

Sept. 30, 1930.

P. HERBST

1,776,791

SUBMERSIBLE DEVICE

Filed Nov. 9, 1929

Fig. 1

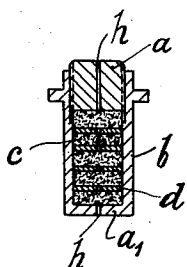


Fig. 2

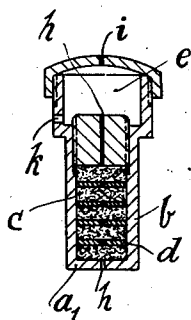


Fig. 3

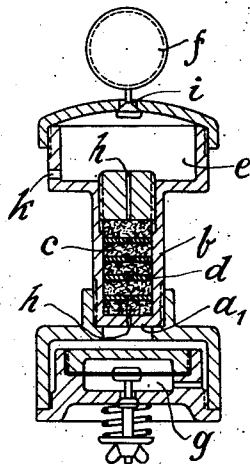
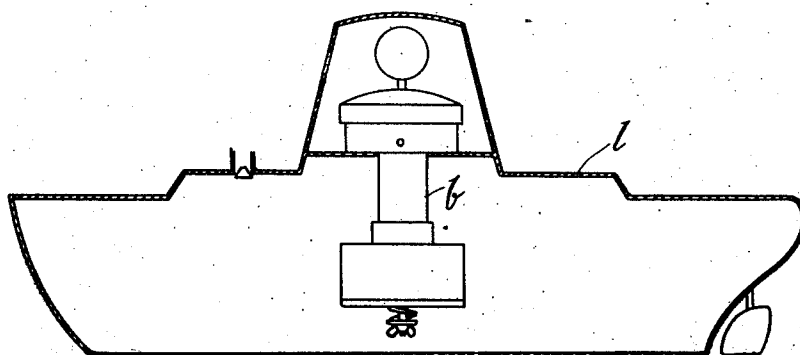


Fig. 4



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UNITED STATES PATENT OFFICE

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SUBMERSIBLE DEVICE

Application filed November 9, 1929, Serial No. 406,094, and in Germany February 29, 1928.

This invention relates to a submersible device for advertising purposes and toys which has the effect that the submersible body fitted with the submerging arrangement immerses and emerges automatically during a longer period.

The feature of the invention consists in that in the submersible body compressed air is stored, escapes through a very finely adjustable valve in extremely small quantities and retained outside the submersible body until the collected quantity through its tendency to rise draws up the submersible body, where through the influence of the surface of the water the collected quantity of air separates from the submersible body which then again sinks until a sufficient quantity of air has again collected outside the submersible body to force up this body. This operation is repeated as long as the excess pressure of the air stored in the submersible body is able to overcome the resistance of the water column above the valve opening, when the submersible body is in submerged position.

Several embodiments of the invention are illustrated by way of example in the accompanying drawing in which:—

Fig. 1 shows the valve for the smallest submersible bodies.

Fig. 2 shows the arrangement for larger sized submersible bodies.

Fig. 3 shows the arrangement for largest sized submersible bodies.

Fig. 4 is a diagrammatic section of a submarine fitted with the arrangement for submerging and rising.

The invention consists essentially of a valve which releases from a compressed air or gas chamber the smallest imaginable quantity of air or gas in a certain unit of time which was practically impossible with a small tap or ordinary valve. This valve, shown in Fig. 1, consists of a cylindrical valve body *b* closed at one end by a bottom *a*, and at the other end by a screw piece *a*. The bottom and screw piece have a small bore *h* in the centre. This valve body is filled with felt discs *c*, between each of which a metal disc *d*, also provided with a small bore *h*, is

situated. The valve is inserted in the wall either of the submersible body itself serving as container for the compressed air or as a special compressed air container so that compressed air can escape in the smallest imaginable quantity through the bore of the valve and the felt discs by suitably tightening the screw part *a*, without any danger of the bore becoming clogged by foreign matters as the calculation of the quantity passing is not as in an ordinary valve effected by a single boring of extremely small cross section and which can easily become clogged, but by a throttle action of the labyrinth-like intermediate spaces of the plurality of felt discs suitably compressed by the screw part.

In this construction the valve is intended for the smallest submersible bodies, the weight and water displacement of which is so counterbalanced that they can sink to the bottom of the water vessel owing to their very slight access weight. The compressed air escaping uniformly through the valve in very small quantities then forms a small bubble above the bore *h* of the screw part which slowly increases in volume and when it has attained a sufficient size rises together with the submersible body to the water surface, where it bursts and the submersible body again sinks to the bottom.

For larger submersible bodies for rising which a small bubble will not suffice, an air collecting chamber *e* is provided above the outlet opening of the valve (Fig. 2), which chamber has in its uppermost point a small outlet opening *i* and a larger opening *k* at the side. When the submersible body is at the bottom the collecting chamber is filled with water, the air escaping from the valve bore *h* collects under the small outlet opening *i* and slowly forces out the water through the lower opening of the collecting chamber. When sufficient air has collected to raise the submersible body, the body rises until the air outlet opening reaches the surface of the water when the air can escape, whereas water flows in through the lower opening *k* and the submersible body then again sinks. In the case of the largest sized submersible bodies in which the escapement of the air

through the small outlet opening would take too long, an accordingly enlarged opening may be closed by a float valve *f* (Fig. 3) during the submerging operation.

5 If for the purpose of obtaining the longest possible working duration a compressed air at a suitably high pressure is employed which naturally will cause a too quick escapement when freshly charged, a pressure reducing
10 valve *g* (Fig. 3) may be arranged in front of the outlet opening of the valve. Fig. 4 shows as an example of the use to which the arrangement may be put, being a diagrammatical view in longitudinal section of a sub-
15 marine 1 serving as submersible body and fitted with valve according to Fig. 3.

I claim:—

1. An automatic submersible device in which gas or compressed air escapes from a
20 container, comprising in combination a valve body in said container having an air escape-ment opening, felt packing discs arranged in said valve body, metal disc interposed be-
25 tween said felt discs in said valve body having a bore in the centre, and an adjusting screw piece threaded into said body and adapted to compress said felt discs.

2. An automatic submersible device as specified in claim 1, comprising in combina-
30 tion with the screw part an air collecting chamber.

In testimony whereof I affix my signature.
PAUL HERBST.

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