

(No Model.)

2 Sheets—Sheet 1.

G. E. FRINK.  
MECHANICAL MOVEMENT.

No. 599,698.

Patented Mar. 1, 1898.

Fig. 1

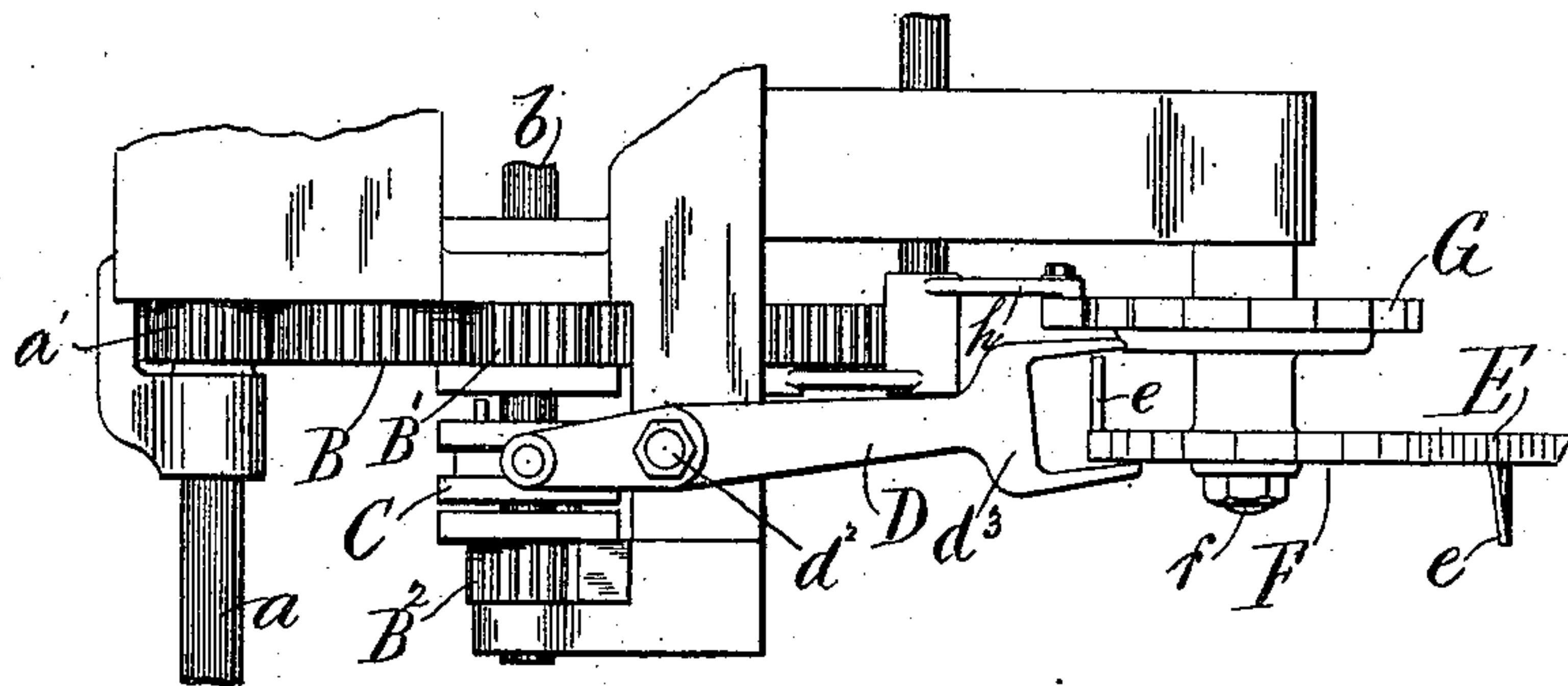
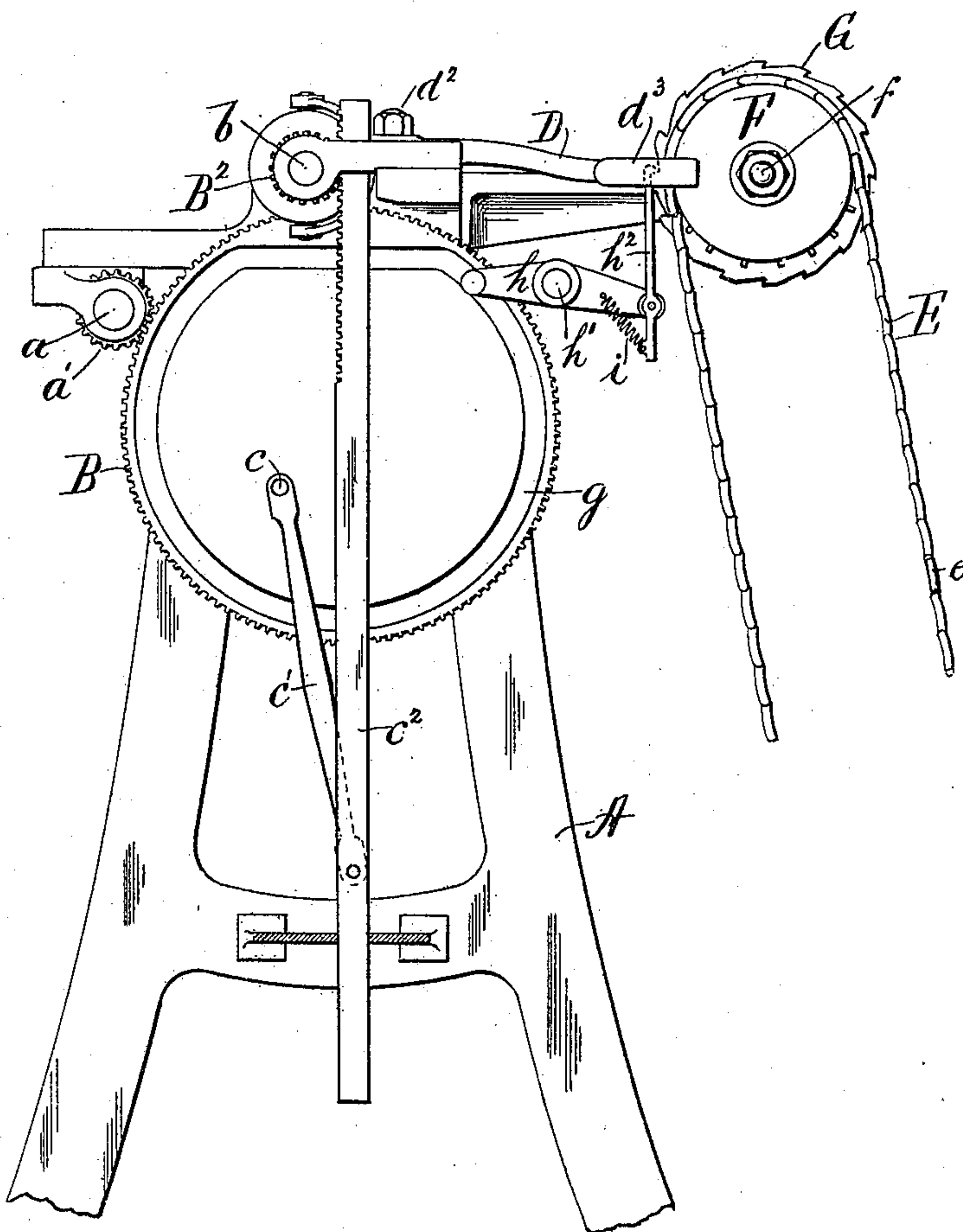


Fig. 2



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Inventor.  
George E. Frink

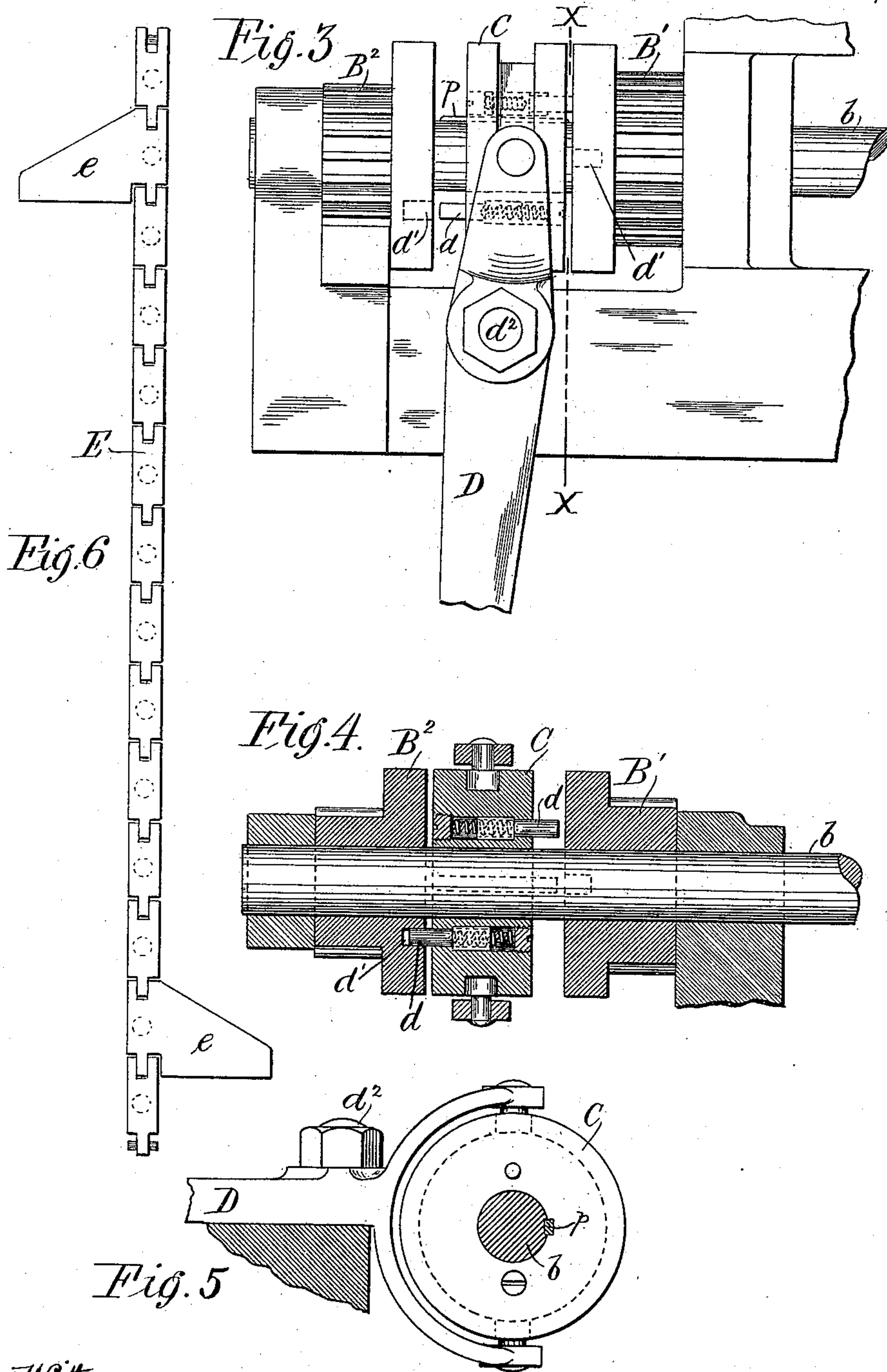
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# UNITED STATES PATENT OFFICE,

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## MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 599,698, dated March 1, 1898.

Application filed March 9, 1892. Serial No. 424,342. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. FRINK, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain  
5 new and useful Improvements in Mechanical Movements; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part  
10 of the same, to be a full, clear, and exact description thereof.

The object of my invention is to produce intermittently a rotary and an oscillating or reciprocating movement from a driving-wheel which constantly rotates in one direction, the  
15 change from rotary to reciprocating movement, and vice versa, to be effected automatically; and a further object of the invention is to provide for the disengagement of a shifting clutch from one of two pinions or spur-gears and its engagement with the other of  
20 said spur-gears while both of said gears are in motion, but at different rates of speed. To that end my invention consists in certain combinations and arrangements of parts hereinafter described.

Referring to the drawings, Figure 1 is a top or plan view of the mechanism to be described. Fig. 2 is an end elevation of the same. Fig. 3 is a top view, upon an enlarged  
30 scale, of the clutch mechanism and the gears to be engaged thereby. Fig. 4 is a central longitudinal section of Fig. 3, the clutch, however, being shown in a different position. Fig. 5 is a transverse section on the line  $x x$   
35 of Fig. 3, and Fig. 6 is a detail showing a portion of a cam-chain.

A is a suitable frame for supporting the several parts. Mounted in a bracket secured to said frame is the main driving-shaft  $a$ , carrying the pinion  $a'$ , which engages a gear-wheel B, which said gear-wheel B serves as  
40 the driving-wheel of the connecting mechanism. The gear-wheel B engages a pinion B', mounted loosely on the shaft  $b$ . Said gear-wheel B is also provided with a crank-pin  $c$ , which, by means of the connecting-rod  $c'$ , serves to operate the rack-bar  $c^2$ , the teeth of which rack-bar engage with the teeth of a pinion B<sup>2</sup>, also loose upon the shaft  $b$ . By the  
50 mechanism described, when the driving-wheel B is revolved the pinion B' will be continu-

ously revolved, while the pinion B<sup>2</sup> will be oscillated or reciprocated first in one direction and then in the other. The pinion B<sup>2</sup> is shown of smaller diameter than the pinion  
55 B', and, being driven by the crank  $c$ , will be moved at a slower rate of speed than said pinion B'.

Connected to the shaft  $b$  by a groove-and-spline connection  $p$  and arranged between the  
60 pinions B' B<sup>2</sup> is a shifting-clutch member C, provided with the usual groove, to be engaged by the fork of the clutch-lever D. The movable clutch C is provided upon each side with a spring-pressed pin  $d$ , as clearly shown  
65 in Fig. 4, and each of the pinions B' B<sup>2</sup> is provided upon its inner face with a hole or recess  $d'$ , adapted to be engaged by said spring-pressed pins  $d$ . The clutch-lever D is pivoted to the frame, as at  $d^2$ , and at its  
70 outer end is provided with a fork  $d^3$ .

E represents an endless cam-chain arranged so as to be embraced by the fork  $d^3$  of the clutch-lever, as shown in Figs. 1 and 2, and provided with projecting cams  $e$ , as shown in  
75 Fig. 6. This endless cam-chain E is supported upon suitable sprocket-wheels, one of which, F, is shown in the drawings, the other one, which is an idler, not being shown. The sprocket-wheel F is secured to a shaft  $f$ , upon  
80 which shaft is also secured the ratchet-wheel G for giving movement to the sprocket-wheel F and thus feeding the cam-chain. Upon the face of the driving-wheel B is a cam-groove  $g$ , as shown in Fig. 2. Engaging with this cam-  
85 groove  $g$  is a roller or stud projecting from the lever  $h$ , which said lever is pivoted to the frame at  $h'$ , and to the opposite end of said lever  $h$  is pivoted a pawl  $h^2$  for engaging the teeth of the ratchet-wheel G and operating  
90 said ratchet-wheel. A spring  $i$  serves to hold the pawl  $h^2$  in operative engagement with the teeth of said ratchet-wheel.

The operation of the parts above described is as follows: It being understood that when  
95 the clutch C is in engagement with the pinion B' the shaft  $b$  will be continuously rotated and that when said clutch is engaged with the pinion B<sup>2</sup> said shaft  $b$  will be oscillated or reciprocated back and forth let it be assumed  
100 that said clutch is in engagement with the pinion B' and the mechanism in operation



with the shaft *b* in rotation. At each revolution of the gear-wheel or driving-wheel B the cam-chain E will, by means of the cam-groove *g*, the lever *h*, the pawl *h*<sup>2</sup>, and the ratchet-wheel G and sprocket-wheel F, be fed along one link. When the driving-wheel B has revolved a sufficient number of times to bring the proper cam *e* on the cam-chain E to a position where said cam is about to engage the fork *d*<sup>3</sup> on the lever D, the next feed of the cam-chain will cause said cam *e* to strike one arm of the fork of said lever, and as the cam is moved along it will serve to force or throw said lever D in a direction to disengage the clutch C from the pinion B' and to engage the other pinion B<sup>2</sup>. The parts are so arranged that the hole *d'* in the pinion B<sup>2</sup> will not be at the proper position to be engaged by the projecting pin *d* upon the movable clutch member at the instant, but the spring behind said pin will yield as the end of said pin comes in contact with the face of the pinion B<sup>2</sup>, thereby enabling the movable clutch to be moved close up to the face of said pinion and thus become disengaged from the pinion B', the spring-pressed pin being forced into and housed within the body of the clutch. When now in the movement of the pinion B<sup>2</sup> under the action of its rack-bar the hole *d'* in the face of said pinion is brought into the proper position, the pin *d* will be shot by its spring, so as to quickly and firmly engage said pinion and thus connect the movable clutch member therewith. The shaft *b* will then partake of the motion of the pinion B<sup>2</sup> and be oscillated back and forth until another cam *e* on the opposite side of the cam-chain E is brought by the continuous feed of said cam-chain to a position where it will operate the clutch-lever D to move it in the opposite direction—i. e., in a direction to disengage the clutch C from the pinion B<sup>2</sup> and to engage said clutch with the pinion B', which said pinion B' will be engaged with the clutch C as soon as the hole *d'* in the face of said pinion is brought to a position where it can be engaged by the appropriate spring-pressed pin *d*. When this engagement has taken place, the shaft *b* will be continuously rotated under the action of the pinion B' until a cam on the cam-chain operates to again shift the clutch C. Any desired number of cams *e* on the cam-chain may of course be employed, and by properly locating and arranging said cams the times for the shifting of the clutch may be varied and regulated as desired.

The mechanism above described may be used for various purposes and will be found particularly useful in connection with that class of knitting-machines which knit first around and around, as in knitting the leg and the foot of a stocking, and then backward and forward, as in knitting the heel and toe. In applying said mechanism to a knitting-machine of the class referred to four cams would be employed arranged alternately

on opposite sides of the cam-chain. Thus the first cam would serve to shift the clutch from the pinion B' to the pinion B<sup>2</sup> at the conclusion of the leg of a stocking and preparatory to commencing the heel. The next cam would throw the clutch back again at the conclusion of the heel and preparatory to commencing the foot. The third cam would shift the clutch again at the end of the foot and preparatory to the commencement of the toe, and the fourth cam would shift the clutch back once more at the end of the toe and preparatory to commencing the leg of the next stocking.

It will be seen that the means for automatically shifting the clutch and thus for changing the shaft *b* from rotary to reciprocating motion, and vice versa, is entirely independent of said shaft, the shifting of the clutch being effected by a train of mechanism of which the shaft itself forms no part. By this arrangement the shaft may be oscillated back and forth any desired number of times without any shifting of the clutch, whereas in devices in which the shaft itself forms a part of the means or mechanism for shifting the clutch it is evident that the clutch must of necessity be shifted first in one direction and then in the other at every oscillation of the shaft.

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

1. The combination of a shaft, two pinions loosely mounted thereon, a movable clutch connected to said shaft so as to be revolved therewith, but so as to be capable of sliding thereon, said clutch being constructed to engage one or the other of said pinions, a lever for operating said movable clutch, a cam-chain for operating said clutch-lever in both directions, and means for feeding said cam-chain, substantially as described.

2. The combination of a shaft, two pinions loosely mounted thereon, means for actuating said pinions at different rates of speed, a movable clutch connected to said shaft so as to be revolved therewith, but so as to be capable of sliding thereon, and provided with spring-pressed pins adapted to engage corresponding recesses in said pinions, and means independent of said shaft for automatically shifting said movable clutch from one pinion to the other without stopping the machine, whereby said clutch may be disengaged from one of said pinions and immediately engaged with the other, while both pinions are in motion, but at different rates of speed, substantially as described.

3. The combination of a shaft, two pinions loosely mounted thereon, a movable clutch connected to said shaft so as to be revolved therewith, but so as to be capable of sliding thereon, and provided with spring-pressed pins adapted to engage corresponding recesses in said pinions, a lever for operating said movable clutch, a cam-chain for operating said



clutch-lever in both directions, and means for feeding said cam-chain, substantially as described.

4. The combination of a shaft, two pinions  
5 loosely mounted thereon, a driving-wheel or  
tooth-gear engaging directly with one of said  
pinions to revolve the same continuously, and  
also operating a rack-bar for oscillating the  
other of said pinions, a movable clutch con-  
10 nected to said shaft so as to be revolved there-  
with, but so as to be capable of sliding there-  
on, and constructed to engage one or the other  
of said pinions, a lever for operating said  
movable clutch, a cam-chain for operating  
15 said clutch-lever, and means operated by said  
driving-wheel for feeding said cam-chain, sub-  
stantially as described.

5. The combination of a shaft, two pinions  
loosely mounted thereon, a movable clutch  
20 connected to said shaft so as to be revolved  
therewith, but so as to be capable of sliding  
thereon, said clutch being constructed to en-  
gage one or the other of said pinions, a lever  
engaging and operating said movable clutch,  
25 a cam-chain directly engaging and serving to  
positively operate said lever in both direc-  
tions, and means for feeding said cam-chain,  
substantially as described.

6. The combination of a shaft, two pinions

loosely mounted thereon, means for actuating 30  
said pinions at different rates of speed, a mov-  
able clutch connected to said shaft so as to be  
revolved therewith, but so as to be capable of  
sliding thereon, said clutch being constructed  
to engage one or the other of said pinions 35  
while both are in motion, but at different  
rates of speed, a lever positively connected  
with said clutch for operating the same, and  
means for automatically and positively op-  
erating said lever in both directions, substan- 40  
tially as described.

7. The combination of a shaft, two pinions  
loosely mounted thereon, means for revolving  
one of said pinions and means for oscillating  
the other of said pinions at a different rate of 45  
speed, a movable clutch connected to said  
shaft so as to revolve therewith but so as to be  
capable of sliding thereon, and provided with  
spring-pressed pins adapted to engage corre-  
sponding recesses in said pinions, a lever for 50  
shifting said movable clutch, cams for shift-  
ing said lever in both directions and means  
for operating said cams, substantially as de-  
scribed.

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Witnesses:

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