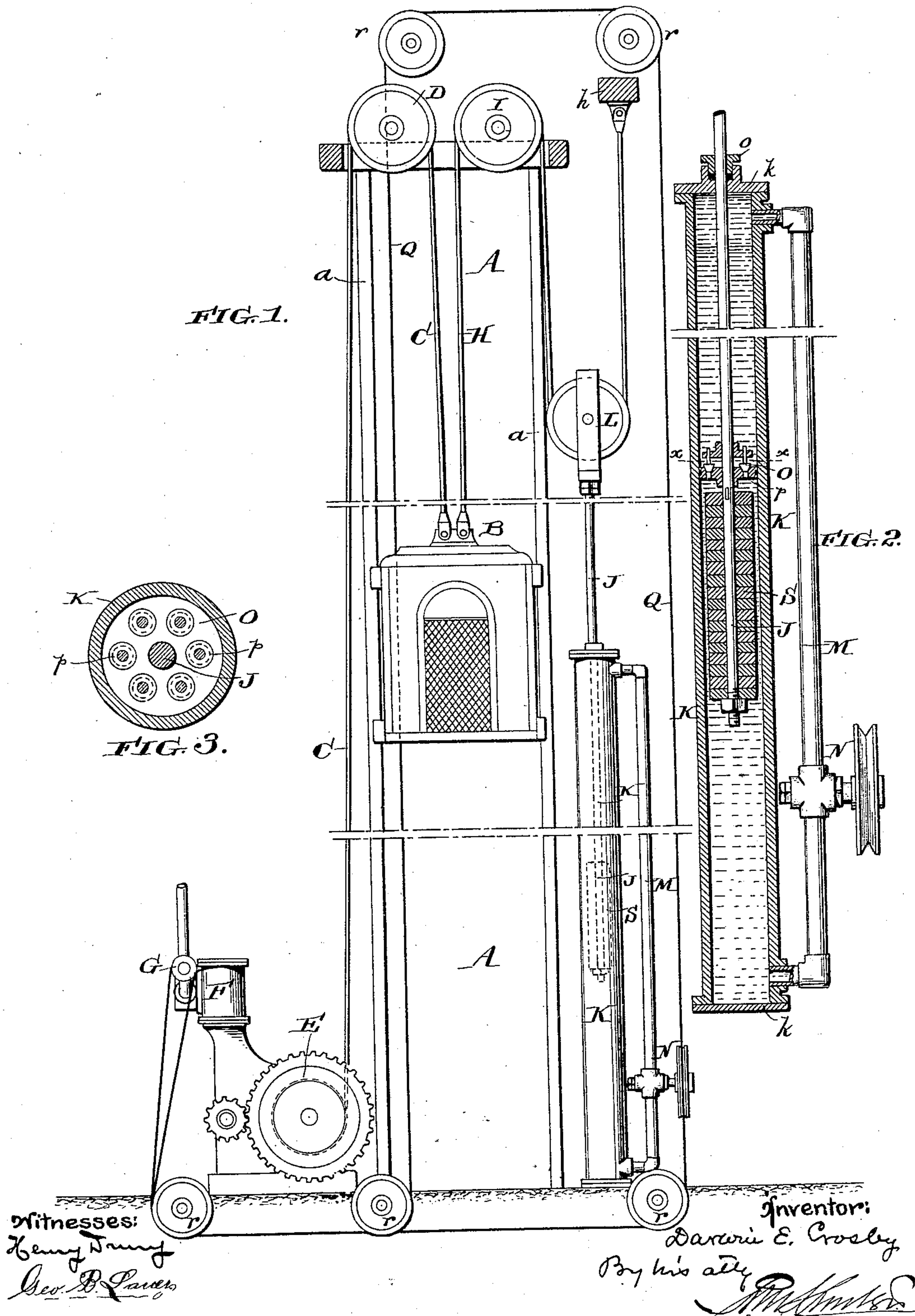


(No Model.)

D. E. CROSBY.
ELEVATOR.

No. 452,426.

Patented May 19, 1891.



UNITED STATES PATENT OFFICE.

DARWIN E. CROSBY, OF PHILADELPHIA, PENNSYLVANIA.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 452,426, dated May 19, 1891.

Application filed December 1, 1890. Serial No. 373,263. (No model.)

To all whom it may concern:

Be it known that I, DARWIN E. CROSBY, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Elevators, of which the following is a specification.

My invention relates to elevators; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

It is the object of my invention to provide an elevator with a safety attachment to prevent accidents from the falling or too rapid descent of the elevator-carriage, caused by a breaking of the hoisting-rope or for any other reason, and to control the speed of the descent of the carriage independently of the hoisting devices.

In carrying out my invention I employ, in addition to the ordinary hoisting devices, which may be of any suitable character, a second rope or cable connected with the elevator and carrying a plunger which is moved with the motion of the elevator-carriage through a cylinder filled with liquid. The movement of the plunger through the cylinder depends upon the freedom of the liquid therein to circulate, and this freedom of circulation of the liquid is controlled by suitable mechanism, so that the movement of the plunger may be regulated or entirely prevented, thus also regulating or preventing the movement of the elevator-carriage with which this plunger is connected. The valve mechanism for controlling the circulation of the liquid in the cylinder is operated from the movable elevator-carriage and may be operated simultaneously with the operation of the hoisting mechanism, as is hereinafter more fully described.

My invention also includes certain novelties of construction and combinations of parts, all of which are hereinafter more fully described and claimed.

In the drawings, Figure 1 is a side elevation of an elevator apparatus having my invention applied thereto. Fig. 2 is a sectional side elevation, on an enlarged scale, of the cylinder for the liquid, with the movable

plunger therein; and Fig. 3 is a cross-sectional view of the same on the line $x x$ of Fig. 2.

A is the elevator-shaft.

B is the elevator-carriage, movable in the shaft A upon the guides a .

C is the hoisting-rope connected with the carriage B and passing over the sheave D to the hoisting-drum E, which is operated by the engine F, or by any other convenient power devices.

G is a valve for controlling the operation of the hoisting devices. (Shown in the drawings as a valve to control the steam-supply to the engine F.)

H is a second rope or cable connected with the elevator-carriage B and passing over the sheave I. This rope H carries a plunger J, which moves in the closed cylinder K.

The plunger J is moved by the rope and cable H as the elevator-car is raised or lowered. It may be connected directly with the rope H; but for convenience and economy of space I prefer to connect the free end of the rope H with a portion of the building or stationary part, as shown at h , and to employ a pulley L, carried by the rope H and having the plunger J connected with it. By this means a compound pulley effect is obtained and the distance through which the plunger moves upon a given movement of the elevator-carriage is correspondingly decreased, thus rendering it possible to employ a smaller cylinder K than would otherwise be required. The cylinder K is provided with closed heads $k k$, and its upper and lower ends are connected by a pipe or passage-way M, in which is located a valve N.

The rod of the plunger J passes through a suitable stuffing-box o in the head of the cylinder K, and is provided with a piston O, which moves in the cylinder. The piston O is provided with one or more valves p , opening upwardly to allow the liquid in the cylinder K to pass through the piston when the latter descends.

Q is a rope or cord for operating the valve N, which may be also employed to operate the valve G, as shown, a continuous rope being employed, passing over guides $r r$. This

rope Q passes through the elevator-carriage B, so that the valves G and N may be operated therefrom.

Normally the valve N is closed, preventing the circulation of the liquid in the cylinder K through the passage M, and in practice I prefer to arrange the wheels or levers for operating the valves G and N so that a movement of the rope Q sufficient to open the valve G will not open the valve N, the latter remaining normally closed whether the valve G is open or not and rendering necessary a further movement of the cord or rope Q to open it. This particular arrangement of the valves G and N is not, however, necessary to my invention, and the valves may be made to operate together, if desired.

The operation of the apparatus is as follows: Considering the elevator-carriage B at the bottom of the shaft A and the valves G and N closed to lift the carriage B, the valve G is opened and the hoist E is put into operation. As the elevator-carriage B rises the tendency of the plunger J is to descend in the cylinder K, and the valves *p* in the piston O, permitting the liquid to pass through the piston, will allow the plunger to descend. While the plunger J is free to descend, it is evident that it cannot rise in the cylinder K by reason of the pressure of the liquor therein, the valve *p*, as has been heretofore stated, moving upwardly. Consequently if the hoisting-rope C should break, the descent of the carriage B would be prevented, and the carriage would be held by the rope H and the plunger J. To allow the elevator-carriage to descend, the rope Q is moved sufficiently to open the valve N, and thus allow the liquor to circulate through the passage-way M, and by thus relieving the pressure above the piston O the plunger is permitted to rise and the carriage B to descend. The speed of descent is controlled by the extent to which the valve N is opened, and may be controlled by the operation of the rope Q upon the carriage. If at any moment it is desired to raise the carriage B, the rope Q is operated to open the valve G of the hoist, simultaneously therewith closing the valve N.

In the drawings I have shown the counterbalance-weights S carried by the rod of the

plunger J below the piston O and moving in the cylinder K. If desired, however, the counterbalance-weights S may be entirely independent of the plunger J, constructed and arranged in the usual manner. By omitting the valves *p* in the piston O and operating the valves G and N simultaneously and similarly the cylinder K and plunger J will be a locking device for holding the carriage firmly in any position in which it may be arrested by the stopping of the hoist, the valve N closing simultaneously with the valve G, and a further movement of the rope G opening the valve N sufficient to allow the movement of the plunger J.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an elevator apparatus, the combination, with the elevator-carriage and the hoisting devices therefor, of a valve to operate said hoisting devices, a plunger connected with the elevator-carriage so as to move with it, a cylinder containing liquid, within which said plunger moves, a valve to control the action of said liquid within the cylinder upon the plunger, and means to operate said valves from the moving car.

2. In an elevator apparatus, the combination, with the elevator-carriage and the hoisting devices therefor, of a valve to operate said hoisting devices, a plunger connected with the elevator-carriage so as to move with it, a cylinder containing liquid, within which said plunger moves, a valve to control the action of said liquid within the cylinder upon the plunger, said valve of the liquid-cylinder being normally closed, and an operating rope or cable for operating both of said valves from the moving carriage, said valves being so timed with reference one to another that the valve of the liquid-cylinder may remain closed when the valve of the hoisting devices is opened.

In testimony of which invention I have hereunto set my hand.

DARWIN E. CROSBY.

Witnesses:

ERNEST HOWARD HUNTER,
S. T. YERKES.