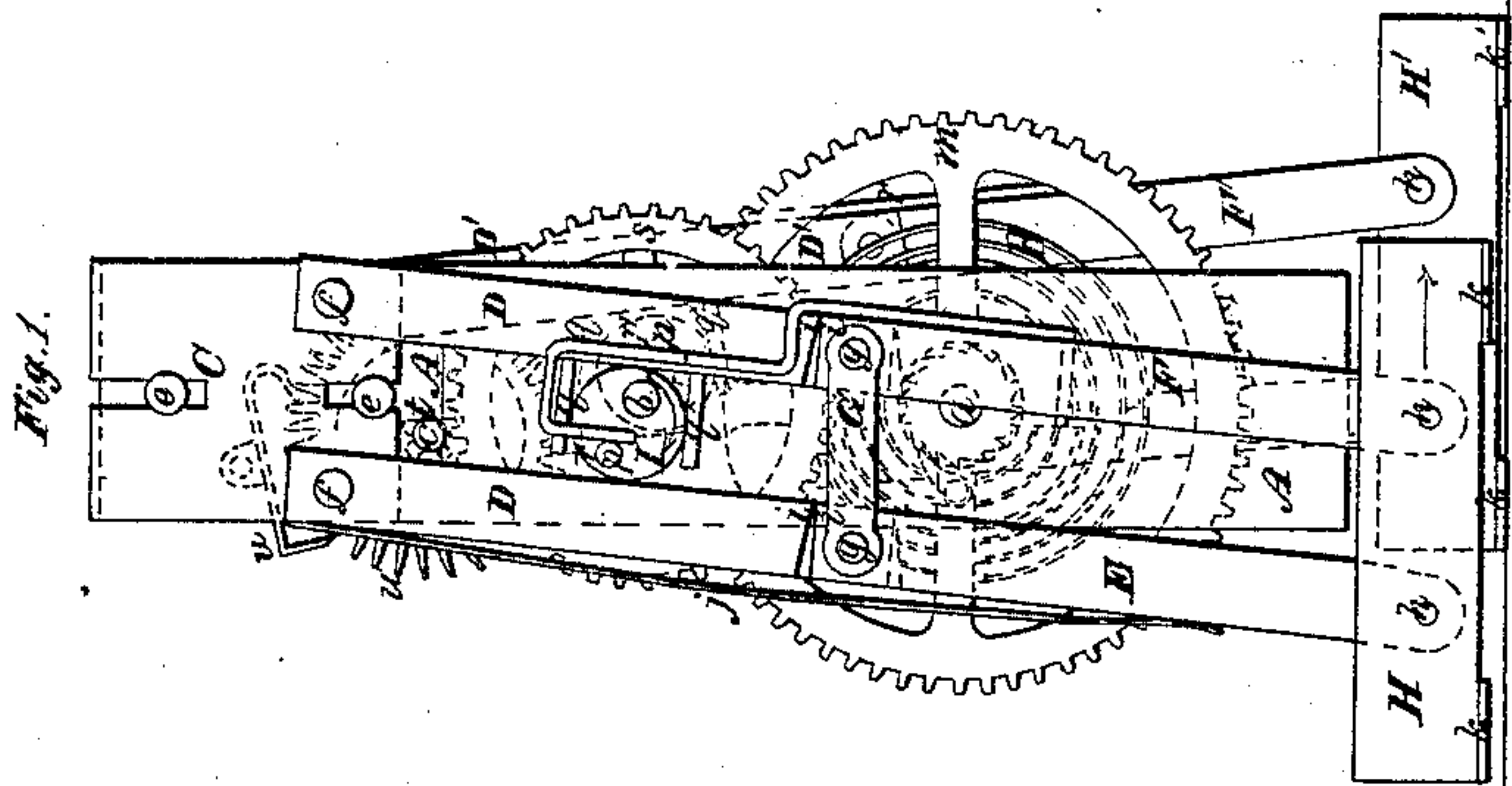
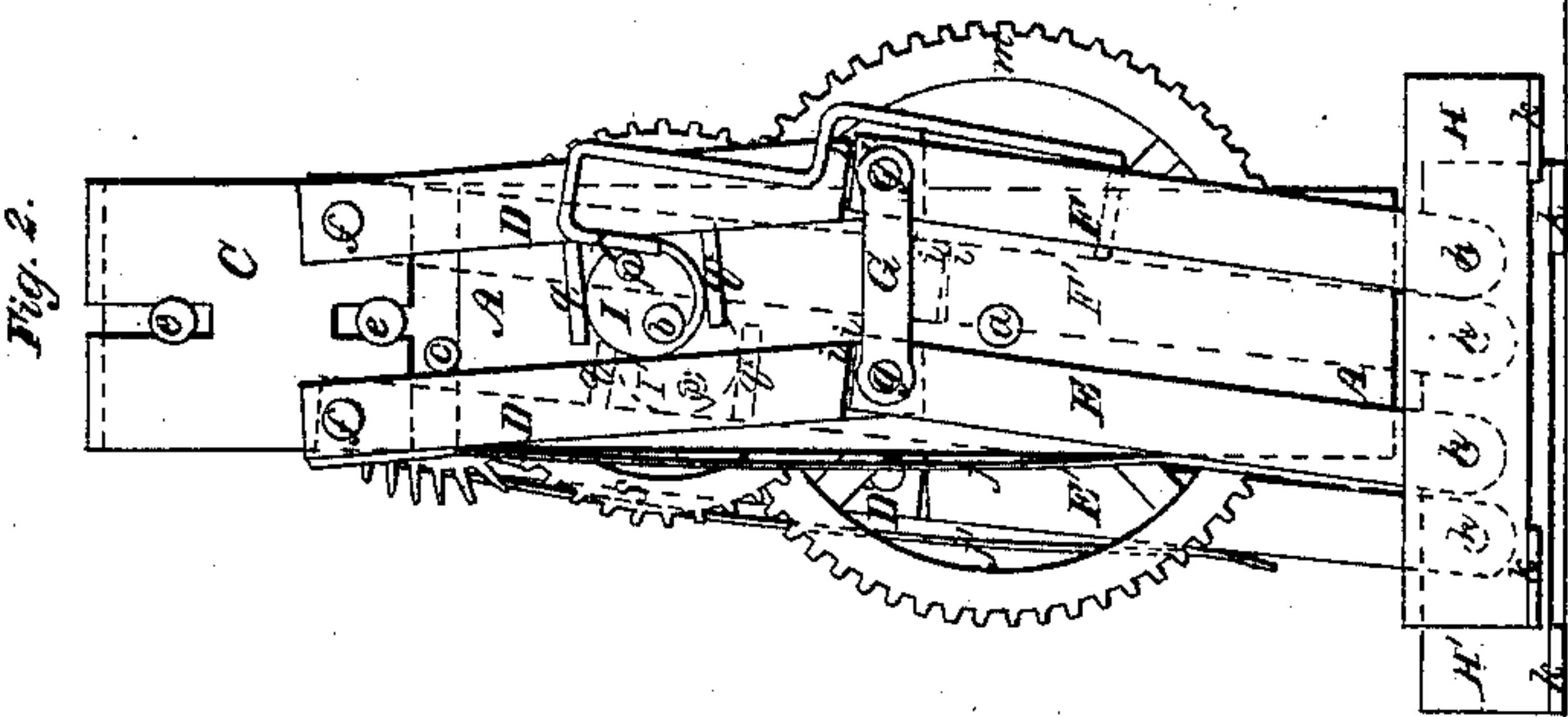
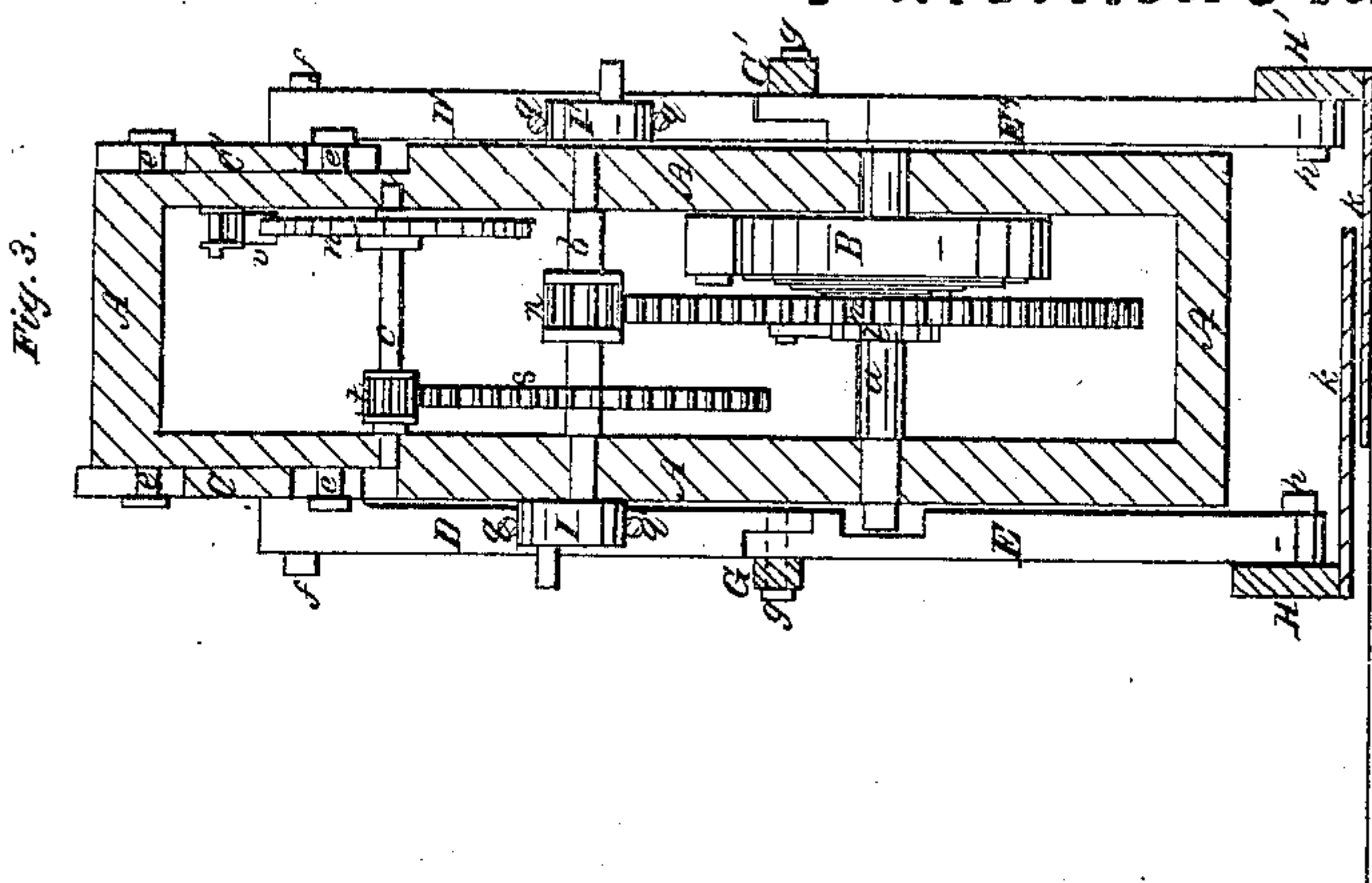


E. P. Morrison,
Motor.

N^o 33,019.

Patented Aug. 6, 1861.



Witnesses.

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UNITED STATES PATENT OFFICE.

E. R. MORRISON, OF SOUTH BERGEN, NEW JERSEY, ASSIGNOR TO THE HANLON BROTHERS,
OF NEW YORK, N. Y.

LOCOMOTIVE APPARATUS.

Specification of Letters Patent No. 33,019, dated August 6, 1861.

To all whom it may concern:

Be it known that I, E. R. MORRISON, of South Bergen, in the county of Hudson and State of New Jersey, have invented a new
5 Locomotive Apparatus Having a Movement Resembling Walking; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings,
10 forming part of this specification, in which—

Figures 1 and 2 are side views of the apparatus showing it in two different positions. Fig. 3 is a transverse vertical section of the same.

15 Similar letters of reference indicate corresponding parts in the several figures.

This invention is more especially intended to be applied to dolls and other toys, but may be applied to other uses.

20 It consists in a frame or box supported upon legs and feet, which by the action of a spring or other motive agent within the said frame or box are caused to have an alternating step by step movement resembling
25 that of walking.

It also consists in certain means by which the motor within the box is made to actuate the legs; also in a certain construction of such legs and feet, each leg of parallel bars
30 with the foot so applied that the foot may be placed flat on the floor or other surface upon which the walking is performed, at every step and so insure steadiness of movement; also in a certain arrangement of the
35 feet whereby the apparatus is balanced and firmly supported on each leg and foot while the step is being taken by the opposite leg and foot; and further in a certain construction of the legs and means of operating the
40 same whereby the movement of the knee-joint is imitated.

To enable others skilled in the art to make my apparatus I will proceed to describe its construction and operation.

45 A is the frame, of wood or metal containing the main spring B, and the bearings for the several spindles *a*, *b*, *c*, of the movement.

C, D, D, E, F, G, are the principal portions of one leg and C', D', D', E', F', G',
50 the corresponding portions of the other leg.

H, H' are the principal portions of the feet.

C, C' are slotted slides attached to opposite sides of the frame A, by means of screws,
55 bolts or pins *e*, *e*, upon which the said slides

are free to work up and down in parallel planes.

D, D, and D', D', are straight bars of equal length pivoted at their upper ends to their respective slides C, C', by pins *f*, *f*. 60

E, F, and E', F' are straight bars of equal length connected at their upper ends by pin joints *g*, *g*, with the lower ends of the bars D, D, and D', D', and having the feet H, H', connected with their lower ends by pins *h*, *h*. 65

G, G' are links by which the pins of the two joints *g*, *g*, in each leg are kept at a distance apart corresponding with its pins *f*, *f*. The pins *h*, *h*, connecting each foot with its leg are at a distance between the pins *f*, *f*, or *g*, *g*, and hence the bars E, F, or E', F', of each leg are always kept parallel with each other and so are the bars D, D, or D', D'. The joints between the bars D, D, and D', D', and their respective bars E, F, and E', F', 75 are so constructed with stops *i*, *i*, in front of their pins *g*, *g*, that they will not bend in a backward direction but that they will bend to some extent in a forward direction as shown in Fig. 2, and each leg has a spring 80 *j*, or *j'*, attached to its upper posterior bar D, or D', and pressing against its lower posterior bar E, or E', for the purpose of straightening the joint.

The principal portions H, H', of the feet 85 consist of straight bars and these have attached to their bottoms or soles at or near their ends, plates *k*, *k*, which may be termed toes, those of each foot being extended laterally toward the other foot beyond the center of gravity of the whole apparatus. The distances between the pins *f*, *f*, that between the pins *g*, *g*, and that between the pins *h*, *h*, are all equal in both legs, and the pins *f*, *f*, of one leg are arranged with their axes in a plane parallel with a plane in which the axes of the two pins of the other leg are situated, the soles of the two feet, if made parallel with each other in one position will be so in all positions, and hence when one foot is bearing upon a floor or any other flat surface the movement of the other foot must always be parallel with that surface. 100

The main spindle *a*, to which the main spring B, is attached and by which the spring is wound up with a key applied to the said spindle, has fitted to it a ratchet wheel *l*, and a spur toothed wheel *m*, the said wheel *m*, fitted loosely to the spindle like the first wheel of a clock movement to allow 110

the spring to be wound up, and having attached to it a pawl to engage with the teeth of the ratchet wheel, which is fast upon the said spindle, for the purpose of causing the spindle to drive the wheel m , as the spring uncoils itself. The wheel m , gears with a pinion n , on the spindle b , and so drives the latter spindle on which there are secured outside of and on opposite sides of the frame A, two eccentrics I, and I', each of which carries on its outer side a wiper p , the said eccentrics and wipers serving to produce the walking movements of the legs. The eccentrics fit between the bars D, D, and D', D', of their respective legs and each also fits between two yoke pins q , q^* , secured in one of the bars D, D, or D', D', of its respective leg and the said eccentrics in their revolution operate between the said pins to raise the legs and bring them down again and operate between the bars D, D, and D', D', to produce the forward movements of the legs and frame. The wipers p , p , are to act upon rods r , r , which are rigidly secured to the lower front bars F, and F', of the legs for the purpose of producing the flexure of the joints g , g , resembling the flexure of the knees in walking. The two eccentrics are arranged in opposite positions relatively to the axis of the spindle and the wipers are similarly arranged, that they may operate the two legs alternately.

The spindle b , is geared by a spur wheel s , and pinion t , with the spindle c , which carries a scrape wheel to which there is applied a verge v , which permits the revolution of the scape wheel, but produces so much friction on the teeth thereof as to offer sufficient resistance to its rotation to prevent the running down of the main spring too rapidly. Instead of this scape wheel and verge, a flyer geared up to a high speed may be used; and in fact the flyer is preferable as it is noiseless in its action.

The construction and arrangement and movements of the several parts of the apparatus having been now fully described, the operation of walking will now be explained with reference to Figs. 1 and 2. The step with either leg always commences after its respective eccentric passes the position in which its most prominent part is directly in rear of the axis of the spindle b , in which position of the eccentric both feet are on the floor or surface on which the walking is performed.

Fig. 1 represents the eccentric I, as having just passed this position and the nearest leg to be commencing the step in the direction of the arrow shown on the foot H. The said eccentric rotating in the direction of the arrow marked upon it, is acting upon its upper yoke pin q , to raise the leg and foot and at the same time upon the front bar D, to throw them forward while the

opposite eccentric by its action against the rear bar D', of the other leg is causing the frame A, to move bodily forward in the same direction in which the foot H, is moving. The leg continues to rise until the eccentric has arrived in its highest position, and to move forward until the eccentric has arrived in its most forward position; and after the eccentric has passed the highest position, it commences to act upon the pin q^* , to depress the leg so that the foot may arrive on the floor as its forward movement terminates.

Fig. 2 shows the step with the foot H, to have nearly terminated. While one eccentric continues to act upon the forward bar D, or D', of its respective leg to produce the forward movement or step, the other one is always acting upon the rear bar D', or D, of the opposite leg to carry the frame A, bodily forward, as is illustrated by the representation of the eccentric I', and its respective leg and their appendages in dotted outline in Figs. 1 and 2; and each eccentric comes into action to produce the step of its respective leg as the other one has completed the step of its leg. Each eccentric in the lower half of its revolution, during which its foot is resting upon the floor operates first upon the pin q^* , to raise the frame A, and afterward upon the pin q , to depress the body so that the body has a constant rising and falling motion, rising during the first half, and falling with the last half of each step.

The flexure of the knee-joint is not absolutely necessary to the success of the operation of the apparatus, which will walk very well without any joint in the legs, except at f , f , and h , h , but the flexure of the knee joint seems to give an easier locomotion. The pins p , p , commence their action upon their respective rods r , r , to produce the flexure of the joint, as shown in Fig. 2, almost as soon as the foot commences rising; and escape from the ends of the said rods to allow the lower part of the leg to be thrown forward by its spring, j , or j' , just before the foot comes to the ground.

By making a frame of suitable form with two pairs of legs operating like the single pair herein described with or without knee-joints the walking of a quadruped may be imitated.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The combination with a box or frame containing a spring or other motor, of one or more pairs of legs and feet which support the said box or frame on opposite sides thereof and which are so actuated by the mechanism within the box that the legs on opposite sides have an alternating step by step movement, substantially as herein described.

2. The construction of the legs of parallel bars connected by pin-joints with the feet and with upright slides C, C, either with or without joints g, g , substantially as herein
5 described for the purpose of causing the feet to be placed flat on the floor at every step.

3. The eccentrics I, I', applied in combination with the legs to produce combined
10 upward and downward and forward movements, substantially as herein described.

4. The extension of each foot in a lateral

direction beyond the center of gravity of the apparatus substantially as and for the purpose herein specified.

5. The combination of the knee joints g, g , 15 the rods r, r , or their equivalents, the wipers p, p , and the springs j, j , the whole operating substantially as herein specified.

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Witnesses:

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JAMES LAIRD.