No. 846,943. PATENTED MAR. 12, 1907.

J. C. PHIPPS.

FLUID CHECK DEVICE.

APPLICATION FILED MAR. 15, 1906.

Fig. 1.

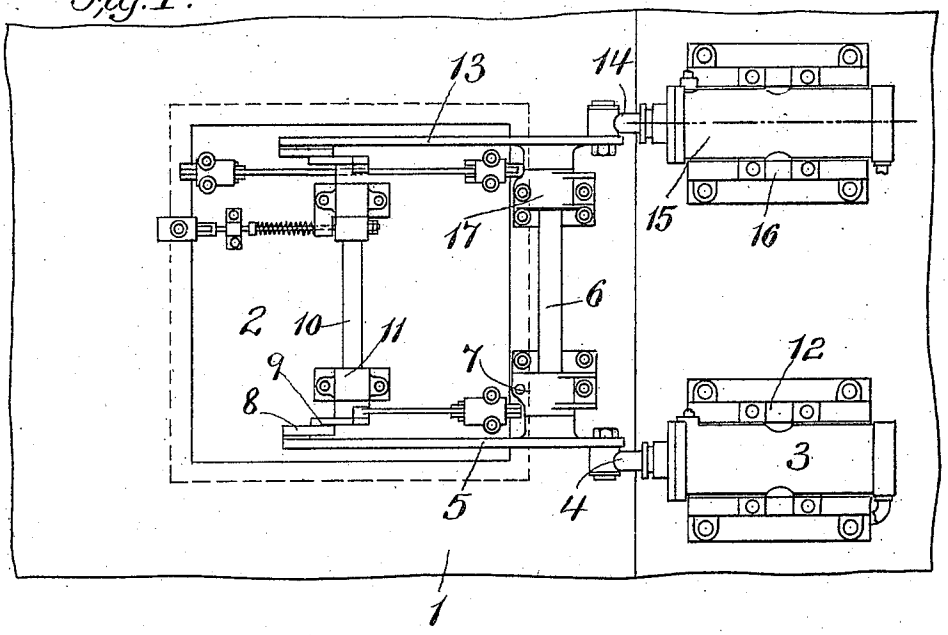
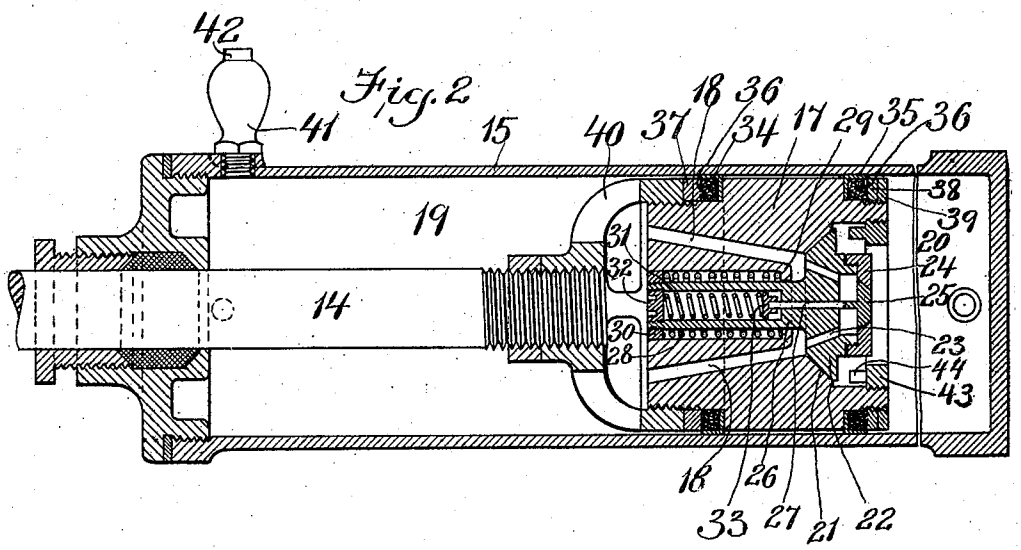


Fig. 2.



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FLUID-CHECK DEVICE.

No. 846,943. Specification of Letters Patent. Patented March 12, 1907.

Application filed March 15, 1906. Serial No. 306,186.

To all whom it may concern:

Be it known that I, JOSEPH C. PHIPPS, of Melrose, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Fluid-Check Devices, of which the following is a specification.

The present invention relates to devices for resisting and checking the movement of haavy doors and hatches, and has for its especial object to provide a check for the armored hatches and water-tight doors of naval vessels. Such vessels are equipped with a pneumatic system for operating the hatches in the protective and other decks and the doors in the water-tight bulkheads, by which all or a part of the hatches and doors may be closed in times of danger. When hatches in the decks are opened, in order to maintain them open the weight of the swinging part must be borne by the air in the pneumatic operating-cylinder; but in case the packing in such cylinder becomes worn or contracted, so as to be no longer tight, the air will escape by the piston and allow the hatch to close. In order to prevent this happening, it is necessary to block up the hatches when open with bars or chocks, which of course render the emergency operating mechanism useless. Again, when the hatches are closed by the ordinary system their weight causes them to fall into place quickly, which is a source of great danger to persons who might be attempting to pass through a hatch at the time the same is closed.

It is the object of my present invention to provide a checking device which is adapted to be used in this relation to support the weight of a hatch or door when the same is open without the necessity of an interposed obstruction, so that the hatch will always be ready to be closed, and which will also retard the closing of the hatch long enough to prevent any one being caught and injured.

The invention, however, is not limited to the use above mentioned, but may be applied to all doors or to machines where a retarded motion is desired and in general to all purposes for which dash-pots or fluid-checks are adapted.

The invention consists in a fluid-check or dash-pot having provisions for interposing resistances of different amounts to its different movements and is constructed as illustrated in the accompanying drawings and described in detail in the following specification.

Of the drawings, Figure 1 represents a view from below of the deck of a ship, showing a hatch with the pneumatic operating mechanism and my checking device applied thereto. Fig. 2 represents a longitudinal section of the check.

The same reference characters indicate the same parts in both figures.

Referring to Fig. 1, the character 1 represents a fragment of a deck as seen from below, and 2 is a hatch hinged to the deck and adapted to be raised for uncovering the hatchway. The same is operated from a pneumatic or hydraulic cylinder 3 by means of a piston-rod 4, connected to one of two bell-crank levers 5, which are pivoted to a shaft 6, mounted in bearings 7, secured to the under side of the deck. The point of attachment of the piston-rod to the lever 5 is on the short arm of the lever below the deck, and when fluid-pressure from a suitable source is applied in the cylinder the piston-rod is projected and the long arm of the bell-crank lever is raised. This acts through a link 8 upon an arm 9, connected to a rock-shaft 10, pivoted in bearings 11, secured to the under side of the hatch, and through these connections raises the hatch. During this movement the cylinder is enabled to rock about its trunnions, which are secured in bearings 12, fixed to the under side of the deck. A second bell-crank lever 13 is secured to the shaft 6, and to the short arm of said lever is pivoted a plunger-rod 14, which extends into a cylinder 15, mounted similarly to cylinder 3 by trunnions held in bearings 16. This cylinder serves as the check which retards movement of the hatch and holds the same in any position.

Referring to Fig. 2, it will be seen that the rod 14 is connected to a plunger 17, which is adapted to reciprocate longitudinally of the cylinder 15, which contains a fluid, preferably oil, and therefore constitutes a fluid-chamber. The plunger is formed with one or more passages 18, which extend entirely through the plunger and connect the fluid-spaces 19 and 20 within the cylinder on opposite sides of the plunger. Near one side the piston is faced off to form a beveled annular valve-seat 21, surrounding the ends of the passages 18, and fitted to said seat is a valve 22, which is adapted to shut off the passages 18 and prevent flow of fluid through them. The valve 22 likewise has one or more passages 23 of much less area than the passages

18, which extend entirely through the valve and connect the passages 18 with the space 20. There is also connected to valve 22 an annular valve-seat 24, surrounding the outlets of passages 23, upon which is adapted to bear a valve 25 for closing the passages 23. Valve 22 has a hollow stem 26 extending into the body of the plunger and receives within it the stem 27 of valve 25. A spring 28 surrounds the valve-stem and bears at one end against an abutment 29 in the plunger and at the other against a ring 30 on the stem. A spring 31 is inserted in the tubular stem and bears at one end against a plug 32, fixed in the stem, and at the other against a cap 33 upon the stem 27 of the smaller valve 25. The plunger is surrounded by cup-leathers 34 and 35, which are caused to bear against the sides of the cylinder by soft packing 36, held in place by packing-rings 37 and 38. 39 is a locking-ring holding the ring 38 in place, while ring 37 is held in place by the crow's-foot 40, which connects the rod 14 to the plunger. Between the arms of the crow's-foot the oil is adapted to flow when the plunger moves.

It will be seen from the foregoing that the springs 28 and 31 tend to hold the valves against their respective seats, but that when sufficient pressure is applied, tending to open or close the hatch, the plunger is moved through the fluid, which is displaced and in flowing through the passages is adapted to open the valves. The parts are so arranged that when the hatch is opened the liquid flows through passages 18 and opens valve 22, offering but a comparatively slight resistance to the opening movement. This is due to the fact that the passages 18 are relatively large and spring 28 only just strong enough to cause the valve to seat when the plunger has no motion. In moving the hatch in the opposite direction to close it the resistance of the fluid comes against the smaller side of valve 25 and opens the same, allowing the fluid to pass through passages 23 and 18. As passages 23 are much smaller than 18, the escape of the oil is rendered more slow and greater resistance thereby opposed to closing than to opening the hatch. This allows the same to close slowly, so that enough time is given after the hatch begins to close to prevent a person being caught. The spring 31 is adjusted with such tension and the valve 25 is of such small area that considerable force is necessary to be applied to the plunger before the latter can move and allow the hatch to close. This resistance preferably is made of great enough amount to support the weight of the hatch at any angle of opening, so that it cannot possibly close by its own weight, but may be readily closed when the operating pressure is applied to cylinder 3. Thus when a hatch is once opened it will be maintained in that position without requiring to be blocked up and will be ready for closing in time of danger. Air or any other fluid may be used in the cylinder 15; but oil is preferable, as it has enough viscosity to make leakage impossible and will also not allow the packing to become dried and loose.

41 represents a small expansion-dome connected to the cylinder 15, containing air or any other compressible substance. This is for the purpose of allowing the oil in the cylinder to expand when the latter is subjected to varying temperatures, as is the case in the engine-room of a ship, and so to avoid danger of straining or breaking the cylinder. By moving a cap 42 from the chamber the supply of oil in the cylinder may be renewed.

The check is adapted to be placed upon a side wall and connected with a swinging door, as well as to be used with a deck-hatch. When used with a door, the check will prevent the same being closed except when the operating pressure is applied to the cylinder.

43 is a ring screwed into the end of the plunger and provided with fingers 44, extending toward the valve 22. These fingers serve as stops to limit the amount by which the valve can separate from its seat.

I claim—

1. A check comprising a fluid-chamber, a plunger movable therein and having passages for escape of the fluid to permit movement of the plunger, valves closing said passages and displaceable to open the same upon movement of the plunger in either direction, and means tending to retain one of said valves closed to resist movement of the plunger in one direction.

2. A check comprising a fluid-chamber, a plunger movable therein and having passages for escape of the fluid to permit movement of the plunger, and valves closing said passages and displaceable to open the same upon movement of the plunger in either direction.

3. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the plunger, valves closing said passage, and displaceable to uncover the passage by resistance of the fluid upon movement of the plunger in either direction, and means tending to hold one of said valves closed.

4. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the plunger, valves closing said passage and displaceable to uncover the passage by resistance of the fluid upon movement of the plunger in either direction, and yielding means tending to hold both of said valves closed.

5. A check comprising a fluid-chamber, a plunger movable therein and having a pas-

sage connecting the fluid-spaces on opposite sides of the plunger, valves closing said passage, one valve being displaced to uncover the passage and the other being seated by resistance of the fluid, upon movement of the plunger in each direction.

6. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the plunger, valves closing said passage, one valve being displaced to uncover the passage and the other being seated by resistance of the fluid, upon movement of the plunger in each direction, and one of the valves being of greater area than the other.

7. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the plunger, valves closing said passage, one valve being displaced to uncover the passage and the other being seated by resistance of the fluid, upon movement of the plunger in each direction, one of the valves being of greater area than the other, and means tending to retain the smaller valve in closed position.

8. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the piston, a valve adapted to cover the passage and being provided with a passage opening thereinto, and a valve covering the passage in the first valve.

9. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the piston, a valve adapted to cover the passage and being provided with a passage of less size than the first passage and opening thereinto, and a valve covering the passage in the first valve.

10. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the piston, a valve adapted to cover the passage and being provided with a passage of less cross-sectional area than the first passage and opening thereinto, and a smaller valve covering the passage in the first valve.

11. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the piston, a valve adapted to cover the passage and being provided with a passage of less cross-sectional area than the first passage and opening thereinto, a smaller valve covering the passage in the first valve, and means tending to seat the smaller valve.

12. A check comprising a fluid-chamber, a plunger movable therein and having a passage connecting the fluid-spaces on opposite sides of the piston, a valve adapted to cover the passage and being provided with a passage of less cross-sectional area than the first passage and opening thereinto, a smaller valve covering the passage in the first valve, and means tending to seat both valves.

13. A check comprising a fluid-chamber containing a quantity of relatively incompressible fluid, a plunger movable therein constructed to permit gradual displacement of the fluid from one side to the other thereof as the plunger is moved, and an expansion air-chamber connected with the fluid-chamber.

14. The combination with a hatch or door, of a check constructed with sufficient resistance to normally hold the hatch or door against any motion, and inelastically yieldable to permit closing thereof with a retarded motion upon application of sufficient external force.

15. The combination with a hatch or door, of a check constructed to support the weight of the hatch or door and normally hold the hatch or door open, and to permit closing thereof with a retarded motion when additional force is applied.

16. The combination with a hatch or door, of a check constructed and arranged with provisions for preventing closing of the hatch or door except by the exercise of considerable force, and for opposing a less resistance to the opening thereof.

17. The combination with a hatch or door and the power mechanism for opening and closing the same, of a check constructed and arranged with provisions for preventing closing of the hatch or door except upon operation of said mechanism, and for opposing less resistance to the opening thereof.

18. The combination with a hatch or door, of a check adapted to permit a relatively free movement of the hatch in one direction and a retarded motion in the opposite direction, and means within the check for normally preventing any motion in the second direction, but displaceable to permit such motion upon the application of additional force.

19. The combination with a hatch or door, of a check comprising a chamber containing fluid, a plunger therein adapted to permit a relatively free passage of the fluid when moving in one direction and a restricted passage when moving in the opposite direction, and a valve normally stopping the restricted passage of the fluid but displaceable by the application of sufficient external force.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOSEPH C. PHIPPS.

Witnesses:
A. C. RATIGAN,
L. E. KENNEDY.