

F. C. FURLOW.
 FLUID BUFFER DEVICE FOR ELEVATORS.
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1,064,204.

Patented June 10, 1913.

Fig. 1.

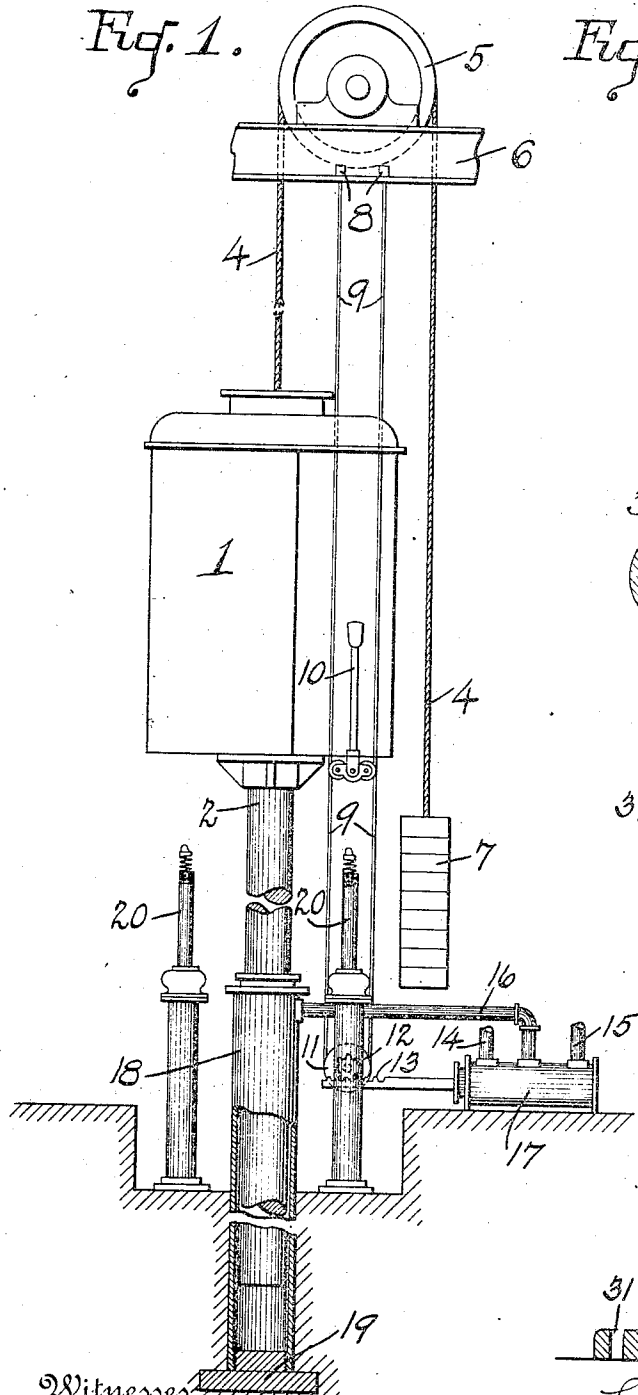
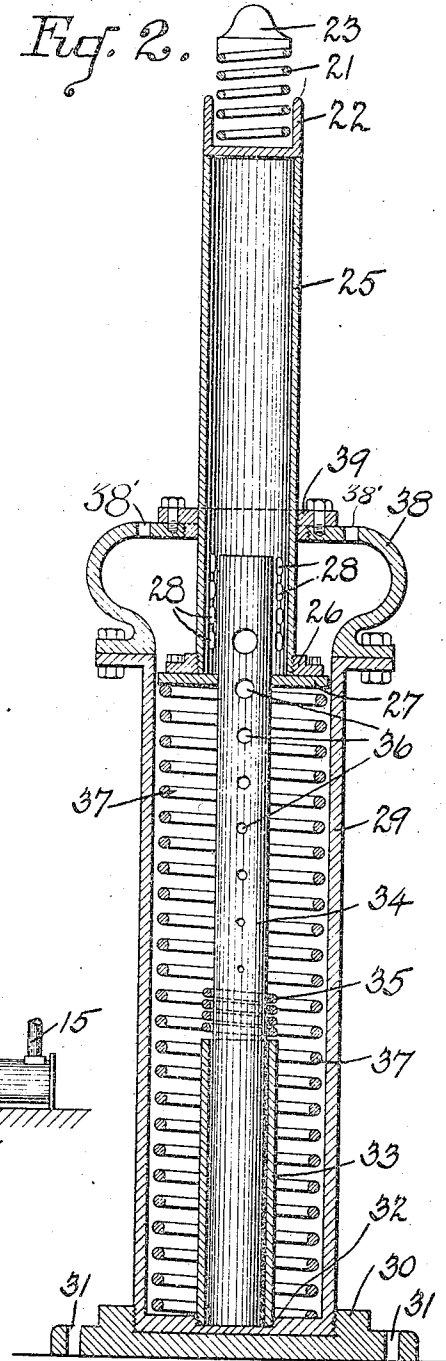


Fig. 2.



Witnesses
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 By his Attorney
Attn: Furlow

UNITED STATES PATENT OFFICE.

FLOYD C. FURLOW, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FLUID BUFFER DEVICE FOR ELEVATORS.

1,064,204.

Specification of Letters Patent.

Patented June 10, 1913.

Original application filed October 9, 1907, Serial No. 396,553. Divided and this application filed February 4, 1911. Serial No. 606,468.

To all whom it may concern:

Be it known that I, FLOYD C. FURLOW, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Fluid Buffer Devices for Elevators, of which the following is a specification.

My invention relates to safety buffers for elevators, and this application is a division of my co-pending application, Serial No. 396,553, filed October 9, 1907, for fluid dash-pot buffer device.

The invention consists of a device for gradually retarding an elevator car or other moving element independently of its operating apparatus, so as to bring the parts gradually to rest without shock or jar.

The invention also comprises means for resetting or returning the buffer device to its initial position, when the same is released by the moving part of the elevator which is arranged to engage the buffer device.

The exact nature of the invention and the specific objects sought to be attained will appear hereinafter in connection with the detailed description of the invention and the appended claims.

In the accompanying drawings, Figure 1 represents an elevator system illustrating an application of my invention: Fig. 2 is a vertical sectional elevation of my improved buffer device including the resetting means.

In general my invention comprises a buffer device or shock absorber adapted to overcome the inertia of a moving body in an elevator in gradually stopping the same.

In the drawings I have shown the buffer device in position to be engaged by the elevator car as it approaches its lower limit of travel, although obviously it might be placed in the path of the counterweight or other moving part which it is desired to stop gradually, where such part is in an elevator system or other analogous apparatus.

In Fig. 1, two cushioning devices of the form shown in detail in Fig. 2 are shown at the bottom of the elevator well in position to be engaged by the elevator car as the same approaches its lower limit of travel, and by the combined retarding action of springs and a varying fluid pressure, bring the car to a complete stop gradually and in-

dependently of manual controllers, although the car may be descending at a high rate of speed.

Fig. 1 illustrates a typical hydraulic elevator of the well known plunger type, the elevator car 1 traveling along the usual guide rails (not shown). To the bottom of the car is securely attached the plunger 2 which is arranged to move up and down freely in the main cylinder 18. The latter is supplied with fluid under pressure through the to-and-from pipe 16 from the pressure supply pipe 14 through the change valve 17. 15 designates the discharge or exhaust pipe. The operation of the change valve 17 is controlled by means of a hand lever 10 in the car cooperating with the standing ropes 9, the sheave 11, the pinion 12 and the rack bar 13 in the well known manner. The standing ropes 9 are fastened at 8 to the overhead beam 6. The cable 4 is attached to the upper side of the car and extends upwardly over the sheave 5, mounted on the overhead beam 6 to the counter-balance weight 7. The counterweight partially balances the combined weight of the car and plunger. The cylinder 18 is closed at its lower end by a head 19 and when the car operating lever 10 is moved in one direction or the other, the change valve 17 will be operated to open or closed position to allow the supply pressure to act on the plunger to lift the car or so as to cause the unbalanced weight of the car and plunger and load to force the fluid out of the cylinder through the exhaust pipe 15.

Although in some instances only one buffer device would be sufficient, it would be preferable in stopping an elevator car to employ a plurality of them. In this instance I have shown two buffer devices in Fig. 1 at the lower limit of travel of the elevator car, and so placed in respect thereto that each will be engaged by the bottom of the car near the lower limit of the car's travel.

Referring now to Fig. 2 which shows the invention in detail, a heavy compression spring 21 is loosely mounted in a short tube or inverted cap 22 secured to the top of a tubular piston rod 25. The spring 21 is surmounted by a rubber cushion 23 which helps to deaden the blow of the elevator car or other moving part when it strikes the

buffer. The lower end of the piston rod 25 is screwthreaded to receive a collar 26 bolted on to a piston 27. The piston rod is provided with a series of perforations 28 near its lower end. A tubular casing 29 is screwthreaded into a support or standard 30 which is provided with holes 31 for bolts or other fastening means to securely hold the buffer device in proper position.

10 The bottom of the casing 29 is provided with a recess 32 which is screwthreaded to receive the lower screwthreaded end of a tube 33. Within the tube 33 is a hollow rod 34 extending from the bottom of the tube 33 up through a central opening in the piston 27 and into the piston rod 25. Surrounding the rod 34 is a coil spring 35 which rests on the tube 33 and forms a resilient stop for the piston 27 and parts carried thereby. The hollow rod 34 is provided with a series of graduated openings 36 extending from near the top of the rod to a point a short distance above the top of the tube 33. These openings are of gradually diminishing diameters from the top one which is large enough to offer but little or practically no resistance to the flow of oil therethrough, to the lowest opening which will allow the oil to pass only very slowly. A coil spring 37 yieldingly holds the piston 27 in its upper position and returns it to such position after the buffer device has operated. Bolted to the upper end of the casing 29 is a hollow cap 38 which forms a liquid receptacle. This cap surrounds the hollow piston rod 25 and is provided with a stuffing box 39 to guide the tube 25 and prevent escape of the liquid. Openings 38' in the cap 38 permit the escape of air displaced by the piston rod 25 as it descends. The receptacle taken as a whole and including the cylinder 29 and cap 38 is filled with oil or other liquid. The hollow rod 34 is therefore also filled. Any suitable liquid such as water or oil may be used. While it may be possible to use water or other similar liquid or even to have the cylinder contain only air, I prefer to employ oil since it prevents rusting or corrosion, does not evaporate appreciably and at the same time lubricates all the moving parts. Furthermore, there is no possibility of the oil freezing and thereby rendering the device inoperative.

55 The operation of the buffer device is substantially as follows: When the elevator car or other moving part which it is desired to bring to a gradual stop and which may be traveling at a high rate of speed, strikes the buffer, the spring 21 is compressed and the piston rod 25 and piston 27 start gradually downward. The spring 21 acts as a cushion for the piston rod and piston and thus prevents them from receiving a sudden and violent blow and also permits them to be started gradually. The rubber cushion 23

also serves to further deaden the blow. As the piston 27 commences its downward movement, the oil beneath it is forced into the hollow rod 34, the oil in the rod being forced outward through the top of the rod and the openings 36 which are above the piston, and through the openings 28 into the space above the piston. As the area of the openings both above and below the piston is large, very little resistance is offered to the flow of the oil during the initial movement of the piston, and the latter is enabled to accelerate very rapidly. That is, it quickly takes up the running speed of the car, the back pressure due to the inertia of the piston and piston rod in starting being absorbed by the spring 21. The circulation of the oil as above noted continues as the piston descends, the restriction to the flow of oil gradually becoming greater as the number and size of the openings 36 below the piston diminish. When the piston has covered the last opening 36, it will be brought to rest, owing to the incompressible nature of the oil, unless there is leakage between the piston 27 and the cylinder 29, or between the piston and the rod 34, in which case it may move far enough to compress the spring 35, and will then be brought to an absolute stop. The spring 35 will act as a buffer to stop the car without any jar in case it is not brought to a complete stop by the retarding effect of the oil.

While I have described my invention in connection with an elevator system, there are doubtless other uses to which my invention could be put to great advantage without invention. Various changes in the details and arrangement of parts might also be made by those skilled in the art without departing from the spirit and scope of the invention. I desire therefore not to be limited to the particular construction and arrangement of parts disclosed.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In an elevator buffer, the combination of a cylinder, a piston movable therein, a hollow piston rod, and a hollow member stationary with respect to the cylinder, extending through the piston and into the piston rod and formed to permit a gradually restricted passage of a fluid through said piston rod from one side of the piston to the other during the movement of the piston.

2. In an elevator buffer, the combination of a cylinder, a piston movable therein and provided with an opening, and a hollow member movable relative to the piston through said opening and provided with an opening or openings in position to gradually restrict the passage of a liquid from one side of the piston to the other.

3. In an elevator buffer, the combination of a cylinder, a piston therein provided with an opening, and a hollow rod within the cyl-

under and extending through the said opening, said rod being formed with a series of lateral openings arranged to successively oppose the piston.

5 4. In an elevator buffer, the combination of a cylindrical casing, a cylindrical hollow rod within the casing and formed with a series of graduated lateral openings, a piston formed with an opening through which
10 the said hollow rod extends, and a piston rod.

5. In an elevator buffer, the combination of a receptacle, a piston movable therein, a hollow piston rod connected to the piston,
15 and a stationary hollow rod in the receptacle and extending through the piston into the piston rod, said stationary rod being formed with a series of lateral openings.

6. The combination of a cylindrical receptacle, a piston movable therein and having
20 a substantially liquid tight fit in the receptacle, and a hollow cylindrical rod within the receptacle and slidable through an opening in the piston which forms during such
25 movement a substantially liquid tight joint with the rod, said hollow rod being provided with an opening or openings in position to gradually restrict the flow of a liquid from one side of the piston to the other as
30 it moves in the receptacle.

7. In an elevator buffer, the combination of a cylindrical receptacle, a piston formed with an opening, a hollow piston rod, and a hollow stationary member located in the
35 receptacle and extending through said opening into the hollow piston rod, and a series of lateral openings in the said hollow member.

8. In an elevator buffer, the combination
40 of a vertical stationary receptacle, a liquid therein, a piston movable vertically in the receptacle and formed with an opening therethrough, a hollow stationary member extending through said opening and provided with a lateral opening or openings of
45 position and size to effect a gradual throttling of the liquid as the piston moves downward, and means carried by the piston to be engaged by a moving part of the elevator.

9. In an elevator buffer, the combination
50 of a receptacle, a piston and hollow piston rod movable therein, a liquid within the receptacle, a cap or cover for the receptacle formed with an opening through which the piston rod extends; a hollow cylinder stationary
55 within the receptacle and extending through the piston into the piston rod, said cylinder and piston rod being formed with lateral openings in position to permit a transfer of the liquid from the lower side
60 to the upper side of the piston and effect a gradual throttling of the liquid as the piston descends.

10. In a buffer device, the combination of a cylinder, a piston movable therein, a
65 liquid in the cylinder, means for gradually restricting the flow of liquid as the piston is moved, and resilient means for retarding the piston brought into operation after the operation of said restricting means.
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11. In an elevator buffer, the combination of a receptacle, liquid therein, a member movable through the liquid, means for gradually restricting the transfer of liquid from one side to the other of said member during
75 such movement, and a resilient device to bring the said movable member to a full stop after the operation of said means.

12. In an elevator buffer, the combination of a receptacle, a piston movable therein,
80 a hollow member extending through an opening in the piston and formed with openings to variably retard the movement of the piston, and a spring or springs to reset the buffer.
85

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

FLOYD C. FURLOW.

Witnesses:

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W. H. BRADY.