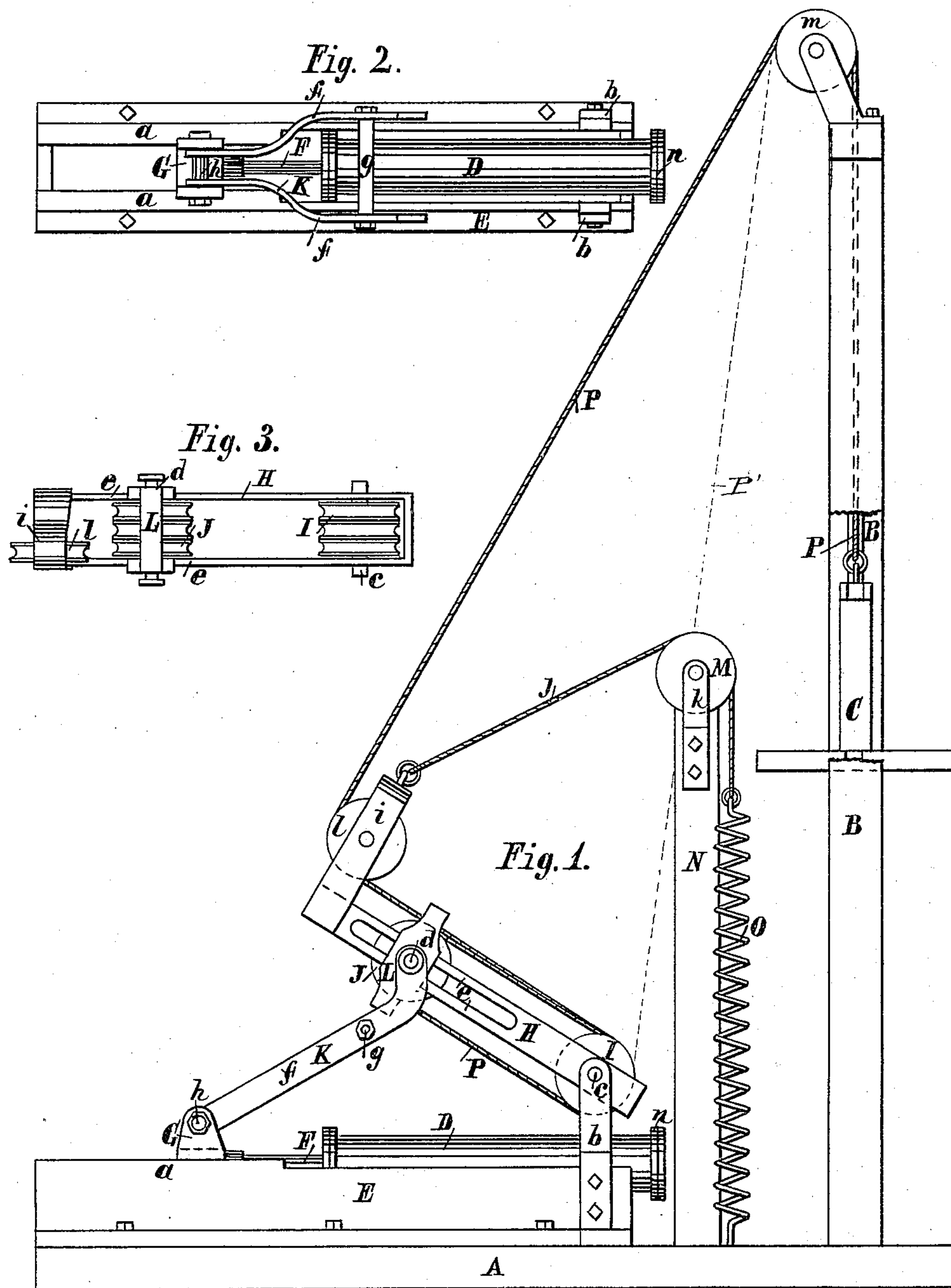


(No Model.)

H. F. SHAW.  
HYDRAULIC ELEVATOR.

No. 316,070.

Patented Apr. 21, 1885.



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# UNITED STATES PATENT OFFICE.

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## HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 316,070, dated April 21, 1885.

Application filed December 26, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY F. SHAW, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Hydraulic Elevators, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to construct a hydraulic elevator which will use for loads differing in weight different quantities of water, and which, by automatic adjustment, will require for a light load less amount of water than for a heavier load, and will use water proportionate to the weight of the load.

My invention consists, primarily, in means whereby the guide or guides for a sheave or set of sheaves in its rectilinear movement may be for different loads brought to positions forming different angles with the direction of motion of the piston, and in the combination of said means and said guide or guides thus adjustable with the cylinder, piston, and piston-rod of a hydraulic elevator, as hereinafter set forth.

The invention also consists in such further details of construction as are hereinafter described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a side elevation of so much of a machine, hoistway, and car as is necessary to illustrate my invention. Fig. 2 is a plan view of parts of the machine, the pivoted frame bearing the sheaves having been removed. Fig. 3 is a plan view of the swinging frame and of the sheaves therein.

The base or floor A, hoistway-guides B, and car C may be such as the location and work to be performed require. The cylinder D may be fixed in a support, E. In the cylinder is the ordinary piston, having a rod, F. The piston-rod is connected at the outer end to a block, G, which moves on ways *a a*, fixed with respect to the cylinder, as by means of the support E.

Pivoted in suitable position with reference to the cylinder, as to the stands *b b*, fastened to the support E, is a frame, H, adapted to swing about a pivot at *c*. There are the two sheaves or two sets of sheaves common to this class of elevators, one set, I, to revolve about a stationary axis, which I prefer to have the

same as the axis of the pivot at *c*, and the other set, J, which has a rectilinear movement to and from the set I, the sheaves J being adapted to revolve about an axis, *d*. Guides are connected with the frame H at *e* for the set of sheaves J in said rectilinear movement.

An arm, K, which may be formed of the two side pieces, *f f*, joined by the cross-bar *g*, is pivoted at one end with respect to the piston-rod, as to the block G at *h*, and at the other end to the carriage L of the set of sheaves J, as at *d*. I prefer to pivot this end of the arm K directly on the extended axis or shaft *d*, and to have this shaft pass through and slide in the slots in the guides *e*, as shown; hence the carriage L with such construction may be dispensed with.

To the frame H, at a distance from the pivot *c*, preferably at or near the outer end of the frame, as to the stand *i*, fastened to the frame, is fastened one end of a rope, *j*. This rope extends over a pulley, M, suitably located, as on a stand, *k*, fixed on a support, N, and is connected at the other end with one end of a spring, O. The other end of this spring is fastened fixedly, as to the base or floor A. A weight suspended by the rope *j* may take the place of the spring. With a large machine a weight would be preferable.

The rope P, which is fastened at one end, and passes about the sheaves I and J, as is common, extends about a pulley, *l*, supported by the frame H or the stand *i* thereon, and thence over a pulley, *m*, at the top of the hoistway, and is fastened to the car at the other end, forming the hoisting-rope, as shown.

Water under pressure being admitted to the cylinder between the head *n* and the piston, the piston-rod is pushed outward, causing, by means of the arm K, the frame H to swing and be adjusted according to the weight of the load. This swinging and adjustment of the frame will also occur when water is allowed to flow out of the cylinder for the purpose of lowering the load. With the lightest load for which the machine is adapted, the frame H, while being inclined in the direction shown, will assume that position in which, of all the positions it may take, it is nearest to a vertical line, or a line at right angles to the direction of movement of the piston. With the heaviest load the frame H will be nearest to



or quite in a line horizontal or parallel with the direction of said movement of the piston. With loads of intermediate weight this frame will assume correspondingly inclined positions. For any distance which the sheaves J may move to or from the sheaves I, the nearer the frame H is to a vertical position the less will be the movement of the piston. Therefore less water will be required to raise a light load than to raise a heavier load, and the water used will be in proportion to the weight of the load. The adjustment of the machine whereby this result is obtained is also automatic, as has been shown.

Certain variations in the arrangement of parts of the mechanism may be made, and some or all of the essential features of my invention be involved. The rope P might extend directly from the sheaves I, as shown by the dotted line at P', thus dispensing with the pulley L, and the car be moved a distance corresponding to the movement of the sheaves J to or from the sheaves I after the frame H has taken that position appropriate for the weight of the load; but the motion of the frame H, when changing from one position to another, would not be communicated to the car.

When it is inconvenient or undesirable to have the frame H swing in a vertical plane, the machine may be so placed that the frame may swing in a horizontal or other frame. As with other elevators in common use, the machine and hoistway may be located at such distance from each other and with reference to each other as the conditions of the building or other place may require.

I claim as my invention—

1. In a hydraulic elevator in which, for hoisting or lowering the load, one set of sheaves has movements to or from another sheave or set of sheaves, adjustable guides for the set of sheaves having said rectilinear movements,

whereby it may be caused to move in a direction having any desired angle with the direction of the motion of the piston, substantially as set forth.

2. In a hydraulic elevator in which, for hoisting or lowering the load, one sheave or set of sheaves has movements to or from another set of sheaves, guides for the sheave or set of sheaves having said rectilinear movements set at an angle with the direction of the motion of the piston, substantially as set forth.

3. In combination with a cylinder, piston, and piston-rod, a pivoted support or frame, bearing-guides for a set of sheaves having rectilinear movements, and an arm or connection connecting said piston-rod with said sheave or set of sheaves, substantially as set forth.

4. In combination with a cylinder, piston, and piston-rod, frame H, sheaves I and J, carriage L, and connecting-arm K, substantially as specified.

5. In a hydraulic elevator, the combination, with the cylinder, piston, and piston-rod, of a pivoted support or frame, H, having guides for sheaves J, connecting-arm K, pivoted with relation to piston-rod and said support or frame, substantially as specified, and counter-balance, as the spring O, substantially as and for the purpose set forth.

6. The combination of cylinder, piston, and piston-rod, pivoted frame H, sheaves I and J, arm K, and hoisting-rope P, substantially as set forth.

7. The combination of a cylinder, piston, and piston-rod, pivoted frame H, sheaves I and J, arm K, hoisting-rope P, rope j, and counter-balance, as the spring O, substantially as described.

HENRY F. SHAW.

Witnesses:

EDW. DUMMER,  
J. G. W. ROMANS.