May 26, 1931. D. MATTEI 1,806,859

SELF ACTING CLOSURE FOR WATER TIGHT COMPARTMENTS

Filed Dec. 26, 1928 2 Sheets-Sheet 1

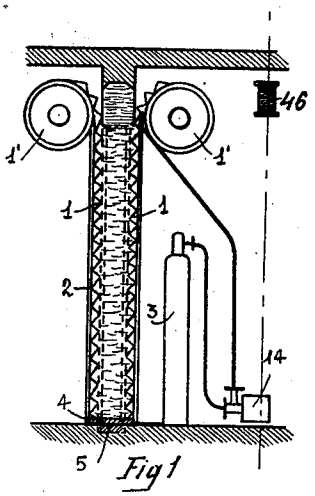


Fig 1

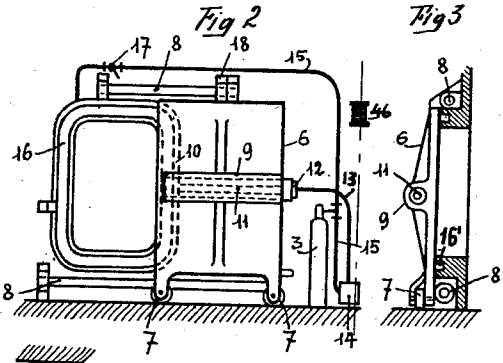
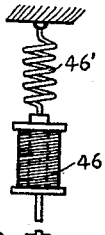


Fig 2

Fig 3



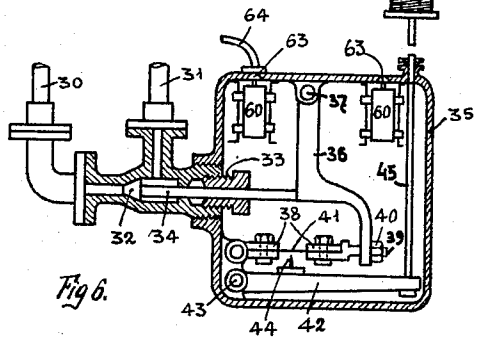


Fig 6.

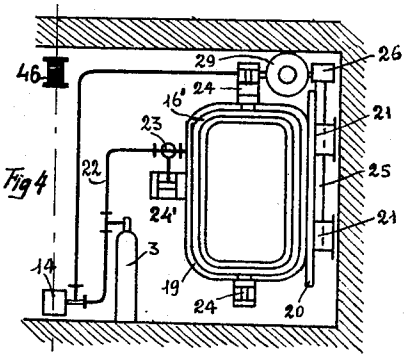


Fig 4

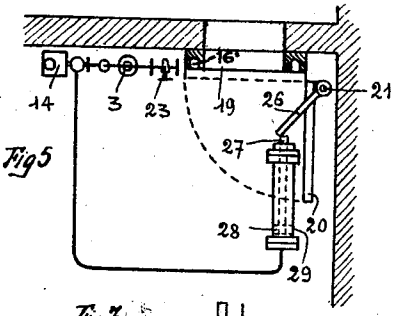


Fig 5

Fig 15.

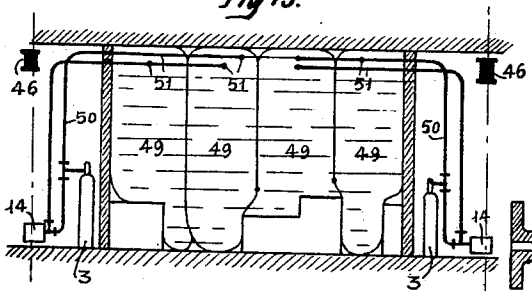
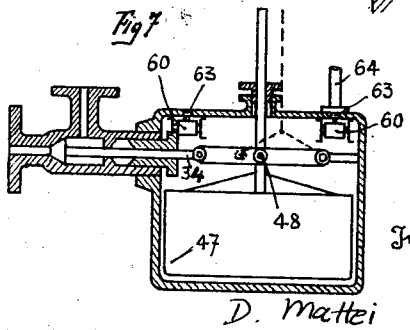


Fig 7



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SELF ACTING CLOSURE FOR WATER TIGHT COMPARTMENTS

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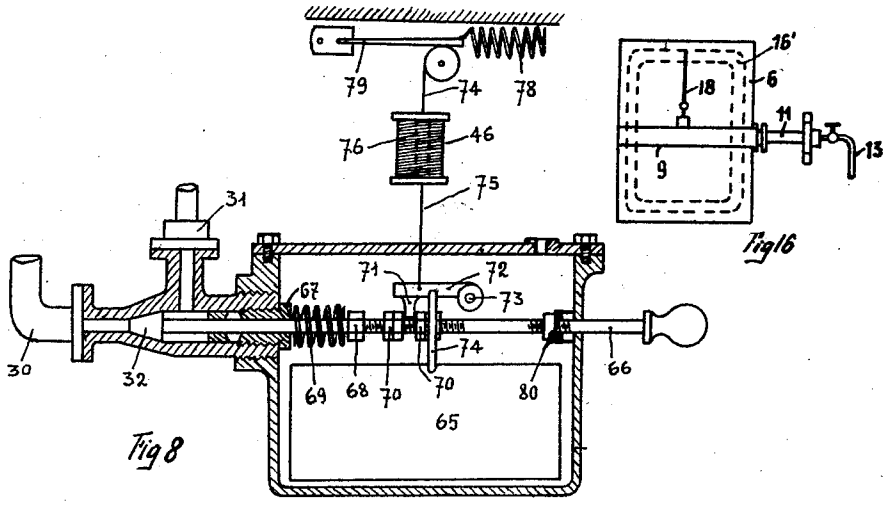
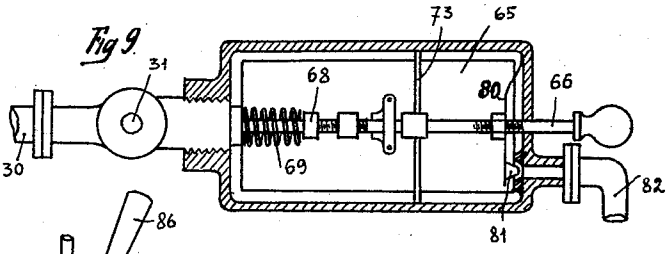


Fig 8

Fig 16



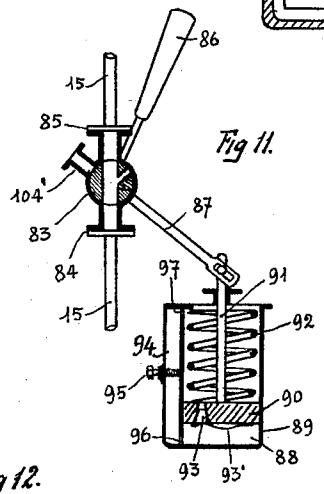


Fig 11.

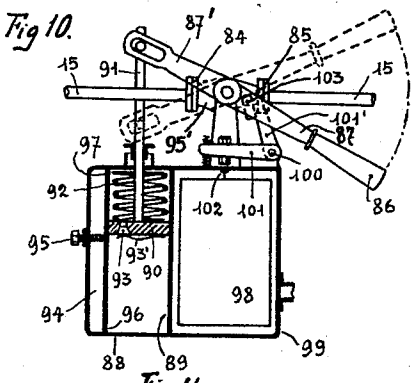


Fig 10.

Fig 12.

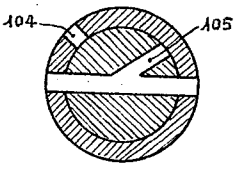


Fig 13

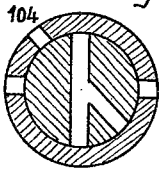
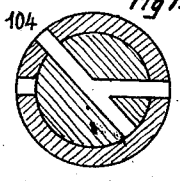


Fig 14



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UNITED STATES PATENT OFFICE

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SELF ACTING CLOSURE FOR WATER TIGHT COMPARTMENTS

Application filed December 26, 1928. Serial No. 328,409.

This invention relates to means for preventing the sinking of ships by closing bulkheads and doors so as to isolate certain compartments or rooms of the ship and thereby prevent the flooding of the entire ship or the spread of fire from one compartment to the other. This problem is of great importance during times of peace and, of course, becomes of enormous importance in times of war.

Prior devices for constructing water-tight compartments have been inefficient and insufficient, either because the closures have not been operated in time or because the various devices have lacked the motive power during the critical period because there have been damages in the connection for operating the closures.

The principal object of the present invention is to construct self-acting closures for compartments which are completely automatic in that they will be operated as soon as water has entered a compartment or has entered a contiguous compartment, without any manual intervention.

A further object is to provide means for operating closures of this type which are sturdy and efficient, in which the motive power is independent from the various other motive powers upon the ship.

A still further object is to make the connections between the closures and the motive power as short as possible to thereby reduce the possibility of the connections being damaged.

It is also an important object of my invention to provide means whereby the closures can be operated from a distance and the controlling means are fitted with a safety device.

The invention is also designed so as to operate automatically when a fire breaks out in a compartment.

It is also an important object of the invention to provide first means for closing the closure and secondly means for making a tight closure after the closure has been shut.

With these and other objects in view, which will become apparent from the detailed description below interpreted in connection with the accompanying drawings which show a preferred embodiment of the invention, the invention consists in the following combination and arrangement of elements.

In the drawings similar reference characters refer to like parts throughout the several views and in which:

Fig. 1 shows in cross section and diagrammatically a closure which is adapted to be wound upon pulleys or rollers.

Figure 2 shows a diagrammatic and elevational view of the invention applied to a sliding door.

Figure 3 shows a vertical cross section of the invention shown in Figure 2.

Figure 4 shows in elevation and diagrammatically the invention applied to a swinging door pivoted at one side thereof.

Figure 5 shows a plan and partial diagrammatic view of the invention shown in Figure 4.

Figure 6 is a cross sectional view showing parts in elevation of the novel connecting valve used.

Figure 7 is a cross sectional view having parts in elevation showing a modified type of valve.

Figure 8 shows a cross sectional view of a further modification of the valve structure.

Figure 9 is a horizontal sectional view of the valve shown in Figure 8.

Figure 10 shows a partial sectional and diagrammatic view with parts in elevation of a controlling device for the various valves that may be used in connection with any one of them.

Figure 11 is a partial cross sectional and diagrammatical view of the device shown in Figure 10 at right angles thereto, with parts omitted for greater clearness.

Figures 12, 13, and 14 show various positions which the valve used in the device of Figures 10 and 11 may assume.

Figure 15 shows diagrammatically an arrangement of a system for the protection of premises from water and from fire when compressed air or carbonic acid is employed for expanding the tubes used, and

Figure 16 is an elevational view of a modification of the device shown in Figures 2 and 3.

Referring particularly to Figure 1, 1 indi-

cates a closure which is adapted to be wound upon the rollers 1'—1'. The closure is preferably constructed of corrugated iron sheets as shown. Extending between the closures 1 is positioned a flexible and elastic air tight bag 2 which when expanded by air from the tank 3 under the control of the valve 14 draws down the corrugated sheets while at the same time tightening the closure against the door jambs. At the floor the bag 2 presses a gum or caoutchouc packing against another gum or caoutchouc packing located in the threshold. At 46 is shown an electric controlling device which can be used to operate the device. Figure 1 shows the bag expanded with the closure shut and the portion thereof at the top which is more heavily dotted shows the position occupied by the bag when empty when the door is open and the corrugated sheets have been wound around their respective rolls. Discharge cocks are provided whereby air can be withdrawn from the bag to open the door. It is self-evident that this type of door, owing to the compactness thereof, may also be advantageously applied so as to operate horizontally.

Referring to Figures 2 and 3, there is shown a sliding door which travels upon rails located either upon the floor or the ceiling by means of the wheel 7. At 8 is shown guide bars placed above and below the door. Fixed to the door 6 is an air cylinder 9 having the piston and the piston rod 11 bored and secured fixedly by the bearing 12 to the wall. The tube 13 connects with the bored portion of the piston and piston rod and is in turn connected to the valve 14. Extending from the valve 14 is a tube 15 which terminates in a gum air chamber 16 positioned in a groove 16' of the door framing and said groove entirely encircles the opening. A valve 17 is positioned in the tube 15 and is normally in closed position, but can be opened by the projection 18 carried by the door when the door is moved into shut position and this operation takes place a few moments before the door is entirely closed. The operation of this type of door is extremely simple. When the valve 14 has been operated either automatically by the action of water flooding the compartment or through electrical means controlled from a distance, or manually, connection is established between the air tank 3 and the cylinder 9 through the tube 13 and the bore of the piston and piston rod. The cylinder is moved outwardly and thereby carries with it the closure which is secured to it to close the door. Just before the door has entirely closed, the projection 18 opens the valve 17, allowing compressed air to enter the air chamber 16 and the circular air chamber will then press tightly against the door, making a tight fit.

In Figure 16 a slight modification is shown wherein the air tube for tightening the connection between the door and the wall is located in the door itself instead of being in the wall.

In Figures 4 and 5 the invention is shown as applied to a swinging door. In these views 19 shows the frame for a metallic door 20 which door pivots on hinges 21. Located in a groove 16' of the framework 19 is a caoutchouc air chamber 16 similar to the one previously described. A tube 22 connects the air chamber 16 with the air tank 3 and the tube 22 is provided with a valve 23 to be operated by the opening and closing of the door. At 24 and 24' are plugs of a spring stop cock design to connect with the door when shut, stop cock 24' being thrown back by the action of the door shutting so as to open the valve 23. Connected fixedly to the pivots of the door 25 is a crank 26, the end of which is duly connected with the piston rod 27 of the piston 28 acting in the cylinder 29 which is fastened to the cylinder of any other suitable supporting surface. The cylinder is connected to the air tank 3 through the valve 14. The operation of this door is quite similar to the previously described door shown in Figures 2 and 3. When the valve 14 opens the connection between air tank 3 and cylinder 29, the door is shut with force and is caught by the plugs. Upon the shutting of the door the valve 23 has been operated so that compressed air can get into air chambers 16, thus tightening the closure.

In Figure 6 the novel valve 14 is illustrated in detail whereby the various devices can be operated because of either the flooding of a compartment or by fire as well as by hand or electrically. At 30 and 31 are shown the connecting pipes of the air tank with the air bags or cylinders respectively. Upon the rod 34 is located the valve head 32 and a stuffing box 33 prevents air from entering the metallic box 35 in which are located the valves 63 and the floats 60. A lever 36 is pivoted at 37 and the rod 34 abuts against this lever. The lower end of the lever has secured thereto one of the clamping devices 38 which terminates in a threaded end 39 and is secured to the lever by the nut 40. Another clamping device 38 secured to the framework of the box 35 is provided spaced from the one secured to the lever and a thin strip of paper 41 is maintained taut between the clamping devices 38. It is apparent that the paper will maintain the lever 36 in abutting relation to the rod 34 when dry, but if the paper becomes wet it will immediately separate and allow the rod 34 to become free and thereby open the connection between pipes 30 and 31.

For operating the lever manually or electrically a lever 42 is pivoted in the box 35 at 43 and carries a sharp blade 44 which is adapted to sever the paper upon the pivoting of the lever 42. The free end of the lever 42

can be raised either by a drawing rod 45 manually or can be operated by a solenoid 46 operating upon an iron core secured to said rod 45. The rod 45 can also be operated by connecting the same to a spring 46′ which tends to raise the core of the cylinder with the wire 45 attached thereto so as to sever the paper 41, but is prevented by the action of the solenoid from doing so. Upon shutting off the current in the solenoid, however, the spring will come into action and sever the paper.

A modification of the valve just described is shown in Figure 7. In the modification a float 47 is utilized which will act upon a toggle link 48 connected to the rod 34. The operation of this modification is believed to be obvious. However, it is also apparent that the float 47 could carry a blade for severing the paper 41 in the device shown in Figure 6.

In Figures 8 and 9 a further modification is shown and comprises a float 65 which is designed to operate upon the catch 71 pivoted at 73 by means of the rod 74 carried by the float. In this modification the valve rod 66 passes through a stuffing box 67 and a spring 69 encircling the rod 66 constantly tends to urge the valve head 32 to the right by its reaction upon a nut 68 which is threaded upon the rod 66. There is also located upon the threaded portion of the rod 66 a pair of spaced double nuts 70 between which the tooth 71 of the catch 72 is held so as to maintain the valve head 32 in closed position against the action of the spring 69 until the catch is released. When the catch is released through an upward movement of the rod 74, then the spring 69 comes into action and moves the valve head 32 towards the right thereby opening the valve. It is evident that the rod 74 will be raised to release the latch upon entry of water into the box so as to raise the float 65.

The latch 71 can also be tripped through the medium of the wire or rod 75 upon which wire is located a core 76 for the solenoid 46. Connected to the other end of the core 76 is a continuation 74 of the wire 75 which passes over a roller and is secured to the spring 78 located under tension in a horizontal position. The fusible element 79 maintains the spring 78 in extended position. It is evident that upon an increase in temperature the fusible element 79 will melt and then the spring 78 will come into action and trip the latch 71. Of course, as previously described, the solenoid 46 can act in either of the ways set forth above.

Upon the side of the box and inside the same is located a float spring 80 having a valve 81 on the free end thereof which engages and seats in the opening leading to the pipe 82 which can communicate with a contiguous compartment. It is evident that upon water entering the box that the rod 66 will be moved to the right and thereby close the valve 81.

In some cases it is desirable that the action of the devices previously described should not take place immediately but should take effect after a certain predetermined period. This is accomplished by the including in the devices of the fluid time switch shown in Figures 10 and 11. Referring to these figures, 90 indicates a piston slidable in the cylinder 89 and having a one-way valve 93 and 93′ in the bottom thereof. The piston rods 91 connected to the piston 90 are encircled by a spring 92 and upon the side of the cylinder is located a partition wall the movement of which is controlled by the screw 95 passing through the cylinder wall and connected to the partition, thereby forming a conduit extending from the top of the cylinder to the bottom of the cylinder with ports 96 at the bottom and 97 at the top. The entire cylinder is filled with oil or glycerine and it will be noted that when the piston is moved into its upward position the spring 92 is compressed and the free return thereof is hindered by the oil in the cylinder, thereby causing a slow return while the piston under the action of the spring 92 draws oil from in front of the piston through the ports 96, conduit 94 and port 97. The time of this return can be regulated by regulating the size of the conduit 94.

Figures 10 and 11 also show this time valve connected to the connection between the air tank and the bags and cylinders. In this connection is provided a valve of a peculiar construction 95′. The lever 87 with the handle 86 controls the movements of this valve and the lever 87 has a projection 87′ having a slot therein making connection with the piston rod 91 of the valve previously described. This lever 87 is designed to be held in the position in which the spring 92 is compressed by a catch 101′ which is pivoted upon the pivot 100 and has another lever 101 connected thereto which is connected to the float 98. A movement of the float will trip the latch 101′ and thereby release the lever 87 and allow the spring 92 to come into action. The valve 95′ will not come into action immediately until it has been turned as indicated in Figures 12, 13 and 14.

If an alarm is desired to be connected with the device this can be provided by locating a passage 105 in the valve structure so that as this passage comes into connection with the port 104 shown in Figure 14 a horn or other similar apparatus connected to this port may be sounded by the compressed air. This will of course give a signal to persons in the vicinity that the doors are to be closed.

In Figure 7 a safety device is provided whereby people trapped may be allowed to escape. To accomplish this a valve 83 is lo-

cated in the principal connection 15 between the air tank and the valve. This valve may be operated from one of the two contiguous compartments and when operated shuts off communication with the air tank and puts the air bags and cylinders in connection with a blow off port 104'. At the same time that this valve is operated, the time valve shown in Figures 10 and 11 is again set in operation, so that after the persons trapped escape the door will automatically close whether the people escaping close it or not.

In Figure 15 there is shown a system whereby premises can be protected. In this figure 49 are the air-tight bags which are either usually folded or rolled and normally shut into metallic boxes. The bags are applied to the ceiling of the premises. In the same way as previously described these bags are connected with the valve 14 and its pipings and will therefore operate in the same way to the action of water flooding the compartment and by the other means previously described. Each air tank must feed independently one or more bags since the bursting or damaging of a bag will interfere with the working of the others.

In Figure 15 the bags are shown filled. If encumbrances are in the room the protection although not complete will be very conspicuous. In case of fire the tubes can be loaded with azote carbonic acid or any other inert gas. For this purpose the piping 50 is designed which branches out throughout the compartment and is provided with a series of fusible operating plugs 51. The operation thereof is self-evident.

I claim:

1. A water-tight closure comprising a movable door, a frame for the door, means for closing the door by flooding the compartment in which the door is located, flexible air bags between the frame and door, a source of compressed air, a fluid operated connection between the door and frame, a pipe connecting the fluid connection and source of compressed air, a pipe connecting the bags and said source, a valve controlling the admission of pressure fluid to both pipes, and a valve in the bag connected pipe operable by the door when closing to inflate the bags to effect a water-tight closure between the door and frame when the door is fully closed.

2. A water-tight closure comprising a movable door, a fixed frame for the door, a cylinder upon the door, a piston movable in the cylinder and fixed adjacent the door, a flexible air bag cooperative with the door, a source of compressed air, a valve connected with said source, a pipe connecting the air bag and cylinder with the valve, said valve being operable upon flooding thereof to operate the piston to close the door, and means carried by the pipe connecting the bag and valve for releasing air in said pipe to inflate the bag when the door is closed.

3. A water-tight closure comprising a movable door, a fixed framework for the door, a valve mechanism for closing the door upon flooding of the compartment in which the door is located, a source of compressed air, a fluid closure inflatable by the source of air after the door is closed, and means included in the valve system for sounding an alarm previous to closing of the door.

4. A water tight closure comprising a movable door, a fixed framework for the door, means for closing said door operating by the flooding of the compartment in which the door is situated, a valve stem associated with the frame and operable directly by the door for effecting a water tight closure between the same only after the door has been fully closed, and air tanks having connections to means upon the door for closing the same and having also connections to the water tight closing means, and means comprising a valve operated by the closing of the door for opening the connection between said air tank and said water tightening closure means.

5. A water tight closure comprising a movable door, a fixed framework for the door, means for closing the door operating by flooding the compartment in which the door is situated, a valve stem associated with the frame and operated directly by the door for effecting a water tight closure between the same only after the door has been fully closed, and a timing device for operating the various means after a predetermined elapsed time.

6. A water tight closure comprising a movable door, a fixed framework for the door, means for closing the door operating by flooding the compartment in which the door is situated, a valve stem associated with the frame and operated directly by the door for effecting a water tight closure between the same only after the door has been fully closed, and flexible air tanks between the door and frame and filled with an inert gas capable of suffocating a fire.

DIEGO MATTEI.