United States Patent [19]

Baisch

[11] **3,880,357**

[45] **Apr. 29, 1975**

[54] **OSCILLATING SHOWER HEAD**

[76] Inventor: **Stephen J. Baisch,** 809 Hyland Ave., Kaukauna, Wis. 54130

[22] Filed: **May 23, 1974**

[21] Appl. No.: **472,554**

[52] **U.S. Cl.** **239/380;** 239/225; 239/590.3

[51] **Int. Cl.** **B05b 1/02**

[58] **Field of Search** 239/97, 222, 225, 228, 239/380, 538, 553.3, 590.3, 563, 597

[56] **References Cited**

UNITED STATES PATENTS

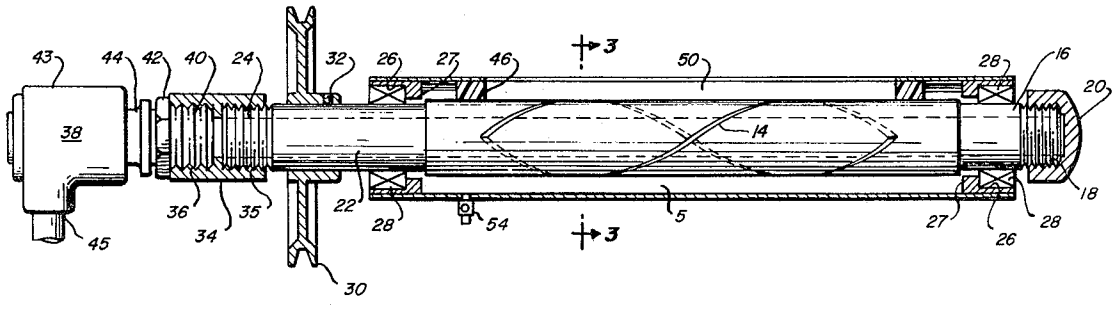
2,695,002	11/1954	Miller	239/225 X
3,136,324	6/1964	Yendley	239/380 X
3,146,953	9/1964	Komanns	239/538
3,353,752	11/1967	Ranhagen et al.	239/538

Primary Examiner—Lloyd L. King
Assistant Examiner—John J. Love

[57] **ABSTRACT**

A shower head having an oscillating nozzle formed by a helix in a rotating inner tube which is spaced from a stationary outer tube, such spacing being bridged in part by an elongated bar having a slot in registery with an elongated slot in the outer stationary tube. A somewhat square shaped nozzle is formed by the helical groove intersecting the registered slots, and such nozzle osciallates between the ends of the registered slots as the inner tube is rotated. Fluid is delivered into an inlet end of the inner tube for discharge through the oscillating nozzle.

10 Claims, 3 Drawing Figures



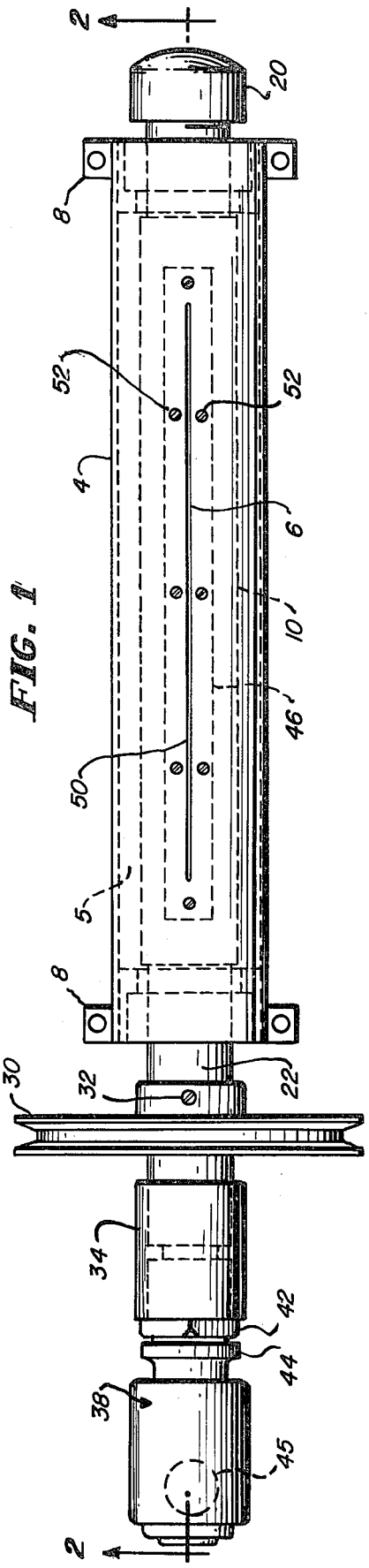


FIG. 1

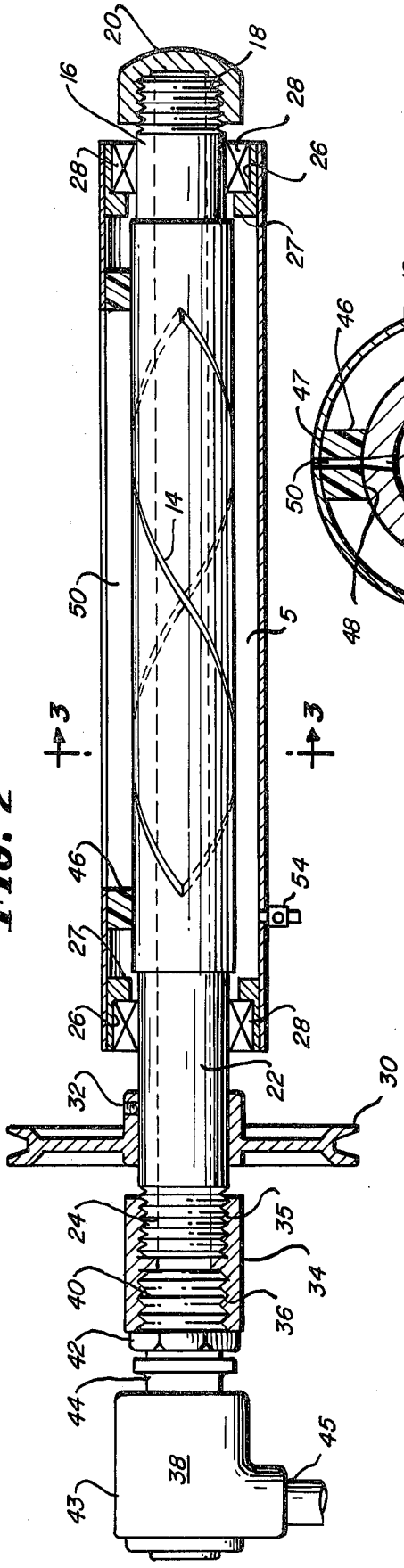


FIG. 2

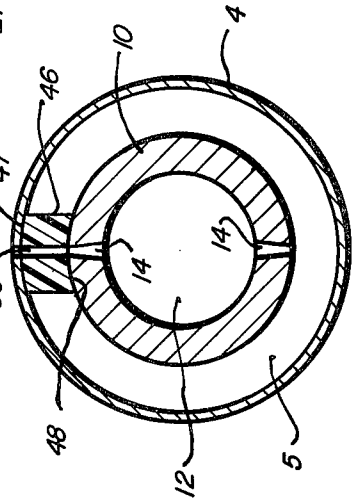


FIG. 3

OSCILLATING SHOWER HEAD

This invention relates to an improved oscillating shower head in which delivered fluid is discharged through an oscillating nozzle formed between the ends of an elongated discharge slot. The invention particularly relates to such an oscillating shower head wherein the nozzle is formed between a helix in a rotating inner tube and registered slots formed in the wall of an outer tube and in a spacer bar which occupies only a small volume of chamber space between a rotating inner tube and a stationary outer tube.

Devices have been developed in the art for spraying liquids or screening solids in a fluid body in a device wherein a rotating cylindrical tube has a helix which successively crosses fixed slots in an outer stationary tube. The successive intersection of the helix and stationary slot results in a travelling nozzle which oscillates as a result of the design of the helix and the rotating inner tube. The art has shown movement of both the inner and outer cylinder in a spraying head as illustrated in U.S. Pat. No. 3,146,953. Such devices have been used for screening a liquid from solids as in U.S. Pat. No. 3,353,752 wherein openings are successively generated between the helix and a plurality of slots. Other representative patents which generally relate to such structures are U.S. Pat. No. 3,136,324 and U.S. Pat. No. 3,347,472.

The state of the art, as represented by the foregoing U.S. patents, illustrates devices wherein a rotating inner cylinder is in bearing relationship with the outer cylinder. The outside of the continuous wall of the inner cylinder is therefore in constant bearing relationship with the inside surface of the continuous wall of the outer cylinder. Such devices understandably require closer attention to tolerances between the bearing surfaces, as well as increasing the wear. This results in an earlier loss of clear nozzle definition for discrete discharge if the bearing surfaces wear down.

One object of the present invention is to provide an improved oscillating shower head useful in a wide number of different applications for discharging various fluid mediums including liquid alone, liquid from which solids are screened, and liquids and solids. Such an improved oscillating shower head is of improved construction and design having reduced bearing surfaces and advantageous selection of materials which in combination lead to long and reliable use.

Yet another object is to provide an improved oscillating shower head which allows the economical replacement of parts most likely to incur wear in use, such replacement being quickly and easily performed.

Still yet another object of the present invention is an improved oscillating shower head of the type described in which a rotating inner tube can be provided with a helix of selective right or left hand configuration, or both, to provide a single travelling nozzle or a pair of nozzles travelling towards and away from each other.

A still yet another object of the present invention is an improved oscillating shower head of the type described which can be used in a wide variety of industrial treatment and cleaning operations, as well as for novelty and decorative uses, while attaining the advantages associated with the improved construction.

Such objects are now attained, as well as still other objects which will occur to practitioners, by the invention of the following disclosure, including drawings wherein:

FIG. 1 is a top plan view of the oscillating shower head;

FIG. 2 is a side elevational view, partly in section, taken along line 2—2 of FIG. 1; and

FIG. 3 is a sectional view, on an enlarged scale, along line 3—3 of FIG. 2.

The oscillating shower head is seen to include an outer stationary tube **4**, which is preferably of stainless steel construction. Such tube encloses or defines a chamber **5**. The continuous wall of the outer tube has an elongated discharge slot **6**, and the opposite ends of such outer tube are shown with lateral mounting brackets or ears **8**, provided with fastener openings as shown.

Inside the stationary tube is shown a rotational tube **10** preferably made of plastic material, substantially rigid. Such inner tube **10** encloses or defines a passageway **12**, and the continuous wall of said inner tube includes a helix **14** which communicates passageway **12** of the inner tube with chamber **5** of the outer tube.

One end of the inner tube is shown to have a reduced diameter **16** which end is modified with mounting threads **18**. An internally threaded bore cap **20** is shown removably mounted on the threads **18**. Such a cap provides a removable closure so that auxilliary structures, not shown, can be mounted to such threaded end, if desired.

The opposite end of the inner tube **10** also has a reduced diameter part **22**, which is longer relative to reduced diameter part or end **16**. Reduced diameter end **22** is modified with mounting threads **24** for threadably engaging structures, as will be later described.

The opposite ends of the chamber **5** are fitted with annular bearing seats **26**, which include shoulders **27** for positioning annular bearing assemblies indicated schematically at **28**. Such bearing assemblies are preferably of the sealed cage type having an inner race. Such bearing assemblies are press fitted into annular bearing seats or bushings **26**. The set of bearing assemblies, including bushings **26**, seal the chamber **5** as well as spacing the inner rotational tube **10** from the continuous wall of outer tube **4**.

The longer reduced diameter end **22** of the inner rotational tube is seen as having a pulley **30** fixed thereto by means such as set screw **32**. Motor and pulley means, not shown, turn the pulley **30** to rotate the inner tube at selected rotational speeds.

Threads **24** at the end of the reduced diameter part **22** are shown engaging a double socket coupling **34**. One threaded socket **35** is seen threadably engaging threads **24** at the tube end, and the other threaded socket **36** is shown mounting a rotary joint **38**. The rotary joint has a threaded end **40** which engages the threaded socket **36**. A tightening nut **42** secures the rotary joint to the double socket coupling member.

The rotary joint member has a stationary housing part **43** which houses rotating part **44**. A fluid inlet **45** delivers fluid into the rotational inner tube from a line or conduit, not shown.

An elongated spacer bar **46** is positioned in chamber **5** between the outer and inner tubes. Such a bar is preferably made of plastic material and has a convex side **47** which is in fixed relationship to the inside of the continuous wall of the outer tube. The bar also has an opposite concave side **48** which is in sliding relationship to the outside continuous wall of the inner tube **10**.

The elongated spacer bar has an elongated discharge slot **50** which is registered with discharge slot **6** in the continuous wall of the outer tube. A plurality of screw fasteners **52** secure the elongated spacer bar to the outer tube.

In operation, a fluid line is connected to the rotary joint member **38** and driving means are connected to pulley **30.** Fluid is delivered into the passageway **12** of the inner tube, and a portion of such fluid will move through the helical groove **14** to fill chamber **5** of the outer tube. Such fluid is retained within the chamber by the sealing bearing assemblies at the opposite ends. Once filled, further fluid does not pass from the inner tube into the chamber **5.** A valve element **54** may be provided to flush out any solids or impurities in the delivered fluid.

Further movement of fluid in the inner tube moves through the nozzle formed by the helix **14** travelling along the registered slots. Such nozzle is of a parallelogram configuration, almost square shaped. It will be appreciated that the faster the inner tube is rotated, the faster the formed nozzle travels and oscillates along the registered discharge slots. The sweep of the travelling nozzle is from one end to the opposite end of such registered slots since the helix **14** extends to such opposite ends. The formation of such a nozzle is illustrated in the view of FIG. **3** wherein the helix **14,** elongated bar slot **50** and outer tube slot **6** are all shown in registery.

It is seen that only a minor circumferential portion of the inner tube bears against the concave side **48** of the elongated spacer bar. This reduces the total bearing surfaces and the consequent wear. It is also seen that the inner tube and elongated spacer bar are relatively inexpensive because of their plastic construction and can be economically replaced when necessary.

It will be understood that for any given helix, the direction of travel of the nozzle can be reversed by simply reversing the rotational direction of the inner tube. It will also be apparent that both right and left handed helical grooves can be provided in the inner tube to obtain a nozzle which travels in opposite directions at the same time. The term "fluid" is intended to mean liquids, as well as gases, and a combination of solids and liquids. If the solids are sufficiently small, they may be discharged with the liquid through the travelling nozzle. In another form, the solids may be screened out by being withheld within the passageway of the rotating tube.

The claims of the invention are now presented, and the terms of such claims may be further understood by reference to the language of the preceding specification and the views of the drawings.

What is claimed is:

1. An oscillating shower head which includes, in combination,

a stationary cylindrical outer tube having a continuous wall substantially enclosing a chamber,

an elongated discharge nozzle in the continuous wall of said outer tube,

a rotatable cylindrical inner tube having a continuous wall substantially enclosing a passageway,

opposite sets of sealing bearing assemblies mounting said inner tube in spaced relationship to the continuous wall of said outer tube,

a helical groove in the continuous wall of the inner tube communicating the passageway of the inner tube with the chamber of the outer tube,

an elongated bar positioned between continuous wall portions of said inner and outer tubes, said bar having a convex side to engage the inside radius of the outer tube and an opposite concave side to engage the outside radius of the inner tube,

an elongated discharge slot in said bar, said bar positioned so that said bar discharge slot is registered with said elongated discharge nozzle in the outer tube,

means on said inner tube to engage rotating means, and

inlet means for a fluid to be delivered into said inner tube for oscillating discharge through said helix and registered slots.

2. An oscillating shower head which includes the features of claim **1** wherein opposite ends of said inner tube extend beyond opposite ends of said outer tube, one of said ends being said inlet means, said inlet means including a rotatable coupler element to engage a fluid line.

3. An oscillating shower head which includes the features of claim **1** above, wherein said elongated bar is at least as long as the length of a helix in the continuous wall of said inner tube.

4. An oscillating shower head which includes the features of claim **2** wherein the means on the inner tube to engage the rotating means is a pulley fixed to one of the extending ends of the inner tube.

5. An oscillating shower head which includes the features of claim **4** wherein said pulley is fixed to the extending end having said inlet means for said fluid delivery, and said opposite extending ends being threaded.

6. An oscillating shower head which includes the features of claim **5** wherein said inlet means includes a rotary coupler element mounted to said threaded end of the inner tube, said rotary coupler element having a non-rotary part for mounting to said fluid delivery line.

7. An oscillating shower head which includes the features of claim **6** wherein the extending threaded end of the inner tube opposite to the end having said rotary coupler element includes a removable threaded closure.

8. An oscillating shower head which includes the features of claim **1** wherein said inner tube and elongated bar are formed from plastic material, and said outer tube is formed from steel.

9. An oscillating shower head which includes the features of claim **8** wherein said plastic rotatable inner tube has opposite ends of reduced diameter, the continuous wall portions whereof are smooth, said reduced diameter smooth wall portions being mounted in spaced relationship to said outer tube by said opposite sets of bearing assemblies, the reduced diameter portions extending from the opposite ends of said outer stationary tube, the terminating portions of said extending reduced diameter portions being threaded, one of said threaded ends having a removable threaded closure, and the opposite threaded end having said inlet means threadably mounted thereto, said elongated plastic bar having its convex side fastened to the continuous wall of said outer tube, and a valve mounted to the wall of the outer tube for flushing the chamber.

10. An oscillating shower head which includes the features of claim **9** wherein the inlet means include a double socket adapter, one socket of said adapter being threadably mounted to the threaded end of the inner tube, and a rotary joint element being threadably mounted to the other of said threaded sockets, said rotary joint including a non-rotational housing part having an inlet for a fluid line, said non-rotational housing part being freely mounted to a rotatable part of the coupler element.

* * * * *