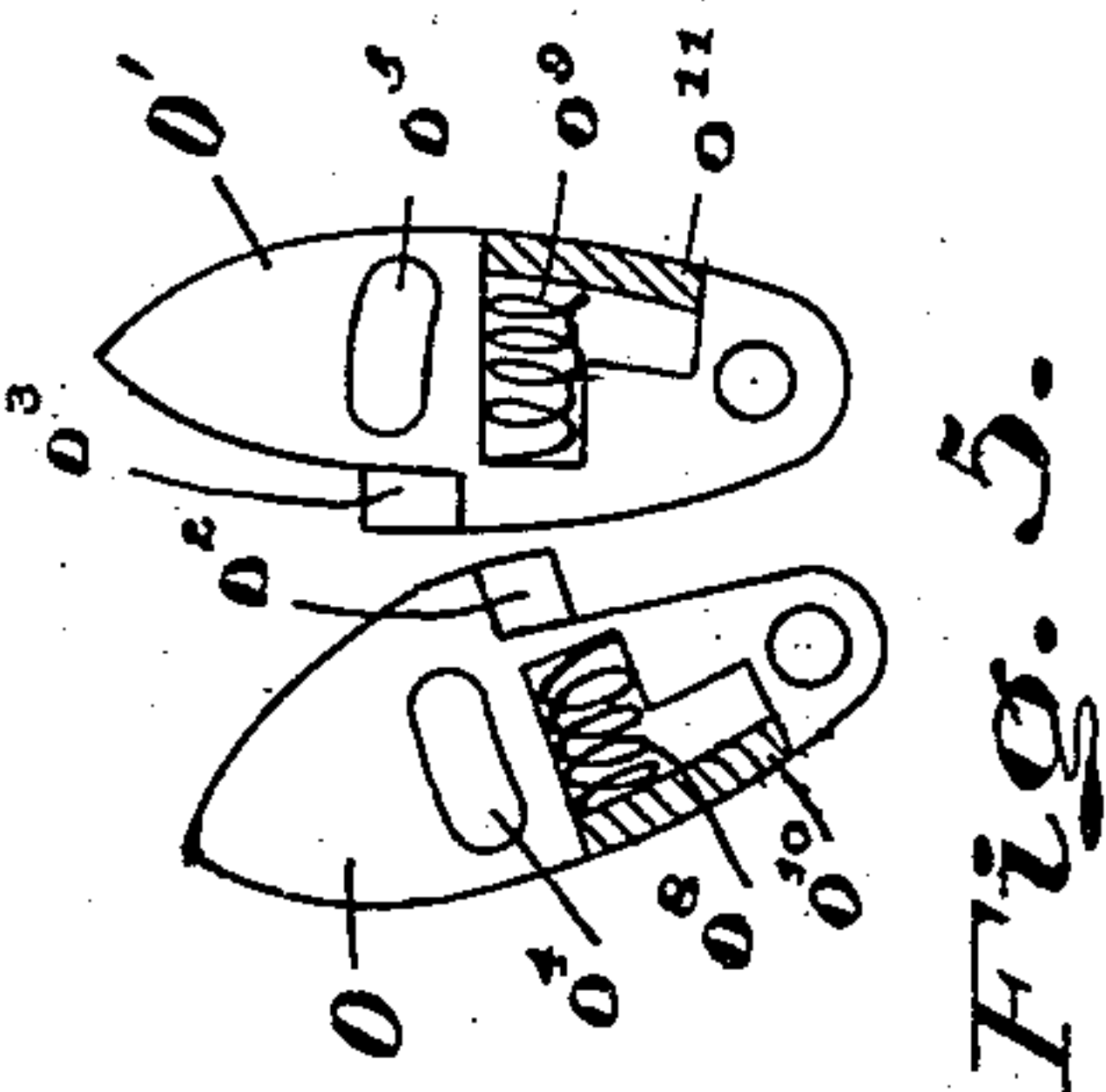
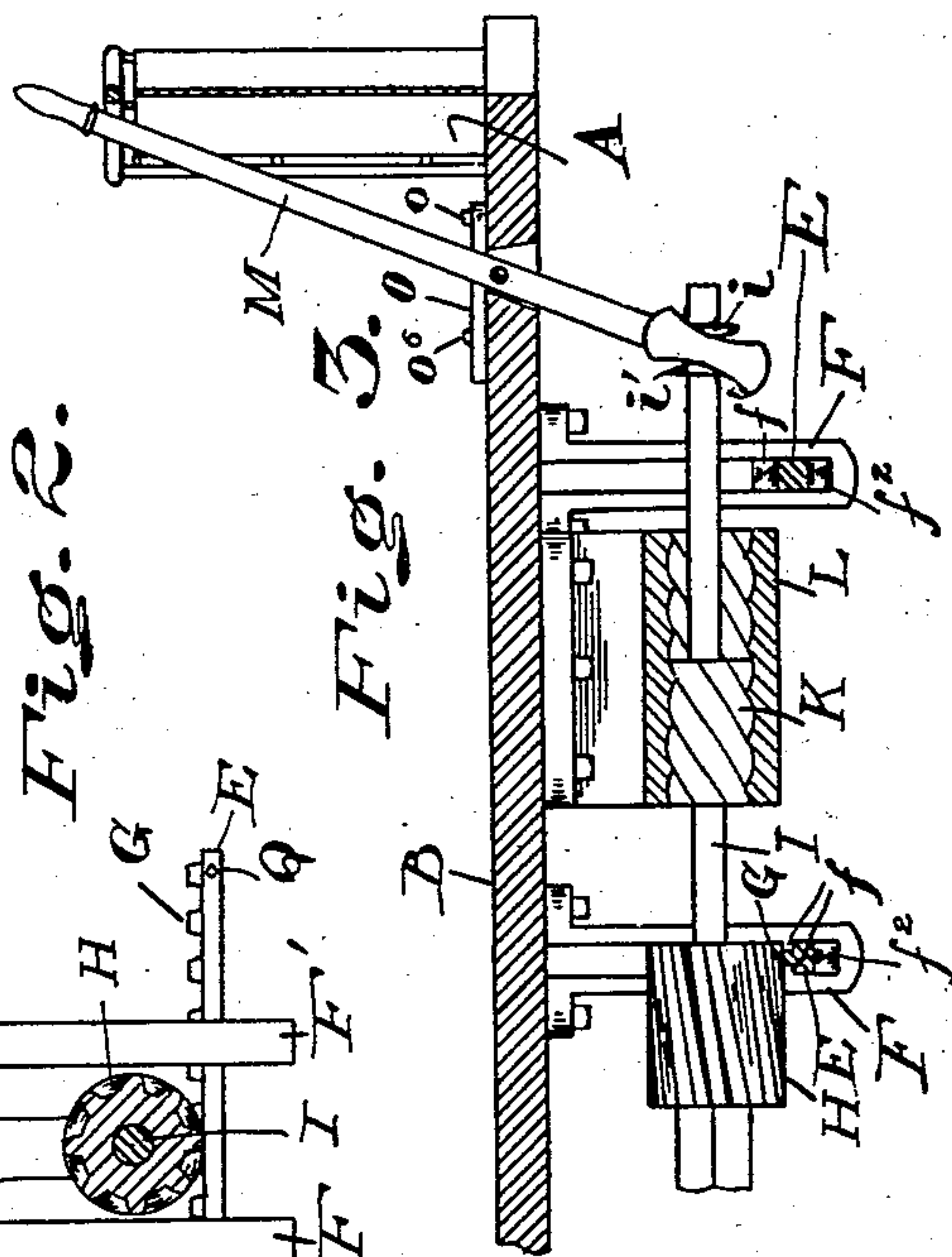
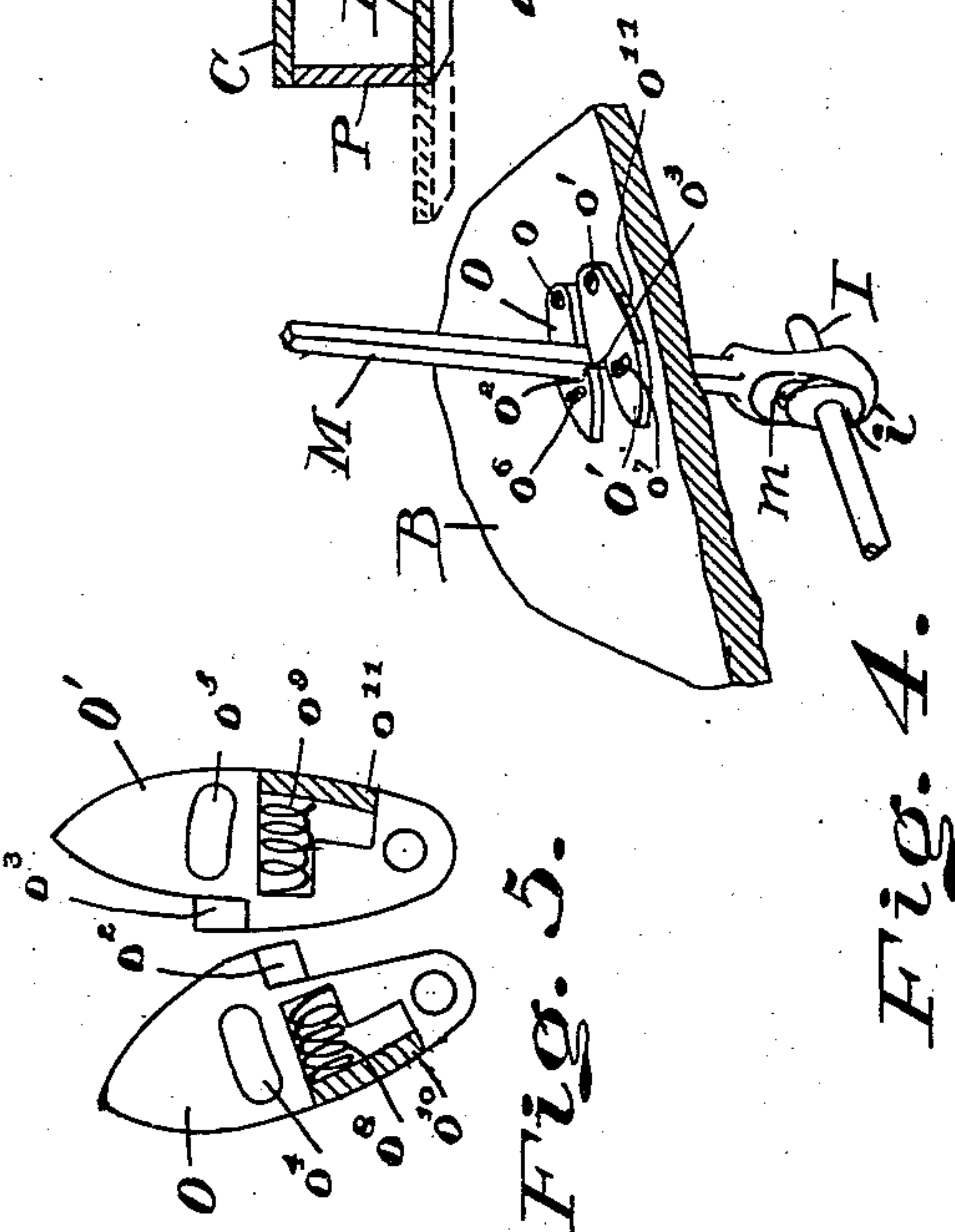
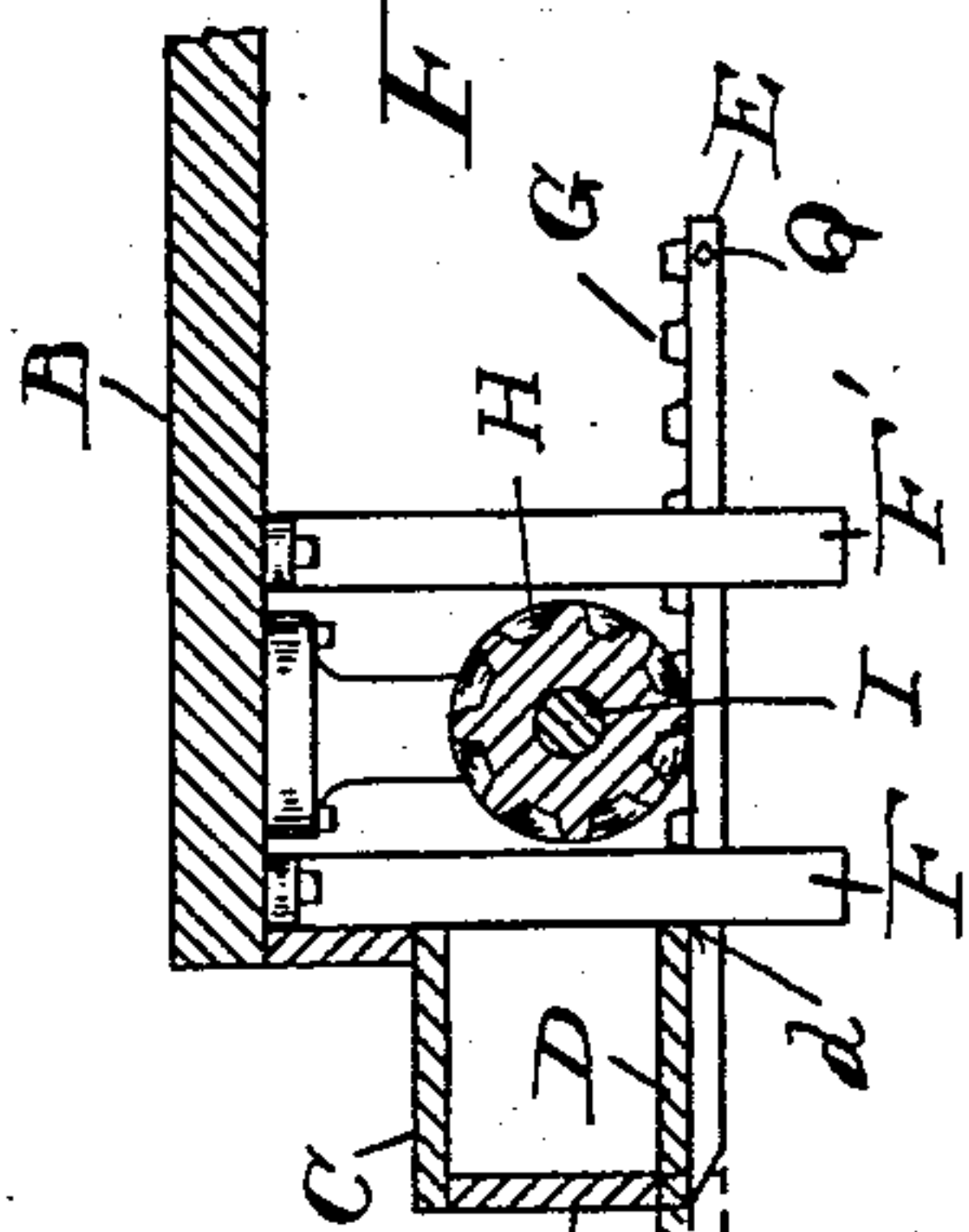
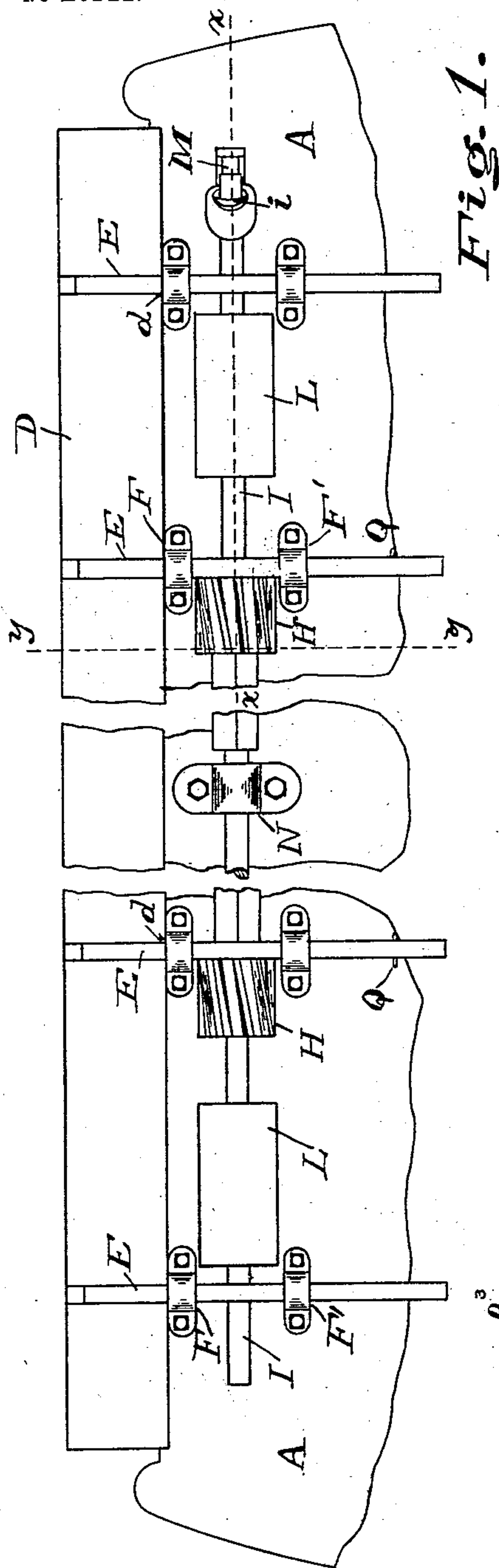


F. KEILWERTH.  
MOVABLE CAR STEP.  
APPLICATION FILED OCT. 3, 1903.

NO MODEL.



Witnesses.  
Henry N. Baum  
Herbert P. Warden

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*Franz Reilwerth,*  
*by W. H. Werbsch, His Attorney.*



# UNITED STATES PATENT OFFICE.

FRANZ KEILWERTH, OF CINCINNATI, OHIO.

## MOVABLE CAR-STEP.

SPECIFICATION forming part of Letters Patent No. 750,981, dated February 2, 1904.

Application filed October 3, 1903. Serial No. 175,639. (No model.)

*To all whom it may concern:*

Be it known that I, FRANZ KEILWERTH, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Movable Car-Steps, of which the following is a specification.

My invention relates to movable car-steps, and has for its object the providing of an extension-step adapted to be slid in and out of operative position and in novel means for supporting and sliding the same, and the invention will be readily understood from the following description and claims and from the drawings, in which—

Figure 1 is a bottom view of my improved device shown attached to the bottom of a car-body, partly broken away. Fig. 2 is a transverse section taken on the line  $y\ y$  of Fig. 1, showing the movable step withdrawn and also showing the movable step in projected relation in dotted lines. Fig. 3 is a longitudinal section taken on the line  $x\ x$  of Fig. 1. Fig. 4 is a perspective view of the operating-lever and its connections. Fig. 5 is a bottom view of the lever-lock.

A is the car-body, of which B is the floor, and C a stationary step.

D is a movable step which is arranged to be slid into operative position and retracted therefrom by the means which I shall now describe.

The movable step has rods E extending therefrom and supported in bearings F F'. These bearings have a lower support and an upper support. These supports may take the form of antifriction-rolls  $f' f^2$  for aiding in ease of operation. A suitable number of the rods E, depending on the length of the movable step, are each provided with a rack G, which is engaged by a pinion H, the latter being preferably of spiral form. The bearings F F' have lugs  $f$  extending above the rods E, having the racks G to prevent those rods from rising.

K is a coarse-pitch screw secured to a shaft I, slidable in a correspondingly-formed bearing L. The shaft I is given a longitudinal movement or thrust by a lever M, thereby moving the coarse-pitch screw longitudinally in the bearing L, the coarse-pitch form of the screw

and bearing causing the turning of the shaft about its axis during the longitudinal movement, thereby turning the shaft I and pinion H and moving the racks G and throwing the movable or extension step into and out of operative position. In the form shown the coarse-pitch screw is shorter than its bearing to accommodate for the endwise thrust of the shaft, and the teeth of the pinion are arranged in spiral form to permit a comparatively long thrust to the shaft, thereby affording easy movement. The pinion H is comparatively wide to accommodate for the longitudinal thrust of the shaft. The pinion may take the form of a toothed sector, as it is not necessary that the teeth of the pinion extend completely around its periphery, the shaft rocking about its axis only a part of a revolution.

N is a bearing for supporting the shaft, any number of which may be provided, dependent on the length of the shaft.

The lever M has at its lower end a slot  $m$ , through which the shaft I takes, the shaft having collars  $i\ i'$ , respectively at front and rear of the lever, against which collars the lever takes in moving the shaft. The collars are preferably rounded at the ends adjacent to the lever, the sides of the lever taking against the collars being correspondingly rounded.

The lever M is locked in position by the catches O O', preferably pivoted to the floor of the car on bolts  $o\ o'$ . The catch O has a shoulder  $o^2$  for locking the lever in position with the step drawn in, thereby also locking the step in that position, and the catch O' has a shoulder  $o^3$  for locking the movable step when thrown out for use. The shoulders have faces inclined to correspond with the inclines of the lever when in its respective locked positions.

The catches O O', respectively, have slots  $o^4\ o^5$  for receiving bolts  $o^6\ o^7$ , regulating and limiting the sidewise thrust of the catches. Springs  $o^8\ o^9$  normally press the catches toward each other, the springs impinging, respectively, against cleats  $o^{10}\ o^{11}$ , secured to the car-floor. These catches are so arranged that they may be thrown sidewardly out of locking position conveniently by the foot of the operator.

The bearings F F' are shown in the form of



hangers depending from the car-body. If desired, the rods E may be extended entirely across the bottom of the car-body and a step similar to the step D secured to their ends at the other side of the car-body for providing a step at each side of the car-body so arranged that when one is withdrawn the other is thrown into operative position.

The car-body, immediately above the movable step, is preferably provided with a riser P, and the movable step when withdrawn slides under this raiser so as to have a perfectly flush exterior, preventing passengers from stepping on the movable step when the latter is withdrawn and preventing accident. Suitable stops (shown in the form of pins Q) are provided for limiting the outward movement of the sliding step, the inward movement being limited in the form shown by the shoulders  $d'$  on the movable step striking the bearings F.

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

1. The combination with a car-body, of a horizontally-slidable step, racks secured thereon, a longitudinally-slidable shaft, parts thereon having teeth engaging the racks, a lever for shifting the shaft endwise and means for rocking the shaft, substantially as described.

2. In combination with a car-body, of a slidable step, a longitudinally-movable rod, a coarse-pitch screw and socket therefor between said body and shaft for rocking the shaft, and a connection between said shaft and slidable step, substantially as described.

3. In combination with a car-body, of a slidable step, a longitudinally-movable rock-shaft, a rack for said step, and a part having spiral teeth thereon secured to said rock-shaft and engaging said rack, means for moving said shaft longitudinally, and means for rocking said shaft, substantially as described.

4. In combination with a car-body, of a slidable step, a longitudinally-movable rock-shaft, connection between said rock-shaft and step, a lever for moving said rock-shaft longitudinally, and a pair of catches O O' respectively having shoulders  $o^2$   $o^3$  for engaging said lever at the respective limits of movement of said lever, substantially as described.

5. In combination with a car-body, of a slidable step, a longitudinally-movable shaft and connection between said shaft and step, a lever for moving said shaft longitudinally, a pair of catches O O' respectively having shoulders  $o^2$   $o^3$  for engaging said lever at the respective limits of movement of said lever, with springs for normally pressing said catches toward the lever, substantially as described.

6. In a construction of the class described, the combination with a car-body, of a riser thereon, a slidable step slidable under said riser, a shaft, means for moving said shaft longitudinally, a coarse-pitch screw and socket therefor for rocking said shaft during its longitudinal movement, and a rocking connection between said shaft and slidable step, substantially as described.

7. In a construction of the class described, the combination with a car-body, of a rock-shaft, means for shifting said rock-shaft longitudinally, a coarse-pitch screw and socket therefor between said body and said shaft for rocking said shaft during its longitudinal movement, a rack on the slidable step, and a part rocking with said shaft and having teeth engaging said rack, substantially as described.

In witness whereof I have signed my name hereto in the presence of two subscribing witnesses.

FRANZ KEILWERTH.

Witnesses:

HERBERT F. HARDEN,  
HENRY N. BAUER.