J. G. WILLARD.

Hydraulic Elevator.

No. 201,078. Patented March 5, 1878.

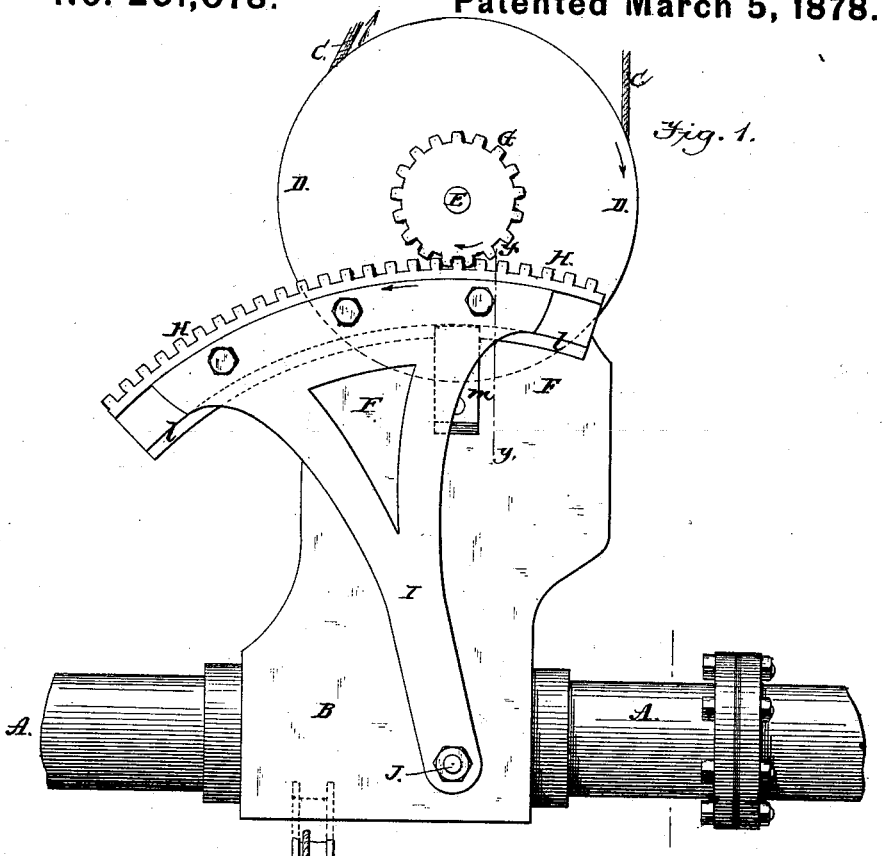

Fig. 1.

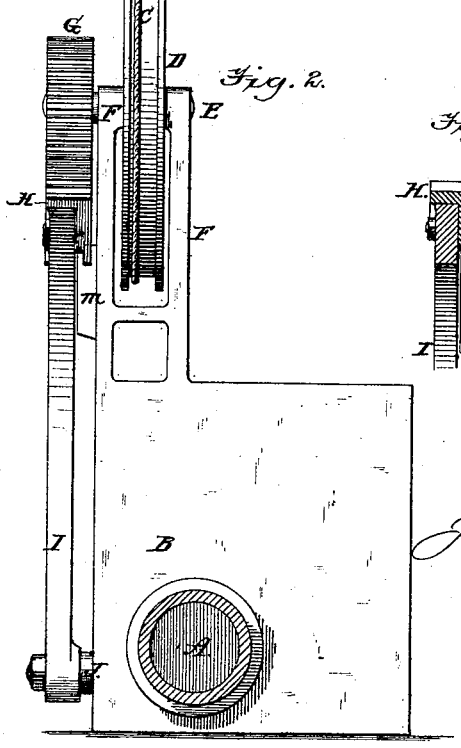

Fig. 2.

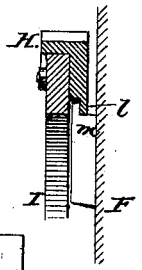

Fig. 3.

Witnesses;

Geo. H. Graham.

Jacob Felbel

Inventor;

Joel G. Willard

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Attorney.

UNITED STATES PATENT OFFICE.

JOEL G. WILLARD, OF NEW YORK, N. Y.

IMPROVEMENT IN HYDRAULIC ELEVATORS.

Specification forming part of Letters Patent No. **201,078**, dated March 5, 1878; application filed June 27, 1877.

To all whom it may concern:

Be it known that I, JOEL G. WILLARD, of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Hydraulic Elevators; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My invention relates to an improved valve-gear or valve-operating mechanism for hydraulic elevators.

As is well known to those familiar with the construction and operation of such machines, the valves by which the pressure of the supply-column (or hydraulic column) is let on to and cut off from the cylinder or cylinders of the machines are necessarily under the control of the elevator-conductor, and are opened and closed most usually by the pulling of a rope or small cable that runs through the car.

As heretofore made, the organization has been such that by a too rapid or quick movement of the rope or cable by the conductor, the valves would be so suddenly closed or operated as to cause a heavy momentum or shock upon the apparatus by the too sudden stoppage of the moving column of water, which shock has not only been objectionable to the occupants of the car and building, but has also subjected all the parts of the machine to severe and dangerous strain, and all the joints of the piping and other water-receptacles to such shock as to cause constant leakage in said joints.

I have successfully overcome these serious objections and difficulties by the employment, in connection with the valve and the usual cable operated by the car-conductor, of a gear mechanism, by which the movement of the cable to be transmitted to the valve-stem is so slowed down that no matter how suddenly the car-attendant may move the rope, the valve will be moved so slowly that no perceptible shock can possibly be produced, and that so no undue strain or concussion of the hydraulic column can be produced to overstrain the pipe-joints or other portions of the elevator apparatus; and my invention, therefore, consists in the combination, with the actuating rope or cable and the valve for regulating the supply of water-pressure, of means, substantially such as hereinafter described, whereby I am enabled to prevent any too sudden movement of the valve, and consequent concussion, by the hydraulic columns.

To enable those skilled in the art to make and use my invention, I will proceed to more fully describe the construction and operation of my improved valve-gear, referring by letters to the accompanying drawings, in which—

Figure 1 represents, in elevation, so much of the supply-pipe, valve-chest, and cable of a hydraulic elevator as is necessary to illustrate my invention, and shows the application thereto of my valve-gear mechanism. Fig. 2 is a side view of the parts shown in front elevation at Fig. 1, and Fig. 3 is a detail section at the line *y y* of Fig. 1.

In the several figures the same part will be found designated by the same letter of reference.

A is the supply-pipe, leading to the cylinder (or one of the cylinders) of a hydraulic-elevator apparatus; and B, the valve chest or chamber, in which is arranged the valve that regulates the passage through the pipe A of the water-supply. C is the usual rope or hand-cable that extends up to and through the car, and which the attendant or conductor pulls on in one direction or another to open and close the valve, and thus apply or cut off the hydraulic pressure which acts as the motive power to drive the car. This rope I pass round a sheave or pulley, D, the shaft E of which is mounted to turn freely in a fixed bearing properly arranged in the stand F, (or is arranged otherwise, as may be convenient.) Keyed to the shaft E is a driving spur-pinion, G, which meshes or engages with the teeth of a sector-gear, H, the arm I of which is fastened at its lower end to the protruding end of the arbor or stem J of the valve.

The sector H is shown as steadied or guided at its upper part by a flange or feather, *l*, passing behind a holder-plate, *m*, fastened to the stand F. This detail of construction is best seen at Fig. 3, and may, of course, be varied at the pleasure of the engineer or builder,

its only object being to afford sufficient rigidity to the working parts, and keep them properly in gear.

Now, it will be seen and understood from the drawings, and the description so far given of the mechanism shown, that its operation is as follows, viz: By pulling the rope C in one direction or the other, the pulley D, with its spur-pinion G, will be rotated correspondingly, and that, by the rotating of the pinion G, the toothed sector H will be vibrated in one direction or the other on its center or axis of vibration, which is the arbor or valve-stem J, and that, consequently, said arbor J will be slightly oscillated, and thereby the valve within the chest will be opened or closed, (according to the direction in which said arbor J is turned;) and it will also be seen that it requires a very considerable throw or movement of the toothed sector H to effect a sufficient movement of the arbor or stem J to open or close the valve, and that a still greater extent of motion of the pulley D and rope C is required for this movement, since the proportions of the pulley, pinion, and sector are such that for a stroke of the latter the former must wind or unwind a length of rope equal to nearly twice the length of the stroke of said sector.

Thus, it will be seen, the rope in the car must be pulled a considerable distance (occupying much time) to produce a sufficient movement in the arbor J to give the valve a complete movement, and therefore the valve cannot be closed so quickly as to cause any undue strain on the parts or joints of the elevator apparatus.

The minutiæ of construction may, of course, be varied without departing from the gist of my invention, or materially changing the construction or mode of operation of the machine or mechanism shown and described.

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

The combination, with the valve and the rope, or its equivalent, extended to the car, of a pinion operated by the movement of the rope and a sector driven by said pinion, and having its axis of motion coincident with the center of oscillation of the valve, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand and seal this 25th day of June, 1877.

JOEL G. WILLARD. [L. S.]

In presence of—
JACOB FELBEL,
JNO. J. BONNER.