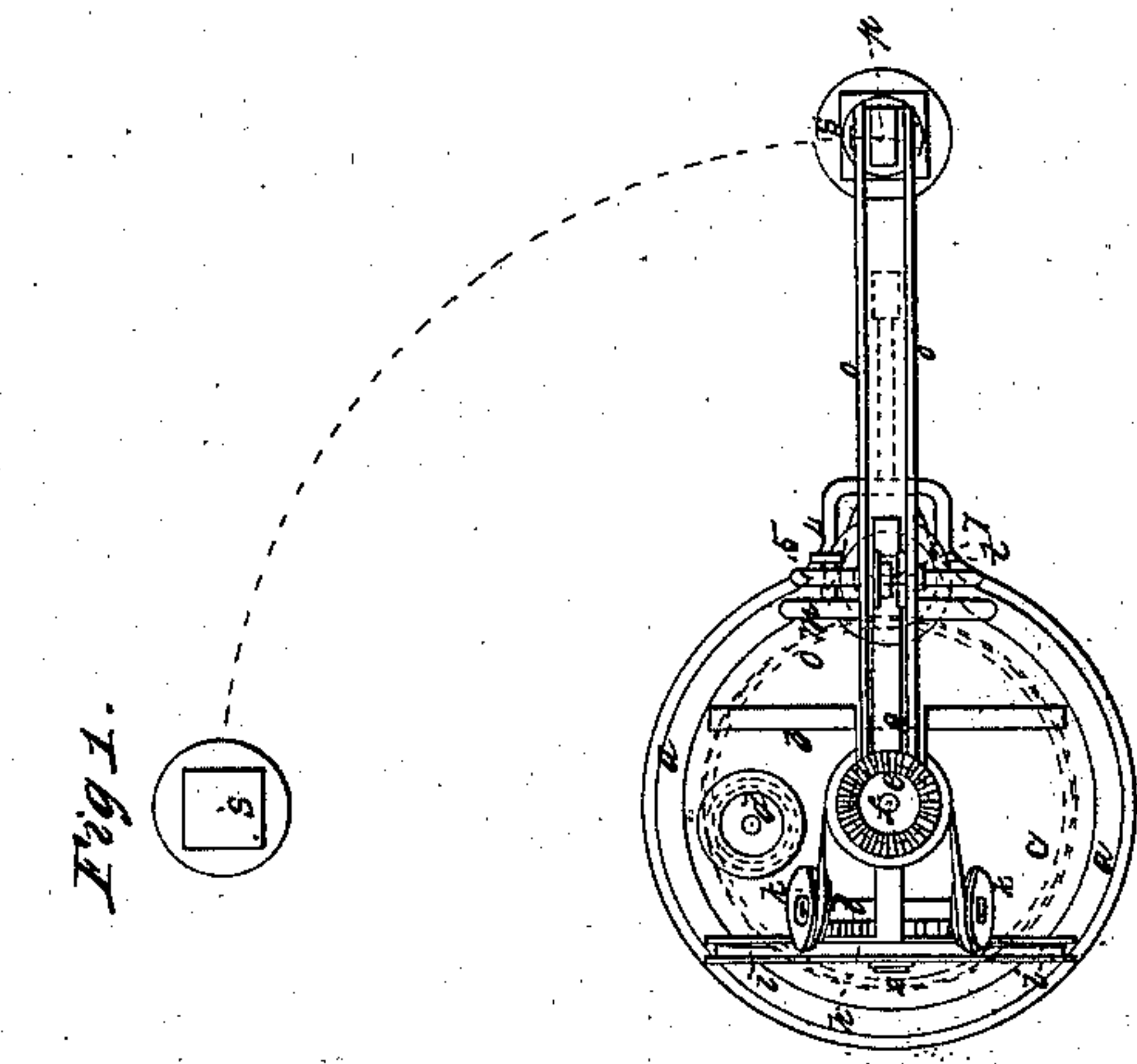
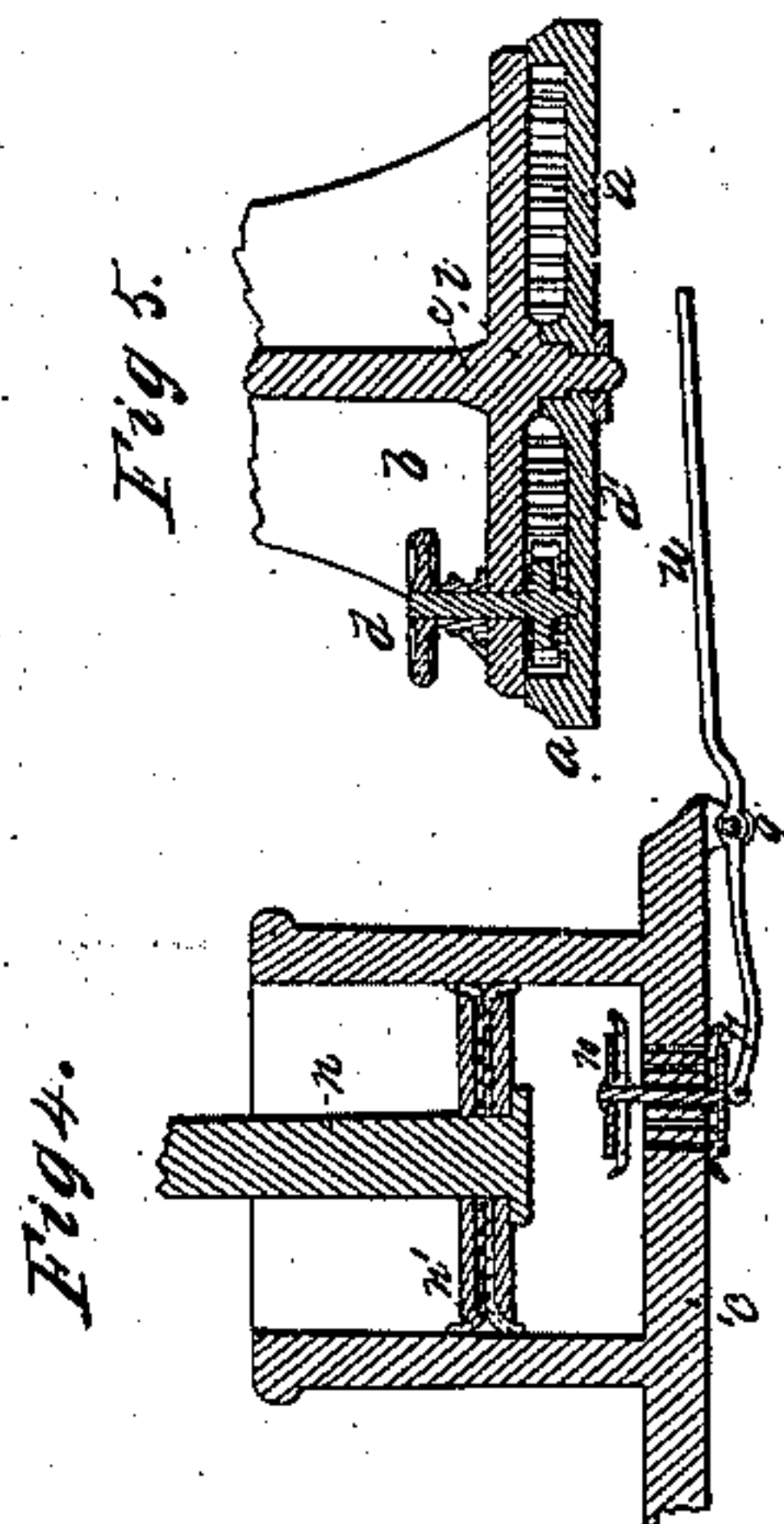
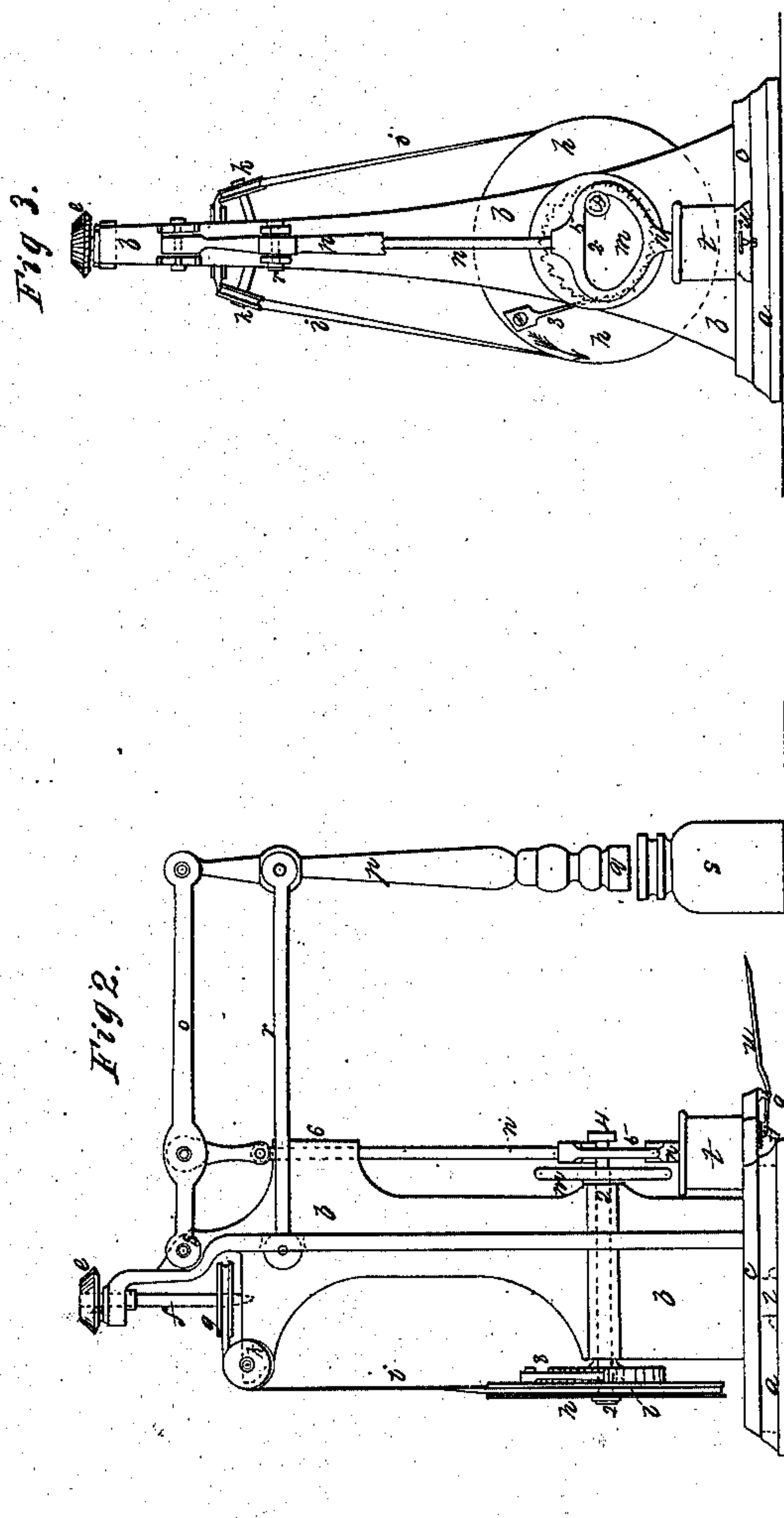


W. D. Grimshaw,

Power Hammer,

No 35,309,

Patented May 20, 1862.



Witnesses.

J. D. Burdick
Chas. W. Harold

Inventor.
William D. Grimshaw

UNITED STATES PATENT OFFICE.

WILLIAM D. GRIMSHAW, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN FORGING-HAMMERS.

Specification forming part of Letters Patent No. 35,309, dated May 20, 1862.

To all whom it may concern:

Be it known that I, WILLIAM D. GRIMSHAW, of Newark, in the county of Essex and State of New Jersey, have invented, made, and applied to use a certain new and useful Improvement in Forging-Hammers; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1 is a plan of my hammer. Fig. 2 is a side elevation; and Fig. 3 is an elevation at right angles to Fig. 2, with the hammer removed.

Similar marks of reference denote the same parts.

The nature of my invention consists in a ratchet-wheel and pawl connected with the main driving-wheel and between that and the cam which raises the hammer, so that the hammer is not obstructed in its fall by the slowness of motion of the propelling power, the ratchet allowing the parts to turn faster than the power as the hammer descends, thus avoiding what is known technically as "backlash."

I so arrange my driving power and hammer that the hammer itself can be made to operate successively upon several anvils set in a circle, thus giving great facility in doing the heavy parts of hand forging for several gangs of workmen. I also arrange an air-vessel in such a manner that the elasticity of the air is made to lessen the blow or to hold up the hammer or to increase the force of the blow.

In the drawings, *a* is a circular base upon which the upright frame *b* turns, the circular base *c* of which frame *b* corresponds with the base *a*, and the parts are connected by a suitable pivot or center bolt, 1. By means of the hand-wheel *d* and a pinion, *d'*, Fig. 5, and circular rack in the base *a* the frame *b* (and hammer carried by it) is revolved as required.

e is a bevel-pinion upon a vertical shaft, *f*, that is vertically above the pivot 1, so that the pinion *e* remains in gear with a driving pinion or wheel on a horizontal driving-shaft propelled by competent power, and the turning of the hammer around into any position does not throw this pinion *e* out of gear.

The power is communicated from a wheel, *g*, on the shaft *f* to the main driving-wheel *h*

by means of a belt or chain, *i*, passing over pulleys *k*. The driving-wheel *h* is on a horizontal shaft, 2, but is loose thereon and sets against a ratchet-wheel, *l*, permanently affixed on said shaft 2, and a spring-pawl, 3, is provided on the wheel *h*, taking the ratchet *l*. At the opposite end of the shaft 2 is a disk, *m*, and crank-pin 4, taking the cross lifting-slot 5 in the vertical rod *n*, that is guided at 6 and connected at 7 to the hammer-arm *o*. This arm *o* is made of two bars attached at 8 to the frame *b*, and at the outer end to the pendent hammer-handle *p* of the hammer *q*. *r* are bars parallel with the arm *o* and serving to keep the hammer-handle always vertical, so that the face of the hammer will be parallel with that of the anvil *s*.

It will now be seen that the crank-pin 4 raises the hammer *q*, and if the wheel *h* is revolving at such a speed that the crank-pin 4 will move sufficiently fast as the slot 5 descends, then the hammer will not be obstructed in its fall; but if a slow movement is employed the weight of the hammer on the crank-pin 4 (after the same passes its upward center point) will cause a quicker movement to the disk *m*, shaft 2, and wheel *l* than the driving-wheel *h* has, and the pawl 3 allows of this increased movement. Thus the hammer itself is not checked or obstructed in its movement, but falls with the force due to its gravity and accelerated velocity, and in consequence of the handle *q* of the hammer being kept vertical by the bars *r* the forging will be effected parallel with the anvil regardless of the thickness of material operated on.

The lower end of the rod *n* is provided with a piston in the air-cylinder *t*.

u is a lever on a fulcrum, 9, having at the inner end a stem carrying valves 10 and 11. The bottom of the cylinder *c* is perforated, and the distance between the valves 10 and 11 is greater than the thickness of said bottom *c*; hence when the workman by his foot or otherwise keeps the valves from resting on their seats the air flows out of and into the cylinder *t* freely as the hammer rises and falls. If the valve 11 is closed just before the hammer commences to rise, the partial vacuum will increase the blow of the hammer, and if the valve 10 is closed after the hammer is lifted its force will be arrested either partially or entirely by the

air-cushion formed in the cylinder *t*. Thus the workman has the hammer entirely under his control.

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

1. The lifting-slot *5*, formed as shown and arranged in connection with the crank-pin *4*, shaft *2*, ratchet-wheel *l*, pawl *3*, and wheel *h*, as and for the purposes specified.

2. Arranging the hammer *q*, arm *o*, parallel-motion bar *r*, and lifting-rod *n* in the manner and for the purposes specified.

3. The arrangement of the wheel *h*, belt *i*, shaft *f*, and pinion *e*, in combination with the

forging-hammer and series of anvils, in the manner and for the purposes specified.

4. The air-cylinder *t*, with the valves *10* and *11*, in combination with the wheels *h* and *l*, shaft *2*, rod *n*, and arm *o* to the hammer *q*, the parts being arranged and acting as and for the purposes specified.

In witness whereof I have hereunto set my signature this 26th day of November, 1861.

WILLIAM D. GRIMSHAW.

Witnesses:

J. D. BURDICK,

THOS. GEO. HAROLD.