L. H. NIELSEN.

MOTOR.

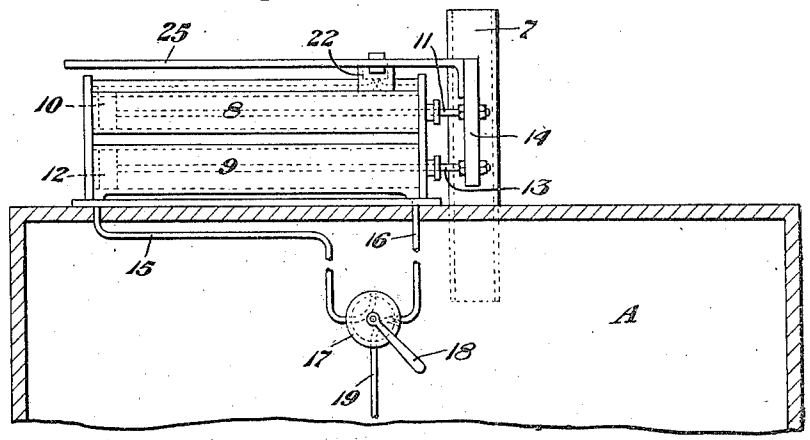
APPLICATION FILED MAR. 1, 1911.

1,007,377.

Patented Oct. 31, 1911

2 SHEETS—SHEET 1.

Fig. 1.



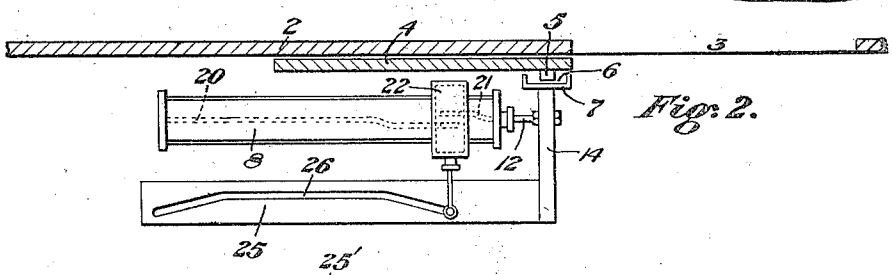


Fig. 2.

Fig. 3.

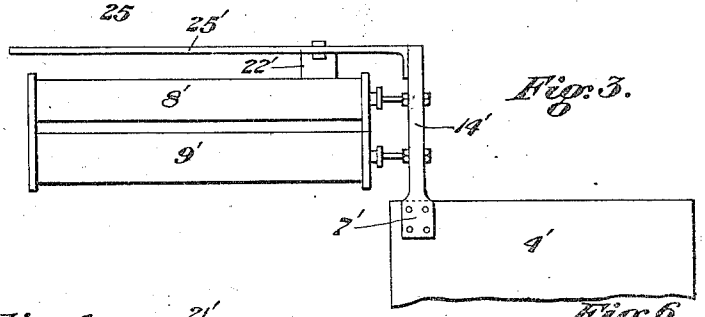


Fig. 4.

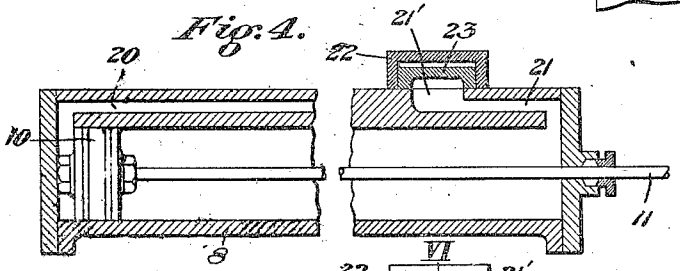
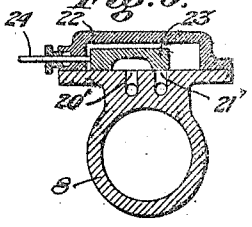


Fig. 6.



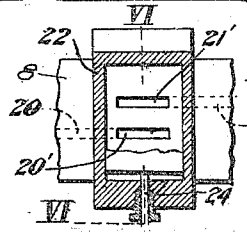


Fig. 5.

Witnesses:

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2 SHEETS—SHEET 2.

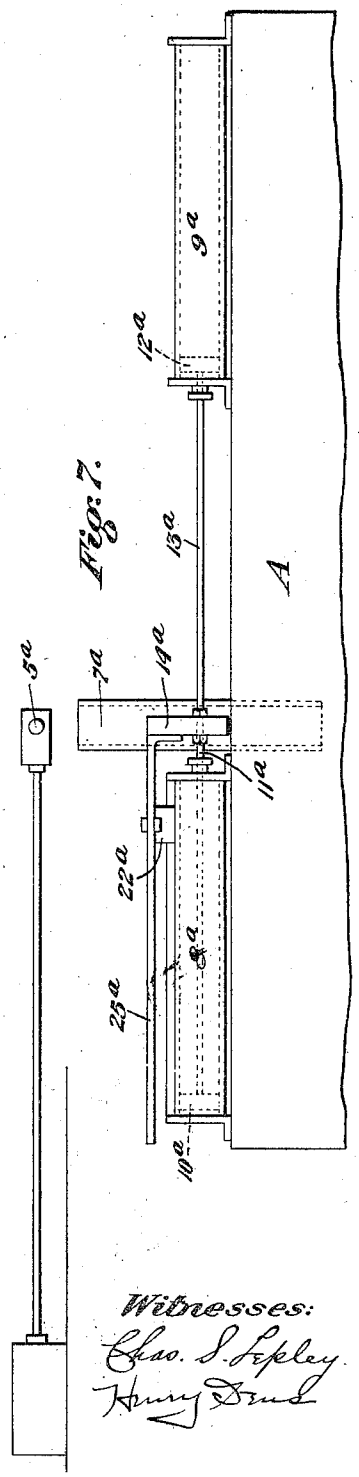

Fig. 7.

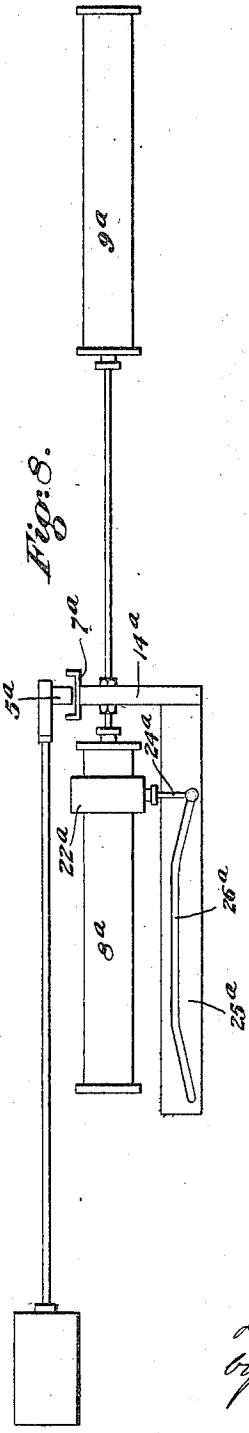

Fig. 8.

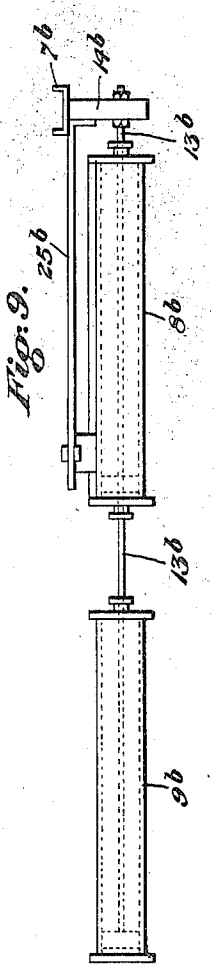

Fig. 9.

Witnesses:

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UNITED STATES PATENT OFFICE.

LUDVIG H. NIELSEN, OF PITTSBURGH, PENNSYLVANIA.

MOTOR.

1,007,377. Specification of Letters Patent. Patented Oct. 31, 1911.

Application filed March 1, 1911. Serial No. 611,705.

To all whom it may concern:

Be it known that I, LUDVIG H. NIELSEN, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Motors, of which the following is a specification.

My invention refers to means for controlling the operation of any movable element to which travel is imparted by an actuating motor, in conformity with the operation of the motor itself.

While the invention is applicable to a great variety of uses, I have shown herein the application to the doors of elevator shafts as one of the instances of its use.

The invention consists of the combination with an actuating motor cylinder for the door, or elevator to be actuated, of a companion cylinder coupled therewith in parallelism for cushioning the stroke of the piston of the motor cylinder.

Ordinarily, in the mechanical operation of elevator or other passenger vehicle doors, the stroke of the motor is unrestrained so that at the end of the stroke either in opening or closing, there is a considerable jar due to the stoppage of the undiminished speed of movement.

My invention has in view to provide means whereby, without appreciably reducing the time of operation, the motor is so controlled that the element to be actuated will slow up at the end of the stroke in either direction, resulting in quiet easy movement without jar or noise.

The invention comprises a motor cylinder, a plunger cylinder in parallelism therewith, either alongside or in tandem relationship with the motor cylinder and through which circulates in either direction a body of any suitable fluid, as oil, alcohol, water, air, etc., and valve mechanism operatively controlled by the motor cylinder plunger, for partly or entirely throttling the circulating fluid at or near the end of the stroke, as hereinafter more fully set forth.

The invention is applicable to either a moving vehicle, as an elevator, for actuation of the several doors of an elevator shaft, in which case it is mounted upon and travels with the car; or in connection with the several individual doors of the shaft, in which case each door is provided with a separate actuating motor and its companion cushioning apparatus, or to any other apparatus requiring the movement of an element or body at a variable speed of travel.

In the drawings, illustrating the application of the invention to both arrangements of an elevator door, which application is to be understood as illustrative of the invention only, without any restriction, Figure 1 shows one form of the invention in which the actuating motor cylinder and the throttling cylinder are mounted side by side upon an elevator car, the door being open and ready to close. Fig. 2 is a plan view of the arrangement shown in Fig. 1, the elevator shaft and door being shown in section. Fig. 3 shows the application of the side-by-side arrangement of the cylinders to one of the doors of an elevator shaft. Fig. 4 is an enlarged longitudinal vertical sectional view, partly broken away, through the throttling cylinder. Fig. 5 is a plan view of Fig. 4, illustrating the circulating ports. Fig. 6 is a cross sectional view on the line VI. VI. of Fig. 5. Fig. 7 is a view similar to Fig. 1 showing the cylinders in tandem relation. Fig. 8 is a plan view of Fig. 7. Fig. 9 is a similar view showing a modification.

In the application of the invention to a movable elevator car as shown in Fig. 1 of the drawings, 2 represents the wall of the elevator shaft or well provided at each floor with the opening 3 closed by the door 4 hung in any suitable well known manner, as by carrying rollers on a supporting track. Each door 4, provided for the opening 3 at each floor of the building, is provided with a projection or lug 5 which in the closed position of the door is located in alinement with the vertical groove 6 of an elongated shifting shoe 7 mounted upon and forming a portion of the actuating mechanism of the elevator car A. Any other suitable interengaging devices may be employed whereby when the car is at any particular floor the shoe 7 or its equivalent will be located in operative engagement with the door 4 for shifting it to open position.

The cushioning cylinder 8 and the operating or motor cylinder 9 are mounted side by side or one above the other at any suitable location on the elevator car, with proper

supporting framework. Plunger 10 of cushioning cylinder 8 is provided with a plunger rod 11 while operating cylinder 9 is provided with a similar plunger 12 and plunger rod 13, both plungers being connected at their outer ends in any suitable way, as by a bracket 14 with the shoe 7, any convenient sliding or rolling bearing mechanism also being provided, if desired. Movement is imparted to plunger 12 of motor cylinder 9 by fluid pressure through connections 15, 16, leading to each end of the cylinder from a controlling four-way valve 17 located in the interior of the car within easy reach of the operator and having an operating handle 18. Fluid pressure may be maintained with the valve through connection 19 and a flexible hose from a stationary source of pressure, or from a tank mounted on and movable with the car, as preferred. For the purpose of controlling the flow of a cushioning fluid from one end of cushioning cylinder 8 to the other, said cylinder is provided with ports 20, 21, respectively, leading from each end to valve ports 20′ and 21′ respectively, extending through the base of a valve casing 22 and containing a controlling valve 23. Said valve is adapted to be shifted by its stem 24 to establish free circulation during the commencement and major portion of the stroke and to partly or entirely throttle the circulation at the end of the stroke. This is accomplished by means of any suitable mechanism operating in conformity with the stroke of the motor cylinder plunger, as a cam 25. Said cam is rigidly secured with plunger rods 11 and 13 by attachment to bracket 14, and by its groove 26, as shown in Fig. 2, engages the terminal of valve rod 24. When the plunger 12 of the actuating cylinder 9 is at the extremity of its stroke in either direction, the valve will be thrown to the limit of its movement as indicated in Fig. 6, entirely or almost entirely closing one of the circulating ports. When movement is imparted to the bracket 14 and shoe 7 the freedom of the flow of the cushioning fluid is established, due to the straight faces of the cam groove, the full open position of the circulating valve ports being maintained. Near the end of the stroke, the circulation is gradually throttled by the inclined terminal of the cam and the speed is correspondingly reduced, due to the resistance of the circulating fluid, whereby to accomplish the ends in view. In the construction shown in Fig. 3, the invention in the same arrangement of cylinders is shown as applied to the operation of shifting one of the doors of the elevator shaft, in which case the bracket 14′ is secured to the door 4′ by its extension 7′ as will be readily understood, the throttling and motor cylinders 8′, 9′, together with the several co-acting and incorporated parts as above described being mounted in any convenient stationary position with relation to the door and operated by controlling connections and a valve at any desired position. The construction and operation is the same as has been described with regard to the mounting of the apparatus movably on the car.

In the arrangement shown in Sheet 2 of the drawings, the throttling cylinder 8^a and the motor cylinder 9^a are mounted in tandem arrangement on either a stationary or movable support as desired, and provided with the corresponding parts and connections indicated by the corresponding numerals with the exponent a and operable in the same manner generally as has been above described. The only difference in this arrangement is that, instead of mounting the cylinders side by side, their parallelism is provided for by arranging the cylinders on the same center and in alinement with each other. In such case, each plunger may be provided with its separate rod if desired, having a separate attachment or connection with the shoe 7^a, or if preferred, a single continuous rod may be used with the same results. In either case, the simultaneous movement of the plungers of each cylinder is provided for and controlled, due to their connection with the shifting shoe and the operation of the cam connected and traveling with the shoe and its connected parts. It will be understood that any other suitable arrangement of the two cylinders may be adapted, as by locating them closely together endwise in alinement and extending a common plunger rod outwardly through one end of one of the cylinders for attachment with the shoe, as illustrated in Fig. 9. In such case, the motor cylinder 9^b and controlling cylinder 8^b are located in tandem parallelism relation, close together as shown, employing a single continuous rod 13^b connected at one end with the yoke 14^b, shoe 7^b and cam 25^b. With either arrangement, the shoe or any equivalent coupler device, is shifted to the desired extent in either direction transmitting corresponding movement to the element to be moved.

In Figs. 7 and 8 the application of the mechanism to the moving of any weight or element W through the connected terminal 5^a adapted to be engaged by the shoe 7^a, is illustrated.

It will be understood that I am in no way restricted to the detail construction or utilization of the invention, but that various other modifications or applications of it are within the province of the skilled mechanic.

The novel feature common to all of the constructions is the combination with the motor cylinder of the controlling cylinder and its circulation valve which in turn is controlled by the movement of the motor cylinder, the cylinders being in parallelism,

and the plunger of each traveling through the same range of movement.

Having described my invention, what I claim is:—

1. Operating mechanism consisting of a motor cylinder and a fluid-containing cushioning cylinder in parallelism therewith, and means subject to the operation of the motor cylinder for controlling the flow of the fluid of the cushioning cylinder, substantially as set forth.

2. The combination with a movable element, of a motor plunger for actuating the element, a cylinder containing a cushioning fluid and in parallelism with the motor plunger, and throttling mechanism controlled by the motor plunger.

3. The combination with a movable element, of a motor plunger for actuating the element, a cylinder containing a cushioning fluid and in parallelism with the motor plunger, and a throttling valve and controlling cam therefor actuated by the motor plunger.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

LUDVIG H. NIELSEN.

Witnesses:

C. M. CLARKE,

CHAS. S. LEPLEY.