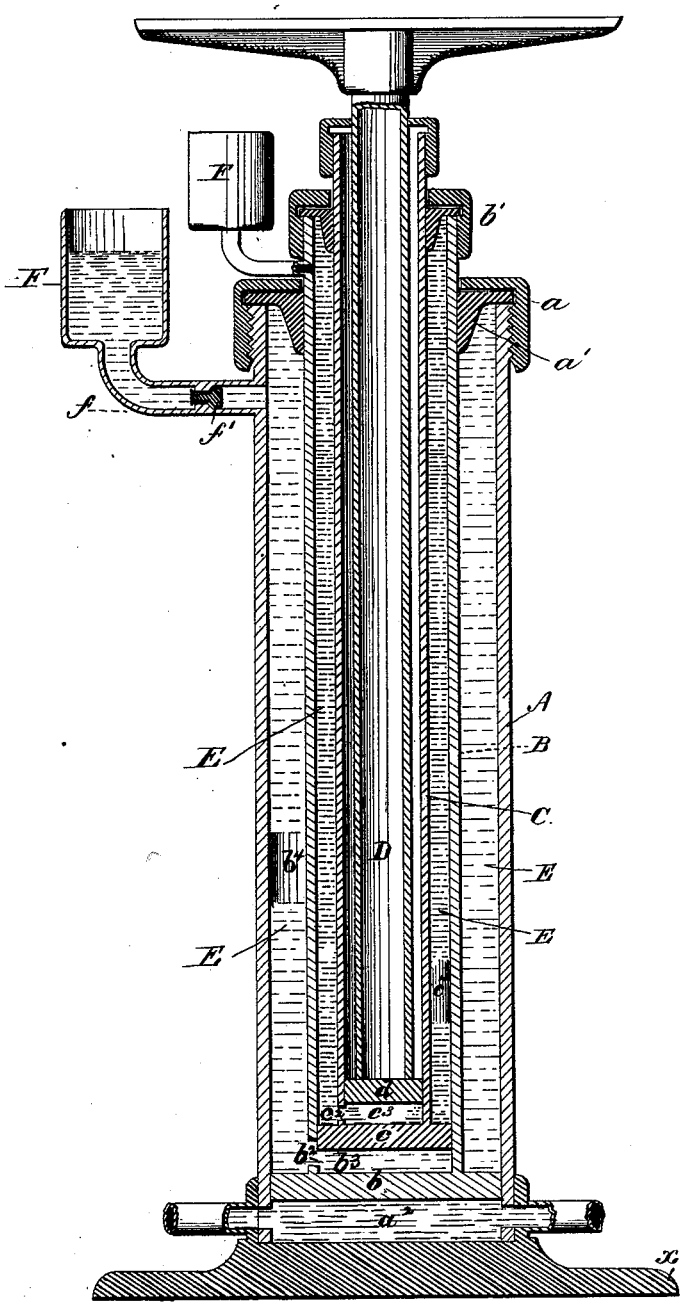
2 Sheets—Sheet 1.

W. R. COMINGS.

TELESCOPIC OR HYDRAULIC ELEVATOR.

No. 191,516. Patented June 5, 1877.

Fig 1.



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2 Sheets—Sheet 2.

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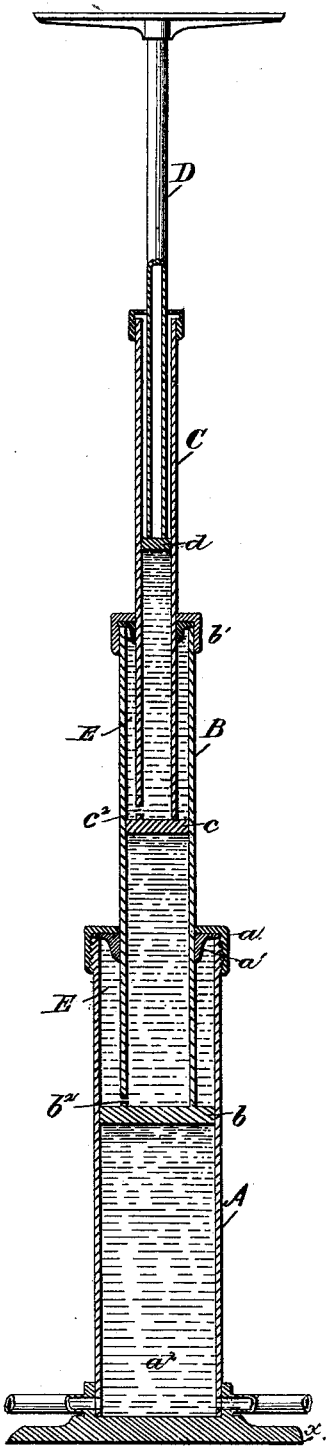
Fig 2



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UNITED STATES PATENT OFFICE.

WILLIAM R. COMINGS, OF NEW BRITAIN, CONNECTICUT.

IMPROVEMENT IN TELESCOPIC OR HYDRAULIC ELEVATORS.

Specification forming part of Letters Patent No. **191,516**, dated June 5, 1877; application filed November 3, 1876.

To all whom it may concern:

Be it known that I, WILLIAM R. COMINGS, of New Britain, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Telescopic Elevators; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention consists, mainly, first, in an improved method of raising the sections of an elevator—consisting, essentially, first, in the employment of a single main power; second, in the employment of certain independent volumes of an incompressible fluid; third, in applying the main power by the movement of the main piston through the medium of the fluid volumes to the auxiliary pistons in such manner that each receives simultaneously an independent movement—and, second, in the peculiar construction of the mechanism employed to carry the method practically into effect.

In the drawings, Figure 1 represents a sectional elevation of my improved elevator with the movable sections in their lowest positions; and Fig. 2 a sectional elevation reduced, with the movable sections partially raised.

To enable others skilled in the art to make and use my invention, I will now proceed to describe fully its construction and manner of operation.

A represents the primary tube or cylinder, forming, with the bed-plate *x*, the base of the elevator, which tube or cylinder is constructed of any proper material, and suitable size, and is provided, near its lower end, with any suitable induction and eduction openings for the admission and discharge of water, steam, compressed air, or other fluid.

a represents a packing-box, of any proper construction, and a^1 suitable packing, by means of which the cylinder B is held in place in the ordinary manner.

B represents the second cylinder, adapted in size to fit within the packing-box *a* of the main cylinder, and slide freely in a longitudinal direction, which is provided below with the piston *b*, fitting accurately the bore of the main cylinder, and above with the packing-box b^1, as shown.

b^2 represents an opening through the wall of this cylinder B, near its lower end, by means of which communication is made between the piston-chamber b^3 and the annular space b^4 between the cylinders A and B, as shown.

C represents the third cylinder, which is identical in construction with cylinder B, and sustains the same relation to it that cylinder B does to cylinder A.

D represents the upper cylinder carrying the platform, which may be constructed similarly to cylinders B and C, with the exception that it may be made without the opening b^2 c^2, as shown in these cylinders.

E E represent independent volumes of a practically incompressible fluid, such as water, alcohol, or oil, which are held in the chambers b^3 c^3, below the pistons, and in the annular spaces b^4 c^4, communicating therewith through the openings b^2 c^2, as shown.

F F represent vessels, or any proper sources of fluid supply, having a communicating pipe, *f*, and check-valve *f'*, by means of which any loss of the fluid E from leakage is replaced.

The operation is as follows:

By the admission of steam, water, or other fluid into the chamber a^2 of the main cylinder below piston *b* the latter is forced upward.

By means of this upward movement of piston *b* the annular space b^4 between cylinders A and B is contracted, and the fluid contained therein is forced through the opening b^2 into the chamber b^3 below piston *c*, in consequence of which the piston *c* is forced up also.

By means of the upward movement of piston *c* the annular space between cylinders B and C is contracted, and the piston *d* is, consequently, actuated in a similar manner to piston *c*.

Any leakage that may occur in the communicating-chambers will be replaced from the supply-chambers by the vacuum which is created when the elevator descends.

It will be understood that, in order to secure the best results, the maximum capacity of each variable piston-chamber is made equal to the maximum capacity of the variable annular space with which it communicates, and that when one of these chambers is at its maximum the other is at its minimum, and, consequently, the two chambers must contain a volume of fluid equal to the capacity of one.

From this construction it follows that when one of the pistons is moved upward the liquid

in the annular space upon which it acts is gradually forced out into the piston-chamber with which it communicates, thereby gradually filling said chamber, and raising the piston until it has reached the limits of its stroke.

It will be understood also that the fluid used in the communicating chambers is incompressible in its nature, and that, consequently, the movement of the main piston will be immediately transmitted by it to each piston of the series, so that all the tubes will move simultaneously, and with a uniform motion.

To enable others to understand more readily the object of this invention, a brief statement is here given of the main defects, both in principle and construction, of hydraulic elevators in general, and of telescopic hydraulic elevators in particular.

First, none of the hydraulic elevators now in use have any effectual means of proportioning the amount of power expended to the weight to be lifted. It is accomplished, to a very limited extent, by connecting the platform, through intermediate mechanism, with pistons of different but fixed lifting capacities.

Second, in all telescopic elevators there is a great loss of power, owing to the decreasing area of the successive cylinders, this loss varying from one-half to three-quarters of the total power applied; next, owing to the same causes and the additional fact that the tubes are forced out one at a time, the platform is given a velocity increasing as the successive sections move upward; then, owing to the independent movement of said sections, there are violent shocks as each strikes its stop ring; next, the effective lifting-power is greatly diminished by the weight of the tubes and the large volumes of water therein contained. On account of all this waste of power it has been found practical to work these elevators only by liquids under a very high pressure.

Now, by this invention herein described, it will readily be seen that the lifting-power is made dependent solely on the area of the lower cylinder. Hence there is no loss of power, except from the friction of the moving parts, and, as the cylinders all move simultaneously, the movement of the platform is of uniform velocity, and by a suitable throwing-off motion the admission-valve can be closed, thus stopping the movement of the tubes before any of them have been forced against their stop-rings, and obviating all shock to the machine itself.

As the actuating power is applied only in the lower cylinder, the use as a motive power of an elastic fluid—such as steam or compressed air—is rendered practicable, and hence it is possible to employ them expansively, and thus vary the consumption of power just in proportion to the load lifted.

For instance, if it is desired to lift one-tenth ($\frac{1}{10}$) of the maximum load, it is only necessary to admit the steam or other elastic fluid till the lower cylinder is filled to one-tenth of its capacity; then, on closing the supply, the steam will expand till it has driven this piston through the remainder of its stroke.

Lastly, as the power of the machine is dependent on the area of the lower cylinder, it is possible to obtain from even a very low pressure any desired lifting capacity by simply increasing this area.

I do not limit myself to the precise construction shown, nor to the employment of any special liquid or fluid, or any special apparatus for controlling the admission and discharge of fluid to and from the main cylinder; but,

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

1. The described method of raising the sections of an elevator, consisting, essentially, first, in the employment of a single main power; second, in the employment of certain independent volumes of an incompressible fluid; third, in applying the main power by the movement of the main piston, through the medium of the fluid volumes, to the auxiliary piston in such manner that each receives simultaneously an independent movement, substantially as described.

2. In an elevator, the combination of the following elements: a primary piston, adapted, substantially as described, to receive movement from the main power, one or more auxiliary pistons, and intermediate means, substantially as described, for communicating, simultaneously and independently, the movement of the primary to the auxiliary pistons.

3. The elevator described, having the primary tube A, one or more auxiliary tubes, B C, having pistons *b c*, piston-chambers b^3 c^3, and one or more independent volumes of incompressible fluid, E E, substantially as described.

4. In combination with a fluid-chamber, b^4 c^4, substantially as described, an auxiliary supply-chamber, F, substantially as described, adapted to restore the loss by leakage, as set forth.

5. In combination with the annular chambers, the supply-tube and check-valve, as and for the purpose described.

6. A hydraulic elevator, substantially as described, adapted to have its auxiliary sections moved independently and simultaneously by a single main power, as and for the purpose set forth.

WM. R. COMINGS.

Witnesses:
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