

H.F. Shaw,

Elevator.

No. 102,719.

Patented May 3. 1870.

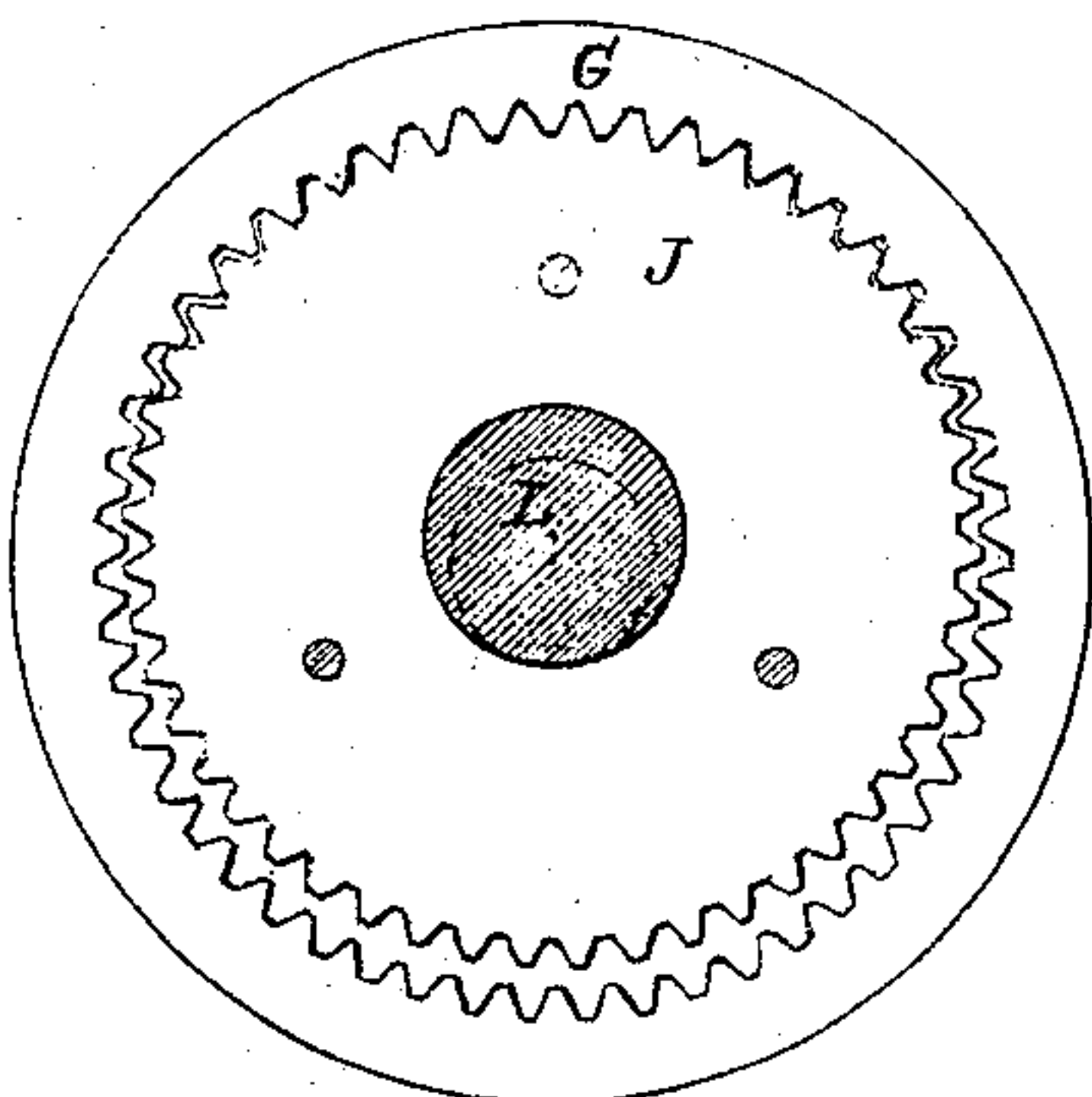
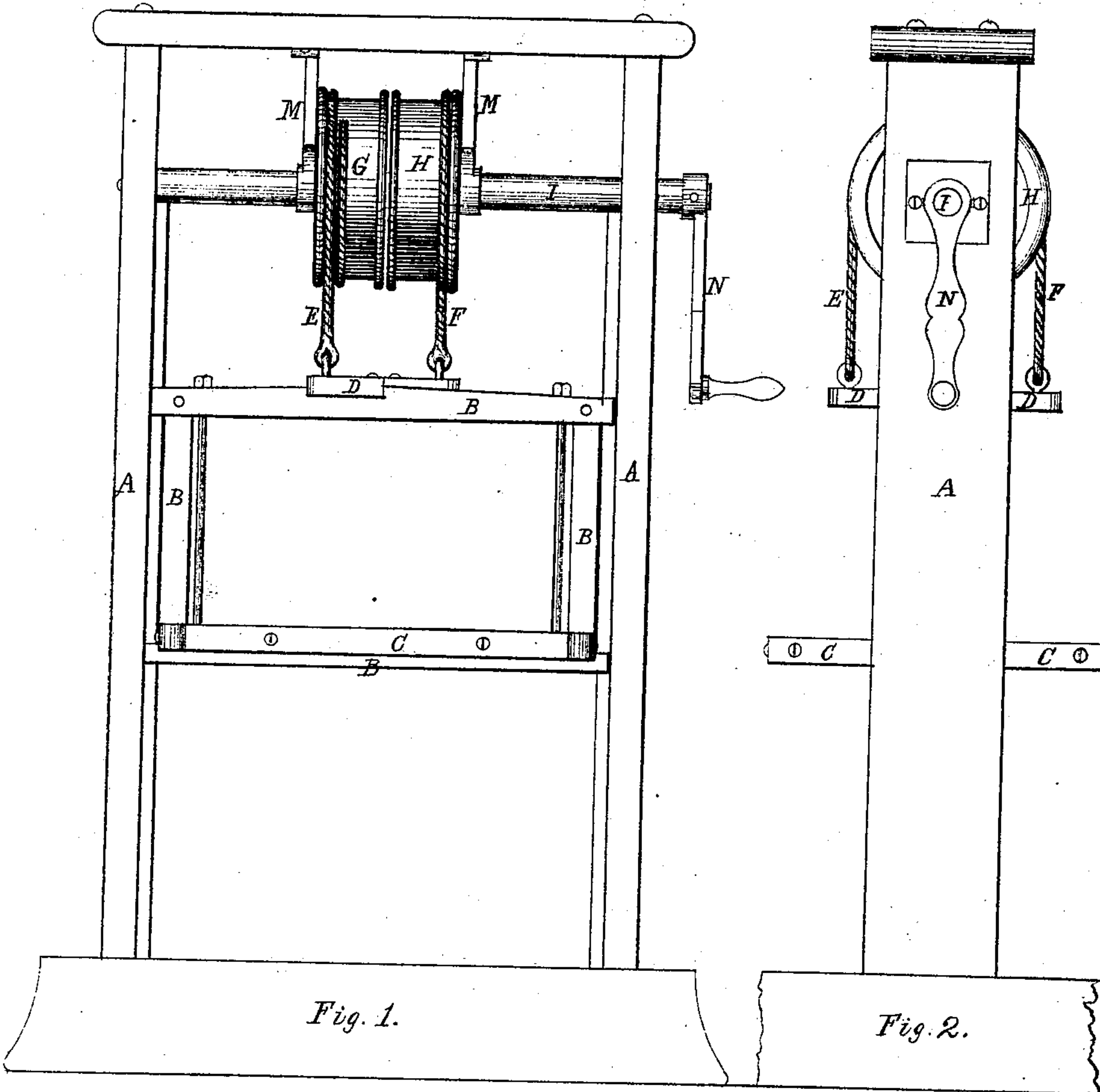


Fig. 5.

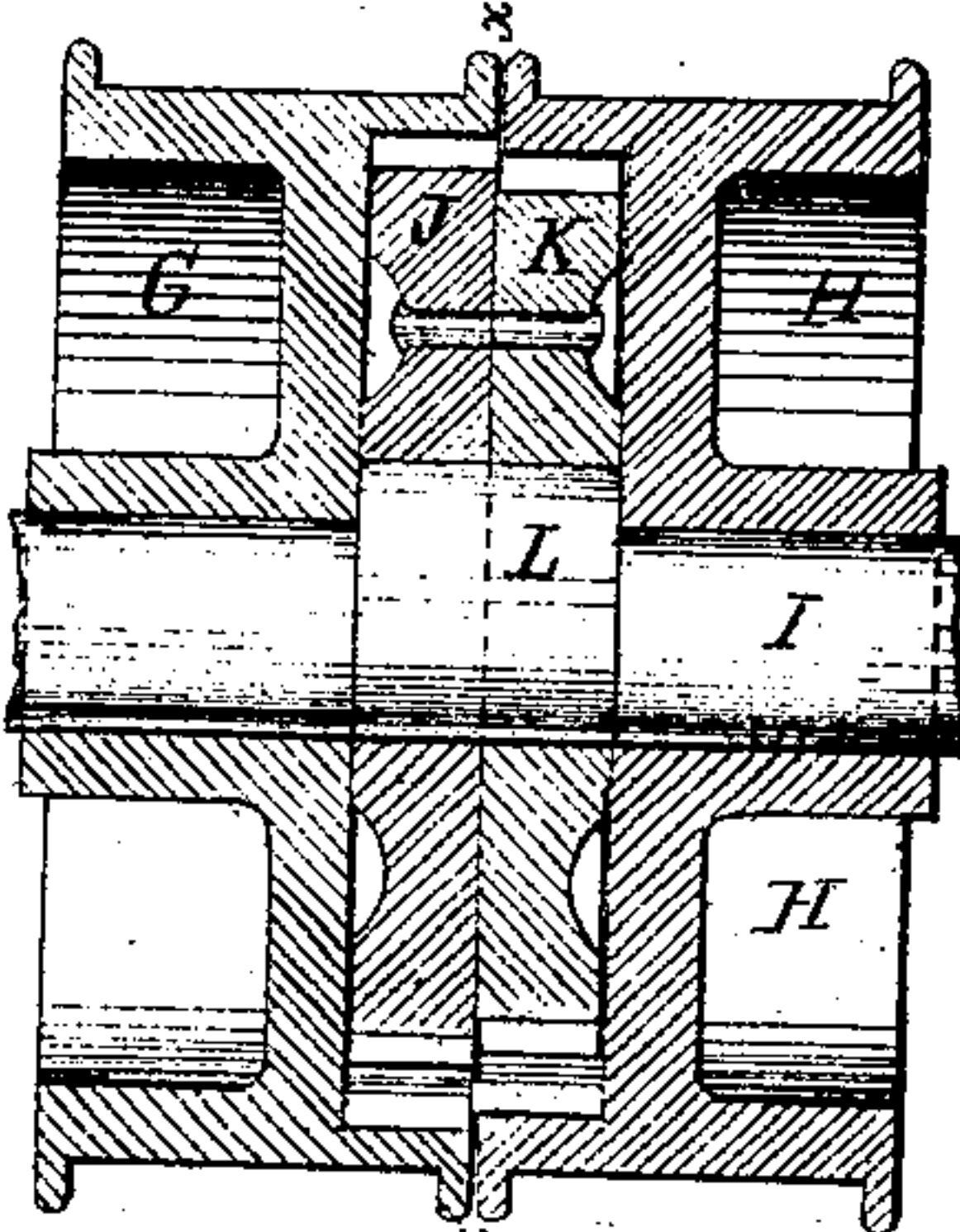


Fig. 3.

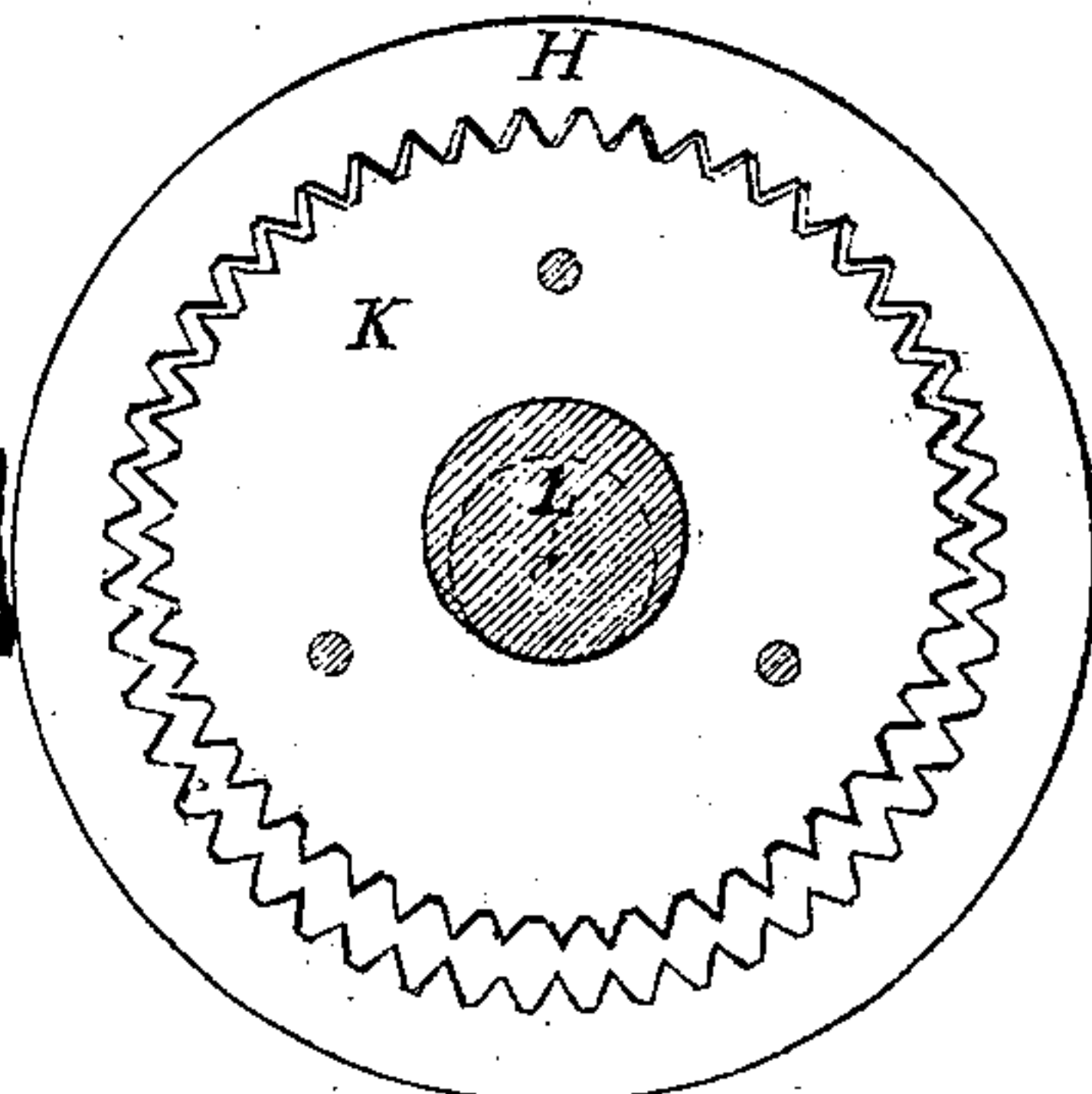


Fig. 4.

Witnesses.

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HENRY F. SHAW, OF WEST ROXBURY, MASSACHUSETTS.

Letters Patent No. 102,719, dated May 3, 1870.

IMPROVED HOISTING-GEAR.

The Schedule referred to in these Letters Patent and making part of the same

I, HENRY F. SHAW, of West Roxbury, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Differential Gear-Power, for raising and lowering heavy weights, of which the following, taken in connection with the accompanying drawings, is a specification.

Nature and Object of the Invention.

The subject-matter of my invention relates to an improvement upon a former invention of mine, described in Letters Patent granted to me March 10, 1868, and numbered 75,304, which consisted of two drums or cylinders mounted upon two eccentrics, placed diametrically opposite to each other upon the same shaft, one of said drums having an internal spur-gear formed in its side, and the other drum being provided with an external spur-gear of a somewhat smaller diameter, which meshes into the internal gear, and, by the action of the eccentrics, the two gears are made to roll upon each other, and, by virtue of the resistance presented by the load, which is suspended by two ropes depending from opposite sides of said drums, they are made to revolve in opposite directions, raising the load when the eccentric shaft is revolved in one direction, and lowering the load when it is revolved in the opposite direction.

For certain purposes, such, for instance, as operating the carriage of passenger-elevators, this arrangement has been found to be objectionable, on account of the vibratory or shaking motion transmitted to the carriage and platform, by the oscillating motion given to the periphery of the drums by the action of the eccentrics.

To obviate this objection and cause the two hoisting-drums to revolve in opposite directions and concentric with the actuating-shaft, so as to produce a perfectly steady and constant motion for raising the load, and at the same time, be perfectly self-sustaining in any position, is the object of my present invention.

My invention consists in the arrangement of two hoisting-drums, side by side upon the same shaft, to each of which, upon sides opposite to each other, is attached a hoisting-rope so connected to the load to be raised that each of said drums shall sustain half the weight, said drum being so fitted to said shaft as to be free to revolve thereon, and having an internal spur-gear formed in each of their contiguous ends of different diameters, but both concentric to the shaft on which they revolve, said drums being operated by the action of two external spur-gears of different diameters, bolted or riveted firmly together, or cast in one piece so as to become practically one gear, and mounted upon a single eccentric upon the same shaft upon which the drums are mounted, and between said

drums one-half of said external gear meshing into one of the internal gears, and the other half into the other internal gear, as shown, each of said internal gears, with the load attached thereto, serving as a fulcrum for the "planet-wheel," or spur-gear mounted upon the eccentric, to act upon to revolve the other drum, and *vice versa*.

Instead of the gears J and K, made as described, a single spur-gear, with teeth cut parallel to each other across the whole face of the same, may be used, the internal gears on the winding drums being made of equal diameters, but having a different number of teeth, and the same result be obtained without changing the principle of operation.

Description of the Drawings.

Figure 1 is a front elevation of an elevator with my improvements applied;

Figure 2 is a side elevation of the same;

Figure 3 is a longitudinal section through center of drums and the gearing, showing the shaft and eccentric in elevation;

Figure 4 is a transverse section through the shaft and eccentric on line *x x* on fig. 3, and showing one of the drums, its internal gear, and that half of the external gear which operates therewith in the elevation; and

Figure 5 is a section on the same line, and showing the other drum and its gearing in elevation.

General Description.

A A are the guiding-posts of the elevator;

B, the frame of the carriage; and

C, the platform.

D is a cross-bar secured to the top of the carriage, and to which the lower ends of the ropes E and F are attached, one at either end, the other end of said ropes being secured to the periphery of the drums G and H upon opposite sides thereof, as shown, the rope E connecting with the drum G, and the rope F with the drum H.

The drums G and H are fitted loosely to the shaft I, so that they are free to revolve thereon, and have an internal gear formed in each of their contiguous ends, the pitch circles of which are concentric with the shaft I.

J and K are two spur-gears riveted firmly together so as to form practically but one gear, and mounted upon a single eccentric, L, their pitch circles being of different diameters and eccentric to the shaft I.

M M are hangers to support the shaft I near the point where the load is applied.

N is a crank, by means of which the shaft I may be rotated.

The operation of my improved machine is as follows:

The parts being in the position shown in the drawings, and the load being suspended in the manner described, so as to be equally divided between the two drums, it will readily be seen that the tendency of the load to cause the two drums to revolve in opposite directions will cause the teeth in the upper portion of the internal gear in the drum G to press hard against one side of the teeth in the upper portion of the spur-gear J, and, if not resisted by a counter pressure, would cause the gear J to revolve in the direction in which said pressure is exerted, and the load would run down, but it will be seen that the teeth in the upper portion of the internal gear in the drum H press with equal force upon the opposite side of the teeth in the upper portion of the spur-gear K to turn that in the opposite direction, and thus the tendency of one drum to revolve, just counteracts the tendency of the other to revolve in the opposite direction, and the load is held in suspension.

Now, if the shaft I be revolved in the direction of arrow, the eccentric L will rotate in the gears J and K, and cause their points of contact with the internal gear to travel around the shaft, the gears themselves being kept from revolving by virtue of the tendency of the load to descend, (caused by gravity,) acting upon said drums to cause them to revolve in opposite

directions, and, as a result of said changing of the point of contact, in combination with the difference in diameters, and number of teeth in the several gears, both drums will be revolved in opposite directions in a path concentric to the shaft upon which they are mounted, and wind the ropes upon their peripheries, and thus raise the load, the motion being perfectly steady and free from any unpleasant jar or vibration.

By reversing the motion of the shaft the action is reversed and the load will be lowered.

Having thus fully described my improvement,

What I claim as new and desire to secure by Letters Patent of the United States, is—

The drums G and H mounted upon the same shaft, each being provided with an internal gear and sustaining half the load to be raised, when said drums are made to revolve in opposite directions by the action of a single spur-gear mounted upon an eccentric upon the actuating-shaft, substantially as described.

Executed at Boston this 23d day of February, 1870.

HENRY F. SHAW.

Witnesses:

D. B. HANSON,
G. E. WHITNEY.