(No Model.)

P. B. LANDGRAF.

MECHANISM FOR REVERSING MOTION AND OVERCOMING DEAD CENTERS.

No. 428,681. Patented May 27, 1890.

Fig. 1

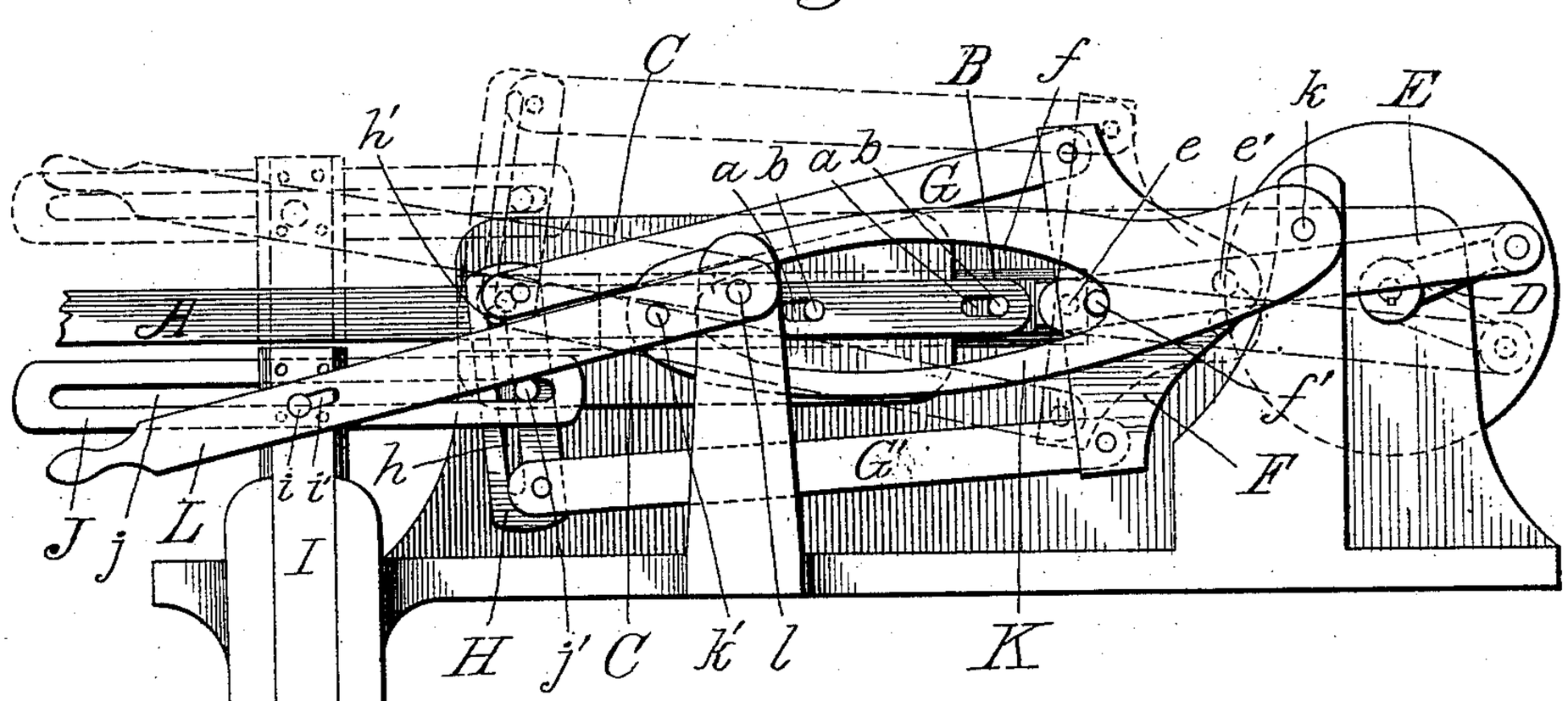


Fig. 2

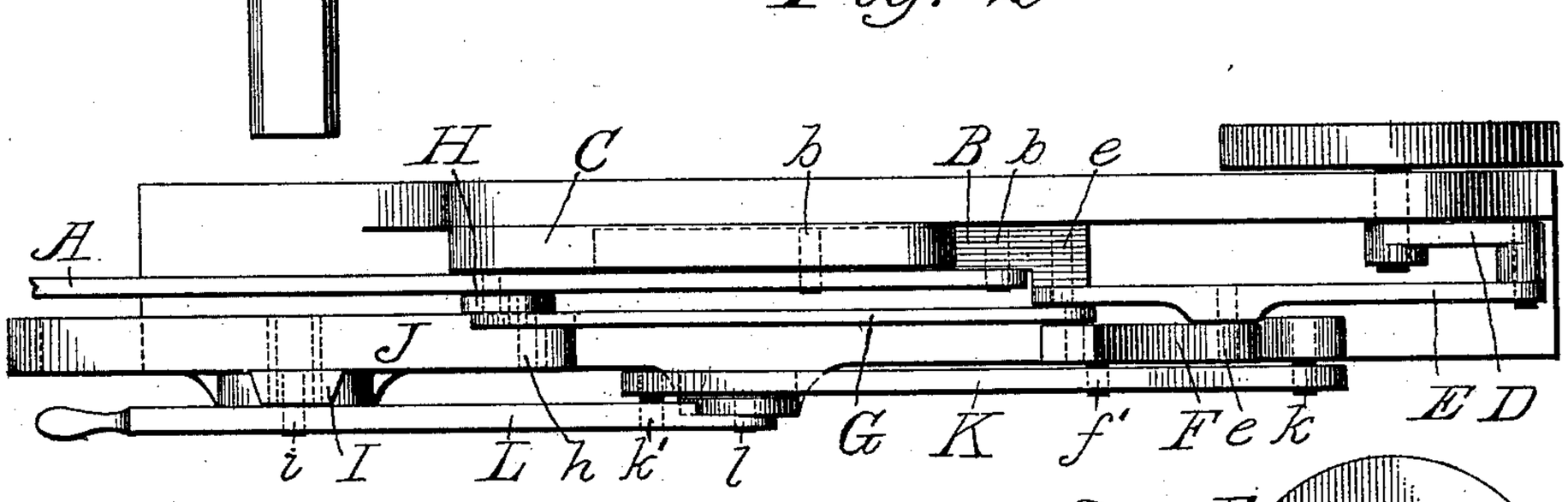
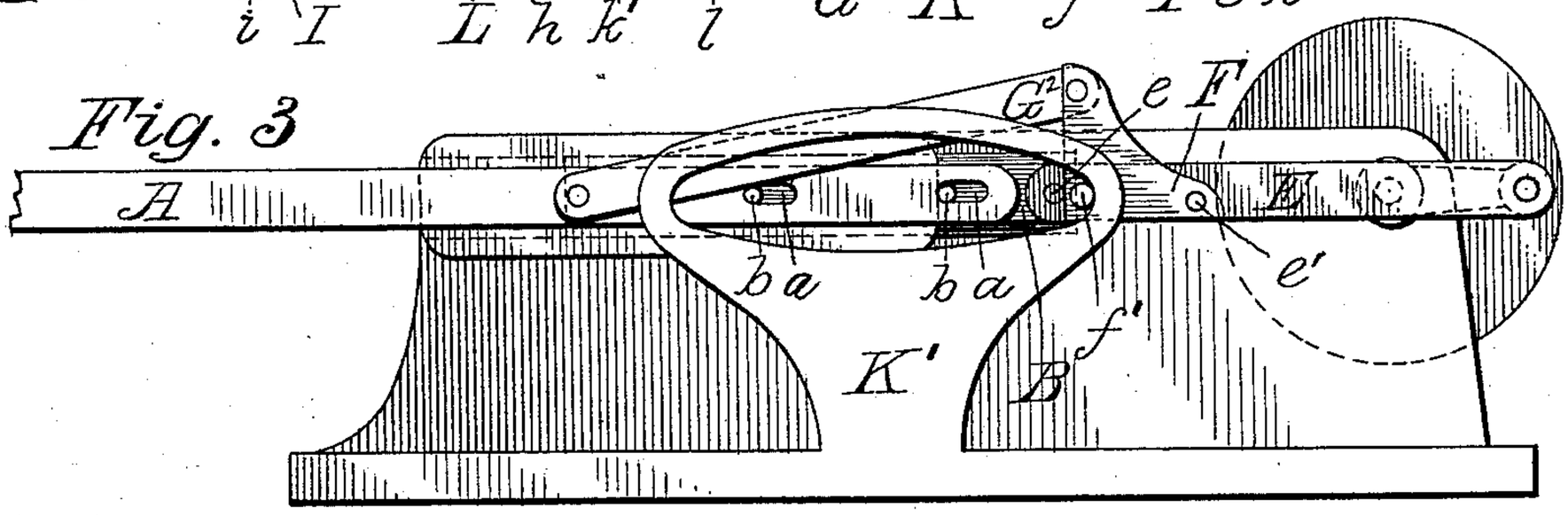


Fig. 3



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PHILIP B. LANDGRAF, OF SOUTH BEND, INDIANA.

MECHANISM FOR REVERSING MOTION AND OVERCOMING DEAD-CENTERS.

SPECIFICATION forming part of Letters Patent No. 428,681, dated May 27, 1890.

Application filed February 7, 1890. Serial No. 339,568. (No model.)

To all whom it may concern:

Be it known that I, PHILIP B. LANDGRAF, a citizen of the United States, residing at South Bend, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Mechanism for Reversing Motion and Overcoming Dead-Centers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to mechanism for reversing motion and overcoming dead-centers; and it consists in the improved construction and combination of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation, the full lines representing the position of parts for reverse motion and the dotted lines the position of parts for direct or right motion. Fig. 2 is a top view, and Fig. 3 a modification.

Similar letters refer to similar parts throughout the several views.

A represents a piston-rod having elongated slots *a a*, and connected by pins *b b*, projecting through said slots, to a block B, sliding in guides C C.

D is the crank.

E is the pitman pivoted at *e* to the sliding block B and pivoted at *e'* to a bell-crank lever F, connected by links or rods G G' with a lever H, having an elongated slot *h*, which receives a pin *h'*, extending from the piston-rod A.

I is a block sliding in suitable guides in a direction at right angles to the piston-rod A, and carrying a frame or guide J, having a groove or slot *j* parallel to the piston-rod and adapted to receive the fulcrum pivot or pin *j'*, extending from the lever H.

K is a lever pivoted at *k* to the supporting-frame and pivoted at *k'* to the reversing-lever L, which is pivoted at its fulcrum *l* to the supporting-frame, and connected with the sliding block I by a pin *i*, extending through the elongated slot *i'* in the lever L. The lever K is provided with a groove or slot *f*, elliptical in shape, forming a guide for the fulcrum pivot or pin *f'*, extending from the bell-crank lever F.

In connecting the parts the pitman E is set at the outer dead-center and the piston-rod A at the end of the outward stroke, with the pins *b b* occupying the inner ends of the slots *a a*, so that the piston-rod in making the inward stroke will draw upon the lever H by means of the pin *h'*, but will not impart motion to the sliding block B until the outer ends of the slots *a a* come in contact with the pins *b b*.

The pitman being at the outer dead-center, as above described, the operation is as follows: The piston-rod A being started on the inward stroke, the pin *h'* will cause the lever H to turn on its fulcrum *j'*, and the motion being communicated by the rods G G' to the bell-crank lever F will cause the pitman E to turn on the pivot-pin *e* and carry its outer end over the dead-center. The outer ends of the slots *a a* now coming in contact with the pins *b b*, the motion of the piston-rod will be imparted to the sliding block B, pitman E, bell-crank F, and lever H, the pivot-pin *f'* sliding in the slot *f* and the pivot-pin *j'* in the slot *j* until the end of the stroke is reached and the pitman is at the inner dead-center. As the pins *b b* will now be at the outer ends of the slots *a a*, it is evident that the outward stroke of the piston-rod will operate first upon the lever H and bell-crank F, so as to carry the pitman over the inner dead-center before imparting the forward motion to the sliding block B. When the reversing-lever L is raised so as to bring the fulcrum-pivot *j'* above the piston-rod, the inward stroke will throw the pitman down and the outward stroke will throw it up, and the revolution of the crank will be direct or right. On the other hand, if the lever L is depressed, bringing the fulcrum-pivot *j'* below the piston-rod, the inward stroke will throw the pitman up and the outward stroke will throw it down, causing reverse motion of the crank. Where reverse motion of the machinery is not desired, the mechanism may be modified, as shown in Fig. 3 of the drawings, in which the reversing-lever L, sliding block I, guide J, lever H, and connecting-rods G G' are omitted, a single bell-crank lever F' being used in place of the

double bell-crank lever F, a stationary guide K′ used in place of the lever-guide K, and a connecting-rod G², pivoted directly to the piston-rod A and to the bell-crank lever F′.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the piston-rod A, having slots *a a* and pin *h′*, the sliding block B, having pins *b b*, the pitman E, the crank D and its shaft, the lever H, having a slot *h* and pin *j′*, the connecting-rods G G′, the bell-crank lever F, having pin *f′*, the lever K, having a slot *f*, the sliding block I, the guide J, having a groove or slot *j*, and the lever L, all arranged and constructed to operate substantially as and for the purposes described.

2. The combination of the piston-rod, sliding block, pitman, the crank and its shaft, bell-crank lever having a fulcrum-pin, and connecting-rod with a suitable guide for the fulcrum-pin of the bell-crank lever, all constructed and arranged substantially as and for the purposes specified.

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

PHILIP B. LANDGRAF.

Witnesses:

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