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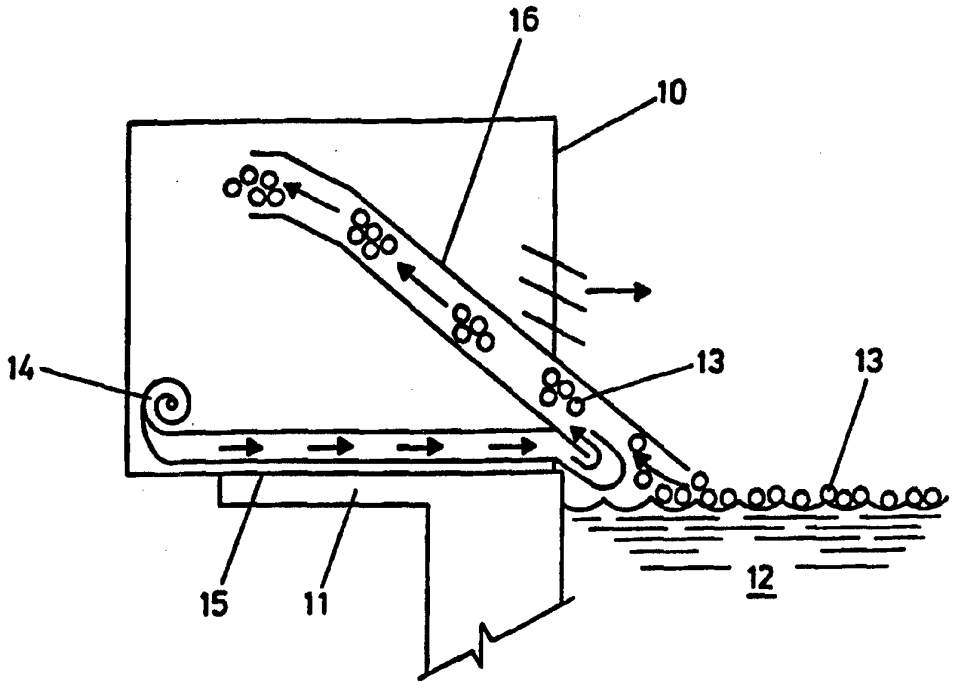

(57) Abstract

Buoyant balls (13) cover the surface of a pool to insulate the pool. The balls (13) are removed by an air blower (14) that sucks the balls upwardly through a tube (16) and then discharges the balls into a tank (10). The balls are discharged from the tank onto the surface of the water under the power exerted by an air blower (21) that causes the balls to travel up a tube (22) and then out of the end of the tube where they fall onto the surface.

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INSULATION OF POOLS

The present invention relates to pool insulation apparatus, a method of removing buoyant articles from a pool and a method of discharging buoyant articles on to a pool.

G.B. Patent No. 1 490 069 (Gilbert) describes an insulation arrangement for a swimming pool in which buoyant balls float on the surface of the pool to insulate the pool. In order to remove the balls from the surface a weir is lowered to allow the balls to float off the surface into a sunken tank. The balls are assisted in their removal by a stream of air or by a mill wheel and a boom can be provided to sweep the balls towards the end of the pool that the tank entry is located. To relocate the balls on to the pool the weir is again lowered and the tank is flooded to raise the balls to the level of the pool. Water or air jets can be provided to facilitate the return of the balls to the pool surface.

There are many disadvantages with Gilbert. First of all the boom is expensive to locate and operate and is only able to be provided on a rectangular pool. Secondly a significant number of balls are unable to be removed. Further, the balls cascade into the pit with the balls being stored whilst wet with water thereby requiring a water pump to remove the water from the bottom of the tank, which water pump is also required to float the balls in the tank. In addition, as the balls are floated up to the top of the tank they bunch and are difficult to remove. When they do exit the tank they are just pushed out on to the surface thereby making it difficult and time consuming to ensure complete coverage of the pool surface.

It is an object of the present invention to attempt to overcome at least some of the above described disadvantages.

According to one aspect of the present invention pool insulation apparatus comprises a plurality of buoyant articles and powered article removal means arranged, in use, to cause the articles to move upwardly relative to the surface of a pool prior to storing the articles in a container.

With such an apparatus the buoyant articles are able to be removed from the surface of a swimming pool without a significant amount of water also being removed as would be the case were the articles to be floated off.

The container may be arranged, in use, to be located above the surface of a pool. The container may be located at the side or on the side of the pool. Alternatively or additionally the container can be below the surface of the pool, for instance below ground.

The removal means may comprise suction means and may comprise venturi suction means. An air blower may be provided in order to provide the air force for the suction means. The air blower may be arranged to cause a jet of air along a passage through which the buoyant articles are arranged to travel. The powered article removal means may be located within the container.

The apparatus may include circulation inducing means arranged, in use, to cause a flow of surface water in a pool towards the article removal means. The circulation inducing means may comprise a pump arranged, in use, to remove water from the region of the surface of a pool

adjacent to the article removal means. The circulation inducing means may be located within the container.

The container may include drainage means arranged to allow water to leave the container and the drainage means may be arranged, in use, to allow the water to return to a pool.

The container may be arranged to direct the articles towards one region of the container. For instance the supporting surface of the container may be on a slope.

According to a further aspect of the present invention pool insulation apparatus comprises a plurality of buoyant articles and discharge means arranged, in use, to deposit the buoyant articles on to the surface of a pool from above the surface of a pool.

With such an apparatus the buoyant articles are able to be more readily distributed over the surface of the pool without bunching or becoming congested as would be the case if the articles were just pushed out on to the water.

The discharge means may comprise a suction means such as venturi means arranged to raise the buoyant articles prior to the articles being deposited on to the surface of a pool. The power means for the suction means may be located within a container that is also arranged to house the buoyant articles before they are deposited on to the surface of a pool.

According to another aspect of the present invention a method of removing buoyant articles from a pool, which articles insulate the surface, comprises operating powered

article removal means to move the articles upwardly, away from the surface of the pool, into a container.

The method may comprise removing the articles to a container located above the surface of the pool.

According to a further aspect of the present invention a method of depositing buoyant articles on to the surface of a pool comprises discharging the articles on to the surface from above the surface of the pool.

The present invention also includes an apparatus as herein referred to in association with a pool.

The present invention includes any combination of the herein described features and limitations.

The present invention may be carried into practice in various ways but one embodiment will now be described by way of example and with reference to the accompanying drawings, in which:-

Figure 1 is a cross-section of a buoyant piece storage tank 10 located at the side wall 11 of a swimming pool 12 showing the method used for removing buoyant pieces that may be balls 13 from the surface of the pool;

Figure 2 is a cross-section similar to Figure 1 but displaced slightly showing the method used for generating surface flow of water towards the tank, and

Figure 3 is a cross-section similar to Figures 1 and 2 but displaced slightly showing the method used for returning the balls 13 to the surface.

When the pool is insulated by the balls 13 the balls completely cover the surface of the pool, whatever may be its shape. The buoyant pieces can be of any suitable buoyant form and may be hollow plastics balls or pieces of cubic cork, for instance. With cubes, the side edges may be in contact thereby reducing any vertical gap between the cubes.

In order to remove the balls from the surface an air blower 14 located within the tank causes air to be directed along a duct 15 and then back up a tube 16 adjacent to the lower end of the tube 16. The lower end of the tube is adjacent to the surface of the pool and the tube extends upwardly towards the top of the tank 10, inside the tank. The air flow caused by the air blower creates a venturi effect within the tube 16 to cause the balls to be sucked off the surface, up through the tubes 16 prior to being discharged into the tank. It will be appreciated that no water is sucked up the tube 16, other than the modest amount of surface water on the balls, and that the air blower 14 is not contacted by water thereby enhancing its life.

In an alternative embodiment, the container can be below the surface of the pool or below ground. In this example a venturi could be used to drain any water in the bottom of the container with the venturi being connected in the return line of the pump.

The balls 13 are directed towards the lower opening of the tube 16 by a water pump 17 located within the tank, as shown in Figure 2. The pump 17 includes an inlet 18 at the surface of the pool that brings water from the top of the pool adjacent to the inlet to the tube 16 through a conduit 19 to the pump before the water is returned to the

pool at an outlet 20 below the surface of the pool. Thus a water circulation is set up that brings the surface water and hence the balls to the opening of the tube 16.

If desired, air or water jets can be distributed around the surface of the pool to assist in the flow of the surface water to the tube 16.

In order to return the balls to the surface of the pool to again insulate the pool a further air blower 21 is provided, as shown in Figure 3. The air blower creates a jet of air in an outlet tube 22 by discharging air through a conduit 23 upwardly along the tube 22 to again create a suction at the lower end of the tube. That suction causes the balls to be projected up the tube 22 before discharge at an outlet 24 above the surface from where they fall down on to the pool. A ramp 25 within the tank guides the balls to the inlet of the tube 22. If desired, the ramp may be of a grid formation to allow any modest amounts of surface water on the balls when they enter the tank to drain to the bottom of the tank, onto the side wall 11 and then back into the pool.

In an alternative embodiment, instead of the venturi effect, illustrated in Figures 1 and 3 for raising and discharging the balls, a straight suction may be applied in either or both instances.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. Pool insulation apparatus comprising a plurality of buoyant articles (13) and powered article removal means (14,15,16) arranged, in use, to cause the articles to move upwardly relative to the surface of the pool prior to storing the articles in a container (10).

2. Apparatus as claimed in Claim 1 in which the container (10) is arranged, in use, to be located above the surface of a pool.

3. Apparatus as claimed in Claim 1 or 2 in which the container (10) is arranged, in use, to be located at the side of a pool.

4. Apparatus as claimed in either of Claims 1 or 3 in which the container (10) is arranged, in use, to be located below the surface of a pool.

5. Apparatus as claimed in Claim 4 in which the container is arranged, in use, to be located below ground.

6. Apparatus as claimed in any preceding claim in which the removal means comprise suction means.

7. Apparatus as claimed in Claim 6 in which the suction means comprise venturi suction means.

8. Apparatus as claimed in either of Claims 6 or 7 including an air blower (14) that, in use, is arranged to provide the air force for the suction means.

9. Apparatus as claimed in Claim 8 in which the air blower (14) is arranged to cause a jet of air along a

passage (16) through which the buoyant articles (13) are arranged to travel.

10. Apparatus as claimed in any preceding claim in which the powered article removal means are arranged to be located within the container (10).

11. Apparatus as claimed in any preceding claim including circulation inducing means (17,18,19,20) arranged, in use, to cause a flow of surface water in the pool towards the article removal means.

12. Apparatus as claimed in Claim 11 in which the circulation inducing means comprises a pump (17) arranged, in use, to remove water from the region of the surface of a pool adjacent to the article removal means (16).

13. Apparatus as claimed in either of Claims 11 or 12 in which the circulation inducing means is located within the container (10).

14. Apparatus as claimed in any preceding claim in which the container includes drainage means arranged to allow water to leave the container.

15. Apparatus as claimed in any preceding claim in which the container is arranged to direct the articles towards one region of the container.

16. Apparatus as claimed in Claim 15 in which the supporting surface of the container is on a slope.

17. Apparatus as claimed in Claim 16 in which the drainage means is arranged, in use, to allow any water that has left the container to return to the pool.

18. Apparatus as claimed in any preceding claim including discharge means (21,22,23,24) arranged, in use, to deposit the buoyant articles (13) on to the surface of a pool from above the surface of a pool.

19. Apparatus as claimed in Claim 18 in which the discharge means comprises suction means (21,23) arranged to raise the buoyant articles (13) prior to the articles being deposited on to the surface of a pool.

20. Apparatus as claimed in Claim 19 in which the suction means comprises venturi means.

21. Apparatus as claimed in either of Claims 19 or 20 in which the power means (21) for the suction means is located within the container (10).

22. A method of removing buoyant articles (13) from a pool, which articles insulate the surface, comprising operating powered article removal means (14,15,16) to move the articles upwardly, away from the surface of the pool in to a container (10).

23. A method according to Claim 22 comprising removing the articles (13) to a container (10) located above the surface of the pool.

24. A method according to either of Claims 22 or 23 further comprising depositing buoyant articles (13) on to the surface of the pool by discharging the articles on to the surface from above the surface of the pool after the articles have been removed from the pool.

25. A method of removing buoyant articles from a pool when using pool insulation apparatus as claimed in any of Claims 1 to 19.

26. Pool insulation apparatus comprising a plurality of buoyant articles (13) and discharge means (21,22,23,24) arranged, in use, to deposit the buoyant articles on to the surface of a pool from above the surface of a pool.

27. A method of depositing buoyant articles (13) on to the surface of a pool comprising discharging the articles on to the surface from above the surface of the pool.

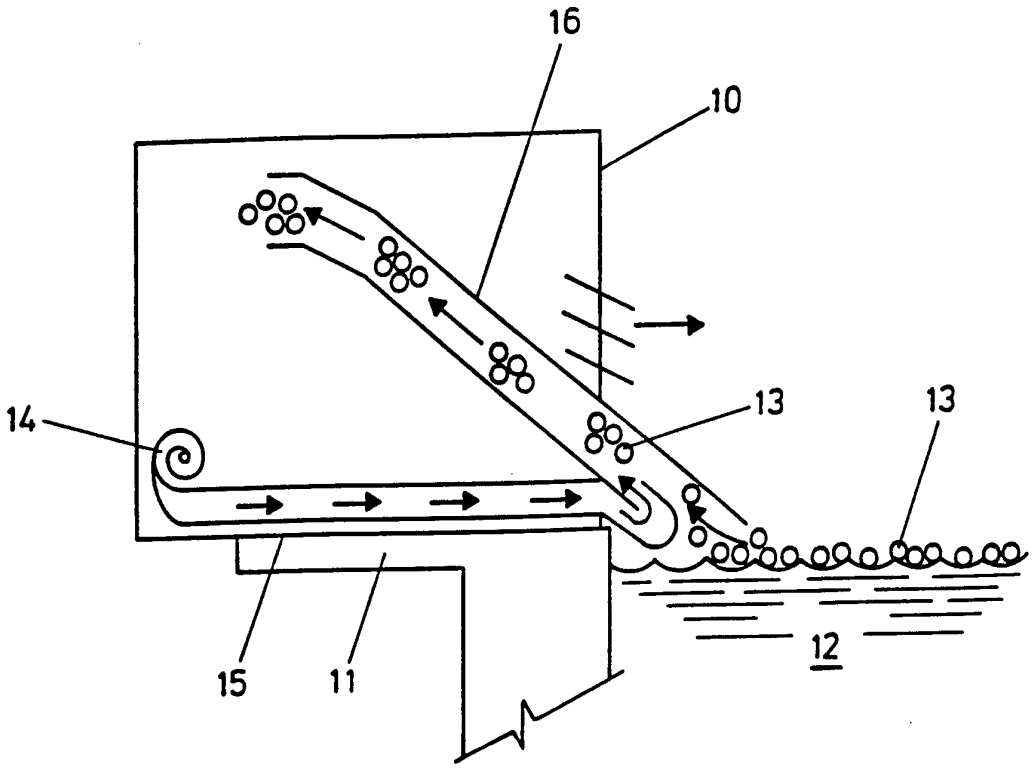

FIG. 1

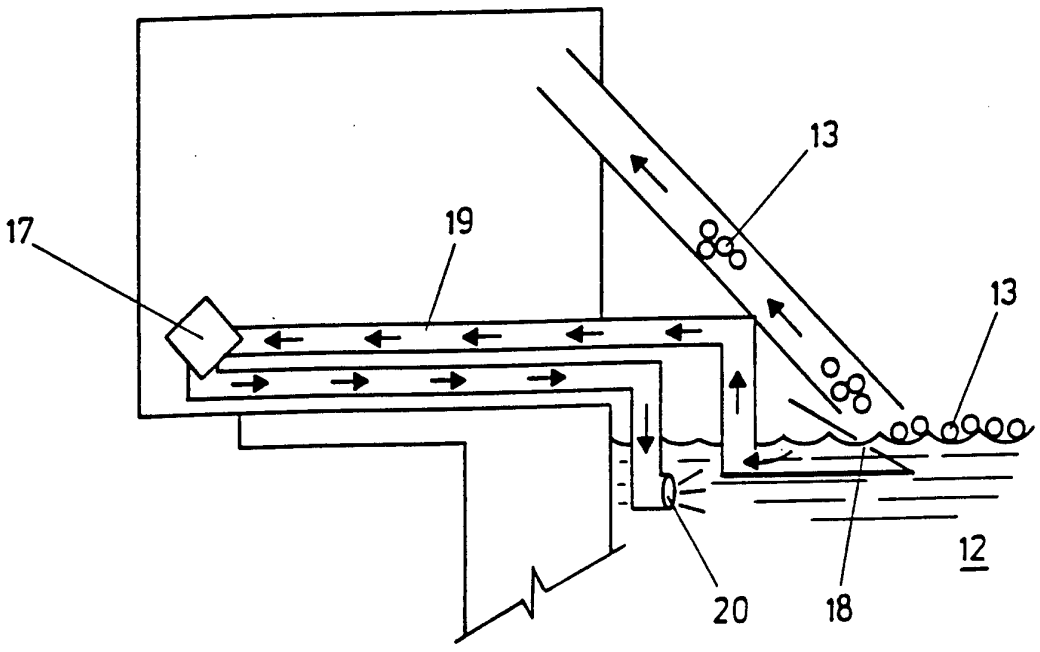

FIG. 2

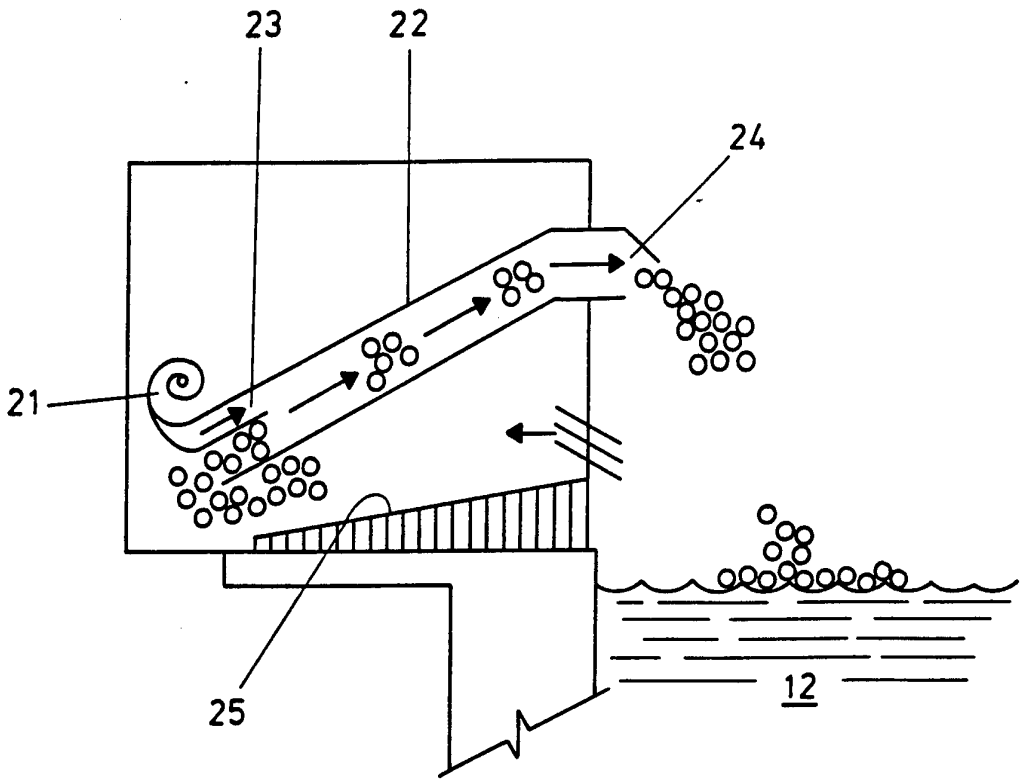

FIG. 3

INTERNATIONAL SEARCH REPORT

Inte; onal Application No
PCT/GB 96/01386

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E04H4/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NL,A,7 904 273 (DUINTJER) 2 December 1980 see page 4, line 7 - page 5, line 14; figures 1-3	1,3,4, 18,22, 24-27
X	FR,A,2 304 750 (BENZLER) 15 October 1976 see page 3, line 7-26; figure 1	26,27
X	DE,A,21 07 926 (LAING) 24 August 1972 see page 1, line 21-32	27

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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25 September 1996	08. 10. 96

Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 137 612 (KELLEY) 6 February 1979 see column 3, line 7 - column 6, line 8; figures 1-5	1,3-6, 11,12, 14, 17-19, 22,24-27
A	EP,A,0 301 132 (ESTA APPARATEBAU GMBH & CO) 1 February 1989 see column 1, line 1-9 see column 6, line 44 - column 11, line 31; figures 1-3	1-3,6, 8-10,14, 15,17, 19, 21-23,25
A	US,A,4 002 336 (BEAVER) 11 January 1977	

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte. onal Application No
PCT/GB 96/01386

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		DE-A-	2513645	07-10-76
		DE-A-	2536485	24-02-77
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US-A-4137612	06-02-79	NONE		
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US-A-4002336	11-01-77	NONE		