other end of which, remaining outside of said casing, forms a handle, by raising or lowering which the lever *f* may be moved on its said central pivot. This thumb-screw is provided with a shoulder, f^4, wider than the said slot, and which, by turning said screw, can be made to bear against the casing of the machine and hold said lever *f* firmly at any desired point.

In order that needles of various sizes may be used and the proper relative adjustment of the needle-blade and shuttle-point maintained, we make an adjustable ring-clamp, L, Figs. 8 and 9, which may be of any desired diameter, entirely surrounding the foot of the needle-bar *h*, Fig. 8, and drawn up against said bar, to secure and clamp the needle between its inner surface and the outer surface of said bar by a set-screw, h^2, acting against the side of said bar opposite to that on which the needle is clamped, and we cut away one side of the foot of this bar, as shown in Fig. 8, so that the needle resting in a groove will be at or about the center line of said bar. This groove *h'* is cut on said bar, so that the side of the needle resting in it will be on the same side on which the shuttle-point passes the blade of said needle, Fig. 8, and by this arrangement

it is evident that a variation in the size of the needle will not alter the distance between that side of the needle and the shuttle-point. Said ring-clamp L also enables us to clamp and hold the needle by a surface-bearing extending the whole depth of the clamp on each side of the needle.

We claim as our invention—

1. A shuttle-driver for sewing-machines having the horns b' b^2, adapted to engage with the rear and forward portions of the bobbin-case of the shuttle, said horn b^2 being extended forward in the direction of the beak of the shuttle to a point in advance of the tip of said beak, substantially as and for the purpose specified.

2. A shuttle-driver for sewing-machines having the horns b' b^2, adapted to engage with the rear and forward portions of the bobbin-case of the shuttle, said horn b^2 being extended forward in the direction of the beak of the shuttle to a point in advance of the tip of said beak, and provided with the slot b^5, substantially as and for the purpose specified.

3. In a sewing-machine, the combination, with the main driving-shaft and connecting-rod, of the driving rock-shaft I, provided with the cam c, the lifting rock-shaft E, provided with arm c^3 and forked arm c', and the feed-bar K, substantially as shown and described.

4. In a sewing-machine, the combination, with the driving-shaft C, having the cam d, and the feed-bar K, of the feed rock-shaft F, having arms e e', the forked connecting-piece J, and an intermediate adjustable device, to which said connecting-piece J is connected near its forked end, whereby during the rotation of the driving-shaft a compound vibratory and longitudinally-reciprocating movement is imparted to said connecting-piece J, and the said movements varied for the purpose of varying the feed, substantially as described.

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Witnesses:
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