CHARLES E. MOORE.

2 Sheets--Sheet 1.

Improvement in Elevators.

No. 114,460.

Patented May 2, 1871.

Fig. 1.

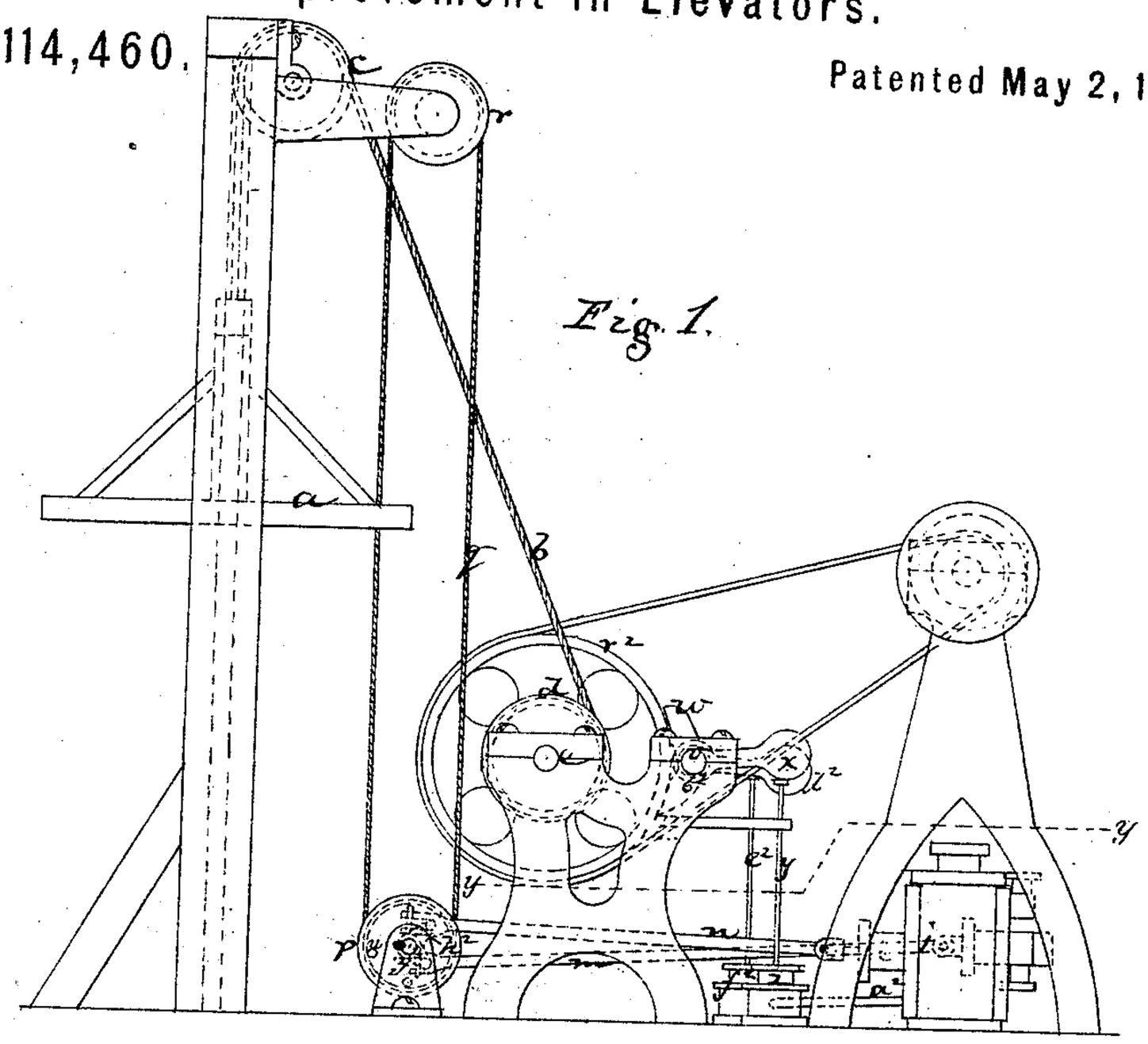
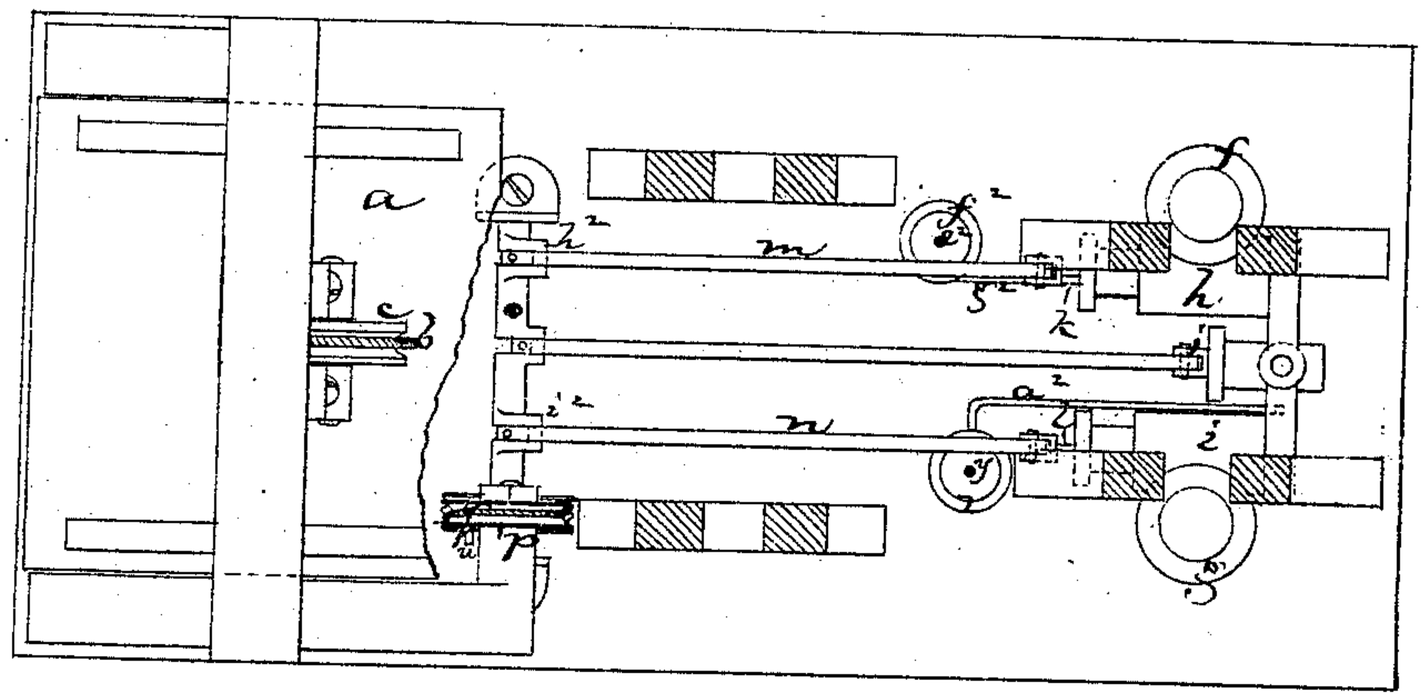


Fig. 4.



Witnesses.
M. M. Frothingham.
L. H. Latimer.

Chas. E. Moore
by his Attys
Crosby & Gould

2 Sheets--Sheet 2.

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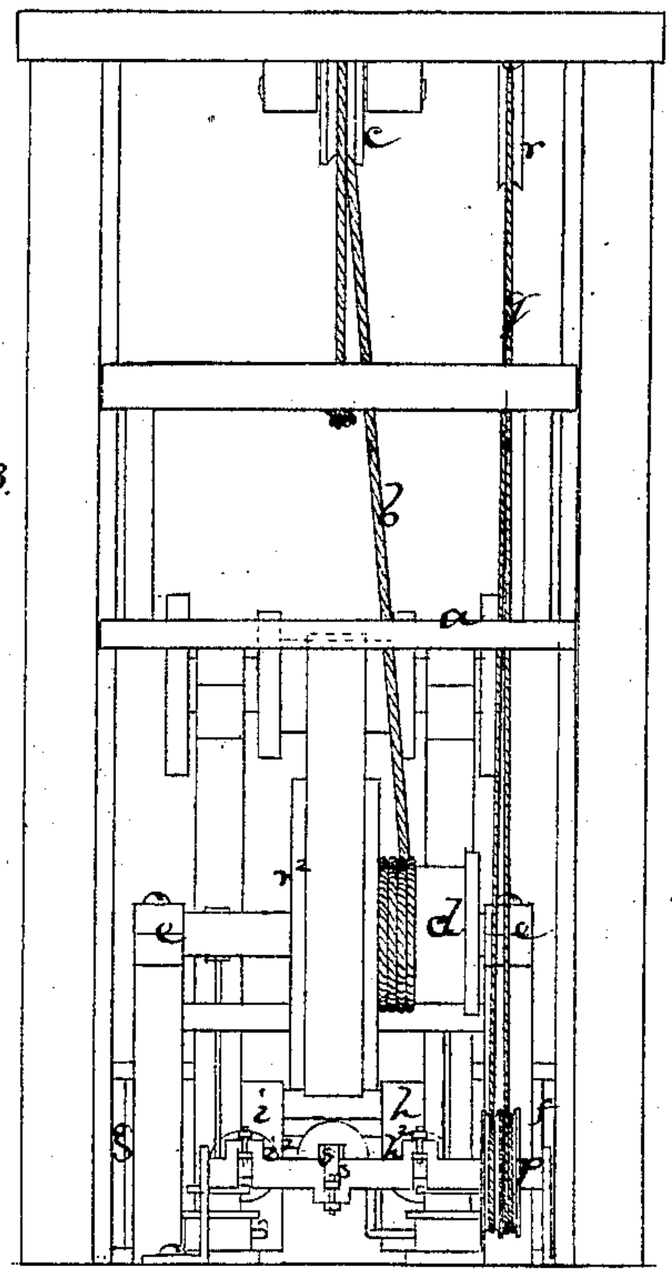

Fig. 3.

Fig. 2.

Witnesses.
M. W. Frothingham.
L. H. Latimer.

Chas. E. Moore,
by his Attys.
Crosby & Gould.

United States Patent Office.

CHARLES E. MOORE, OF BOSTON, ASSIGNOR TO HIMSELF AND MARTIN L. WYMAN, OF MELROSE, MASSACHUSETTS.

Letters Patent No. 114,460, dated May 2, 1871.

IMPROVEMENT IN ELEVATORS.

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

To all whom it may concern:

Be it known that I, CHARLES E. MOORE, of Boston, in the county of Suffolk and State of Massachusetts, have invented Improvements in Elevators; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

My invention relates to certain improvements in steam-elevators for passenger or freight purposes, the improvements having particular reference to the method of starting and stopping the engine of such an elevator, both in its ascent and descent, the operation of starting and stopping the engine being effected by opening and closing a valve in the exhaust-pipe of the engine.

By my invention the steam is never shut off from the cylinders of the engine except by closing the valve which admits the steam from the boiler to the engine.

In all steam-elevators heretofore employed the stopping or starting of the elevator has been effected by shutting off the steam from or letting steam into the cylinders of the engine, such an organization rendering it necessary to apply a brake to some part of the elevator to sustain the car or platform and prevent any accident from the elevator running down, as it of course would and must do if the brake was not applied, the engine having no power to sustain the car when the steam is shut off from the cylinders of the engine. In the descent of the car the brake sometimes is not sufficient to prevent the car from running below the point at which it was intended to stop, as the momentum of the elevator is arrested only by the friction of the brake.

With my invention no brake is necessary to stop the engine, as when the passage for the escape of the exhaust steam is closed the engine must necessarily stop, as it is impossible for the engine to continue to run if the escape of the exhaust steam is prevented; and, unless it is necessary that the elevator should make a long stop at any of the landings of the hoistway, this invention of closing the exhaust is all that is necessary for the operation of the elevator.

But, as all steam-pistons are not perfectly steam-tight, the leakage of steam, if the engine be stopped a great length of time, would permit them to descend very slowly. To prevent this an automatic steam-brake may be employed, which brake is operated by the pressure of the steam in the exhaust-pipe of the engine, which forces the brake against one of the wheels of the elevator, the brake being relieved, when the exhaust is opened, to allow the engine to run.

It is in the method of stopping the elevator and holding it by the pressure of the steam when stopped, and in the employment of the brake in combination with the pressure of the steam to hold the car, that the invention primarily consists.

The drawing represents an elevator mechanism embodying the improvements, with sufficient of the engine and engine connections to enable my improvements to be understood.

Figure 1 shows the mechanism in side elevation.

Figure 2 is a sectional elevation, the section being taken on the line *x x*.

Figure 3 is an end view.

Figure 4, a sectional plan on the line *y y*.

a denotes the car moving vertically in a suitable hoist-way, and being suspended from and actuated by a rope or suspensory, *b*, which, running over a sheave, *c*, passes around the winding-drum *d*, driven by suitable connections with the engine, the journals of the drum turning in suitable bearings, *e*.

f g denote the two cylinders of the double steam-engine;

h i, the two steam-chests thereof; and

k l, the two reversing valve-stems. These two valves are so constructed that steam is never shut off from the cylinders of the engine, but used only to reverse the motion of the engine. Valves operated by the link motion can be used for reversing, or the reversing may be effected by any other suitable devices.

The reversing mechanism, shown in the drawing, is as follows:

By two links, *m n*, the two reversing-valves are connected with two cranks, h^2 i^2, of a crank-shaft, *o*, having a pulley, *p*, which is operated to turn the crank-shaft by a rope, *q*, around the pulley *p* and another pulley, *r*, and running through the car. By pulling down upon the rope or part of the rope running through the car the links are thrown outward and the reversing-valves of the two cylinders are moved into position to hoist the car. By reversing the position of the cranks the links are thrown inward, and the reversing-valves of the engine are then in position to lower the car.

Now, to stop the car it has been customary to connect a stop and reverse-valve with the crank-shaft, (operated by the car,) and to shut off the steam by closing this valve whenever the car was to be stopped.

I combine with the steam-cylinder or cylinders, and the valve or valves operated from the crank-shaft, an auxiliary valve, also operated by such crank-shaft, and controlling the exhaust-passages from the cylinders, in such manner that, while the valve or valves of the main cylinder or cylinders are in position for the car to either ascend or descend, the movement of the car is arrested by closing the exhaust, the steam-passages being kept charged with steam and ready for the re-

sumption of movement of the car, or for reverse of movement, at whatever point the car may be stopped, and in whichever direction it may be moving when stopped.

The valve-stem of the exhaust-valve is seen at *j*, the valve moved by it controlling an exhaust-passage common to both cylinders.

The valve-stem *j* is connected by a link, *s*, with a third crank, *t*, on the crank-shaft *o*.

When the shaft is so turned as to bring the crank *t* into upright position the exhaust-passage is closed by the link *s*, and as the crank continues to turn toward the engine it still keeps the valve-port covered, and keeps it so covered until the crank-arm reaches a vertical position under the axis of the shaft, while from the vertical upper or lower position the movement of the crank outward, or in a direction from the engine, opens the valve and allows steam to exhaust from each cylinder.

A suitable stop, *u*, prevents movement of the crank beyond the position necessary to open the exhaust-valve after it has been closed.

If, then, the car be ascending, the crank *t* will be back from its uppermost position, and the other cranks will be in position for the car to ascend.

To stop the car the operator draws up the rope, carrying the crank *t* into vertical position, moving the link *s* toward the engine, and closing the valve in the exhaust-pipe connected with said link by the valve-stem *j*.

This movement does not operate either of the main cylinder-valves, as no movement of such valves takes place in bringing the crank *t* to upright position from the position at which it was stopped when it opened the exhaust-valve, there being provision for play of the cranks in the links through such movement of the crank *t*, so that if the car is to be again started in the same direction (upward) the rope is drawn down and the cranks assume the position they had before the car was stopped, and while the exhaust is closed steam remains in the cylinders, and the pressure of the steam sustains the weight of the car and holds the car in a stationary position. If, however, the car is to be started in the other direction, (after being stopped,) the operator continues to pull up on the rope and carries the center crank around, and with it the cranks of the operating-cylinders, which cranks move and reverse their valves without motion being imparted to the pistons, because of the closed position of the exhaust-pipe valve.

The movement of the exhaust-crank and its valve does not uncover the exhaust-port until the crank has passed to a vertical position below the crank-shaft, and thence to an inclined position back of the shaft; and when it reaches this position the two cranks will have been carried in, throwing in the two valves, reversing their position, so that the car will then descend.

The operations to stop the descending car, or to reverse the movement of the descending car, are precisely the converse of those described.

Thus it will be seen that the steam is never cut off from the steam-cylinders, but that its pressure is always exerted either to raise or lower the car or to hold it in stationary position.

v denotes a brake-shaft, having a brake-shoe, *w*, which, when an arm, *x*, is thrown up, bears upon the drum-pulley r^2.

Under this arm is a vertical piston-rod, *y*, projecting from the piston of a steam-cylinder, *z*.

This cylinder is connected, by a suitable pipe, a^2, with the exhaust-pipe between the exhaust-valve and the engine-cylinders; and when the exhaust is closed the pressure of the steam is exerted upon the piston of the cylinder *z*, throwing the piston-rod up, raising the arm *x*, and crowding the brake against the pulley, tending to arrest rotative movement of the pulley.

As soon as the exhaust is opened, pressure of the steam upon the piston ceases and the pulley is free to move.

On the brake-shaft is a loose sleeve, b^2, having projecting down from it at one end a brake-shoe, c^2, and projecting down from its other end a weighted arm, d^2.

Under this arm is a vertical piston-rod, e^2, projecting up from a piston in a steam-cylinder, f^2.

From this cylinder a steam-pipe, g^2, extends to one of the steam-chests, and the pressure of the steam at all times while the engine is in operation keeps the piston-rod up and holds the brake-shoe from the drum; but as soon as steam is shut off from the engine, the pressure upon the piston being removed, the weighted arm throws down the brake, and the pressure upon the pulleys counteracts any tendency of the car to descend by gravity.

It will be obvious that the method of working the reversing-valves and the exhaust-controlling valve may be variously modified, the essence of my invention consisting in employing, in connection with reversing-valves, that control entrance of steam to the cylinders or the direction of movement of the car, an auxiliary valve that controls the exhaust-passages and enables the car to be arrested by shutting the exhaust, and to be held in position by the pressure of the steam.

I claim—

1. An elevator, the car of which is held in elevated position in the hoist-way when the engine is stopped by the pressure of the steam in the engine, by means substantially as described.

2. In combination with the engine-cylinder or cylinders and the reversing-valve or valves, the auxiliary valve controlling the exhaust-steam passage, so that the engine is stopped and the movement of the car thereby arrested, by shutting the exhaust, and without movement or independent of the movement of the reversing mechanism, the car being held in stationary position by the pressure of the steam.

3. In combination with the exhaust-valve, operating to stop the engine, the brake automatically operated by the piston-rod of a steam-cylinder connected with the exhaust-pipe, substantially as described.

4. In combination with the hoisting-engine, a brake held out of contact with the drum or driving-pulley by the pressure of the steam when the engine is working, and which is thrown against the pulley whenever steam is shut off from the engine, substantially as described.

CHARLES E. MOORE.

Witnesses:

FRANCIS GOULD,

S. B. KIDDER.