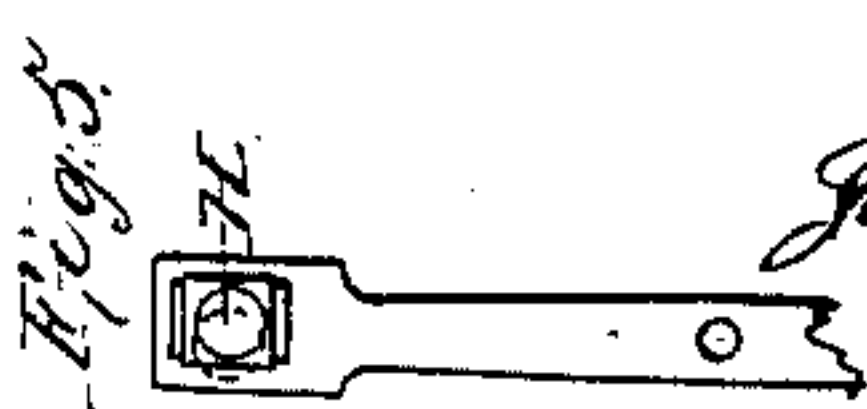
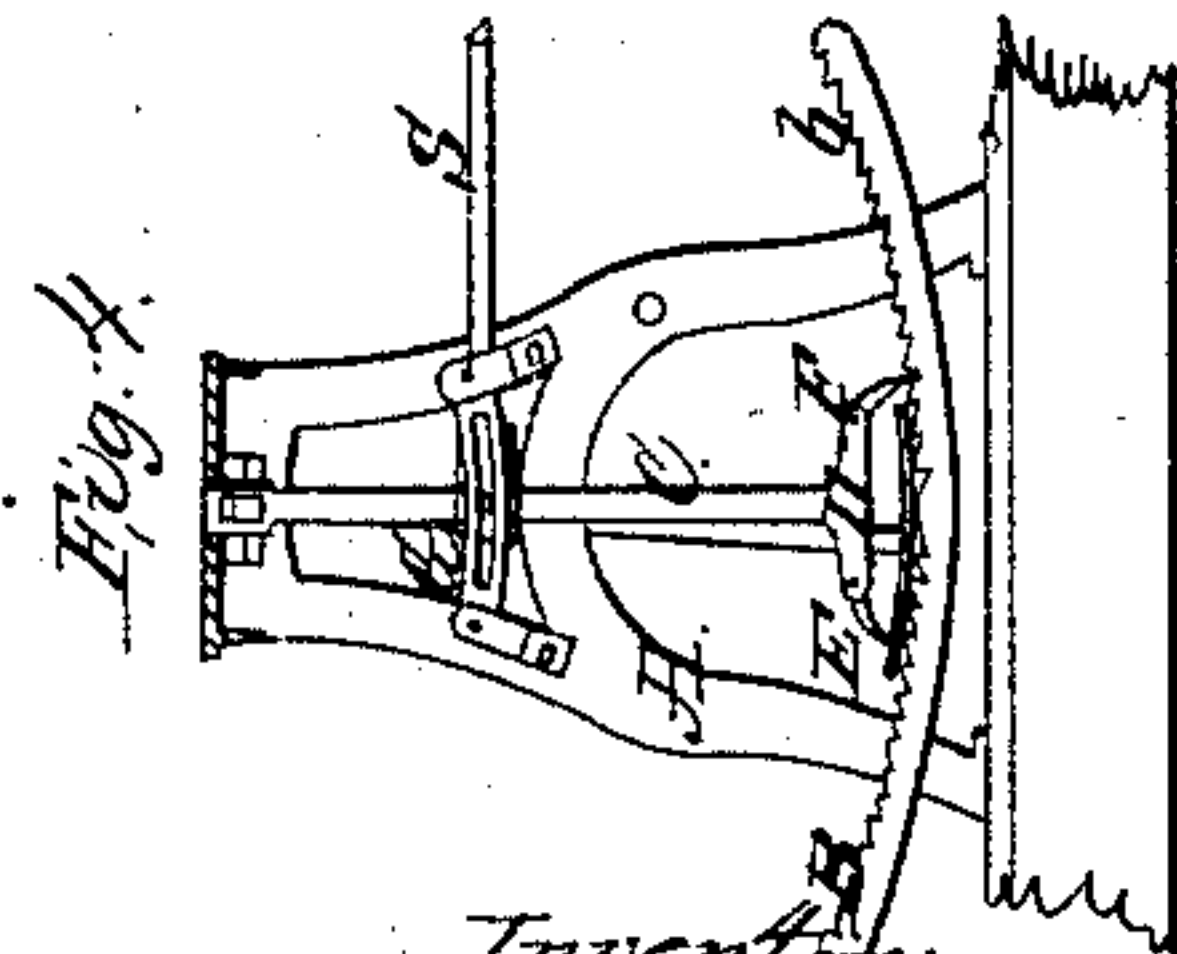
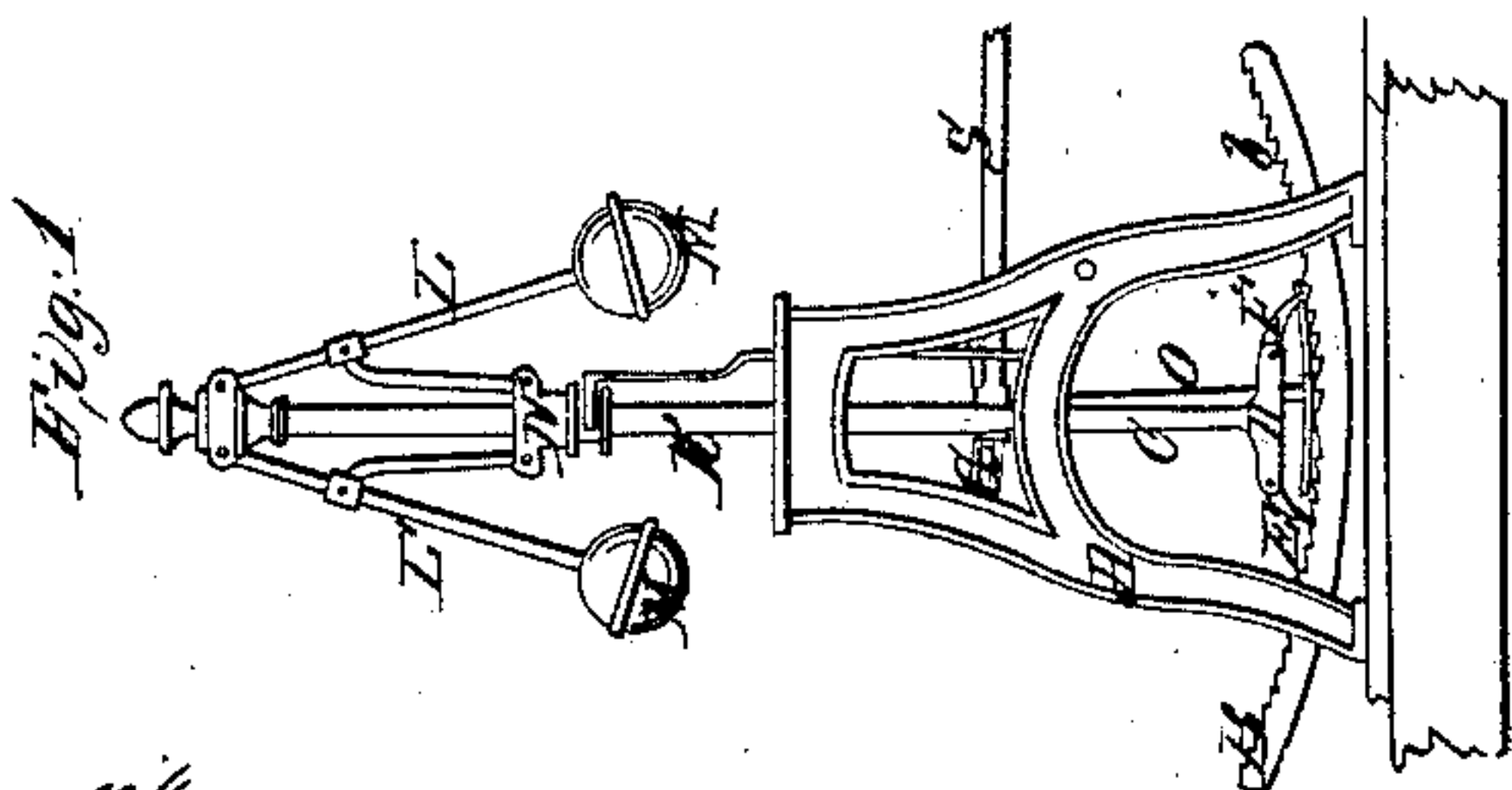
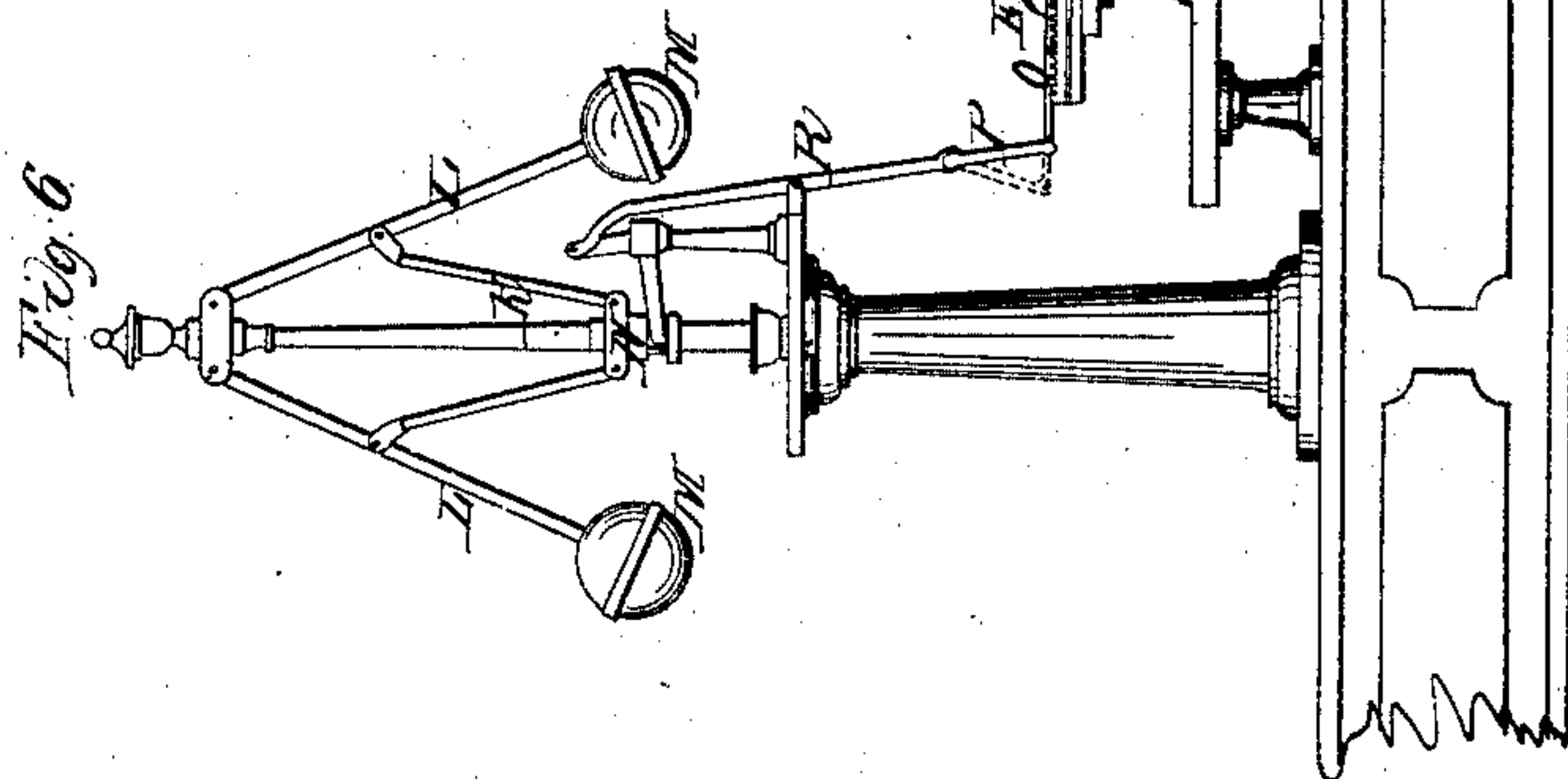
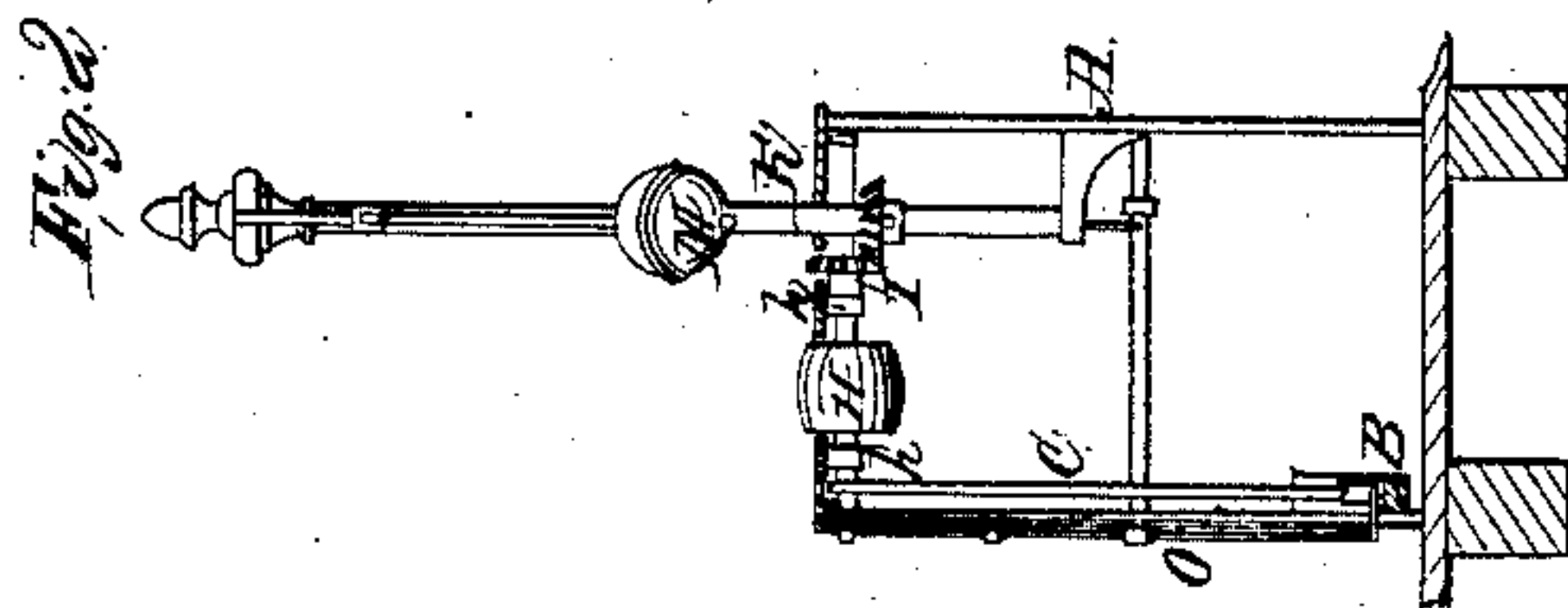
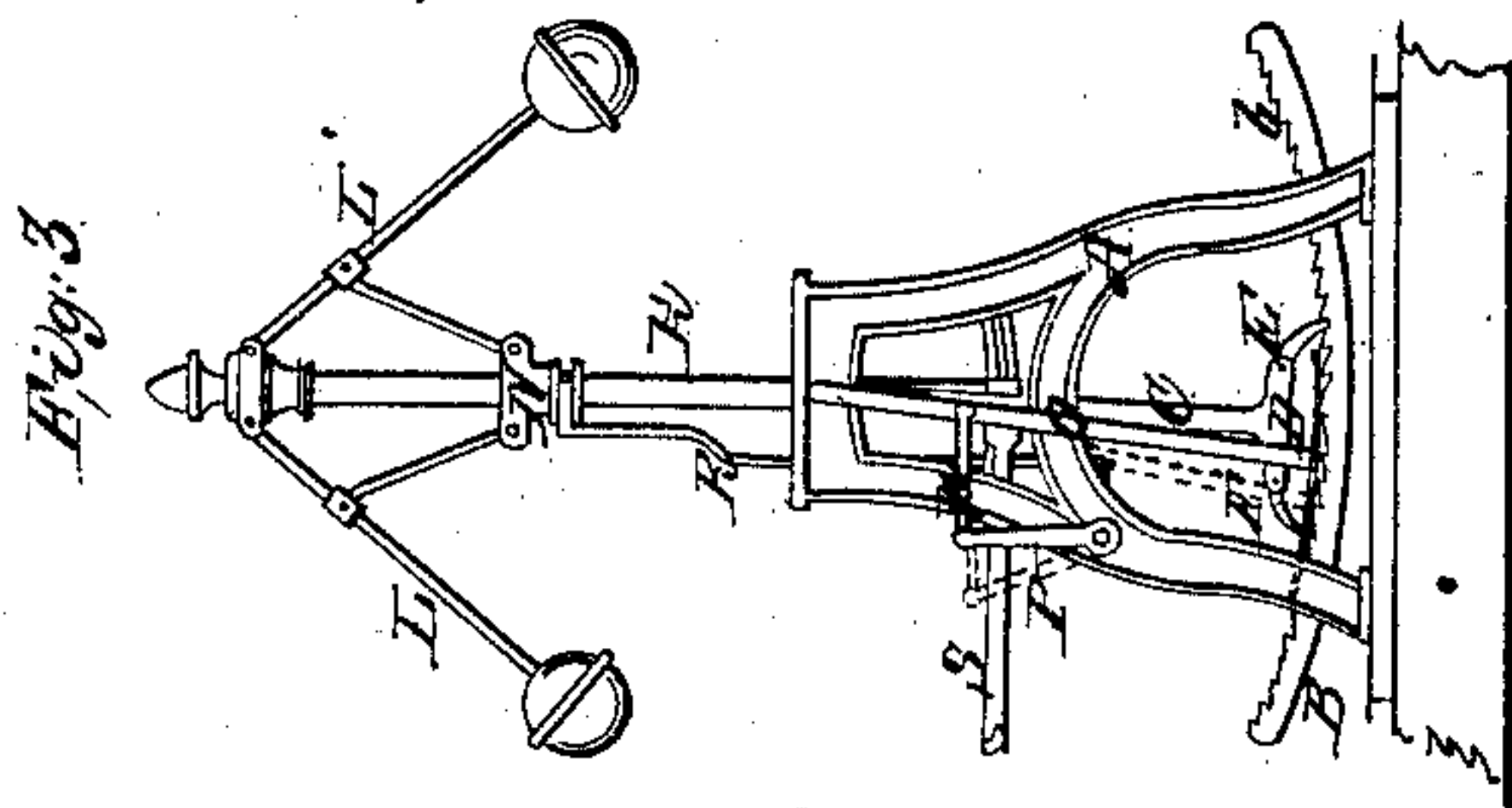


J. A. Burnap,

Governor.

N^o 30,384.

Patented Oct. 16, 1860.



Witnesses:
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Chas. Hackett

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UNITED STATES PATENT OFFICE.

JOHN A. BURNAP, OF ALBANY, NEW YORK.

REGULATOR FOR STEAM AND OTHER ENGINES.

Specification of Letters Patent No. 30,384, dated October 16, 1860.

To all whom it may concern:

Be it known that I, JOHN A. BURNAP, of Albany, in the county of Albany and State of New York, have invented a new and useful Apparatus to be Applied to Governors for Regulating Water or Steam Power.

It is simple in construction and regulates the least variation in speed, and possesses advantages over other contrivances for a similar purpose which will be herein clearly and distinctly specified.

The nature of my invention is as follows: A stationary segment rack provided with fine teeth on its upper surface, is secured to a suitable frame. A pendulous lever with a cross piece on its lower end having two studs, one on each side on which pawls play freely, is suspended on a stud which slides in a guide secured to the frame, for the purpose of keeping it a proper distance to allow the pawls to work on the rack. A horizontal shaft provided with a pulley and revolving in bearings secured to the frame has a bevel wheel on one end which meshes into a corresponding wheel which drives the governor spindle. The other end is provided with a crank or eccentric which works in a slot formed in the upper end of the pendulous lever and as it turns freely on a stud in the guide a reciprocating motion is imparted to it at both ends. A bar is suspended on a stud secured on the outside of the frame and is provided with a plate or guard on its lower end made with the same curve and moving freely over the segment rack. This swinging bar is connected with the governor by means of a rod secured to a crank on one end of a counter shaft, the other end of which is provided with a crank which connects with a rod to the sliding sleeve on the governor spindle in the usual manner.

The operation of the machine is as follows: Power being applied to the pulley on the shaft the governor is made to revolve, and as the speed increases the balls expand, thereby acting on the swinging rod by means of the crank, counter shaft, etc., and moving the plate or guard toward one end of the segment rack. One of the pawls on the lower end of the pendulous lever then drops into gear and the motion given to it by the crank or eccentric causes it to work into each tooth in succession on the segment rack, thereby moving the pendulous lever to one side and closing the gate or valve, connected by means of a rod to the stud in

the guide and checking the speed—but when additional machinery is thrown into gear the governor balls are depressed, and the swinging rod moves the plate or guard in the opposite direction, thereby keeping one pawl out of contact and allowing the pawl on the other side to catch into the rack and work the pendulous lever back to its original position, thus opening the gate or valve.

By my arrangement all the strain is taken off the governor, its only work being to move the plate or guard over the stationary rack; and by the use of a friction jointed arm connecting said plate or guard to the governor its relative position may be changed even when in motion, to suit the will of the engineer; it has been tested and applied to steam and water power and has produced satisfactory results.

The arrangement applied to steam engines differs in some respects from the one above specified; it consists of a straight rack secured to a frame and provided with a groove or channel on one side to receive a stud fixed on an arm to which are secured two pawls, the other end being applied to a lever which works the cut off rods, and provided with an elongated slot affording sufficient play to prevent a too sudden check or cut off of steam and thereby producing a more uniform motion.

Having thus set forth the novelty of my invention and to enable others skilled in the art to make and use the same, I will now proceed to describe it and certify that the accompanying drawings are a full and correct representation of the same, like letters corresponding to like parts.

Figure 1 represents a side elevation of the regulator as applied to a water wheel gate. Fig. 2 is an end view of the same with the top plate in section. Fig. 3 is a back view. Fig. 4 is a vertical section. Fig. 5 is an enlarged view of the upper end of the pendulous lever. Fig. 6 represents the regulator as applied to a steam engine, the red dotted lines indicating the position to which the friction jointed arm may be varied.

A, Figs. 1, 2, 3 and 4, represents the frame or stand to which is bolted the segment rack B provided with fine teeth on its upper surface.

C is a pendulous lever made with a cross piece D which has two pawls E and F, one on each end, turning freely on studs.

G is a guide secured to the frame A and

provided with a slot groove to receive a stud on which the pendulous lever C is suspended, the upper end being formed with a slot to receive the crank or eccentric on the shaft H (represented enlarged at Fig. 5). $h h'$ are bearings in which it revolves. I is a wheel secured on one end and meshing into wheel J on the governor spindle K (both of which wheels are beveled).

L L are the arms and M M the balls; N the sliding sleeve.

O is a swinging bar and plate or guard suspended from a stud in the frame A (and represented clearly at Fig. 3). P is a crank lever connected to it by the rod (p), the other end being fitted to counter shaft Q attached to the frame and provided with a crank on the other end connecting the sleeve N by the rod R.

S is a rod connecting pendulous lever C with the gate of a water wheel.

When the pulley on the shaft H is put in rapid motion the balls M M expand, raising the sleeve N, rod R and moving the crank lever P and swing bar and plate or guard O to one side; the pawl E then catches in the teeth (b) on the segment rack B, thereby holding the lower end of the pendulous lever P firmly and imparting its motion to the rod S to which the gate is connected and closing the same. But when the speed is diminished by extra machinery being thrown

into gear the depression of the balls acting on the counter shaft and cranks forces the swinging bar and plate or guard O in the opposite direction, thereby opening the gate by the rod S.

In the regulator applied to a steam engine as shown in Fig. 6, A is the rock shaft frame to which is secured the straight rack B provided with fine teeth (b) on its upper side and having a groove or channel cut in one side to receive a stud fixed on an elbow on one end of a bar C which carries two pawls E and F playing freely on a stud. The other end is connected to a lever G which moves on a crank D on the rock shaft H worked by an eccentric. The stud which secures the lever G plays freely through the upper end of crank D and connects with rods S S which work the cut off.

I claim—

1. The movable pendulous lever or ratchet arm C working on a fixed rack B, said lever being constructed and operating substantially as and for the purpose specified.

2. The friction jointed arm P for adjusting the relative position of the guard O, substantially as set forth.

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Witnesses:

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