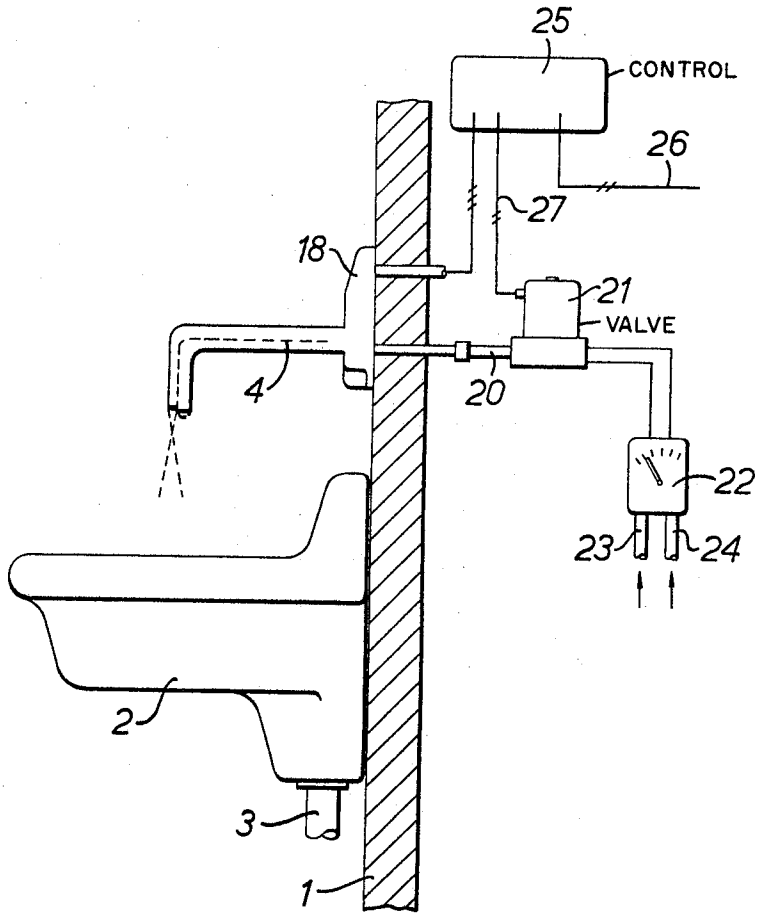
Nov. 25, 1969 K. H. S. JOHANSEN 3,480,787

AUTOMATIC INSTALLATION FOR WASHING HANDS

Filed April 8, 1966 3 Sheets-Sheet 1

FIG. 1.



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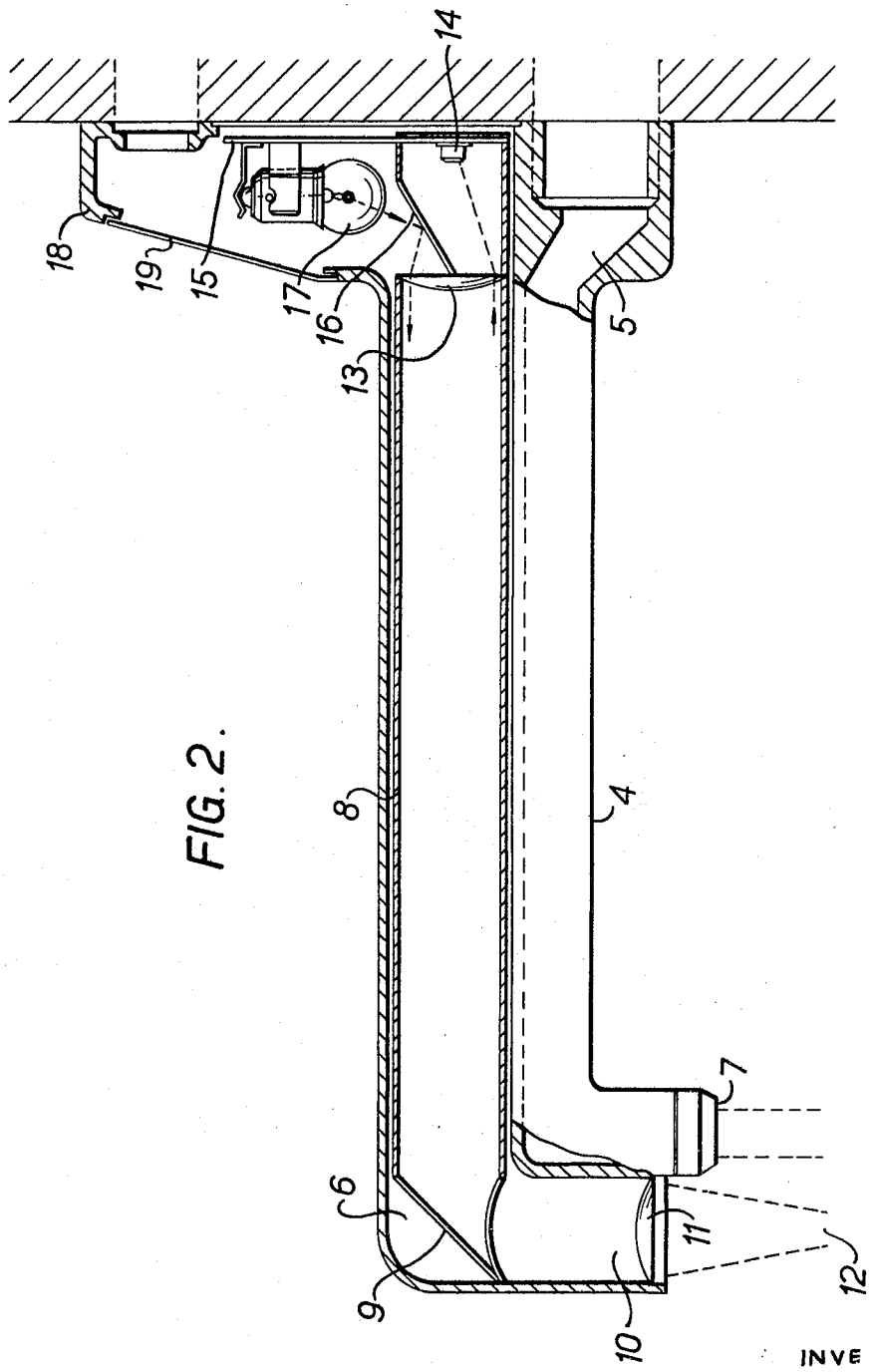

FIG. 2.

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FIG. 3.

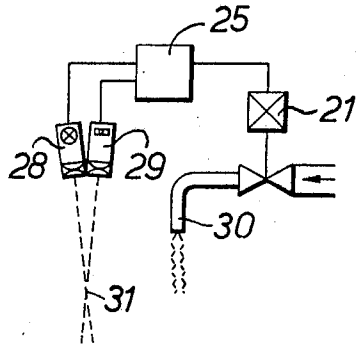


FIG. 4.

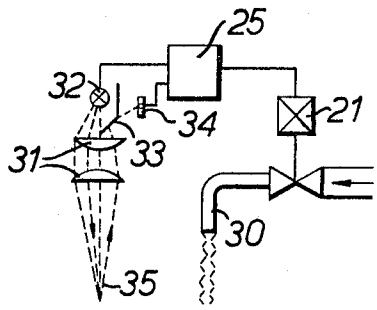


FIG. 5.

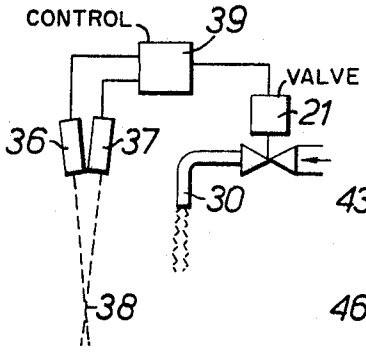


FIG. 6.

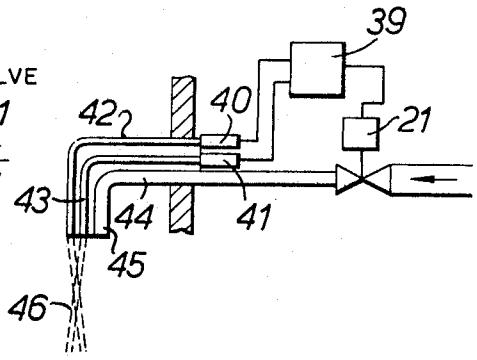
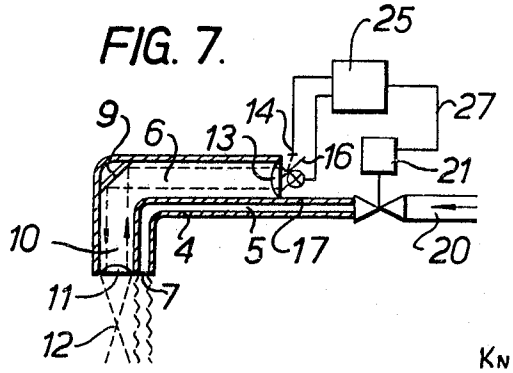


FIG. 7.



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3,480,787

AUTOMATIC INSTALLATION FOR WASHING HANDS

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Claims priority, application Denmark, June 30, 1965, 3,344/65
Int. Cl. H01j 39/12
U.S. Cl. 250—221 12 Claims

ABSTRACT OF THE DISCLOSURE

An automatic installation for actuating a valve permitting the flow of water from a nozzle for washing hands placed beneath the nozzle, the installation including a transmitter of radiation impulses directed toward the location in which hands are to be placed and a receiver of radiation impulses reflected from hands so located, the receiver being connected to a valve-actuating circuit.

The invention relates to an automatic installation for washing hands of the type where a closing member in a supply conduit to a nozzle is controlled by an apparatus that emits and receives radiation impulses and thereby senses whether an object is present in the path of the radiation.

An installation of the type indicated is known where a transmitter and a receiver are placed in the ceiling above the washbasin, and where the mirror means are placed in the floor below the front edge of the washbasin. However, it is unpractical to arrange the mirror means in the floor.

Furthermore, an installation of the type indicated is known where a projecting rod is arranged at one side of the washbasin, the transmitter being arranged in said projecting rod, and where a projecting rod with the receiver is arranged at the other side of the washbasin. In this case the radiation is interrupted when a person moves his hands into a position at a suitable height above the basin The two projecting rods are, however, unpractical.

In addition there is known an installation where an apparatus is arranged beside the washbasin and somewhat higher than the latter, said apparatus containing both a transmitter and a receiver which both are focused. When a person places a hand with the palm in the focus region the palm will be illuminated and will emit radiation to the receiver. This type of activation, however, is unpractical and has no natural relationship to the motions of washing hands.

The object of the invention is to devise an automatic installation of the type indicated for washing hands where the above mentioned drawbacks are remedied so that a practical structure and an easy and natural activation. This is obtained according to the invention by placing the transmitter and receiver of the radiation impulses in such a manner that they have an intersection point in a region at the same height as the rinsing region below the nozzle and at a slight distance to one side of the axis of the nozzle. When a person moves a hand into the region below the nozzle the hand will intercept the radiation from the transmitter and will emit radiation which is received by the receiver. By these means a simple and natural activation is obtained, and the apparatus may be constructed simply and practically as will be explained in the following description.

According to the invention the transmitter and the receiver may be placed higher than the outlet of the nozzle and they may be directed downwards. By these means

there is obtained an especially practical structure where the transmitter and the receiver are in the way to the least possible degree, and where the receiver and the transmitter only are slightly exposed to getting wet during use of the washbasin.

According to the invention the transmitter and the receiver and preferably other apparatus components may be integrated to form a unit with the nozzle. Thereby an especially compact and advantageous structure is obtained where practically no other cleansing is required than cleansing of the nozzle.

In the accompanying drawings there are shown some embodiments of an automatic installation for washing hands according to the invention,

FIG. 1 showing a section through the wall with the first embodiment of an installation for washing hands,

FIG. 2 a section of FIG. 1 in a larger scale,

FIG. 3–7 schematic views of five embodiments where FIG. 7 substantially corresponds to FIGS. 1 and 2.

On a wall **1** there is fastened a washbasin **2** with a drain **3**. Above the washbasin there is fixedly arranged a nozzle **4** which, as shown in FIG. 2, consists of a lower canal **5** and an upper canal **6**. The lower canal has a downwards directed outlet aperture **7**. In the upper canal **6** there is arranged a tube **8** which at its outer end supports a plane mirror **9** arranged at an angle of 45° to the axis of the pipe and placed just above a vertical canal portion **10** in which there is placed a lens **11** with a principal focus **12**.

At the other end of the tube **8** there is arranged a lens **13** with its principal focus in a photoresistor **14** the latter being fixedly arranged on a rear plate **15**. Behind the lens **13** an oblique mirror **16** is placed, a lamp **17** being arranged above said mirror, the light source of said lamp **17** being placed in the principal focus of the system consisting of the lens **13** and the mirror **14**. The lamp **17** is fixed on the rear plate **15** and is arranged in a housing that is made integrally with the nozzle **4** and has a detachable cover **19**.

A water supply conduit **20** is connected to the canal **5**, a magnet valve **21** being inserted in said conduit **20**, the latter being connected with a thermostatically controlled mixing fitting **22** with supply conduits **23** and **24** for cold and hot water respectively.

The wires to the photoresistor **14** and the lamp **17** are connected to a per se known apparatus **25**, the latter being connected to an electricity supply cable **26** and furthermore being connected to the magnet valve **21** by means of control wires **27**.

The lamp **17** is lighted when the installation is in use. When a person moves a hand into the rinsing region below the outlet aperture **7** the hand will be illuminated by the radiation originating from the lamp **17** and continuing to the mirror, through the upper half of the lens **13**, to one half of the mirror **9** and through one half of the lens **11**, and the hand will therefore emit light which passes through the lens **11**, to the mirror **9** and through the lower half of the lens **13** to the photoresistor **14**. The resistance in the latter is altered thereby which in the usual manner causes emission of a controlling impulse in the apparatus **25**, said impulse travelling through the wires **27** to the magnet valve **21** so that the latter is opened and water flows through the canal **5** and out through the outlet aperture **7**. Such apparatuses are usually constructed in such a manner that the magnet valve is kept open for a certain length of time after the impulse to the photoresistor **14** has stopped so that the basin may be rinsed after the person has washed hands.

In FIG. 3 there is shown an installation where a transmitter **28**, consisting of a photoresistor and a lens system are arranged beside each other at a somewhat higher

level than a nozzle **30** and at a slight distance to the side of the vertical axis of the nozzle. The principal focus of the transmitter and the receiver coincide in the point **31**. The transmitter and the receiver are connected to an apparatus **25** that controls a magnet valve **21**.

In the embodiment shown in FIG. 4 the transmitter and receiver have a common lens system **31** above which a transmitting lamp **32** and an oblique mirror **33** are arranged, a receiver in the shape of a photoresistor **34** being placed alongside said lamp **32** and mirror **33**. The transmitter and the receiver are connected to an apparatus **25** which controls a magnet valve **21**. The common lens system **31** is arranged with a vertical axis in a position at a distance to the side of a nozzle with vertical axis and said system is arranged in such a manner that its principal focus **35** is placed lower than the outlet aperture of the nozzle **30**.

In FIG. 5 there is shown an installation having a transmitter **36** for emission of sound waves with a high frequency, e.g. 40,000 Hertz, and a receiver **37** for receiving such sound waves. The transmitter and receiver are arranged with slightly oblique directions with their axes intersecting in a point **38**. The transmitter and the receiver are connected to an apparatus **39** which controls a magnet valve **21**. The point of intersection **38** is positioned lower than the outlet aperture of a nozzle **30** with vertical axis. When a person moves a hand into the rinsing region below the nozzle **30** the sound waves from the transmitter **36** will hit the hand which then will emit sound waves that in turn are received by the receiver **37**, the latter emitting an impulse in the usual manner to the apparatus **39** so that the magnet valve is opened.

The installation shown in FIG. 6 has a transmitter **40** for emitting sound waves with a high frequency and a receiver **41** for receiving such sound waves. A canal **42** is connected to the transmitter and a canal **43** is connected to the receiver. Said canals **42** and **43** extend along a horizontal stretch **44** and a vertical stretch **45** of a nozzle and may form a unit with the nozzle in the same manner as the canals **5** and **6** in FIG. 2. The transmitter and the receiver are connected to an apparatus **39** that controls a magnet valve **21** in a supply conduit to the nozzle **44**, **45**. The two downwards extending stretches of the canals **42** and **43** have slightly oblique directions towards a point of intersection **46**. The transmitter emits sound waves which travel through the canal **42**. When a person moves a hand inwards below the vertical stretch of the nozzle, said hand will be hit by said sound waves and said hand will reflect sound waves that travel into the canal **43** and through same to the receiver **41**, said receiver emitting an impulse to the apparatus **39** so that the magnet valve **21** is opened.

The installation shown in FIG. 7 corresponds substantially to FIGS. 1 and 2 and corresponding reference numerals are used.

The shown and described embodiments are only to be considered by way of example as different variations are conceivable within the scope of the invention. A nozzle with an oblique direction may thus be employed. Furthermore the transmitter and the receiver may be arranged with a pronounced oblique direction in which case they may be placed behind the nozzle. The point of intersection should be placed at a slight distance to the side of the axis of the nozzle, but it will be clear that by placing the point of intersection in front of the nozzle the distance of the former from the nozzle may be relatively great without any adverse effects, e.g. the distance may be 100 mm. or more although it must be presumed that also in this case it would be most practical that the distance be relatively small, e.g. 50 mm. or less. The height of the point of intersection in relation to the outlet aperture may also vary. It must be presumed that it would be advantageous that the point be placed 50 mm. lower than the outlet aperture of the nozzle, for instance also because it thereby becomes possible to employ a relatively small and cheap lens system, but there is nothing to hinder placing the point 100 mm. or more lower than the outlet aperture of the nozzle.

What I claim is:

1. A controlling apparatus for automatically opening and closing a faucet, comprising an emitter which is adapted to emit a delimited ray group, a receiver which is adapted to receive a limited ray group and to activate means for opening and closing the faucet, and means for positioning said emitter and receiver in such a manner with respect to each other that said ray groups intersect each other in a limited region at a level below the outlet of the faucet and laterally in relation to a vertical axis of the faucet.

2. A controlling apparatus for automatically opening and closing a faucet comprising a receiver which is adapted to emit a limited ray group having an axis and converging in a direction away from the emitter, means for positioning said emitter so that the rays intersect each other in a limited region at a level below the outlet of the faucet and laterally in relation to the faucet's axis, a receiver which is adapted to receive a limited ray group having an axis and to activate means for opening and closing the faucet, and means positioning said receiver whereby its axis is coincident with the emitter's axis.

3. A controlling apparatus for automatically opening and closing a faucet, comprising a receiver which is adapted to receive a limited ray group having an axis and converging in a direction away from the receiver, said receiver also being adapted to activate means for opening and closing the faucet, means positioning said receiver so that the rays of said ray group intersect each other in a limited region at a level lower than the outlet of the faucet and laterally in relation to the axis of the faucet, an emitter which is adapted to emit a limited ray group having an axis, and means positioning said emitter so that its axis is coincident with the receiver's axis.

4. A controlling apparatus for automatically opening and closing a faucet, comprising an emitter which is adapted to emit a limited ray group having an axis and converging away from the emitter, means positioning said emitter so that the rays of said ray group intersect each other in a region at a level lower than the outlet of the faucet and laterally in relation to the axis of the faucet, a receiver which is adapted to receive a limited ray group with an axis and which converges in a direction away from the receiver, said receiver also being adapted to activate means for opening and closing the faucet, and means positioning said receiver so that the rays thereof intersect each other in a limited region substantially coinciding with the intersection region for the ray group from the emitter with the axis of said receiver coinciding with the axis of said emitter.

5. An installation for washing hands according to claim **1** in which the emitter and receiver are placed higher than the outlet of the nozzle and are directed downwards.

6. An installation for washing hands according to claim **1** in which the emitter and receiver are integrated to form a unit together with the nozzle.

7. An installation for washing hands according to claim **2** in which the emitter and receiver are placed higher than the outlet of the nozzle and are directed downwards.

8. An installation for washing hands according to claim **2** in which the emitter and receiver are integrated to form a unit together with the nozzle.

9. An installation for washing hands according to claim **3** in which the emitter and receiver are placed higher than the outlet of the nozzle and are directed downwards.

10. An installation for washing hands according to claim **3** in which the emitter and receiver are integrated to form a unit together with the nozzle.

11. An installation for washing hands according to claim **4** in which the emitter and receiver are placed higher than the outlet of the nozzle and are directed downwards.

12. An installation for washing hands according to claim 4 in which the emitter and receiver are integrated to form a unit together with the nozzle.

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WALTER STOLWEIN, Primary Examiner

U.S. Cl. X.R.

251—129

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,480,787 Dated November 25, 1969

Inventor(s) Knud Harald Storm JOHANSEN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In Claim 2 Line 2 for " a receiver which"
read -- an emitter that--

SIGNED AND
SEALED
MAY 5 1970

(SEAL)
Attest:

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Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents