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ELECTRIC EYE OPERATED WASH BASIN SYSTEM

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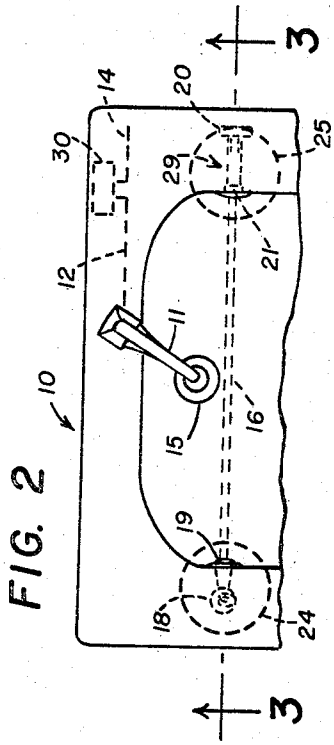


FIG. 2

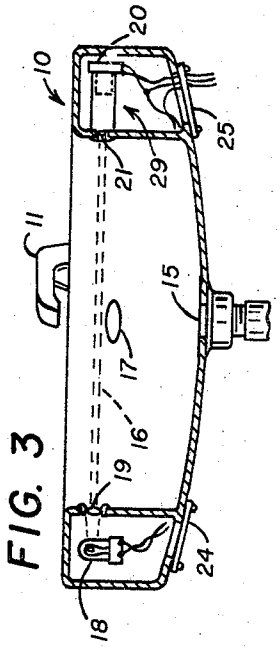


FIG. 3

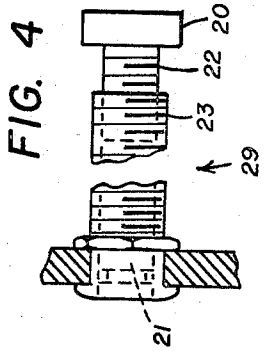


FIG. 4

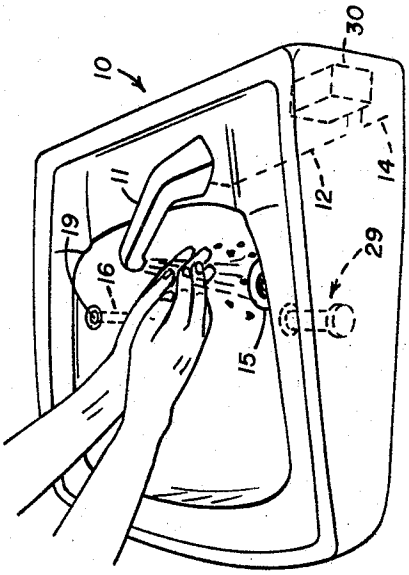


FIG. 1

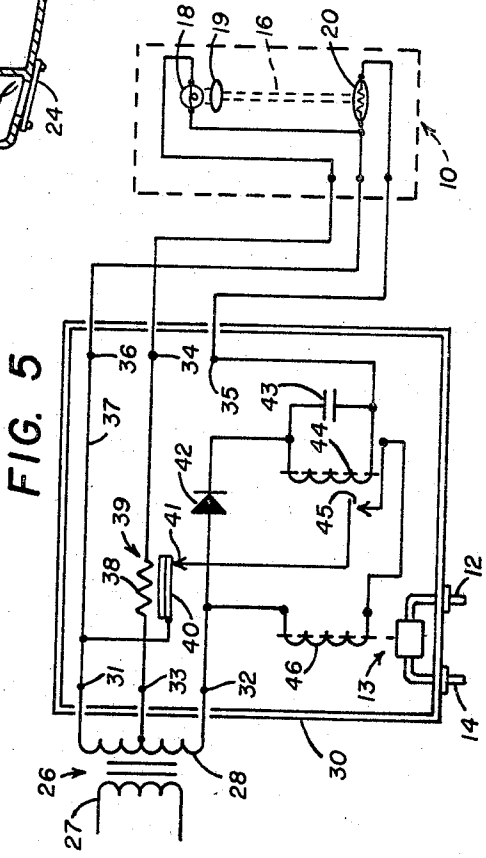


FIG. 5

INVENTOR.
JOHN H. CATHCART
BY
George E. Pearson
ATTORNEY

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ELECTRIC EYE OPERATED WASH BASIN SYSTEM

John H. Cathcart, 573 H Ave., Coronado, Calif. 92118

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ABSTRACT OF THE DISCLOSURE

Flow of water into a wash basin is started and stopped by a solenoid valve inserted into the water supply line leading to the basin faucet. An electric eye system including an electric lamp mounted on one side of the basin and a light sensitive photoelectric element mounted on the other side of the basin provides a narrow beam of light which is directed along a path disposed in front of the water path in juxtaposition thereto.

The light sensitive element controls circuitry which energizes the solenoid valve to start the water flow when the beam is extinguished at the light sensitive element and which deenergizes the valve to stop the water flow when the light beam is restored at the light sensitive element.

When the basin user puts his hands into the expected path of the water flow from the faucet, the light beam is intercepted and blocked by the hands to thus extinguish the beam at the light sensitive element, thereby to start the water flow. When the hands are withdrawn, the beam is restored at the element and flow of the water is stopped.

This invention relates generally to wash basin or lavatory systems and apparatus and more particularly to improvements therein having provision for controlling water flow from the basin without necessitating manipulation for that purpose by the user's hands of the faucet or some other part of the wash basin system and apparatus.

More specifically, the present invention contemplates a new and improved wash basin arrangement in which water flow is initiated or terminated merely by the acts of interposing the hands within or withdrawing the same from the desired path or region of water flow. Such an arrangement obviously is of inestimable value and utility to dentists, physicians, and surgeons who not only necessarily must scrupulously avoid and minimize hand contact with objects such as a faucet which could be infected with germs, but who wish also to retain full manipulative use of their hands in operations necessitating the water flow.

The wash basin system of the present invention may also be used to advantage in public, school, and other wash rooms, where for reasons of health, ease and economy of operation, and fastidiousness of users, hand manipulation of faucets is intolerable if not impracticable. Hand valves or faucets, for example, because of mechanical weaknesses and the human element involved in their use, are notoriously subject to being left open or only partially closed. This is not only wasteful of the water supply but also may have serious overflow consequences if drains are left closed or become clogged through carelessness or other causes.

SUMMARY OF THE INVENTION

In accordance with the arrangement of the present invention, a faucet which does not have the usual valve means associated with it is mounted on the wash basin so as to pass a stream of water directly into the bottom drain of the basin. Water flow to the faucet is controlled by a normally closed solenoid valve connected into the water supply line, the water flow being initiated when a light beam is interrupted and the flow terminated when the light beam is restored. The beam of light is generated by a so-called "electric eye" system and is passed in juxtaposition to the path of desired flow of water from the faucet to the bottom drain whereby the beam is respectively interrupted and restored when the hands of the user are moved into and withdrawn from the water path.

OBJECTS OF THE INVENTION

An object of the present invention therefore is to provide a new and improved wash basin system which provides the aforedescribed features and advantages incident to an automatic water supply operation while obviating the aforementioned and other disadvantages of the manually manipulated systems.

Another object is to provide an electric eye operated wash basin system having provision for preventing momentary or sustained water flow due to random impingement of spurious or ambient light beams effective to actuate the electric eye system or due to extinguishing of the lamp which produces the desired light beam.

Another object is to provide an electric eye operated wash basin system having provision for preventing sporadic or continuous water flow due either to blocking of the beam by the stream itself or by a rising level of water within the basin.

Still another object is to provide an electric eye operated wash basin which may be safely operated at low voltage.

Still another object resides in the provision of an electric eye operated wash basin system which lends itself for use in multiple basin wash rooms.

Still other objects, features and advantages of the invention will become more fully apparent as the description of a preferred embodiment thereof proceeds with reference to the accompanying drawing wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the wash basin system of the present invention;

FIG. 2 is a plan view of a portion of the wash basin system disclosed in FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a detail view, somewhat enlarged, of the light sensitive unit assembly; and

FIG. 5 is a schematic diagram of the complete electrical system of the wash basin.

THE SPECIFICATION

Referring now to the drawing for a more complete understanding of the invention, the numeral **10** generally designates a wash basin or lavatory which may be formed of any material suitable for the purpose such, for example, as cast iron, and/or steel with a porcelain coating, stainless steel, vitreous china, or other ceramics. The basin has a faucet **11** which does not have the usual hand valve or cock for manually controlling flow of water from the faucet. For purposes of the instant invention, faucet **11** is connected by suitable tubing **12** to a solenoid control valve generally designated **13**, FIG. 5, which controls the flow of water from a water supply line **14**.

It will be understood that basin **10** may have its own mixing valve (not shown) from which supply line **14** extends to solenoid valve **13** and to which the hot and cold water lines connect in the usual manner. On the other hand, basin **10** may be one of many such basins provided in a public, school, or the like washroom, in which case, the lines **14** from these basins may lead to a common mixing valve which serves all the basins.

Faucet **11** is mounted at the top of basin **10** and so positioned thereon to pass the water stream therefrom along a vertical path and directly into the bottom drain **15** of the basin, as clearly depicted in FIGS. 1 to 3. A narrow light beam **16** is disposed in juxtaposition to the

water path and passes horizontally between the sidewalls of the basin. Thus, when the user's hands are moved into the water path, as depicted in FIG. 1, the light beam **16** is interrupted, and when the hands are removed, the light beam is restored.

As best seen in FIG. 2, the light beam **16** passes in front of the water path and therefore does not intersect therewith to thus assure that the water flow, once initiated by interruption of the light beam, will not itself block the beam and cause continuous flow when the hands have been removed. Provision is also made for preventing blocking of the beam by a rising level of water in the basin, it being noted by reference to FIG. 3, that the level of beam **16** is near the top of the basin and above the overflow drain **17**.

Beam **16** is produced by an "electric eye" system which comprises an electric lamp **18**, a lens **19** for focusing the light from the lamp into the narrow beam **16**, and a light sensitive unit **29** which comprises a photoelectric cell or element **20** and a transparent window **21** through which the beam passes to impinge upon the cell. The beam is preferably narrowed by the lens **19** to provide the desired side-by-side juxtapositioned, but non-intersecting relation of the beam and water paths to thus render the system critically sensitive to the placement of the hands in the water path. To this end, it is also preferable that the light sensitive element **20** be critically positioned so as to have a "line-of-sight" relation only with the beam **16** and thus not be subject to activation by random beams of light from ambient or spurious sources of light which may chance to impinge upon the window **21** and not otherwise be blocked by the basin walls, particularly when the level of the beam must be disposed near the top of the basin.

To achieve maximum isolation of the light sensitive element **20** from spurious light sources, the element preferably is adjustably mounted so as to provide maximum spacing with respect to the window **21**. In the arrangement disclosed, element **20**, FIG. 4, is secured to a tube **22** which telescopes into a tube **23** which contains and seals the window **21** in watertight relation therewithin, the connection between tubes **22** and **23** being threaded, for example, to facilitate adjustment of the spacing between the element and window. Tubes **22** and **23** further preferably are blackened, or otherwise treated, on their inner surfaces to avoid reflection of light which may enter the window spuriously.

Lens **19** and photoelectric unit **29** are suitably mounted and sealed in watertight relation in the opposite sidewalls of the basin **10**, in the manner shown, and their associated lamp and photoelectric elements **18** and **20** conveniently are mounted within the double walls of the basin where they are accessible through openings provided, as shown, on the underside of the basin, these openings being normally closed by the access plates **24** and **25**.

Referring now to FIG. 5 for a description of the electrical system, power is supplied by a transformer generally designated **26** which has a primary winding **27** which is connected in the usual way to the conventional 110 volt power supply. To isolate the wash basin from the high voltage, the electrical components of the wash basin system are operated from the center tapped transformer secondary winding **28** which provides a low safe voltage of the order of 24 volts across its outside terminals. Transformer **26**, moreover, preferably is mounted remotely from the wash basin, being mounted on or within the wall support for the basin, or in another room removed from the wash room itself, particularly in arrangements in which the same transformer may supply the electrical systems of several wash basins.

Voltage from secondary winding **28** is supplied to a control box **30** which may be mounted on or near the wash basin **10**, as in one of the double wall pockets of the basin accessible through removal of access plates **24** or **25**, or on the wall support for the basin, or from a mounting bracket secured to the basin, whichever arrangement is most expedient.

Control box **30** has three inlet terminals **31**, **32** and **33** which connect with the respective outer and center tap leads of the transformer secondary winding **28**, and has three outlet terminals **34**, **35** and **36** which connect with the lamp **18** and light sensitive element **20**, terminal **31** being connected internally of the box by conductor **37** to outlet terminal **36**. By reason of these connections, lamp **18** is connected in series with a heater winding **38** across inlet terminals **31** and **33** to be thus energized by the upper half of secondary winding **28**, as viewed in FIG. 5. Heater winding **38** is a part of a thermostat **39** having a bimetallic element **40** which closes a contact **41** when the heater winding is energized. Thus, when the lamp **18** burns out, or is otherwise extinguished, the element **40** returns to its non-heated position and the contact **41** is opened.

A rectifier **42**, a capacitor **43** connected in parallel with a relay winding **44**, and the light sensitive element **20** are connected in series across inlet terminals **31** and **32** whereby these elements are energized by the full voltage of transformer secondary winding **28**, the capacitor serving in the usual manner to sustain the pulsating D.C. current supplied by the rectifier and thus prevent chattering of the contacts **45** operated by the relay when winding **44** is energized.

The series circuit comprising winding **46** of solenoid valve **13**, the normally open relay contacts **45**, and the thermostatically closed contacts **41** and its associated bimetallic element **40** is connected across inlet terminals **31** and **32** whereby the solenoid winding also is energized, upon closure of relay contacts **45**, by full voltage supplied from the secondary winding **28**.

Light sensitive element **20** is of a well known commercially available type which normally has a low resistance in the absence of light thereon and has a relatively high resistance when light is applied thereto. Thus, in the circuit arrangement of FIG. 5, with the concentrated light beam **16** supplied from lamp **18** through lens **19** and applied to element **20**, the resistance of the same is sufficiently high to limit the current to relay winding **44** to a low value insufficient to operate the relay and close the contacts **45**. When the light beam is interrupted, however, the resistance of element **20** drops to a low value and sufficient current is passed therethrough to energize relay winding **44** sufficiently to operate the relay and thus close relay contacts **45**. When this occurs, the circuit is completed through contacts **45** to energize solenoid winding **46** to thus actuate the solenoid valve **13** and permit water flow to the faucet **11**.

As long as the beam is interrupted as by the hands, as shown in FIG. 1, the water will continue to flow until the hands are removed from the water path and thus from the beam path as well. When the beam is restored, the element **20** instantly assumes its high resistance value, the current to relay winding **44** decreases, the relay contacts **45** open, and the solenoid valve **13** is de-activated to thus cut off the water flow. As aforementioned, the heater winding **38** for thermostat **39** is energized by current which passes through lamp **18** and thus, if for some reason this current should be discontinued, as when lamp **18** burns out, the heater winding is deenergized and this causes the thermostat contact **40** to open to thus prevent operation of the solenoid valve **13** even though the relay contacts **45** are closed because the beam has been removed from element **20**.

From the foregoing it will now be apparent that there has been provided a wash basin system which is well adapted to fulfill the aforestated objects of the invention, and while there has been disclosed only one embodiment of the invention which gives satisfactory results, other embodiments and arrangements will occur to those skilled in the art without departing from the scope of the appended claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A wash basin system of the character disclosed comprising, in combination, a wash basin having a bottom drain, a water supply line, and an overflow drain limiting the level to which the water rises in the basin to a predetermined level, a faucet connected to said water supply line and mounted on the basin to direct a stream of water along a predetermined path into the basin when water is caused to flow to the faucet, electroresponsive valve means connected in said water supply line for opening the same to permit water flow to said faucet when the valve means is energized, means mounted on the basin for generating a beam of light and passing the same within the basin along a predetermined path disposed above said predetermined water level and in juxtapositioned and non-intersecting relation to said water path whereby the beam of light is respectively interrupted and restored when the hands of the wash basin user are respectively moved into and withdrawn from the water path, a light sensitive electroresponsive element mounted on the water basin and disposed within the path of said light beam, and circuit means including said element for respectively energizing and deenergizing said valve means when the light beam is respectively interrupted and restored.

2. A wash basin system as in claim 1 and further comprising a window for passing said light beam to said light sensitive element, said window being mounted and sealed in watertight relation within one sidewall of said basin, said light beam generating and passing means comprising an electric lamp and a lens mounted and sealed in watertight relation within the opposite sidewall of the basin for focusing the light from said lamp onto said element in a narrow beam disposed in closely spaced and non-intersecting relation to said water path.

3. A wash basin system as in claim 2, said element having means for mounting and adjustably spacing the same from said window to prevent ambient and spurious light beams impinging on the window from reaching the element.

4. A wash basin system as in claim 3, said element mounting means including tubing having non-light reflecting inner walls.

5. A wash basin system as in claim 1, said light beam being directed substantially horizontally between opposite side walls of the basin and near the top thereof, and said basin having said bottom drain disposed substantially in said water path and an overflow driven for limiting the rise of water in the basin to a level disposed below the level of the light beam.

6. A wash basin system as in claim 2, said circuit means including means operated by energy supplied to said electric lamp for deenergizing said valve means when the lamp is extinguished.

7. A wash basin system as in claim 1, said valve means having a solenoid actuating winding, said circuit means including a relay having normally open contacts connected in series circuits with said solenoid winding and

an actuating winding connected in series circuit with said light sensitive element, said light sensitive element having relatively high and low resistance values when said light beam is respectively applied and removed therefrom whereby insufficient current passes to said relay winding to actuate the relay and close said contacts when the element is illuminated by the light beam and sufficient current passes to the relay winding to actuate the relay and close said contacts when the light beam is removed from the element.

8. A wash basin system as in claim 7, said circuit means including a power supply transformer having a low voltage center tapped secondary winding, a rectifier, and a capacitor connected in parallel with said relay winding, said rectifier and said parallel combination of said capacitor and relay winding and said light sensitive element being connected in series circuit across the outer terminals of said secondary winding, said beam generating and passing means including an electric lamp for producing said beam when the lamp is energized, said lamp being connected between the center tap and one of said outer terminals of the secondary winding, and said solenoid winding and said relay contacts being connected in series across said outer terminals of the secondary winding.

9. A wash basin system as in claim 8 and further comprising a thermostat having a bimetallic element and a heater winding connected in series with said lamp for actuating the bimetallic element in response to current drawn by the lamp, said thermostat further having a pair of normally open contacts adapted to be closed by said bimetallic element and connected in series circuit with said series connected relay contacts and solenoid winding.

10. A wash basin system as in claim 9, said solenoid valve means being mounted on or near said wash basin and said wash basin being mounted remotely from said transformer.

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LAVERNE D. GEIGER, Primary Examiner

D. B. MASSENBERG, Assistant Examiner