F. B. PERKINS.

Valve-Operating Mechanism for Hydraulic-Elevators.

No. 203,494. Patented May 7, 1878.

Fig. 1.

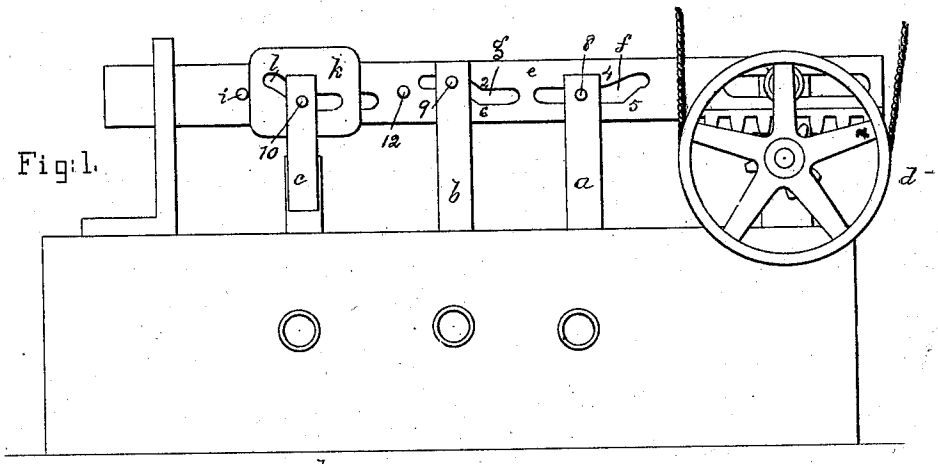


Fig. 2.

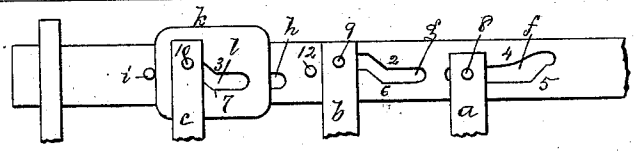


Fig. 3.

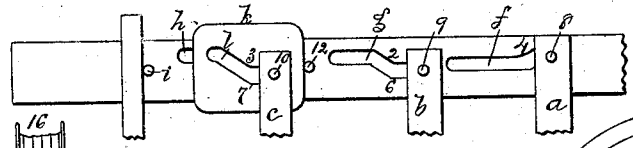


Fig. 5.

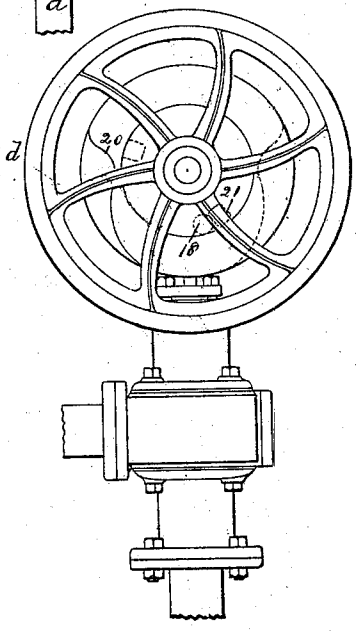
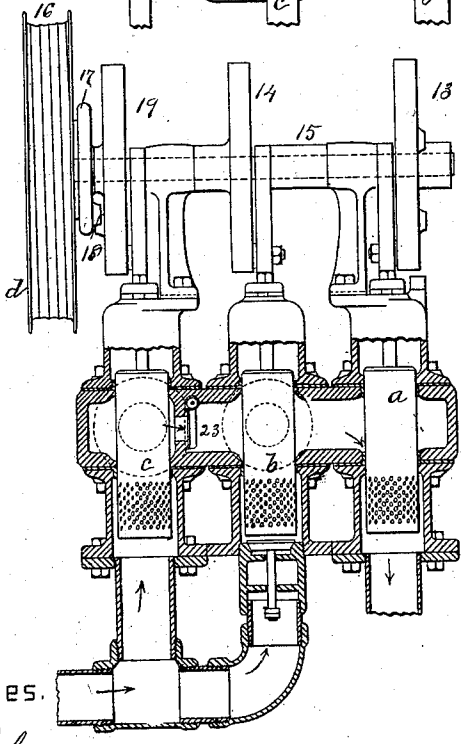


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

FRANCIS B. PERKINS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN VALVE-OPERATING MECHANISMS FOR HYDRAULIC ELEVATORS.

Specification forming part of Letters Patent No. **203,494**, dated May 7, 1878; application filed July 30, 1877.

To all whom it may concern:

Be it known that I, FRANCIS B. PERKINS, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Valve-Operating Mechanism for Elevators, of which the following is a specification:

This invention relates to mechanism by which to operate the valves of hydraulic elevators having main and auxiliary cylinders adapted to be thrown into operation according to the weight to be lifted by the elevator-platform.

In such an elevator the valve communicating with the water-passage leading to the smaller or main cylinder is arranged to be operated by a primary cam, under the control of the elevator-manager when the elevator is started, and then, if more power is required, a further movement of the bar or shaft carrying the primary cam will operate a secondary cam to open the valve for the auxiliary cylinder and increase the lifting-power of the elevator.

In all elevators of this class wherein the lifting capacity is varied by the action of independent cylinders, each having its own inlet-valve, which is opened at the proper time to bring each cylinder and piston into operation, an inlet-valve of the auxiliary cylinder called into operation to augment the power of the elevator has been operated after the inlet-valve of the main cylinder, and the cylinder last called into operation has been the first to have its inlet-valve moved when water has been cut off to cause the elevator-platform to stop. If the valve-operating mechanism is not moved far enough to also cut off the flow of water into the main cylinder, or that of least capacity, then it is obvious, should a portion of the load be subsequently removed from the platform, leaving the load on the platform lighter than the lifting capacity or power of the main cylinder, or the one not cut off, then in such case the platform will quickly rise under the action of the water in the main or smaller cylinder at a time when it is desired that the platform remain at rest. A sudden change of load in this way on a passenger-elevator is liable to frighten the passengers and to result in accidents.

To obviate this difficulty I have arranged a primary and secondary cam to operate the inlet-valve of, first, the main or smaller cylinder, and then, by a further movement of a bar or shaft, to operate the valve of the secondary or auxiliary or larger cylinder; and when the elevator-platform is to be stopped the two cams are caused to close both inlet-valves simultaneously, the secondary cam for the auxiliary valve having a certain amount of lost motion, so that it is brought into actual operation to shift its valve just as the device for moving the main valve comes into operative position. Such a combination of valve-operating cams enables the water for both cylinders to be cut off simultaneously, and causes the pistons in both cylinders to stop without any tendency to rise by reason of a change in the load.

Figure 1 represents, in side elevation, sufficient of a valve-operating mechanism to illustrate one embodiment of this invention, the primary cam being shown as having been moved sufficiently toward the right to open or lift the inlet-valve to admit water into the main cylinder; Fig. 2, a view of the apparatus shown as moved yet farther toward the right, to cause the secondary cam to open the inlet-valve of the auxiliary cylinder; Fig. 3, a view, showing both valves closed; Fig. 4, a modification, showing all the valves closed; and Fig. 5, an end view of Fig. 4.

The valve *a* and its stem, of any usual or suitable construction, preferably as shown in Fig. 4, controls the exhaust-water, the valve *b* the water to enter the main, or in this instance the smaller, cylinder, and the valve *c* the water entering the auxiliary or larger cylinder.

In Fig. 1 the devices to operate the valves *b c* are a primary cam, *g*, and a secondary cam, *l*, in a block, *k*, the former fixed with relation to a bar, *e*, and the latter loosely connected therewith, so that when the bar is started from either of its extreme positions the secondary cam will remain at rest for a short time.

This bar *e* is moved by the usual hand-rope, to be placed on the pulley *d*, a pinion on the shaft carrying a wheel engaging a rack on the bar. This bar is also provided with a cam, *f*, to open and close the exhaust-valve *a*. The portions 2 3 4, acting upon pins 8 9 10, lower

the valves, and the opposite portions 5 6 7 elevate them.

Referring to Fig. 1, it is assumed that the bar *e* has been moved toward the right far enough to lift or open the valve *b* of the main cylinder, and in such position the exhaust-valve *a* and auxiliary valve *c* are closed. If more power is needed, move the bar yet farther to the right until the pin *i* on the said bar meets the block *k*, provided with the secondary cam *l*, and moves it, such movement operating the auxiliary valve and admitting water into the auxiliary cylinder.

In Fig. 2 both the main and auxiliary valves are opened. Now, if it is desired to close the valves to cut off the flow of water into the cylinders and cause the platform to stop, the bar *e* is moved toward the left. As the bar starts the loosely-connected block *k* remains at rest, the bar sliding through without moving such block until the pin 12 strikes such block. Just at that time the part 2 of the cam *g* comes into position against, and so as to move, the pin 9 and close valve *b*, and at the same time the inclined portion 3 of the secondary cam *l* acts upon pin 10 and closes valve *c*, both valves being thereby closed simultaneously.

As the bar *e* was moved toward the left the part *k*, provided with the secondary cam *l*, was permitted to have a certain amount of lost motion, to enable it to come into operation simultaneously with the primary cam *g* for moving the main valve.

In Fig. 4 the cam-grooved disks 13 14 are fixed on a shaft, 15, having a fast pulley, 16, for the usual hand-rope, and a fast clutch, 17, provided with a pin, 18. The cam-grooved disk 19, serving as the secondary cam, is loose on the shaft 15, and corresponds in function and operation with the block *k* and cam *l*. This disk has two pins, 20 and 21, (see Fig. 5,) between which rests the pin 18 on the disk, so that when the shaft 15 is rotated the secondary cam 19 has a certain amount of lost motion, as described, with reference to the block *k*. Crank-pins on the valve-stems enter cam-slots in the disks, and operate to open the main and auxiliary valves consecutively and close them simultaneously. The valve 23, Fig. 4, permits the water in the auxiliary cylinder, controlled by the valve *c*, to flow into the passage-way of valve *b* when the water is being exhausted and the platform is descending.

In the plans herein described it will be noticed that but one hand-rope is needed to operate the valves for both the main and auxiliary cylinders and the exhaust, such rope passing over a wheel or drum, as usual, and one shaft, according to the extent of its motion, is made to serve as the prime mover for all the valves.

I claim—

1. In a hydraulic elevator having main and auxiliary cylinders, the combination, with a primary cam to open and close the main inlet-valve, of a secondary cam to open the auxiliary inlet-valve after the opening of the main inlet-valve, and to close the auxiliary inlet-valve simultaneously with the closing of the main inlet-valve, substantially as described.

2. The primary cam for the main valve and its mover, in combination with the secondary cam for the auxiliary valve, the secondary cam being connected loosely with the mover of the primary cam, whereby lost motion is provided for, to operate substantially as described.

3. In a hydraulic elevator having two or more cylinders and separate inlets for each, the combination, with the inlet-valves, of mechanism to open them consecutively through a single hand-rope, and to cut them off simultaneously, thereby stopping the flow of water to each cylinder at the same time, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANCIS B. PERKINS.

Witnesses:

G. W. GREGORY,

W. J. PRATT.