

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 732 468 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

18.09.1996 Bulletin 1996/38

(51) Int. Cl.⁶: E04H 4/00

(21) Application number: 95200534.6

(22) Date of filing: 03.03.1995

(84) Designated Contracting States:

AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL
PT SE

(71) Applicant: Bastenhof, Dirk

NL-3905 RB Veenendaal (NL)

(72) Inventor: Bastenhof, Dirk

NL-3905 RB Veenendaal (NL)

(74) Representative: de Bruijn, Leendert C. et al

Nederlandsch Octrooibureau

P.O. Box 29720

2502 LS Den Haag (NL)

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

(57) A pool or water tank is provided with means for generating waves. Said means comprise one or more pipes (2), each of which is connected, at least at both ends, via a hole (8) in the wall (1) of the pool or tank, to the pool or tank, wherein a piston or disc (5) which

essentially closes off the cross-section of the pipe (2) is fitted in one section of each of the pipes (2) and a power source (6) is present in order to move the piston or disc (5) backwards and forwards.

fig-1

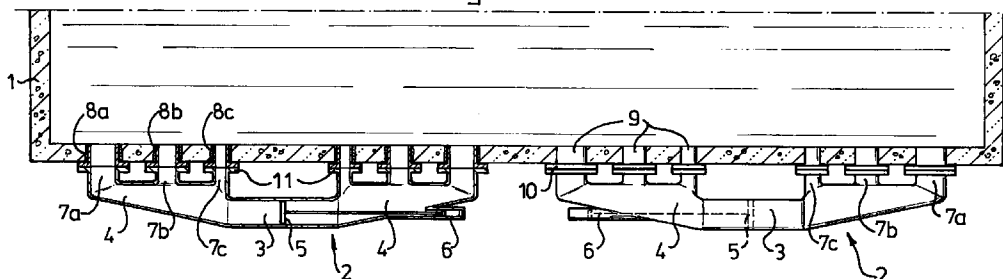
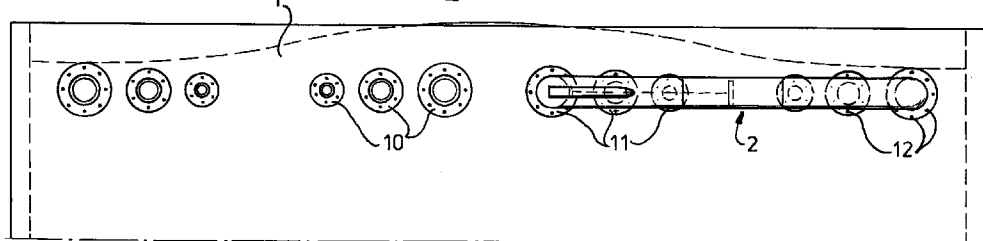


fig-2



EP 0 732 468 A1

Description

The invention relates to a pool or water tank provided with means for generating waves.

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.

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.

The aim of the invention is to overcome the drawbacks of known pools or water tanks which have wave mechanisms and to provide a pool or water tank, 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 pool or water tank provided with means for generating waves is characterised in that said means comprise one or more pipes, each of which is connected, at least at both ends, via a hole in the wall of the pool or tank, to the pool or tank, wherein a piston or disc which essentially closes off the cross-section of the pipe is fitted in one section of each of the pipes and a power source is present in order to move the piston or disc backwards and forwards.

DE-A-2811623 describes a swimming pool wherein a niche filled with water adjoins 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 recreational element in a simple manner.

Preferably, the length of the pipes corresponds to at most half of a resonance wavelength of the water in the pool or tank.

In practice, each pipe will be provided on either side of the central section, in which said piston or disc 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 vice versa. Therefore, the cross-sectional area of the channels will be greatest at the ends of a pipe and that of the channels at the side of said 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 but in opposing directions of flow.

The invention also relates to a wave installation to be used in the abovementioned pool or water tank.

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. Conse-

quently, 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. 5

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. 10 15

Claims

1. Pool or water tank provided with means for generating waves, characterised in that said means comprise one or more pipes (2), each of which is connected, at least at both ends, via a hole (8) in the wall of the pool or tank, to the pool or tank, wherein a piston or disc (5) which essentially closes off the cross-section of the pipe is fitted in one section of each of the pipes and a power source (6) is present in order to move the piston or disc backwards and forwards. 20 25 30
2. Pool or water tank according to Claim 1, characterised in that the length of the pipes (2) corresponds to at most half of a resonance wavelength of the water in the pool or tank. 35
3. Pool or water tank according to Claim 1 or 2, characterised in that each pipe (2) is provided on either side of the central section (3), in which said piston or disc (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. 40
4. Pool or water tank according to Claim 3, characterised in that the cross-sectional area of the channels (7a) at the end of a pipe is the greatest and that of the channels (7c) at the side of said central section (3) is the smallest and any channels (7b) decrease in cross-sectional area from the largest channel to the smallest channel. 45 50
5. Pool or water tank according to one of the preceding claims, characterised in that if various pipes (2) are used, the power sources (6) operate in phase with one another but in opposing directions of flow. 55
6. Wave installation intended for the pool or water tank according to one of the preceding claims, characterised by a pipe (2) to be connected at both ends

to a hole in the wall of a pool or water tank, which pipe has, in one section, a piston or disc (5) which essentially closes off the cross-section of the pipe, and a power source (6) in order to move the piston or disc backwards and forwards.

7. Wave installation according to Claim 6, characterised in that the pipe (2) is provided, on either side of a central section (3), in which the said piston or disc (5) is movable, with two or more channels (7a, 7b, 7c) to be connected to a hole (8a, 8b, 8c) in the wall of the pool or water tank.
8. Wave installation according to Claim 7, characterised in that the cross-sectional area of the channels (7a) at the ends of the pipe (2) is the greatest and that of the channels (7c) at the sides of said central section (3) is the smallest and any channels (7b) decrease in cross-sectional area from the largest channel to the smallest channel.

fig-1

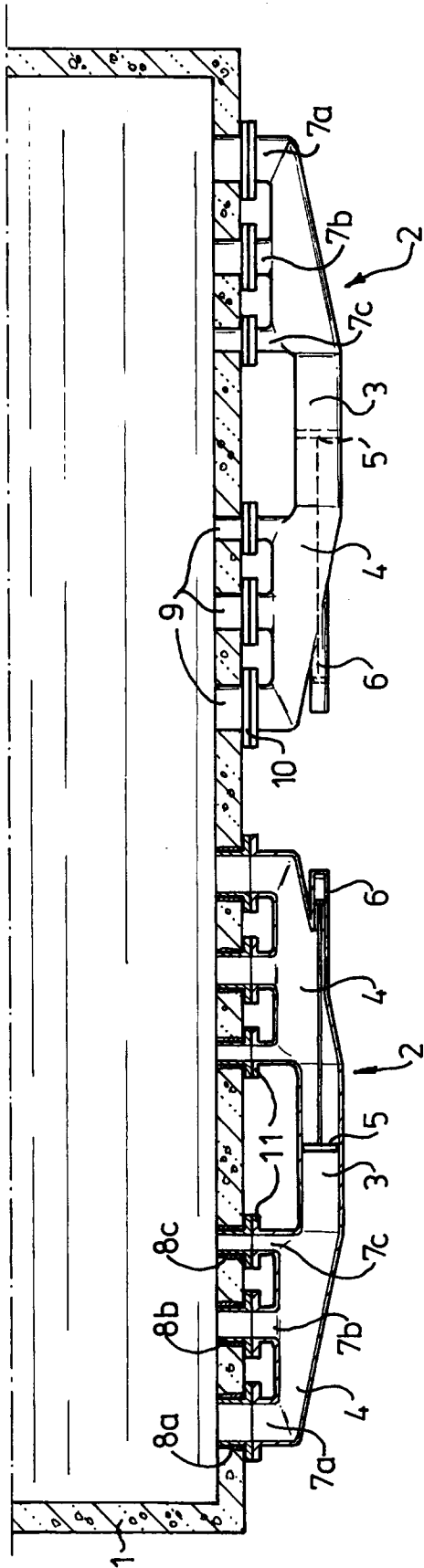


fig-2

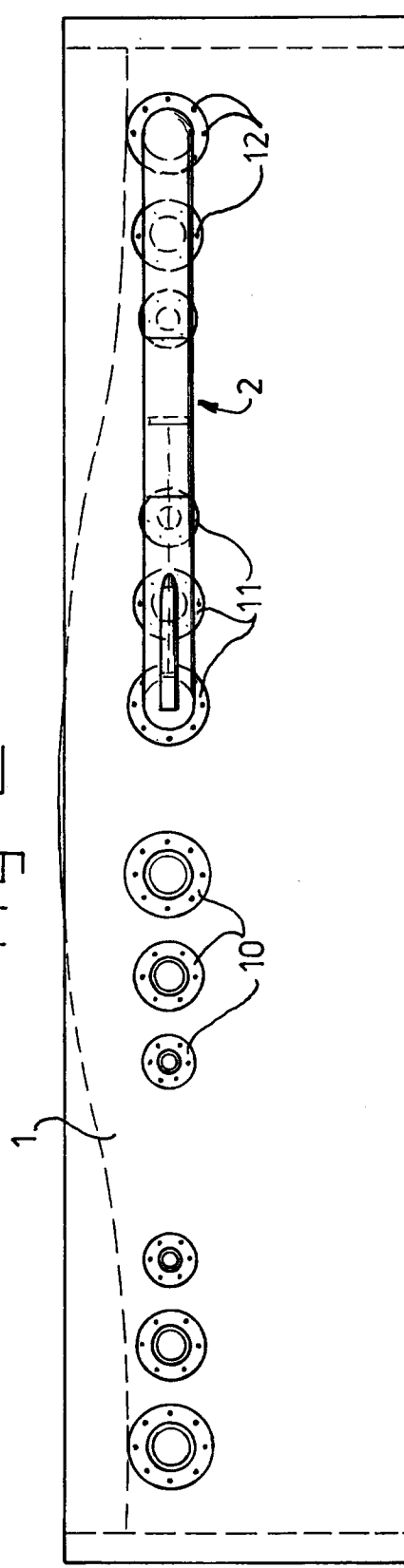
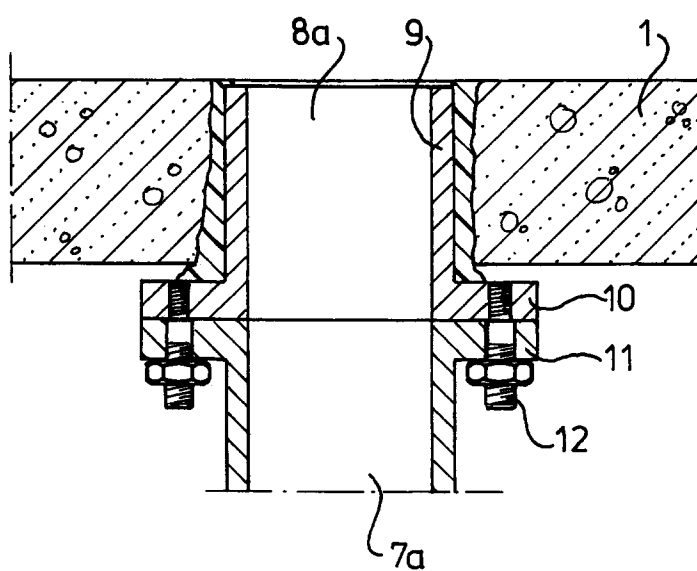


fig - 3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 20 0534

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,X	DE-A-28 11 623 (H. J. BÖHM) * page 2, line 27 - page 3, line 28; figures 3-5 *	1,5,6	E04H4/00
A	US-A-3 350 724 (W. J. LEIGH) * the whole document *	1,6	
A	FR-A-438 113 (H. RECKNAGEL) * the whole document *	1,6	
A	BE-A-1 002 884 (SERVILOG S.A.) * page 1, line 1 - page 2, line 9 *	2	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E04H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 6 July 1995	Examiner Delzor, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.92 (P04C01)