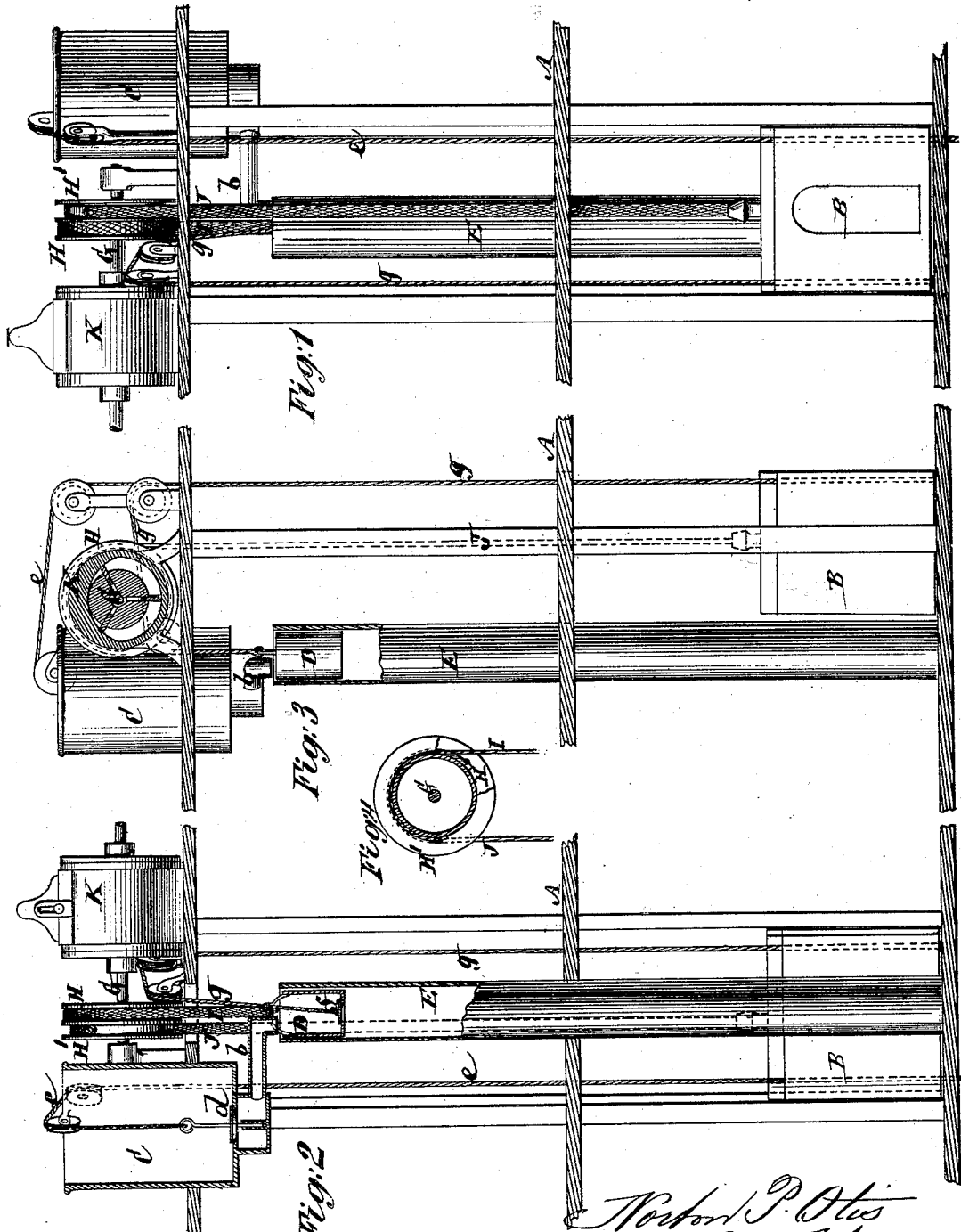


N. P. OTIS.
Hoisting-Machine.

No. 166,219.

Patented Aug. 3, 1875.



Witnesses:
Michael Ryan
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Norfolk P. Otis
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UNITED STATES PATENT OFFICE.

NORTON P. OTIS, OF YONKERS, NEW YORK.

IMPROVEMENT IN HOISTING-MACHINES.

Specification forming part of Letters Patent No. **166,219**, dated August 3, 1875; application filed January 8, 1875.

To all whom it may concern:

Be it known that I, NORTON P. OTIS, of Youkers, in the county of Westchester and State of New York, have invented certain Improvements in Hoisting Apparatus or Elevators, of which the following is a specification:

This invention more particularly relates to hoisting apparatus or elevators in which a variable counter-balance is used to control the load; and the invention generally consists in a combination, with such elevators, of a fluid retarder, arranged to control either the load or the counter-balance, as regards giving a fixed speed to the elevator, that otherwise would have an unlimited velocity. Water, sand, loose chain, or other substance, fluid, or material, may be used to make up the variable counter-balance, by which the load, car, or traveling platform is raised and lowered. It will suffice here, however, to describe the invention in connection with a hydraulic elevator. The invention also includes, in connection with such an elevator and fluid retarder, independent chains or ropes, carrying the load and counter-balance, and attached on opposite sides of the axis of the shaft, which is controlled by the retarder.

In the accompanying drawing, Figure 1 represents a side view of a hydraulic elevator having my improvement applied; Fig. 2, a partly-sectional similar view of the same from the reverse side, and Fig. 3 a partly-sectional elevation thereof at right angles to the other figures. Fig. 4 is a transverse section of the pulleys with attached counterbalance-chains.

A is one of any number of intermediate floors, through which the car B or simple load is raised or lowered by the elevator. C is the overhead tank or reservoir, which is supplied with water in the usual or any suitable manner, and from which water is run by a spout, *b*, into a bucket, D, on opening a valve, *d*, in the bottom of the reservoir, through the agency of a cord or chain, *e*, as in the case of other hydraulic elevators, said bucket, which works up and down within a pipe or trunk, E, forming, when loaded with water, the variable counter-balance used to raise or lower the load. Such bucket is provided with a valve, *f*, controlled by a cord, *g*, to discharge

the water wholly or in part from it, as required, for the purpose of effecting its ascent, or otherwise adjusting or controlling it in relation with the load. G is the main overhead shaft, carrying drums or pulleys H H', around the one, H, of which the counterbalance rope or chain I is passed, and made fast to said shaft on the one side of its axis, while the other pulley, H', receives around it, in a reverse direction, the independent hoisting rope or chain J, also made fast to the shaft G on the other side of its axis, so that as either one rope or chain winds the other unwinds, and, by the winding-up chain increasing in leverage on its drum as the slack of the unwinding chain increases, but the leverage on its drum diminishes, an equilibrium is established between the two chains throughout their action. If preferred, however, the two ropes or chains I J, instead of varying their diameters on the drums, may retain a uniform diameter by a spiral disposition of them along the drums.

Connected with the shaft G is a rotary or other fluid retarder, K, but preferably a rotary one—such, for instance, as that described in Letters Patent No. 143,518, issued to Gideon B. Massey and A. B. Darling October 7, 1873. Said retarder, by its connection with the shaft G, and the independent connection of the variable counter-balance D relatively with the load, operates to control the speed of the counter-balance irrespectively of the load, so that in case of any detachment of the latter, whether by accident or otherwise, the velocity of the counter-balance will still be checked or controlled and made uniform; but this independent control of the counter-balance by the retarder in no way interferes with the latter's controlling the velocity of the load as well, by reason of the independent connection, as described, of the load with the same shaft G. Thus the same retarder controls both separately and jointly the counter-balance and the load.

Of course, it is not absolutely necessary that the fluid retarder should be directly connected with the shaft G, as the same may be indirectly connected therewith by means of gearing.

The action of a fluid retarder, as regards insuring a fixed or regulated velocity to the

mechanism controlled by it, being well understood, there is no necessity here to describe the same.

I claim—

1. The combination of a fluid retarder with a variable counter-balance, controlled directly by the fluid retarder, substantially as specified.

2. The combination, with a variable counter-balance and the car or load controlled by it, of a fluid retarder, for regulating the velocity of both, essentially as described.

3. The combination, with a fluid retarder, for controlling both the variable counter-balance and the car or load, of the independent chains or ropes connecting said counter-balance and load with reverse sides of the shaft controlled by the retarder, substantially as specified.

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