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DISPLAY DEVICE

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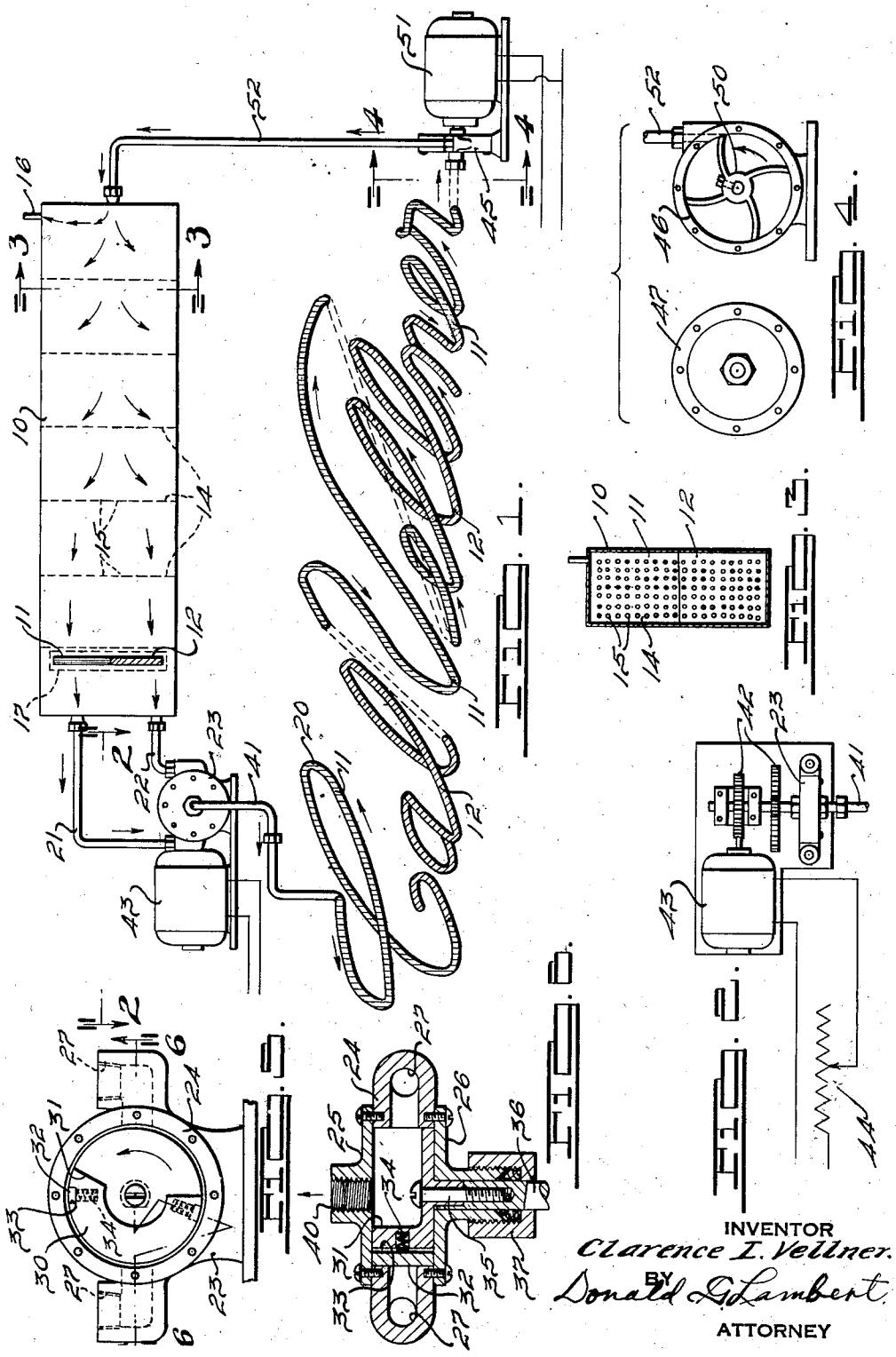

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## DISPLAY DEVICE

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10 Claims. (Cl. 40—125)

This invention relates to display or exhibit devices and more especially to animated advertising devices in which moving liquids flow through transparent or translucent forms arranged as indicia.

The principal object of the invention is to improve the art of sign exhibits.

Another object of the invention is to provide a novel display and exhibit device in which a plurality of liquids of different colors are continuously moved.

Another object is to provide in a sign exhibit of the above character a plurality of relatively immiscible and differently colored liquids which are intermittently flowed through indicia of the sign so as to attract attention to the sign exhibit both by virtue of the motion of such liquids and by the changes of color effected.

A further object is to provide a sign of the above character in which the liquids remain in the liquid state under all normal outdoor temperature conditions encountered.

Another object is to provide a novel construction and arrangement for flowing contrastingly colored liquids through indicia of a sign exhibit and for separating such liquids.

Another object is to provide a vented fluid circuit system for flowing contrasting liquids through indicia of a sign display so as to allow for expansion and contraction of the liquids and to lessen pressure required for causing their movement.

Other objects, features and advantages will become apparent from the following description and appended claims.

For the purpose of illustrating the genus of the invention, a typical concrete embodiment of sign exhibit construction is shown in the accompanying drawing, in which:

Fig. 1 is a more or less diagrammatic side elevation of such a sign exhibit;

Fig. 2 is a detail top plan of the fluid changer shown in Fig. 1, the view being taken as indicated by the line 2—2 of Fig. 1;

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged side elevation of pump mechanism shown in Fig. 1, the view being taken as indicated by the line 4—4 of Fig. 1, a removable cover plate being shown as disassembled from and disposed at one side of the remainder of the pump;

Fig. 5 is an enlarged side elevation of the liquid changer valve shown in Figs. 1 and 2, a cover plate of such valve being removed to show interior parts; and

Fig. 6 is a horizontal section taken substantially on the line 6—6 of Fig. 5.

Referring to the drawing, the numeral 10 designates a separation chamber or tank adapted to contain two or more contrastingly colored and immiscible liquids of appreciably different specific gravities. The tank 10, as indicated in Figs. 1 and 3 is of generally rectangular formation and of considerable length as indicated in Fig. 1. The height of the tank 10 also exceeds its width as indicated in Fig. 3 so that the liquids, indicated at 11 and 12, will have ample opportunity to separate and assume different levels in the tank 10. The liquids 11 and 12 are adapted during operation of the display device to flow in the general direction from right to left, as viewed in Fig. 1.

Vertically arranged baffle plates or partitions 14 provided with perforations 15 are disposed in the interior of tank 10 to quiet flow of the liquids in the tank and aid in the separation of the liquids into different strata in accordance with their respective densities. The perforated or otherwise foraminous baffles 14 impede the longitudinal flow of the liquids 11 and 12 from right to left in tank 10, Fig. 1, thus facilitating separation of the liquids from one another. While but two liquids 11 and 12 are shown in the accompanying drawing, it is to be understood that any desired number of mutually immiscible and differently colored liquids of different specific gravities may be employed. The tank 10 is vented at the top by a vent pipe 16 to permit trapped air to escape from the system and to allow filling or replenishing of one or more of the liquids employed. A level gauge 17 may be provided as indicated in Fig. 1 for determining the amounts and condition of the liquids within tank 10.

Any mutually immiscible liquids of different densities and capable of absorbing and retaining a dye or coloring matter may be employed. For outdoor display devices, the liquids should be such that neither vaporization or freezing will occur at extreme summer or winter temperatures. The liquids should also retain the coloring matter during frequent intermingling and separating of the liquids and should not stain or discolor a transparent display tube 20, such as a glass tube formed to provide indicia, as indicated in Fig. 1. Tetra-chlor-ethylene, alcohol, saline solutions such as barium or calcium chloride and other liquids together with aniline dyes may be used.

The transparent display tube 20 is preferably arranged at a level below the separator chamber

or tank 10 so that liquids will flow from the tank and through the display tube 20. A plurality of conduits such as 21 and 22, one for each of the different liquids employed, connect one end of tank 10 at the proper levels to a color changer valve 23. The valve 23 comprises a cylindrical casing 24 having removable cover plates 25 and 26 and inlet parts 27 to which supply conduits, such as 21 and 22, are connected at points equidistantly spaced about the periphery of casing 24. The valve 23 also includes a cylindrical rotor 30 cut away as indicated at 31 in Figs. 5 and 6 so that but one inlet port 27 is open at a time but no great interval elapses between the closing of one inlet port and the opening of the next inlet port. Thus where two inlet ports 27 and two supply conduits are provided the cut away recess 31 will extend through slightly less than 180 degrees of the rotor periphery while where three liquids, three inlet conduits and three inlet ports are employed the recess would extend through slightly less than 120 degrees, etc.

Wiper blades 32 are disposed in transverse and radially directed recesses 33 adjacent the margins of the cut away portion 31 of rotor 30 and are biased radially outwardly by springs 34 for sealing purposes.

The rotor 30 is connected by a screw 35 to a drive shaft 36 projected through a suitable stuffing box 37 on cover plate 26. The cover plate 25 is centrally provided with an outlet port 40 connected by a conduit 41 to the display tube 20. The rotor 30 is adapted to be driven through the shaft 36 and reduction gearing 42 by means of a motor 43. A resistance controller 44 is provided in the supply circuit of motor 43 for varying the timing of color changes.

A centrifugal pump 45 comprising a casing 46 provided with a removable cover plate 47 and a rotor 50 is employed for returning the liquid through a conduit 52 from the transparent display tube 20 to the right hand end of tank 10 as viewed in Fig. 1. The pump 45 is adapted to be driven by a motor 51. Optionally, the pump 45 could be interposed in the conduit 41 instead of the conduit 52, if desired.

The tank 10, conduit 21 or 22, color changer valve 23, conduit 41, transparent display tube 20, pump 45 and conduit 52 provide a single complete liquid circuit through which either liquid 11 or 12 may be continuously circulated. The motor driven color changer valve 23 may be operated at any desired speed to switch at suitable intervals from one liquid to the other. The speed of operation of the motor 43 determines the interval between color changes and this speed of operation with respect to the speed of operation of motor 51 determines the length of the column of liquid of one color passed through the display tube 20. The speed of motor 43 may be varied by resistance controller 44 so that such columns may be of equal, greater, or less length than the length of display tube 20. For bi-directional sign exhibits or display devices, another transparent display tube could be connected to the conduits 41 and 52, the connections to these conduits being crossed so as to have the liquids flow in the proper direction through the indicia provided by the second display tube. Border display tubes and other display forms could also be similarly connected as desired. Any desired color combinations can be employed by proper selection of the different liquids used. Liquids are pumped under low pressure conditions due to the venting of the liquid circuit by vent 16, thus reducing the likelihood of leakage and reducing the power required to operate the device. Any air which might be introduced into the system at such points as the color changer valve or the pump would escape at vent 16. Large bore transparent display tubes 20 may be employed so that large display units may be used since small bore tubes are not required as in the case of liquid and gas display devices in which unordered bubbling of liquid and gas results when too large bore display tubes are employed. Fluorescent liquids may be employed when desired. The use of large bore display tubes also reduces pressures against which the pump must act, thus aiding in effecting economy of operation.

As many changes could be made in the above described construction and many apparently widely different embodiments of this invention could be had without departing from the spirit thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, conduit means providing a single complete circuit and including a transparent tube forming indicia and a separating chamber for allowing the liquids to separate by gravity, means for circulating liquid through said conduit means, and means for selectively circulating any one of said liquids through the transparent tube.

2. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, conduit means providing a single complete circuit and including a transparent tube forming indicia and a separating chamber for allowing the liquids to separate by gravity, means for circulating liquid through said conduit means, means for selectively circulating any one of said liquids through the transparent tube, and means for operating said last-named means so as intermittently to circulate each of said liquids through the transparent tube.

3. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, conduit means providing a single complete circuit and including a transparent tube forming indicia and a separating chamber for allowing the liquids to separate by gravity, means for circulating liquid through said conduit means, valve means for selectively conducting any one of said liquids from said separating chamber to the transparent tube and means for operating said valve means so as intermittently to circulate each of the different colored liquids through the transparent tube.

4. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, conduit means providing a single complete circuit and including a transparent tube forming indicia and a separating chamber for allowing the liquids to separate by gravity, means for circulating liquid through said conduit means, valve means for selectively conducting any one of said liquids from said separating chamber to

the transparent tube while preventing flow of the remainder of the liquid from said chamber to said tube and means for operating said valve means so as intermittently to circulate each of the different liquids through the transparent tube.

5. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, a transparent tube forming indicia, a separation chamber for allowing the liquids to separate by gravity, conduit means connecting one end of said tube to one end of said chamber, pump means in said conduit for causing flow of liquid from said tube to said chamber, valve means, a plurality of conduits, one for each of said liquids, communicating between said valve means and the other end of said separation chamber, and conduit means connecting said valve means and the remaining end of said transparent tube.

6. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, a transparent tube forming indicia, a separation chamber for allowing the liquids to separate by gravity, conduit means connecting one end of said tube to one end of said chamber, pump means in said conduit for causing flow of liquid from said tube to said chamber, valve means, a plurality of conduits, one for each of said liquids, communicating between said valve means and the other end of said separation chamber, conduit means connecting said valve means and the remaining end of said transparent tube and means for continuously operating said valve means for intermittently causing circulation of each of the contrastingly colored liquids through the transparent tube.

7. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, a transparent tube forming indicia, a separation chamber for allowing the liquids to separate by gravity, said chamber being arranged at an elevation above said transparent tube, conduit means connecting one end of said tube to one end of said chamber, pump means in said conduit for causing flow of liquid from said tube to said chamber, valve means, a plurality of conduits, one for each of said liquids, communicating between said valve means and the other end of said separation chamber, and conduit means connecting said valve means and the remaining end of said transparent tube.

8. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, a transparent tube forming indicia, a separation chamber for allowing the liquids to separate by gravity, conduit means connecting one end of said tube to one end of said chamber, pump means in said conduit for causing flow of liquid from said tube to said chamber, perforated baffles arranged in vertical positions in said separation chamber for quieting flow of the liquids therethrough, valve means, a plurality of conduits, one for each of said liquids, communicating between said valve means and the other end of said separation chamber, and conduit means connecting said valve means and the remaining end of said transparent tube.

9. In a display device, a plurality of contrastingly colored liquids each immiscible in any other of said liquids, each liquid being of a density different from that of any other of said liquids, conduit means providing a single complete circuit and including a transparent tube forming indicia and a separating chamber for allowing the liquids to separate by gravity, vent means communicating between the interior of said chamber and atmosphere for venting air from said conduit means, means for circulating liquid through said conduit means, and means for selectively circulating any one of said liquids through the transparent tube.

10. In combination: a large-bore display tube; two mutually immiscible liquids of different specific gravities; a single separation tank for allowing the liquids to separate by gravity; and means for alternately circulating long-length sections of each of such liquids from said tank, through said tube, and back to said tank.

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