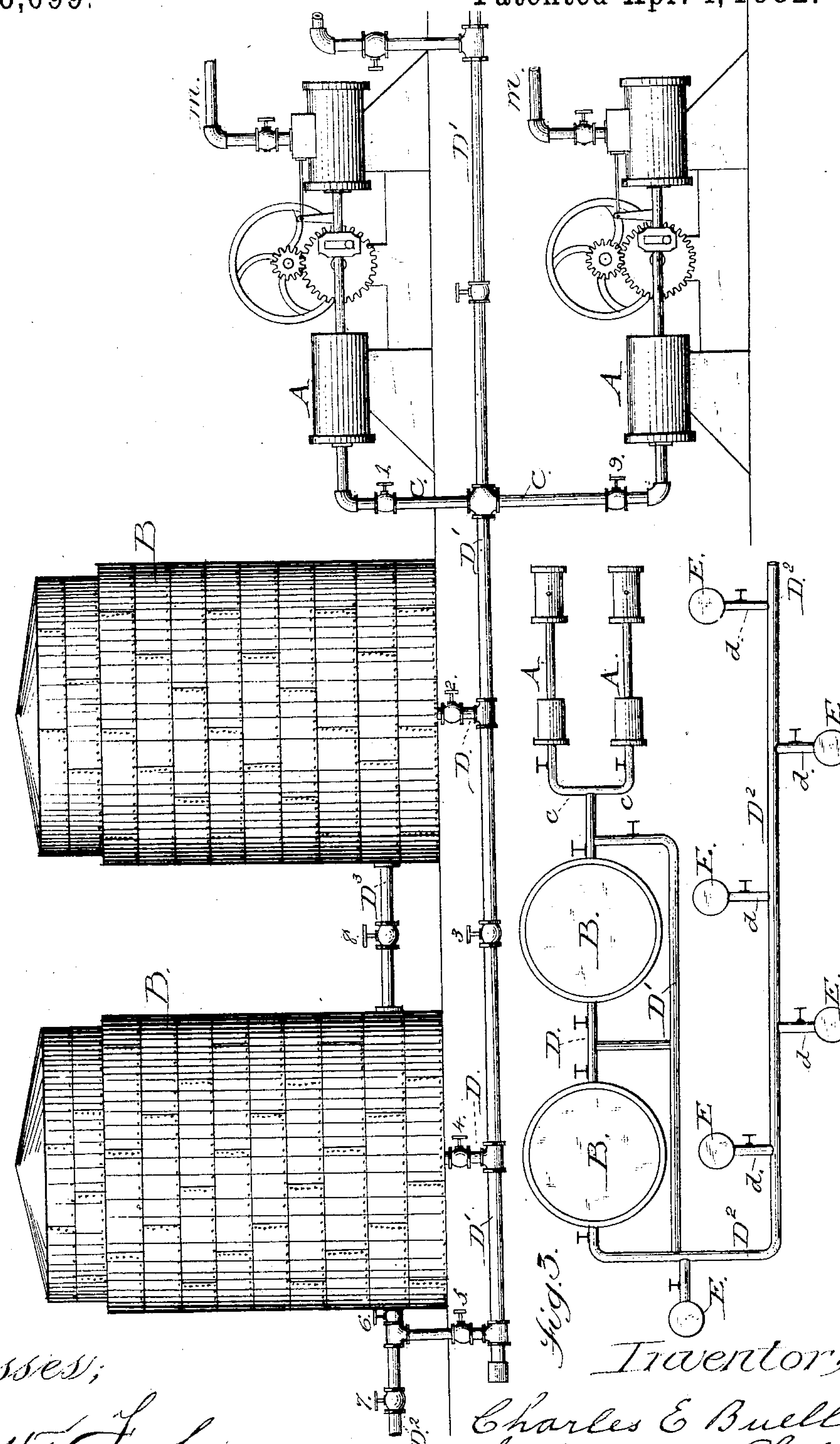
(No Model.) 2 Sheets—Sheet 1.

C. E. BUELL.

PNEUMATIC ELEVATOR.

No. 256,099. Patented Apr. 4, 1882.



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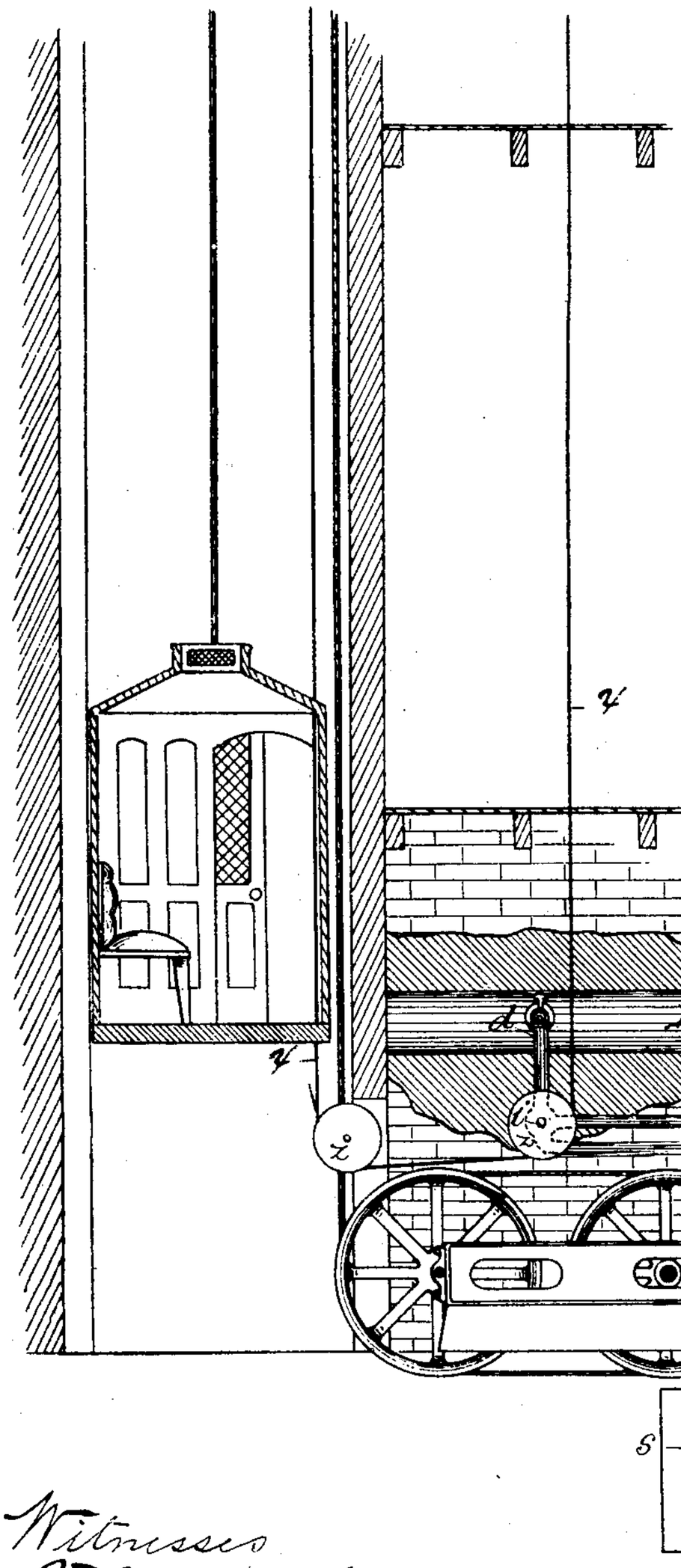

Fig 2

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UNITED STATES PATENT OFFICE.

CHARLES E. BUELL, OF NEW HAVEN, CONNECTICUT.

PNEUMATIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 256,099, dated April 4, 1882.

Application filed December 16, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Pneumatic-Elevator Systems, of which the following is a specification.

This invention relates to an improved system for operating pneumatic elevators, and to a combination of air-compressors, compressed-air holders or reservoirs, air-mains, and a series of elevator-stations located along the line of said mains at a distance from the air-compressing apparatus, the object being to obviate the expense and care of power-generating and air-compressing machinery at every point where said elevators are located by providing a central station where all of said machinery shall be located, and proper air-mains connecting said central station with said series of elevator-stations.

In the drawings forming part of this specification, Figure 1 illustrates the air compressing and storing apparatus as arranged at the central station according to my invention. Fig. 2 illustrates the pneumatic motor and elevating appliances of an outlying station connected with the air-main from said central station. Fig. 3 is a general plan view, illustrating the relative arrangement of the central and a series of outlying stations and their air mains.

In the drawings, A indicates air-compressing apparatus; B, extensible and automatically-compressible air-holders; *c*, air-pipes from said compressing apparatus to the air-main D^2. D′ is a pass-pipe. D are pipes from the main to the air-holders. D^3 is a pipe connecting said air-holders. E indicates way-stations. 1 2 3 4 5 6 7 8 9 are stop-valves. *d* indicates branches from main D^2. *e* is an escape-pipe to convey air away from the elevator-motor. *i* is a three-way valve in branch *d*. *h* is the motor-cylinder. *n* is a brine or liquor tank. *o* is a pipe connecting tank *n* and said cylinder *h*. *x* is a check-cord. *z* are check-cord pulleys.

The air-compressing apparatus A is of the description shown in my Letters Patent No. 246,657, of September 6, 1881, and there fully described; but any other suitable air-compressing machinery may be used; and the extensible and automatically-compressible air-holders B are such as are described in my Letters Patent No. 240,084, of April 12, 1881. In those pneumatic elevators now or heretofore employed a steam engine and boiler, air-compressor, air-holder, fuel and water supply conveniences must all of necessity constitute a part of the plant at every elevator-station, occasioning considerable expense for construction and current repairs, occupying valuable space, requiring the services of an engineer, or of the latter and a fireman also, and increasing the risk of loss from fires; but in my improved system, as herein set forth and shown, the above-mentioned requisites of a plant are dispensed with at all the outlying stations on the line of the air-mains and attached thereto, and much of the fixed expense appertaining to the regular maintenance of elevator conveniences is avoided and a better and more constant supply of air for motive power is secured.

It will be seen by reference to Fig. 1 that two compressors, A, are connected by the pipes *c* with the receiving and distributing air-pipe D′. The purpose of said arrangement of compressors is to provide against the necessity of stopping the elevator for repairs to the compressing machinery, for one only of said compressors is used regularly, the other being shut off from pipe D′ by closing valve 1 or 9. A pipe, *m*, supplies steam from any suitable boiler to run the compressors. The extensible and compressible air-holders B are connected with said air-pipe D′ by the pipes D, and are connected with each other by the pipe D^3, and the main distributing-pipe D^2 leads from the air-holder which stands farthest from the compressors A. By the above-named pipe-connections with pipe D′ either one or both of said air-holders may be employed as circumstances may require, for by shutting valves 2 and 8 and opening valve 3 the right-hand air-holder is cut-off from pipe D′ and from the other holder; and by reopening valves 2 and 3, closing 4 and 6, and opening 5 air from pipe D′ will flow by the left-hand holder into the main D^2; and by closing valve 5 and opening valves 2, 4, 6, and 8 there is a circulation of compressed air through both of the holders

B into the main D^2. The valve 7 in the latter serves to regulate the flow of air therethrough, if need be.

In Fig. 2 is represented a part of a dwelling or other building supplied with elevating apparatus partly of ordinary construction; but through a broken-away part of the wall of masonry is shown the main air-pipe D^2 in the ordinary position of a gas or water main buried in the ground adjacent to the foundation-wall of the building. From said air-main D^2 a branch pipe, *d*, in which is placed a three-way valve, *i*, having a pulley, *z*, on its stem, conveys compressed air to a suitable brine or liquor tank, *n*, delivering said air therein above the dotted line *s s*, which represents the liquor-level therein. An air-pipe, *o*, having one end dipping quite low in the liquor in said tank *n*, has its opposite end connected to the motor-cylinder *h*, which, with the elevator-rope pulleys connected therewith, is of ordinary construction. An air-escape pipe, *e*, is connected to said three-way valve *i*, and the ordinary check-cord *x* runs through the elevator-well and around the pulleys *z z*.

The air-main D^5, starting from the compressing apparatus A and air-holders B, Fig. 1, is designed to be run from the central air-compressing station (represented in said figure) through the streets of a city or town, or otherwise, to other buildings far or near, in which suitable elevating machinery is placed, and through suitable connections with the latter to supply compressed air, as above described, to actuate said elevating machinery.

The general plan view shown in Fig. 3 illustrates said air-main and its relation to the outlying stations E along the line of said main.

The employment of one air-holder B will serve to keep the pressure of air constant in the main pipe D; but by the use of two holders connected side by side and holding a surplus volume of air the pressure in the main pipe or pipes is caused to be very equal and constant, even though many stations may be drawing air at the same time.

Other suitable descriptions of compressors and air-holders than those herein shown may be used in this system.

The specific operation of some parts of this system is above described, and its general operation is as follows: The air-compressors A are started (one or both) and air to a suitable operating-pressure is forced through pipes *c* and D′ into the air-holders B, expanding the latter as shown, and into the main D^2, furnishing an ample supply of compressed air for working the elevating machinery at the various outlying stations E. When the cord *x* is pulled to start the elevator upward the pulley *z* on the stem of the three-way valve *i* is rotated, causing a passage to open through said valve directly through the same, letting air flow from the main D^2 into the tank *n* through the branch-pipe *d*, and forcing the liquor therein into the cylinder *h* and causing the elevator to rise. To lower the elevator the pulley *z* on said valve-stem is turned to operate said valve, so that the supply of air from the main D^2 to said tank shall be cut off, and at the same time to open the way for the air under pressure in said tank to escape through the pipe *e* to apartments in the building for ventilation or refrigeration, when, the pressure being removed from cylinder *h*, the elevator will descend at such a speed as the escape of the said liquor from said cylinder will permit.

I claim—

1. The combination, in a pneumatic-elevator system, of a central station having located thereat an air-compressing apparatus, one or more extensible and compressible air-holders to receive and hold the compressed air, suitable air-pipes to convey air from said compressors to said air-holders, and a main air-pipe to convey the air away from said central station, with one or more outlying elevator stations at a distance from said central station, each provided with a pneumatic-elevator motor connected with said main air-pipe, and with appliances, substantially as described, for governing the flow of compressed air from said main pipe to said elevator-motor, substantially as described.

2. In a pneumatic-elevator system, the combination, with air-compressing machinery and an elevator-motor, substantially as described, of air-pipes connecting said compressing machinery and elevator-motor, and of one or more expansible and compressible air-holders connected in said air-pipes, substantially as set forth.

3. The combination, with the compressed-air main D^2 and the tank *n*, and with appliances, substantially as described, for admitting air to and from said tank, of the escape-pipe *e*, substantially as set forth.

Signed by me at Washington, D. C., this 15th day of December, 1881.

CHARLES E. BUELL.

Witnesses:

A. C. BUELL,

A. E. SHUMAN.