

[54] **POP-UP HEAD FOR WATER JET-POOL
CLEANING SYSTEM**

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1967, Pat. No. 3,521,304.
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[58] Field of Search134/167 R, 168 R; 4/172.15,
4/172.16, 172.17

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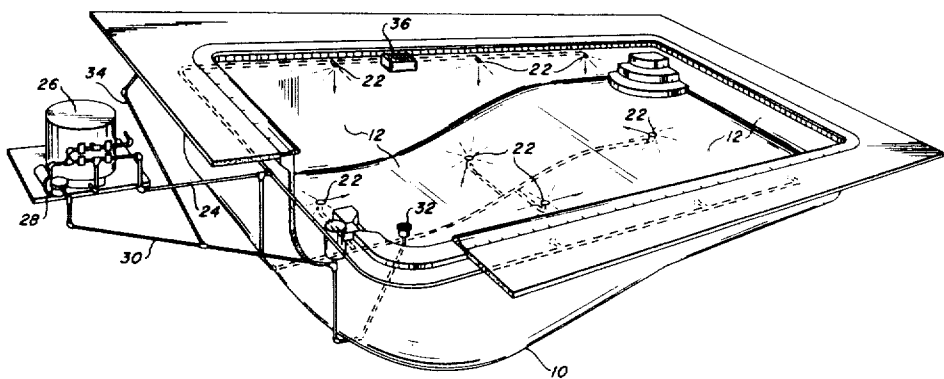
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ABSTRACT

A swimming pool cleaning system comprising a pool structure having inner surfaces, and a plurality of rotating jet delivery means adapted to deliver jet streams of water substantially parallel to and in adjacent relation with the inner surfaces of the pool for washing and cleaning said inner surfaces; said means also provided with jet nozzles disposed at an acute angle to the rotating axis of the rotary jet delivery means to maintain deleterious matter in suspension in the water so that it may be carried away by the pool circulation system.

1 Claim, 6 Drawing Figures



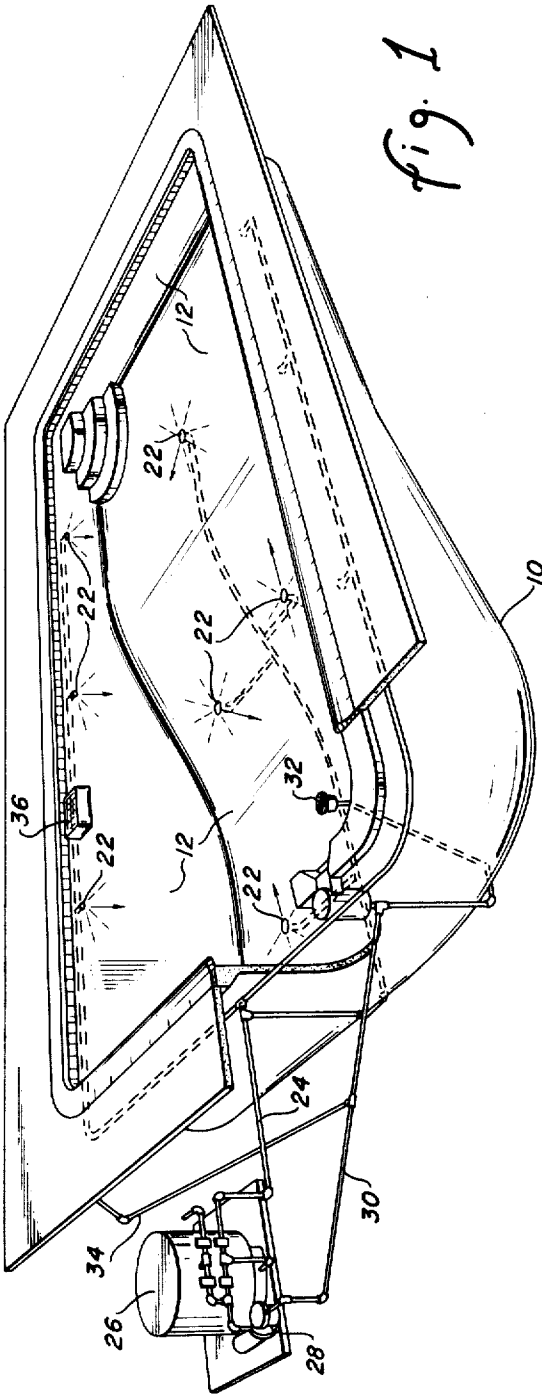


Fig. 1

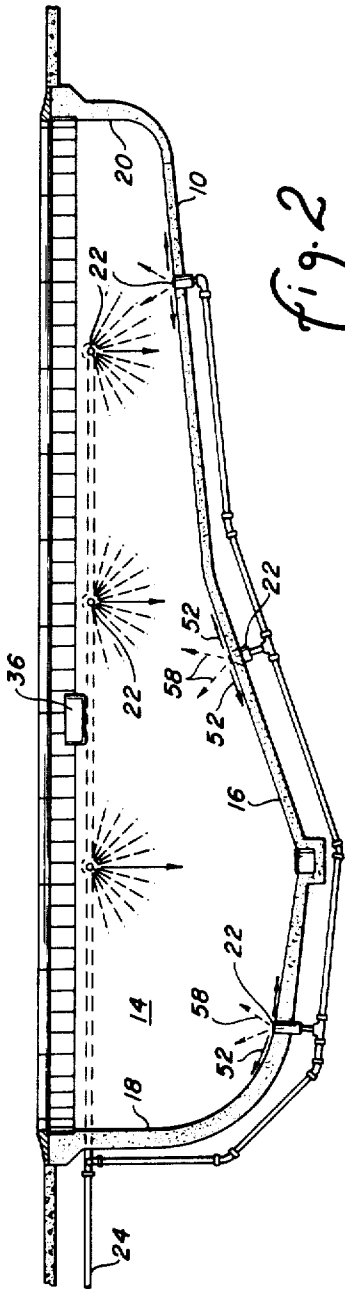


Fig. 2

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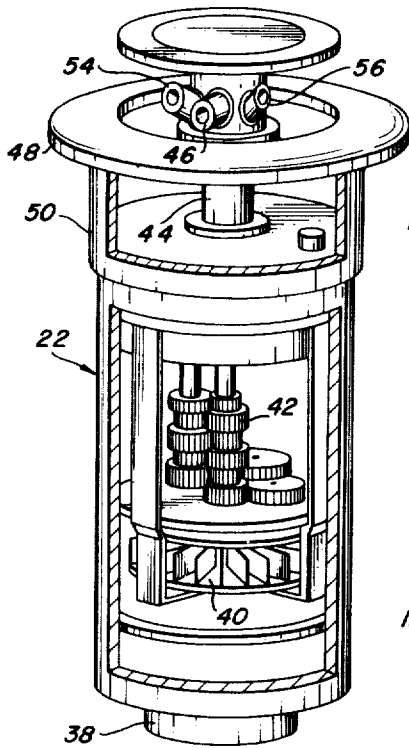


fig. 3

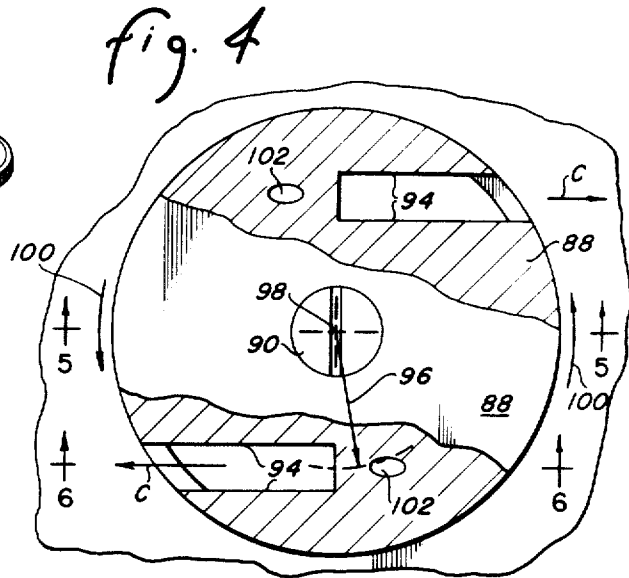
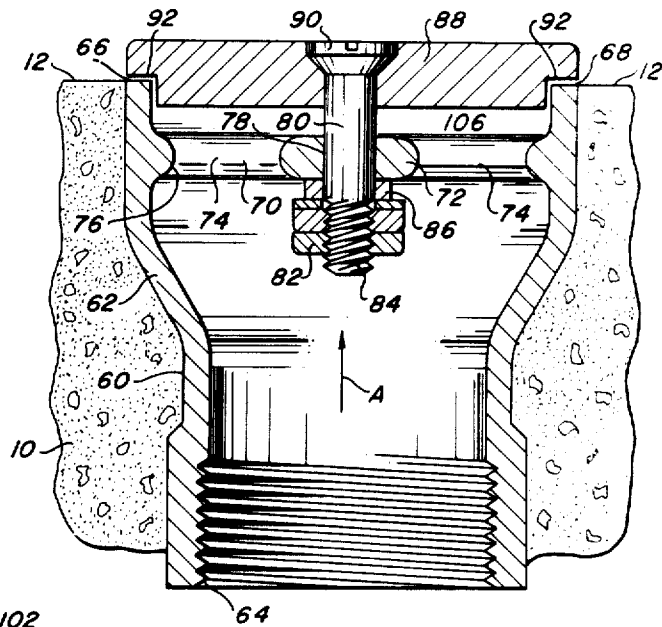


fig. 5

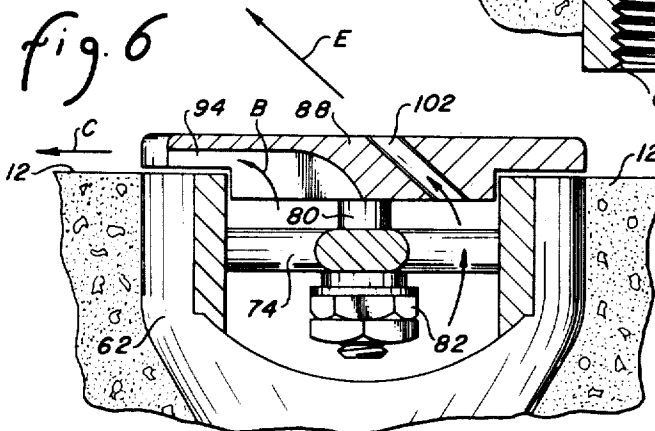


fig. 6

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POP-UP HEAD FOR WATER JET-POOL CLEANING SYSTEM

This application is a continuation in part of my application Ser. No. 666,595, filed Sept. 11, 1967, entitled "Swimming Pool Cleaning System" and now U.S. Pat. No. 3,521,304.

This invention relates to a swimming pool cleaning system and more particularly to a swimming pool cleaning system, wherein a plurality of rotary jet nozzles are disposed adjacent inner surfaces of the pool to wash the inner surfaces, and also to maintain deleterious matter in suspension in the water so that it may be carried outward through the main drain or the skimmer inlets of the pool water circulating apparatus.

Many devices and methods have been used for cleaning deleterious matter from the interior of a swimming pool. Some of them include manually operated vacuum pickups, others include snake-like water jet tubes of flexible character which operate in a generally sinusoidal movement, and rub the bottom of the pool while moving around and creating jet streams along the inner surfaces of the pool.

Other prior art devices have included nozzles adjacent the inner surfaces of the pool structure, and these nozzles have been unidirectional or monodirectional, and have been partially successful; however, most prior art pool-cleaning systems have required a substantial mount of attention, labor, and/or maintenance.

The present invention comprises a pool structure having inner surfaces, and rotary water jet delivery devices carried by the pool structure, and having rotary water jets disposed to deliver jet streams substantially parallel to the surfaces of the walls and bottom portion of the pool so that the inner surfaces may be effectively washed to suspend fine sedimentary material and other deleterious matter which collects in a swimming pool. In addition, the rotary jet delivery means is provided with secondary jet nozzles disposed to project jet streams in a rotary direction, but at an acute angle to the rotating axis of the rotary jet delivery means, and also at an acute angle to the adjacent surfaces of the pool, such that the material washed into suspension from the surfaces of the pool structure may be maintained in suspension so that the deleterious matter may be carried away, either through the main drain and/or the skimmer inlet.

In this manner, the deleterious matter is constantly washed from the inner surfaces of a swimming pool, and maintained in suspension so that it is constantly carried away by the water passing into the main drain, and also into the usual skimmer, and is thus collected in the usual filter normally operable to collect foreign matter from the water which is constantly recirculated through the pool and the filter.

Accordingly, it is an object of the present invention to provide a novel swimming pool cleaning system employing a plurality of rotary jet delivery means adapted constantly to rotate 360° and to project its streams in adjacent parallel and scrubbing relation with the inner surfaces of a pool structure.

Another object of the invention is to provide a novel swimming pool cleaning system having rotary jet delivery means provided with jet nozzles adapted to issue jet streams parallel with and in scrubbing relations with inner surfaces of a swimming pool, and also to issue secondary jet streams at an angle or an acute angle to the rotating axis of the rotary jet delivery means for maintaining the material in suspension in the water within the pool.

Another object of the invention is to provide a novel swimming pool cleaning system employing a plurality of rotary jet delivery means in connection with the water circulating plumbing and filter system of a swimming pool.

Another object of the invention is to provide a novel rotary jet delivery means having simple features of construction for efficiently projecting jet streams in parallel scrubbing relationship with inner surfaces of a swimming pool structure, and also to provide for angularly disposed jet streams for maintaining foreign matter in suspension in the water until it is collected by the swimming pool filtering system.

FIG. 1 is a fragmentary perspective view showing a swimming pool, together with a water circulating and filtering

means, and showing a swimming pool cleaning system in connection therewith, and in accordance with the present invention;

FIG. 2 is a vertical sectional view of a swimming pool, such as shown in FIG. 1, and showing a swimming pool cleaning system in connection therewith, and in accordance with the present invention;

FIG. 3 is a fragmentary elevational view of a rotary water jet delivery means used as part of the swimming pool cleaning system of the invention, and showing structural portions of the housing of the rotary jet delivery means broken away to amplify the illustration;

FIG. 4 is a top or plan view of a modified rotary jet delivery means of the invention, showing portions thereof broken away and in section to amplify the illustration, and illustrating fragmentary portions of concrete in which said rotary jet delivery means is embedded;

FIG. 5 is a fragmentary sectional view taken from the line 5—5 of FIG. 4, showing a part of the rotary jet delivery means of the invention in elevation to facilitate the illustration; and

FIG. 6 is a fragmentary sectional view taken from the line 6—6 of FIG. 4, illustrating by arrows the directions of jet streams which may be projected by the rotary jet delivery means of the invention.

As shown in FIG. 1, the swimming pool cleaning system of the invention includes a swimming pool structure 10 having inner surface portions 12 which include surfaces at sides 14, a bottom 16, and end walls 18 and 20, all as shown best in FIG. 2 of the drawings. Embedded in the side walls 14, bottom 16 and end walls 18 and 20, if desired, are rotary jet delivery assemblies 22, as will be hereinafter described in detail.

Communicating with each of the rotary water jet delivery assemblies or means of the invention is a conduit 24 adapted to deliver water under pressure to operate the rotary jet delivery assemblies, as will be hereinafter described. This conduit 24 is disposed to communicate with the outlet of a filter 26, a pump 28 delivers water under pressure to the filter, and receives water through a conduit 30 communicating with a main drain 32, and also communicating with a conduit 34 communicating with the skimmer 36.

The pump 28 thus pulls water from the main drain 32 and skimmer 36, and forces it through the filter 26, and the conduit 24, and to the rotary jet delivery assemblies 22.

As shown in FIG. 3, a rotary jet delivery assembly 22 is provided with a plumbing connection end 38 adapted to be connected with the conduit 24 by a conventional plumbing fitting. The plumbing fitting 38 communicates with a liquid driven turbine 40 operably connected to a reduction gear train 42 which slowly rotates a hollow shaft 44 carrying a plurality of jet nozzles, one of them being designed 46, and directed generally at right angles to the axis of the rotating hollow shaft 44. This shaft 44 is rotated at low speed by the gear train 42.

A flange 48 extending from the housing 50 of the rotary jet delivery assembly 22 is adapted to be substantially in flush relation with one of the inner surfaces 12 of the pool structure 10. Thus, the jet nozzle 46 is adapted to issue a water jet, as indicated by arrows 52, so that the water jet is parallel to and in scrubbing relation with the respective inner surface areas of the pool structure surrounding the rotary water jet delivery assembly 22.

Additional nozzles 54 and 56 are directed at an acute angle to the axis of the hollow shaft 44, and with relation to the axis of the jet nozzles 46. These jet nozzles 54 and 56 are adapted to issue jet streams in directions of broken lines 58, shown best in FIG. 2 of the drawings, so that water washed from the inner surfaces of the pool by the jet streams 52 will be forced upward and maintained in suspension in the water, and thus the deleterious matter, such as fine silt, bugs, leaves, grass, and other matter may be maintained in suspension until it is eventually withdrawn from the pool through the main drain 32 or the skimmer 36 by means of the pump 28. This deleterious matter is then collected in the filter, and the clean water passes back through the conduit 24, and to further operate the

rotary jet delivery assemblies 22. Each of these assemblies 22 thus operates jet stream nozzles 46 disposed parallel to and in close adjacent relation with the inner surfaces 12 of the pool structure 10, and also nozzles disposed at an acute angle to the rotating axis of the hollow shaft 44 which carries water under pressure upwardly through the nozzles 46, 54 and 56, as hereinbefore described.

The particular rotary jet delivery assemblies 22, as shown in FIG. 3, are conventional sprinkler heads manufactured by Moist O'Matic, Inc., Post Office Box 489, Riverside, Calif., a subsidiary of the Toro Manufacturing Corporation. These assemblies 22 are generally of a 630 series, turf irrigation sprinkler construction manufactured by Moist O'Matic, Inc., and are therefore substantially conventional rotary jet delivery devices.

In the modification, as shown in FIGS. 4, 5 and 6, a simple jet reaction rotary disc serves to motivate the rotary jet delivery means of the invention.

As shown in FIGS. 4, 5 and 6, the modified rotary jet delivery assemblies are designated 60, and comprise a generally cylindrical housing 62 having a lower internally threaded open end 64 adapted to be connected with inlet plumbing communicating with the conduit 24. Each housing 60 is provided with an upper open outlet end 66 having a peripheral edge 68 disposed substantially flush with one of the inner surface portions 12 of the pool structure 10.

The housing 60 is provided with a bearing spider 70 which includes a central hub 72, and spaced radiating legs 74 extending outwardly and integral with an internal wall of the housing 60 at 76.

The central hub portion 72 is provided with a bore 78 in which a shaft 80 is rotatably mounted. This shaft 80 is provided with a pair of jam nuts 82 screw-threaded on an externally screw-threaded portion 84 of the shaft 80, and a low coefficient of friction thrust bearing, such as Teflon, designated 86, bears on a lower surface of the hub 72, while water pressure tends to hold a disc 88 in connection with the shaft 80 upwardly, as will be hereinafter described.

The disc 88 is mounted on the shaft 80 and abuts a head 90 thereof. Water pressure in a direction of an arrow, shown in FIG. 5, tends to hold the rotary member 88 upwardly so as to maintain its lower edge 92 in slightly spaced relationship with the peripheral edge 68 of the housing 60.

Disposed in overlying relation with the edge 68 of the housing 60 are jet nozzle slots 94. These slots 94 are in the lower portion of the disc 88, and direct water as indicated by arrows B and C in FIG. 6. These jet nozzle slots 94 are disposed tangent to a radius 96 shown best in FIG. 4 of the drawings. This radius or arc being spaced outward from the rotary axis of the disc which is about the center 98 of the bolt head 90, shown in FIG. 4.

These jet slots 94 tend to provide for jet reaction causing the disc 88 to rotate in a direction of arrows 100 in FIG. 4 of the drawings.

The jet nozzles 94 are thus disposed to issue jet streams, as indicated by the arrow C in FIG. 6, in parallel scrubbing relation with an inner surface 12 of the pool structure 10, and inasmuch as the disc 88 is free to rotate continuously throughout 360°, an entire area surrounding the disc 88 is washed. Thus, inner surfaces of the pool structure 10 are washed clean, thus removing sediment or other deleterious matter, while upwardly directed jet nozzles 102 issue jet streams, as indicated by an arrow E in FIG. 6 of the drawings, the jet reaction relative to the nozzles 102 being in the same direction as that of the nozzles 94, also tending to rotate the disc 88 in the same direction of the arrows 100. The angle of the nozzles 102 being in accordance with the direction of the arrow E in FIG. 6, and at an acute angle to the rotary axis of the disc 88 about the axis of the shaft 80, and also these jet nozzles 102 are disposed at an acute angle to the axis of the jet nozzles 94 and/or the adjacent inner surfaces 12 of the pool

structure 10.

With water pressure in the direction as indicated by the arrow A, the disc 88 is maintained free and slightly spaced from the edge 68 of the housing 62, and a peripheral portion 106 of the disc 88 is disposed in slight spaced relation to an internal annular wall of the housing 62 to thus prevent lateral displacement of the disc 88 in the event a person steps on it. Water flow around this edge 106 will always maintain the disc concentric, and substantial tolerance may be provided in the bore 78 around the shaft 80 to permit free rotation of the disc 88 and shaft 80.

The Teflon bearing 86 is a low coefficient of friction bearing, and operating in water has a great life expectancy.

It will be appreciated by those skilled in the art that the rotary jet nozzle assemblies, as hereinbefore described, and as disposed in relation to inner surfaces of a swimming pool structure provide for the washing and scrubbing of the internal surfaces, and also the maintenance of the deleterious matter scrubbed therefrom in suspension in the water contained in the pool so that the suspended material may be carried away through the main drain 32 and the skimmer 36, and thus the entire area or inner surface 12 of the pool may be maintained clean, in accordance with proper spacing of the rotary jet delivery assemblies 22.

It will be understood that each assembly 60 is equivalent to the assemblies 22, shown and described in connection with FIG. 2 of the drawings.

It will be obvious to those skilled in the art that various modifications of the present invention may be resorted to in a manner limited only by a just interpretation of the following claims.

I claim:

1. A system for cleaning the inner surfaces of a swimming pool, said pool having
 - a pool water filter,
 - means for withdrawing water containing suspended deleterious matter from said pool and conducting said water to said filter and
 - means for returning said suspended deleterious matter is separated from said water, and said filtered water from said filter to said pool,
 said system comprising a plurality of rotating water jet delivery assemblies located at spaced points upon the inner surface of said swimming pool, each said assembly comprising:
 - a. a generally cylindrical housing having a threaded inner end adapted to be connected to inlet plumbing conduits communicating between said housing and said filter and having an outer open end mounted substantially flush with said inner surface;
 - b. a rotary jet delivery head adapted to constantly rotate 360° having primary cleaning water jet apertures therein to project pressurized streams of jet cleaning water in directions tangential to the axis of rotation thereof and in adjacent parallel and scrubbing relation to the inner surface of said pool and having means defining secondary water jet apertures disposed to project water jet streams in a rotary direction at an acute angle to the rotating axis of said rotary jet delivery head and also at an acute angle to the adjacent surfaces of the pool to maintain said deleterious matter scrubbed from said inner surface of said pool by said primary water jets in suspension in said pool water for removal by said filter; and
 - c. a shaft rotatably mounted within said generally cylindrical housing at its lower end and affixed to said rotary jet delivery head at its upper end, said shaft holding said rotary jet delivery head in operative position with respect to said cylindrical housing and being rotatably journaled within said housing such that water supplied to the inner end of said housing forces said water jet delivery head to a position spaced from the outer end of said housing and said pool inner surface.

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