The invention relates to a swimming pool cleaner. The swimming pool cleaner comprises a pool cleaner body comprising a conduit with an inlet end and an outlet end. The conduit defines a flow path through the body. The body is connectable to a water source from which a water stream can be directed through the conduit. The swimming pool cleaner further comprises a receptacle which is connected to the body and has an inlet opening outside the conduit. The inlet opening of the receptacle is directed or faces in an operatively upstream direction towards the inlet end of the conduit. The receptacle defines a receptacle pocket for receiving solid material which enters the inlet opening of the receptacle.
CLEANING OF SWIMMING POOLS

[0001] THIS INVENTION relates to the cleaning of swimming pools. More particularly, the invention relates to cleaning pool cleaners. The invention provides for a swimming pool cleaner, for a swimming pool cleaning arrangement, and for a method of operating a swimming pool cleaner in a swimming pool. The invention provides also for and extends to a swimming pool cleaning kit.

[0002] Swimming pool cleaning systems typically include a water circulation system, which may include an in-line filtration stage, in which water is withdrawn from the pool, by means of a pump, and is then re-introduced into the pool, after having passed, if applicable, through the filtration stage. More particularly, such cleaning systems typically include an unfiltered water inlet, typically comprising a weir or skimmer, which is provided in or adjacent the pool, such that water from the pool surface flows into the weir. Water is then drawn from the pool, by action of the pump, through the weir to the filtration stage, in which the water may be subjected to filtration through one or more of a variety of filtering media, typically including filtering screens and/or sand. After being subjected to filtration, filtered water (filtrate) is returned to the pool through a filtered water outlet.

[0003] Automatic swimming pool cleaners are generally employed in conjunction with such a water circulation system of a swimming pool and are used to remove solid materials, such as dirt, debris and other foreign materials, from bottom and sidewall surfaces of the swimming pool. Typically, such automatic pool cleaners are of the so-called suction-type and employ suction provided by the circulation system pump in withdrawing an unfiltered water stream from the pool, in which stream solid material, which is picked up from the bottom and sidewall surfaces of the swimming pool, is conveyed to be filtered out of the water in the filtration stage. The operating area and freedom of motion of such suction-type swimming pool cleaners are limited, in that they are confined to operation on bottom and sidewall surfaces of the pool and are only able to pick up solid material which has settled to the bottom of the pool, or which adheres to the side walls of the pool. The abovementioned limitations of operating area and freedom of motion of suction-type pool cleaners lead to foreign materials on the pool water surface or in suspension in the pool water, not readily being removed from the pool, until these materials settle to the bottom, or adhere to the side walls of the pool. As suction-type pool cleaners are typically connected to the circulation system at the weir of the pool, removal of foreign materials from the water surface is inhibited or prevented, as limited volumes of surface water are withdrawn from the pool through the weir and virtually all water thus enters the circulation system through the pool cleaner. It is possible to employ a second weir, but such a solution is not economically attractive, as the pool construction and configuration of the pool's filtration system need to be altered in order to incorporate such a second weir. Manual surface cleaning is also an option, but is cumbersome and time-consuming. A further difficulty associated with suction-type pool cleaners is that, due to the general use of a diaphragm valve to generate convulsive or jerking movement of the pool cleaner, operation of the pool cleaner is often interrupted by solid material which gets stuck in the diaphragm.

[0004] The Applicant believes that the present invention will alleviate at least some of the abovementioned difficulties which are associated with suction-type swimming pool cleaners.

[0005] In accordance with a first aspect of the invention, there is provided a swimming pool cleaner, which comprises a pool cleaner body comprising a conduit with an inlet end and an outlet end and which defines a flow path through the body, the body being connectable to a water source from which a water stream can be directed through the conduit; and a receptacle connected to the body and having an inlet opening outside the conduit, the inlet opening being directed or facing in an operatively upstream direction towards the inlet end of the conduit, and the receptacle defining a receptacle pocket for receiving solid material which enters the inlet opening of the receptacle.

[0006] In this specification, as is also indicated above and at certain instances hereinafter, the terms "downstream" and "upstream" are to be understood to be used in relation to an operative direction of water flow along the flow path provided by the conduit of the pool cleaner body.

[0007] The conduit, and hence the pool cleaner body, may be tubular, typically being in the font of a pipe or a hose. Preferably, the pool cleaner body may be flexible, being manufactured of a flexible material.

[0008] The receptacle may be mounted to the body in collar-or sleeve-fashion, such that the receptacle pocket extends, or is defined, radially about the pool cleaner body, with the pocket being directed or extending towards the outlet end. In other words, the receptacle may thus be mounted to the pool cleaner body such that the receptacle completely surrounds at least a part of the pool cleaner body. In such a case, the pool cleaner body may thus project into and extend through the pocket.

[0009] The receptacle may taper in cross-section, relative to the flow path of the flow conduit, from an open upstream or inlet end of the receptacle, which defines the inlet opening, towards a downstream end of the receptacle, such that the downstream end of the receptacle substantially closes about the body. It is to be appreciated that, in such a case, the receptacle pocket will thus also be tapered, typically in longitudinal section. It is further to be appreciated that, when the receptacle is mounted to the pool cleaner body in collar-fashion as hereinbefore described, the downstream end of the receptacle may typically be closed at least partly by an outer surface of the pool cleaner body. More particularly, the downstream end of the receptacle may close or terminate against or around the pool cleaner body in annular fashion.

[0010] The receptacle may be mounted to the pool cleaner body by means of a receptacle mounting which comprises at least an upstream element and a downstream element, to which elements the upstream and downstream ends of the receptacle are respectively mounted. Thus, the upstream element may typically define the upstream inlet opening of the receptacle and the downstream element may define at least a part of the downstream closed end of the receptacle. It is to be appreciated that, at the closed downstream end of the receptacle, the downstream element may typically be in close abutment with the pool cleaner body, thus closing the receptacle against the body.

[0011] In particular, the upstream element may have a mounting portion, by which the upstream element is mounted to the pool cleaner body, and a receptacle connecting portion, to which the upstream end of the receptacle is connected and which supports the upstream end of the receptacle in an open condition. Typically, the mounting portion may comprise an annular sleeve which can receive therethrough and be
mounted in close abutment with the pool cleaner body. In such a case, the receptacle connecting portion may be radially spaced from the mounting portion, being retained in its radially spaced position by radially extending means.

[0014] The receptacle may, at least in part, be of a porous or foraminous material so that water is able to pass through the receptacle, with oversized solid material, which may be suspended or carried in water which may pass through the receptacle, be retained in the receptacle in sieve-fashion. Preferably, the receptacle may be of a net material. In such an embodiment, the upstream and downstream elements of the receptacle mounting may typically be in the form of support or tenter elements, with respective upstream and downstream ends of the net being anchored to the respective tenter elements and the net element thus being supported or tentered between the tenter elements.

[0015] An outlet nozzle may be mounted to the outlet end of the conduit, the nozzle defining a nozzle conduit therethrough which is in communication with the flow conduit defined by the body.

[0016] In one embodiment of the invention, at least a portion of the nozzle may be pivotally or angularly displaceable relative to the body such that at least a portion of the nozzle conduit is also displaceable relative to the flow conduit of the body in a substantially pivotal or angular fashion.

[0017] The nozzle may typically have flow dispersing formations which are arranged in a flow dispersing flow channel provided at least partially about and externally to an external periphery of at least a portion of the nozzle conduit, such that pivotal displacement of the nozzle brings the dispersing flow channel and thus the flow dispersing formations into flow communication with the flow conduit of the body.

[0018] Preferably, the outlet nozzle may, in an embodiment as alluded to hereinbefore, have an upstream portion and a downstream portion which respectively define an upstream nozzle conduit portion and a downstream nozzle conduit portion, with the upstream nozzle conduit portion being connected to the body and the downstream nozzle portion being pivotally connected to the upstream portion. Typically, the downstream portion may also comprise more than one part in order to facilitate assembly of the nozzle. The downstream nozzle conduit portion or part thereof may typically also define a pivot chamber, upstream from the downstream nozzle conduit portion and from the flow dispersing formations, in which pivotal displacement of the upstream nozzle conduit portion is allowed relative to the downstream nozzle conduit portion.

[0019] In addition, or alternatively, the nozzle may have a flow regulating element which is adjustable to adjust the flow rate at which water exits the nozzle, thereby to adjust the force which the water stream exercises on the pool cleaner as it exits the conduit.

[0020] The pool cleaner may be provided with a number of accessories, some of which may typically be employed to adjust buoyancy thereof. Thus, the pool cleaner may typically be provided with removable weights, which may be selectively attached to the pool cleaner, preferably to the pool cleaner body, so as to vary or control buoyancy of the pool cleaner. Additionally, or alternatively, the pool cleaner may be provided with removable cleaning elements, typically in the form of brush elements, which may also selectively be attached to the pool cleaner, preferably to the pool cleaner body but typically also to the receptacle mounting or portion thereof.

[0021] The pool cleaner would, in use, be driven by hydraulic means, operating, of course, in a body of water. More particularly, the pool cleaner may be driven by a water stream which passes through the conduit. Preferably, the water stream may be pumped or jetted into and through the conduit, such that the water stream exercises a resultant force on the pool cleaner when the water stream exits the conduit outlet end, thereby driving the pool cleaner to move in an operatively upstream direction relative to the direction of flow through the conduit. It will be appreciated that pumping or jetting water through the conduit mainly by applying suction, i.e. negative pressure, to the conduit, or, more preferably, by pumping water, from the water source, through the conduit.

[0022] The pool cleaner may typically be employed in a swimming pool having a water circulation system comprising a pump which withdraws water from the swimming pool through a circulation system inlet and returns water to the swimming pool through a circulation system outlet. In such an embodiment, the water source may thus be the water of the swimming pool in which the pool cleaner is employed. Thus, the water source may be the circulation system outlet of the water circulation system of the swimming pool. The pool cleaner body may thus be connectable to the circulation system outlet such that the conduit is in flow communication with the circulation system outlet.

[0023] Connection of the pool cleaner body to the circulation system outlet may be effected by means of a connector or connection piece and, optionally, a flexible pipe or hose. The connector may include a flow regulating element which may be adjustable to vary the volume and flow rate of water which is delivered to the pool cleaner from the water source, thereby to control the force with which the pool cleaner is driven through the swimming pool water.

[0024] It is envisaged that, in use, by mounting the receptacle to the body such that the receptacle pocket is defined in a downstream direction with the inlet opening of the receptacle being directed in an upstream direction, displacement of the body in an upstream direction due to the force of the water stream exiting the body through the conduit outlet results in the receptacle being displaced along with the body in a generally upstream direction, thereby effectively dragging the receptacle through the water in a roughly scooping movement and collecting solid material from the water or the swimming pool floor or wall in sieve-fashion, as hereinbefore described.

[0025] In accordance with a second aspect of the invention, there is provided a pool cleaning kit, which includes

[0026] a pool cleaner body comprising a conduit with an inlet end and an outlet end and which defines a flow path through the body, the body being connectable to a water source from which a water stream can be directed through the conduit; and

[0027] a receptacle which defines a receptacle pocket for receiving solid material therein, the receptacle being connectable to the body such that an inlet opening thereof is provided outside the conduit and is directed or faces in an operatively upstream direction towards the inlet end of the conduit.

[0028] The invention extends also to a pool cleaning kit which includes a pool cleaner in accordance with the first aspect of the invention and at least one extension hose.

[0029] In accordance with a third aspect of the invention, there is provided a swimming pool cleaning arrangement, which includes

[0030] a swimming pool water circulation system comprising at least a pump, a circulation system inlet through which
water is withdrawn from a swimming pool by the pump, and a circulation system outlet through which withdrawn water is reintroduced into the swimming pool by the pump; and

[0031] a swimming pool cleaner in accordance with the first aspect of the invention, the pool cleaner being operatively connected to the circulation system outlet.

[0032] In accordance with a fourth aspect of the invention, there is provided a method of operating a pool cleaner in a swimming pool, the method including

[0033] passing a water stream through a conduit defined in a body, thereby displacing the body in an operatively upstream direction relative to the direction of water flow in the flow path through the conduit; and

[0034] collecting, in a receptacle mounted to the body and having an opening directed in an operatively upstream direction to define a receptacle pocket in an operatively downstream direction, solid materials from the swimming pool.

[0035] The pool cleaner may be a pool cleaner in accordance with the first aspect of the invention.

[0036] The invention will now be described by way of example with reference to the accompanying diagrammatic drawings.

[0037] In the drawings:

[0038] FIG. 1 shows a longitudinal cross-sectional view of a swimming pool cleaner in accordance with the invention;

[0039] FIG. 2 shows a schematic representation, in longitudinal cross-sectional view, of a swimming pool cleaner arrangement, in accordance with the invention;

[0040] FIG. 3 shows a longitudinal cross-sectional view of a circulation system outlet connection piece used in conjunction with circulation system outlet nozzle in the form of an aim-flow nozzle of the assembly of FIG. 2;

[0041] FIG. 4 shows a longitudinal cross-sectional view of one embodiment of a pool cleaner outlet nozzle of the assembly of FIG. 2;

[0042] FIG. 5 shows a longitudinal cross-sectional view of another embodiment of a pool cleaner outlet nozzle of the assembly of FIG. 2;

[0043] FIG. 6 shows a longitudinal cross-sectional view of a hose connection of the assembly of FIG. 2;

[0044] FIG. 7 shows a longitudinal cross-sectional view of brush and weight elements of the assembly of FIG. 2;

[0045] FIG. 8 shows, in longitudinal cross-sectional view, another embodiment of a weight element;

[0046] FIG. 9 shows an end view of the weight element of FIG. 8;

[0047] FIG. 10 shows, in three dimensional exploded view, another embodiment of a pool cleaner outlet nozzle of the assembly of FIG. 2;

[0048] FIG. 11 shows, in longitudinal section, the outlet nozzle of FIG. 10 in an assembled axially aligned condition;

[0049] FIG. 12 shows, in longitudinal section, the outlet nozzle of FIG. 10 in an assembled axially misaligned condition; and

[0050] FIG. 13 shows, in longitudinal section, a swimming pool outlet connection element for connecting the pool cleaner of FIG. 1 to a swimming pool outlet nozzle.

[0051] Referring to the drawings and in particular to FIG. 1, reference numeral 10 generally indicates a pool cleaner in accordance with the invention. As is also indicated above and in certain instances hereinbefore, all references to upstream and downstream directions, unless indicated otherwise, are to be regarded in relation to an operative direction of flow of water through the pool cleaner 10, as is designated by the arrow 15.

[0052] The pool cleaner 10 has a body in the form of a flexible corrugated pipe or hose 12. In other embodiments of the invention, the pipe 12 may, of course, be non-flexible, i.e. rigid. It will be appreciated that the pool cleaner hose 12 constitutes a flow conduit which defines a flow path, designated by reference numeral 14, along which water can flow through the hose 12.

[0053] As also indicated above, the arrow 15 indicates an operative direction of water flow in the conduit 14. Thus, as will be appreciated, the hose 12 has an upstream inlet port 12.1 and a downstream outlet port 12.2. The inlet port 12.1 and outlet port 12.2 respectively define female and male connection pieces which render the end portions 12.1, 12.2 matingly connectable to elements which have complementary male and female connection pieces. More particularly, the inlet portion 12.1 defines an outwardly flared inlet conduit portion 14.1, which tapers in an internal cross-section in a downstream direction. The outlet portion 12.2 defines an outwardly tapered outlet conduit portion 14.2, which tapers in an external cross-section in a downstream direction.

[0054] A receptacle 16, comprising a tentered net material 17, is mounted to the hose 12 between two tenter elements 18, 20. The one tenter element 18 comprises a mounting sleeve 18.1 by which the tenter element 18 is mounted snugly to the hose 12, with the hose 12 being received by and passing through the mounting sleeve 18.1. Although it is not illustrated, the mounting sleeve 18.1 may be provided with fastening or clamping means which fasten the mounting sleeve 18.1, and thus the tenter element 18, to the hose 12. Four supporting arms 18.2 (only two of which are visible) project radially in a generally downstream direction from the mounting sleeve 18.1 to an annular supporting element 18.3, having a diameter greater than that of a diameter of the hose 12, the supporting element 18.3 thus being radially spaced from the hose 12. The supporting element 18.3 is circular in outline.

[0055] The other tenter element 20 is generally annular in shape and is mounted snugly to the hose 12 in a sleeve-like fashion. The tenter element 20 is used in conjunction with a retaining element 20.1 which is also annular in shape and which is mounted loosely on the hose 12, also in sleeve-like fashion, upstream from the tenter element 20.

[0056] One end 17.1 of the net material 17 is anchored to the supporting element 18.3. The supporting element 18.3 supports the end 17.1 of the net material 17 in an open condition, radially spaced from the hose 12, thereby defining a receptacle inlet, which is generally indicated by reference numeral 22. It will be appreciated that the inlet opening 22 is directed or faces in a generally upstream direction relative to the operative direction of flow 15 in the conduit 14, i.e. towards the inlet end portion 12.1 of the hose 12. As the supporting element 18.3 is circular in outline, the inlet opening 22 of the receptacle is also circular. Although not illustrated as such, it is preferred that the supporting element 18.3 has at least one straight portion, with the inlet opening 22 thus also having at least one straight portion in outline. Preferably, the supporting element may have more than one straight portion, typically having a multi-sided geometric outline, e.g. triangular, rectangular, pentagonal, hexagonal, heptagonal etc. It is expected that, in having such at least one straight portion, collection of debris from surfaces, particularly from a bottom surface, of the swimming pool in which the pool cleaner 10 operates, will be facilitated as a contact area between the surface and a straight portion of the supporting
element 18.3 is larger than in the case of a curved portion of the supporting element 18.3 contacting the surface, such as would be the case when the supporting element 18.3 is circular in outline, as in the illustrated embodiment. In a case wherein the supporting element 18.3 is not circular, the number of supporting arms 18.2 which support the supporting element 18.3 may also be varied, depending on the shape of the supporting element 18.3.

[0057] Another end 17.2 of the net material 17 is received by the second tenter element 20 and is fastened thereto. The end 17.2 of the net material 17 passes through the retaining element 20.1, upstream from the tenter element 20 in relation to an operative direction of flow 15 in the flow conduit 14.

[0058] Anchoring of the net material 17 to, or between, the supporting element 18.3 of the first tenter element 18 and the second tenter element 20, is such that the net material is tentered in a tapered fashion, tapering in a downstream direction relative to the operative direction of flow 15 inside the conduit 14. Thus, the net material 17 defines a tapered receptacle pocket, the pocket being generally designated by reference numeral 24. It will, of course, be appreciated that, in accordance with the invention, the receptacle pocket 24 may also not be tapered and may be substantially cylindrical, depending on the manner in which the net material 17 is tentered between the tenters 18, 20. The receptacle is closed off by the second tenter element 20 at downstream end of the receptacle, relative to the operative direction of flow in the conduit 14. It will be appreciated that the receptacle pocket 24 extends radially from and thus radially surrounds a part of the hose 12.

[0059] It is envisaged that one or both of the tenter elements 18, 20 may be provided, on their outer periphery, with circumferentially spaced cleaning elements or brush modules which may, by abrasive contact, clean surfaces of the swimming pool with which they may come into contact.

[0060] Referring now to FIG. 2, reference numeral 30 generally indicates, in sectional view, a schematic representation of a pool cleaner arrangement in accordance with the invention. Sectioning of the various components or elements of the arrangement 30 is illustrated more clearly in FIGS. 3 through 7 by the application of hatching.

[0061] The arrangement 30 includes the pool cleaner 10 of FIG. 1. In designating the parts of the pool cleaner 10, the same reference numerals are used as in FIG. 1. To facilitate representation of the arrangement 30, the inlet end portion 12.1 and outlet end portion 12.2 of the hose 12 of the pool cleaner 10, as well as other components or elements of the arrangement 30 as set out hereinafter, are illustrated in broken fashion. Further, in contrast to FIG. 1 and the other elements of the arrangement 30 in FIG. 3, the pool cleaner 10 is shown in plain side view and not in sectional view.

[0062] The hose 12 of the pool cleaner 10 is connected, at the inlet portion 12.1 thereof, in flow communication with an outlet nozzle of a pool water circulation system of a swimming pool in which the pool cleaner is employed, the outlet nozzle being in the form of a so-called aim-flow nozzle 32. As will be appreciated, the circulation system and swimming pool are not illustrated. The circulation system, however, typically comprises, in addition to the aim-flow nozzle 32, a circulation system inlet, typically in the form of an overflow or weir, and a pump which withdraws water from the swimming pool through the circulation system inlet and returns the withdrawn water to the swimming pool through the circulation system outlet or aim-flow nozzle 32.

[0063] The aim-flow nozzle 32 comprises a nozzle housing 32.1 which is mounted in a wall of the swimming pool (not illustrated). A spherical spout element 32.2, having a conduit 32.3 therethrough, is swivelably housed in the housing 32.1. Thus, by swivelably displacing the nozzle element 32.2 in the nozzle housing 32.1, a direction of flow water through the nozzle 32 can be adjusted.

[0064] The hose 12 is not connected directly to the aim-flow nozzle 32, but by means of first and second extension hoses 34A, 34B, which are also illustrated in broken fashion. The hoses 34A, 34B, similarly to the hose 12, have inlet and outlet end portions 34A.1, 34B.1, 34A.2, 34B.2 which respectively constitute female and male connection pieces. It will be appreciated that, although only two extension hoses are illustrated, the pool cleaner arrangement 30 can also include more than two extension hoses, depending on the length of the extension hoses, the size of the swimming pool in which the pool cleaner 10 operates, as well as the length of the pool cleaner hose 12.

[0065] A connection 36 between the inlet end portion 12.1 of the hose 12 and an outlet end portion 34A.2 of the extension hose 34A, as well as a connection 38 between the inlet and outlet end portions 34A.1, 34B.2 of the extension hoses 34A, 34B are secured by means of clamps 39, which clamps 39 fasten the hoses 12, 34A, 34B to each other. The clamps 39 are also shown in broken fashion. It will be appreciated that, although the respective end portions 12.1, 34A.2, 34A.1, 34B.2 are not illustrated in engaged fashion, due to the broken illustration of the clamps 39, these portions will typically, in use, be matingly engaged. A representation of the connections 36, 38 is illustrated more clearly in FIG. 6.

[0066] Reference numeral 40 designates one embodiment of a circulation system outlet connection piece which is mounted to the aim-flow nozzle 32 and enables connection of the inlet end portion 34B.1 of the extension hose 34B to the aim-flow nozzle 32. The connection piece 40, as it is mounted to the aim-flow nozzle 32, is shown in more detail in FIG. 3.

[0067] Thus, referring to FIG. 3, the connection piece 40 has a conduit 41 therethrough. The conduit 41 has a first cylindrical portion 41.1, defined by a mounting portion 42 of the connection piece 40. The first cylindrical portion expands into a second cylindrical portion 41.2 of greater diameter than the first cylindrical portion 41.1. The second cylindrical portion 41.2 is defined by an outlet portion 44 of the connection piece 40. An outlet end 44.1 of the outlet portion 44 is tapered in an operatively downstream direction, thus forming a male connection piece, similar to those of the hoses 12, 34A, 34B, whereby rendering the circulation system outlet connection piece 40 matingly connectable to the inlet end portion 34B.1 of the hose 34B. The mounting portion 42 of the connection piece 40 is snugly received axially inside the conduit 32.3 of the spout element 32.2 of the aim-flow nozzle 32 to mount the connection piece 40 to the nozzle 32. Although not illustrated, it is envisaged that the connection piece 40 may have additional securing components, such as a flange-like base member which is secureable or fastenable to the housing 32.1 of the aim-flow nozzle 32, typically by means of screw-thread.

[0068] Four circumferentially spaced apertures, only three of which are visible, being designated by reference numeral 43, are defined in a wall of the second conduit portion 41.2 of the connection piece 40. It will be appreciated that less or more than four apertures 43 may be provided. A circumferentially displaceable flow regulator 47 is circumferentially displaceably mounted to the outlet portion 44 of the connec-
tion piece 40, such that the regulator 47 passes over the apertures 43. The regulator 47 has a roughly egg-shaped aperture 45 defined therein. As the regulator 47 is circumferentially displaced about the outlet portion 44 of the connection piece 40, the aperture 45 is selectively and progressively brought into register with the apertures 43, thereby providing a second water outlet from the connection piece. It will be appreciated that by maximizing the degree of overlap between the aperture 45 and the aperture 43, more water exits through the overlapping apertures 43, 45, thus reducing water flow rate through the connection piece 40. The provision of four apertures 43 is seen as advantageous, as the direction in which water exits the connection piece 40 through the created second outlet can be varied, depending on which of the apertures 43, if any, the aperture 45 overlaps.

[0069] Reference numerals 46A and 46B respectively designate different embodiments of pool cleaner outlet nozzles which may be connected to an outlet end portion 12.2 of the hose 12 of the pool cleaner 10. The outlet nozzles 46A, 46B, in arrangement with the outlet end portion 12.2 of the hose 12, are shown more clearly in FIGS. 4 and 5 respectively.

[0070] Each nozzle 46A, 46B is circular in cross-section and has a conduit 46A.1, 46B.1 therethrough.

[0071] The conduit 46A.1 of the nozzle 46A has an inlet portion 46A.2 which tapers in internal cross section in an operatively downstream direction and thus defines a female connection in the nozzle 46A, thereby rendering the nozzle 46A matingly connectable to the outlet end portion 12.2 of the hose 12.

[0072] The conduit 46B.1 of the nozzle 46B also has an inlet portion 46B.2 which tapers in internal cross section in an operatively downstream direction and thus defines a female connection in the nozzle 46B, thereby rendering the nozzle 46B matingly connectable to the outlet end portion 12.2 of the hose 12.

[0073] Referring, in particular, to FIG. 4, the nozzle 46A has a segmented outlet portion 48 comprising four circumferentially spaced outlet portion segments 50, only two of which are visible. The segments 50 are resiliently displaceable towards each other by a biasing element 52, which is screwed onto the end portion 48 of the nozzle 46A by means of a screw thread. Screw thread, by which the biasing element 52 is screwed onto the end portion 48, is not illustrated. A rear portion 48.1 of the end portion 48 tapers in external cross section in an operatively downstream direction, thereby defining an abutment surface 48.2 against which a biasing element 52.1 of the biasing element 52 abuts. Displacement of the biasing element 52 in an operatively upstream direction by screwing the element 52 along the screw thread thus results in the biasing portion 52.1 of the biasing element 52 engaging and acting in on the abutment surface 48.2, thereby urging the outlet portion segments 50 towards each other and effectively reducing a diameter of the outlet portion 48. An annular spacing element 53 is positioned in the outlet portion 48, between the segments 50. The spacing element 53 urges the segments 50 away from each and eventually returns the segments 50 to a normal position as the biasing element 52 progressively disengages the abutment surface 48.2 when the biasing element 52 is displaced, i.e. threaded or screwed, in an operatively downstream direction. It will be appreciated that, in use, reduction of the diameter of the outlet portion 48 will result in the velocity or flow rate of water exiting the nozzle 46A increasing.

[0074] The nozzle 46A is further provided with an elastic element 51, circumferentially mounted adjacent an end of the outlet portion 48 of the nozzle 46A. When the biasing element 52 is not operatively engaged with the abutment surface 48.2, and the segments 50 are thus not resiliently displaced towards each other, substantially being in a rest condition, the elastic element 51 is stressed. As the segments 50 are displaced towards each other, as hereinbefore described, the elastic element urges end portions of the segments 50 towards each other, thus ensuring that the outlet defined by the segments is well-defined. The elastic element 51 is spaced from the biasing element 52.1, such that four apertures, only one aperture 55 being visible, are circumferentially defined between the segments 50 when the segments 50 are not in abutment with each other. It is expected that these apertures 55 will allow air to be drawn into the water stream which exits the conduit 46A.1, thereby increasing the turbulence of the water stream.

[0075] Referring now to FIG. 5, the nozzle 46B has an outlet portion 54. A peripheral aperture 56 of circular cross-section is defined in the outlet portion 54. It will be appreciated that, if desired, more than one peripheral aperture may be provided. The outlet portion 54 is further provided with a circumferentially displaceable annular flow-regulating element 58, which is circumferentially mounted to the outlet portion 54, over the aperture 56. The element 58 has a flow-regulating aperture 58.1 defined therein, the aperture being illustrated in circumferential register with the aperture 56. It will be appreciated that, by bringing the aperture 58.1 in register with the aperture 56, an additional water outlet, to an outlet of the nozzle, is provided in the outlet portion 54. Depending on the degree of overlap between the aperture 58.1 and the aperture 56, at least some water, which would have exited through the nozzle outlet, exits through the additional outlet, thus reducing the flow rate through the nozzle outlet. The flow rate of water through the nozzle outlet can thus be controlled by the flow-regulating element 58. Alternatively, and more preferably, the flow-regulating element 58 may be omitted from the nozzle 46B, such that the aperture 56 is permanently open. It is expected that, by such an arrangement, when the nozzle 46B moves above a water surface of the swimming pool in which it operates, it is possible that air may be sucked into the outlet water stream, resulting in the outlet stream being broken and the pool cleaner returning to below the water surface. The Applicant has found that it is advantageous, although not required, that when the aperture 56 is permanently open, an outlet conduit portion 46B.3 of the conduit 46B.1, defined by the outlet portion 54, has a greater inner diameter D1 than an inner outlet diameter D2 of the inlet portion 46B.2 of the conduit 46B.1. The outlet portion 54 may further be provided with additional peripherally arranged outlet passages 69 from which water can exit the conduit 46B.1. It is expected that these additional outlets 69 will enhance turbulence of the water stream exiting the nozzle 46B, thereby to bring and keep in suspension materials which may have precipitated on a bottom surface, or floor, of the swimming pool.

[0076] In an alternative embodiment of the nozzle 46B, the outlet portion 54 of the nozzle 46B may have an inner diameter D1 equal to that of the inner outlet diameter D2 of the inlet portion 46B.2 of the conduit 46B.1. In such an embodiment, the aperture(s) 56 and thus the regulating element 58 will be omitted and an inner surface of the outlet conduit
portion 461.3 will be provided with a spiraled groove in order to cause turbulence of the water stream which exits the conduit 463.1.

[0077] In FIG. 6, a more detailed representation of the connection 36/38 of the hoses 12.3A/34A.34B of FIG. 2 is illustrated.

[0078] Although not illustrated as such, and as mentioned hereinbefore, the connection 36/38 of the hoses 12.3A/34A.34B normally includes a mating connection between the inlet end portion 12.1/34A.1 of the hose 12.3A to the outlet end portion 34A.2/34B.2 of the hose 34A/34B. As also mentioned hereinbefore, connection 36/38 of the hoses 12.3A/34A.34B to each other is secured by a clamp 39. The clamp 39 is part-circular in cross-section, thus defining a circumferential opening or slit 71, and is of a resilient material, typically a plastic material. The clamp 39 defines a part-circular clamping flange 39.1 on either end thereof. Each clamping flange 39.1 thus has a circumferential opening 71 therein. The weight element 70 is manufactured from a metal, the metal typically being nickel-plated to protect the element 70 from rust.

[0085] In use, the weight element 70 is mounted to a hose, such as the hoses 12A/34A.34B, by inserting the hose through the opening 72 into the passage such that the hose is mounted snugly in the passage 71. It will be appreciated that the width of the opening 72 is less than the diameter of the hose. Accordingly, the hose, typically being of a flexible material as also indicated hereinbefore, will be deformed when being inserted into the passage through the opening 72.

[0086] In use, the arrangement 30 is typically installed in a swimming pool (not illustrated) having a water circulation system (not illustrated) comprising at least a pump which draws water out of the swimming pool through a weir and returns water to the swimming pool through a circulation system outlet. Preferably, the water circulation system also includes an in-line filtering stage, typically a sand filtering stage. Installation is effected by initially connecting the circulation system outlet connection piece 40 to the aim-flow nozzle 32 of the swimming pool. The second extension hose 34B is then connected to the connection piece 40 and the first extension hose 34A is connected to the second extension hose 34B. The pool cleaner 10 is connected, at the inlet end portion 12.2 thereof, to the second extension hose 34A. One of the outlet nozzles 46A, 46B is, optionally, connected to the outlet end portion 12.1 of the pool cleaner 10. It will be appreciated that one or more weight elements 62 and brush elements 64 may also, optionally, be connected to either the body hose 12 of the pool cleaner 10 and/or to one or more of the extension hoses 34A, 34B, depending on the desired buoyancy of the pool cleaner 10. Connections between the various components of the arrangement 30 are secured by the clamps 39.

[0087] When the water circulation system of the swimming pool is operational, water is pumped or jetted through the aim-flow nozzle 32, into the extension hoses 34A, 34B. Water is then conveyed through the extension hoses 34A, 34B to the pool cleaner hose 12 of the pool cleaner 10. The water passes through the conduit 14 of the pool cleaner 10 and exits the conduit 14 through the outlet end portion 12.1 of the hose 12 of the pool cleaner 10 as a water jet stream.

[0088] The water jet stream which exits the conduit 14 exerts a resultant force on the pool cleaner 10 and propels or drives the pool cleaner 10 in an operatively upstream direction, relative to the direction of water flow in the conduit 14. It will be appreciated that such a drive arrangement is in contrast to conventional suction-type pool cleaners which are driven by suction force which is delivered by the pump of the swimming pool water circulation system. The receptacle 16 is also propelled in an operatively upstream direction in a scooping fashion with water thus entering the receptacle pocket 24 through the inlet 22 and exiting the receptacle pocket 24 through apertures in the net material 17. Oversized solid materials carried or suspended in the water which passes through the receptacle pocket 24 are thus retained in or picked up by the receptacle 16, thereby being separated from the pool water and, eventually, being removed from the pool by manually emptying the pocket 24 of the receptacle 16.

[0089] Adjustment of the regulator 47 of the circulation system outlet connection piece 40 and/or the biasing element 52 of the outlet nozzle 46A and/or the flow-regulating element 58 of the outlet nozzle 46B, whichever is employed, results in the flow rate of the water jet exiting the conduit 14 increasing or decreasing, depending on the manner in which
the regulator 47 and/or either of biasing element 52 or flow regulating element 58 is/are adjusted. Accordingly, by varying the flow rate of the water jet, a speed at which the pool cleaner 10 moves or is propelled through the swimming pool can be adjusted. Of course, when the flow regulating element 58 of the outlet nozzle 463 is omitted, as hereinbefore described, the effect may differ in that air gets sucked into the outlet conduit portion 463.3, resulting in water pressure being dissipated.

[0990] Brush elements 64 are mounted to various parts of the arrangement 30, as desired. Preferably, as illustrated in FIG. 2, brush elements 64 are mounted to whichever of the nozzles 46A, 46B are used, as well as adjacent an inlet end portion of the hose 12. Thus, as the pool cleaner 10 moves through the swimming pool and comes into contact with wall and bottom surfaces of the swimming pool, the brush modules 66 come into contact with these surfaces and act to dislodge dirt, algae and the like therefrom, bringing these materials into suspension and rendering the materials susceptible to be picked up by the receptacle 16 and/or removed through the weir. The brush elements 64 also prevent the hose nozzle 46A/46B from contacting the pool surfaces, thus reducing wear on the nozzle 46A/46B and increasing its lifespan for operation.

[0991] The same applies to other sections of the arrangement 30 to which brush elements 64 are mounted.

[0992] It is envisaged that, in addition to the pool cleaner 10, recreational elements, such as toys etc. can also be included as part of the arrangement 30.

[0993] It is further envisaged that other types of additional cleaning equipment, such as a rake or the like, may also be operatively connected to the swimming pool cleaner. It is expected that such additional cleaning equipment, in particular a rake, may aid in the collection of larger debris which cannot be contained within the receptacle pocket.

[0994] Further, it is also envisaged that, if desired, the arrangement may include chemical dispensing means which may be mounted to the pool cleaner 10 or to any of the extension hoses 34A, 34B.

[0995] Referring now, in particular, to FIG. 10, reference numeral 100 generally indicates another embodiment of an outlet nozzle, for connection to the pool cleaner 10 in a similar fashion as the nozzles 46A, 46B.

[0996] The nozzle 100 comprises and assembly of a number of components, as illustrated in exploded view in FIG. 10. The components include an upstream nozzle element 102, a pivot element or ball 104, a downstream nozzle element 106 comprising an upstream part 106a and a downstream part 106b, a fluid dispersing ring 108 and a downstream nozzle conduit element 110.

[0997] The upstream element 102 comprises a pool cleaner connection portion 102a and an upstream nozzle conduit portion 102b. The upstream nozzle conduit portion 102b is of lesser diameter than the connection portion 102a.

[0998] The downstream nozzle element 106, as mentioned, comprises an upstream part 106a and a downstream part 106b. At an interface 112 (see FIG. 11) between the upstream and downstream parts 106a, 106b, each part is diametrically widened in relation to the rest thereof, the two parts 106a, 106b thereby together providing a pivot chamber 114 (see again FIG. 11).

[0999] The part 106a of the downstream nozzle element 106 has an aperture 106c defined in an upstream end wall thereof 106d, the aperture 106c having a lesser cross sectional diameter than a diameter of the pivot ball 104 such that the pivot ball 104 is not able to pass through the aperture 106c.

[1000] The part 106b of the downstream nozzle element 106 has an inwardly extending peripheral rim 106c provided adjacent a downstream end 106d thereof.

[1001] The pivot ball 104 has a generally spherical shape, having a passage of complemental cross sectional outline to that of the upstream nozzle conduit portion 102b, thereby being capable of being threaded onto the upstream nozzle conduit portion 102b.

[1002] The fluid dispersing ring 108 tapers slightly in an operatively downstream direction, being sized so as to be snugly accommodated within the pivot chamber 114, particularly in abutment with a downstream peripheral wall 114a thereof (see FIG. 11).

[1003] The downstream nozzle conduit element 110 is tubular and has two arrangements 116a, 116b of radially extending flow dispersing formations 118 provided along the length thereof. An upstream end 110a of the element 110 is slightly flared.

[1004] The components set forth above assemble to form or provide the nozzle 100.

[1005] More particularly, as is illustrated in FIG. 11, the nozzle 100 is provided by mounting the upstream nozzle element 102 to the upstream part 106a of the downstream nozzle element 106b by inserting the upstream nozzle conduit portion 102b through the aperture 106c and then threading the pivot ball 104 over the upstream nozzle conduit portion 102b, thereby locating the pivot ball 104 in abutment with an inner face of the upstream end wall 106d. It will be appreciated that the pivot ball 104 is capable of moving rotationally against the inner face of the end wall 106d, thereby allowing for pivotal or angular displacement of the upstream nozzle conduit portion 102b inside the pivot chamber 114, in the fashion illustrated in FIG. 12.

[1006] The typical direction of water flow through the nozzle 100 is depicted by the arrow "A" both in FIG. 11 and in FIG. 12.

[1007] The downstream nozzle conduit element 110 is located co-axially within the downstream part 106b of the downstream nozzle element 106 such that the downstream flow dispersing formation arrangement 106a abuts against an inner face of the peripheral rim 106c. It is to be appreciated that the space between an outer face of the peripheral wall of the downstream nozzle conduit element 110 and an inner face of the peripheral wall of the downstream part 106b of the downstream nozzle element 106 constitutes a flow dispersing channel 120. The flow dispersing channel thus extends radially between the outer face of the peripheral wall of the downstream nozzle conduit element 110 and the inner face of the peripheral wall of the downstream part 106b of the downstream nozzle element 110, with the flow dispersing formation arrangements 116a, 116b partially closing the channel 120 at their respective locations.

[1008] The fluid dispersing ring 108 is located, as mentioned above, peripherally in abutment with a downstream end wall 114a of the pivot chamber 114. Although not clearly illustrated as such, it is to be noted that an inner wall of the ring 108 is partially inwardly tapered and partially cylindrical.

[1009] In use, the nozzle 100 is mounted to a downstream end of the pool cleaner 10 by means of the pool cleaner mounting portion 102a in an assembled condition, as envisaged by FIG. 11. It is expected, and has indeed been observed
in trial runs conducted with the pool cleaner 10 having the nozzle 100 mounted thereto, that the upstream and downstream conduit portions 102b, 110 of the nozzle 100 remain substantially axially aligned as the pool cleaner 10 moves in a submerged fashion through the water in a swimming pool, substantially in the configuration illustrated in FIG. 11. However, should the pool cleaner 10, and thus also the nozzle 100, breach the surface, it has been observed that the buoyancy of the pool cleaner 10 is great enough for the pool cleaner 10 to begin sinking again almost immediately. This is also, possibly, partly as a result of the erratic movement promoted by the force of the water being directed through the flow conduit 12 of the pool cleaner 10. The nozzle 100, however, having breached the water surface, may be angularly displaced and thus lifted out of the water substantially in toto as the pool cleaner 10 re-submerges. It will be appreciated that this may result in water which is flowing through the conduit being ejected or jetted out of the nozzle and out of the pool, which is undesirable as the surrounding pool area becomes wetted and water is wasted. This situation impacts on the practicality of the pool cleaner. Optimal movement of the pool cleaner is also affected. However, in the case of the nozzle 100, re-submergence of the pool cleaner pivots the upstream nozzle element 102 relative to the downstream nozzle element 106, with the downstream nozzle element 106 thus typically still located or drifting on the water surface. As the pool cleaner 10 re-submerges, the upstream nozzle element 102 pivots in relation to the downstream element 106 as the submerging pool cleaner 10 effectively pulls it in a downward direction. This causes the upstream nozzle conduit portion 102b to be displaced out of alignment with the downstream nozzle conduit element 110 and being brought into partial flow communication with the flow dispersing conduit 120. The observed advantage of this is that all of the water which is being passed through the upstream nozzle conduit portion 102b does not exit the nozzle through the downstream nozzle conduit element 110, which may result in water being sprayed out of the swimming pool, but is dispersed by the dispersing formations 116a, 116b, thereby being retained, substantially, within the swimming pool. It is therefore to be appreciated that the configuration of the nozzle does not impact upon the driving force under which it is propelled forward, in that misalignment between the upstream and downstream nozzle conduits in most cases only occurs when the pool cleaner 10, and thus the nozzle 100, surfaces. Misalignment of the upstream nozzle conduit portion 102b and the downstream nozzle conduit element 110 has also been found to promote re-submergence of the pool cleaner 10.

[0110] It has been found that the employment of the dispersing ring 108 results in water exiting the upstream nozzle conduit portion 102b, when it is misaligned with the downstream nozzle conduit element 110, being spread substantially evenly across the flow dispersing formations, thereby prohibiting ejection and thus dispersal of the water through only a limited number of the flow dispersing formations 118.

[0111] Referring now to FIG. 13, reference numeral 200 shows a swimming pool outlet connection element for connecting the pool cleaner 10 to a swimming pool outlet nozzle, whether directly or by means of a number of extension hoses.

[0112] The connection element 200 comprises a cylindrical body 202 which defines a flow path 203 therethrough. A circumferential rim 204 projects radially about the body adjacent an upstream end thereof. The rim 204, in use, would act as an abutment formation by means of which the element 200 would be mounted in a secured condition to the outlet nozzle of the swimming pool, typically by means of a nut or the like.

[0113] The connection element 200 further has two downstream projecting gripping members 206a, 206b, each inflecting radially outwardly adjacent a downstream portion thereof. The members 206a, 206b are resiliently deformable and would, in use, serve to secure the pool cleaner conduit 12, or extension hose connected thereto, to the swimming pool outlet nozzle for direction of a water stream therethrough. More particularly, the members 206a, 206b would bias themselves resiliently outwardly against an inner wall of the conduit 12 or extension hose, thereby to grip and secure it in a position in which it is in axial flow communication with the flow path 203 of the element 200 and with the swimming pool outlet nozzle.

[0114] The Applicant regards it as an advantage of the invention, as described, that the pool cleaner 10 operates off, or is driven by, a pool circulation system outlet (or exit side), rather than off a pool circulation system inlet (or suction side) and expects that higher pool cleaning efficiency will be achieved by such an arrangement. However, as indicated hereinbefore, the Applicant expects that it may also be possible for the pool cleaner of the invention to operate off the pool circulation system inlet, or suction side.

[0115] Conventional suction-type pool cleaners, operating off and being driven by suction delivered by a pump of the water circulation system, convey most debris and solid materials which are picked-up from pool surfaces, and which are not removed in intermittent filtering stages, to an inline pool filter of the swimming pool circulation system. Pool chemicals which precipitate on a bottom surface of the swimming pool are also picked up by such pool cleaners and are conveyed to the pool filter in which these chemicals may be filtered out. Materials, and chemicals, which are filtered out by the pool filter, then have to be removed from the filter by backwashing the filter. As will be appreciated, backwashing of the pool filter results in a loss of water, as well as a loss of filtered out chemicals. The efficiency of pool chemicals may thus be negatively impacted on by the usage of suction-type pool cleaners.

[0116] Further, as also alluded to hereinbefore, operation of suction-type pool cleaners are often interrupted by large pieces of solid material, such as leaves and/or twigs, which become lodged in a diaphragm of the pool cleaner. This problem is obviated by the pool cleaner 10 of the present invention, as no transport or conveyance of solid materials occurs in the conduit 14.

[0117] It should further be noted that, due to the unpredictability and erratic nature of the effect on the pool cleaner 10 of the force of the water jet which exits the conduit 14, it is expected that random movement of the pool cleaner through the swimming pool will be effected. It is regarded as another advantage of the invention, as described, that the random or irregular or erratic motion of the pool cleaner 10 results in the pool cleaner having a more comprehensive and more randomized cleaning path than the swimming pool and will not therefore be caught-up in a fixed or memorized operating path, such as is typically the ease with conventional surface-based suction-type pool cleaners. So-called "dead zones", in which the pool cleaner does not operate due to becoming caught-up in such a fixed operating path, are thus reduced or completely avoided.

[0118] As will be appreciated, adjustment of the spherical outlet nozzle 32.2 of the aim-flow 32 will result in a connec-
tion angle of the connection piece 40 being adjusted. Such an adjustment of the connection angle of the connection piece 40 is expected to influence an operating range or area of the pool cleaner 10 and therefore provides adjustment means in addition to the weight elements 62, whereby the operating range or area of the pool cleaner 10 can be adjusted.

[0119] It is regarded as another advantage of the invention as described that the force with which the water jet stream exits the conduit 14, combined with the erratic movement of the pool cleaner 10, will enhance water circulation in the swimming pool and will also keep more solid materials in suspension in the swimming pool, thus rendering the materials more susceptible to being scooped up by the receptacle 16. Enhanced circulation of water in the swimming pool will also aid in preventing algae from growing in the water and on surfaces of the swimming pool. It is also expected that the water jet will dislodge dirt from surfaces of the swimming pool and bring these into suspension in the swimming pool water so as to be picked up by the receptacle 16 of the pool cleaner 10. Further, enhanced circulation of water inside the swimming pool is also expected to result in treatment chemicals, such as granular chlorine, being distributed more evenly through the swimming pool, thus not precipitating on a bottom surface of the swimming pool, and being dispersed more evenly throughout the swimming pool, thus leading to more effective use of these chemicals. As indicated hereinbefore, chemicals are also not removed from the swimming pool by the pool cleaner 10, as the pool cleaner 10 does not use suction force to operate. Chemical water treatment is thus enhanced by the pool cleaner 10 of the present invention.

[0120] The pool cleaner 10 further has much greater freedom of motion when compared to suction-type pool cleaners which are confined to operation on surfaces of the swimming pool, as also alluded to hereinbefore. Thus, it is regarded as an advantage of the invention, as described, that the pool cleaner 10 is free to operate randomly within the water body in the swimming pool, and even on a surface of the water body, specifically where the water meets with the swimming pool wall where debris tend to accumulate and algae tend to grow causing a unsightly ring or mark which is, in Applicant’s experience, not effectively cleaned by conventional suction-type pool cleaners which cannot effectively operate at such a location. The present invention, particularly by means of the cleaning elements which are mountable to various portions thereof, addresses this problem.

[0121] It is regarded as yet another advantage of the invention, as described, that, due to the pool cleaner 10 operating off an outlet of the swimming pool water circulation system, in the form of the air-flow nozzle 32, and not off an inlet weir of the swimming pool circulation system, water circulation directly though the weir remains possible, which would not have been the case when a conventional suction-type pool cleaner is used. As a result, undersized solid material, which is not picked up by the receptacle 16, is kept in suspension by the action of the water jet. At least some of these solid materials are eventually sucked into the weir and filtered out of the circulation system in the filtering stage of the circulation system.

[0122] The weight elements 62, when included in the arrangement 30, will act to vary the buoyancy of the pool cleaner 10, thus influencing an operating height of the pool cleaner 10 inside the swimming pool and also having a bearing on the speed and degree of irregularity with which the pool cleaner 10 operates. It will be appreciated that, by including a sufficient number of weight elements 62 in the arrangement 30, operation of the pool cleaner 10 may be confined to a bottom surface of the swimming pool. When operating on the bottom surface of the swimming pool, the water jet stream will act to bring at least some solid materials, which may be located on the swimming pool floor, into suspension so as to be removed from the swimming pool either by the receptacle 16 or through the weir.

[0123] The Applicant also expects that the pool cleaner 10 of the invention will result in more efficient electricity usage due to the expected increased operating efficiency of the pool cleaner 10 in relation to conventional suction-type pool cleaners.

[0124] The Applicant further expects that, due to the simplicity of construction of the pool cleaner of the invention, the pool cleaner will also be more economically attractive than complex conventional suction-type pool cleaners.

[0125] It is further regarded as another advantage of the invention that the pool cleaner operates less noisily than conventional suction-type pool cleaners.

1. A swimming pool cleaner, which comprises a pool cleaner body comprising a conduit with an inlet end and an outlet end and which defines a flow path through the body, the body being connectable to a water source from which a water stream can be directed through the conduit; and a receptacle connected to the body and having an inlet opening outside the conduit, the inlet opening being directed or facing in an operatively upstream direction towards the inlet end of the conduit, and the receptacle defining a receptacle pocket for receiving solid material which enters the inlet opening of the receptacle.

2. The swimming pool cleaner according to claim 1, wherein the receptacle is mounted to the body in collar- or sleeve-fashion, such that the receptacle pocket extends, or is defined, radially about the pool cleaner body, with the pocket being directed or extending towards the outlet end.

3. The swimming pool cleaner according to claim 2, wherein the receptacle surrounds at least a part of the pool cleaner body, with the pool cleaner body projecting into and extending through the pocket.

4. The swimming pool cleaner according to any one of claims 1 to 3 inclusive, wherein the receptacle tapers in cross-section, relative to the flow path of the flow conduit, from an open upstream or inlet end of the receptacle, which defines the inlet opening, towards a downstream end of the receptacle, such that the downstream end of the receptacle substantially closes about the body.

5. The swimming pool cleaner according to claim 4, wherein the receptacle is mounted to the body by means of a receptacle mounting which comprises at least an upstream element and a downstream element, to which elements the upstream and downstream ends of the receptacle are respectively mounted, with the upstream element defining the upstream inlet opening of the receptacle and with the downstream element defining at least part of the downstream closed end of the receptacle.

6. The swimming pool cleaner according to any one of claims 1 to 5 inclusive, wherein the receptacle is, at least in part, of a porous or foraminous material so that water is able to pass through the receptacle, with oversized solid material, which may be suspended or carried in the water which passes though the receptacle, being retained in the receptacle in sieve-fashion.
7. The swimming pool cleaner according to any of claims 1 to 6 inclusive, wherein an outlet nozzle is provided at the outlet end of the conduit, the nozzle defining a nozzle conduit therethrough which is in communication with the flow conduit defined by the body.

8. The swimming pool cleaner according to claim 7, wherein at least a portion of the nozzle is pivotally displaceable relative to the body such that at least a portion of the nozzle conduit is also displaceable relative to the flow conduit of the body in a substantially pivotal fashion.

9. The swimming pool cleaner according to claim 8, wherein the nozzle has flow dispersing formations which are arranged in a flow dispersing flow channel provided at least partially about and externally to an external periphery of at least a portion of the nozzle conduit such that pivotal displacement of the nozzle brings the dispersing flow channel and thus the flow dispersing formations into flow communication with the flow conduit.

10. The swimming pool cleaner according to claim 8 or claim 9, wherein the outlet nozzle has an upstream portion and a downstream portion which respectively define an upstream nozzle conduit portion and a downstream nozzle conduit portion, with the upstream nozzle portion being connected to the body and the downstream nozzle portion being pivotally connected to the upstream portion.

11. The swimming pool cleaner according to claim 7, wherein the nozzle has a flow regulating element which is adjustable to adjust the flow rate at which water exits the nozzle.

12. A swimming pool cleaning kit, which includes a pool cleaner body comprising a conduit with an inlet end and an outlet end and which defines a flow path through the body, the body being connectable to a water source from which a water stream can be directed through the conduit; and

a receptacle which defines a receptacle pocket for receiving solid material therein, the receptacle being connectable to the body such that an inlet opening thereof is provided outside the conduit and is directed or faces in an operatively upstream direction towards the inlet end of the conduit.

13. A swimming pool cleaning arrangement, which includes a swimming pool water circulation system comprising at least a pump, a circulation system inlet through which water is withdrawn from a swimming pool by the pump, and a circulation system outlet through which withdrawn water is reintroduced into the swimming pool by the pump; and

a swimming pool cleaner in accordance with claims 1 to 10 inclusive, the swimming pool cleaner being operatively connected to the circulation system outlet.

14. A method of operating a pool cleaner in a swimming pool, the method including passing a water stream through a conduit defined in a body, thereby displacing the body in an operatively upstream direction relative to the direction of water flow in the flow path through the conduit; and

collecting, in a receptacle mounted to the body and having an opening directed in an operatively upstream direction to define a receptacle pocket in an operatively downstream direction, solid materials from the swimming pool.

15. A swimming pool cleaning kit, which includes a pool cleaner in accordance with any one of claims 1 to 11; and

at least one extension hose.

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