

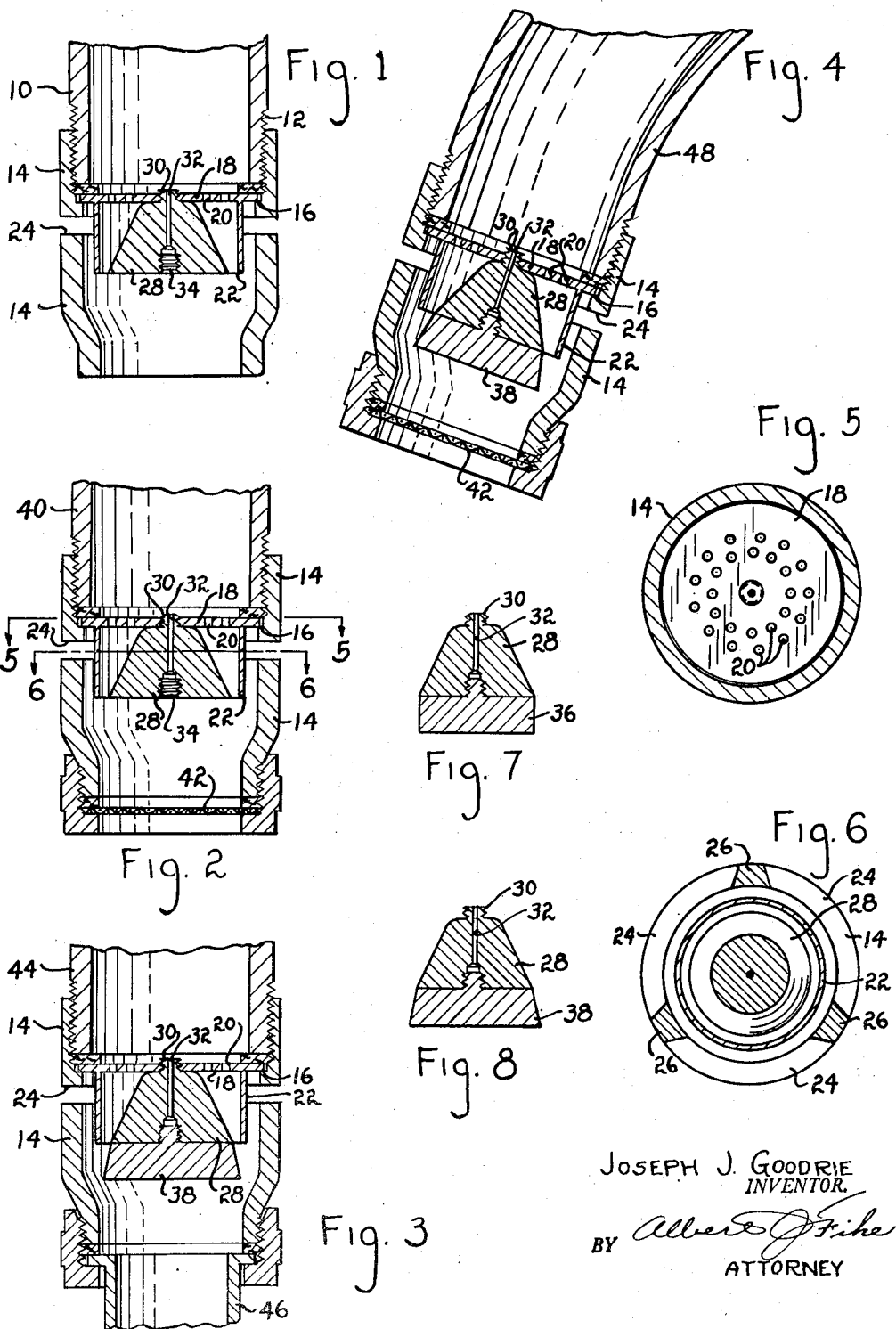
June 6, 1950

J. J. GOODRIE

2,510,395

WATER AND AIR MIXING DEVICE

Filed Nov. 13, 1947



JOSEPH J. GOODRIE
INVENTOR.

BY *Albert J. Fike*
ATTORNEY

UNITED STATES PATENT OFFICE

2,510,395

WATER AND AIR MIXING DEVICE

Joseph J. Goodrie, Chicago, Ill., assignor to
Wrightway Engineering Co., Chicago, Ill., a corporation of Illinois

Application November 13, 1947, Serial No. 785,558

5 Claims. (Cl. 261—116)

1

This invention relates to an improved combination water and air mixing device, and the present invention comprises an improvement over my prior Patent No. 2,134,182, which patent was granted on October 25, 1938.

One of the principal objects of this invention is the provision of an apparatus which can be used as a vacuum breaker for toilet bowls or such similar equipment where there is always a possibility of back siphonage and subsequent contamination of the entire water system.

Another important object of the invention is the provision of a fluid mixing device, in which aeration of water can be accomplished when the water is being ejected from a faucet or when flowing through a pipe.

A still further and other important object of this invention is to provide a fixture, which will produce aerated water and at the same time include a non-splashing screen, which is particularly desirable in connection with sink faucets.

Another object of the invention is the production of a combination vacuum breaker and aerating apparatus for water pipes or the like, which can be readily changed from a high pressure to a low pressure system, in a minimum of time and with a very slight change in the construction.

Other and further important objects of the invention will be apparent from the disclosures in the accompanying drawings and following specification.

The invention, in a preferred form, is illustrated in the drawings and hereinafter more fully described.

In the drawings:

Figure 1 is a sectional view of the improved combination vacuum breaking and mixing device of this invention, showing the same as applied to an ordinary water faucet or fixture such as employed in kitchen sinks or in similar environments.

Figure 2 is a view similar to Figure 1, but with a non-splash screen included in the apparatus.

Figure 3 is a sectional view showing the device employed in a length of pipe and particularly in connection with an added element which will make it adaptable for use as a vacuum breaker to be used in association with a flush valve for toilets.

Figure 4 is likewise a sectional view, illustrating the device of this invention employed as a shower head, whereby aerated water can be furnished under considerable pressure and with or without a non-splash screen.

Figure 5 is a sectional view taken on the line

2

5—5 of Figure 2, looking in the direction indicated by the arrows.

Figure 6 is likewise a sectional view taken on the line 6—6 of Figure 2, looking in the direction indicated.

Figure 7 is a detail view of the removable two piece plug which comprises one of the important features of the invention and which can be readily changed to accommodate both high and low pressure systems.

Figure 8 is a view similar to Figure 7 showing a modified form of the removable plug.

As shown in the drawings:

The reference numeral 10 indicates generally the end of a water supply pipe or faucet such as are employed in practically all cases where water is delivered. The particular pipe is screw-threaded as shown in 12 to receive the device of this invention.

The structure of the invention comprises essentially a length of pipe or tubing 14 which can be made of various sizes to meet different needs, and which is internally screw-threaded at its upper end to render the same readily applicable to the externally screw-threaded end 12 of a pipe 10 or similar fitting.

This internally screw-threaded end is of slightly greater diameter than the internal diameter of the remainder of the tube, thereby providing a shoulder 16, upon which is loosely fitted a perforated disk 18. The perforations in this disk are illustrated at 20. A sealing gasket is provided as shown at 44.

The disk 18 is provided with an integral downwardly extending annular flange 22, the lower edge of which extends below a series of slots or openings 24, which are cut into the periphery of the pipe or tube 14 and which are defined by integral connecting webs 26, whereby the length of the pipe 14 is a unitary structure. These webs are best shown in Figure 6 and the slots defined by these webs are for the purpose of admitting air into the interior of the pipe 14. When water is flowing through the pipes 10 and 14 and through the perforations 20 in the disk 18, an aspirating effect is produced, whereby air is drawn in through the slots 24 and mixed with the water.

This aspirating and mixing effect is enhanced by a tapered plug 28, which is preferably of conical form as illustrated, and which is provided with an integral screw-threaded plug at its upper end as shown in 30, whereby it can be removably mounted in an internally screw-threaded opening in the disk 18.

3

The plug is centrally and longitudinally perforated as illustrated at 32, thereby providing for passage of additional water therethrough when it is in use.

This central passageway 32 terminates in an enlarged internally screw-threaded cavity 34, which is adapted for the reception of an integral lug on an auxiliary plug 36 or 38.

The addition of this plug 38 makes the device workable with a much higher back pressure, while at the same time eliminating any possibility of accidental or objectionable spraying of excess water out through the ports 24.

It will be noted that this removable plug is shown cylindrical at 36 and frusto-conical at 38, but either form will work satisfactorily with any reasonably high back pressure.

In Figure 2 the device is shown as applied to a length of pipe 40 and with an anti-splash screen 42 fitted on the end. In this embodiment, the single plug 28 is employed and such construction applies more particularly to a pipe through which water is flowing at a fairly low pressure.

In Figure 3, the device is shown as used in the pipe 44 and connects the same with a further pipe 46, the apparatus being inserted into a water line which is used in connection with an ordinary flush valve for a toilet bowl. Most of these are operated with a fairly high back pressure, so the additional plug 38 is employed. In this embodiment, the device is used mainly as a vacuum breaker, so that water from the toilet bowl will not be inadvertently or accidentally pulled back into the main water supply line by siphoning, as quite often happens, especially in buildings of more than three stories, where the water pressure is shut off or lowered for some reason or another. Obviously, if there were no vacuum breakers and the water pressure in such a building dropped below a certain point, water in the toilet bowls on the higher floors would immediately be siphoned back into the main water supply line with subsequent contamination of drinking water, once the pressure is again restored.

In Figure 4, the device is shown as applied to pipe 48, which is employed as part of a shower head, and in this instance, the main object is to aerate the water flowing through the pipe 48 by aspirating air in through the openings 24 and the addition of the plugs 28 and 38 assures a thorough aeration of the water while the screen 42 can be used or not, as desired. The screen does provide an anti-splash feature.

It will be seen that herein is provided an improvement over my prior patent, in that the screen between the inner and outer casing has been eliminated and the outer casing has been tapered, so that the water flowing through the plurality of openings in the upper part of the casing is discharged through the nozzle, flared against the outer casing and thoroughly mixed with air before being discharged. The elimination of an internal screen removes any possibility of stoppage or plugging.

When connected to an ordinary water faucet, as illustrated in Figure 1, and with the central

4

plug 28 removed, the water is discharged through all passages and furnishes a perfect aerated mixture. A non-splash screen can be used if desired.

When the central plug 28 is in position, the device can be used on showers, submerged fixtures or any fixtures which include a back pressure and aerated water will result from the flow therethrough, while at the same time the device will successfully operate with a higher back pressure.

In use with toilet bowls, as a siphon breaker, the single plug 28 can be employed for a low pressure system and an additional plug 36 or 38 can be readily applied for use with a high pressure system.

In this embodiment, and on account of the ready flow of considerable air, an ordinary toilet can be flushed with about one half of the amount of water ordinarily considered necessary. The use of the invention in connection with a shower head will be obvious in that a satisfactory flow of aerated water immediately results and the anti-splash screen can be employed or not, according to the particular desires of the user.

I am aware that many changes may be made and numerous details of construction varied throughout a wide range without departing from the principles of this invention, and I therefore do not propose limiting the patent granted hereon otherwise than as necessitated by the prior art.

I claim as my invention:

1. An aerating device for faucets and the like comprising a casing having lateral air inlet ports and provided with a water inlet connection, a disc adjacent the ports having circularly disposed openings transversely of the connection for discharging fine parallel jets of water, a skirt within the casing spaced from the wall thereof adjacent the ports, an elongated body beneath the disc circular in cross section having a portion upwardly tapered on which the jets impinge and means at the outer end of the casing for uniting the air and water mixture into a coherent stream.

2. A device as described in claim 1, wherein said means includes a restriction of the internal diameter of the outer end of the casing and a screen at such reduced end.

3. A device as described in claim 2, wherein the restriction of the end of the casing is below the end of the elongated body and provides a mixing chamber for the air and water.

4. A device as described in claim 1, wherein the skirt is directly connected to the disk.

5. A device as described in claim 4, wherein the skirt depends from the disk.

JOSEPH J. GOODRIE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,912,113	Aghnides	May 30, 1933
2,134,182	Goodrie	Oct. 25, 1938
2,210,846	Aghnides	Aug. 6, 1940