Nov. 27, 1956 O. W. HOLDEN 2,771,998

AERATOR SCREEN

Filed Jan. 5, 1954

Fig. 1.

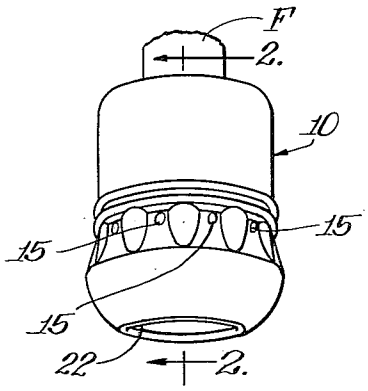


Fig. 2.

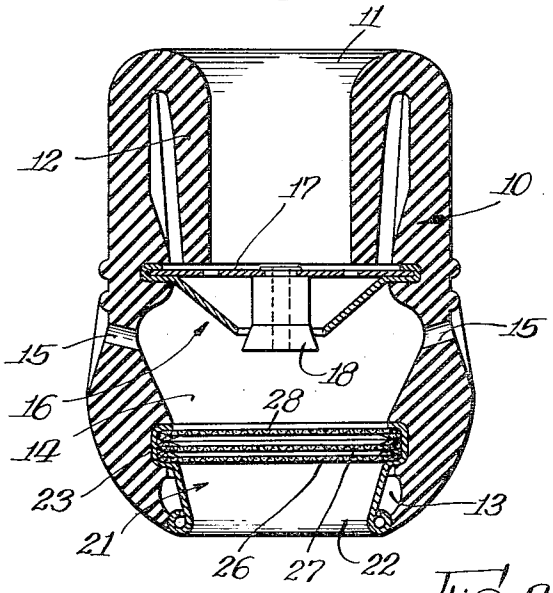


Fig. 3.

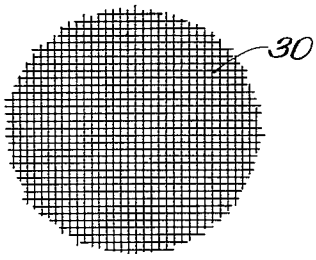


Fig. 4.

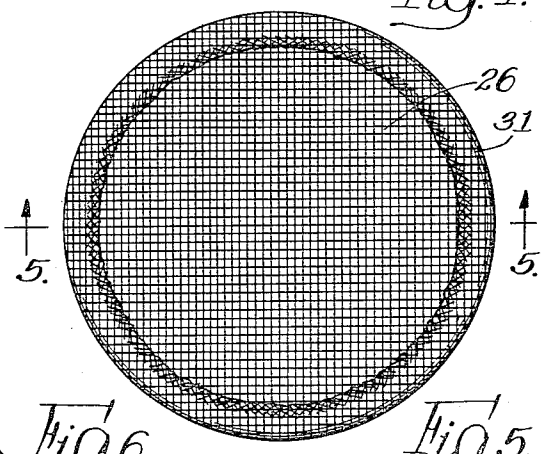


Fig. 5.

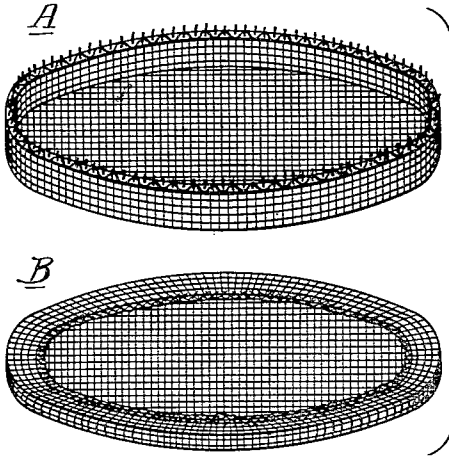
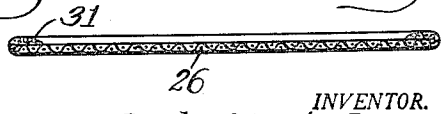


Fig. 6.



INVENTOR.
Orloff W. Holden,
BY
Mueller & Aichele
Atty's

United States Patent Office

2,771,998

Patented Nov. 27, 1956

2,771,998

AERATOR SCREEN

Orloff W. Holden, Chicago, Ill., assignor to Orloff W. Holden and Marguerite H. Holden, a partnership doing business as Knickerbocker Rubber Company, Not Inc., Chicago, Ill.

Application January 5, 1954, Serial No. 402,237

3 Claims. (Cl. 210—84)

This invention relates to devices for aerating pressurized liquids, and more particularly to aerating devices of the type adapted to be supported by a water faucet to transform liquid emerging from the faucet into a soft coherent stream that is not subject to splashing when it impinges upon hard objects.

Some aerating devices of the type referred to above comprise a cylindrical casing made of resilient material such as rubber. The casing has an inlet at one end which is adapted to be connected to a water faucet or the like, and the aerator includes appropriate means supported within the casing for breaking up the stream of water from the faucet into a spray of fine particles. The resilient casing also has an outlet end which incorporates appropriate overlying screens for diffusing the spray formed in the casing. A mixing chamber is formed in the casing between the spray forming means and the diffuser screens, and the casing has apertures extending therethrough for the entry of air into the mixing chamber.

With the above construction, the pressurized fluid from the faucet is transformed within the casing to a fine spray which draws air through the openings in the mixing chamber. As the spray engages the diffuser screens at the outlet end of the casing, air bubbles are entrained and thoroughly mixed with the fluid so that a soft aerated stream of water emerges from the device.

It has been the usual practice in the art for the overlying diffuser screens referred to above to be in the form of screen discs supported in a holder in the outlet of the device and separated one from the other by metal rings. Normally, however, these screen discs have jagged edges and small projecting wires from these edges have a tendency to bend when the discs are inserted in the holder and permanent damage occurs when it is attempted mechanically to clamp the discs in place. Moreover, due to the irregular and jagged edges of the discs, it is sometimes necessary to force them into the holder manually which slows up the manufacturing process and often causes distortion of the discs.

It is, accordingly, an object of the present invention to provide a diffuser screen system for an aerator device which is so constructed that the manufacturing difficulties referred to above are completely obviated.

Another object of the invention is to provide such an improved diffuser screen system which incorporates a series of diffuser screens and which is constructed so that the screens may be rapidly and conveniently assembled with a minimum of work stoppage or time consuming operations.

Yet another object of the invention is to provide such an improved diffuser screen system in which the diffuser screens are constructed so that the body portions thereof may be separated a desired amount for efficient diffuser action without the need for separate elements such as metallic rings and the like.

A general object of the invention is to provide such an improved diffuser screen system that can be manufactured expeditiously and which uses a minimum of component parts so that the resulting units may be sold at a relatively low cost as compared with prior art units of this general type.

A feature of the invention is the provision of a diffuser screen system for an aerating device which includes a series of overlying diffuser screens, in which the edges of the screens are folded over to present a smooth periphery to the surface of the holder and to serve as separators for the individual screens in the holders thus obviating the need for ring separators or the like.

The above and other features of the invention which are believed to be new are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof may best be understood by reference to the following description when taken in conjunction with the accompanying drawing in which:

Fig. 1 shows a typical aerating device of the type with which the present invention is concerned and which incorporates the invention;

Fig. 2 is a sectional view of the device of Fig. 1 taken along the lines 2—2;

Fig. 3 is a plan view of a diffuser screen normally used in prior art devices;

Fig. 4 is a plan view of a diffuser screen constructed in accordance with the invention;

Fig. 5 is a sectional view of the screen taken along the lines 5—5 of Fig. 4; and

Fig. 6 indicates in perspective the various steps in the construction of the improved screen for the diffuser system of the invention.

As previously stated, the present invention may be used in a pressurized liquid stream aerating unit of the type having a casing with an inlet and adapted to be mounted on a faucet and outlet and through which the stream emerges. The unit includes a filtering and diffusing device for the stream adapted to be mounted in the outlet end of the casing and, in accordance with the invention, this device includes at least two diffuser screens, means for supporting the screens in the outlet end of the casing with the screens overlying one another and extending across the outlet end, and at least one of the screens having a bent-over peripheral edge facing the other of the screens. This bent-over peripheral edge causes smooth peripheries to be presented to the surface of the outlet by the screens and also forms a spacer between the screens to separate the diffuser area or body portion of each without the requirement of a separate spacing ring or other means.

Referring now to the drawings and particularly Figs. 1 and 2, the aerating device includes a unitary casing **10** of resilient material, such as rubber, and which generally is cylindrical in form. The embodiment of the aerator device disclosed is generally similar to that disclosed and claimed in copending application Serial No. 318,182, filed November 1, 1952, now Patent No. 2,741,467, in the name of Lee and Gerberich and assigned to the present assignee. Casing **10** has at one end an inlet portion **11** defined by a re-entrant portion **12** which may be slipped over the end of a water faucet (such as F in Fig. 1) to secure the casing **10** thereon. As previously noted, the casing may be composed of rubber or similar resilient material, and the inturned or re-entrant portion **12** may be of reduced thickness to increase the flexibility and resilience thereof. At the end of casing **10** opposite to the inlet portion **12** is an outlet portion **13**, and between the inlet and outlet portions there is a mixing or aerating chamber **14**. A plurality of apertures **15** are provided in the casing leading into the mixing chamber **14** so that air may enter into the chamber.

A spray forming structure **16** is mounted in casing **10** between inlet portion **11** and chamber **14**, and structure **16** includes an apertured orifice disc **17** and a hollow open ended frusto-conical splash member **18** supported below the disc. Details of structure **16** are fully described in the copending application referred to previously herein and a more detailed description thereof in the present specification is deemed to be unnecessary.

The aerator also includes a preassembled diffuser unit **21** which is removably supported in outlet portion **13** of casing **10**. Unit **21** is similar in some respects to that disclosed and claimed in copending application Serial No. 318,263, filed November 1, 1952, now Patent No. 2,730,136, in the name of the present inventor. Briefly, unit **21** has a converging outlet **22** with a rolled over annular portion at its outer end coacting with the rim of outlet portion **13**, and this unit has an annular portion **23** at its inner end extending radially outwardly into a corresponding groove formed in casing **10**. The annular portion **23** of unit **21** defines an internal annular channel and one or more diffuser screens **26**, **27** and **28** are supported within the annular channel. These screens overlie one another and extend across unit **21**. The arrangement is such that diffuser unit **21** can easily be pried from its position in casing **10** for cleaning purposes.

The diffuser screens may comprise, for example, a plurality of discs of metal screen or other suitable material. In the prior art, these diffuser screens usually had the configuration represented by screen **30** of Figure 3, with the screens being separated by metallic rings. As shown in this figure, such screens have jagged peripheral edges and, as previously discussed herein, these edges create problems in the rapid and efficient assembly of the screens in the diffuser. Moreover, such screens require wire ring separators which add unnecessarily to the cost of the unit both from a standpoint of material cost and the time consumed to install the rings.

In accordance with the present invention, and as shown in Figs. 4 and 5, the screens are provided with a bent-over peripheral edge **31** that may be formed in a simple manner to be described. This unique construction eliminates entirely the problems encountered in the assembly of screens such as illustrated in Fig. 3. The jagged edges are now bent inwardly so that the peripheries of the screens are smooth. The screens, therefore, may be easily inserted in the holder without any danger of damage or distortion. Moreover, merely by inserting the screens in the holder in a certain fashion, the desired separation of the body portions thereof for efficient diffuser action can be obtained without the need for separate ring spacers. For example, in Fig. 2, bottom screen **26** and intermediate screen **27** are inserted with their bent-over edges up so that a desired separation is achieved between the body portions of these screens. Top screen **28** is then inserted with its bent-over edge down so that a desired greater separation is achieved between the body portions of screens **27** and **28**.

In a constructed embodiment of the invention, by way of example, the diffuser screens were made of .011" wire, which when woven together into a 30—30 mesh screen makes an overall thickness of .022". The edges were turned over to have an over-all thickness of the order of .035" to .040". This provides a separation between screens **26** and **27** of approximately .015", and provides a separation between screens **27** and **28** of approximately .030".

Fig. 6 shows the simple steps involved in constructing the screen utilized in the invention. In step A in the peripheral edge of the screen disc is bent at right angles to the plane of the screen by any suitable punching or forming tool. In step B, the up-standing peripheral edge of the screen is turned down into the plane of the screen

to provide the desired smooth peripheral edge and integral spacer.

The invention provides, therefore, an improved diffuser unit for use in a liquid aerating device in which the diffuser screens are constructed for simple assembly in the unit and so that the required spacing therebetween may be obtained without the need for any separate components that add to the cost of the unit.

While a particular embodiment of the invention has been shown and described, modifications may be made and it is intended in the appended claims to cover all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. In a unit through which a liquid stream flows, a filtering and diffusing device for the stream adapted to be mounted within the unit including in combination, at least two diffuser screens, means for supporting said screens in the unit with said screens overlying one another and each said screen having a body portion extending across the unit, and at least one of said screens having an integral inwardly bent-over outer portion intermediate adjacent screens, said bent-over portion forming a raised spacer on said one of said screens thereby serving to separate the body portions of said adjacent screens one from the other and resulting in a relatively smooth peripheral edge free of wire endings.

2. In a liquid stream aerating unit having a casing with an inlet end adapted to be mounted on a faucet and with an outlet end through which the stream emerges, a filtering and diffusing device for the stream adapted to be mounted in the outlet end of the casing including in combination, at least two diffuser screens, means for supporting said screens in the outlet end of the casing with said screens overlying one another and each said screen having a body portion extending across the outlet end, at least one of said screens having an integral inwardly bent-over outer portion intermediate adjacent screens, said bent-over portion forming a raised spacer on said one of said screens thereby serving to separate the body portions of said adjacent screens one from the other and resulting in a relatively smooth peripheral edge free of wire endings.

3. In a liquid stream aerating device having a casing with an inlet end adapted to be mounted on a faucet and with an outlet end through which the stream emerges, a filtering and diffusing device for the stream adapted to be mounted in the outlet end of the casing including in combination, a hollow open-ended frusto-conical member having an annular portion at its large end extending radially outwardly to define an internal annular groove, a plurality of disc-shaped diffuser screens supported within said annular groove, said screens overlying one another and each said screen having a body portion extending across said frusto-conical member, at least one of said screens having an integral inwardly bent-over outer portion intermediate adjacent screens, said bent-over portion forming a raised spacer ring on said one of said screens thereby serving to separate the body portion of said last-named screen from said adjacent one of said screens and resulting in a relatively smooth peripheral edge free of wire ending.

References Cited in the file of this patent

UNITED STATES PATENTS

2,100,165	Holmberg et al.	Nov. 23, 1937
2,127,397	Freedlander	Aug. 16, 1938
2,316,832	Aghnides	Apr. 20, 1943
2,633,343	Aghnides	Mar. 31, 1953
2,664,278	Aghnides	Dec. 29, 1953