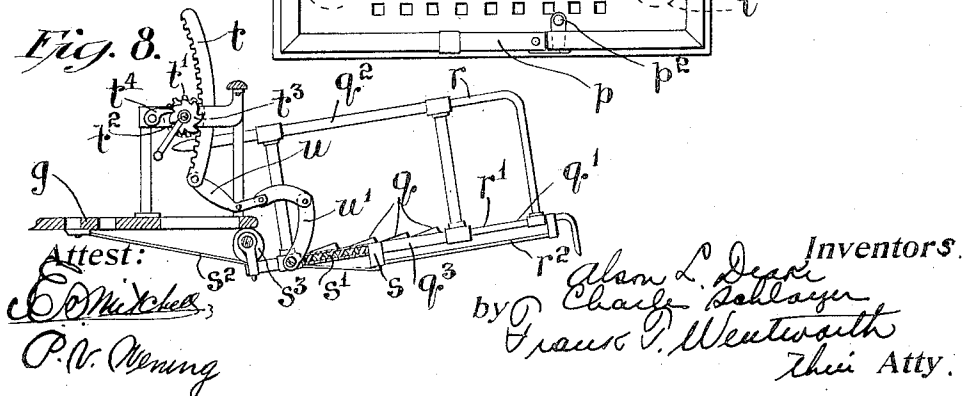
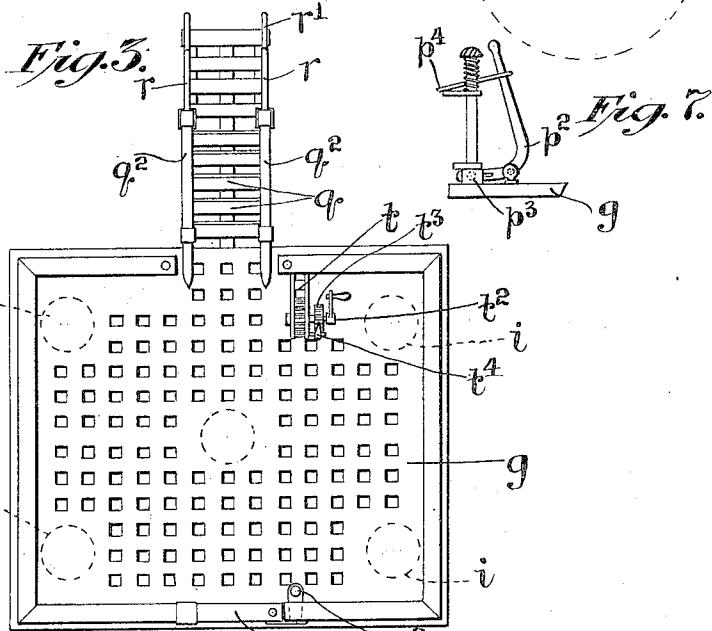
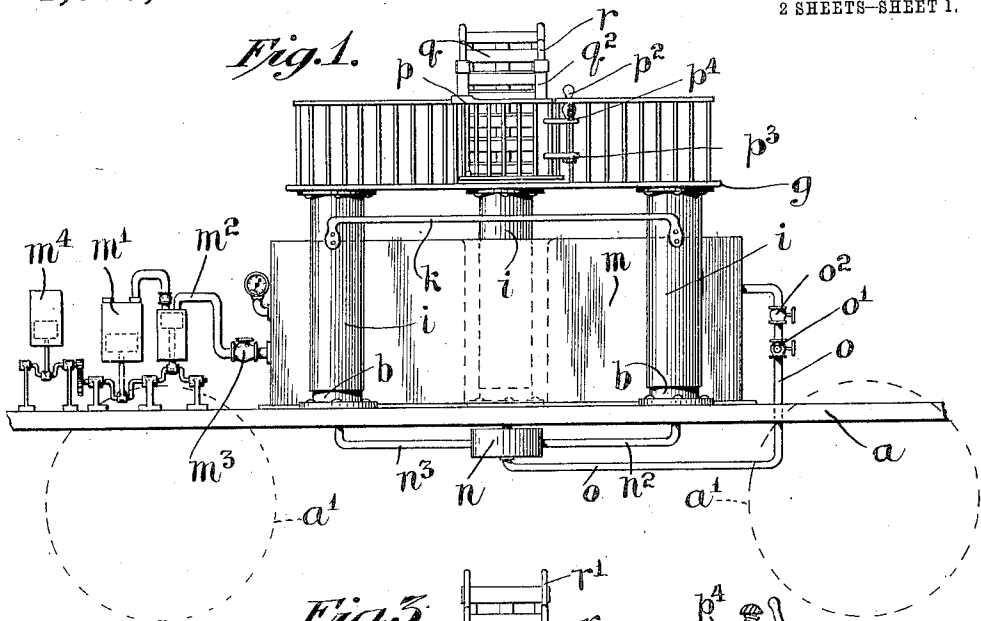


A. L. DRAKE & C. SCHLAYER.
ELEVATOR.
APPLICATION FILED MAR. 23, 1909.

1,057,414.

Patented Apr. 1, 1913.
2 SHEETS—SHEET 1.



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1,057,414.

Patented Apr. 1, 1913.
2 SHEETS—SHEET 2.

Fig. 2.

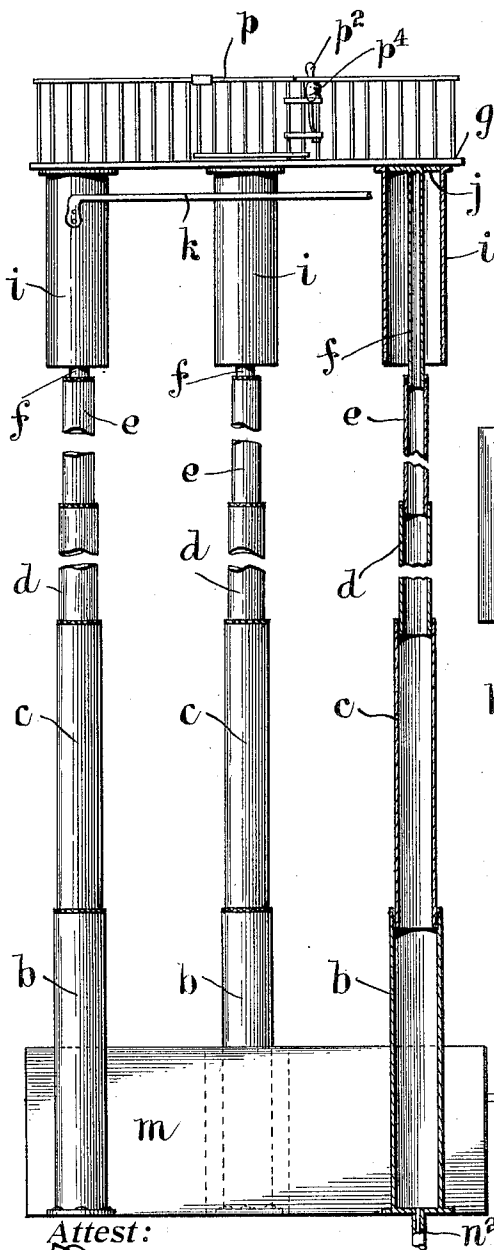


Fig. 4.

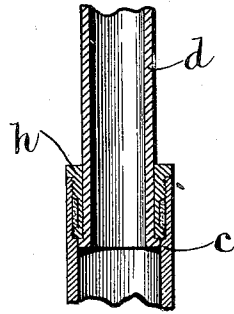


Fig. 5.

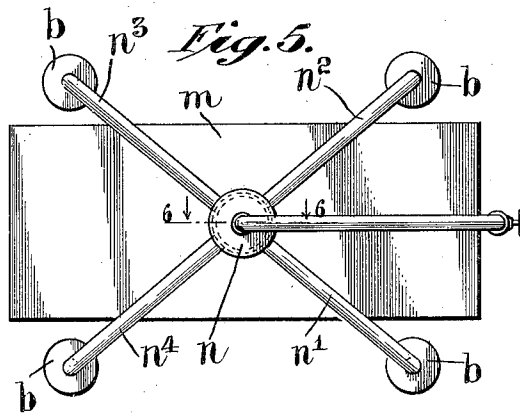
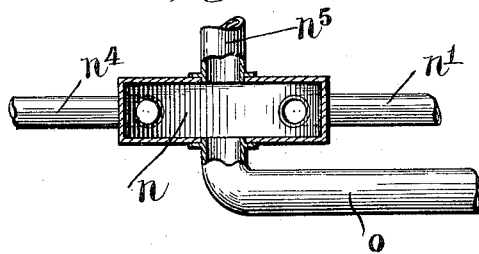


Fig. 6.



Attest:
P. V. Klening
P. V. Klening.

Alon L. Drake Inventor S.
Charles Schlager
by Frank P. Wentworth
their Atty.:

UNITED STATES PATENT OFFICE.

ALSON L. DRAKE AND CHARLES SCHLAYER, OF NEW YORK, N. Y.

ELEVATOR.

1,057,414.

Specification of Letters Patent.

Patented Apr. 1, 1913.

Application filed March 23, 1909. Serial No. 485,284.

To all whom it may concern:

Be it known that we, ALSON L. DRAKE and CHARLES SCHLAYER, both citizens of the United States, and both residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

Our invention relates to elevators and more particularly to an elevator of the plunger type.

The main object of our invention is to provide an elevator of the plunger type wherein the plunger or plungers will telescope so as to avoid the necessity for a well in which said plungers or plunger move or moves.

A further object is to provide an elevator of this character, the plunger of which will be so constructed and arranged as to permit the elevator to be readily and rapidly raised to the desired elevation within the limitations imposed by the structure itself, and when lowered will be so compact in form and of such weight as to permit it to be readily transported from place to place.

A still further object is to provide an elevator of this character wherein the power for raising same may if desired, be compacted and stored in small space without entailing excessive weight; and will be ready for instant use.

A still further object is to provide a device of this character wherein the pressure utilized in raising it may be controlled in its application to limit the extent of elevation, and to relieve the pressures acting upon the plunger or plungers at any desired speed.

A still further object is to provide a device of this character wherein the stored lifting power may be renewed while the elevator is in use, or as the stored power is gradually diminished.

A still further object is to provide an elevator of this character wherein the parts will be so arranged as to insure the equilibrium of the structure when raised even to the full extent.

A still further object is to provide an elevator of this character which is used without counterweights, and has a plurality of plungers so distributed as to avoid the buckling of the elevating pistons or plungers by rea-

son of an unequal distribution of weight within the car or cage.

A still further object is to provide an elevator of this character employing a plurality of plungers wherein the power will be simultaneously and equally applied to each plunger and be controlled from a single source both for supplying the power to raise the car, and for relieving the pressures actuating the pistons or plungers for the purpose of lowering said car or cage. And a still further object of the invention is to provide an elevator of this character which may be economically constructed, and maintained at small expense.

The invention consists primarily of an elevator embodying therein a cage or car, a plunger or piston consisting of a plurality of telescoping sections, and means respectively introducing elastic fluid under pressure into said sections, and discharging it therefrom, and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—Figure 1 is a side elevation of a plunger embodying our invention, the elevator being lowered; Fig. 2 is a side elevation of the air tank, car and plunger system raised to the full extent, showing one plunger in cross section; Fig. 3 is a plan view of the car; Fig. 4 is a detail view of the adjoining ends of two of the telescopic sections of the plunger; Fig. 5 is a bottom plan view of the tank and the distributing and controlling mechanism for simultaneously introducing air under compression to all the pistons; Fig. 6 is an enlarged section on the lines 6—6 of Fig. 5; Fig. 7 is a detail view of the locking and release mechanism of the gate to the car, and Fig. 8 is a detail side elevation of the mechanism raising and lowering the gang plank in said car.

Like letters refer to like parts throughout the several views.

Our invention is designed primarily for use in connection with a portable structure adapted for service as a fire apparatus, but while it is designed to be so used, it is apparent that its range of utility is not restricted to life saving appliances. In the drawings, however, we have shown it as being adapted for such use and will describe it more particularly with regard thereto.

In large cities there is a growing tendency toward the erection of so-called apartment or tenement houses ranging from 6 to 10 stories in height, and the fire escape facilities in such buildings are ordinarily inadequate, resulting in frequent disasters with resultant loss of life. It is our aim to produce a device which may be drawn close to such a building and be raised to any floor thereof for the twofold purpose of conveying firemen and fire fighting appliances rapidly to any floor and at the same time provide for the removal of occupants with a reasonable degree of safety and expedition. To accomplish this result it is essential that the apparatus be so light in weight as to be readily transported to the desired point and upon its arrival be in condition for immediate use. It is also necessary that when the structure is lowered its center of gravity will be so low as to permit its rapid transportation without likelihood of overturning and its height insufficient to interfere with that net work of wires and elevator structures common to many cities. In view of the conditions of use, the power utilized must be one not involving any complicated apparatus or machinery, and its control must be such as to avoid any great likelihood of its becoming disarranged under ordinary conditions.

In the embodiment of our invention shown in the accompanying drawings, we have shown a base *a* having mounted thereon a plurality of hollow plungers each of which is composed of a plurality of telescopic sections, the succeeding sections being of lesser diameter than the one below it, thus permitting each plunger to be collapsed, or the sections thereof to be nested, to permit a variance in the extent of projection, or traverse, of the plungers without the necessity for a cylinder of a length equaling the entire extent of projection or traverse of the plunger. It is needless to say that to permit such nesting, the various sections are hollow. Each of said plungers comprises a well *b* having slidably mounted therein a tubular section *c*. Similarly mounted in the section *c* is a tubular section *d* which in turn has mounted therein a similar section *e* in which moves the top section *f* of a telescopic plunger. While in the drawings, we have shown but four movable sections, to each plunger, it is apparent that this number may be increased to any desired reasonable extent to accord with the conditions of use and the desired extent of traverse of the car *g* supported by the various plungers. Suitable means for coupling these sections are provided as an ordinary gland packing *h*, shown in Fig. 4, having the twofold function of holding the telescopic sections together when projected to the full extent, and of preventing the escape of the compressed air or other elevating

means employed. Attached to the car *g*, and encircling the section *f*, is a cylindrical shield *i* of a diameter greater than the well *b*, so that, when the sections are nested, the shield will inclose said well and hold the parts in proper alinement. The top of the said shield *i* is provided with a packing *j* which serves to prevent the escape of air or other gases when the car is at the lowermost level. This shield also carries braces *k* for strengthening the structure and preventing the loss of alinement when the car is raised. The similar parts of the various wells and plungers are preferably all of the same dimensions, thus insuring the application of the lifting power thereto under the same conditions. This construction and arrangement of the plungers not only permits the effectual use of compressed air for the lifting or elevating power, but is such as to permit the elevator to be used without foundations, or a permanent sunken structure, and that apparatus appurtenant thereto, for controlling the power. Hence the base *a* may take the form of a wagon or vehicle platform, making the elevator portable. In Fig. 1, we have indicated at *a'* *a'* the wheels of a vehicle as above referred to.

Adjacent to the plungers, is a storage tank *m*, for air or other elastic fluid under compression, which tank is charged by a pump *m'* in communication therewith through a pipe *m²* containing in its length a check valve *m³*. This pump, is illustrated conventionally as of a compound type, and as being driven by an explosive engine *m⁴*, an arrangement desirable as insuring high pressure, if required, and lightness and compactness of the plant as an entirety. Various well known regulating appliances may, if desired, be used for starting and stopping the engine *m⁴* for the purpose of maintaining the pressure within the tank *m* at any desired point.

The tank *m* is in communication with each of the plungers through a distribution system of piping, and controlling means located therein, whereby equal power may be simultaneously applied to all of said plungers. This insures an equal lifting power in each plunger, any variance of such being due only to a difference in the quantity of friction between the various sections of each plunger, which is slight under the most unfavorable circumstances. This distribution system in the form of our invention shown in the drawings, consists of a distributing box *n* arranged beneath the tank and the various plungers having air lines *n'* *n²* *n³* *n⁴* and *n⁵*, extending to and in communication with the wells *b* respectively, said air lines establishing direct unobstructed communication between said distributing box and said wells. Leading from said box *n* is an air line *o* communicating

with the tank m and having in its length a vent valve o' and a controlling valve o^2 between said vent valve and the tank, this arrangement of valves being for the purpose of delivering air to the various plungers when both said valves are open, and permitting the venting of the plungers when the controlling valve o^2 is closed. The vent valve should be so proportioned as to gradually relieve the pressure within the plungers thus permitting the lowering of the car g through the reduction of such pressure. It will thus be observed that the valve o^2 controls the speed and extent of elevation of the car g and the valve o' controls the speed and extent of the lowering of same.

The car g may be of any desired construction although preferably the floor thereof is latticed as shown in Fig. 3, and the railing inclosing same is open, as shown in Fig. 2, for the purpose of lightening the structure of the car. On one side of this car is a swinging gate p having a socket plate on one end adapted to fit over the top rail and having a spring p' acting to normally close it and the arm p^4 on the lever p^2 serving to hold it closed. Attached to the car is a bell crank lever p^2 one arm of which is pivotally connected to a block p^3 acting on the lower stringer or rail of the gate whereby said gate may be lifted to permit it to be swung outwardly. On the opposite side of the car is an extension gang plank consisting of a portion q hinged to the car as shown in Fig. 8 and a sliding portion q' mounted on said hinged portion and adapted to slide relative thereto so as to partially telescope these sections. The bottom and top rails q^2 q^3 of the section q are hollow to accommodate the rails r r' of the section q' . This latter section is provided with a sliding block s mounted upon the bottom rail q^3 , the spring s' mounted on said bottom rail serving to normally project the section q' . The rod r^2 acts as under bracing for carrying the floor of the extension q' . Secured to the floor of the car g is a flexible cable s^2 connected with the block s which cable bears upon an eccentric s^3 adapted to shorten this cable when the gang plank is raised, so as to telescope the sections q q' , thereof. Mounted in suitable standards on the car g is a curved rack t in mesh with a pinion t' actuated by a crank shaft t^2 carrying a ratchet wheel t^3 controlled by a pawl t^4 . Pivotally connected to the rack t is a bell crank lever u one arm of which is connected by a compound lever system u' with the section q of the gang plank adjacent to the point where it is hinged to the car. It will thus be observed that the gang plank may be raised or lowered by the mechanism last described and that its length will be either increased as it is lowered or diminished as it is raised by

the mechanism heretofore described. The projections q^4 at the outer end of the extension q' are for the purpose of engaging the object to which the gang plank is extended and thus sustain the outer end of the plank, in conjunction with the lever and rack mechanism above referred to.

In describing the operation of the device heretofore described, the description will be in connection with its use as a fire apparatus, it being understood, however, that this merely is one of its uses and it is not our intention to limit ourselves to this particular use.

It will be observed that the entire structure being supported from a platform a this platform may be readily transported from place to place the concentration of the weight being sufficiently close to said platform to prevent over-balancing of the structure while being transported. The height of the wells b and the length of the various plunger sections will be such as to bring the weight well upon the platform, and to permit the apparatus to move freely about the streets of a city even when overhead wires extend above the said streets.

Under normal conditions the pressure within the tank m will be maintained at that necessary to raise the car g to the greatest height permitted by the telescopic sections of the plungers c , d , e , and f , so that the apparatus is always in readiness for instant use. If desired, however, the pump m' may be put in operation through the engine m^4 when the apparatus starts, in order to develop the desired pressure while the apparatus is being transported.

Assuming that the apparatus reaches the point of use, it is drawn as close to the building as conditions will permit and opposite the point to which access to the building is sought. Any desired appliances or any desired number of men, may then be placed upon or enter the car g , for the purpose of elevating them to any floor within the range of elevation of said car to which access may be desired for purposes of rescue, or of seeking a vantage point for fighting the fire. Access is had to the car by opening the gate p by swinging the lever p^2 , which raises the socket plate of the top rail from its engagement with the top rail of the car and permit the gate to be opened outwardly. The gate in use will be on the side of the car away from the building, so as to permit ready access thereto removed as far as possible from danger, by means of ladders or other appliances. When the car is thus loaded, the spring p' may be relied upon to swing the door to place, and a reversal of the operation of the lever p^2 will drop it so as to lock the gate in the closed position, the arm p^4 on said lever holding it closed. It will be observed that the time re-

quired for loading the car will be in proportion to the size of the load but that under all conditions it will be quickly accomplished.

5 Everything being thus in readiness the vent valve o' is closed so as to present no obstructions between the valve o^2 and the distributing box n and at the same time cut off the outlet to the open air. The valve o^2 10 may then be opened to any desired extent to retain complete control over the speed of traverse of the car, the amount of air or other elastic fluid under compression, admitted, being regulated by the operator in 15 accordance to the weight of the load. The air when thus released by the valve o^2 flows through the air line to the distributing box n and thence simultaneously and in substantially equal volume through the air lines n' 20 n^2 n^3 n^4 and n^5 to the bottom of the respective wells b , in which respectively are nested the sections c d e and f of a telescopic plunger. The pressure thus admitted to the 25 plunger will act first upon each section f and will gradually force same upwardly through the packings in each section e until it has been raised to the greatest extent possible, whereupon the sections e will be extended, thus in turn elongating each plunger to the same extent to accomplish the 30 elevation of the car. It will be observed that the area of the head of the section f and the exposed surfaces of the bottom of this section and of the sections c d e and in 35 conjunction with the degree of compression of the elastic fluid used as a lifting power, regulate the quantity of power necessarily developed, providing the volume of air admitted to these plungers is sufficiently great 40 to prevent undue expansion of the said fluid with a resultant loss of power. Hence the proportion of the tank to the various plungers and the wells therefor, must be such as to provide for a sufficient quantity 45 of elastic fluid under compression to secure any desired lifting power. By using a plurality of such plungers we not only increase the area of the surfaces acted upon by the elastic fluid, but secure lightness of structure and added stability to the car when 50 raised; and at the same time permit the operation of the device with lighter pressure. By opening the valve o^2 to the full extent, the car may be rapidly raised to any 55 desired elevation, the operator at the bottom as heretofore stated, controlling the speed and the extent of elevation. If desired, however, any other means for controlling the flow of air or other fluid under 60 compression to the various plungers may be used, it not being our intention to limit the invention to the precise form of control shown in the drawings and heretofore described.

65 When the car has reached the desired

height, the operator cuts off the flow of air or other fluid under compression, the air columns in the various plungers serving to maintain the car at this altitude. Should leakage occur in any of the glands, the 70 operator may open the valve o^2 slightly to maintain the desired volume of air and the desired pressure within the various plungers.

Drawing air from the tank m , as described, for the purpose of raising the car will lower the pressure in said tank to an extent to diminish the efficiency, so that 75 when the car is once raised it becomes desirable to start the air pump for the purpose of again raising the pressure in this tank. Hence there will always be a reserve force sufficient to repeat the operation of raising the car. The use of air under compression permits the continued use of the 80 elevator without the necessity for cumbersome weighty machinery, or the presence of storage tanks for water common to hydraulic elevators. The lifting power may also be stored in a comparatively compact space and without materially adding to the 85 weight of the apparatus. It is apparent that in an apparatus of this character no counterweights, side rails, or other appliances common to elevators are essential although under some conditions of use such 90 might be employed without effecting the function or mode of operation of our device. The telescopic plungers being arranged symmetrically with relation to the car and with one of them centrally of the 95 others, the weight of the car will be so sustained as to prevent the overbalancing thereof, and stability will be imparted thereto. The lattice work of the car will have the sole function of minimizing atmospheric resistance to the movement of the 100 car in either direction.

When the car has reached the desired altitude the pawl p^4 is released and the pinion t' rotated by means of the crank shaft 110 t^2 to raise the segment t and actuate the bell crank u , and compound lever system u' to lower the gangplank and project it toward the window or other opening or upon the roof of the building to which access is 115 desired. As the said gang plank is lowered, sufficient slack will be formed in the cable s^2 to permit the spring s' to force the extension q' outwardly relative to the section q so as to give the desired extent of projection to the gangplank. In so moving, the 120 rails r r' will move in the rails q^2 q^3 . When the car has been loaded when raised, and it is desired to lower it to the ground, the pawl p^4 is thrown into engagement with the 125 ratchet t^3 and the operation of lowering said gangplank reversed. As the section q is raised, the eccentric s^3 will shorten the cable s^2 and thus draw the section q' toward the section q tensioning the spring s' through 130

the block *s*. When so raised the gangplank will project across the opening in the rails of the car, closing same. The car being so closed the valve *o*² is closed so as to cut off the tank *m* from said cylinders, and the vent *o*¹ opened to relieve the pressures within the plunger and permit the car to descend under gravity. The vent afforded by the valve *o*¹, being small, the descent of the car will be gradual. The plungers each being composed of a plurality of telescoping sections, this descent will be accomplished by the automatic nesting of the sections, under gravity, the sole care of the operator being to prevent a too sudden lowering of the pressures within the plungers which might result in damage to the machine or injury to the occupants of the car. With compressed air or other fluids under compression, controlled in the manner indicated, considerable speed may be developed during the ascent of the car and this ascent will be uniform or by a gradual acceleration, the upward movement being continuous until the power is cut off by the operator.

We are aware of the fact that the use of compressed air or other elastic fluid under compression as a lifting power in not new in the useful arts and we lay no claim thereto broadly. We believe it to be new, however, to provide an elevator of the plunger type embodying therein a plunger composed of a plurality of telescopic sections and means for introducing fluid under pressure into said plunger for the purposes herein set forth; and intend to claim such broadly. It is not our intention to limit the invention to the precise details of construction shown in the drawings, and heretofore described, as it is apparent that the general design of the elevator may be changed, to meet the conditions of use, without departing from the spirit and scope of the invention.

Having described our invention, what we claim as new and desire to have protected by Letters Patent is:—

1. In an elevator, a portable platform having mounted thereon a storage tank, an air compressor, means whereby said compressor may be operated, pipe connections between said tank and said compressor, an elevated car, a plunger arranged centrally of said car and supported from said plat-

form, a plurality of plungers arranged symmetrically about said central platform, each of said plungers consisting of a plurality of telescoping sections, a shield attached to said car and encircling the upmost section of each of said plungers, packing carried within said shield adjacent to said platform adapted to coöperate with the lowermost section of each plunger to prevent the escape of gases when the car is in the lowered position, braces between the various shields whereby rigidity is imparted to the entire structure, a distributing box, to the interior of said plungers respectively, a pipe connection between said distributing box and said compressed air tank and independently operative valves whereby elastic fluid under compression may be simultaneously delivered to all of said plungers, and all of said plungers may be simultaneously vented to permit the control of the movements of the elevator from the ground.

2. In an elevator, a platform, a storage tank, an air compressor, means actuating said compressor, pipe connections between said tank and said compressor, a car elevated upon said platform, a plurality of plungers arranged symmetrically about said platform, each of said plungers consisting of a plurality of telescoping sections, a shield adapted when said car is lowered to encircle each of said plungers, means packing said shield whereby the escape of gases when the car is in the lowered position is prevented, a gas distributing box in communication with the interior of said plungers, a pipe connection between said distributing box and said compressed air tank, and independently operative valves whereby elastic fluid under compression may be simultaneously delivered to all of said plungers and all of said plungers may be simultaneously vented to permit the control of the movement of the elevator from the ground.

In witness whereof we have hereunto severally affixed our signatures this 22nd day of March, 1909, in the presence of two witnesses.

ALSON L. DRAKE.
CHARLES SCHLAYER.

Witnesses:

P. V. WENING,
P. FRANK SONNEK.