No. 731,116. PATENTED JUNE 16, 1903.

A. J. MYER.

DEVICE FOR OVERCOMING THE DYNAMIC FORCE OF BODIES.

APPLICATION FILED JAN. 26, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

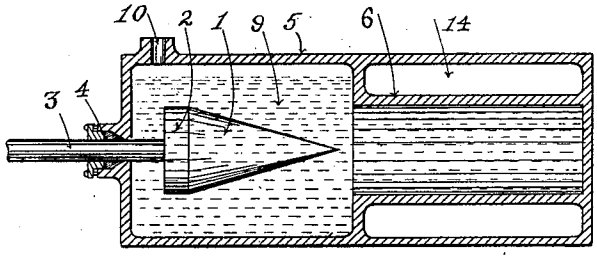


Fig. 1

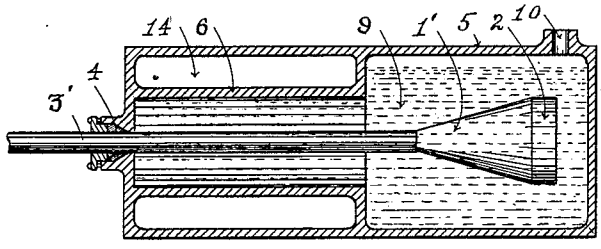


Fig. 2

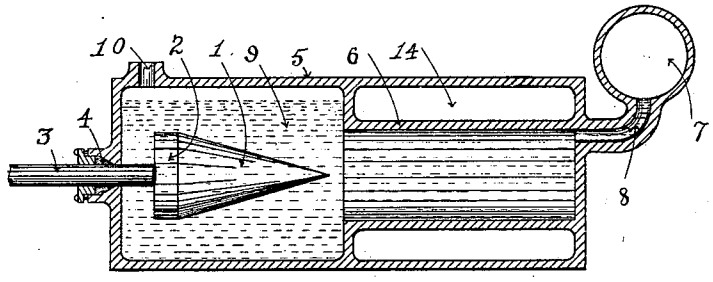


Fig. 3

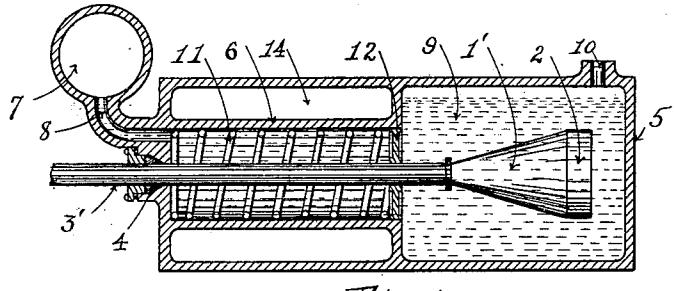


Fig. 4

Witnesses:
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Inventor:
Albert J. Myer.
By his Attorneys,
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 2 SHEETS—SHEET 2.

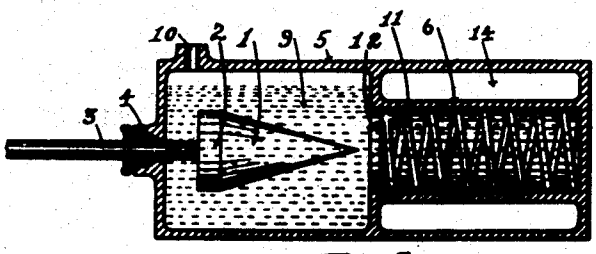


Fig. 5

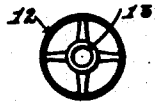


Fig. 6

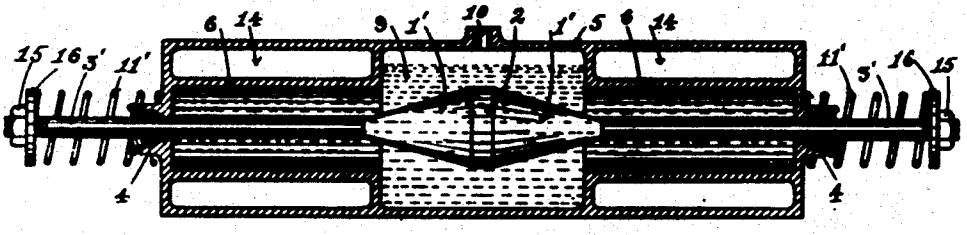


Fig. 7

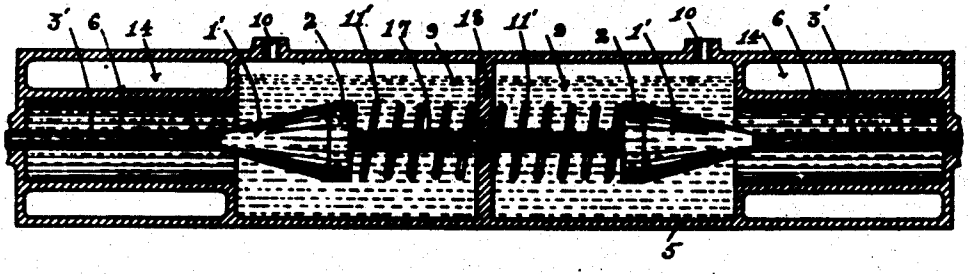


Fig. 8

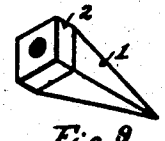


Fig. 9

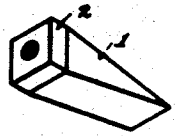


Fig. 10

Witnesses:

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By his Attorneys

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No. 731,116. Patented June 16, 1903.

UNITED STATES PATENT OFFICE.

ALBERT J. MYER, OF LAKEVIEW, NEW YORK.

DEVICE FOR OVERCOMING THE DYNAMIC FORCE OF BODIES.

SPECIFICATION forming part of Letters Patent No. 731,116, dated June 16, 1903.

Application filed January 26, 1903. Serial No. 140,596. (No model)

To all whom it may concern:

Be it known that I, ALBERT J. MYER, a citizen of the United States, residing at Lakeview, in the county of Erie and State of New York, have invented certain new and useful Improvements in Devices for Overcoming the Dynamic Force of Bodies; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in hydraulic cushions, its object being to provide a resistance for gradually decreasing and finally nullifying the dynamic force of bodies.

My that end my invention consists of an inclined or tapering penetrating element secured to or actuated by the body in motion, a liquid-receiving element, an open-end receptacle for containing the liquid, its inner area corresponding in cross-section with or slightly in excess of the maximum cross-section of the inclined or tapering penetrating element and adapted for the primary liquid-displacing reception and the final restraining reception of the inclined or tapering penetrating element to gradually decrease and finally nullify the dynamic force of the body.

My invention further consists in combining with the open-end receptacle an air-chamber communicating therewith to act as an auxiliary and final pneumatic cushion for the confined liquid ahead of the inclined or tapering penetrating element in the open-end receptacle.

My invention further consists in combining with the open-end receptacle elastic means for restoring the inclined or tapering penetrating element to its normal position after the dynamic force of the body acted upon has been nullified.

In the drawings, Figure 1 is a central longitudinal section of my improved device to be operated with the dynamic force of pushing or thrusting bodies. Fig. 2 is a similar view of my improved device to be operated by the dynamic force of pulling bodies. Fig. 3 is a central longitudinal section of my improved device to be operated with the dynamic force of pushing or thrusting bodies with the application thereto of an auxiliary pneumatic cushion. Fig. 4 is a similar view of my improved device to be operated with the dynamic force of pulling bodies with the application thereto of an auxiliary pneumatic cushion. Fig. 5 is a similar view illustrating the elastic means for restoring the inclined or tapering penetrating element to its normal position, which means is also shown in connection with Fig. 4. Fig. 6 is a detached view of one of the details shown in Figs. 4 and 5. Figs. 7 and 8 are central longitudinal views of my device to be operated by dynamic forces acting in opposite directions and showing means for restoring the inclined or tapering elements to their normal positions. Figs. 9 and 10 show modified forms of the inclined or tapering element.

Referring to the drawings, and particularly to Fig. 1, in which I have shown my improved device adapted for operation with the dynamic force of pushing or thrusting bodies, the penetrating element consists of the inclined or tapering section 1, preferably conical in configuration and to which I preferably add the short cylindrical section 2. This penetrating element is rigid upon and in line with the shaft 3, which is actuated by the body in motion. This shaft 3 reciprocates in the stuffing-box 4 in the end wall of the chamber 5. Communicating with this chamber 5 is the open-end cylindrical receptacle 6, smaller in diameter or in cross-section than the chamber 5, the area in cross-section of said receptacle 6 corresponding to or slightly exceeding the maximum cross-section of the tapering penetrating element or, in other words, the cylindrical section 2. The liquid-receiving element 9 has a level sufficient to entirely fill the open-end receptacle 6 and partially fill the chamber 5 when the tapering penetrating element 1 is in normal position, as shown in Fig. 1, the unoccupied space at the top of the chamber 5 being sufficient to accommodate the liquid displaced by the shaft 3 when the penetrating element 1 has entirely entered the open-end receptacle 6. A valve is to be arranged at a point, as indicated at 10, to permit the air to be expelled when the

chamber 5 is filled, as well as to admit air when the level of the liquid assumes its normal position. This constitutes one form of my improved device, the operation of which is substantially as follows: The dynamic force of the moving body acting through the shaft 3 rapidly impels the penetrating element 1 toward the open-end receptacle 6. The tapering section first comes in swift contact with the liquid in the receptacle 6, the resisting force of the liquid increasing as the penetrating element rushes into the same, thus correspondingly decreasing the dynamic force of the moving body. The quantity of water forced out of the receptacle also gradually decreases until the cylindrical section of the penetrating element reaches and enters the receptacle. The dynamic force thus gradually and gently decreased is practically nullified as the largest section of the penetrating element enters the receptacle, as at that point the escape of the liquid is reduced to a minimum. This has the effect of bringing the moving body to a standstill in so gradual and gentle a manner as to be scarcely noticeable. Should there be any possible chance of a final jar, the cushion of air in the chamber 7, as shown in Fig. 3, exerted against the liquid forced therein through the passage 8, will take up and entirely nullify the same. In the event of the employment of the air-chamber it is desirable that the maximum cross-section of the penetrating element should fit as tightly as possible within the open-end receptacle without interfering with its reciprocation in such receptacle, for without such conditions the effectiveness of the air-cushion would be impaired. If desired, the chamber 14 surrounding the open-end receptacle can be utilized as an air-chamber to form an auxiliary pneumatic cushion in lieu of the chamber 7. If necessary to restore the penetrating element to its normal position in the chamber 5, a spring 11 may be arranged within the receptacle 6, (see Figs. 4 and 5,) having at its free end the cylindrical open head 12, with a central socket 13, as shown in Fig. 6, to receive the point of the penetrating element.

Fig. 2 illustrates the form of my device to be operated with the dynamic force of a pulling body. In such figure the shaft 3′, actuated by the pulling body, passes through the open-end receptacle 6, its inner end having the penetrating element 1′ arranged thereon in a position the reverse of that shown in Fig. 1 to enable the tapering section to enter the receptacle under the impulse of the pulling body. The operation is identical with that of the form shown in Fig. 1.

In Figs. 7 and 8 I have shown the adaptation of my device to conditions where the dynamic force may be exerted in either of two opposite directions or where the body itself carrying my device has motion in reciprocation, and in such construction I have shown means for maintaining the penetrating bodies at the middle point, so that they may act to counteract a force from either direction. In Fig. 7 I have shown a construction wherein the springs 11′ 11′ are arranged externally and taking over the shafts 3′ 3′ and provided with nuts 15 15 and washers 16 16 for adjustment of the springs. In Fig. 8 I have shown a construction where the penetrating elements are coupled together by a shaft 17, which passes freely through a support 18, integral with or secured to the walls of the chamber 5. The springs 11′ 11′ abut against this support 18.

My improved device just described is susceptible of varied applications—such, for instance, as overcoming the recoil of a gun or preventing undue shock to the springs of a vehicle. If applied to the bows of boats entering slips or to the ends of cars, the type shown in Figs. 1, 3, 5 or of Figs. 7 and 8 would be applicable to overcome the force of collision. The type shown in Fig. 2 could be also employed to great advantage in connection with cables for towing boats and holding anchors to overcome the heavy strains to which the cables are subjected in rough water.

While my invention is peculiarly adapted to runaway or falling elevators, the adaptation need not be described here, since it constitutes the subject-matter of a separate application for Letters Patent.

While I prefer the conical form of penetrating element, I do not wish to be confined thereto, as other configurations could be effectively employed, such as pyramidal or wedge-shaped penetrating elements, as shown in Figs. 9 and 10.

Where the liquid is subjected to the action of low temperatures, an antifreezing liquid should be employed.

Having thus described my invention and its method of operation, what I claim is—

1. A hydraulic cushion for overcoming the dynamic force of bodies, consisting of an inclined or tapering penetrating element actuated by the body in motion, a liquid-receiving element, and an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the maximum cross-section of the inclined or tapering penetrating element, and adapted for the primary liquid-displacing reception and the final restraining reception of the inclined or tapering penetrating element, substantially as and for the purposes stated.

2. A combined hydraulic and pneumatic cushion for overcoming the dynamic force of bodies, consisting of an inclined or tapering penetrating element actuated by the body in motion, a liquid-receiving element, an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the maximum cross-section of the inclined or tapering penetrating element, and adapted for the primary liquid-displacing reception and the final restraining

reception of the inclined or tapering element, and an air-chamber communicating with the open-end receptacle to act as an auxiliary and final pneumatic cushion, substantially as and for the purposes stated.

3. A hydraulic cushion for overcoming the dynamic force of bodies, consisting of an inclined or tapering penetrating element actuated by the body in motion, a liquid-receiving element, an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the maximum cross-section of the inclined or tapering element, and adapted for the primary liquid-displacing reception and the final restraining reception of the inclined or tapering element, and elastic means for restoring the inclined or tapering penetrating element to its normal position after the dynamic force of the body acted upon has been nullified, substantially as and for the purpose stated.

4. A combined hydraulic and pneumatic cushion for overcoming the dynamic force of bodies, consisting of an inclined or tapering penetrating element actuated by the body in motion, a liquid-receiving element, an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the maximum cross-section of the inclined or tapering element, and adapted for the primary liquid-displacing reception and the final restraining reception of the inclined or tapering element, elastic means for restoring the inclined or tapering element to its normal position after the dynamic force of the body acted upon has been nullified, and an air-chamber communicating with the open-end receptacle to act as an auxiliary and final pneumatic cushion, substantially as and for the purpose stated.

5. A hydraulic cushion for overcoming the dynamic force of bodies, consisting of a penetrating element having an inclined or tapering section and an adjoining straight section to be acted upon by the body in motion, a liquid-receiving element, and an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the cross-section of the inclined or tapering penetrating element, and adapted for the primary liquid-displacing reception and the final restraining reception of the inclined or tapering penetrating element, substantially as and for the purposes stated.

6. A combined hydraulic and pneumatic cushion for overcoming the dynamic force of bodies, consisting of a penetrating element having an inclined or tapering section and an adjoining straight section to be acted upon by the body in motion, a liquid-receiving element, an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the maximum cross-section of the inclined or tapering penetrating element, and adapted for the primary liquid-displacing reception and the final restraining reception of the inclined or tapering element, and an air-chamber communicating with the open-end receptacle to act as an auxiliary and final pneumatic cushion, substantially as and for the purposes stated.

7. A hydraulic cushion for overcoming the dynamic force of bodies, consisting of a penetrating element having an inclined or tapering section and an adjoining straight section to be acted upon by the body in motion, a liquid-receiving element, an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the cross-section of the inclined or tapering penetrating element, and elastic means for restoring the inclined or tapering element to its normal position after the dynamic force of the body acted upon has been nullified, substantially as and for the purposes stated.

8. A combined hydraulic and pneumatic cushion for overcoming the dynamic force of bodies, consisting of a penetrating element having an inclined or tapering section and an adjoining straight section to be acted upon by the body in motion, a liquid-receiving element, an open-end receptacle for containing the liquid element, its inner area corresponding to or slightly exceeding the cross-section of the inclined or tapering penetrating element, and adapted for the primary liquid-displacing reception and the final restraining reception of the inclined or tapering penetrating element, an air-chamber communicating with the open-end receptacle to act as an auxiliary and final pneumatic cushion, and elastic means for restoring the inclined or tapering element to its normal position after the dynamic force of the body acted upon has been nullified, substantially as and for the purposes stated.

9. A hydraulic cushion for overcoming the dynamic forces of bodies, consisting of inclined or tapering penetrating elements oppositely arranged to be acted upon by bodies in motion, a liquid-receiving element, open-end receptacles for containing the liquid element, their inner areas corresponding to or slightly exceeding in cross-section the maximum cross-section of the inclined or tapering penetrating elements, substantially as and for the purposes stated.

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

ALBERT J. MYER.

Witnesses:
SAMUEL M. WELCH,
EDWARD R. BOSLEY.