

No. 708,726.

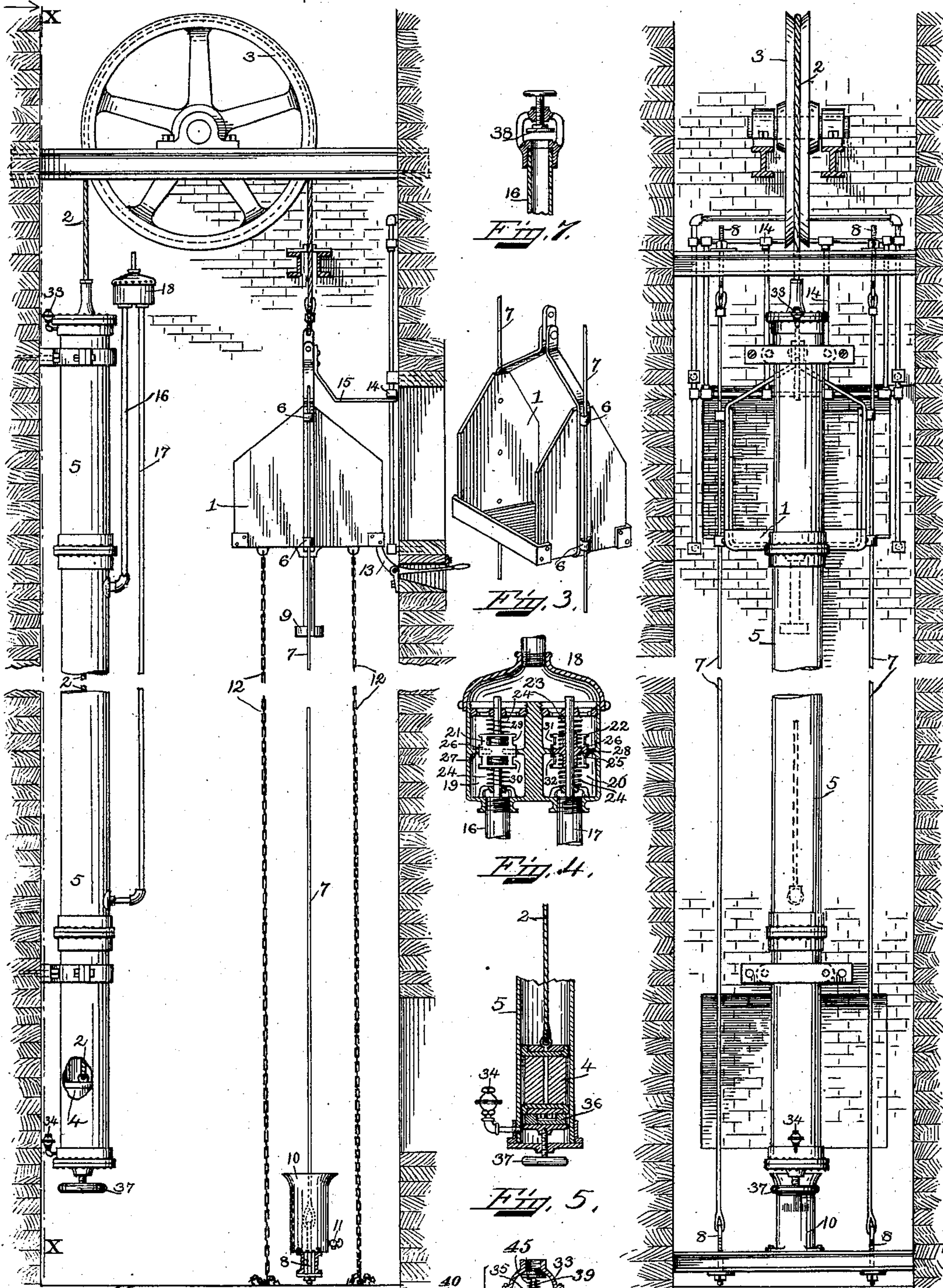
Patented Sept. 9, 1902.

G. MILES.

DROP.

(Application filed Aug. 17, 1900.)

(No Model.)



Witnesses: *Fig. 1.* *Fig. 2.* *Inventor.*
Wm. J. Edwards. *George Miles*
E. S. Lombard. *Fig. 8.* *by A. C. Orme*

UNITED STATES PATENT OFFICE.

GEORGE MILES, OF BOSTON, MASSACHUSETTS.

DROP.

SPECIFICATION forming part of Letters Patent No. 708,726, dated September 9, 1902.

Application filed August 17, 1900. Serial No. 27,188. (No model.)

To all whom it may concern:

Be it known that I, GEORGE MILES, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and
5 useful Improvements in Drops, of which the following is a specification.

My invention relates to mechanism for lowering articles from one to another position, known in the trade as "drops."

10 In some kinds of business the merchandise is received and stored or put through various processes of manufacture in the lofts of the warehouses or factories, and when it is to be shipped or further fabricated it is delivered
15 only from a particular hatchway, so as to facilitate the handling of the commodities. A good instance is to be noted in the daily newspaper offices, a class of business that is usually located in portions of the town where floor-
20 space is very expensive, and it is a matter of importance to keep down the space occupied by the wells connecting the several floors and at the same time it is imperative to insure the immediate despatch of completed matter. The
25 composing and stereotyping departments are commonly arranged in the upper parts of the building, while the printing-presses are located in the basement. Hence there is frequent occasion to lower the completed plates
30 to the press-room.

I have devised mechanism to fulfil the requirements above outlined; and the invention consists in devices adapted to normally locate
35 a car, sling, hook, or other load-supporting device at the floor from which deliveries are to be made, which when loaded and released, if it has been restrained while loading, descends to the place of discharge under automatic control and when relieved of its load
40 again rises to its normal position, governed in like manner. The car or other support may be connected with a piston moving in a cylinder containing a fluid in such manner that the unloaded car tends to rise to the de-
45 livery-floor. The connection might be by a rope passing over a sheave to an overweighted piston. The cylinder may be closed at both ends, and at points near its ends openings, of which the areas may be preferably varied at
50 will, regulate the flow of fluid at the opposite portions of the cylinder for the changing

loads to be handled. The varying devices may consist of throttling-valves adapted to be adjusted manually or automatically so as to furnish sufficient openings to allow the
55 fluid to pass to the atmosphere and to admit air to the cylinder, or some of the fluid may be permitted to again enter the cylinder at the end opposite to the piston's motion if the opening to the atmosphere is insufficient to
60 prevent too much retardation of the piston. The openings of the cylinder are preferably arranged at such distances from the ends as to form cushions of fluid for the piston at the
65 ends of the strokes. To further regulate the travel of the piston, each end of the cylinder may be supplied with an adjustable relief-valve, so air may flow into the cylinder to relieve an excessive rarefaction of the entrapped
70 fluid. Devices are provided to position the car at each limit of its travel, and an automatic latch to support the car or grasp the rope or cable is preferably arranged so the car may be stationary till loaded and then manually re-
75 leased to allow the car to convey the commodities to the place of discharge. To insure prompt starting of the car, I attach to it a supplemental weight, which has a variable effect on the car to partially counterpoise the piston that is at a maximum when the car is at the
80 loft and at a minimum when the car is at the bottom of the well. Metal, wooden, or other guideways, themselves rigid or secured to the sides of the well, are found in practice to become displaced or to splinter. If some point of
85 the well bulges inward, the guides will cause the car to jam, and if the guides should separate the car might get clear of the guides. When the car has an attendant, such displacements might be discovered before becoming
90 serious; but when the car has no attendant or is automatically actuated it would not be discovered, and in view of the long travel and very high speed of a drop-car such constructions are not available. For this reason I guide
95 my car by means of eyes running along cables tightly stretched by threaded bolts which are adjusted by nuts bearing on beams secured in the well. It is impossible for the car to get away from the guides, and the yielding
100 character of the guides is exceptionally adapted to the extreme speeds of the car.

The invention further consists of the devices and their combinations, which will be more particularly pointed out.

The drawings show in Figure 1 a vertical section of the top and bottom portions of a drop-well and elevations of my drop mechanism; Fig. 2, a view at right angles to Fig. 1, as from the line X X; Fig. 3, a perspective of the car; Fig. 4, a section of the regulating-valve; Fig. 5, a section of the lower portion of the air-cylinder; Fig. 6, a detail; Fig. 7, a section of the throttling devices; Fig. 8, a plan of half of relief-valve.

In an instance in which the travel may be about one hundred feet and the well some twenty-four by thirty-six inches in area the drop-car 1 is supported from a cable 2, which runs over a sheave 3 and has attached to its extremity a piston 4, that travels in a cylinder 5, composed of lengths of pipe connected together and secured to the walls of the drop-well. The car is guided by attached eyes 6, which traverse the guiding-ropes 7, tightly stretched by tension-bolts 8, supported from beams crossing the well. Beneath the car is supported the plunger 9, which as the car descends enters the dash-pot 10, supported on cross-beams and furnished with a small valve 11 to regulate the escape of the inclosed air. Hanging from the car are supplemental weights or counterpoise chains 12, which as the car descends coil up on the bottom of the well or other support to aid in starting and regulating the motion of the car, and the chains should be of sufficient weight to cause the car to fall with its lightest load, while the piston should be heavy enough to lift the car and counterpoise from the bottom of the well. A suitably-supported latch 13 may hold the car while being loaded, and when moved out of the path of the car by the attached lever permit the car to descend. The doorway at the upper floor is guarded by a gate 14, that is lifted and lowered by a projecting arm 15, connected with the car 1. Small pipes 16 and 17 may connect the cylinder near its extremities with the body of a controlling device 18, which consists of chambers 19 and 20, furnished with valves 21 and 22, that control the flow of fluid through the chambers to the relief-passage 23, leading to the atmosphere. The valves are held in their mid-positions, normally closing the chambers 19 and 20 by springs 24. The valves are tubular, but furnished with a central partition 25, so that in connection with their central cylindrical portion 26 they close the ports 27 and 28 of the chambers leading to the relief-passage. Apertures 29 and 30 in valve 21 and 31 and 32 in valve 22 when the valves are positioned otherwise than centrally to the ports 27 and 28 allow the relief-passage to connect with either of the chambers. Relief-valves 33 and 34 may be located at each end of the cylinder, and their stems 39 are preferably guided by holes 40 in the followers 35, threaded in the bear-

ing 41, which is supported by arms 42 from one member of the valve-body. The followers may be adjusted, as by a spanner entering holes 43 in the valves registering with holes 44 in the flanges of the followers, to vary the tension of the springs 45, that normally hold the said valves to their seats, to insure the air-cushion, but being intended to open, so the inflow of air at the start may be regulated. The holes 43 in the valves may be closed by screw-plugs 46. At the bottom of the cylinder 5 is located a stop 36, which may be adjusted by the hand-wheel 37 to position the piston 4, and thereby locate the car at the upper floor. The travel of the car is limited in the other direction by the plunger 9, attached to the car and adapted, in connection with the dash-pot 10, secured to the cross-beams and provided with the adjustable vent 11, to check and finally arrest the motion of the car, so it may stand at the lower doorway. The plunger 9 may be adjusted by means of its threaded supporting-stem so when the plunger rests on the bottom of the dash-pot the surfaces of the car-floor and doorway at the bottom of the well will be just level. This once effected seldom requires adjustment, as the connected parts are rigid.

Normally the car 1 is, as illustrated, at the upper doorway and preferably held by the latch 13. The car is now loaded, and when the latch is moved out of the path of the car by the hand-lever the car begins to descend and lifts the piston 4 in the cylinder 5. The rarefaction of the air below the piston is relieved by valve 34 opening and admitting air behind the piston. At the same time the piston compresses the air above it in the cylinder, and one or both of the valves 21 and 22 may lift and permit the air to pass through the ports 27 or 28 to the relief-passage 23 and atmosphere. As soon as the piston passes the connection of the pipe 17 with the cylinder the air escapes through pipe 16 to chamber 19 and holds up valve 21, so it may rush in at the bottom of valve 21 and out by apertures 30 to relief-passage 23 and the atmosphere. If the air should not have sufficient vent through the connection to the atmosphere to permit the car to fall at proper speed, air will accumulate in the relief-passage 23 enough to exceed the pressure behind the piston, when it pushes the valve 22 downward and passes into the valve 22 and out through the apertures 31 to chamber 20 and thence by pipe 17 to the cylinder 5 below the piston 4 and diminishes the drag on the piston. When the piston passes the connection of the pipe 16 with the cylinder, the entrapped air is compressed to check the descent of the car, which has from the start been losing the weight of the counterpoise-chains 12 as the links reach the floor, and is at last brought to rest by the plunger 9 entering the dash-pot 10 to support the car on the bottom thereof. As soon as the car descends the gate 14, which has been rest-

ing on the arm 15, closes the upper doorway to guard the drop-well. When the load is removed, the car begins to rise, as the piston 4 more than balances the car without its counterpoise and in its motion constantly picks up the counterpoise-chain 12 from the floor, which tends to diminish the effect of the weight of the piston 4. The inflow of air behind the piston at the valve 33 now acts to aid the piston to lift the car, and the valve should be so adjusted, by means of the follower 35, that the start of the car is prompt but without shock. As the piston descends in the cylinder 5 compression of the air again occurs in the pipes 16 and 17, which affects the valves 21 and 22, as above described, and when the piston passes the connection of the pipe 16 and the cylinder the valve 22 is held up, permitting the air to enter valve 22 and pass out by apertures 32 to the relief-passage 23 and the atmosphere. If the pressure in the relief-passage 23 begins to exceed the pressure behind the piston, the valve 21 is pushed down, and the excess of air passing into valve 21 leaves it by aperture 29 to enter chamber 19 and to pass by pipe 16 above the piston 4 to aid its motion. When the controlling fluid is air, the regulating-valve 18, as above described, may sometimes be omitted, and the size of the pipe-openings will determine the control and retardation of the car; but it is advantageous to provide some means for varying the openings of the pipes 16 and 17 so that the speed of travel of the car may be regulated for considerable changes of load, as the throttle-valves 38, attached to each of the pipes, are located so as to be easily accessible for adjustment.

By the term "car" I mean anything that may support a load, and it is understood that such particular devices as are described as connected with a car or more suitable equivalents may be used in connection with such other supports. It is believed that this invention possesses some novelty, and although I have necessarily described certain constructions in the above disclosure it is not to be understood that they are limitations, as any good mechanic might vary portions of the devices without departing from the essential features of the invention.

Having described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a drop, a car guided by cables having tension-adjustments, and a piston with connections to normally overbalance the car, combined with means to form air-cushions to control the travel of the piston toward each limit of its stroke, and adjustable devices to admit air-pressure behind the piston at the beginning of its stroke, substantially as described.

2. In a drop, the combination with a car, a piston, a fluid-cylinder, and a fitting having chambers connected with opposite portions

of and near the extremities of the said cylinder, of a valve controlling each chamber of the fitting so that if the pressure increases in either chamber its valve will allow escape of fluid from the said chamber, to permit motion of the piston, substantially as described.

3. In a drop, the combination with a car, a piston, a fluid-cylinder, and a fitting having inlet-chambers both of which are in connection with a relief-passage of the fitting and each of which chambers is in connection with an opposite portion of the fluid-cylinder, of valves controlling ports in each chamber of the fitting so that if the pressure in either chamber falls below the pressure in the relief-passage, the valve of that chamber will permit some fluid to pass from the relief-passage to its end of the cylinder to relieve the drag on the piston, substantially as described.

4. In a regulating device for drops, chambers having inlets, a relief-passage having an outlet, and connections from each chamber to the relief-passage, combined with valves arranged to normally close the connections from the chambers to the relief-passage, but having devices adapted to automatically allow motion of the valves so either or both of the chambers may connect with the relief-passage, substantially as described.

5. In a regulating fitting for drops, means forming inlets to, devices forming an outlet from, and ports between the inlets and outlet of the fitting, combined with valves and yielding supports for the valves arranged to close the ports normally, but when the pressure in an inlet increases its valve may open to discharge fluid to the outlet, and upon excessive increase of pressure in the outlet the valve of the other inlet may open so that inlet may receive fluid from the outlet, substantially as described.

6. In a drop, a car, a chain, a cylinder, a tight piston moving in the cylinder adapted to lift the car and chain, and connections for the moving parts, combined with automatically-acting valves and connections with opposite ends of the cylinder so air may be passed from one to the other side of the piston to increase its speed, substantially as described.

7. In a drop, a car, a chain, a cylinder and a tight piston moving in the cylinder to lift the car and chain through suitable connections, combined with means acting automatically for normally forming air-cushions at each end of the cylinder to retard the piston when approaching the said ends, and also acting to relieve a reduction of air-pressure at the ends of the cylinder as the piston leaves the said ends, substantially as described.

8. In a drop, a car, a chain, a cylinder, a tight piston and connections between the car and piston, combined with means to form air-cushions at each end of the cylinder, to freely pass air to or from the middle of the cylinder and devices for forming an adjustable air-

cushion beneath the car as the car nears the limit of its downward travel, substantially as described.

9. In a drop, a car, a cylinder and a piston
5 suitably connected with the car actuated by gravity to lift the empty car from its lower positions, combined with a chain hanging from the car when in position to receive a load to cause the car to fall by gravity, automatic de-
10 vices to apply air-pressure behind the piston at the start and means for forming air-cushions in front of the piston near its limit of travel, substantially as described.

10. In a drop, a cylinder, a car, and a pis-
15 ton connected to the car, combined with an

adjustable stop at one end of the cylinder to position the piston and car at a point of their travel, substantially as described.

11. In a drop, a cylinder, piston, and a car connected with the piston, combined with a 20 plunger attached to the car, a stop for the plunger, and adjustments to determine the final position of the car, substantially as described.

In testimony whereof I have affixed my sig- 25
nature in presence of two witnesses.

GEORGE MILES.

Witnesses:

T. V. CONNERS,

JOSEPH P. DORMON.