United States Patent [19]

Hruby, Jr.

[11] **3,801,010**

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[54] **LOW PROFILE FOUNTAIN ASSEMBLY**

[75] Inventor: **John O. Hruby, Jr.**, Burbank, Calif.

[73] Assignee: **Rain Jet Corp.**, Burbank, Calif.

[*] Notice: The portion of the term of this patent subsequent to Dec. 12, 1989, has been disclaimed.

[22] Filed: **Dec. 11, 1972**

[21] Appl. No.: **313,989**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 306,528, Nov. 15, 1972, and a continuation-in-part of Ser. No. 87,886, Nov. 9, 1970, Pat. No. 3,705,686.

[52] **U.S. Cl.** **239/17**, 239/590.5

[51] **Int. Cl.** **B05b 17/08**

[58] **Field of Search** 239/17, 22, 23, 553.5, 239/590.5

[56] **References Cited**

UNITED STATES PATENTS

3,705,686	12/1972	Hruby, Jr.	239/22
3,486,700	12/1969	Bristow	239/590.5
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FOREIGN PATENTS OR APPLICATIONS

496,231	11/1938	Great Britain	239/553.5
293,636	12/1953	Switzerland	239/590.5

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—John J. Love
Attorney, Agent, or Firm—Christie, Parker & Hale

[57] **ABSTRACT**

An ornamental fountain assembly includes a nozzle support housing which defines an internal chamber. Water inlet duct means communicate with the chamber. The chamber has a height along a vertical axis of the assembly which is at least equal to the diameter of the duct means adjacent the chamber. The chamber has a cross-sectional area in planes normal to the axis which is at least twice the effective water flow area of the duct means adjacent the chamber. A fountain nozzle is carried by the housing coaxially of the chamber and communicates with the chamber through the upper boundary thereof. The nozzle has a liquid inlet opening of area less than the cross-sectional area of the chamber. Liquid flow controlling and directing means are associated with the path of the water flow through the chamber from the opening of the inlet duct means to the chamber to the inlet of the nozzle. The liquid flow controlling and directing means are proportioned and arranged for causing liquid flowing along the path at the nozzle inlet to have an essentially axial flow characteristic and an essentially uniform liquid flow pattern. The flow controlling and directing means include the above-mentioned proportioning of the chamber relative to the inlet duct means and the nozzle inlet areas; this means also includes vertically disposed perpendicularly intersecting baffle members in the chamber arranged symmetrically about said axis.

8 Claims, 3 Drawing Figures

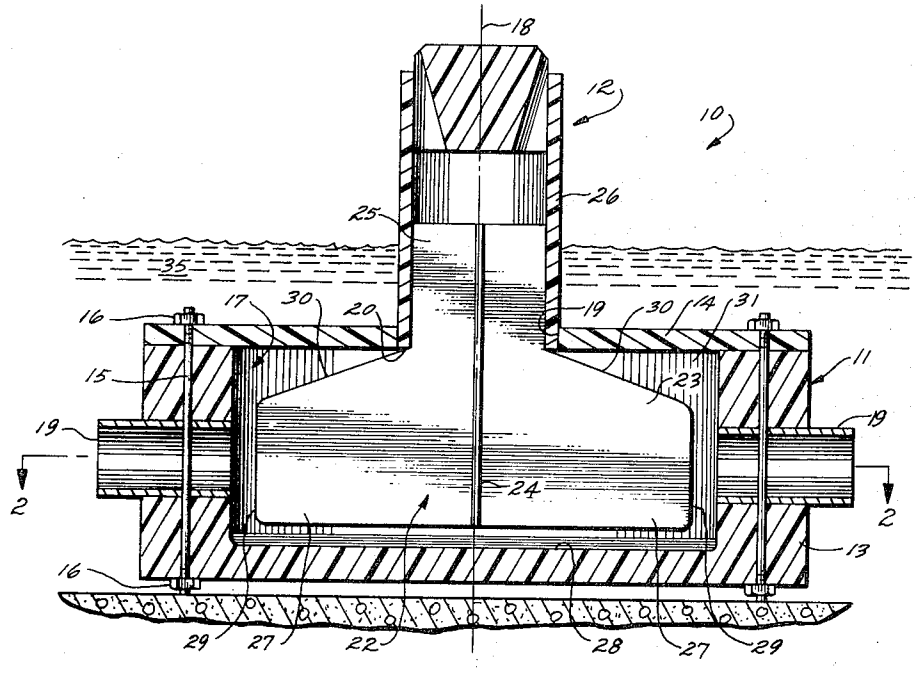

FIG. 1

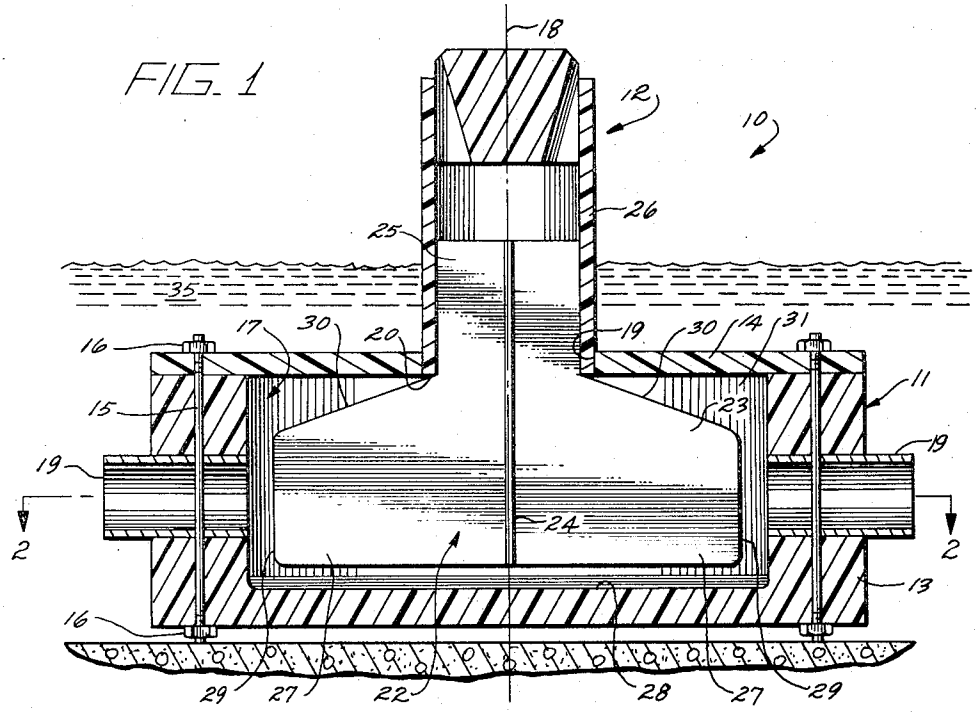
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FIG. 2

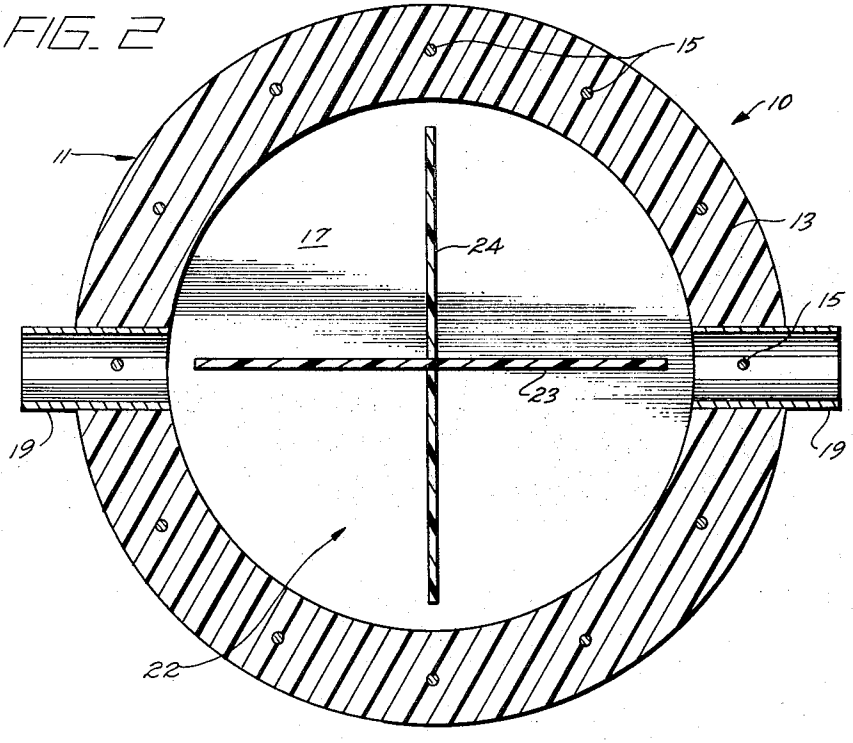
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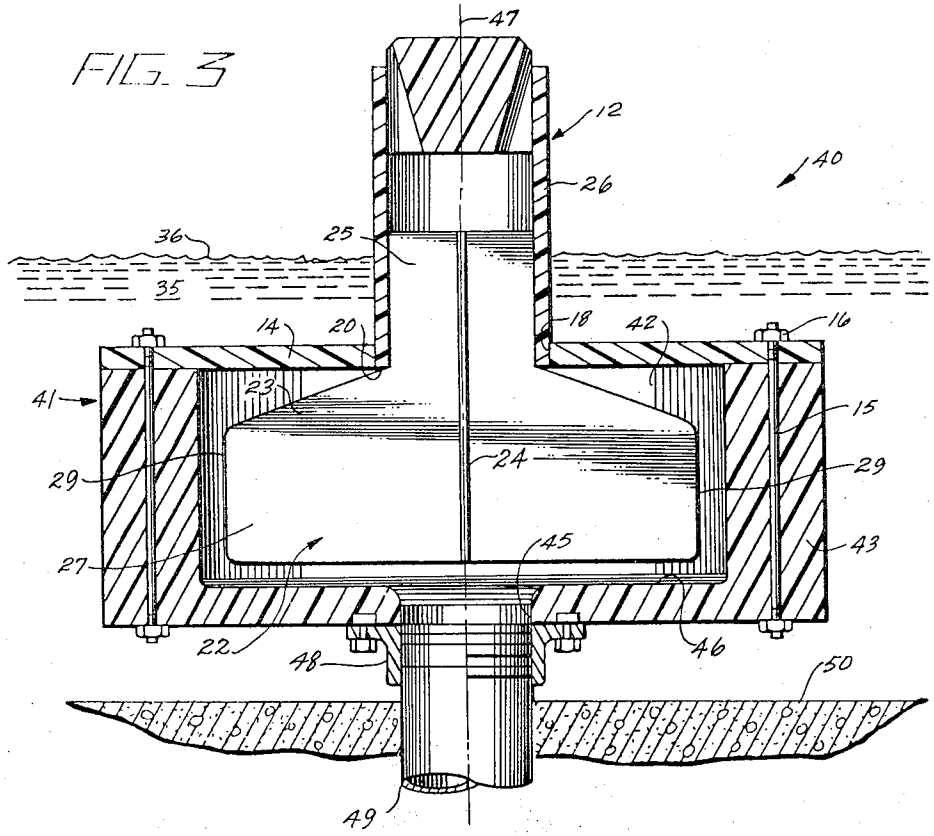
FIG. 3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LOW PROFILE FOUNTAIN ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 87,886 filed Nov. 9, 1970, issued as U.S. Pat. No. 3,705,686 on Dec. 12, 1972, and also of application Ser. No. 306,528, filed Nov. 15, 1972.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to ornamental fountains or the like having upwardly discharging liquid discharge nozzles. More specifically, the invention pertains to a fountain nozzle support base useful in shallow fountain pools.

2. Description of the Prior Art

U.S. Pat. No. 3,705,686, of which this application is a continuation-in-part, describes several fountain nozzle support bases which are arranged to cause water flowing from an internal chamber of the base to the inlet of a nozzle supported by the base to have an essentially laminar liquid flow characteristic. The support bases described in the patent are also arranged so that the water entering the nozzle has a uniform liquid flow pattern. These characteristics in the water entering the nozzle are desirable so that the base may be used to advantage with any one of a number of fountain nozzles, each of which is arranged to operate on water introduced to it in a particular manner to produce a characteristic aesthetically appealing effect in the discharge pattern of water emerging from the nozzle. The fountain discharge pattern may be comprised of aerated water or non-aerated water, or a combination of aerated and non-aerated water streams.

In general, the fountain nozzles produced by the owner of this application, as well as by other manufacturers of fountain nozzles, are designed and arranged with reference to water supplied to the nozzle through a coaxially aligned supply pipe of indefinite length. Water so supplied to the nozzle has an essentially laminar flow characteristic and has a uniform liquid flow pattern, as these terms are defined hereinafter. In practice, however, it is rare that the fountain nozzle will be mounted to a coaxially aligned pipe of extended length, with the result that the fountain nozzle does not perform in use in the manner intended by the manufacturer.

The fountain bases described in U.S. Pat. No. 3,705,686 are useful to provide the desired flow characteristics in water presented to the nozzle in situations which would otherwise result in gross departure from these desired characteristics in the water flow to the nozzle. The support bases described in this patent, as a practical matter, are relatively high structures which are used to best advantage only in relatively deep fountain pools and the like. In any fountain installation, it is desirable, for best aesthetic effect both during periods when the fountain is in use and in periods when the fountain is not operated, that minimum structure project above the surface of the fountain pool. Accordingly, it is desirable that the fountain support base and as much of the nozzle as possible be submerged within the fountain pool. The relatively great height of the support bases described in the above-mentioned patent makes those support bases unsuitable for use in shallow fountain pools where the best aesthetic effect is desired.

As used herein, the terms "uniform liquid flow rate" and "uniform liquid flow pattern" mean that the liquid velocity profile taken in any radial plane through the nozzle inlet, or adjacent to the nozzle inlet, is the same whether the liquid flow characteristic be laminar or turbulent. Where the water introduced into the nozzle has a uniform liquid flow pattern, the flow rate of the water along one side of the nozzle is the same as the flow rate along any other portion of the nozzle duct at the same location radially from the nozzle axis.

SUMMARY OF THE INVENTION

The fountain bases according to the present invention produce the desired essentially laminar axial flow characteristic and uniform liquid flow pattern in water supplied to fountain nozzles supported by the base. The present bases are of low height, and therefore are useful in relatively shallow fountain pools where support bases of the type described in U.S. Pat. No. 3,705,686 cannot be used for best aesthetic effect.

Generally speaking, this invention provides an ornamental fountain assembly which includes a nozzle suport housing defining therein a chamber. Water inlet duct means communicate with the chamber. The chamber has a height along a vertical axis of the assembly which is at least equal to the diameter of the duct means adjacent the chamber. The chamber has a cross-sectional area in planes normal to this axis which is at least twice the effective water flow area of the duct means adjacent the chamber. The fountain nozzle is carried by the housing coaxially of the chamber and communicates with the chamber through an upper boundary of the chamber. The nozzle has a liquid inlet opening of area less than the cross-sectional area of the chamber. Liquid flow controlling and directing means are associated with the path of water flow through the chamber from the opening of the inlet duct means to the chamber to the inlet of the nozzle. The flow controlling and directing means are proportioned and arranged for causing liquid flowing along the path at the nozzle inlet to have an essentially axial flow characteristic and an essentially uniform liquid flow pattern. The flow controlling and directing means include the above-mentioned proportioning of the chamber relative to the inlet duct means and nozzle inlet areas. The flow controlling and directing means also include vertically disposed, perpendicularly intersecting baffle members located in the chamber and disposed symmetrically about the assembly axis.

DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features of this invention are more fully set forth in the following detailed description of two presently preferred embodiments of the invention, which description is presented with reference to the accompanying drawings, wherein:

FIG. 1 is a cross-sectional elevation view of a first embodiment of this invention;

FIG. 2 is a view taken along line 2—2 in FIG. 1; and

FIG. 3 is a cross-sectional elevation view of another embodiment of the invention.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

A fountain assembly **10** (see FIGS. **1** and **2**) includes a support base **11** for a fountain nozzle **12.** The base is composed of a body **13** and a top annular closure plate **14** which are secured together by a plurality of through-bolts **15** and corresponding nuts **16,** the through-bolts passing entirely through the cover plate and body, as illustrated. The through-bolts and their associated nuts are disposed at regular intervals about the circumference of the base, which preferably is of right circularly cylindrical configuration. A chamber **17** is formed within body **13** and preferably is of right circularly cylindrical configuration concentric about an axis **18** of the fountain. The chamber opens to the top surface of the body but is closed by the top plate which has an outlet opening **19** formed therein concentric to axis **18.**

At least one inlet duct is provided to the chamber through its side walls. As shown in FIG. **1,** in fountain **10** two coaxially aligned diametrically opposed inlet ducts are provided in base **11,** and these ducts are provided in the form of corresponding ones of a pair of connection nipple tubes **19** which have their outer ends disposed outside the base for connection to suitable water supply conduits. Preferably, as shown, the nipples are disposed so that they are traversed diametrically by corresponding ones of through-bolts **15;** the through-bolts serve to retain the nipples within body **13** and also to modulate the flow of water through the nipple into chamber **17.**

Nozzle **12** has an open lower inlet end **20.** The nozzle is mounted to base **11** so that the inlet end of the nozzle communicates with chamber **17** via opening **19.** The mounting of the nozzle to the base is so arranged that the nozzle is disposed coaxially of chamber **17.** The structure of the nozzle per se is not an element of this invention, and workers skilled in the art to which this invention pertains will readily appreciate that any of the fountain nozzles, including nozzles of the rotary pendulum type, disclosed in previously issued patents owned by the assignee of this invention may be used, as desired, in fountain **10.**

A baffle assembly **22** is disposed within chamber **17,** and partially within the lower extent of nozzle **12,** for distributing within chamber **17** the water which enters the chamber through the inlet openings to the chamber. The baffle assembly is arranged so that, as the water flows from the chamber to the open lower end of nozzle **12,** the water possesses a uniform liquid flow pattern and flows essentially axially of the nozzle with an essentially laminar flow characteristic. Baffle assembly **22** is composed of a pair of perpendicularly oriented, inverted T-shaped baffle plates **23** and **24.** The leg **25** of each baffle plate has a width corresponding to the inner diameter of the body **26** of nozzle **12.** The laterally extending arms **27** of each T are disposed in chamber **17,** as shown. The leg **25** of each baffle plate extends as far as practicable along the body of the nozzle from its open lower end. As shown best in FIG. **2,** the line of intersection of baffle plates **23** and **24** corresponds with fountain axis **18,** and one of the baffle plates **23** is coincident with the line along which connection nipples **19** are coaxially aligned.

Preferably, as shown in FIG. **1,** the baffle assembly has its lower extent spaced a short distance above the floor **28** of chamber **17.** Also, it is preferred that the outer edges **29** of the arms **27** of the baffle plates be spaced somewhat from the side walls of the chamber, and that arm edges **29** be connected to the side edges of the leg **25** of each baffle plate by an edge **30** which is inclined upwardly and inwardly relative to nozzle axis **18.** In this manner, an equalizing channel **31** is provided in chamber **17** circumferentially of the baffle assembly.

Support base **11** includes water flow controlling and directing means associated with the path of water flow from inlet nipples **19** to the inlet opening of nozzle **12** for causing water entering the inlet opening of the nozzle to have an essentially axial flow characteristic and an essentially uniform liquid flow pattern. This liquid flow controlling and directing means is provided in part by baffle assembly **22.** The proportioning of the dimensions and configuration of chamber **17** relative to the water flow areas of nipples **19** and the nozzle inlet opening are also aspects of the liquid flow controlling and directing means of base **11.**

It is preferred that the total height of base **11** be as small as possible to enable the base to be used with very shallow pools such as fountain pool **35,** shown in FIG. **1;** it is desired that base **11** and as much of nozzle **12** as possible be submerged below the surface **36** of the fountain pool during use of fountain **10.** To achieve these ends, chamber **17** has as large a diameter as possible, and has a total cross-sectional area in planes perpendicular to axis **18** which is substantially greater than the aggregate area of the water inlet openings to the chamber. A large cross-sectional area of chamber **17,** relative to the total water inlet opening area to the chamber, assures that the velocity of water entering the chamber through nipples **19,** for example, will be substantially reduced within the chamber. Such a velocity reduction reduces the tendency of water to swirl both within the chamber and as it enters into the inlet opening of nozzle **12,** thereby assuring to the greatest extent possible that the water entering into the nozzle flows parallel to the axis of the nozzle and has an essentially laminar flow characteristic.

It has been found that the cross-sectional area of chamber **17** in planes perpendicular to axis **18** should be at least twice the total water inlet area to the chamber, and preferably four or more times greater than the inlet area to the chamber. Also, the cross-sectional area of the chamber in planes perpendicular to axis **18** should be substantially greater than the area of the inlet opening to the nozzle which is supported by the base. Also, the height of the chamber should be at least equal to, and preferably greater than, the diameter of any one of the inlet openings to the chamber. As a general rule, for best practice of this invention, as the height of the chamber is reduced, the diameter of the chamber should be increased.

As will be apparent from a comparison of the structures shown in FIGS. **1** and **3,** this invention comprehends that the inlet openings to the chamber may be formed either through the side walls of the chamber or through the bottom of the chamber. Where the chamber water inlet openings are formed through the side walls of the chamber, one, two or four such openings may be provided. Regardless of the number of openings provided to chamber **17,** each opening should be centered in a plane of one of the baffle plates so that the baffle plate operates on water entering the chamber

from the adjacent inlet opening to divide the water flow into two equal parts.

Especially where only a single inlet opening is provided to chamber **17**, it is desired that equalization flow channels be provided around the circumference of baffle assembly **22** within the chamber to assure that the water entering nozzle **12** has the desired uniform liquid flow pattern. The presence of equalization flow channels around the circumference of baffle assembly **22** is also desired in multi-inlet bases according to this invention where the flow rate through any one inlet opening can vary relative to the flow rate through the other inlet openings, as where the water flow to one or more plural inlet openings is separately valved. On the other hand, where two or four water inlet openings are provided to the chamber and the inlet openings are so connected to a source of water that no differential flow rates can exist between the several inlet openings, then baffle plates **23** and **24** may be configured to intimately engage the bottom, side and top surfaces of chamber **17**.

Another fountain **40** according to this invention is illustrated in FIG. **3**. Fountain **40** includes an axial-flow, low profile, flow-regulating support base **41** for a suitable fountain nozzle such as nozzle **12**. As in fountain **10**, a cruciform flow modulating and equalizing baffle assembly **22** cooperates with the lower portions of nozzle body **26** and with an internal chamber **42** formed within a body **43** of the base. A water inlet opening **44** is provided through the floor **45** of chamber **42** and is aligned coaxially of a nozzle axis **47** about which chamber **42** is concentric. A conventional bolting flange **48** is carried by the lower exterior surface of base **41** concentrically about inlet opening **45** to adapt the base to be connected to the externally threaded upper end of a riser nipple **49** which extends a short distance above the floor **50** of fountain pool **35**. Preferably, as shown in FIG. **3**, the upper extent of inlet opening **45** is belled or flared.

In fountain **40**, baffle assembly **22** cooperates with the proportioning and arrangement of chamber **42** to provide water flow controlling and directing means within the base for assuring that water entering the inlet end of nozzle **12** flows axially within the nozzle body with an essentially laminar flow characteristic and has an essentially uniform liquid flow pattern. As with chamber **17** of fountain **10**, chamber **42** of fountain base **41** is proportioned and arranged with respect to the cross-sectional area of both the water inlet opening to the chamber and the nozzle inlet opening area. Accordingly, chamber **42** has a cross-sectional area in planes perpendicular to axis **47** which is at least twice the effective flow area of inlet opening **45**, and preferably is at least four or more times greater than the inlet opening area. Also, as shown in FIG. **3**, the cross-sectional area of the chamber in planes perpendicular to axis **42** is substantially greater than the inlet opening of the nozzle which is supported by the base.

In an axial-flow, low profile base according to this invention, it is desired that baffle assembly **22** be arranged so that the bottom, side and top surfaces of the arms **27** of baffle plates **23** be spaced from the adjacent surfaces of chamber **42**, thereby to provide flow equalizing water circulation paths within the chamber about the circumference of the baffle assembly. These equalizing flow paths are desired about the circumference of the baffle assembly because, conventionally, riser nipple **49** extends directly upwardly from an elbow located essentially immediately below the floor **50** of the fountain pool. The presence of an elbow close to the upper end of riser nipple **49** causes the water flowing through inlet opening **45** to have a non-uniform liquid flow pattern, which flow pattern is modulated by the proportioning of chamber **42**, in cooperation with baffle assembly **22**, into a uniform liquid flow pattern at the inlet opening to the nozzle supported by base **41**.

Workers skilled in the art to which this invention pertains will readily appreciate that modifications and alterations may be made to the structures of the two embodiments described above without casting aside or departing from the teachings of this invention. Accordingly, the foregoing description should not be regarded as limiting the scope of this invention.

What is claimed is:

1. An ornamental fountain assembly comprising a nozzle support housing defining therein a chamber, a water inlet duct means communicating with the chamber, the chamber having a height along a vertical axis of the assembly which is at least equal to the diameter of the duct means adjacent the chamber, the chamber having a cross-sectional area in planes normal to said axis which is at least twice the effective water flow area of the duct means adjacent the chamber, a fountain nozzle carried by the housing coaxially of the chamber and communicating with the chamber through the upper boundary thereof, the nozzle having a liquid inlet opening of area less than said cross-sectional area of the chamber, and liquid flow controlling and directing means associated with the path of water flow through the chamber from the opening of the inlet duct means to the chamber to the inlet of the nozzle and proportioned and arranged for causing liquid flowing along the path at the nozzle inlet to have an essentially axial flow characteristic and an essentially uniform liquid flow pattern, said means including the aforesaid proportioning of the chamber relative to the inlet duct means and nozzle inlet areas and vertically disposed perpendicularly intersecting baffle members in the chamber symmetrical about said axis.

2. A fountain assembly according to claim **1** wherein the inlet duct means are defined through the side walls of the chamber.

3. A fountain assembly according to claim **2** wherein the inlet duct means comprises a plurality of openings to the chamber through the side walls thereof at locations spaced uniformly about the axis.

4. A fountain assembly according to claim **3** wherein each chamber inlet opening is aligned with a baffle member.

5. A fountain assembly according to claim **1** wherein the baffle members extend in the chamber laterally from the nozzle opening.

6. A fountain assembly according to claim **5** wherein the baffle members have edges disposed proximate to but spaced from the adjacent surfaces of the chamber.

7. A fountain assembly according to claim **1** wherein the inlet duct means to the chamber comprises a water inlet opening formed through the bottom of the chamber concentric to said axis.

8. A fountain assembly according to claim **1** wherein the baffle members extend through the nozzle inlet opening.

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