

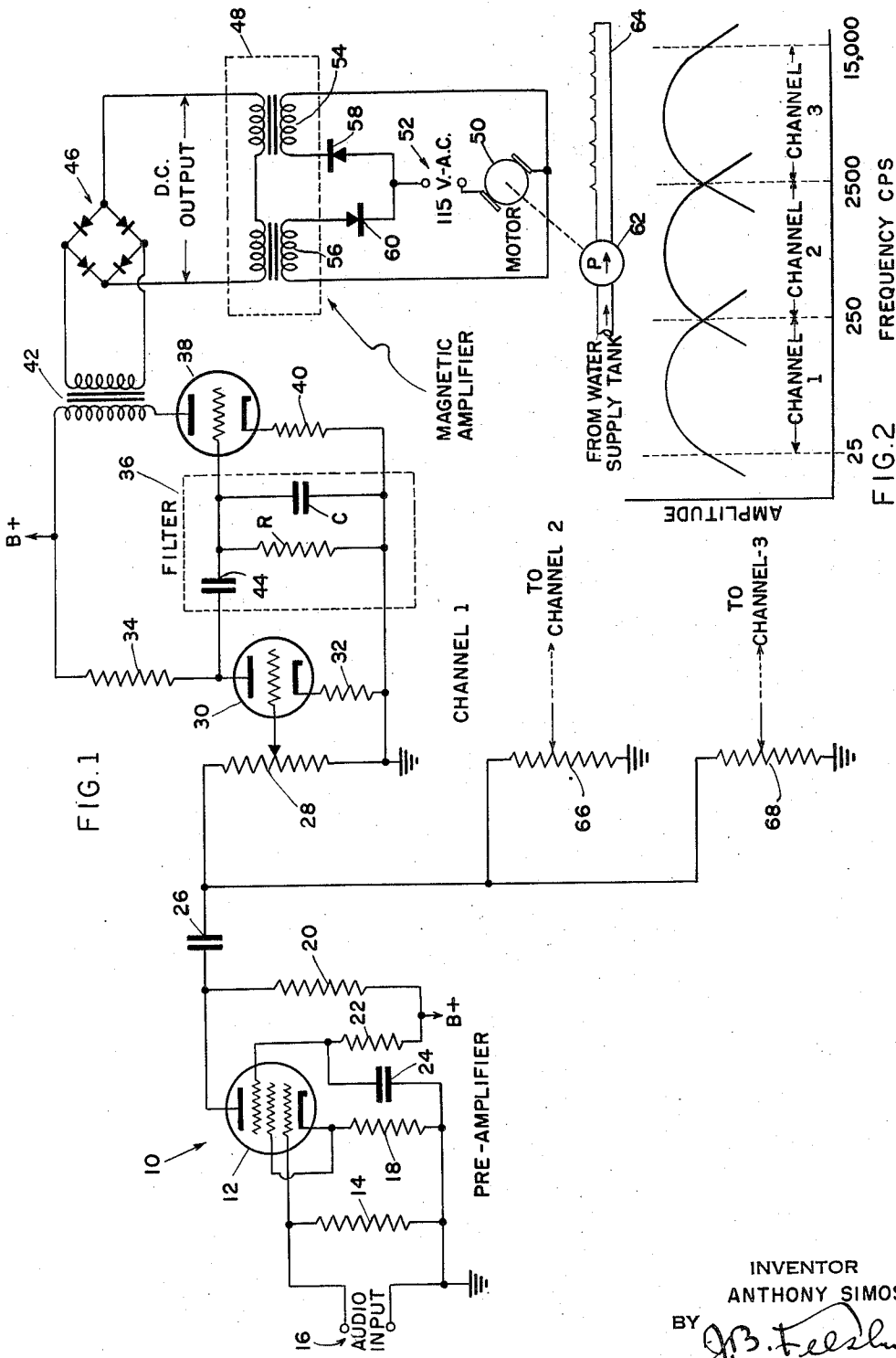
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AUDIO FREQUENCY CONTROLLED FOUNTAIN

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AUDIO FREQUENCY CONTROLLED FOUNTAIN

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5 Claims. (Cl. 84-464)

Use is frequently made of water sprays or fountains to provide entertainment and for advertising purposes. In some of these applications the water spray or sprays are caused to fluctuate in amplitude by manual or mechanical means in accordance with a predetermined pattern. This invention is directed to a means by which single or multiple fountain sprays may be actuated by means of the voice or other audio frequency.

The principal object of my invention is to provide a water spray display wherein the spray amplitude or height varies with changes in amplitude of audio frequency vibrations.

Another object is to provide a water display of the above nature wherein a plurality of different frequency band-pass channels energized from a single sound source provide varying patterns of display amplitude in a plurality of grouped spray fountains.

Another object is to provide an electro-mechanical system for controlling water pressure in response to varying voltage amplitudes derived from sound vibrations.

Still another object is to provide a fountain spray control system of the character described that will be practical, efficient and long-wearing in operation.

The foregoing and other objects, advantages and features of the invention will become evident from the following description, taken together with the accompanying drawings. In the drawings:

Fig. 1 is an electrical schematic diagram of a three-channel system embodying the invention; and

Fig. 2 is a graph showing the frequency ranges of the three channels shown in Fig. 1.

In brief, the invention contemplates the use of a pre-amplifier for raising the voltage level of the input audio signal derived from the voice or music to a level of about one volt R. M. S., an intermediate amplifier, a power amplifier, a D-C. rectifier in the output circuit of the power amplifier to provide a D-C. output current having an average amplitude of the audio voltage, and a control amplifier connected to energize an electrically-driven pump in accordance with the varying D-C. output current. The output of the three amplifiers may be connected to three or more channels each of which comprises an intermediate amplifier and an output pump motor control circuit, and each channel may have its own audio frequency band-pass network allowing passage respectively of low, middle and high audio frequencies, for example. In such an installation, the spraying heights of the channel fountains would vary independently in accordance with changes of the audio frequency signal input. All three sprays might also operate at once, for example, if there are simultaneous low, middle and high frequency sounds, as from an orchestra.

Referring now in detail to the drawings, the numeral 10 in Fig. 1 indicates the pre-amplifier portion of the circuit, the same comprising a pentode 12 having the usual grid resistor 14 across which the audio input, whether speech, live music or recorded or transcribed sound, is applied at input terminals 16. Numeral 18

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designates the cathode bias resistor and the numeral 20 indicates the output load resistor energized from a source of plate voltage B. The screen grid of pentode 12 is connected to plate voltage B through the usual screen voltage dropping resistor 22, and is by-passed by a condenser 24 connected to ground. The output of pre-amplifier 10 is connected through coupling condenser 26 across an input control potentiometer 28, the movable contact of which is connected to the grid of an intermediate triode amplifier 30 associated with spray channel 1. The cathode of the intermediate amplifier triode 30 is connected to ground through a cathode resistor 32, and the plate of said triode is connected through a plate resistor 34 to the source of plate supply voltage B. The amplified output from intermediate amplifier triode 30 is connected through an R-C filter network, generally designated by the numeral 36, to the control grid of a power output triode 38. The cathode of said output triode is connected through a cathode resistor 40 to ground, and the plate of said output triode is connected through the primary winding of an output transformer 42 to the source of plate voltage supply B. The filter network 36 comprises a coupling condenser 44, a resistor R and a condenser C connected in shunt from the grid of output triode 38 to ground. As indicated in Fig. 2, the filter network in Fig. 1 may be designed to pass frequencies between 25 and 250 cycles per second, this band representing the low frequencies of the audio frequency range. The secondary or output winding of the output transformer 42 is connected to the input of a full wave bridge type rectifier 46, the rectifier output of which is connected to the input winding of a magnetic amplifier 48.

A pump motor 50 is energized from a source of 115 volt A-C. supply voltage through winding legs 54 and 56 of a magnetic amplifier 48, one leg being for each half-cycle. Half-wave rectifiers 58 and 60 are connected in series with each winding leg circuit to prevent reverse current flow. It will thus be apparent that impedance changes of the leg windings 54 and 56 in dependence upon the D-C. output current changes in the control winding of the magnetic amplifier will operate to correspondingly vary the speed of pump motor 50. Pump motor 50 is mechanically connected to a pump 62, and will therefore operate to similarly change the volume of flow or height of spray from its associated fountain or spray system. This system is indicated generally by the numeral 64 in Fig. 1.

The output of the pre-amplifier 10 is also connected to a potentiometer 66 associated with channel 2 and a potentiometer 68 associated with channel 3. The remainder of the fountain spray control circuits, being similar to circuit shown and described hereinabove in connection with channel 1, is not further illustrated. The band-pass filters associated with channels 2 and 3, of course, are designed to pass a different range of frequencies from those of the band-pass filter of channel 1, and are preferably designed to pass the middle and high audio frequency ranges, respectively, as indicated by the curves for channels 2 and 3 as shown in Fig. 2.

In the operation of the fountain control system, it will be noted that spray amplitude adjustment for each of the three fountain channels can be individually made by adjustment of the respective potentiometers 28, 66 and 68. A minimum flow at no audio input can be had by provision of a pre-magnetizing winding in the magnetic amplifier 48.

Although the invention has been described in connection with the use of a magnetic amplifier for controlling the pump motors, it will be understood that other means could also be used. For example, in the control of high capacity fountains having a flow of one hundred gallons per minute or more, an eddy current clutch coupling

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energized by the D.-C. output of the amplifier could be used between the pump motor and the pump. It is therefore to be understood that the particular embodiment of the invention herein described is given by way of example only. Various other practical embodiments will undoubtedly present themselves to those skilled in the art and yet be within the scope of the invention as defined in the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. A device for controlling a plurality of water spray fountains in accordance with individual frequency bands of an audio frequency energy source, comprising an audio amplifier having an output circuit, a plurality of power amplifiers connected to be controlled by the output circuit of said audio amplifier, said power amplifiers each having different band pass characteristics and a power output circuit, a full wave rectifier connected in each of said power output circuits, a plurality of electrically driven water pumps, and a magnetic amplifier interconnecting the output of each of said full wave rectifiers with one each of said electrically driven pumps to separately control said plurality of sprays in accordance with variations of the audio frequency.

2. A device for controlling a plurality of water spray fountains in accordance with respective frequency bands of an audio frequency source, comprising an audio amplifier having an output circuit, a plurality of amplifier circuits connected to be controlled by the output circuit of said audio amplifier, each of said amplifiers having power output circuits, a full wave rectifier connected in each of said power output circuits, an electrically driven water pump for each of said power amplifiers, means interconnecting the output of each of said full wave rectifiers and its respective electric water pump to energize said pumps in accordance with variations of audio frequency, each of said power amplifier circuits comprising an audio frequency band-pass circuit, each of said band-pass circuits being adapted to pass respective frequency ranges of different band-pass characteristics, and a plurality of water fountains, one connected to each of said pumps.

3. An electro-mechanical system for controlling the spray height of a plurality of water fountains in accordance with electrical audio input signals, comprising a pre-amplifier, a plurality of audio power amplifiers connected to be energized by the output of said preamplifier, said power amplifiers each having different band pass characteristics and each having an output circuit, rectifier means

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in each of said output circuits, a magnetic amplifier controlled by each of said output circuits, electro-mechanical control means connected to the output circuit of each said magnetic amplifiers, and a plurality of water fountain systems, each of said electro-mechanical means being operative to vary water pressure in one each said fountain systems.

4. An electromechanical system to controlling the spray heights of a plurality of water fountain systems in accordance with frequency and amplitude variations of an audio input signal, comprising a pre-amplifier, a plurality of audio power amplifiers connected to be energized by the output of said pre-amplifier, said power amplifiers each having an output circuit, rectifier means in each of said output circuits, a magnetic amplifier for each of said output circuits and connected to be actuated by the output of its respective rectifier means, electro-mechanical control means connected to the output circuit of each of said magnetic amplifiers a plurality of water fountain systems, one for each magnetic amplifier, said electro-mechanical means for each magnetic amplifier being operative to vary water pressure in one each of said fountain systems, each of said power amplifier circuits comprising an audio-frequency band-pass circuit, each of said band-pass circuits being adapted to pass respective frequency ranges of different band-pass characteristics.

5. In combination, electric circuit means to produce a fluctuating current responsive to fluctuating sounds of varying audio frequencies, means electrically connected to the first means, to separate said current into a plurality of component circuits at each different audio frequency range, means connected to each component circuit to amplify its current, an electric variable speed motor connected to each component circuit and amplifying means therefor, and being automatically responsive in speed to the amplitude of the amplified current of said component circuit, and fountain spray pump means controlled by and responsive to the speed of each motor, having means to cause a spray, the height of which is responsive to the speed of operation of the motor.

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