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TORPEDO SWITCH

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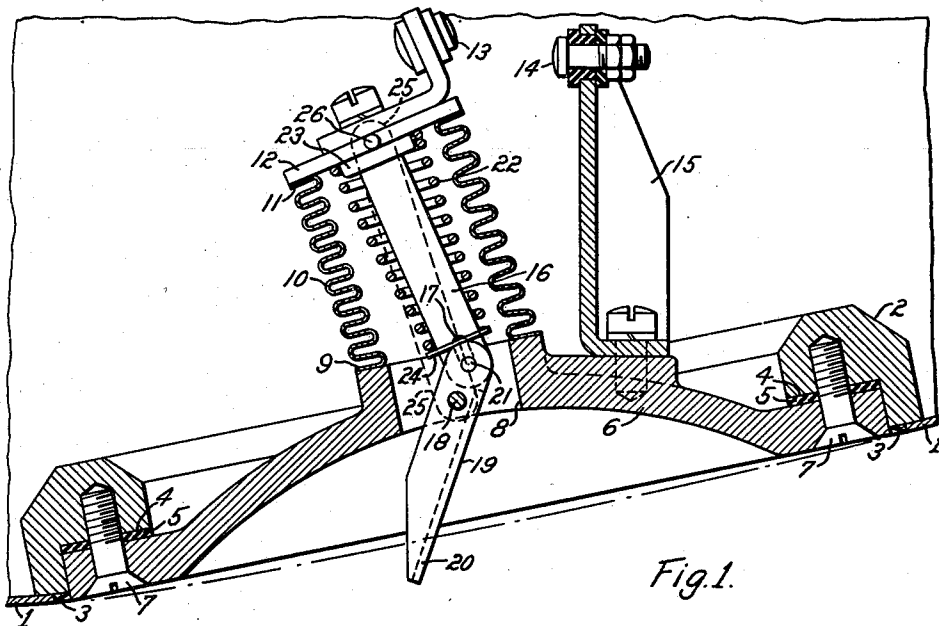


Fig. 1.

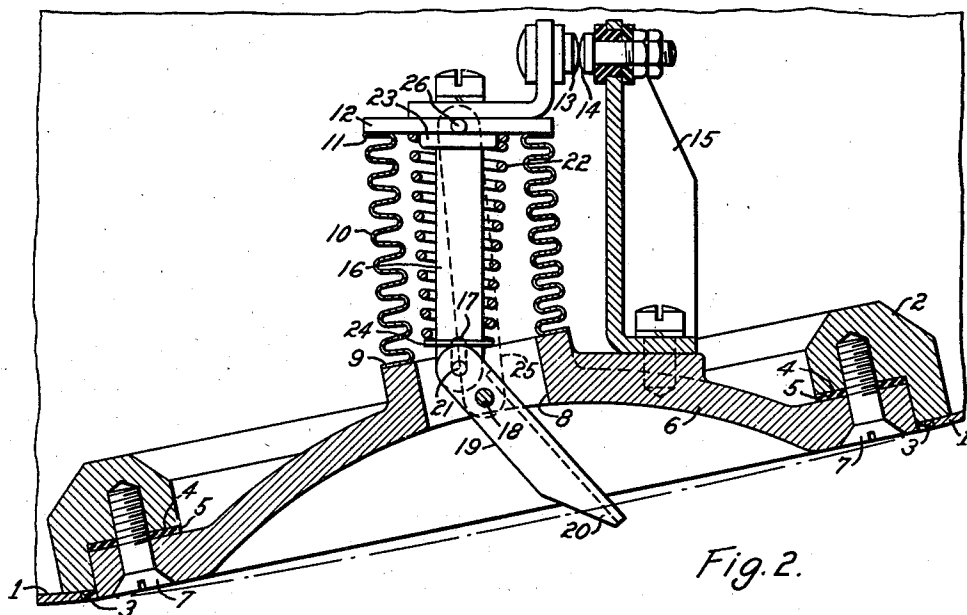


Fig. 2.

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TORPEDO SWITCH

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My invention relates to switches and more particularly to trigger switches of special utility for controlling the propulsion equipment and other equipment of torpedoes.

Modern warfare has introduced the aerial torpedo as well as torpedoes that are launched from small service boats not carrying firing tubes. With such torpedoes it is important that the propulsion equipment be set in operation only after the torpedo is free from the launching craft. One method heretofore used involved the use of a lanyard attached to a removable latch in a trigger switch mounted in the torpedo. Such devices may get fouled, particularly if a torpedo is launched from an aircraft moving at a relatively high speed where the angle at which the lanyard removes the detent may vary of a considerable range.

It is a broad object of my invention to provide a trigger switch actuated by the flow of the water past the torpedo as it is launched.

A more specific object of my invention is to provide a trigger switch for a torpedo which switch is actuated by the flow of water relative to the torpedo and effectively seals the interior of the torpedo from the sea water outside of the torpedo.

Another specific object of my invention is the provision of a trigger switch operable by the sea water and mounted on a handhole cover so as to provide a unitary structure that may be readily mounted and removed from the torpedo.

The objects hereinbefore expressly indicated are merely illustrative of many other objects of my invention which objects and advantages will become readily apparent from a study of the following specification and the accompanying drawing, wherein

Figure 1 shows a vertical sectional view of my special trigger switch shown in the position it occupies before operation, and

Fig. 2 shows my trigger switch on the same section line but in the position it holds after operation.

Numeral 1 designates the shell or housing of the torpedo to which, at a suitable region for a handhole, preferably in the afterbody of the torpedo, I weld a ring 2 so as to provide a hermetic seal between the housing 1 and ring 2 at the weld 3. The ring 2 is provided with a suitable seat 4 on to which is fitted a gasket 5 so that the plate 6, when bolted into place by bolts 7, provides a liquid tight closure or cover for the opening in ring 2. The plate 6 is provided with a central opening 8 to the inner edges of which I connect the outer end 9 of the sleeve-like or

"Sylphon" bellows 10. The connection at the edges of the opening of the outer end 9 may be by brazing or soldering so as to provide a hermetic connection. The inner or upper end 11 of the bellows has attached thereto a closure 12 which is brazed or soldered to the Sylphon bellows, so as to provide a hermetic seal. To the upper or inner surface of the closure 12, I secure the switch contact 13 which, of course, may be designed as a double contact to bridge a pair of stationary contacts disposed in fixed relation inside the torpedo. As shown, I use a single movable contact 13 coacting with a single stationary contact 14, mounted on a bracket 15, secured to the inner surface of the plate 6. To the outer surface of the closure 12 I rigidly attach the link 16 so as to be disposed generally centrally of the bellows. The outer end of the link 16 is provided with an elongated slot 17 disposed longitudinally of the link 16.

Disposed below the outer end of link 16 I position a bearing pin 18 in the walls of the opening 8 in the plate 6, and on this bearing pin I mount the lever 19 so that its upper or inner end is disposed upwardly into the opening 8, and its lower end is designed into a scoop 20 to coact with the water flow outside of the torpedo.

The upper end of the lever 19 is bifurcated and carries a fixed pin 21 disposed transverse of the bifurcation. The assembly is so made that the pin is disposed through the elongated slot 17. Before this final assembly, however, is made, a spring 22 having a washer 23 at its inner end and a washer 24 at its outer end, is slipped over the link 16 so as to encompass the link 16. The spring is placed under suitable compression so that its lower washer 24 presses against the upper articulate ends of the bifurcations of lever 19. It will thus be apparent, as shown in Fig. 1, that the link 16 and lever 19 will have a knee-action and will be either in the position shown in Fig. 1 when the switch has not been actuated, or in the position shown in Fig. 2 when the switch has been actuated by the flow of the water outside of the torpedo acting on the scoop 20.

To avoid damage to the Sylphon bellows and also to definitely control its path, I mount a pair of links one on each side, as 25, pivotally connected to the closure at 26 and pivotally connected to the bearing pin 18. From the foregoing description of the structure of my switch, it will be apparent that when the torpedo is launched the flow of the sea water will be from left to right, and the water will thus engage the scoop 20, projected in the forward direction into the

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path of the water, as shown in Fig. 1 and thus rotate in a counterclockwise direction so that the switch contacts 13 are actuated with a snap action from the position shown in Fig. 1 to the position shown in Fig. 2.

The scoop 20 as shown in Fig. 2 is after operation of the trigger switch disposed in the aft direction of the torpedo and thus adds no material resistance to the movement of the torpedo through the water.

While I have shown but one embodiment of my invention, it is apparent that others, particularly after having had the benefit of the teachings of my invention, may devise similar switches for the same general purpose. I, therefore, do not wish to be limited to the particular showing herein made, but wish to be limited only by the scope of the claims hereto appended.

I claim as my invention:

1. An electric switch having special utility for controlling circuits of the starting and propulsion equipment of a torpedo having a generally conventional casing, or shell, said switch comprising in combination, a plate having a central opening secured at its edges in a liquid-tight manner to the torpedo shell, a "Sylphon" bellows having one end secured in liquid-tight manner to the plate at the edges of the opening and projecting into the torpedo, a leak-proof closure plate for the end of the "Sylphon" bellows remote from the opening in the plate, a rigid bar secured to the closure plate and projecting axially of the bellows to substantially the end of the bellows secured to the first-named plate, a spring disposed about the bar, a lever pivoted intermediate its ends in the plate at the region of the opening, said lever having at one end a sliding pivotal connection to the bar disposed axially of the bellows and at its other end being shaped into a scoop for operation by the water as the torpedo moves through the water, said lever being operatively connected to the spring so that the spring, bar and lever comprise a snap-acting, over-center device when the lever is actuated by the water, and switch contacts operatively associated with closure plate.

2. An electric switch having particular, but not exclusive, utility for the starting and propulsion equipment of a torpedo having a substantially conventional shell, or housing, said switch comprising in combination, a "Sylphon" bellows having the edges at one of its ends hermetically sealed to the torpedo shell at an opening in the shell so that the inside of the bellows is exposed to the medium outside of the shell, a closure hermetically sealing the other end of the bellows, a scoop pivoted intermediate its ends at the opening having one end projecting into the bellows and the other end projecting beyond the outside of the shell of the torpedo, a link disposed in the bellows at one end rigidly connected to the closure and at its other end pivotally and slidably connected to the end of the scoop projecting into the bellows, a compression spring engaging the closure and the end of the scoop projecting into the bellows to thus provide an over-center device so that movement of the scoop by the medium outside the torpedo will cause the closure to move from one position to another position with a snap action, and switch contacts actuated by the closure.

3. In a trigger switch of special utility for controlling electric circuits of a torpedo which has a conventional housing, said switch comprising, a mounting plate at its edge hermetically

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secured to the torpedo housing and having an opening, a "Sylphon" bellows having its outer end hermetically secured to the plate at the edges of the opening in the plate whereby the inside of the bellows is exposed to the medium outside the torpedo, a closure hermetically sealing the inner end of the bellows, switch contacts secured to the closure to thus be movable with deflecting movements of the bellows, switch contacts disposed in fixed relation to the plate disposed in the torpedo and adapted to cooperate with first-named switch contacts, and means mounted on the plate and operable by the flow of the medium outside the torpedo with reference to the torpedo for deflecting the inner end of the bellows to thus actuate said switch contacts.

4. In a trigger switch of special utility for controlling electric circuits of a torpedo which has a conventional housing, said switch comprising, a mounting plate at its edge hermetically secured to the torpedo housing and having an opening, a "Sylphon" bellows having its outer end hermetically secured to the plate at the edges of the opening in the plate whereby the inside of the bellows is exposed to the medium outside the torpedo, a closure hermetically sealing the inner end of the bellows, switch contacts secured to the closure to thus be movable with deflecting movements of the bellows, stationary switch contacts so mounted on the plate to cooperate with said movable contacts, and a scoop pivoted intermediate its ends on the plate and having one end disposed to be actuated by the flow of the water past the torpedo and having said other end operatively connected to the closure to thus cause movement of the bellows to operate the switch contacts when the torpedo is launched.

5. In a trigger switch of special utility for controlling electric circuits of a torpedo which has a conventional housing, said switch comprising, a mounting plate at its edge hermetically secured to the torpedo housing and having an opening, a "Sylphon" bellows having its outer end hermetically secured to the plate at the edges of the opening in the plate whereby the inside of the bellows is exposed to the medium outside the torpedo, a closure hermetically sealing the inner end of the bellows, switch contacts secured to the closure to thus be movable with deflecting movements of the bellows, stationary switch contacts mounted on the plate so that the entire trigger switch comprises a unitary structure on the plate, said stationary contacts being disposed to cooperate with the movable switch contacts on the closure, a lever pivoted intermediate its ends on the plate so that one end projects into the bellows and the other, being shaped into a scoop, projects into the path of the water flowing past the torpedo when the torpedo is projected into the water, an over-center connection between the closure and the end of the lever projecting into the bellows so that the movable switch contacts are snap-actuated when the scoop end of the lever is moved by the water flow relative to the torpedo.

6. In a trigger switch of special utility for controlling electric circuits of a torpedo which has a conventional housing, said switch comprising, a mounting plate at its edge hermetically secured to the torpedo housing and having an opening, a "Sylphon" bellows having its outer end hermetically secured to the plate at the edges of the opening in the plate whereby the inside of the bellows is exposed to the medium outside the torpedo, a closure hermetically sealing the inner end

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of the bellows, switch contacts secured to the closure to thus be movable with deflecting movements of the bellows, stationary switch contacts mounted on the plate so that the entire trigger switch comprises a unitary structure on the plate, said stationary contacts being disposed to cooperate with the movable switch contacts on the closure, a lever pivoted intermediate its ends on the plate so that one end projects into the bellows and the other, being shaped into a scoop, projects into the path of the water flowing past the torpedo when the torpedo is projected into the water, a link disposed in the bellows having its inner end rigidly secured to the outer surface of the closure, a slidable washer disposed over the link, a compression spring disposed about the link and between the closure and washer to urge the washer toward the outer end of the link, said outer end of the link having a slidable and pivotal connection with the inner end of the lever so that the link, lever and spring provide an over-center device, whereby operation of the lever will move the movable contacts with a snap action.

7. In a trigger switch of special utility for controlling electric circuits of a torpedo which has a conventional housing, said switch comprising, a mounting plate at its edge hermetically secured to the torpedo housing and having an opening, a "Sylphon" bellows having its outer end hermetically secured to the plate at the edges of the opening in the plate whereby the inside of the bellows is exposed to the medium outside the torpedo, a closure hermetically sealing the inner end of the bellows, switch contacts secured to the closure to thus be movable with deflecting

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movements of the bellows, stationary switch contacts mounted on the plate so that the entire trigger switch comprises a unitary structure on the plate, said stationary contacts being disposed to cooperate with the movable switch contacts on the closure, a lever pivoted intermediate its ends on the plate so that one end projects into the bellows and the other, being shaped into a scoop, projects into the path of the water flowing past the torpedo when the torpedo is projected into the water, a link disposed in the bellows having its inner end rigidly secured to the outer surface of the closure, a slidable washer disposed over the link, a compression spring disposed about the link and between the closure and washer to urge the washer toward the outer end of the link, the outer end of the link beyond the normal position of the washer being provided with a longitudinal slot, a pivot pin secured to the inner end of the lever disposed in the slot so that the lever and link have a pivotal and slidable engagement and said spring holds said lever and link in either of their two over-center positions, whereby movement of the scoop end and the lever will effect operation of the movable contacts by snap action.

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The following references are of record in the file of this patent:

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