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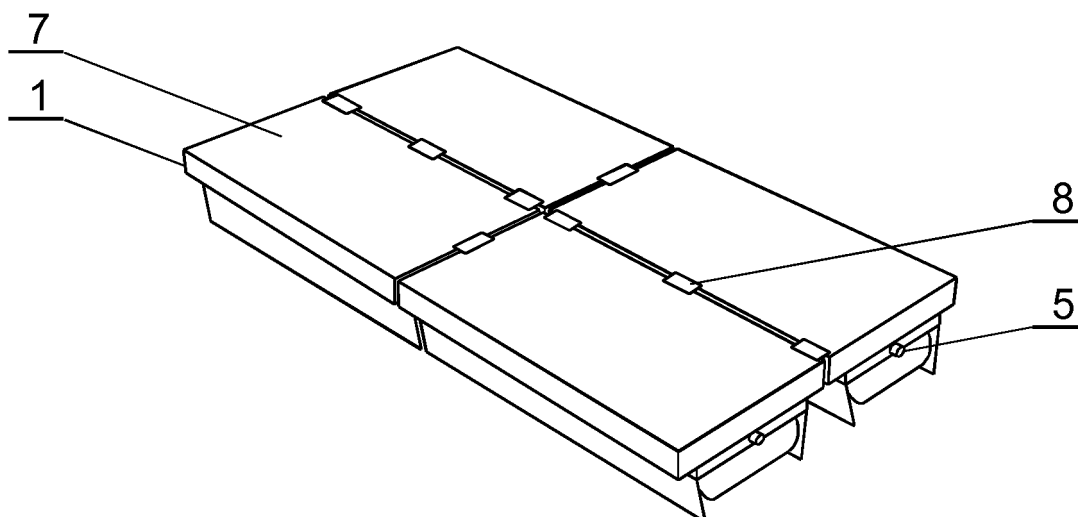
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(54) **A sectional pontoon bridge**

(57) The invention relates to a cassette for a pontoon bridge, the cassette (1) comprising a main compartment (9), a pontoon (2) having an elastic cushion installed in the main compartment (9), a split bottom (3) of the main compartment (9) with movable lids configured to open

under pressure of the extending pontoon (2) when the pontoon (2) is inflated such as to allow extension of the pontoon (2) outside the main compartment (9). The invention also relates to a pontoon bridge formed of a plurality of the cassettes (1).



**Fig. 1**

## Description

**[0001]** The invention relates to pontoon bridges.

**[0002]** The currently known and used buoyant systems comprise individual buoyant segments, which are objects made of metal or plastics, having different dimensions and a closed form. The ready-to-use buoyant segments must have factory-provided leak tightness to provide appropriate displacement. Their disadvantages include high transport volume and requirement for abundant transport means, accompanying equipment (e.g. cranes) and service personnel. Large and heavy pontoons forming military buoyant systems of this type are known from the Polish patent PL158579 and the Polish patent application PL297453.

**[0003]** In particular, the steel segments known from the Polish patent PL158579, due to their high dead weight and large dimensions, allow one truck to transport only two segments. Loading and unloading of these pontoons, as well as their service and assembly on water need numerous, highly qualified crew and specialized equipment. All of that limits the scope of applications of such heavy constructions. The lack of mobility makes them unusable especially in hard cross-country conditions, which limits operational capabilities. Exploitation of such constructions is very expensive. Steel pontoons require providing appropriate conditions of storage (in particular, large space) and anti-corrosion protection. They also require maintenance of additional sites with specially adapted vehicles for transport of individual segments and additional equipment necessary for assembly, disassembly and maintenance in operating condition. The complicated exploitation procedures of heavy metal pontoons having closed form require also maintaining numerous crew and appropriate training of service personnel. The mobility of such objects is very limited due to their constructional features. Use of such constructions involves complicated connecting mechanisms. The above features result in high exploitation costs of such constructions.

**[0004]** The object of the invention is a cassette for a pontoon bridge, the cassette comprising a main compartment, a pontoon having an elastic cushion installed in the main compartment, a split bottom of the main compartment with movable lids configured to open under pressure of the extending pontoon when the pontoon is inflated such as to allow extension of the pontoon outside the main compartment.

**[0005]** The movable lids of the split bottom can be further configured to close and fold the pontoon into the main compartment when the pontoon is deflated.

**[0006]** Each of the movable lids of the split bottom can be connected with the main compartment by hinges with a spring mechanism configured to bias the movable lids to closed position.

**[0007]** The split bottom can be a two-lid bottom comprising two movable lids installed opposite each other.

**[0008]** The cassette may further comprise an elastic

net attached to the movable lids of the split bottom and configured to keep the bottom part of the pontoon substantially above the bottom edges of the movable lids of the split bottom.

**[0009]** The elastic net can be further configured to limit the maximum opening of the movable lids of the split bottom.

**[0010]** The main compartment can be made of lightweight plastics.

**[0011]** The main compartment can be joined with a roadway surface for moving vehicles.

**[0012]** The cassette may further comprise connectors for connecting the cassette with other cassettes.

**[0013]** The pontoon can be inflatable with an inflating system having pressure connectors for connecting the inflating system with inflating systems of other cassettes.

**[0014]** The movable lids of the split bottom can be made of reinforced material to provide ballistic cover for the pontoon.

**[0015]** The cushion of the pontoon can be made of puncture-resistant, reinforced elastic or semi-elastic material.

**[0016]** Another object of the present invention is a pontoon bridge formed of a plurality of the cassettes according to the invention.

**[0017]** A plurality of cassettes can be connected with connectors limiting the range of movement between the cassettes.

**[0018]** A plurality of cassettes may have an inflating system for inflating the pontoons and wherein the inflating systems of the cassettes are connected together with pressure connectors.

**[0019]** The present invention is shown by way of exemplary embodiment on a drawing, in which:

Fig. 1 shows a cassette pontoon bridge comprising individual cassettes.

Fig. 2 shows the cassette in a transport position.

Fig. 3 shows the cassette in a working position.

Fig. 4 shows the cassette in an intermediate position.

**[0020]** The cassette pontoon bridge according to the invention has a modular structure and is composed of individual cassettes 1, as shown in Fig. 1. A plurality of cassettes 1 can be immediately assembled and used to build the cassette pontoon bridge.

**[0021]** The main element of construction of a single cassette 1 of the cassette pontoon bridge is a main compartment 9 of the cassette 1 made of lightweight plastics, such as polyurethane, polyethylene. A pontoon 2, having a high strength elastic cushion, is installed in the compartment 9 of the cassette 1. In a transport position, the cushion of the pontoon 2 is packed up inside the main compartment 9, which is closed by a split bottom 3. The split bottom 3 comprises a movable left and a movable right lid, installed on lid hinges together with a spring mechanism 4. The lids are closed by means of the spring mechanism 4. An elastic net 6 is attached to both lids of

the cassette 1, which stabilizes the pontoon 2 in the open position and facilitates its proper folding and sets its placement for the transport position. The net 6 also closes the split bottom 3. The cushion of the pontoon 2 is inflated with compressed air by an inflating system, the elements of which are joined between individual cassettes 1 by quick-release pressure connectors 5. The top portion of the cassette 1 is joined with a roadway surface 7 for moving vehicles. The cassettes 1 are interconnected by means of intersegmental connectors 8, which provide adequately strong connections between individual cassettes 1 of the cassette pontoon bridge and limit the range of movement between the cassettes 1.

**[0022]** A single cassette 1 is characterized by a construction allowing easy and quick folding to a transport position, as shown in Fig. 2. In the transport position, the cushion of the pontoon 2 is packed up into the main chamber of the cassette 1, which is closed by the split bottom 3. Therefore, the volume of the cassette 1 can be decreased, which provides saving of the transport space and increases the mobility of the cassette pontoon bridge.

**[0023]** The cassette 1 has a variable displacement. The element providing the variable displacement during use is a high-strength, in particular resistant to punctures, elastic or semi-elastic cushion of the pontoon 2, for example made of polyurethane. The cushion can be filled with compressed air and when filled, it provides adequate buoyant force. The level of filling defines the displacement of the cassette 1, which is equal to the difference between the buoyant force and the dead weight of the cassette 1. Therefore, the displacement of the cassette pontoon bridge, as well as its draught, can be varied by varying the level of filling of individual cassettes 1.

**[0024]** The lids of the split bottom 3 are opened by means of change of pressure inside the cushion of the pontoon 2, during operation of the filling system, and can be easily closed by means of the spring mechanism 4 aided by the net 6 extended within the compartment 9 of the cassette 1, which also folds the cushion of the pontoon 2 into the cassette 1. The pontoon 2, during the operation of filling, opens by means of its pressure both lids of the split bottom 3 aside and stretches the net 6 attached to the lids, as shown in Fig. 4. The opened lids in the working position, as shown in Fig. 3, are used as ballistic cover of the cassette pontoon bridge for military applications. To provide adequate ballistic cover, the lids of the split bottom 3 are made of reinforced material. When air is released, the pontoon 2 is folded by the elastic net 6, which pulls it inside the cassette 1. The open lids of the split bottom 3 protect the cushion of the pontoon 2 at its sides from damage.

**[0025]** An important element of the cassette 1 of the cassette pontoon bridge is the elastic net 6 extending between the lids of the split bottom 3. Both lids of the split bottom 3, when ajar, are opened by the pontoon 2 during use of the filling system. The net 6 keeps the lids of the split bottom 3 in a proper position and limits the lids from

extensive opening. Therefore, the elastic net 6 is configured to limit the maximum opening of the movable lids of the split bottom 3. As seen in the figures, the elastic net 6 is configured to keep the bottom part of the pontoon substantially above the bottom edges of the movable lids of the split bottom 3.

**[0026]** Therefore, the cassette pontoon bridge according to the invention is to be understood as an object formed by any assembly of individual cassettes having configurations and dimensions equal to the multiple of dimensions of the individual cassettes shown in the drawings. The cassette pontoon bridge may be used to form floating bridges, floating footbridges, floating platforms, floating wharfs, floating jetties, ferries or rafts.

**[0027]** The cassette pontoon bridge can be used to form stationary and temporary objects. It can be used in many public, commercial, tourist, recreational or amusement applications. However, it is particularly useful for military applications, as well as during natural or building disasters. In particular, the possibility of positioning of the cassette pontoon bridge below the water surface (the crossing camouflage) is particularly useful for military applications.

**[0028]** The objects formed of individual cassettes of the cassette pontoon bridge may also function as temporary crossing, in place of stationary crossing objects which have been damaged or broken. The cassette pontoon bridge may be also used as a substitute crossing during repairs and conservation of stationary crossing objects and other elements of water infrastructure. The crossing may be two-way.

**[0029]** The possibility of arbitrary forming of the dimensions and configuration of the cassette pontoon bridge is achieved by full repeatability and variable displacement of individual cassettes. The cassettes can be re-used for many assembly and disassembly operations. The leak-tightness and displacement can be guaranteed for various exploitation conditions. The cassettes are highly susceptible to damages and destruction, due to reinforced cushion of the pontoon and covers formed by the lids of the split bottom. All of the above increases the possible applications of the cassette pontoon bridge. The displacement of the cassette pontoon bridge may be regulated, as it depends on the level of filling of the pontoons with compressed air.

**[0030]** The constructional features of the cassettes provide easy transport of a higher number of cassettes in small cargo space, quick assembly of long runs of the cassette pontoon bridge and compact construction due to foldable pontoon. This allows easy storage and transport of the elements of the system. Due to simple construction and small number of elements, the assembly of fully functional floating objects can be achieved by sparse crew without special training.

**Claims**

1. A cassette for a pontoon bridge, the cassette (1) comprising:

- a main compartment (9),
- a pontoon (2) having an elastic cushion installed in the main compartment (9),
- a split bottom (3) of the main compartment (9) with movable lids configured to open under pressure of the extending pontoon (2) when the pontoon (2) is inflated such as to allow extension of the pontoon (2) outside the main compartment (9).

2. The cassette according to claim 1, wherein the movable lids of the split bottom (3) are further configured to close and fold the pontoon (2) into the main compartment (9) when the pontoon (2) is deflated.

3. The cassette according to any of claims 1-2, wherein each of the movable lids of the split bottom (3) is connected with the main compartment (9) by hinges with a spring mechanism (4) configured to bias the movable lids to closed position.

4. The cassette according to any of previous claims, wherein the split bottom (3) is a two-lid bottom comprising two movable lids installed opposite each other.

5. The cassette according to any of previous claims, further comprising an elastic net (6) attached to the movable lids of the split bottom (3) and configured to keep the bottom part of the pontoon substantially above the bottom edges of the movable lids of the split bottom (3).

6. The cassette according to any of previous claims, wherein the elastic net (6) is further configured to limit the maximum opening of the movable lids of the split bottom (3).

7. The cassette according to any of previous claims, wherein the main compartment (9) is made of lightweight plastics.

8. The cassette according to any of previous claims, wherein the main compartment (9) is joined with a roadway surface (7) for moving vehicles.

9. The cassette according to any of previous claims, further comprising connectors (8) for connecting the cassette (1) with other cassettes (1).

10. The cassette according to any of previous claims, wherein the pontoon (2) is inflatable with an inflating system having pressure connectors (5) for connect-

ing the inflating system with inflating systems of other cassettes (1).

11. The cassette according to any of previous claims, wherein the movable lids of the split bottom (3) are made of reinforced material to provide ballistic cover for the pontoon (2).

12. The cassette according to any of previous claims, wherein the cushion of the pontoon (2) is made of puncture-resistant, reinforced elastic or semi-elastic material.

13. A pontoon bridge formed of a plurality of the cassettes (1) according to any of claims 1-11.

14. The pontoon bridge according to claim 13, wherein a plurality of cassettes (1) are connected with connectors (8) limiting the range of movement between the cassettes (1).

15. The pontoon bridge according to claim 13 or 14, wherein a plurality of cassettes have an inflating system for inflating the pontoons (2) and wherein the inflating systems of the cassettes (1) are connected together with pressure connectors (5).

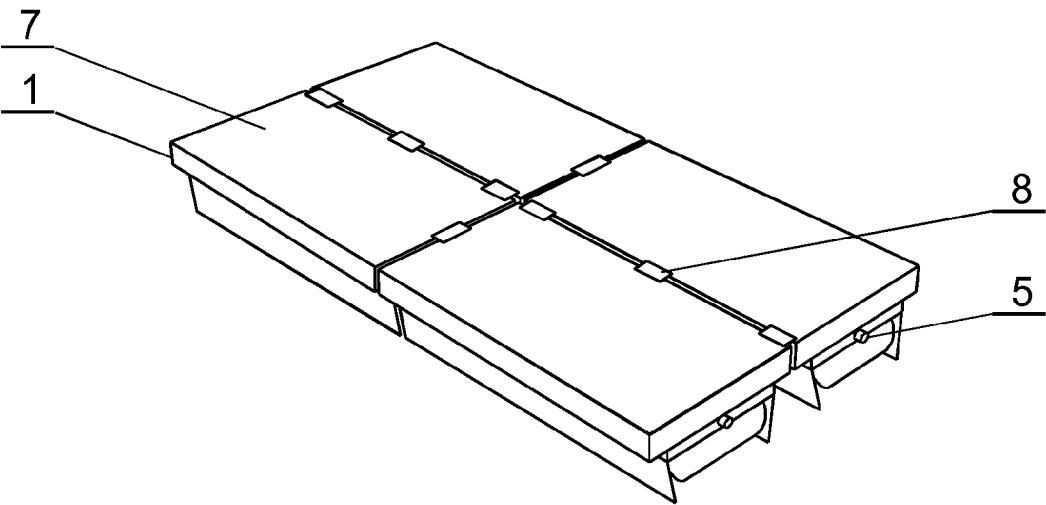


Fig. 1

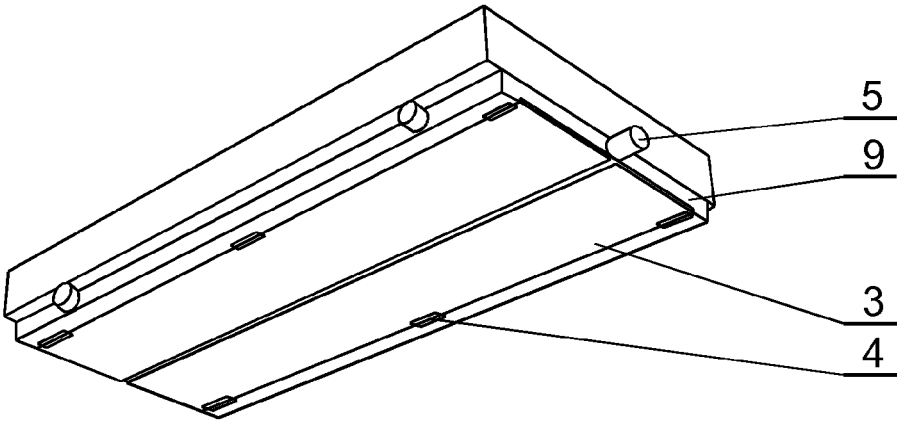
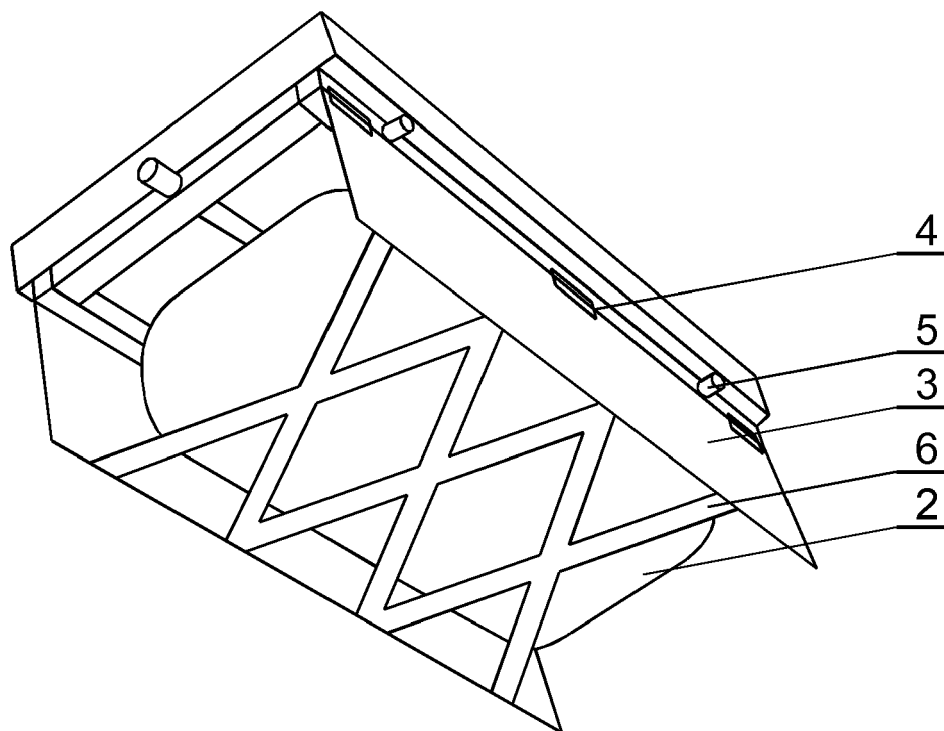
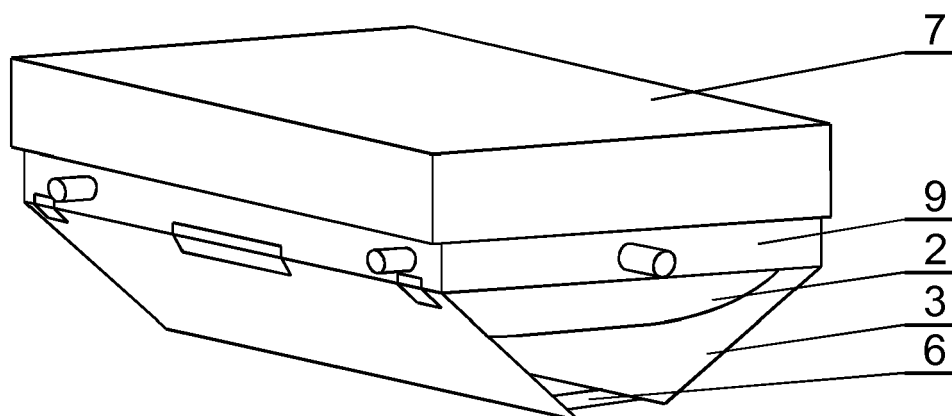


Fig. 2



**Fig. 3**



**Fig. 4**