Feb. 15, 1955 H. W. WILLINGER ET AL 2,702,125

DIP TUBE

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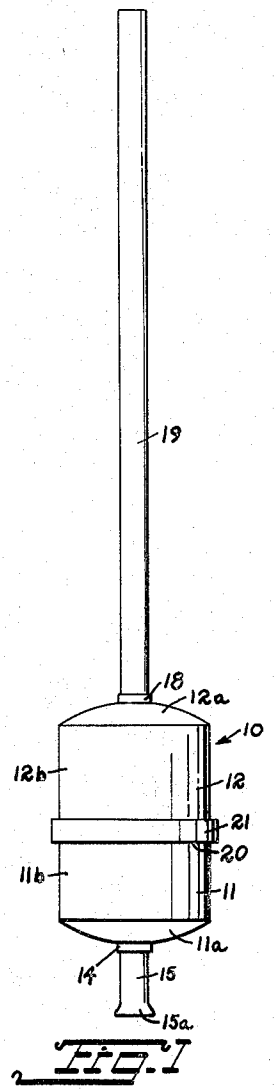


FIG. 1

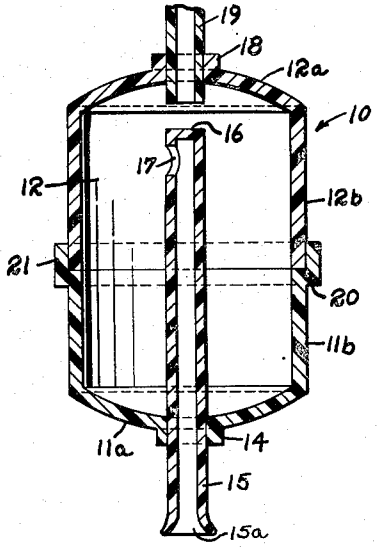


FIG. 2

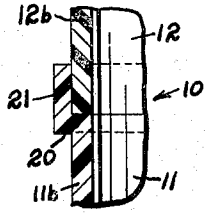


FIG. 3

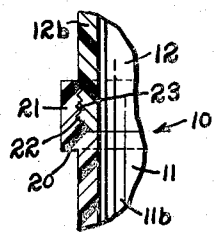


FIG. 4

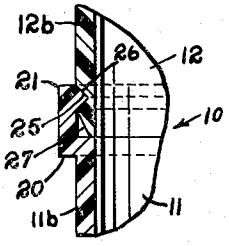


FIG. 5

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This invention relates to new and useful improvements in dip tubes.

It has been common practice to employ dip tubes for lifting sediment from the bottom of aquariums and which dip tubes are constructed to have one-piece completely enclosed hollow reservoirs. Such dip tubes have been found objectionable due to the difficulty encountered in cleaning the interior of the reservoir of dregs of sand and pebbles lifted from the bottom of the aquarium and of the sediment which becomes lodged in the corners of the reservoir. As a result, such dip tubes become messy in appearance and oft times give off a very undesirable odor caused by the decaying sediment lodged therein and have been thrown away while still useful, except for those objections. Furthermore, users of the prior dip tubes have been subject to the annoyance of trying to remove small live fishes from the interior of the reservoir which have found their way there-into while the dip tubes have been used for their normal purposes. Generally, it is impossible to remove such small fishes without causing their immediate death or such irreparable injury that the fishes do not live long after their removal from the reservoir.

It is the primary purpose of the present invention to construct dip tubes having reservoirs made up of opposed separably joined cup-shaped members which can be completely opened to permit the interior thereof to be quickly and thoroughly cleaned of any dregs of sand and pebbles and accumulated sediment and to quickly release any entrapped small fishes and to overcome all of the objections to the prior art dip tubes.

Another object of the present invention proposes forming one of the cup-shaped members with an outwardly directed flange about its open end for engagement by the material of the other cup-shaped member about its open end and which flange continues into a peripheral skirt wall for surrounding the said other cup-shaped member joining them to form the reservoir of the dip tube.

Still another object of the present invention proposes forming the skirt wall to have an internal diameter to frictionally engage about the periphery of the said other cup-shaped member in a manner so that the cup-shaped members can be pulled apart for cleaning the interior thereof or for releasing entrapped small fishes.

The present invention further proposes several different methods of joining the opposed cup-shaped members so as to form the reservoir of the dip tube.

It is a further object of the present invention to form dip tubes which are simple and durable, which are effective for their intended purposes and which can be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, to the appended claims in which the various novel features of the invention are more particularly set forth.

On the accompanying drawing forming a material part of the present disclosure:

Fig. 1 is a side elevational view of the dip tube constructed in accordance with the present invention.

Fig. 2 is an enlarged longitudinal sectional view of the bottom portion of Fig. 1.

Fig. 3 is an enlarged detailed view of a portion of Fig. 2.

Fig. 4 is a view similar to Fig. 3, but illustrating a modification of the present invention.

Fig. 5 is another view similar to Fig. 3, but illustrating a still further modification of the present invention.

The dip tube, according to the first form of the present invention shown in Figs. 1 to 3, includes a reservoir **10** having a pair of opposed superimposed cup-shaped members **11** and **12**, each molded of a synthetic resinous material. The bottom cup-shaped member **11** has a bottom wall **11***a* and an upstanding cylindrical side wall **11***b*. Likewise, the top cup-shaped member **12** has a top wall **12***a* and a depending cylindrical side wall **12***b* of the same diameter as the cylindrical side wall **11***b* of the bottom cup-shaped member **11**. The cup-shaped members **11** and **12** are superimposed on one another with their open sides facing one another.

The bottom wall **11***a* of the bottom cup-shaped member **11** is formed with a concentric hole surrounded by a collar portion **14**. A water inlet tube **15** is extended through the collar portion **14**, as best shown in Fig. 2. The water inlet tube **15** is made of the same material used for forming the reservoir **10** and is fixedly joined to the collar portion **14** for application of heat if the resinous material is a thermoplastic one or by using a solvent for the resinous plastic material.

The bottom end **15***a* of the water inlet tube **15** is outwardly flared, as shown in Figs. 1 and 2, to reduce the suction at the open end of the tube and so reduce the tendency for the water entering the bottom of that tube to lift sand and pebbles while at the same time leaving sufficient suction to lift the lighter sediment which collects on the surface of the sand and pebbles on the bottom of an aquarium. The top end of the water inlet tube **15** is closed by an integral wall **16**. Below the wall **16**, the water inlet tube **15** is formed with a discharge opening **17**, see Fig. 2, for the discharge of water and sediment from the tube into the reservoir **10**.

The top wall **12***a* of the top cup-shaped member **12** is formed with a concentric hole surrounded by an integral collar portion **18**. An elongated handle or water outlet tube **19** has its bottom portion extended through the collar portion **18** with its bottom end terminating just slightly above the top end of the water inlet tube **15**. It therefore becomes apparent that it is essential to close the top end of the inlet tube **15** to prevent the water and collected sediment which rises in the inlet tube from shooting upward and out of the top of the outlet tube **19**. As in the case of the water inlet tube **15**, the water outlet tube **19** is formed of the same resinous plastic material as is used for the reservoir **10** and is fixedly joined thereto by the application of heat if the resinous material is a thermoplastic one or by the use of a solvent for the material. The length of the water outlet tube **19** is controlled by the depth of the water in the aquarium in which the dip tube is to be used. The outlet tube should be of such a length that with the dip tube suspended in the aquarium water with the flared bottom end **15***a* of the inlet tube **15** spaced just slightly above the sand and pebbles on the bottom of the aquarium, the top end portion of the outlet tube **19** will be extended above the level of the water to be held in one hand.

Means is provided for releasably joining the cup-shaped members **11** and **12** to form an integral unit of the reservoir **10**. That releasable joining means comprises an outwardly extended circumferential flange **20** formed about the open end of the cylindrical side wall **11***b* of the bottom cup-shaped member **11**. The edges of the cylindrical side wall **12***b* of the top cup-shaped member **12**, defining the open end of that top cup-shaped member about the exposed face of that flange **20**. About its periphery, the flange **20** continues into a skirt wall **21**, which rises from the flange **20** and which surrounds the cylindrical side wall **12***b* of the top cup-shaped member **12**. The upstanding skirt wall **21** has an internal diameter to frictionally surround the cylindrical side wall **12***b* of the top cup-shaped member **12** joining the cup-shaped members **11** and **12** so that they can be separated by being pulled axially apart. When the cup-shaped members **11** and **12** are pulled apart their interiors are completely exposed for convenient cleaning and for freeing any small fishes which might become entrapped therein.

The manner of using the dip tube to remove sediment which collects on the bottom of an aquarium is as follows:

While holding the dip tube by the top end of the water inlet tube **19** with one finger closing the top end of that tube, the dip tube is lowered into the aquarium water until the flared bottom end **15***a* of the water inlet tube **15** is directly over the collected sediment which is to be removed. In that position, the finger is removed from the top end of the water outlet tube **19** so that the air pressure on the surface of the aquarium water will force the water to rise within the water inlet tube **15** and lift the collected sediment off the bottom of the aquarium to discharge with the water through the discharge hole **17** to collect in the reservoir **10**. The dip tube is then removed from the aquarium water and inverted so that the water and collected sediment within the reservoir **10** can flow out through the water outlet tube **19**. The process is repeated until all of the collected sediment is removed from the bottom of the aquarium.

When removal of the sediment from the aquarium is completed, the cup-shaped members **11** and **12** forming the reservoir can be pulled apart so that their interior can be completely cleaned of dregged sand and pebbles and any sediment which becomes lodged in the corners of the reservoir interior. Thus, the reservoir **10** will be thoroughly clean and fresh at all times. Also, if any small fishes should find their way into the reservoir **10** while the dip tube is being used for normal aquarium cleaning purposes, the cup-shaped members **11** and **12** can be pulled apart to quickly free the entrapped fishes without killing or irreparably injuring the same in the process of removing.

In the modification of the invention shown in Fig. 4, means is provided for securing the cup-shaped members **11** and **12** together somewhat more positively than by just relying upon frictional contact. In this form of the invention, the interior of the skirt wall **21** is formed with a screw thread **22** which engages a complementary screw thread **23** formed about the cylindrical wall **12***b* of the top cup-shaped member **12** adjacent its open end. Thus, the cup-shaped members **11** and **12** can only be separated by being rotated relative to one another.

The modification shown in Fig. 4, is in all other respects the same as that described in connection with Figs. 1 to 3 and like reference numerals are used to identify like parts.

The modified form of the invention shown in Fig. 5 is characterized by still another means for joining the cup-shaped members **11** and **12** more securely. Referring to Fig. 5 it will be noted that the inner face of the upstanding skirt wall **21** is formed with an inwardly extending circumferential projection **25** which is triangular in cross section and which extends into a complementary circumferential groove **26** formed about the cylindrical wall **12***b* of the top cup-shaped member **12**. When the cup-shaped members **11** and **12** are pulled apart, the projection **25** will snap out of the groove **26**. To guide the projection **25** into the groove **26**, when the cup-shaped members **11** and **12** are being put together, the cylindrical wall **12***b* of the cup-shaped member **12** between the groove **26** and its open end is formed with a downwardly and inwardly beveled surface **27** for spreading the skirt wall **21** and guiding the projection **25** into position within the groove **26**.

The form of the invention shown in Fig. 5 is also, in all other respects, similar to the form described in connection with Figs. 1 to 3 and like reference numerals are used to identify like parts.

As previously indicated, in the preferred construction of the dip tubes of the present invention, the reservoir parts, the water inlet tube and the water outlet tube are preferably molded of a resinous plastic material; however, any other material which is inert in water and which will not form, by oxidation or otherwise, any poisons dangerous to fish kept in aquariums may be used for forming the dip tube. For example, the dip tube can be formed of the relatively water inert stainless steel, but the dip tube will have greatest utility and permit the contents of the reservoir to be seen, especially any entrapped small fishes, if the parts are formed of a transparent synthetic resinous material. In this connection, good results have been had by forming the parts of one of the thermoplastics. Especially good results have been obtained from using polystyrene which is a polymer of styrene ($C_6H_5CH{:}CH_2$).

While we have illustrated and described the preferred embodiments of our invention, it is to be understood that we do not limit ourselves to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new and desire to secure by United States Letters Patent is:

1. A dip tube for insertion into an aquarium containing water and sediment to be removed from the bottom thereof, comprising a bottom one-piece cup-shaped member having a cylindrical side wall and an apertured bottom wall, an inverted top one-piece cup-shaped member having a cylindrical side wall and an apertured top wall, said top member being superimposed on said bottom member with said apertures aligned and said side walls abutting one another, superimposed inlet and outlet tubes axially separated at their adjacent ends defining an unobstructed space therebetween, said inlet tube being extended through and mounted in the apertured bottom wall of said bottom member, said outlet tube being extended through and mounted in the apertured top wall of said top member, said inlet tube having an outwardly flared bottom end portion beneath said bottom member and its top end portion extended upward through said bottom member and into said top member and spaced from the inner face of the top wall of said top member defining a sediment trap within said members below the top end of said inlet tube, said outlet tube being of a length to extend above the surface of water in the aquarium when the dip tube is submerged in the water with the flared bottom end portion of the inlet tube spaced slightly above the bottom of the aquarium, a cylindrical skirt wall integral with one of said side walls and of an internal diameter to receive the other side wall, and means releasably joining said skirt wall to said other side wall releasably securing said members together.

2. A dip tube for insertion into an aquarium containing water and sediment to be removed from the bottom thereof, comprising a bottom one-piece cup-shaped member having a cylindrical side wall and an apertured bottom wall, an inverted top one-piece cup-shaped member having a cylindrical side wall and an apertured top wall, said top member being superimposed on said bottom member with said apertures aligned and said side walls abutting one another, superimposed inlet and outlet tubes axially separated at their adjacent ends defining an unobstructed space therebetween, said inlet tube being extended through and mounted in the apertured bottom wall of said bottom member, said outlet tube being extended through and mounted in the apertured top wall of said top member, said inlet tube having an outwardly flared bottom end portion beneath said bottom member and its top end portion extended upward through said bottom member and into said top member and spaced from the inner face of the top wall of said top member defining a sediment trap within said members below the top end of said inlet tube, said outlet tube being of a length to extend above the surface of water in the aquarium when the dip tube is submerged in the water with the flared bottom end portion of the inlet tube spaced slightly above the bottom of the aquarium, a cylindrical skirt wall integral with one of said side walls and of an internal diameter to receive the other side wall, and means releasably joining said skirt wall to said other side wall releasably securing said members together, said joining means comprising a circumferential projection on the inner face of said skirt wall, the said other side wall having a circumferential groove into which said projection is engaged.

3. A dip tube for insertion into an aquarium containing water and sediment to be removed from the bottom thereof, comprising a bottom one-piece cup-shaped member having a cylindrical side wall and an apertured bottom wall, an inverted top one-piece cup-shaped member having a cylindrical side wall and an apertured top wall, said top member being superimposed on said bottom member with said apertures aligned and said side walls abutting one another, superimposed inlet and outlet tubes axially separated at their adjacent ends defining an unobstructed space therebetween, said inlet tube being ex-

tended through and mounted in the apertured bottom wall of said bottom member, said outlet tube being extended through and mounted in the apertured top wall of said top member, said inlet tube having an outwardly flared bottom end portion beneath said bottom member and its top end portion extended upward through said bottom member and into said top member and spaced from the inner face of the top wall of said top member defining a sediment trap within said members below the top end of said inlet tube, said outlet tube being of a length to extend above the surface of water in the aquarium when the dip tube is submerged in the water with the flared bottom end portion of the inlet tube spaced slightly above the bottom of the aquarium, a cylindrical skirt wall integral with one of said side walls and of an internal diameter to receive the other side wall, and means releasably joining said skirt wall to said other side wall releasably securing said members together, said joining means comprising a circumferential projection on the inner face of said skirt wall, the said other side wall having a circumferential groove into which said projection is engaged, said projection and said groove being triangular in cross-section, the said other side wall having a beveled surface between said groove and its end opposite its closed end for guiding said projection into said groove when said cup-shaped members are being joined together.

4. A dip tube for insertion into an aquarium containing water and sediment to be removed from the bottom thereof, comprising a bottom one-piece cup-shaped member having a cylindrical side wall and an apertured bottom wall, an inverted top one-piece cup-shaped member having a cylindrical side wall and an apertured top wall, said top member being superimposed on said bottom member with said apertures aligned and said side walls

abutting one another, superimposed inlet and outlet tubes axially separated at their adjacent ends defining an unobstructed space therebetween, said inlet tube being extended through and mounted in the apertured bottom wall of said bottom member, said outlet tube being extended through and mounted in the apertured top wall of said top member, said inlet tube having an outwardly flared bottom end portion beneath said bottom member and its top end portion extended upward through said bottom member and into said top member and spaced from the inner face of the top wall of said top member defining a sediment trap within said members below the top end of said inlet tube, said outlet tube being of a length to extend above the surface of water in the aquarium when the dip tube is submerged in the water with the flared bottom end portion of the inlet tube spaced slightly above the bottom of the aquarium, and a cylindrical skirt wall integral with one of said side walls and of an internal diameter to receive and snugly embrace the other side wall.

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