(No Model.)

R. C. SMITH.

HYDRAULIC ELEVATOR.

No. 420,549. Patented Feb. 4, 1890.

Fig. 1.

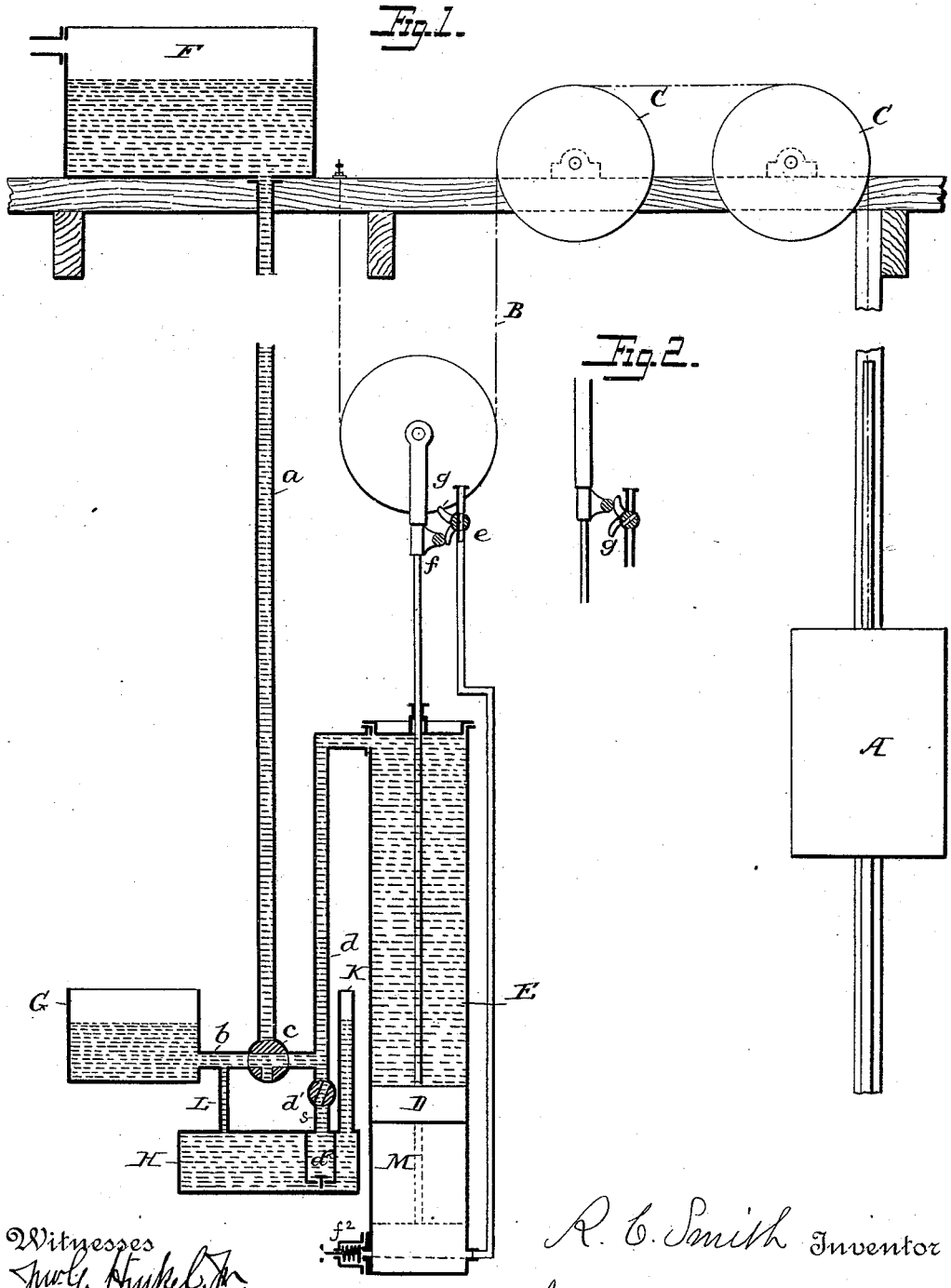

Fig. 2.

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RUDOLPH C. SMITH, OF YONKERS, NEW YORK.

HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 420,549, dated February 4, 1890.

Application filed March 4, 1887. Serial No. 229,725. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH C. SMITH, of Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Hydraulic Elevators, of which the following is a specification.

My invention relates to improvements in hydraulic elevators having the operating or driving side of the cylinder connected to a source of supply of fluid under pressure and the idle side to a closed air-reservoir, wherein air is compressed and expanded for the purpose of equalizing the motive power, an arrangement for which Letters Patent No. 357,345, dated February 8, 1887, have been granted to me.

The object of my invention is to save the extra space of the reservoir and yet gain part of the equalization of the motive power due to the use of a separate reservoir of proper proportions, as fully described in said Letters Patent, No. 357,345, dated February 8, 1887.

In carrying out my invention in an elevator-engine in which the car is raised by a fluid admitted to the top of the cylinder above the piston and under pressure from any suitable source—as an elevated tank, an accumulator, or weighted plunger—I provide a valve *e* for opening or closing the idle end of the cylinder. For convenience' sake, I lead a pipe from the idle end to a proper location near the moving parts, so as to get the above-mentioned valve in proper position to be actuated by means of a toe attached to the piston-rod. It is clear that the valve may be placed close to the bottom of the cylinder, and that a proper connection attached to the traveling parts and extending down to the location of the valve may be used instead.

In the accompanying drawings, Figure 1 represents a sectional elevation of my improved hydraulic elevator, illustrating the operating-cylinder with the pipe leading to the traveling parts. Fig. 2 is a detached sectional view.

A designates the elevator car or cage fitted to travel along vertical guides or ways and connected by hoisting-cables B, which pass over overhead sheaves C, with a piston D fitted to travel in an operating-cylinder E, which may be arranged either vertically or in any inclined position.

F designates an elevated tank, which represents a source of supply for water under pressure, and from which a supply-pipe *a* leads downward to the upper portion of the cylinder E above the piston. With the upper end of the cylinder is also connected a discharge-pipe *b*, which leads to a discharge-tank G. The communication between the supply-pipe *a* and cylinder and between the cylinder and discharge-pipe is controlled by any suitable valve, a three-way cock or plug-valve *c* being shown here as a simple illustration of such valve.

The parts above described may be embodied in elevators of different constructions having other features and appliances, if desired. As shown, there is, in addition, an open tank H, a pipe *s* communicating with said tank and with the pipe *d*, and provided with a cock d' and check-valve d^2, the said parts operating to secure a water-column brake, substantially as the corresponding parts set forth in my aforesaid Letters Patent No. 357,345. A spring-weighted valve f^2, opening outwardly, serves to relieve excessive pressure in the cylinder E.

For counterbalancing a part of the pressure and weight on the top of the piston, air is employed below said piston for this purpose.

The cylinder is made of sufficient length to allow the proper travel for the piston. The valve *e* is open, while the piston travels upward from the lowermost position until the toe *f* on the piston-rod strikes the lever *g*, actuating the valve, thereby closing it. The part of the cylinder below the piston acts now for the rest of the stroke as an air-reservoir, and the increased weight of ropes and water-column are partly counterbalanced by the varying pressure of the air, as described in Letters Patent No. 357,345, dated February 8, 1887. At the return-stroke the valve *e* is opened as soon as the toe *f* strikes the lever *g*, and the last part of the return-stroke is made against the uniform pressure of the atmosphere.

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

The combination of an elevator car or cage, an operating-piston, ropes or cables connecting the cage with the piston, a lifting-cylinder to which a liquid under pressure is supplied at one side only of the piston, a pipe communicating with the opposite end of the cylinder, to which air or other elastic gas is supplied, a valve in said pipe, and mechanism operated by the moving parts of the elevator for opening or closing said valve at a determined position of the piston, and keeping it closed during the remaining part of the discharge-stroke of the piston and until the corresponding part of the return-stroke of the piston is completed, substantially as set forth.

RUDOLPH C. SMITH.

Witnesses:
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