

# Anti-drown ring – a patented drowning protection device (patent no. 197623)

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## Summary:

The anti-drown ring is a device that does not restrict the user's movements and, when activated, brings the critical drowning hazard situation under control and allows the user to safely remain in water.

The anti-drown ring, being an inexpensive drowning protection device, should be universally available for water lifeguards, swimming schools, aquatic sports or open-air recreation centers, fishery and other aquatic industries, as well as for military personnel training or operating in areas that require crossing water barriers

**Key words:** aquatics, equipment, rescue.

## Introduction

The beginning of the summer holiday season is always accompanied by media warnings to maintain caution when bathing in open reservoirs. Most cases of drowning are recorded at non-attended beaches. These cases pertain mostly to the youth, but also to adults, oftentimes taking a swim after drinking alcohol in quantities that increase risk-taking, bravado and courage show-off behaviors.

Several hundred drowning cases are recorded every year across the country, with the maximum value reaching as much as 600 drowning cases during a single season.

## Methods of aquatic rescue to date

Compared to the development of technical devices that facilitate everyday life in all areas, methods of aquatic rescue used to date should be judged in a very critical manner. Even the most efficient lifeguards are not always able to provide timely rescue aid to the drowning person, as the equipment they have at their disposal is usually limited to the anachronistic life buoys and boats.

This form of rescue is often to no avail, as the time between the alarm and the rescue is too long.

Therefore, there is a need to revise the rescue methods available to date. We should strive to be

able equip the person in water with a device that would allow them to manage the drowning hazard by themselves, without the dramatic wait for rescue. To date, the only device of this type is the life jacket, which restricts the movements and the ease of swimming, and which is used mostly by people working on ships and fishing boats.

### The search for novel water rescue devices

For many years, various personal rescue devices, oftentimes automatically-triggered devices that could be worn by every individual staying in open reservoirs, have been proposed. Many devices of these type are known from Polish patent descriptions nos. 52602, 105721, 59710, 105722 and 70297

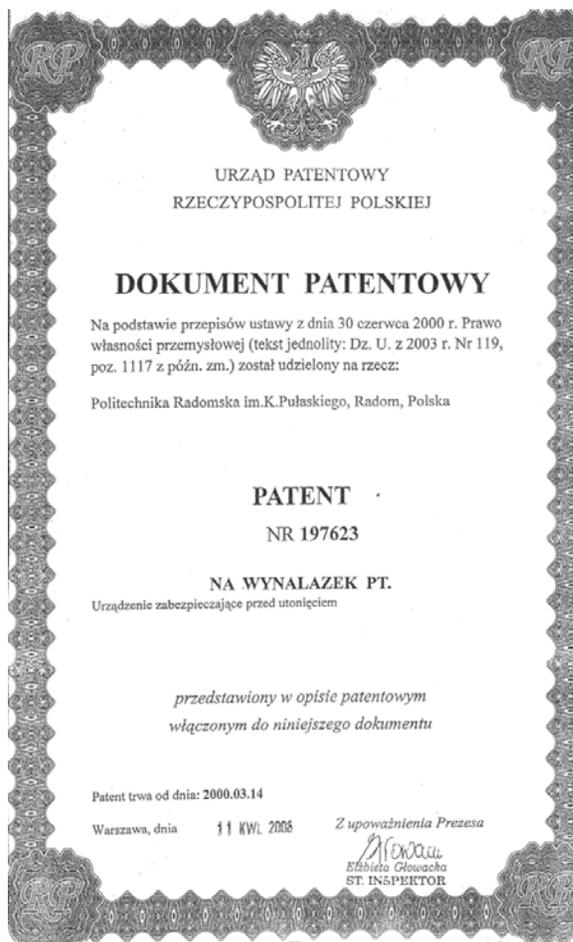
However, the mechanisms to trigger these devices are complex and usually respond only

following complete immersion of the drowning person under increased hydrostatic pressure that ruptures the foil surrounding a bag that is then transformed into a life buoy.

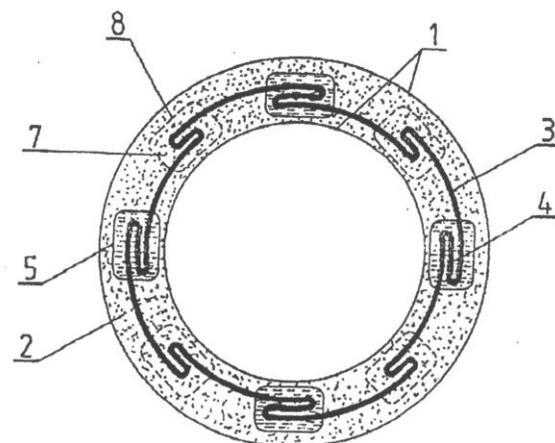
Title page of patent no. 197623 regarding the invention titled DROWNING PROTECTION DEVICE, as discussed in the article.

### Anti-drown ring design summary

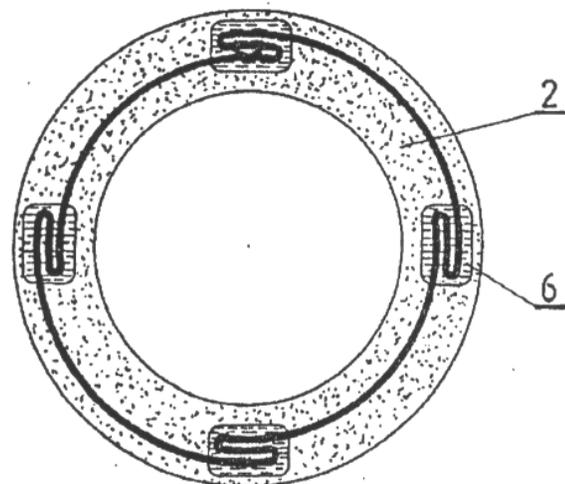
When not activated, the anti-drown ring in question is a thin ring made of elastic rubber tubing freely placed around the neck and not restricting



**Figure 1:** Title page of patent no. 197623 regarding the invention titled DROWNING PROTECTION DEVICE, as discussed in the article.

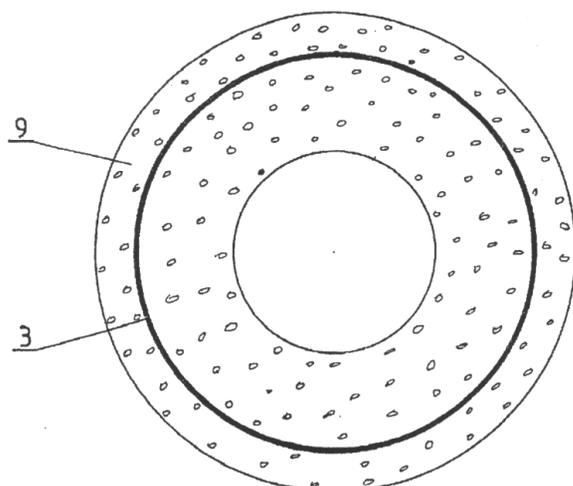


**Figure 2:**

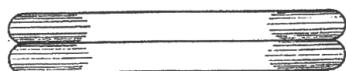


**Figure 3:** Figures 2-3 present the circular cross-section of non-activated system.

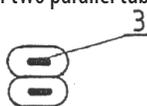
- The numbered arrows indicate as follows:
- 1 – cross-section of the walls of the anti-drown ring;
  - 2 – tubing lumen filled with acidic reagent;
  - 3 – cross-section of ribbon with indicated bends;
  - 4 – ribbon bend inside the container filled with alkaline reagent;
  - 5 – alkaline reagent container wall;
  - 6 – alkaline reagent placed in the container with ribbon bend;
  - 7,8 – free ribbon bends in acidic reagent environment.



**Figure 4:** Figure presents a schematic circular cross-section of the anti-drown ring filled with gas. Of note are the wider device lumen and straightened ribbon bends.



**Figure 5:** Figure presents a transverse cross-section of an anti-drown ring consisting of two parallel tubings.



**Figure 6:** Figure presents a transverse cross-section including the ribbon cross section indicated by arrow 3

the user's movements in water. The diameter of the ring is slightly smaller than the diameter of human head, which prevents the device slipping off neck and head while making rapid movements in water.

Inside the tubing, there is a loose-fitted ribbon made of material characterized by high resistance to tear and to various ambient conditions.

Besides the ribbon, the inside of the tubing is filled with reagent 1, which is a solution of an acidic substance. The ribbon includes several tightly insulated bends comprising containers filled with reagent 2, which is a powdered alkaline substance.

The walls of containers filled with reagent 2 are made of material impenetrable to both materials, albeit relatively easy to tear.

**Explanations to figures 2-5:** Figures presenting schematic cross-sections of the anti-drown device of the invention.

## The principle of operation

The anti-drown ring is slightly extended and placed on the neck by sliding it over one's head. When at risk of drowning, the user holds on to the device and tears it so as to unfold the folds of the ribbon inside the containers filled with reagent 2. Unfolding the ribbon leads to the container walls being ruptured, leading to the release of the alkaline reagent (reagent 2) from the containers into the acidic reagent (reagent 1) that fills the tubing.

Mixing both reagents leads to an instantaneous chemical reaction with the release of gas which automatically transforms the tubing into a pumped bladder. The quantities and ratios of both reagents should be matched so as the formed gas extends the tubing to a diameter of ca. 10 cm. Thus, the bladder buoy formed around the neck provides displacement sufficient to maintain one's head above water while allowing to maintain free movements of entire body.

Loose fitting of the ribbon inside the tubing is provided by ribbon bends not placed in containers with reagent 2 (free bends). This solution allows for slight expansion and multiple putting on and removing the anti-drown ring without damaging the walls of containers with reagent 2 and thus triggering the unwanted chemical reaction generating gas when putting on the device.

Such a design solution allows the resistance to be felt twice: the first time when the ribbon is straightened out at free bends, and the second involving the rupture of container walls, leading to contact between both reagents and generation of gas.

## Leak protection

The anti-drown ring made of thin rubber tubing may be at risk of accidental puncturing. In order to avoid such risk, the ring may be made of two parallel tubings fitted with identical ribbons and identical reagents.

## The benefits of the anti-drown ring

The anti-drown ring is characterized by the simplicity of technical solution, capability of being put on and removed multiple times before a

critical situation is encountered that requires the device to be activated.

The incentives to start production of the anti-drown ring should with no doubt include low costs of materials required for production (rubber tubings, ribbons, reagents) and, as a consequence, low prices that would make the device available to everyone.

### **Production and marketing of the anti-drown ring**

Design preparation, production of a prototype batch and initiation of production would require efforts to obtain funds from state or European Union budget allocated to water rescue, or from private sponsors.

The prototype series should be made in order to raise interest of sponsors so as to acquire funds required for the development of technical solutions for serial production of the anti-drown rings. Semi-technical scale implementation works should be made in institutes (plants) developing rubber industry machinery.

The next marketing stage would involve the promotional campaign, mostly in the media as well as in the water industry aquatic sports and recreation centers, the military, the police and public schools of all levels.

The promotional campaign should include presentations in shopping centers and at the aquatic sports and water rescue equipment trade fairs.

After the anti-drown rings are well accepted by the general public, technical solutions should be developed so as to allow automated mass production of the devices.

### **Mass marketing of anti-drown rings**

With mass-production capabilities available, promotional campaigns should be organized at

the national and international aquatic sports and water rescue equipment trade fairs.

Likewise, long-term educational campaign should be started to promote the benefits of such a simple drowning protection device. Trainings should be provided mostly to individuals spending free time at or working on open water reservoirs.

### **Strategic goals of the promotional campaign**

Dissemination of social awareness of the benefits of using the anti-drown rings.

Introduction of legal obligation to use anti-drown rings by individuals staying in open water reservoirs.

The ultimate goal would be to reduce the annual number of statewide drowning cases from several hundred to not more than several dozen accidents (wintertime and flood drowning).

The obligation to use the anti-drown rings would lead to a great change in the profile of water rescue activities by limiting the latter to educational and preventive activities, including the control whether individuals staying in open water reservoir wear the rings.

The planned strategic goals may be achieved by convincing entrepreneurship-supporting institutions and decision makers about the attractiveness of the device, obtaining funds for prototyping, promotion, trainings and initial production stages.

Depending on the societal interest and demand for anti-drown rings, mass-scale production should be undertaken so as to meet the market demands.

As the experience in using the anti-drown rings would grow, the proposed model might be modified provided that the general principle of operation and use remain unchanged.