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(54) **Pool or water tank, such as a swimming pool, provided with means for generating waves**

Becken oder Wassertank, wie z.B. ein Schwimmbad, mit Mitteln zum Erzeugen von Wellen

Bassin ou réservoir d'eau, tel qu'une piscine, avec des moyens générateurs de vagues

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Description

The invention relates to a wave installation for generating waves in a pool or water tank, comprising a conduit connected, at least at both ends, via a hole in the wall of pool or tank to the pool or tank, piston means essentially closing off the cross-section of the conduit, and a power source in order to move the piston means backwards and forwards.

Such a wave installation is disclosed in DE-A-2811623.

Various methods are known for generating waves in swimming pools or water tanks for fish or mammals. One of said methods comprises supplying compressed air in turn to chambers which are closed at the top and at the bottom protrude into the water in the pool or tank. If the compressed air is introduced into the various chambers at the natural frequency of the pool, this method requires relatively little energy, but the major drawback is that the tank or swimming pool has to have an adapted, relatively expensive design.

In the case of a second known method, a ball which has a weight which is movable up and down therein floats in the middle of the tank. A ball of this type takes up a relatively large amount of space and must be able to be suspended from the ceiling by a hoist construction. Moreover, a long electric cable to the ball is needed underwater, the length of said cable being subject to regulations. Further the ball is a heavy weight and may hurt people during movement.

Furthermore, it is known to move part of the floor of a swimming pool. This involves an expensive structural facility which is usually unsuitable for existing pools or tanks.

DE-A-2811623 describes a swimming pool wherein a niche filled with water joins one of the sides of the swimming pool is in open communication with the swimming pool and is divided into three chambers by means of two partitions. The two partitions are each connected by means of a rod to a piston which is movable in a hydraulic cylinder. Waves can be generated in the swimming pool by moving the two partitions by means of the pistons. This construction requires expensive structural facilities and is not suitable for adding to an existing swimming pool as a recreation element in a simple manner.

The aim of the invention is to overcome the drawbacks of known wave installations and to provide a wave installation indicated in the preamble, for which the means for generating waves are simple and relatively inexpensive and can be installed in existing pools or tanks without special structural facilities (apart from possibly raising the height of the walls of the pool or tank). Moreover, the wave facilities must not give rise to obstacles for swimmers and there must be no cables or leads present in the pool or tank.

According to the invention the wave installation is characterized in that said conduit consists of one single

pipe not belonging to the building structure of the pool or tank, and that said pipe is divided by one single piston into two flow chambers.

Preferably the length of the pipe corresponds to at most half of the resonance wave length of the water in the pool or tank.

In practice, each pipe will be provided on the other side of a central section, in which said piston is movable, with two or more channels connected to a hole in the wall of the swimming pool.

The cross-sectional area of the channels will have to be greatest at locations where the amplitude of the wave is greatest, and visa versa. Therefore, the cross-sectional area of the channels will be greatest at the ends of the pipe and that of the channels at the side of the means will be smallest and the cross-sectional area of the channels will decrease from the largest channel to the smallest channel.

If various pipes are used, the power sources will operate in phase with one another and adjacent pipes will have opposing directions of flow.

The invention will now be explained in more detail with reference to the figures.

Figure 1 shows a top view of part of the pool or water tank;

Figure 2 shows a side view of the pool or water tank according to Fig. 1; and

Figure 3 shows a cross-section of a possible connection of an orifice of a pipe opening into an opening in the side wall of the pool or tank.

The walls of the wave pool or tank shown are indicated by 1. Two wave installations, each consisting of a pipe 2 having a central section 3 and two connecting sections 4 fitted on either side thereof, are installed on one side wall. A piston or disc 5, which essentially closes off the cross-sectional surface area and can be moved backwards and forwards by means of a piston rod of a pneumatic cylinder 6, is fitted inside the central section. The connecting sections 4 each have three inlet and outlet channels 7a, 7b, 7c, which are connected by flange connections to openings 8a, 8b, 8c in the side wall of the pool or tank.

Figure 3 shows the flange connection between a channel 7a and the side wall of the pool or tank. A pipe 9 is fixed by means of resin in the opening 8a to provide a seal. Said pipe has a flange 10, which is fixed by means of bolts 11 to a flange 12 of the channel 7a.

The length of a pipe 2 corresponds to at most half the resonance wavelength of the pool or tank. The two pipes shown generate waves which have twice a half resonance wavelength. The one pipe operates in the same phase but in the reverse direction of flow to the preceding pipe. The shape of the waves is shown by a broken line in Figure 2.

The channels 7a and the openings 8a at the ends of a pipe 2 have a larger cross-section than the channels

7b and openings 8b, which, in turn, have a larger cross-section than the channels 7c and openings 8c. Consequently, the size of the cross-section follows the size of the wave amplitude.

Of course, the first impulse will take a great deal of power, but as the wavelength of the generated wave follows the resonance wavelength of the pool or water tank, it becomes increasingly easier.

The installation according to the invention has considerable advantages. It is easy to install. No structural facilities are needed for wave generation. It may be necessary to raise the height of the sides of the pool or tank, or the water level could be lowered. The apparatus can be fixed to the outside of existing pools or tanks by simply drilling a few holes in the wall of the pool or tank. The apparatus does not constitute any obstacles for the swimmer and there are no cables or leads through the area. It is very suitable for use in tanks containing mammals or fish and produces no noise.

Claims

1. Wave installation for generating waves in a pool or water tank, comprising a conduit (2) connected, at least at both ends, via a hole (8) in the wall of pool or tank to the pool or tank, piston means (5) essentially closing off the cross-section of the conduit, and a power source (6) in order to move the piston means backwards and forwards, characterized in, that said conduit consists of one single pipe not belonging to the building structure of the pool or tank, and that said pipe is divided by one single piston into two flow chambers.
2. Wave installation according to claim 1, characterized in that the length of the pipe (2) corresponds to at most half of the resonance wave length of the water in the pool or tank.
3. Wave installation according to claim 1 or 2, characterized in that the pipe (2) is provided on the other side of the central section (3), in which said piston (5) is movable, with two or more channels (7a, 7b, 7c) connected to a hole (8a, 8b, 8c) in the wall of the swimming pool.
4. Wave installation according to claim 3, characterized in that the cross-sectional area of the channels (7a) at the end of the pipe is the greatest and that of the channel (7c) at the side of the central section (3) is the smallest and any channels (7b) decrease in cross-sectional area from the largest channel to the smallest channel.
5. Pool or tank comprising one of more wave installations according to one of the preceding claims.

6. Pool or water tank according to claim 5, characterized in that if various pipes (2) are used, the power sources (5) operate in phase with one another but in opposing directions of flow.

Patentansprüche

1. Welleneinrichtung zum Erzeugen von Wellen in einem Pool oder Wassertank, umfassend eine Leitung (2), die zumindest an beiden Enden über ein Loch (8) in der Wand eines Pools oder Tanks mit dem Pool oder Tank verbunden ist, eine Kolbeneinrichtung (5), die im wesentlichen den Querschnitt der Leitung abschließt, und eine Energiequelle (6), um die Kolbeneinrichtung nach hinten und nach vorne zu bewegen, dadurch **gekennzeichnet**, daß die Leitung aus einer einzelnen Röhre besteht, die nicht zu dem Aufbau des Pools oder Tanks gehört, und daß die Röhre durch einen einzelnen Kolben in zwei Strömungskanäle unterteilt ist.
2. Welleneinrichtung gemäß Anspruch 1, dadurch gekennzeichnet, daß die Länge der Röhre (2) höchstens der Hälfte der Resonanzwellenlänge des Wassers in dem Pool oder Tank entspricht.
3. Welleneinrichtung gemäß Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Röhre (2) auf der anderen Seite des mittleren Abschnittes (3) vorgesehen ist, in dem der Kolben bewegbar ist, mit zwei oder mehreren Kanälen (7a, 7b, 7c), die mit einem Loch (8a, 8b, 8c) in der Wand des Swimmingpools verbunden sind.
4. Welleneinrichtung gemäß Anspruch 3, dadurch gekennzeichnet, daß der Querschnittsbereich der Kanäle (7a) am Ende der Röhre am größten ist und daß der Kanal (7c) an der Seite des mittleren Abschnittes (3) am kleinsten ist und jegliche Kanäle (7b) bezüglich der Querschnittsfläche vom größten Kanal zum kleinsten Kanal abnehmen.
5. Pool oder Tank, umfassend eine oder mehrere Welleneinrichtungen gemäß einem der vorhergehenden Ansprüche.
6. Pool oder Tank gemäß Anspruch 5, dadurch gekennzeichnet, daß, wenn verschiedene Röhren (2) verwendet werden, die Leistungsquellen (5) miteinander in Phase arbeiten, jedoch in entgegengesetzten Strömungsrichtungen.

Revendications

1. Installation génératrice de vagues servant à géné-

rer des vagues dans un bassin ou réservoir d'eau, comprenant un conduit (2) raccordé, au moins au niveau des deux extrémités, au bassin ou au réservoir par un trou (8) dans la paroi du bassin ou du réservoir, un moyen formant piston (5) obturant sensiblement la section transversale du conduit, et une source (6) d'énergie pour faire reculer et avancer le moyen formant piston, caractérisée en ce que ledit conduit est constitué par un seul tuyau n'appartenant pas à la structure de construction du bassin ou réservoir, et en ce que ledit tuyau est divisé en deux chambres d'écoulement par un seul piston.

2. Installation génératrice de vagues selon la revendication 1, caractérisée en ce que la longueur du tuyau (2) correspond tout au plus à la moitié de la longueur d'onde de résonance de l'eau dans le bassin ou réservoir. 15
3. Installation génératrice de vagues selon la revendication 1 ou 2, caractérisée en ce que le tuyau (2) comporte, de l'autre côté de la partie centrale (3), dans laquelle ledit piston (5) peut se déplacer, deux canaux (7a, 7b, 7c) ou plus reliés à un trou (8a, 8b, 8c) dans la paroi de la piscine. 20 25
4. Installation génératrice de vagues selon la revendication 3, caractérisée en ce que la section transversale des canaux (7a) à l'extrémité du tuyau est la plus grande et celle du canal (7c) sur le côté de la partie centrale (3) est la plus petite, et la section transversale de l'un quelconque des canaux (7b) diminue entre le canal le plus grand et le canal le plus petit. 30 35
5. Bassin ou réservoir comportant une ou plusieurs installations génératrices de vagues selon l'une des revendications précédentes.
6. Bassin ou réservoir d'eau selon la revendication 5, caractérisé en ce que, si on utilise divers tuyaux (2), les sources (5) d'énergie fonctionnent en phase les unes avec les autres mais dans des directions d'écoulement opposées. 40 45

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fig -1

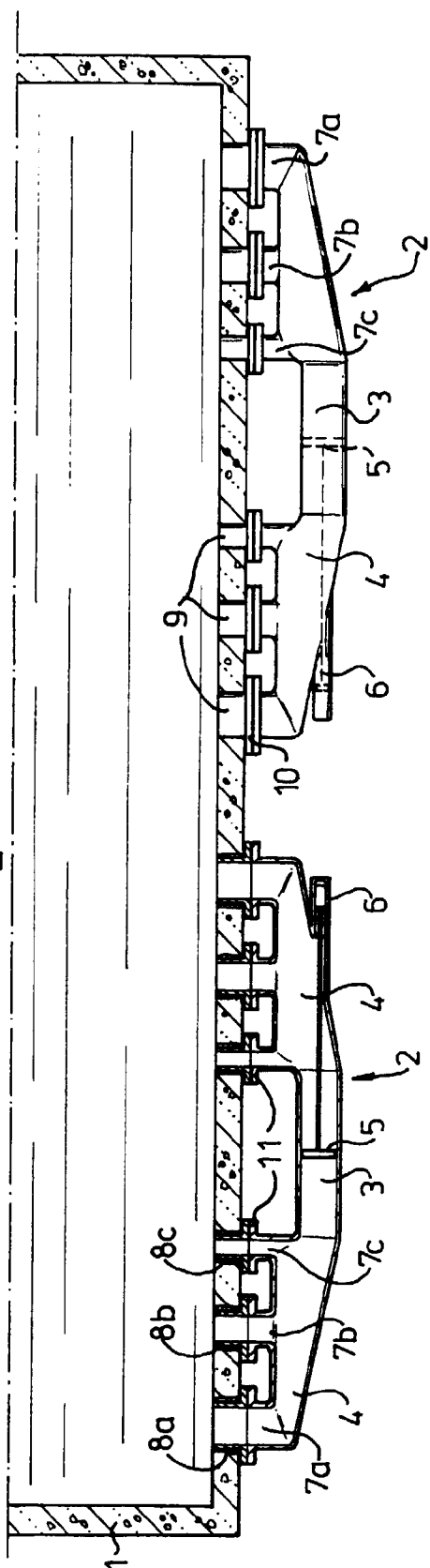


fig -2

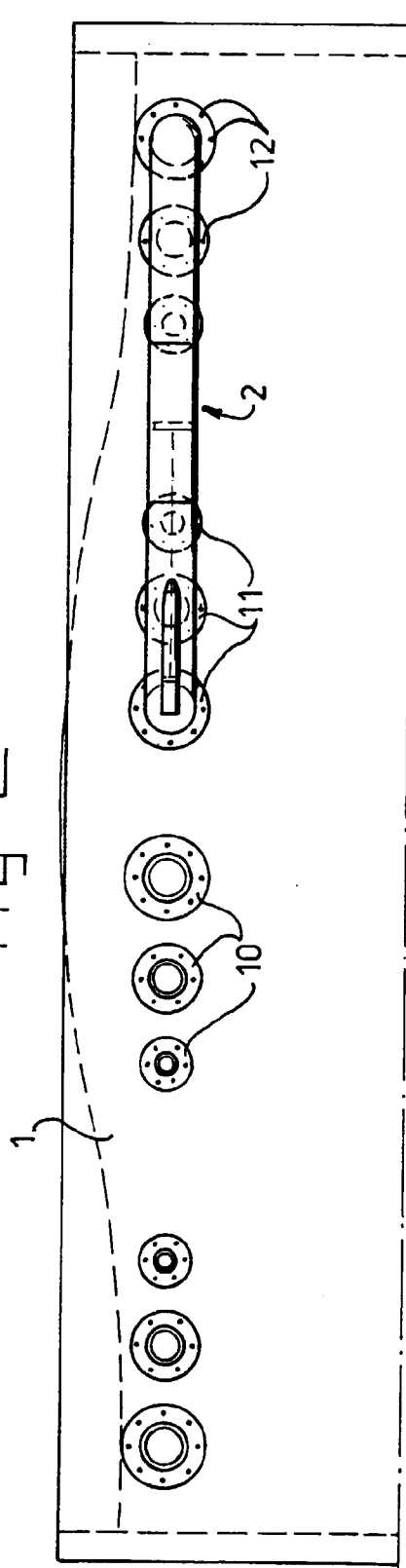


fig - 3

