Jan. 26, 1960 O. PRZYSTAWIK 2,922,582

FOUNTAIN INSTALLATION

Original Filed Aug. 31, 1953 3 Sheets-Sheet 1

Fig. 1

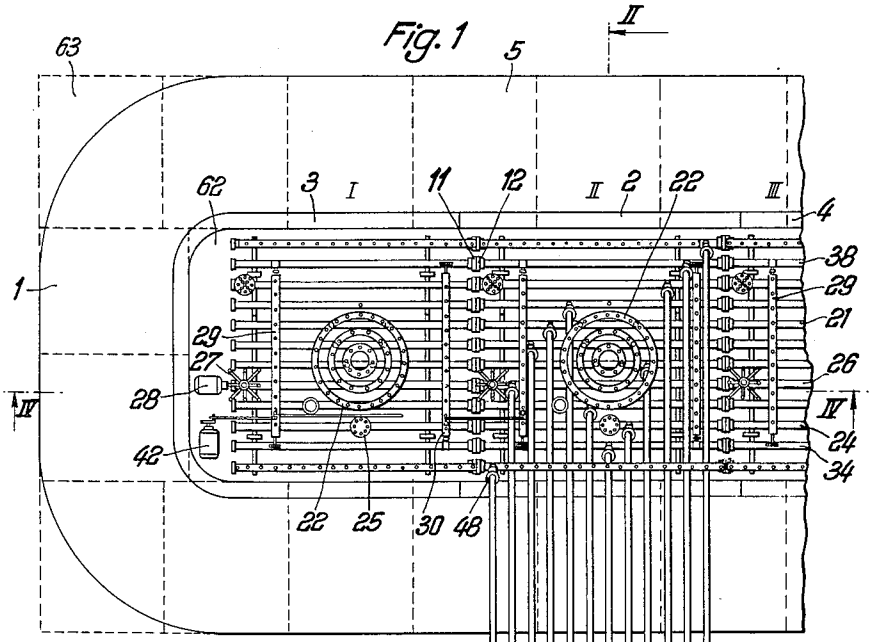


Fig. 3

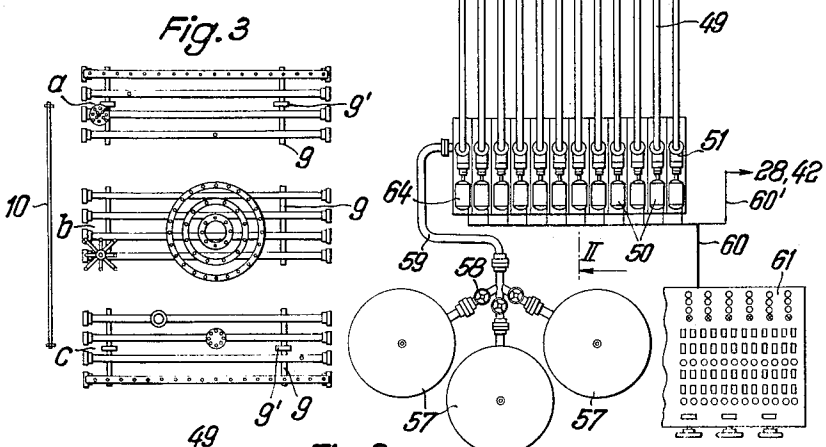
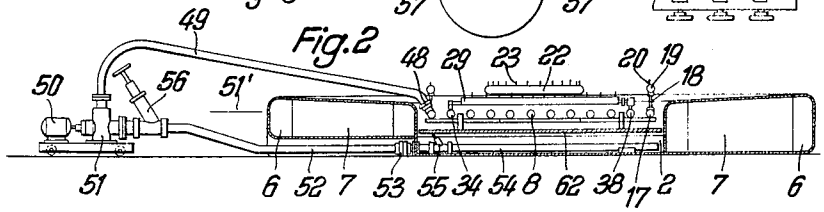


Fig. 2



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FOUNTAIN INSTALLATION

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Fig. 4

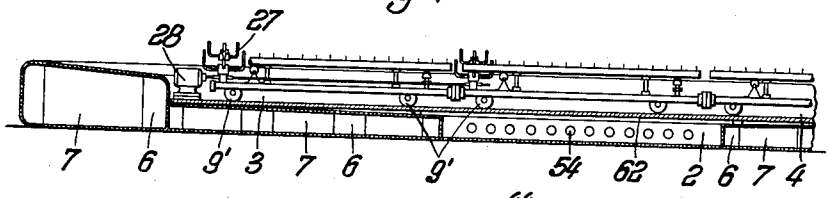


Fig. 5

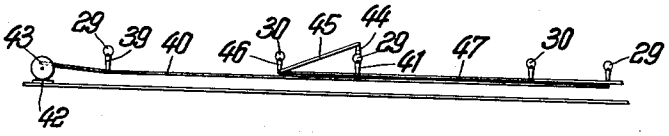


Fig. 6

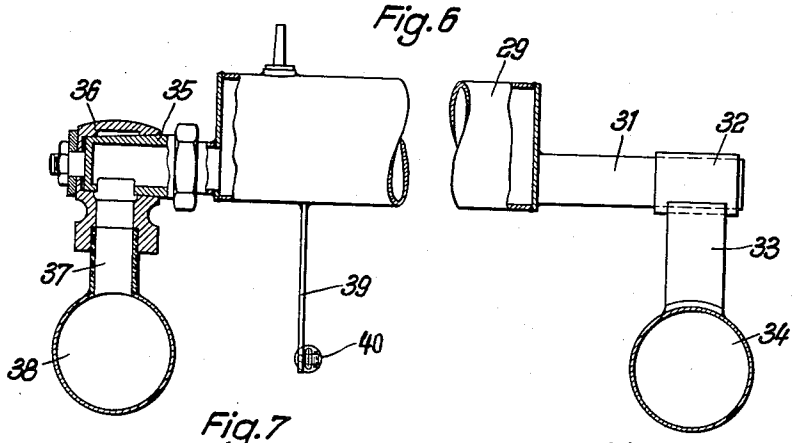


Fig. 7

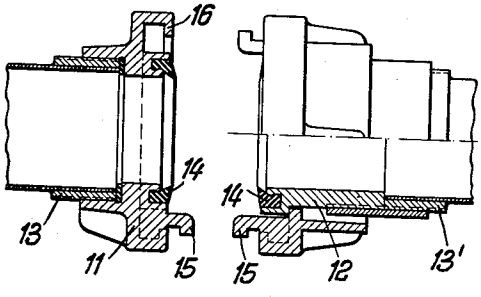
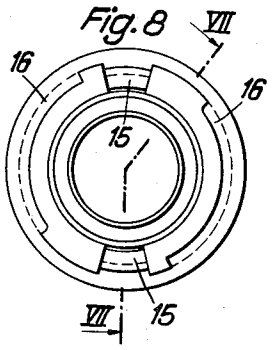


Fig. 8



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FOUNTAIN INSTALLATION

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Fig. 9

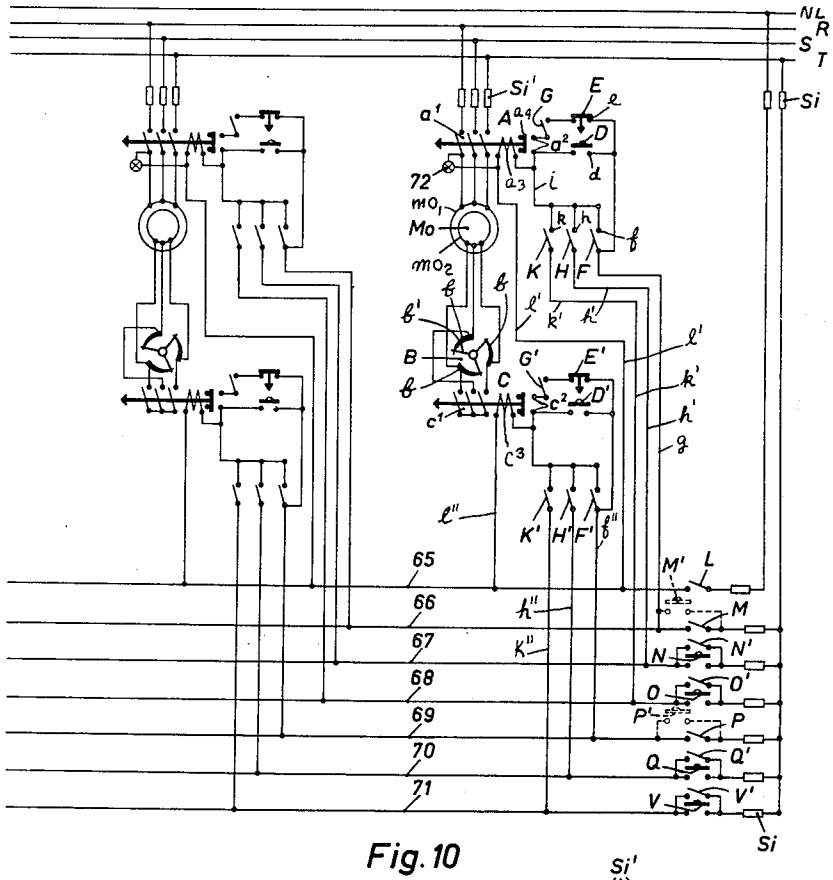
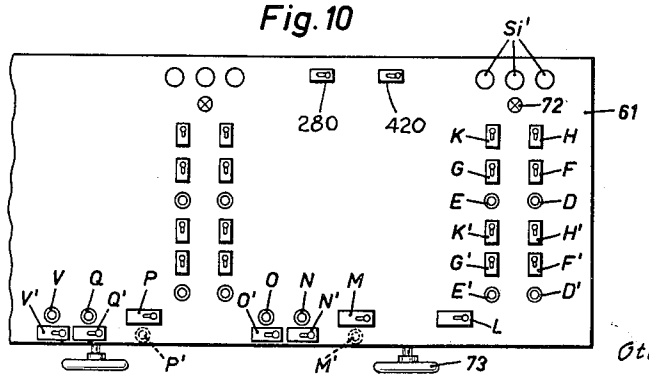


Fig. 10



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United States Patent Office

2,922,582

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2,922,582

FOUNTAIN INSTALLATION

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Original applications August 31, 1953, Serial No. 377,591, now Patent No. 2,708,355, dated May 17, 1955; August 31, 1953, Serial No. 377,596, now Patent No. 2,787,495, dated April 2, 1957. Divided and this application January 8, 1957, Serial No. 633,044

Claims priority, application Germany September 2, 1952

11 Claims. (Cl. 239—23)

This invention relates to fountains, and more particularly to a fountain installation, wherein pipes on one hand connected with controllable supply conduits and on the other hand connected with spraying nozzles are placed in a tub. This application constitutes a divisional application of my co-pending United States Patent application, Serial No. 377,591, filed August 31, 1953, and entitled "Fountain Installation Disassembling Features," now Patent No. 2,708,355; and also of my co-pending United States Patent application, Serial No. 377,596, filed August 31, 1953, and entitled "Fountain Installation and an Electric Circuit for Operating Same," now Patent No. 2,787,495.

Installations of this kind are used especially in exhibitions, on stages or the like. Owing to the rather large size of such installations it is hitherto customary to fix same immovably to the floor of a stage and to cover same by suitable covering means when they are not used. However, a soiling of the tub of such a fixed fountain installation cannot be avoided, so that dirt particles enter the pipe lines and the pump system during the operation of the device. Therefore, the operation of such a fountain installation is greatly impaired.

An object of the present invention is to provide a fountain installation which may be readily set up and taken apart in a short time. Thus, on one hand a soiling of the installation during the period of non-use is avoided, and on the other hand, it is possible to transfer the installation in any desired manner from one place to another one and even to set same up on a stage without any change of the latter.

Another object of the invention is the provision of a fountain assembly in which a wide variance in individual sprays is effected by including a plurality of pipe lines, each feeding a different nozzle group and each connected to an individual controllable pump. The water pressures in the several pipe lines are thus operated independently of each other and are not affected by the pressure operation of the other pipe lines. The pumps are controlled at a master control board in such a manner that so-called "dancing water" effects may be produced.

A further object of the invention is the provision of a fountain installation of the character described which incorporates a closed or recirculating water system. Thus, in operation, the pumps feed themselves with water drawn from the tub itself, and no outside pressure source of water is required. This enables the installation to be set up as a temporary display in any location, and facilitates the transportability of the installation.

In order to obtain the above advantages, an important feature of the present invention resides in the provision of a plurality of separate spray nozzle pipe lines which are substantially parallel to each other and which are placed wholly within a tub with each connected to a separate pump. The suction lines of the pumps are immersed in the collecting space of the tub for recirculation of the water as a closed system. At least one of the pressure pumps is connected through a control valve to a water supply tank or to a system of supply tanks, the holding capacity of the vessel or vessels corresponding to the amount of water which is required for efficient operation of the fountain spray system.

Another feature of the invention resides in the arrangement of nozzles of the fountain installation. For example, one pipe line may contain a nozzle unit comprising a plurality of nozzles arranged in the form of a ring, which ring may be rotatably driven.

In all portions of the fountain assembly, the ready assembly and disassembly is made possible by constructing the tub, the collecting vessels, the pumps, pipe lines, driving motors, and electrical installation in such a manner that these portions are separable into pieces, units or sub-sections which are easily transported and conveyed.

Other objects and structural details of the invention will be apparent from the following description when read in conjunction with the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a fragmentary top plan view of the main portion of the fountain installation having three groups of pipe lines with twelve pipe lines each,

Fig. 2 is a sectional view taken on line II—II of Fig. 1,

Fig. 3 is a top plan view of a disassembled group of pipe lines,

Fig. 4 is a sectional view taken on line IV—IV of Fig. 1,

Fig. 5 is a side elevational view of a detail of the installation,

Fig. 6 is an elevational view of the detail shown in Fig. 5, partly in section,

Fig. 7 is an elevational view of two parts of a pipe coupling, partly in section along lines VII—VII of Fig. 8,

Fig. 8 is a front elevational view of one of the two halves of the pipe coupling shown in Fig. 7,

Fig. 9 is a diagrammatical illustration of electric circuits for two pump motors of the installation, and

Fig. 10 is a fragmentary top plan view of the switchboard of the installation.

Referring to Fig. 1, a tub 1 of elongated shape, made of an elastic material, for example rubber, contains the system of pipe lines of the installation when the latter is ready for operation. As best shown in Figs. 2 and 4, the center portion of the tub has a deep trough 2; troughs 3 and 4 respectively of less depth are arranged next to said deep trough 2 at both sides thereof. Furthermore, the tub 1 has a comparatively wide rim 5 surrounding the troughs. The tub 1 may be brought into and held in the desired shape by blowing air into inflatable chambers 6 formed by a double bottom and arranged within the range of the troughs 3 and 4 of the rim 5. The chambers 6 are formed by flexible partitions 7 aiding in maintaining the shape of the tub. It is sufficient to provide only one chamber with a closable valve (not shown) for the supply of compressed air as all of the chambers communicate with each other. Of course, if desired, a plurality of valves may be arranged in chambers of the tub; in such a case the deflating of the tub may be carried out at a faster speed.

The installation shown in the drawings has twelve pipe lines 8 arranged parallel to each other at predetermined distances from each other. Said pipe lines 8 are divided into three groups, I, II and III, the groups I and III being located in the range of the troughs 3 and 4 respectively and the group II being located in the range of the deep trough 2 (see Figs. 1 and 4). Each group has twelve pipe sections, an exemplitive length of the pipe sections being 2.5 meters. As best shown in Fig. 3, the pipe-sections of a group, for example of group I are

sub-divided into three sub-groups *a*, *b* and *c*. The pipe-sections of each sub-group are welded onto transversely extending tubular rods **9** which may be connected with each other by a screw bolt inserted therein for forming above-mentioned group of pipe sections. The two extreme sub-groups *a* and *c* are provided with wheels **9'** rotatably arranged on the center portion of the tubular rods **9** pertaining to said sub-group.

Each pipe-section of the pipe lines **8** is provided at its ends with coupling elements designed in such a manner that the pipe-sections of adjacent groups of pipe-sections may be tightly connected with each other. Figs. 7 and 8 illustrate an embodiment of such coupling elements. Sleeves **13** and **13'** having an exterior thread are welded to the ends of the pipe-sections. The coupling members **11** and **12** are tightly screwed onto said sleeves **13** and **13'** respectively. Each of the coupling members **11** and **12** has a packing ring **14** partly projecting from the coupling member. Furthermore, each coupling member **11** and **12** is provided with hooklike portions **15** arranged for gripping engagement with the inner surface of a sectional annular flange **16** of the complementary coupling member when the coupling members are engaged with each other.

If a group of pipe-sections is used as a group arranged at one of the ends of the installation, for example the groups I and III, the outermost ends of the pipe-sections are sealed by closing elements or by welding. However, if it is desired to use more than three groups of pipe-sections for a subsequent setting-up of the installation, additional groups having coupling elements at both ends of their pipe-sections are inserted into the arrangement. The division of a group of pipe-sections into sub-groups, described in connection with Fig. 3, is also applied to the groups II and III.

The pipe lines **8** are provided with jet nozzles of different construction. The pipe-sections **17** (see Fig. 2) arranged at an outer end of each group carry tubes **18** projecting upwardly and supporting sections **19** extending parallel to the above described pipe-sections. The sections **19** closed at their ends are provided with a plurality of spray nozzles **20**, preferably of the adjustable type, said spray nozzles being arranged along the length of said sections. The pipe line **21** (see Fig. 1) carries pipe rings **22** through the medium of pipe supports. Said pipe rings **22** are provided with a plurality of spray nozzles **23** extending upwardly and being arranged along the circumference of said pipe rings. Each ring of an additional series of rings arranged within the ring **22** is connected with an additional pipe line. The pipe line **24** is provided with roseheads **25**. The pipe line **26** is provided with rotatable eight-fold nozzles **27**, which may be driven by an electro-motor **28**. It is understood that the various forms of nozzles capable of use in the installation is not limited to the type of nozzles mentioned above. For example, each group of pipe-sections is also provided with two nozzle pipes **29** and **30** extending in a direction perpendicular to the direction of the longitudinal axis of the pipe-sections, one of said two nozzle pipes being illustrated in Fig. 6 in an enlarged scale. A pin **31** welded to the closed end of the nozzle pipe **29** is journalled in a bearing **32** carried by a support **33** secured to a pipe-section **34**. A hollow cone **35** having an inlet opening is screwed onto an extension arranged at the opposite end of the nozzle pipe **29**. Said cone **35** is rotatably arranged in a casing **36** communicating with a pipe-section **38** through a tube **37**. A dependent control arm **39** welded to the nozzle pipe **29** is pivotally connected with a rod **40**. As best shown in Fig. 5, a dependent arm **41** of the corresponding nozzle pipe **29** of the next group is also pivoted to said rod **40**. Said rod **40** is reciprocated by means of an electric motor **42** and a crank **43**. The nozzle pipe of the group provided with the dependent arm **41** has an additional erect arm **44** connected with dependent arm **46** of the nozzle pipe **30** through the medium of a link **45**. Furthermore, a link **47** leading to the dependent arms on the corresponding nozzle pipe of adjacent group or groups is pivoted to the arm **46**. Thus, the nozzle pipes **29** and **30** of each group will be oscillated in opposite directions by reciprocation of the rod **40**. The nozzle pipe or pipes **29** respectively communicate with the pipe line **38** (Fig. 1) and the nozzle pipe or pipes **30** respectively communicate with the pipe line **34**. If desired, instead of oscillating the nozzle pipes **29** and **30** in opposite directions, it is also possible to design the controlling mechanism in such a way that all of the nozzle pipes are oscillated in the same direction. Of course, different combinations of movement are also feasible. As will be pointed out hereinafter, the pipe lines **34**, **38** are capable of being fed selectively with water under pressure to obtain sundry ornamental effects.

One of the groups of pipe-sections, for example the center group II according to the embodiment shown in the drawings, is provided with connections **48** for supply conduits **49**. Said connections comprise disengageable couplings, for example, of the type described above. The supply conduits **49** could be made of flexible hoses. Each pipe line of the installation is connected with a separate supply conduit **49**. Each supply conduit **49** is connected with a separate pump **51** operable by an electric motor **50**. The inlet of each pump **51** is connected with a pipe or flexible hose **52** (see Fig. 2) which, in turn, is connected through the medium of a coupling **53** with a suction pipe **54** extending into the trough **2**. The pumps **51** must be arranged in such a relation to the tub **1**, that all of the inlets are at a level below the highest level of the water in the troughs when the fountain installation is not in operation and consequently a filling of the pumps **51** with water prior to the operation is obtained so as to assure a delivery of water by the pumps upon actuation thereof. Said highest level of the water is indicated in Fig. 2 by the line **51'**. The suction pipes **54** have a slot extending at the lower side thereof from end to end so as to obtain a maximum suction of the inlet opening. A check valve **55** arranged in each suction pipe **54** prevents water from flowing out of the inlets of non-operating pumps **51** when the level of the water in the tub **1** falls below the level of the inlets owing to the operation of one or more of the other pumps. A manually operable throttle valve **56** is arranged in each pipe **52** connected with the inlet of the associated pump **51**.

Each outlet of three water supply tanks **57** is connected with a valve **58**. Said valves **58** are connected with a conduit **59** leading to one of the pumps **51** which is of especially large dimensions. The system of conduits communicating with the supply tanks **57** is also provided with couplings so that it may be readily taken apart. Preferably, the supply tanks **57** and the assembly of pumps **51** are provided with rollers or wheels or are mounted on carriages, so that they may be readily moved from one place to another one.

The electrical parts of the electric motors **28**, **42** and **50** are connected by a disengageable cable **60**, **60'** with a switchboard **61** comprising the necessary main switch, starter, fuses, etc. for the electric motors. The switchboard comprises also keys for selectively switching on and switching off the motors individually or in various combinations. Preferably, the switchboard **61** is provided with wheels or rollers or is mounted on a carriage for an easy transfer from one place to another one. For the operation of the installation the switchboard **61** is located at a place from which the operator may readily observe the entire installation.

Fig. 9 illustrates the connections of the motors driving the pumps, only two motors being shown and one of said two motors being indicated by the reference *Mo*. The motors are so-called three-phase slip-ring motors capable of regulation of their power output within a very wide

range. The stator winding mo_1 of each motor Mo is connected with the three phases R, S and T of a three-phase line or network through fuses Si' and three main contacts a^1 of a first switching device A having an auxiliary contact a^4 and a relay winding a^3. The auxiliary contact a^4 bridges two stationary contacts a^2 when the first switching device A is in closed position.

A regulator B is connected with the rotor winding mo_2 of the motor Mo in a manner known per se. The three resistors such as b of said starter regulator B may be connected in star by a member b' which is slidable along the resistors b so as to insert any portion thereof between their full value and zero. The resistors b may also be short circuited by a second switching device C having there main contacts c^1 and an auxiliary contact c^2 and being controlled by a relay winding c^3. An auxiliary contact c^4 of the second switching device C bridges two stationary contacts c^2 when the switch C is in closed position.

One of the stationary contacts a^2 is connected in series with the blade of a hand operated switch G which is in turn connected in series to a normally closed push button switch E. The other of the stationary contacts a^2 is connected with a normally open push button switch D. The normally open push button switch D and the normally closed push button switch E have stationary contacts d and e, respectively, which are connected to a common conductor g connected to a conductor **66** to be described more in detail hereinafter.

The other of the stationary contacts a^2 is connected to a conductor i to which the stationary contacts k, h, f of hand operated blade switches K, H, F, respectively are connected. The blade of switch K is connected by a conductor k' to a conductor **68** to be described more in detail hereinafter. Similarly the blade of switch H is connected by a conductor h' to a conductor **67** to be described more in detail hereinafter. The blade of switch F is connected through the conductor g mentioned hereinabove to the conductor **66**.

The relay winding a^3 is connected with one end thereof to the conductor i and with the other end thereof over an indicatory lamp **72** to one of the main contacts a^1. Furthermore the other end of winding a^3 is connected to a conductor l' which in turn is connected to a conductor **65** to be described more in detail hereinafter.

As clearly shown in Fig. 9 the switches C, D', E', G', F', H', K', are switches designed and connected in the same manner as the switches A, D, E, G, F, H, K respectively described more in detail hereinabove. However, the blades of switches F', H' and K' are connected, respectively, through conductors f'', h'' and k'' to conductors **69**, **70** and **71** respectively, to be described more in detail hereinafter.

All of the motors of the installation are equipped with above described electrical means, the switches and push buttons being connected with conductors **65**, **66**, **67**, **68**, **69**, **70**, **71** common to the electric systems of the motors. The conductor **65** is connected with the neutral conductor NL of the network through a switch L. The remaining conductors **66**–**71** are connected with one of the three phases of the network, for example the phase T through switches M and P or group push buttons N, O, Q and V respectively.

Each winding a^3 and each winding c^3 is connected with the conductor **65** through conductors l' and l'' respectively. Each switch D, E and F is connected with the conductor **66**, each switch H is connected with the conductor **67**, each switch K is connected with the conductor **68**, each switch D', E' and F' is connected with the conductor **69**, each switch H' is connected with the conductors **70** and each switch K' is connected with the conductor **71**.

Of course all of the conductors are protected against short circuit by fuses Si inserted at the side of the network.

All of the manually operable push buttons and switches are mounted on the switchboard **61** shown in Fig. 10.

The operation of the device shown in Figs. 9 and 10 is as follows:

The above described electrical control system permits an individual or a group-wise operation of the motors, so that different effects may be obtained with the fountain installation during an operation thereof. As a matter of example, some of the effects and the methods for obtaining same will be described hereinafter.

It is assumed that the installation is filled with water. For an operation of the fountain installation, at first the electromagnetically controlled switches A and C of all motors are connected with the neutral conductor NL by closing the hand-actuated switch L. A closing of switch M causes a connection of the conductor g and thus of the contacts d, e of the push buttons D, E of the blade of the switch F with one of the three phases such as phase T of the three-phase network. Now, upon pressing the start push button D associated with a single motor Mo, the circuit including the winding a^3 of the associated switch A is closed. Thus, said switch A causes a closing of its contacts a^1 and a bridging of its contacts a^2 by the auxiliary contact a^4. The closed contacts a^1 connect the stator mo_1 of the motor with the three phases of the network. Upon releasing the start push button switch D the current in the winding a^3 of the switch A is again interrupted. If it is desired to maintain the energization of the winding a^3 after releasing the start push button switch D the switch G associated therewith has to be closed in advance. Then upon release of the start push button D current still flows through the winding a^3 of the switch A through the closed stop button E and the bridged contacts a^2. Let it be assumed that the motor Mo runs at a speed of approximately 25% of the maximum speed when the switch A is closed and the regulator B is set for highest resistance, and that the pump connected with the motor supplies an amount of water causing a vertical water jet of a height of .5 meter. If, for example, the pump driven by said motor delivers the water to the pipe line **17**, a water jet of said height is ejected from each nozzle of the nozzle pipes **19**. Upon actuation of the stop push button E the holding circuit of the winding of the switch A is interrupted so that the contacts a^1 and a^2 of said switch A are opened. Thus, the motor is switched off. The pump connected with the motor stops the delivery of water, so that all water jets collapse.

A different effect may be obtained in the following manner: Upon closing the switch G and actuating the start push button D the motor Mo is switched on, whereby again one or more water jets of a height of .5 meter are obtained as described above. Now, when the switch P is closed the operating switches and push buttons for the electromagnetically controlled switch C are also connected with said one phase T of the three-phase network, so that current flows to the winding c^3 of the electromagnet of the switch C upon a pressing of the start push button D'. The contacts c^1 of the switch C are closed and the contacts c^2 are bridged by the auxiliary contact c^4. The contact c^4 closes the holding circuit of the winding c^3 of the switch C through the switch G' and the stop push button E', so that the start push button D' may be released provided the switch G' was closed first. The contacts c^1 of the switch C short circuit the resistors b of the regulator B so that now the motor Mo runs at maximum speed with highest power output. Thus, a sudden increase in the delivery of water by the associated pump occurs, so that all of the water jets suddenly shoot upwardly to their maximum height adjusted by the valve **56**. Upon actuation of the stop push button E' the holding circuit of the winding of the switch C is interrupted, so that the contacts c^1 and c^2, c^4 of the switch C are opened again. The speed of the motor drops to the original value, so that all of the water jets are lowered

again to a height corresponding to the 25% output of the motor. When the push buttons or momentary switches D' and E' are alternatively actuated, pressure shocks or bursts are obtained which result in a shock-like rising and lowering of the water jets. Such bursts of the water jets and subsequent fast lowering of the water jets may give the impression of water curtains closing and opening in vertical direction.

If a slow rising of the water jets is desired instead of above described shock-like rising of said water jets, upon the connection of the switch A in the above described manner the speed of the motor and thus the delivery output of the associated pump may be increased or reduced by a change of adjustment of the regulator B in any desired manner.

If several motors shall be controlled simultaneously by connecting and disconnecting the switches A, the switches F associated with the motors to be controlled are closed and the connecting and disconnecting of the switches A is effected by closing and opening the switch M. In a similar manner the short circuit of the regulators B connected with the motors to be controlled simultaneously may be obtained by closing the switch P after preceding closing of the switches F' associated with the motors to be controlled.

The switches H, K and H', K' respectively in conjunction with the group push buttons N, O and Q, V respectively permit a simultaneous operation of selected groups of motors. Let it be assumed for example that the plant is equipped with ten pumping aggregates and correspondingly with ten motors (only two motors being shown in Fig. 9; however the remaining motors not shown in Fig. 9 are associated each with starting and switching means similar to those shown in Fig. 9). Let it be further assumed that the first, third, fifth, seventh and ninth motors form a first group, the first, fifth and ninth motors form a second group, and the second, fifth and eighth motors form a third group. In this case at the switchboard such as **61** shown in Fig. 10 the following operations have to be performed; for the first motor the switches F and K have to be closed, for the second motor the switch H has to be closed, for the third motor the switch F has to be closed, for the fifth motor the switches F, H and K have to be closed, for the seventh motor the switch F has to be closed, for the eighth motor the switch H has to be closed, for the ninth motor the switches F and K have to be closed. Thus by opening and closing the group switch M all those motors are switched on and off for which the switches F are closed. With the group push button switch O all those motors are controlled for which the switches K are closed. With group push button switch N all those motors are controlled for which the switches H are closed.

It should be understood that the above is only an example, the kind of switching depending entirely on the effects to be desired.

In the same manner the short-circuiting switches C can be controlled by a corresponding operation of the switches F', K' and H' in connection with the group switches P, Q and V.

In order to indicate to the operator whether a motor is switched on or not, a glow lamp **72** is connected between one phase and the side of the winding a^3 of the switch A which is connected by the connection l' to the to the connection **65** connected through switch L with the neutral wire NL.

In order to facilitate the operation in certain cases blade switches such as N', O', Q' and V' can be provided which shunt, respectively, the push button switches N, O, Q and V.

Also, the blade switches M and P may be, if desired, bridged, respectively, by push button switches M' and P' shown in Fig. 9 in dotted lines. These push button switches facilitate the operation of the switching plant if it is intended to operate for a short time the switches A and C, respectively, connected therewith.

In the appended claims the switches D, E, F, H, K are termed first connecting means and the switches M, N, O first switching means associated with the first connecting means so as to render the same operative in predetermined groups. The switches D', E', F', H', K' are termed hereinafter the second connecting means and the switches F, Q, V the second switching means associated with the second connecting means.

Alternatively the switches F, H, K are termed hereinafter the set of switching means arranged in parallel with one another.

Alternatively, the switch L is termed hereinafter the hand-actuated switch, the switches F, H, K a set of first switching means, and the switches M, N, O a set of second switching means.

Fig. 10 illustrates the arrangement of the push buttons and switches, described above in connection with the electrical system shown in Fig. 9 on the switchboard **61**. Each series of push buttons and switches arranged one above the other and each switch wheel **73** of a regulator B are associated with a certain motor. The switching means arranged in a line next to each other are associated with several motors. Of course, the connections of the pump motor **64** (see Fig. 1) are the same as the connections of the pump motors **50**. Furthermore, the switchboard comprises additional switches **280** and **420** for the switching on and switching off of the motors **28** and **42**. Figs. 9 and 10 illustrate only the electrical connections and switching means for two motors. Of course, the switchboard comprises also the switching means for the other pump motors.

The installation according to the invention may be disassembled into a plurality of parts, each of which having a size which permits it to be packed easily, for example in a box. For the setting up of the installation, at first the tub **1** is spread on the floor whereon it is inflated. At the same time the individual groups of the pipe-sections are assembled by rigidly connecting the sub-groups shown in Fig. 3 by means of two screw bolts **10** inserted into the tubular rods **9**. Thereafter, the suction pipes **54** inserted into the trough **2** are watertightly passed through openings of the side wall of said trough. Additional water jet devices, for example, the transverse nozzle pipes **29** and **30**, are connected with the system as desired. For this purpose, for example, the pin **31** (Fig. 6) of the nozzle pipe **29** is inserted into the bearing **32**, whereupon the nozzle pipe is slightly retracted for connection at its other end by the screw connection with the rotatable cone **35**. Then, the link mechanism is connected with the oscillatably mounted nozzle pipe **29**. Each pump **51** of the assembly of pumps brought into proper position is connected with a suction pipe **54** by means of a coupling **53** arranged at the end of a pipe or hose **52** connected with the inlet of the pump. Then a board or a plurality of boards forming a bottom **62** (see Figs. 2 and 4) is placed into the tub **1**, said bottom **62** covering the suction pipes **54** and bridging the deep trough **2**. It would also be sufficient to place merely two boards or sheet metals extending in the direction of the longitudinal axis of the tub **1** into the trough **2**, as the bottom to be formed mainly serves the purpose of forming a track for the wheels **9'**. Then, the groups of pipe-sections are rolled in proper sequence into the tub **1** over a bridge made by boards resting on the floor and on the rim of the tub. The pipe-sections are connected with each other by the couplings. Furthermore, the supply conduits **49** are connected with the pumps **51** of the assembly of pumps. The electric motors **28** and **42** are also installed. Finally the water supply tanks **57** are connected with the pipe system, and the switch board **61** is connected with the electric means respectively, whereupon the installation is ready for operation. One or more valves **58** controlling the supply of water from the tanks **57** are opened, as needed.

The motor 64 connected with the pumps capable of filling the pipe system with water from the tanks 57 is switched on for pumping such an amount of water into the tub as is required by the size of the installation. The other pumps of the assembly of pumps are filled with water flowing from the suction pipes 54 through the conduits 52 into the pumps. Then the level of the water in the trough 2 reaches its maximum height indicated by the line 51' (Fig. 2). If desired, the water supply tanks 57 may be removed from the stage upon disengagement of a coupling, before the fountain installation is put into operation.

The height of the jets produced by each pipe may be adjusted by means of the throttle valves 56 while the pumps operate at highest output, so that the height of the jets can be readily adapted to the available space in the room where the installation is located. Now, the operator may operate the various pumps with adjustable outputs in any desired sequence or combination by means of instruments of the switchboard. Furthermore, other instruments of the switchboard may be used for controlling the electrical and mechanical drives of the nozzle bodies, for example, the oscillatable nozzle pipes 29 and 30 or the rotatable eight-fold nozzles 27. The electric circuit including the various electric means of the installation is not the subject matter of this invention so that a detailed description thereof is unnecessary.

It will be observed that each nozzle is preferably connected to a separate pump which is individually energized or driven. In addition, the installation may be dismantled into several units or sections, and the entire installation can be quickly and easily connected so as to form a closed, recirculating unit. By these features, the portability or displacement of the installation from one place to another, and the assembly of the units or sections into a complete installation is made very advantageous. Further, it will be noted that many or few of the pipes can be connected as desired to form sub-units. It is thus an easy matter to adapt the installation, both as to size and as to complexity, to suit the requirements of the various locations at which the fountain display is to be exhibited. The various combinations of units which can be employed make it possible to replace broken or damaged parts so that the installation will always be ready for use and is relatively easy to maintain in operating condition.

By interchanging parts of the installation and varying the arrangement of nozzles, it is possible to obtain a large variety of spray effects. The fountain installation of the invention may obviously be further enhanced by providing a lighting system which may also be energized and controlled from the switch board 61, so that the dramatic spray effects obtainable may be further emphasized by the use of colored illumination or beams.

Although the embodiment of the fountain installation shown in the drawings contains only three groups of pipe-sections with an overall length of approximately 7.5 meters of each pipe line, the installation may be enlarged by the addition of additional groups of pipe-sections; of course, such an enlarged installation requires a tub of greater length.

Instead of forming the tub by a plurality of inflatable chambers, the tub may be also produced in such a manner that a plurality of containers, for example boxes, being assembled in the shape of a tub and being connected with each other are covered with a rubber sheet. Thus, for example, the rim of the tub may be formed by a plurality of boxes 63 shown in dash lines in Fig. 1, said boxes surrounding a space corresponding to the trough of the tub. Then a sheet of rubber or other waterproof material is placed onto the rectangle of boxes, whereby the tub is formed. If desired, containers of smaller height may also be placed under the rubber sheet for the formation of troughs of different depth. This embodiment has the advantage that the size of the tub may be readily changed; a tub of smaller size requires merely the use of a smaller number of boxes and the tucking in the rubber sheet.

I have described preferred embodiments of my invention, but it is understood that this disclosure is for the purpose of illustration and that various omissions or changes in shape, proportion and arrangement of parts, as well as the substitution of equivalent elements for those herein shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub, a plurality of pressure pumps respectively connected to said pipe lines for supplying water under pressure thereto, remote control means located outside said tub and connected to said pressure pumps for individually and selectively controlling said pressure pumps whereby to vary the pressure in the respective pipe lines relative to each other, a plurality of varied nozzle groups connected to and fed by individual ones of said plurality of pipe lines, a portion of said nozzle groups being arranged in unitary spray formations, another portion of said nozzle groups being mounted for turning movement, motor means operatively coupled to said movable nozzle groups for individual actuation of the latter in their turning movement, and remote control means located outside said tub and connected to said motor means for selective energization of the latter.

2. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub, a plurality of pressure pumps respectively connected to said pipe lines for supplying water under pressure thereto, a plurality of spray nozzles communicating with said pipe lines and fed thereby, at least some of said spray nozzles being arranged in nozzle groups mounted for movement relative to said pipe lines, drive means connected to the movable nozzle groups for individual movement of the latter, a control panel located remote from said tub, first and second control means on said control panel, first coupling means connecting said first control means to said pressure pumps for individual and selective remote control of said pressure pumps by said first control means on said control panel and second coupling means connecting the second control means to said drive means for selective remote energization thereof by said second control means on said control panel.

3. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub, a plurality of spray nozzles connected to and fed by said pipe lines, a plurality of pressure pumps respectively connected to said pipe lines for supplying water under pressure thereto, and control means located remote from said tub and operatively connected to said pressure pumps for individually and selectively controlling said pressure pumps whereby to vary the pressure in the respective pipe lines relative to each other, said spray nozzles being arranged in nozzle groups for producing varied spray patterns, at least some of said nozzle groups being movable to produce moving water streams, and drive means operatively connected to said movable nozzle groups for driving said movable nozzle groups.

4. A fountain installation according to claim 3 in which one of said movable nozzle groups includes a group of upstanding nozzles arranged in a circle and extending above the pipe line, and said drive means includes a motor connected to said upstanding nozzle group for rotating the latter.

5. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub, a plurality of spray nozzles connected to and fed by said pipe lines, means connected to and

communicating with said pipe lines for supplying water under pressure to said pipe lines, an elongated pipe disposed above said pipe lines, one of said pipe lines having an upstanding hollow casing in communication therewith, the elongated pipe having at one end a hollow extension rotatably mounted in said casing and communicating therewith, said elongated pipe having an axial row of nozzles, means mounting said elongated pipe for rocking movement about its longitudinal axis, drive means operatively coupled to said elongated pipe, for rocking the latter, and remote control means connected to said drive means for selective actuation thereof.

6. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub and extending longitudinally thereof, a plurality of spray nozzle units connected to and fed by said pipe lines, a plurality of pressure pumps respectively connected to said pipe lines for supplying water under pressure thereto, said spray nozzle units including an elongated pipe disposed above and extending transversely of said pipe lines and journalled thereon for rocking movement about its longitudinal axis, one of said pipe lines having an upstanding hollow casing in communication therewith, the elongated pipe having at one end a hollow extension rotatably mounted in said casing and communicating therewith, said elongated pipe having an axial row of nozzles, and drive means operatively connected to said elongated pipe for rocking the latter about its longitudinal axis.

7. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub, a plurality of spray nozzles connected to and fed by said pipe lines, means connected to and communicating with said pipe lines for supplying water under pressure to said pipe lines, a pair of spaced, parallel, elongated pipes disposed above said pipe lines, a hollow casing for each elongated pipe upstanding from and mounted on one of said pipe lines in communication therewith, each elongated pipe having at one end a hollow extension rotatably mounted in a respective hollow casing and communicating therewith, each elongated pipe having an axial row of nozzles, and drive means operatively connected to each elongated pipe for rocking the elongated pipes in unison and in opposite directions.

8. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub, a plurality of spray nozzles connected to and fed by said pipe lines, means connected to and communicating with said pipe lines for supplying water under pressure to said pipe lines, a plurality of pairs of spaced, parallel, elongated pipes disposed above said pipe lines, a hollow casing for each elongated pipe upstanding from and mounted on one of said pipe lines in communication therewith, each elongated pipe having at one end a hollow extension rotatably mounted in a respective hollow casing and communicating therewith, each elongated pipe having an axial row of nozzles, and means for rocking the elongated pipes of each pair in opposite directions, said rocking means including a double-armed lever, a crank drive connected to one arm of said double-armed lever, a rod connecting one arm of the double-armed lever to one pipe of each pair of pipes, a rod connecting the other arm of the double-armed lever to the other pipe of each pair of pipes, said double-armed lever reciprocating said rods in opposite directions.

9. In a fountain installation including a tub, a supply pipe disposed in said tub, means connected to said supply pipe for supplying water under pressure thereto at least one pair of elongated spray pipes extending substantially transversely of said supply pipe, means adjacent the opposite ends of each of said spray pipes journalling each of said spray pipes for rocking movement about a longitudinal axis, the journalling means at one end of each of said spray pipes including an upstanding casing supported on and communicating with said supply pipe, said upstanding casing having bearing means receiving the adjacent end of the associated spray pipe and journalling the latter for said rocking movement with said spray pipe communicating with said supply pipe through said upstanding casing, and drive means connected to said pair of spray pipes for rocking said spray pipes in unison and in the opposite directions.

10. A fountain installation for producing spray water effects, comprising a tub, a plurality of pipe lines disposed in said tub, a plurality of spray nozzles connected to and fed by said pipe lines, means connected to said pipe lines for supplying water under pressure thereto, a pair of spaced, parallel, elongated spray pipes disposed above said pipe lines and extending substantially transversely thereto, a hollow casing for each elongated pipe upstanding from and mounted on one of said pipe lines in communication therewith, each of said spray pipes being journalled at one end in one of said hollow casings and communicating therewith, each spray pipe having an axial row of nozzles, and drive means for rocking the pair of spray pipes in unison and in opposite directions, said drive means including motor driven crank means, a double-armed lever, a rod connecting the crank means to said double-armed lever for reciprocating the latter, means connecting one arm of the double-armed lever to one of said pair of spray pipes, and means connecting the other arm of the double-armed lever to the other of the pair of spray pipes.

11. A fountain installation for producing spray water effects, comprising a tub, a plurality of water supply pipe lines disposed in said tub, a plurality of pumps for supplying water to said pipe lines, a motor for each of said pumps, remote control means for selectively actuating said motors and including a control board, a spray nozzle group connected to and fed by each pipe line, some of said spray nozzle groups being movably mounted, motor means operatively connected to said movable spray nozzle groups for driving the same, means on said control board for regulating said motor means, said movable spray nozzle groups including a pair of spray pipes mounted in said tub above said pipe lines and each journalled for rocking movement about its longitudinal axis, each spray pipe having an axial row of spray nozzles, crank means for rocking said spray pipes, said crank means comprising a crank connected to and driven by one of said motors, a double-armed lever, a rod connecting said crank to one arm of said double-armed lever, and coupling means connecting the arms of said double-armed lever to the respective spray pipes whereby said crank means rocks said spray pipes in unison and in opposite directions.

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