

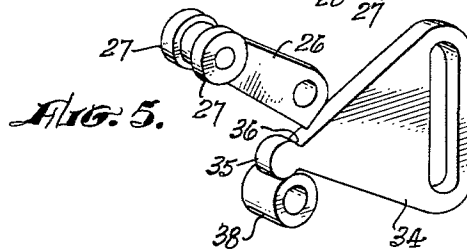
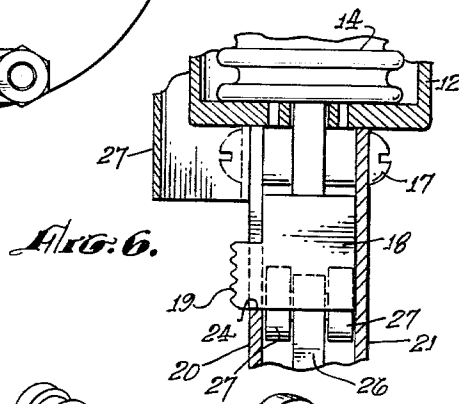
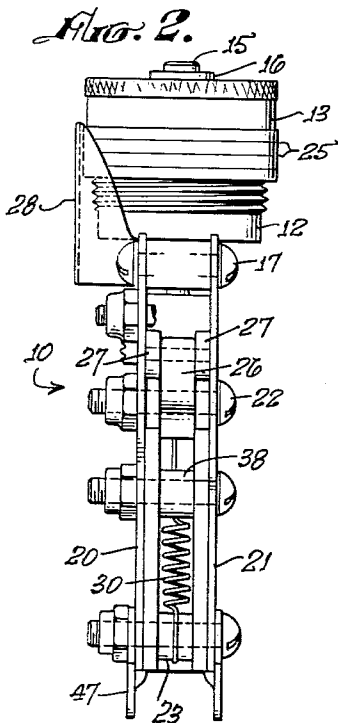
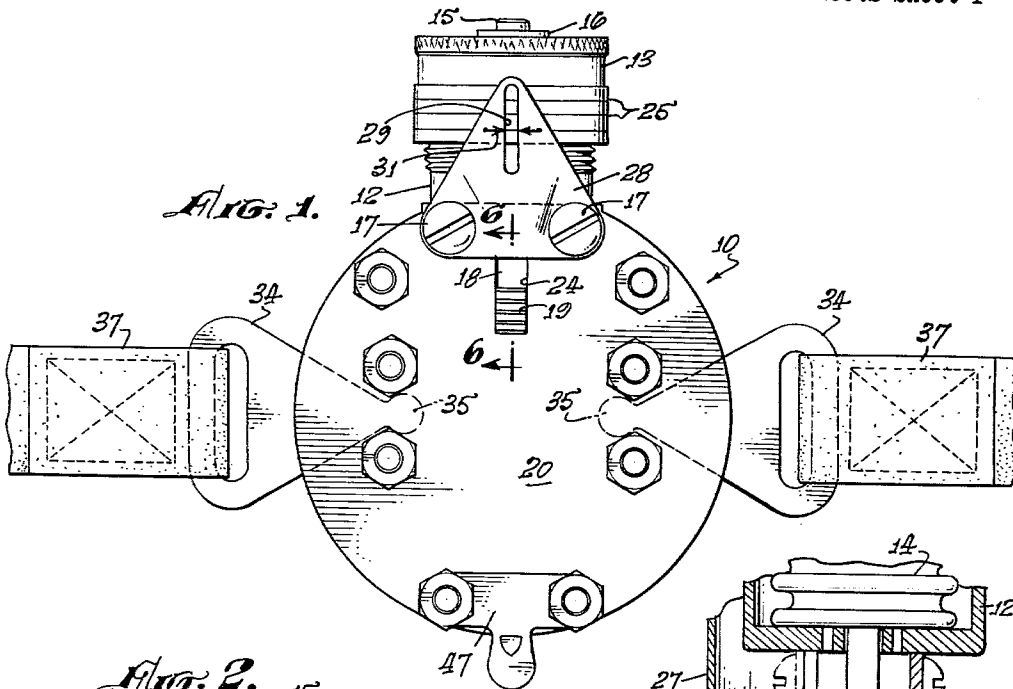
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R. J. TRAUGER
UNDERSEA RELEASE CLASP

3,228,080

Filed Sept. 27, 1963

2 Sheets-Sheet 1



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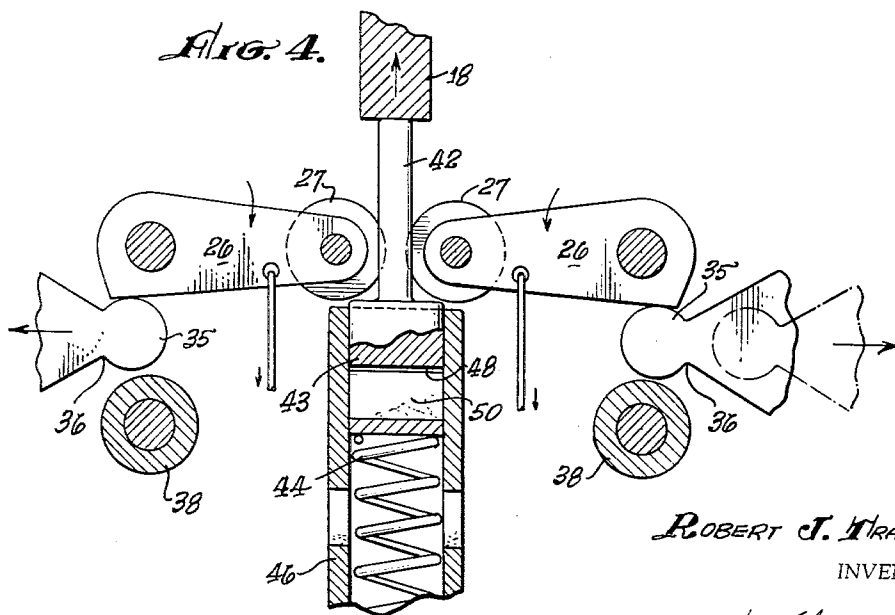
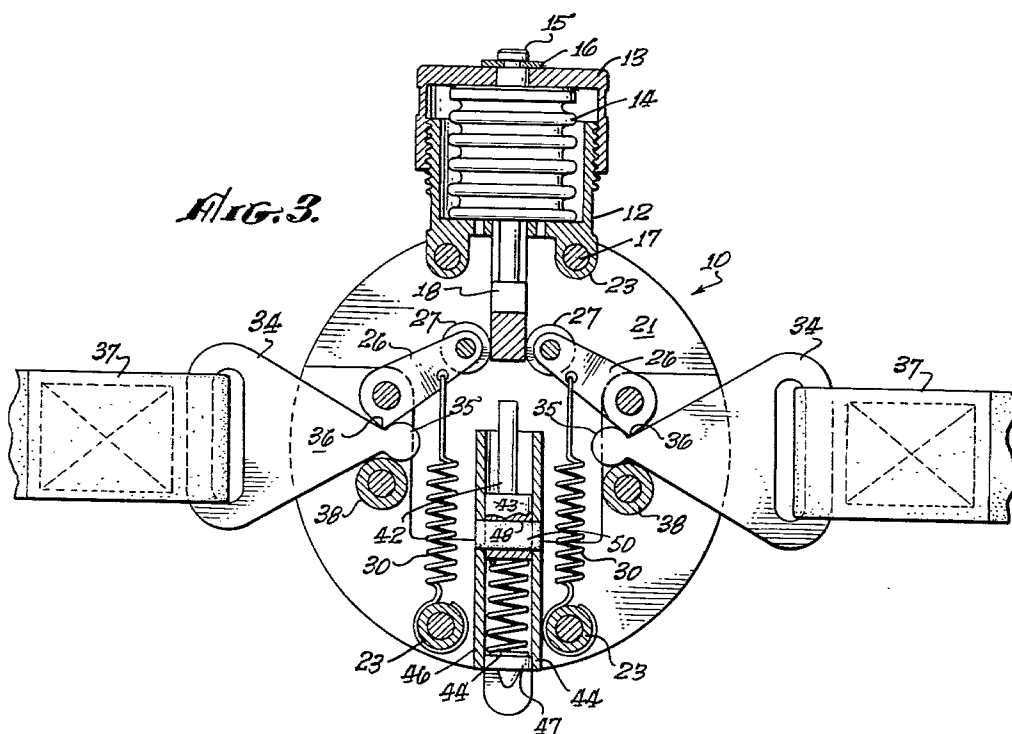
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UNDERSEA RELEASE CLASP

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3 Claims. (Cl. 24—230)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates generally to means for releasing weights or other systems of buoyancy control from movable underwater objects and specifically to a release buckle or clasp for the weight belts of undersea divers.

As is well known, the buoyancy of underwater divers is controlled by various sheddable weights which may include leaded shoes or boots, in the case of conventional divers, or various detachable weights carried on or near the person of a skin-or-scuba diver. Under normal circumstances, when the diver has completed his work, he releases sufficient weight and returns to the surface at a rate dependent on conditions, such as depth of dive or time of immersion. Such release of weights requires a conscious, deliberate, physical action by the diver to disengage himself from the weights or to swim to the surface against negative buoyancy. Where, for one reason or another, the diver becomes incapacitated, he may slowly sink to the bottom or, in the case of the skin diver, remains at the submerged level until his air runs out.

The present invention provides a release clasp which will automatically release the weights on a diver when the diver has descended to a predetermined depth or has been submerged a predetermined time. This may be accomplished with a holding means which holds the weights by engaging the ends of a weight belt and which will release the belt ends when disengaged therefrom, a means for biasing the holding means toward disengagement from the weight belt ends and means responsive to water pressure and time of immersion for retaining the holding means in engagement with the belt ends until the predetermined depth or predetermined time has occurred. The invention is not confined to releasing only divers weights but may be employed to release any object such as marker buoys from submarines or other submerged vehicles.

The principal object of my invention, therefore, is to provide means to automatically shed the dead weights a diver carries on his weight belt in the event he is incapacitated or inadvertently descends beyond a prescribed depth so that normal buoyancy will facilitate his return to the surface, conscious or not.

Another object of my invention is to provide hydrodynamic means for such diver carried weights that operates as a function of either manual, hydrostatic pressure, or time controls.

A further object of my invention is to provide automatic release means for permitting the retrieval of oceanographic devices.

Another object of my invention is to provide hydrostatically controlled releasing means for automatically releasing marker buoys from submarines or other underwater diving craft that have exceeded prescribed depths.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIGURE 1 is a front elevation of the invention;

FIG. 2 is a side elevation of the invention;

FIG. 3 is a front elevation in cross-section showing the assembly of working elements;

FIG. 4 is a partial diagrammatic view illustrating the operation of certain of the working elements;

FIG. 5 is a diagrammatic view in perspective showing certain details; and

FIG. 6 is a partial side view in cross-section showing certain details in an enlargement over FIG. 2.

With reference to FIGS. 1, 2, and 3, the undersea release clasp or buoyancy control device 10 comprises a bellows chamber 12, a bellows 14, a pair of spaced supporting plates 20 and 21, a pair of belt or strap ends 34 shaped to cooperate with spring urged pawls 26 so that under normal conditions the ends 34 are held within the body of the clasp while under other conditions the pawls 26 may be operated so as to release the belt ends 34.

The hydrostatic release means comprises the aneroid bellows 14 which is supported in an upright position by the chamber 12 which is secured between the upper portions of the spaced supporting plates 20 and 21 by means of screws or rivets 17. This chamber 12 is provided with a cover 13 having a centrally disposed aperture in its top portion. Bellows 14 is provided with a grooved neck 15 which protrudes upwardly through the aperture in the cover and is secured thereto by lock washer 16. This attachment serves to anchor the upper end of the bellows with relation to the body of the clasp. Since cover 13 is adjustable with relation to chamber 12, the compression of bellows 14 may be effected to vary the required hydrostatic pressure for its operation. In order to provide a measure for this compression, a generally triangular, partly cylindrical indexed marker 28 is furnished and shown as secured by screws 17 on the outward upper portion of the face plate 20. This marker is provided with a slot 29 through which calibrated marking rings 25 on cover 13 may be observed. The lower horizontal portion or base of the chamber 12 is supplied with one central aperture for the reception and passage of bellows stem 18 and a plurality of small orifices for the introduction of water under pressure. Stem 18 protrudes downwardly between the rollers 27 on the rotatable pawls 26 thereby separating the pawl ends and, as will be described more in detail later, serves to lock the belt ends 34 within the body of the clasp. As indicated in FIGS. 1 and 6, stem 18 is provided with a serrated section 19 which extends outwardly through slot 24 in plate 20. This serrated portion serves as a manual release by being forced upwardly by the diver, thus moving the stem 18 upwardly against the spring force of the bellows and allowing the pawls to drop and release the belt ends 34.

Plates 20 and 21 are held together by screws 22 and rivets 17 passing through apertures in the plates. Bushings 23 are provided in conjunction with these fastenings as well as the supports for the various pawls and rollers, so that a uniform separation between the plates is provided.

Rotating pawls 26 are rotatably supported between the plates 20 and 21 and are of such length as to normally contact stem 18 and be held in such position as to lock belt ends 34 within the body of the clasp. These belt ends are formed in the generally triangular configuration shown with the apex 35 shaped in circular form having indentations 36 therein to cooperate with the adjacent shaped ends of pawls 26 whereby when the roller ends 27 are separated by the stem 18, the apices 35 are locked against the stop or roller 38. The pawls 26 are first held against stem 18 and then, when stem 18 moves upwardly, are forced downwardly to release the belt ends 34 by means of tension springs 30. The lower ends of these

springs are hooked around spacer 23 in the lower portion of the plate assembly. The configuration of the pawls and ends 34 are detailed in FIG. 5.

The time control feature, with reference to FIGS. 3 and 4, comprises a vertical plunger 42 having a reduced diameter terminating in a piston 43, a plunger-spring holder 46, a compression spring 44, and a water-soluble shear pin 50. The piston 43 and the adjacent portion of the holder 46 have a diametrical aperture 48 formed therein for the reception of the water-soluble shear pin 50. This aperture 48 is so positioned that the spring 44 must be compressed by the piston 43 in order to insert the water-soluble shear pin 50. Fitting 47 is provided to act as a retainer or keep for retaining the holder 46 in place between the plates 20 and 21.

The operation of the device should be obvious from the foregoing description. For example, a diver may descend to work at the 200-foot level in water of much greater actual depth and may carry only a thirty-minute supply of air. In this event, the bellows would be pre-set for, say, 225 feet depth, and a water-soluble shear pin adapted to dissolve sufficiently to release the plunger in, say, twenty-five minutes. If the diver became incapacitated and started to sink to the bottom as he would under these circumstances because the external pressure would have reduced his volume such that he would have an overall negative buoyancy, the device would automatically release the weight belt whereupon he would float to the surface and be assisted upon recovery. If he were incapacitated but remained at the 200-foot level, the time control feature of the device would actuate and accomplish the same result.

Under ordinary circumstances, when the diver has completed his mission and desires to return to the surface promptly, he can release his weight belt by simply pushing upwardly on the manual release 19.

In other words, when the device is carried below its pre-set depth, bellows 14 is compressed which, in turn, raises stem 18 from between the pawls 26. These pawls are then forced downwardly by the spring 30 and release the belt ends 34. When the device has been immersed beyond its pre-set time, the water-soluble shear pin will have dissolved sufficiently to allow the spring 44 to shear it and force the piston 43 and plunger 42 upwardly. Plunger 42 then contacts the lower end of bellows stem 18, forcing it upwardly to release the pawls 26. The manual release has been described.

While the invention has been described principally in connection with diving apparatus and operations, its application to general oceanographic work and observations should be clearly indicated.

Having thus described my invention, I claim:

1. An undersea release clasp adapted to hold and then release a weight-sustaining belt on the body of a diver comprising, in combination:
 - a clasp body;
 - belt ends adapted to be normally held within said clasp body;
 - means for holding said belt ends in said clasp body;
 - hydrostatic means for cooperating with said holding means for releasing said belt ends at a pre-set depth, said hydrostatic means including:
 - a bellows housing supported by said clasp body;
 - an adjustable cover for said housing;
 - a pressure-sensitive sealed bellows mounted in said housing, said bellows being secured to said adjustable cover; and
 - a stem secured to the lower convolution of said bellows, said stem protruding downwardly through said housing into the interior of said clasp body and adapted to prevent said holding means from releasing said belt ends;
 - a separated projection being formed on the lower portion of said stem, said projection protruding through said clasp body to serve as a manual release for op-

erating said holding means for releasing said belt ends; and

time control means for cooperating with said holding means for releasing said belt ends upon the expiration of a pre-set time.

2. An undersea release clasp adapted to hold and then release a weight-sustaining belt on the body of a diver comprising, in combination:

- a clasp body;
 - belt ends adapted to be normally held within said clasp body;
 - means for holding said belt ends in said clasp body;
 - hydrostatic means for cooperating with said holding means for releasing said belt ends at a pre-set depth, said hydrostatic means including:
 - a bellows housing supported by said clasp body;
 - and adjustable cover for said housing;
 - a pressure-sensitive sealed bellows mounted in said housing, said bellows being secured to said adjustable cover; and
 - a stem secured to the lower convolution of said bellows, said stem protruding downwardly through said housing into the interior of said clasp body and adapted to prevent said holding means from releasing said belt ends;
 - time control means for cooperating with said holding means for releasing said belt ends upon the expiration of a pre-set time, said time control means including:
 - a holder mounted internally of said clasp body, said holder being in coaxial relationship with said bellows stem and having a diametrical aperture formed intermediate its ends;
 - a reduced diameter plunger mounted in said holder;
 - an enlarged diameter piston being formed at the lower end of said plunger, said piston having a diametrical aperture formed to match the said aperture in said holder;
 - a water soluble shear pin inserted in the corresponding apertures in said holder and said piston; and
 - means for forcing said piston and plunger upwardly when said water-soluble shear pin has been immersed for its pre-set time whereby said plunger impacts against the lower end of said bellows stem, forcing said stem upwardly out of engagement with said holding means; and
 - manual release means associated with said holding means for effectuating release of said belt ends from said clasp body.
3. An undersea release clasp adapted to hold and then release a weight-sustained belt on the body of a diver comprising, in combination:
 - a clasp body;
 - belt ends adapted to be normally held within said clasp body;
 - means for holding said belt ends in said clasp body;
 - hydrostatic means for cooperating with said holding means for releasing belt ends at a pre-set depth, said hydrostatic means including:
 - a bellows housing supported by said clasp body;
 - an adjustable cover for said housing;
 - a pressure-sensitive sealed bellows mounted in said housing, said bellows being secured to said adjustable cover; and
 - a stem secured to the lower convolution of said bellows, said stem protruding downwardly through said housing into the interior of said clasp body and adapted to prevent said holding means from releasing said belt ends; and
 - a projection being formed on the lower portion of said stem, said projection protruding through said clasp body to serve as a manual release for operating said holding means for releasing said belt ends.

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