Apparatus for generating a surface wave in a rink used for activities such as roller skating and skate boarding. The apparatus comprises a flexible deck (13) resting on the ground (11) or other support surface. The flexible deck (13) is constructed with a lateral deformation (17) which provides a permanent wave formation in the deck. A carriage is located within the lateral deformation and can travel along the ground to move the wave formation relative to the flexible deck.
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1. GENERATING A SURFACE WAVE IN A RINK FOR ROLLER SKATING, SKATE-BOARD RIDING AND THE LIKE.

FIELD OF THE INVENTION

THIS INVENTION relates to an apparatus for generating a surface wave.

The invention has been devised particularly, although not solely, for generating a surface wave in a rink or other area used for sports, games or recreational activities particularly related to roller skating and skate boarding.

BACKGROUND OF THE INVENTION

There have been several proposals for rinks for activities such as roller skating and skateboarding in which a travelling wave is generated in the rink to assist in propelling users around the rink. One such proposal is disclosed in International Application No. PCT/EP81/00118 which is concerned with a rink which comprises a flexible deck which rests on the ground or other surface and a carriage provided under deck for movement relative to the deck. The presence of the carriage under the deck deforms the deck so as to provide a wave formation which travels along the deck as the carriage circulates underneath. Somewhat similar proposals are disclosed in International Application No. PCT/EP83/00288 and French Patent No. 1,2253,73.

These proposals do, however, suffer from a disadvantage that it is the presence the carriage underneath that actually deforms the flexible deck to create the wave formation in the deck. The carriage is therefore required to lift the deck at the leading edge of the travelling wave formation as it circulates underneath the deck. Additionally, the deck is under load in the sense that it carries the weight of the deformed portion of the deck and the weight of users riding on the wave formation at any
2.

particular time. The need for the carriage to lift the
deck at the leading edge of the travelling wave formation
and to carry a load, makes it particularly difficult to
propel the carriage along its path underneath the deck.

SUMMARY OF THE INVENTION

The present invention seeks to provide an apparatus for
generating a surface wave which does not suffer from the
disadvantage discussed above in relation to the prior
proposals.

In one form the invention resides in apparatus for
generating a surface wave comprising a support surface, a
flexible deck resting on the support surface, the flexible
deck being constructed with a lateral deformation which
provides a permanent wave formation in the deck, and means
for moving the wave formation relative to the flexible
deck.

Preferably, the lateral deformation in the flexible deck
is created by the presence of surplus material in the
deck. Conveniently, the deck is generally circular and
the lateral deformation is created by introducing an
additional sector of material into the circular deck.

Where the flexible deck is circular, the wave formation
would progressively increase in amplitude in a radially
outward direction from the centre of the deck.

Preferably, the wave is arranged to move in a circuit
around the flexible deck.

Preferably, the support surface comprises a floor area or
ground surface.
Preferably, said means for moving the wave along the flexible deck comprises a carriage located between the support surface and the lateral deformation in the flexible deck. Movement of the carriage along the support surface causes movement of the wave formation along the flexible deck. While the carriage may cause the lateral deformation to assume a shape which provides a smooth wave formation, it does not in itself create the lateral deformation. The lateral deformation exists in the flexible deck irrespective of the presence of the carriage; the primary purpose of the carriage is to cause the wave formation to move relative to the flexible deck.

It is particularly convenient for the flexible deck to be of a generally circular configuration. With such an arrangement, the carriage is preferably in the form of a boom disposed radially with respect to the flexible deck. The boom may be supported on wheels which travel along the support surface, with at least one of the wheels being driven. The boom preferably includes rollers which make rolling contact with the underside of the flexible deck. The boom preferably extends upwardly in a radially outward direction to provide the varying amplitude of the wave formation.

Preferably, the peripheral edge of the flexible deck is located closely adjacent the support surface when it is not elevated owing to the presence of the wave formation. In this way, a rider of a skateboard or roller skates can conveniently travel between the support surface and the upper face of the flexible deck. Indeed, the peripheral edge of the support surface may be bevelled or otherwise shaped to define a ramp to provide a smooth transition between the support surface and the upper face of the deck.
For safety purposes, the peripheral edge of the flexible deck is preferably constructed to provide cushioning upon impact. This serves to lessen the likelihood of damage or injury in the event of a rider crashing into the edge of the flexible deck when it is elevated owing to the presence of the wave formation. For further safety, a skirt or other protective device is preferably provided at the outer edge of the carriage.

While the flexible deck may be of any suitable form, it is particularly convenient to construct the deck from sectors. In one arrangement, the sectors may be sheet metal interconnected for limited pivotal movement at their neighbouring edges. The limited pivotal movement between sectors provides the deck with the required flexibility while preventing the wave formation from collapsing. In another arrangement, the flexible deck may be of laminated construction, with each lamination comprising a plurality of sectors. The sectors defining each lamination are bonded to sectors in a neighbouring lamination and are offset with respect to each other such that each sector in one lamination extends across two sectors of a neighbouring lamination. The sectors may be of resilient sheet metal or any other suitable material.

Another form of the flexible deck may involve construction (by moulding or any other process) of a one-piece deck with the deformation created in it during the construction stage. For instance, where a moulding process is used to construct such a form of flexible deck, the mould would have a surface profile which would establish the deformation in the moulded deck.

The flexible deck may be provided with more than one wave formation if so desired.
5.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood by reference to the following description of two specific embodiments thereof as shown in the accompanying drawings in which:

Fig. 1 is a schematic perspective view of a wave generating apparatus according to the first embodiment;
Fig. 2 is a plan view of the wave generating apparatus of Fig. 1 with part of the flexible deck removed to reveal the carriage;
Fig. 3 is a schematic fragmentary side view of the wave generating apparatus showing the flexible deck and the carriage;
Fig. 4 is a schematic side view of the wave generating apparatus showing an end of the boom;
Fig. 5 is a side view of the boom showing further details thereof;
Fig. 6 is a plan view of the boom of Fig. 5;
Fig. 7 is a schematic section along the lines 7-7 of Fig. 6;
Fig. 8 is a schematic section along the line 8-8 of Fig. 6;
Fig. 9 is an elevational view of the outer end of the boom;
Fig. 10 is a plan view of the flexible deck;
Fig. 11 is a view of the under surface of the deck, showing only several of the sectors which define the deck;
Fig. 12 is a fragmentary side view of the deck, illustrating the connection between neighbouring sectors of the deck and reinforcement under each sector;
Fig. 13 view is a fragmentary elevation showing detail of the central region of the deck;
Fig. 14 is an plan view of the central region of the deck;
6.

Fig. 15 is a series of three views providing a schematic illustration as to the way in which two wave formations are created in the flexible deck; Fig. 16 is an exploded view illustrating the construction of a flexible deck according to a second embodiment; and Fig. 17 is an exploded schematic side view of the deck of Fig. 16.

DESCRIPTION OF PREFERRED EMBODIMENTS

The first embodiment is shown in Figs. 1 to 15 of the drawings and is directed to a rink for skateboarding and roller skating. The rink includes a floor area 11 and a flexible deck 13 which rests on the floor. The flexible deck 13 provides a surface over which riders of skateboards and roller skates can travel. The peripheral edge 15 of the flexible deck is shaped to provide a ramp which provides a relatively smooth transition between the floor 11 and the upper surface of the flexible deck.

The flexible deck 13 is constructed with two diametrically opposed lateral deformations which provide permanent wave formations 17 in the deck. The wave formations are created by the presence of surplus material in the deck, as will be explained in more detail later. The wave formations remain in the flexible deck as it rests on the floor area and each can support its own weight and the normal weight of users on the rink.

A carriage 19 is located between the floor surface and each lateral deformation in the flexible deck. Movement of the carriages 19 over the floor surface 11 causes the wave formations 17 to travel in a circuit around the flexible deck.
7. The carriages 19 are coupled together for movement in unison and each comprises a mobile boom 21 disposed radially with respect to the circular flexible deck. Each boom 21 is pivotally connected at its radially inner end to a beam 23 which is pivotally mounted onto a post 24 for rotation about a substantially vertical axis. In addition to being supported on the beam 23, the boom 21 is supported on ground engaging wheels 25 at least one of which is driven by drive means 20 such as an electric motor. The boom 21 supports a plurality of rollers 27 for rolling contact with the underside of the flexible deck 13. The rollers 27 are arranged to follow the progressively increasing amplitude of the wave formation in the radial direction. The rollers 27 include central rollers 27a which contact the underside of the flexible deck at the crest of the wave formation and rollers 27b which contact, the underside of the deck at the point at which the wave formation rises and falls.

The rollers 27 act on the lateral deformation to cause it to assume a shape which provides a smooth wave formation. The rollers, however, do not create the lateral deformation. The lateral deformation exists in the flexible deck irrespective of the presence of the rollers. The purpose of the carriage is to merely cause the lateral deformation to move around the flexible deck.

The outer end of each boom 21 is covered with a skirt 28 which travels with the boom.

In this embodiment, the flexible deck 13 is composed of a plurality of sectors 31 of sheet metal material. Neighbouring sectors 31 are hingedly connected to each other to provide flexibility to the deck while preventing collapse of the wave formations. The sectors themselves also provide a degree of flexibility in that the sheet
metal is resilient. The connection 32 between neighbouring sectors is illustrated in Fig. 12 of the drawings. The connection comprises an inturned portion 34 at the radial edge of each sector 31 so as to define a channel 35. A link element 37 extends between the sectors and includes a pair of inturned marginal portions 39 which define channels 40 which interlock with the channels 35 of the neighbouring sectors in the manner shown in the drawings. Metal to metal contact between the various parts in the connection is prevented by the presence of cushioning materials such as silicon sealant (not shown). Additionally, a rib 41 of resiliently flexible material such as urethane is installed between the radial edges of neighbouring sectors.

A radially extending reinforcing rib 43 is centrally mounted on the underside of each sector.

Cushioning means 45 such as elements of rubber or other suitable material are provided on the underside of each sector 31, one between the central reinforcing rib 43 and each radial edge. The cushioning means 45 are arranged to function as buffer which prevents the sectors 31 from actually coming into contact with the ground, thereby preventing excessive noise.

The link elements 37 are connected to a circular frame 46 mounted on the post 24, by way of connecting links 47. The effective length of each connecting link 47 is variable to accommodate rise and fall of the sectors as the wave formations pass around the flexible deck. This is achieved by slidably supporting each connecting link 47 in a sleeve 48 which is pivotally mounted at 49 onto the circular frame 46. The connecting link 47 is retained in the sleeve by a stop 50 at the radially inner end.
Sliding movement of the connecting link relative to the sleeve is controlled by two springs 51, one acting on the sleeve and the other acting on the radially outer end of the sector. The springs also act on spacer 53 which maintains then in a spaced condition, as best seen in Fig. 13.

As previously mentioned, the wave formations in the flexible deck are created by the inclusion of surplus material in the circular flexible deck. More particularly, at least one additional sector is incorporated into the flexible deck in this embodiment to create the wave formations. The creation of the wave formations is schematically illustrated in the three views which appear in Figs. 15.1, 15.2 and 15.3 of the drawings. The views illustrate that a flat circular plane 56 (Fig. 15.1) can be caused to deform laterally by forming a radial slit 57 in the circular plane and expanding the slit. The extent of the expansion of the slit 57 determines the amplitude of the wave formations 58 so produced as shown in Figs. 15.2 and 15.3. The surplus material is introduced into the distorted plane as a sector to fill the expanded radial slit.

Referring now to Figs. 16 and 17 of the drawings, there is shown an alternative construction for the flexible deck 13. In this second embodiment, the flexible deck 13 is of laminated construction, comprising a plurality of layers (there being five layers shown in Fig. 16). Each layer 60 is composed of a plurality of sectors 61 including at least one additional sector to create a wave formation. The sectors of one layer are bonded to the sectors of a neighbouring layer and each sector extends across two sectors of a neighbouring layer, as shown in the drawings. This construction allows the formation of a flexible deck
with one or more wave formations without requiring pivotal connection between neighbouring sectors. Each sector is constructed of resilient material such as sheet metal and neighbouring sectors in each lamination are spaced apart to accommodate relative movement therebetween as the wave formations travel through the sectors.

As a further alternative (which is not shown in the drawings), the flexible deck may be moulded or otherwise formed as a one-piece unit with each lateral deformation created during the formation process. For example, the flexible deck may be moulded from suitable elastomeric material having reinforcing materials embedded in it, with the mould being of an internal profile which would incorporate the lateral deformation into the moulded deck.

It should be appreciated that the scope of the invention is not limited to the scope of the embodiments described.
THE CLAIMS defining the invention are as follows:-

1. Apparatus for generating a surface wave comprising a support surface, a flexible deck resting on the support surface, the flexible deck being constructed with a lateral deformation which provides a permanent wave formation in the deck, and means for moving the wave formation relative to the flexible deck.

2. Apparatus according to claim 1 wherein the lateral deformation in the flexible deck is created by the presence of surplus material in the deck.

3. Apparatus according to claim 2 wherein the deck is generally circular and the lateral deformation is created by introducing an additional sector of material into the circular deck.

4. Apparatus according to claim 1, 2 or 3 wherein said means for moving the wave along the flexible deck comprises a carriage located between the support surface and the lateral deformation in the flexible deck.

5. Apparatus according to any one of the preceding claims wherein the flexible deck to be of a generally circular configuration.

6. Apparatus according to claim 5 wherein the carriage comprises a boom disposed radially with respect to the flexible deck.

7. Apparatus according to claim 6 wherein the boom is supported on wheels which travel along the support surface, with at least one of the wheels being driven.
8. Apparatus according to claim 6 or 7 wherein the boom includes rollers which make rolling contact with the underside of the flexible deck.

9. Apparatus according to claim 6, 7 or 8 wherein the boom extends upwardly in a radially outward direction to provide the wave formation with varying amplitude.

10. Apparatus according to any one of the preceding claims wherein the peripheral edge of the flexible deck is located closely adjacent the support surface when it is not elevated owing to the presence of the wave formation.

11. Apparatus according to claim 10 wherein the peripheral edge of the support surface is shaped to define a ramp to provide a smooth transition between the support surface and the upper face of the deck.

12. Apparatus according to any one of the preceding claims wherein the peripheral edge of the flexible deck is constructed to provide cushioning upon impact.

13. Apparatus according to any one of the preceding claims wherein the flexible deck is constructed from sectors.

14. Apparatus according to claim 13 wherein the sectors are interconnected for limited pivotal movement.

15. Apparatus according to claim 13 wherein the flexible deck is of laminated construction, with each lamination comprising a plurality of sectors, the sectors defining each lamination being bonded to sectors in a neighbouring lamination and being offset with respect to each other such that each sector in one lamination extends across two sectors of a neighbouring lamination.
16. Apparatus according to any one of claims 1 to 13 wherein the flexible deck is of one-piece construction with said lateral deformation formed therein.

17. Apparatus substantially as herein described with reference to the accompanying drawings.
INTERNATIONAL SEARCH REPORT

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl. A63C 19/02, 19/10

II. FIELDS SEARCHED

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Other than Minimum Documentation searched:

AU: IPC as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT

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IV. CERTIFICATION

Date of the Actual Completion of the International Search: 27 January 1989 (27.01.89)
Date of Mailing of this International Search Report: 08 February 1989

International Searching Authority: Australian Patent Office

Signature of Authorized Officer: [Signature]
(E.J. KNOCK)
This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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