

[54] MUSICAL DISPLAY FOUNTAIN

[76] Inventor: Gunter Przystawik, 5230 Tamiami Ct., Cape Coral, Fla. 33904

[22] Filed: Jan. 11, 1973

[21] Appl. No.: 322,856

[52] U.S. Cl. 239/242; 239/19; 239/229

[51] Int. Cl.²..... B05B 3/16; F21P 7/00; B05B 3/00

[58] Field of Search 239/242, 255, 229, 98, 239/19, 162, 587

[56]

References Cited

UNITED STATES PATENTS

1,239,952	9/1917	Perry	239/242
1,479,675	1/1924	Rees	239/242
1,900,837	3/1933	Mills	239/162
2,132,314	10/1938	Needler	239/242
2,411,964	12/1946	Grass	239/162
2,574,206	11/1951	Browning.....	239/162

2,610,088 9/1952 Randell..... 239/162
 2,620,232 12/1952 King..... 239/229

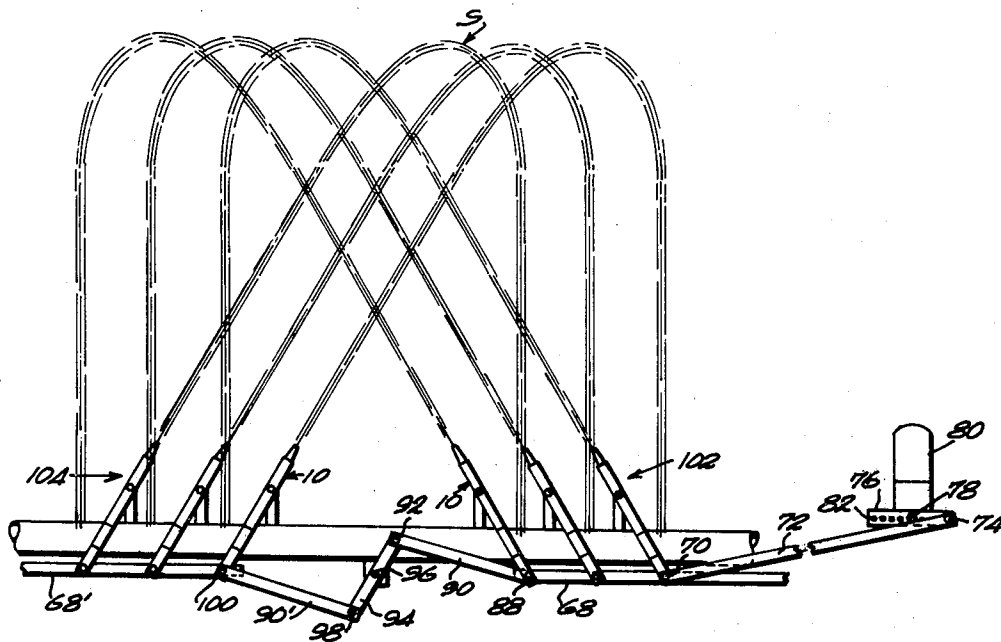
Primary Examiner—Lloyd L. King

[57]

ABSTRACT

Nozzle means comprised generally of a plurality of nozzles, each of which is accurately constructed to discharge a stream of water, controlled in changing angular relationships and directions, along with variations in water pressures, to achieve beautiful effects. The nozzles and control system are for use in a fountain display which is synchronized to music and controlled multi-color lighting system to provide a spectacular entertainment display. Each nozzle includes a fixed bottom portion and nozzle, and means for attachment to the actuating system whereby the degree of angular movement of said nozzle is accurately controlled.

5 Claims, 5 Drawing Figures



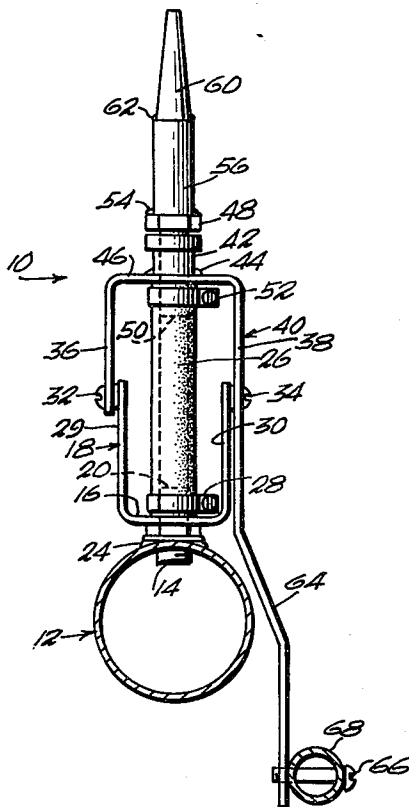


Fig. 1

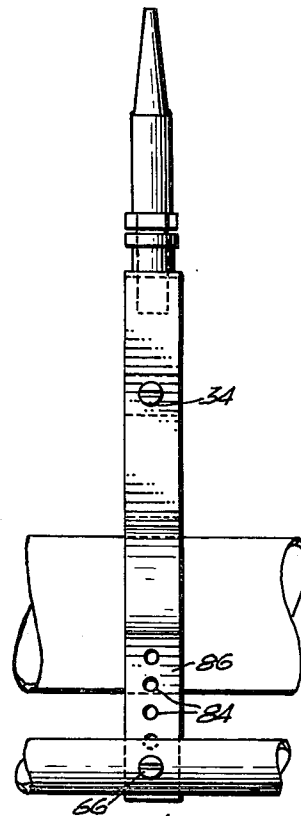


Fig. 2

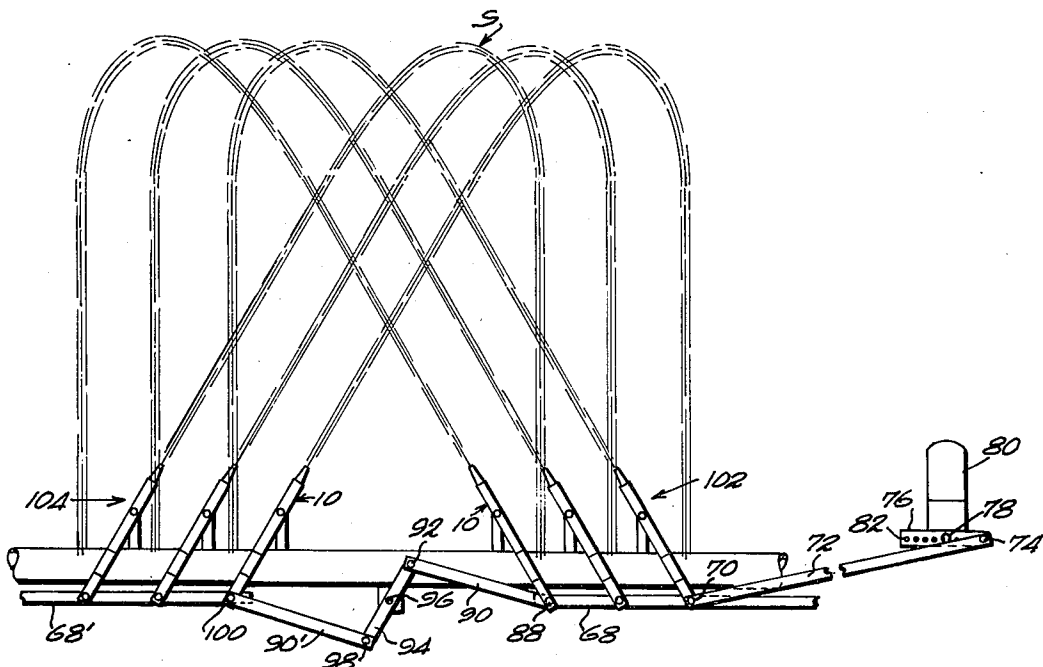
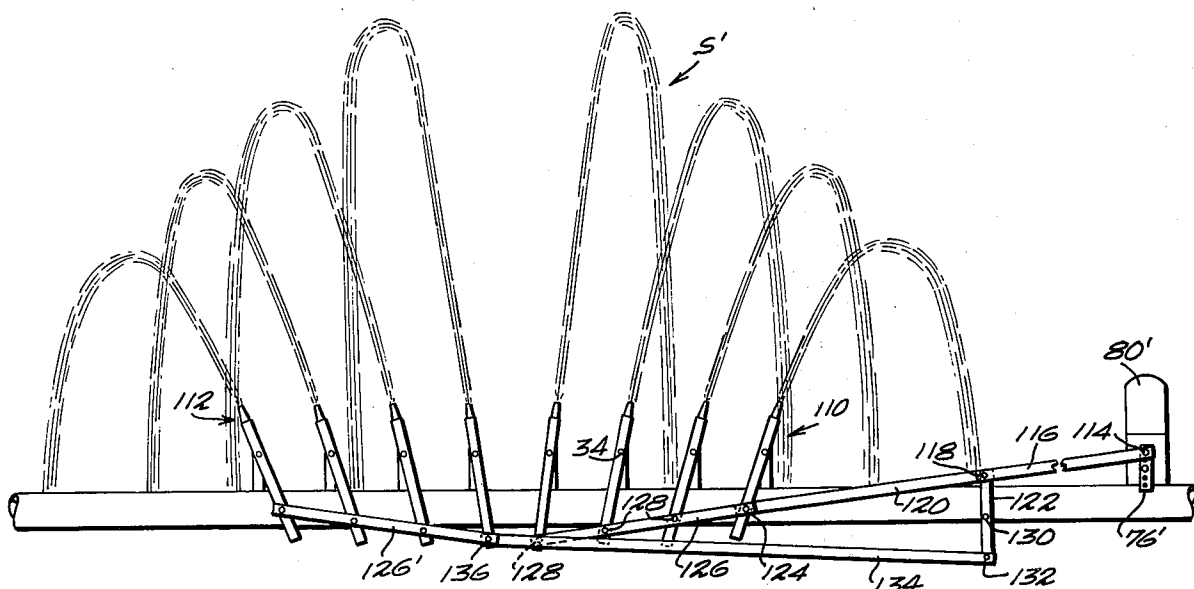
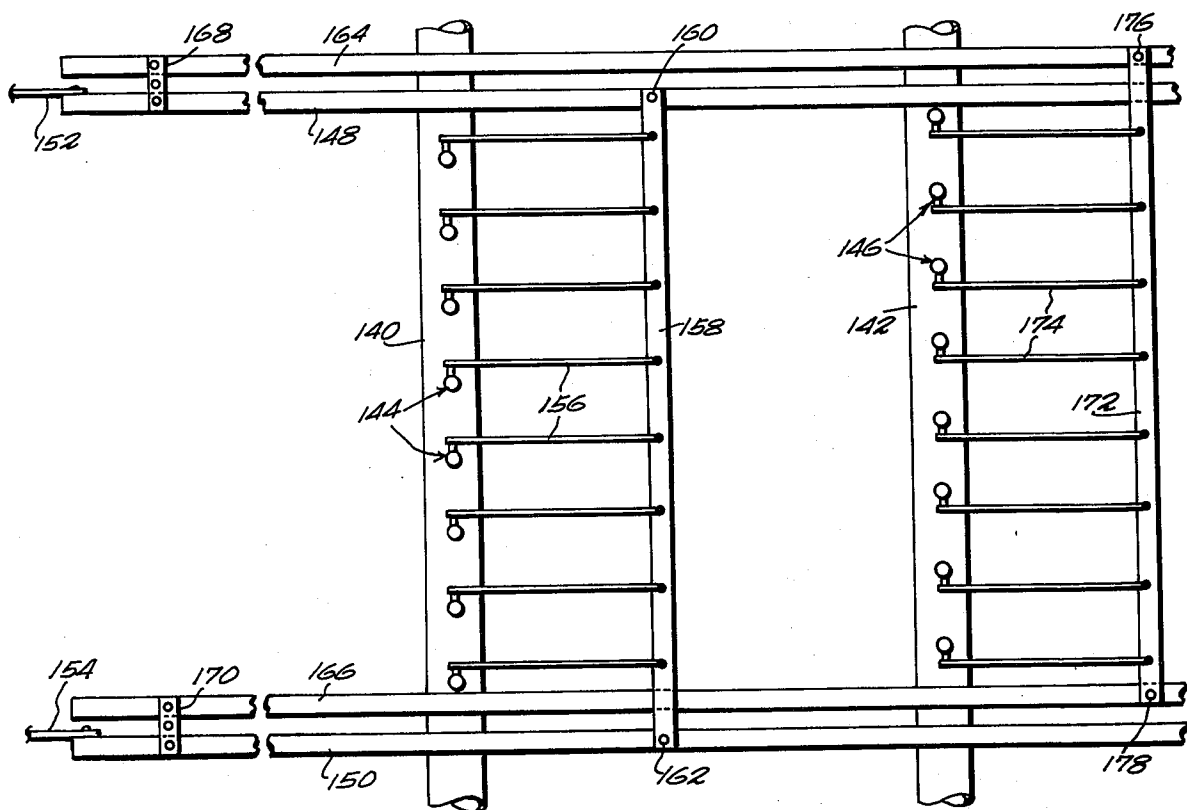


Fig. 3



MUSICAL DISPLAY FOUNTAIN

STATE OF THE PRIOR ART

Prior art U.S. Pat. Nos. 915, 162 to E. L. DeLong, No. 1,209, 813 to W. H. Coles, No. 1,380,403 to G. E. March and No. 1, 410,434 to R. N. Werstler all pertain to irrigation systems providing above ground sprinkler heads, incorporating drive means to move the spray heads in unison in an oscillating or reciprocating fashion to irrigate a maximum amount of the surrounding territory.

U.S. Pat. No. 3,030,031 to R. L. Barker and U.S. Pat. No. 3,587,972 to Waldo W. Weeth disclose above ground irrigation systems incorporating elongated supply pipes, placed on the ground, with a plurality of resilient nozzles extending upwardly therefrom which "wiggle" to cause the water being discharged therefrom to cover a greater area.

U.S. Pat. No. 3,650,470 to Charles A. Wertman discloses a liquid sprinkling system including means and method comprising passing liquid through a plurality of flexible tubings and for a cyclicly moving said tubings in unison while liquid is passing therethrough to produce a predetermined liquid sprinkling pattern formed by continually moving liquid streams which distribute the liquid evenly from perimeter to center.

This device incorporates a complicated mechanical assembly including a liquid motor, a gear reduction train, a crank mechanism, an oscillating plate having a plurality of circumferentially spaced apart clearance holes, a liquid manifold compartment and a plurality of flexible tubings extending through said clearance holes to provide a generally rotary spray pattern.

U.S. Pat. No. 3,077,306 to Hans Hergog discloses an extremely complicated mechanical device which relates to a fountain comprised of a circular series of jet nozzles, mounted in a carrying plate by means of articulated joints so as to be moveable in all directions and connected by flexible base connections to a distributor head having a like number of connecting nipples and having a limited freedom of movement.

BACKGROUND OF THE PRESENT INVENTION

The present invention is directed to an oscillating fountain nozzle, including adjustment means, for use in a system incorporating, a plurality of said nozzles, drive means and connecting means to said nozzles for synchronizing the flow of water therethrough with music to achieve a water effect, synchronized to the music.

In practice, this type of display also employs a controlled, changeable, multi-color lighting system. The overall effect is truly spectacular. Various nozzle means, providing a plurality of different spray patterns, are employed in a single installation and means are also provided to selectively vary the water pressure to said various nozzle means whereby the flow of water emitted therefrom may, for example, vary from approximately 1 foot in height to 100 feet.

Each nozzle is provided with a main water supply conduit which may supply water to one nozzle or a plurality of nozzles. The nozzle means of the present invention provides pivot means and adjustable connection means to a drive means such as a gear reduction motor to oscillate the nozzle and the resulting water spray through a predetermined degree of angular movement.

In one system of the present invention, a first plurality of the nozzles, in communication with a water supply conduit, are pivotally mounted in a spaced apart relation along one side of the conduit and a second plurality of nozzles are similarly mounted along the opposed side of the conduit. The drive motor by means of an eccentric and linkage means oscillates the first plurality of nozzles in unison, in a constant parallel relationship, through a predetermined degree of arcuate movement. From the first plurality of nozzles, a reversing lever is connected to the second plurality of nozzles, to synchronize the movement thereof in an opposed relation to the first plurality of nozzles. In this manner, a constantly changing spray pattern is provided wherein the streams of water from said first and second pluralities of nozzles, sequentially change from a converging, cross-over pattern to an oppositely outwardly diverging pattern.

A second system of the present invention provided a somewhat similar arrangement of first and second pluralities of nozzles to provide a constant, symmetrical spray pattern.

In a third system of the present invention, a plurality of spaced apart nozzles, in accordance with the present invention, are provided across each of two or more main water supply conduits which are, in turn, spaced a predetermined distance apart in a generally parallel relationship. Drive motor means, in combination with various combinations of side rails and linkage means may be provided to oscillate the nozzles, pivotally attached to the respective conduits, to achieve a variety of different, synchronized spray patterns.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of a spray nozzle, in accordance with the present invention, connected to a water supply conduit;

FIG. 2 is a side elevational view of the spray nozzle of FIG. 1;

FIG. 3 is a side elevational view of a plurality of spray nozzles, incorporated in a first system, to provide an ever changing symmetrical spray pattern;

FIG. 4 is a view similar to FIG. 3 illustrating a second system to provide a different, ever changing, symmetrical spray pattern; and

FIG. 5 is a schematic top plan view of a third system which may incorporate various side rail and linkage means from drive motor means to two or more pluralities of the nozzles of the present invention to provide various ever changing, symmetrical spray patterns.

DETAILED DESCRIPTION OF THE DRAWINGS

With reference to the drawings in which like reference characters designate like or corresponding parts throughout the various views and with particular reference to FIGS. 1 and 2, the nozzle means of the present invention, designated generally at 10, is illustrated in fixed relation to a water supply pipe 12. A nipple 14 is fixed through an opening in the top of the water supply pipe 12 and the base web 16 of a yoke member 18 is fixed over the top portion 20 of the nipple 14, transversely of the water supply pipe 12.

With reference to FIG. 1, nipple 14 is threaded through the water supply pipe 12 and is fixed thereto at 24. Slip fitted over the top portion of the nipple 14, a flexible water conduit means, such as the hose 26, is fixed thereto by a clamp ring 28. The bottom edge of

the hose 26 is in abutment with the top surface of the yoke base 16.

With further reference to FIG. 1, the upper ends of the upstanding arms 28 and 30 of yoke 18 are pivotally connected at 32 and 34 respectively, to the downwardly extending arms 36 and 38 of a yoke member 40 which is generally inverted relative to the yoke 18. A bushing 42 is fixed at 44 in a normally upwardly extending relation to the top face of the base web 46 of yoke 40 in normal apial alignment with the bottom nipple 14. Threaded downwardly through the bushing 42, a top nipple 48 includes a lower end portion 50 to connect with the top end of the flexible hose 26 in a clamped relation at 52. The upper end of the nipples are soldered at 54 to an axially aligned tube 56 which is preferably formed of soft copper or lead. Extending upwardly from the tube 56, in axial alignment therewith, is a nozzle 60 which is fixed to the upper end of the soft copper as by silver solder 62 or lead tube secured by ordinary solder. The copper or lead tube 56 being soft permits the accurate adjustment of the nozzle 60 relative to said tube 56. In practice, a plurality of nozzle assemblies, employed in a single system to be subsequently described, are directed to vertical attitudes and the water is turned on to flow therethrough. Because of the soft copper or lead tube construction, each nozzle 60 of the system is readily adjustable so that the water flowing therefrom falls in a circle with the nozzle 60 at the center thereof.

Precision and accuracy in every aspect of a fountain display of this nature are quite essential and contribute greatly to the effect because a plurality of each of a number of water spary systems are generally employed and the combination of all systems provide a total, symmetrical spray pattern which may be well over 100 feet in length. As previously stated, a manually or automatically controlled, constantly changing multi-color lighting system is also employed and the combination of the lighting system and spray pattern are controlled to reflect the ever changing mood, tempo, rhythm, etc. of the accompanying music in a most spectacular manner.

One arm 38 of the upper yoke member 40 is extended downwardly at 64 for pivotal connection at 66 to an elongated push rod 68. Referring now to FIG. 2, a plurality of two, three or more nozzles assembled being fixed to the water supply pipe 12 in a predetermined relation such as the equally spaced apart arrangement as illustrated. The push rod 68 is pivotally connected at 70 to one end of a crank arm 72. The opposed end of the crank arm 72 is adjustably, pivotally connected at 74 to an eccentric 76, secured to the driveshaft 78 of a gear reduction motor 80. Desirable results have been achieved when the eccentric 76 is rotated at about 30 RPM, or once every two seconds. If desired, the speed of the motor can be varied as by the use of a 3 phase slip ring motor and rheostat or an Electronic Speed Control may be employed. With this arrangement, all of the nozzle assemblies 10 are uniformly oscillated through an arc of a predetermined number of degrees depending on the pivotal attachment 74 relative to a plurality of adjustment holes 82 in the eccentric 76, and the pivotal attachment 66 relative to the plurality of adjustment holes 84 in the lower portion 86 of the arm extension 64. With the pivotal attachment 66 illustrated, the nozzle assemblies 10 will maintain a parallel relationship at all times. If the push rod 68 is normally angled in a manner so as to connect

with different adjustable holes 84 in each extension 64, to progressively shorten the distance between the pivots 66 and 34, for example, the nozzle assemblies 10 will swing through arcs of different spray patterns.

With further reference to FIG. 3, the inner end of the push rod 68 is pivoted at 88 to a link 90 which is pivotally connected at 92 at its opposed end to a rocker arm 94. Rocker arm 94 is centrally pivoted at 96 relative to pivot 92 and a pivot 98, connecting with a link 90, is, in turn, pivoted at 100 to a second push rod 68', connected to a second series of nozzle assemblies 10, spaced a distance from the first and second series of spray nozzles, designated 102 and 104, is such that an ever changing spray patterns is defined which constantly changes back-and-forth from the cross-over pattern illustrated to one in which the sprays, from all of the nozzles 60 of each series 102 and 104, are directed in a generally parallel outwardly diverging relation to each other.

FIG. 4 illustrates a different linkage arrangement from the gear reduction motor 80' minutes to two series of spary nozzles assemblies 110 and 112, each consisting of four spray nozzle assemblies 10. The driven eccentric 76 is adjustably connected at 114 to one end of a first crankarm section 116. A pivot connection 118 is provided between the opposed end of the crank arm section 120 is pivoted at 124 to a push rod 126. Said push rod 126, is pivoted at 128 to various adjustment holes 84 in the respective arm extensions 64 in each nozzle assembly 10 whereby the distance between the pivots 128 and 34 becomes progressively shorter.

With further reference to FIG. 4, the rocker arm 122 is centrally pivoted at 130 relative to a pivot 132 connecting to a first end of the connector link 134 is pivoted at 136 to a push rod 126' which is connected to each nozzle assembly 10 of the second series 112 in the same manner as described relative to the push rod 126 and the first series 110.

Because of the pivotal connections between the push rods 126 and 126' and various adjustment holes 84 in the arm extensions 64 as above described, an ever changing angular relation is provided between the nozzle assemblies 10 of each series 110 and 112. Therefore, the spray pattern 5' constantly changes between the generally overall fan shaped pattern illustrated in FIG. 4 and a cross-over pattern illustration in FIG. 3 and a cross over pattern in which the spary from each series 110 and 112, is somewhat divergent relative to the adjacent spary or sprays.

FIG. 5 is a schematic illustration of another system utilizing the nozzle of the present invention. A pair of transverse main water supply pipes 140, 142 are illustrated in a substantially spaced apart, parallel relation. A plurality of nozzle assemblies 144, 146 are fixed relative to the respective pipes 140, 142 in the above described manner. A first pair of longitudinal side rails 148, 150 are spaced outwardly of the respective sides of the pluralities of nozzle assemblies 144, 146 and crank arms 152, 154 driven by one or more motor driven eccentric means (not shown) serve to reciprocate the rails 148, 150.

The first plurality of nozzle assemblies 144, carried by the water supply pipe 140, are each operably connected by a link 156 to a transverse push rod 158 and the opposed ends of the push rod 158 are pivotally connected to the respective side rails 148, 150 at 160, 162. When the crank arms 152, 154 are actuated by the

driven eccentric means as described relative to FIGS. 3 and 4, the side rails 148, 150 are reciprocated in unison causing like movement of the transverse push rod 158 to oscillate each of the nozzle assemblies 144 in vertical, longitudinal planes by means of links 156 to provide a uniform oscillating spray pattern by all of the nozzle assemblies 144. If two, three or more series of water supply pipes, nozzle assemblies, push rods and connecting links are connected to the side rails 148 and 150, all of the spray nozzles would operate in unison.

If the motor drive to one side rail 148 or 150 is started and allowed to rotate so that the eccentric is positioned 180° relative to the other, the respective pivots 160, 162 would continually move in opposite directions causing a different spray pattern because the transverse push rod 158 would, in effect, oscillate about its center axis.

As illustrated in FIG. 5, pairs of normally spaced apart side rails 148, 164, and 150, 166 may be provided which are pivotally linked together at 168 and 170. A second transverse push rod 172 is connected by links 174 to the respective nozzle assemblies 146 carried by the water supply pipe 142. The second transverse push rod 172 is pivotally connected at 176, 178 to the respective side rails 164 and 166. When the crank arms 152, 154 are actuated, as above described the first plurality of spray nozzle assemblies 144 will be caused to oscillate, the side rails 164 and 166 will pivot relative to the side rails 148 and 150 causing the transverse push rod 172 to oscillate the spray nozzle assemblies 146 in an opposed relation to the spray nozzle assemblies 144. If the motor drive to one side rail 148 or 150 is started and is allowed to rotate so that the eccentric is positioned 180° relative to the other respective pairs of pivots 160, 162 and 176, 178 would continually move in opposite directions in an opposed relation causing the push rods 158 and 172 to oscillate about their center axis in an opposed relation to provide yet another spray pattern.

Other symmetrical spray patterns can be accomplished by the structure illustrated in FIG. 5, for example, the connecting links 156 and/or the connecting links 172 may be pivotally attached to various adjustment holes 84 in the respective extensions 64.

The respective pairs of side rails 148, 164, and 150, 166 may be pivotally interconnected to provide opposed movement of the transverse push rods 158 and 172 by a linkage means from the drive motor eccentric which is similar to that described relative to FIG. 4. For example, the side rails 148 and 150 may be driven by crank arm sections similar to 116 and 120, and the side rails 164 and 166 may be respectively, pivotally attached thereto by rocker arms and links similar to 122 and 134.

While a preferred form of spray nozzle assembly has been herein illustrated and described, it will be obvious to anyone skilled in the art that various modifications, structural changes and substitutions of equivalents can be made in the spray nozzle assemblies, and in the systems for utilizing same, without departing from the true spirit of the inventions as defined in the appended claims.

What is claimed is:

1. A musical display fountain having a horizontally disposed water supply pipe and a series of water spray nozzles operably connected to the water supply pipe comprising a mechanical linkage interposed between

the water supply pipe and the series of water spray nozzles for accurately controlling the angular movement of a plurality of said spray nozzles including:

- A. A series of first nipple members rigidly attached to the water supply pipe and in open communication with the interior thereof;
- B. A series of second nipple members spaced vertically above the respective first series of nipple members;
- C. A plurality of flexible water conduit means connecting respectively between the first and second series of nipples and having lower and upper ends and including;
- D. A first series of support yoke means fixed relative to said first nipple lower ends communicating with the water supply pipe;
- E. A second series of support yoke means fixed relative to said second nipple upper ends;
- F. Hinged connecting means between the first and second series of lower and upper support yoke means;
- G. The upper support yoke means having an extension beyond the hinged connecting means;
- H. A push rod pivotally attached to the extension from each of said lower support means;
- I. Drive means operably connected with said push rod to oscillate said second upper support yoke means and the second nipple and upper end; and
- J. A plurality of nozzles carried in fixed relation respectively to each of said second series of nipples in axial alignment therewith.

2. A musical display fountain as defined in claim 1 including soft metal tubular members of the lead and soft copper class connecting between the series of water spray nozzles and the series of second nipple members.

3. A fountain spray nozzle structure including a second spray nozzle structure as defined in claim 1, spaced a predetermined distance from the first spray nozzle structure, a rocker arm, and link means connecting between said rocker arm and the respective push rods whereby said first and second spray nozzles are oscillated through similar arcs of a predetermined number of degrees in an opposed relation.

4. A fountain spray nozzle system including a plurality of spray nozzle structures as defined in claim 1 fixed to each of at least two transverse water supply pipes, first and second pairs of spaced apart parallel longitudinal side rails spaced outwardly of the respective sides of said pluralities of spray nozzles structures in a cross over relation to the water supply pipes, a transverse push rod spaced relative to said pluralities and being pivotally attached at their opposed ends between alternating, opposed pairs of said first and second pairs of side rails, link means pivotally connecting between said push rods and each of said second support means extension, a pair of gear reduction motors, each providing an eccentric including adjustable pivot connection means fixed to the drive shaft of said motor, a first crank arm section pivotally connecting between said eccentric and a first end of a centrally pivoted rocker arm, a second crank arm section pivotally connecting between said first crank arm section and one of said side rails of one of said pairs, a connecting link pivotally connecting between a second end of said rocker arm and the other side rail of said one pair.

5. A fountain spray nozzle structure as defined in claim 1 wherein said drive means comprises a gear reduction motor having a driveshaft, and an adjustable eccentric pivot driving connection means fixed to the driveshaft of said motor, and a crank arm pivotally connecting between said eccentric and push rod.

* * * * *