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SLIME MEASURING APPARATUS

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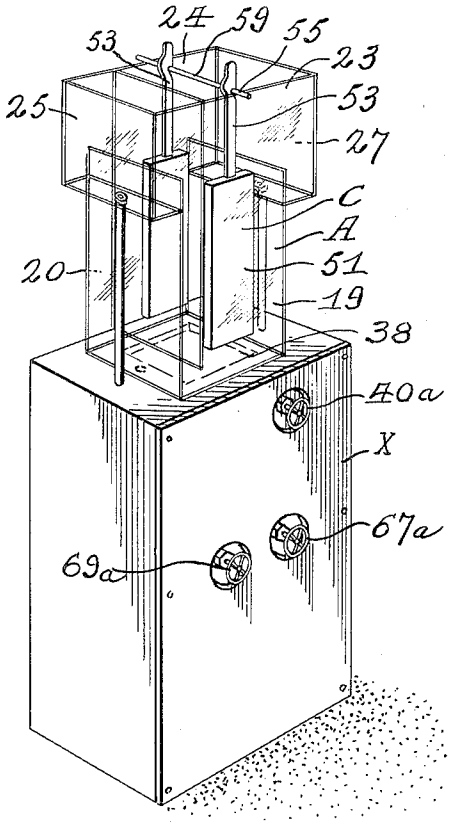


Fig. 1

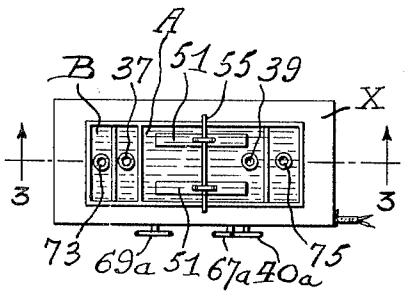


Fig. 2

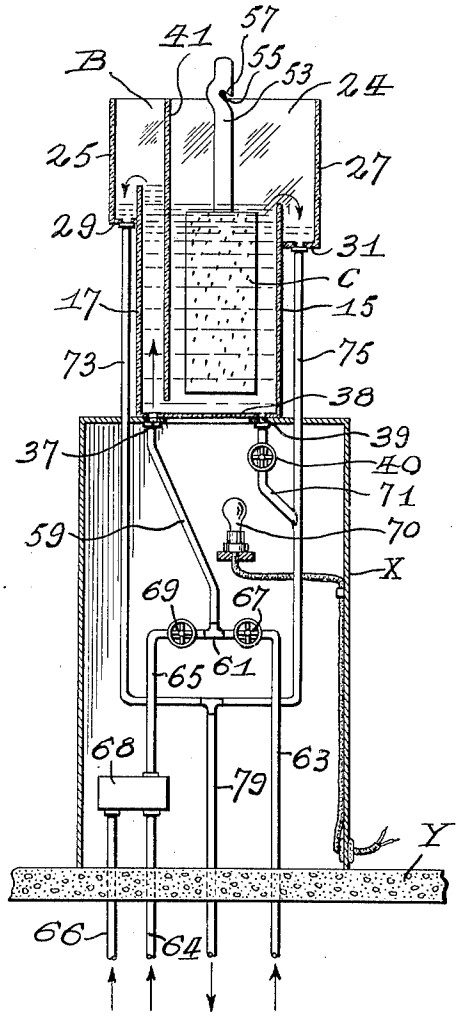


Fig. 3

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SLIME MEASURING APPARATUS

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4 Claims. (Cl. 73—53)

This invention relates to the measuring of fouling or deposits in a liquid system which produces fouling as an incident to its operation.

One specific application of the invention is to the measuring of slime in the white water in a paper mill system.

Various means have been suggested to solve this problem. Generally speaking, a device is used in which there is a removable element having a surface on which slime collects. The element is periodically removed and gravimetric measurements made of the amount of slime which is collected in the interim.

This suffers from the disadvantages that in the first place, it is awkward, time consuming and sometimes expensive to remove the element from the system, and in the second place, slime is often scraped off the surface during movement of the element accidentally or due to the action of surface tension.

Furthermore, the appearance of the slime is usually quite different in air than in water due to the surface tension drawing all the hairs and tentacles together and distorting the physical appearance.

Furthermore, due to these changes in character and losses in quantity of slime caused by the removal of the board from its original environment, it is no longer possible to replace the same board in the system for a true cumulative measure of the slime growth.

Applicant's development

Having regard to the problem and to the prior art attempts at its solution, the applicant has now developed an apparatus which avoids the previous disadvantages and provides certain positive advantages.

Broadly speaking, the applicant's invention is embodied in a method which involves running the fouled liquid continuously through a transparent container in which there is placed a surface on which the fouling can collect and then without interrupting the flow, cutting off the supply of fouled water and displacing the fouled water by running fresh water through the container so as to allow the condition of the slime-collecting surface to be observed through the transparency of the container and of the fresh water, without disturbing the fouling which continues to remain submerged and unaltered.

The invention is also embodied in the apparatus for carrying out this method. The apparatus includes the following features. A tester is provided made up of a container or tank having transparent walls. The tank is provided with inlet means at the bottom and outlet means at the top. The inlet is connected to respective conduits connected with a source of fouled water and a source of fresh water and valves controlling the conduits.

Preferably one side of the tank is lower than the other, with the inlet adjacent to the higher side and a baffle spaced from the higher side so that the incoming liquid passes directly upward from the baffle and the higher side. This causes a constant head and prevents surges in the main body of the tank.

Preferably the tester is mounted on a stand which encloses the piping leaving the device. The stand is mounted on a permanent structure, for example, the plant floor.

Detailed description

Having thus generally described the nature of the invention, it will be referred to in further detail by reference to the accompanying drawings which illustrate a preferred embodiment in which:

Figure 1 is a perspective view of a tank according to the invention with associated apparatus.

Figure 2 is a top plan view of the apparatus of Figure 1.

Figure 3 is a horizontal cross section along the line 3—3 of Figure 2.

Referring more particularly to the drawings, A represents in general a tank and X a stand on which the tank is mounted. It is made up of side walls **15** and **17** and end walls **19** and **20** respectively, the lower ends of which meet the base which meets the stand X. The wall **17** is somewhat higher than the wall **15**. The side walls **15**, **17** are extended to have extensions **23**, **24** above the end walls **19** and **20**. The extensions **23**, **24** also project laterally as indicated beyond the side margins of the walls **15** and **17**.

Connected to the extensions **23**, **24** are top side walls **25** and **27** and inwardly extending floor members **29** and **31**. The walls **23**, **24**, **25**, **27**, and members **29** and **31** provide a skirt portion extending upwardly above the container proper A.

The tank A has a base or floor **38** resting on the stand X, the floor **38** is provided with an inlet **37** and drain **39**.

A baffle **41** extends from the top of the skirt portion B downwardly parallel to and spaced from the wall **17** to a position spaced from the floor **38**, the space allowing circulation of liquid therethrough. When the walls and other parts are made of plastic material, they are preferably "welded" together at their edges by a suitable cement, so that the joints are practically imperceptable.

A slime collecting member C having a wide slime collecting surface **51**, is suspended within the container through an upwardly extending arm **53**. The arm **53** has an indented portion **55** providing a projection **57** which engages a hanging bar **59** which rests on the top of the sides **23** and **24**.

In the construction illustrated twin slime-collecting members C. are shown in position. Preferably, the whole tank, or a substantial part of it, is made of transparent material such as glass or plastic so that the slime collecting members C can be readily seen through it.

To the inlet **37** is connected a conduit **59** which through a T **61** is connected to conduits **63** and **65**. The conduit **63** is controlled by a valve **67** and the conduit **65** by a valve **69**. The conduit **63** leads from a source of fouled water containing slime-producing organisms and the conduit **65** leads from a source of fresh water, preferably from a cold water pipe **64** and a hot water pipe **66** and a thermostat **68** controls the amount of hot and cold water supplied, thus controlling the temperature of the fresh water entering the tank when desired.

The drain **39** is connected to a conduit **71** which leads to the sewer. A valve **40** controls this drain, which is provided so that the tank may be drained for repairs. Likewise, the floor members **29**, **31** in the overflow boxes are provided with outlets **73** and **75** connected to conduit leading to the sewer.

According to a preferred form of the invention, the tank A, as has been described, is mounted on top of a stand or housing X. The top of the stand X has a hole in it just slightly smaller than the base **38** so that the

electric light **70** is adapted to provide a source of light shining through the transparent tank for the purpose of providing better visibility. The conduits extending from the tank are contained in the stand and hidden from view. The housing X is mounted on the floor Y of the plant in which the fouled liquid is circulating and preferably the conduits extend from the housing through the floor Y.

Preferably the electric light **70** is mounted within the housing to provide an indirect source of light shining through the tester and also so that the valves and conduits are visible when the housing is opened up. Preferably the valve handles **69***a*, **67**A, **40***a* extend out through the housing so that they can be manipulated from without.

Operation

The operation of the device is as follows.

Normally the conduit **63** remains open and fouled water flows into the container A through it and out through the outlet conduits **73** and **75**.

The column provided between the wall **17** and the baffle **41** constitutes a surge head preventing surges of water in the main tank portion of the tank, while at the same time causing the evenflow of liquid through the tank. Liquid will overflow the top of the wall **17** and the top of the wall **15** and will pass out through the outlets **73** and **75**.

As the fouled water passes through the tank, slime is gradually deposited on the surfaces **51** of the slime-collecting member C.

While the fouled water is running through the tank it is not possible to see the surface because of the opacity of the liquid.

To look at the fouled surfaces the valve **67** is shut off and the valve **69** opened. This allows fresh water to enter and circulate through the tank. The fresh water displaces the fouled water and being a clear liquid it clarifies and makes it possible to see the fouled surfaces. The slime is not disturbed as the water used is the same in character being only clean water under the same flow conditions as if fouled water had been used. If the slime board were removed from the box to look at it the forces of surface tension would pull at the slime, sloughing off some and distorting the rest.

With the present method there is no trouble with surface tension, the slime continues to remain undisturbed as the fresh water continues at the same flow and only displaces the fouled water thereby permitting visibility of the slime surface through the clear transparent water.

When fresh water is allowed to enter the tank the fouled surfaces can be inspected and any calculations made, as to deposit of slime.

By closing valve **69** and opening valve **67** the unit is then allowed to continue the deposition of slime without having disturbed the slime board C surface **51**. Since this whole operation takes only a couple of minutes, the unit operates in virtually continuous service thereby allowing for a considerable saving in time by the operator.

The walls of the tank A and the skirt B are of transparent material such as glass though preferably of a transparent plastic material as for example acrylic resins known under the trademark names "Lucite" or "Plexiglas." The tubing **75** and **73** is also preferably of transparent material, by choice a transparent plastic material.

A rubber knife like a windshield-wiper, is preferably employed to scrape the sides of the box A before checking any observation so as to remove any accumulation of fibers or slime from the side of the flow-box.

As shown in the preferred embodiment, the body of the container A has no obstruction to vision of the contents. For example, the plastic transparent material making up the sides and other surfaces is joined by fusion or by cementing in such a manner that no metal structural members are necessary at the junction of the various

sheets making up the surfaces. Likewise, the conduits **73** and **75** which are in the field of vision can be made of transparent material. So, when fresh water is being run through the tank or container A there is no obstruction to vision.

The tester, according to the invention, is an apparatus which will allow a clear visual appreciation of surface fouling conditions. The unit can investigate the surface fouling properties of any fluid which may be connected to it, and of any surfaces which are placed in it. By a simple manipulation of valves the transition is made which allows a visual observation of these surfaces. The unit is never out of service and it has the distinct advantage that the surfaces are not touched or exposed to forces of surface tension which would disturb the surface deposit, or change its characteristics, and/or cause it to slough off before it could be visually inspected.

By routine observation of surface fouling conditions as seen through this unit it is possible to correlate the manner and the extent to which surface fouling influences the operation of a paper machine, which may be more at some seasons of the year than at others. These observations can be made on sample panels of concrete, lithcote, copper, wood, etc., representative of the surfaces of the area in question, which would be placed in a tester in surface under actual mill conditions using a sample of the white water or stock in question.

The visual observation is believed more important than a gravimetric determination because it indicates certain physical qualities, such as how easily the deposit is attached, whether it has already partially sloughed off, whether it is gelatinous, stringy, colored, etc., which are more vividly appraised by the eye than a conglomerate gravimetric reading. However, whenever a gravimetric reading is required it can be measured accurately as the unit is designed to allow a complete recovery of all the deposit including that which would normally slough off during removal of the panel.

While periodic observation of panels in the tester can be used for slime control purposes and changes in dosage, that such a unit may also serve for control of pitch chemicals or any chemicals or materials used to prevent various kinds of surface fouling, when properly connected for this service.

Another important use should be, that as an overall guide to the cleanliness of system surfaces information may be obtained from it that will be helpful in decisions relating to midweek washups.

A unit of the type described can also serve for technical investigations in other ways. By using panels which have been specially treated by bactericides for the purpose it will allow visual inspection of which bactericides are best adapted for treatment on mill surfaces.

By a suitable addition of bactericide to the white water feeding the tester a visible indication of how such a bactericide would inhibit mill slime growth can be obtained. This will provide comparative information on the effectiveness of the bactericide for mill slime control.

The effectiveness of washup and recirculating compounds can also be determined by examination of test pieces placed in the tester either as an investigating technic to determine their suitability, or for mill control of a recirculating program to determine the extent of the cleaning job that is being done.

It is not intended that this apparatus in general principle should be limited to use in the paper mill field as it should also find use in many other fields. With suitable modifications it could be altered to measure rust formation in a cooling water system, scale in a water boiler, sludge in an oil pipeline, etc. It is also contemplated that similar apparatus might be used in vapour systems, for example, to measure rust in a steam line,

carbon deposit in a smoke chamber, soot in a chimney flue, etc.

I claim:

1. A method of measuring slime in a paper mill system comprising creating a flow of white water continuously to immerse a prominent slime receiving surface for a time effective to build up a deposit of slime statistically indicative of slime formation in the system, then replacing the flow of white water with a flow of clear water thereby to immerse said surface with clear water without disturbing the slime deposit and to render the said surface visible whereby the slime deposit may be observed undisturbed.

2. A device of the type described, comprising in combination, a container having opposed side walls and opposed end walls, one of said end walls being higher than the other, a base in the container connected to the four walls, a baffle extending downwards and spaced from said higher wall extending from a position spaced from the floor of the container to a position above the higher side wall, a skirt extending about the top part of said container outwards from a position below the top of said higher and lower side walls to form two receiving troughs for receiving water overflowing said walls each of said troughs having an outlet, an inlet to said container immediately below the space between said higher side wall and said baffle, means for sustaining a slime-collecting member in said container and a slime-collecting member connected to said means, the walls, baffle and skirt being made of transparent material whereby the condition of the slime-collecting member may be observed under suitable conditions without removing said member from the container, said inlet being connected respectively with a source of slime-containing water of which it is desired to measure the slime contained, and a source of clean water, and means for controlling said connections whereby slime containing water or clean water may be circulated through the container.

3. A method of measuring fouling in an industrial fluid system, comprising flowing an opaque fouled liquid continuously in contact with a prominent surface immersed in said liquid, replacing the flow of fouled liquid with a flow of clear liquid without interrupting the flow of liquid to immerse the surface with the clear liquid whereby the surface may be observed to determine the amount of fouling which has taken place by the passage thereover of the fouled liquid.

4. An apparatus of the type described, comprising in combination, a tank, means for flowing continuously through said tank an opaque fluid medium containing slime-forming organisms, said tank having a wall including a top edge, one portion of the top edge being higher than an opposed portion, a baffle extending vertically in such tank and spaced from said one portion, an inlet into the bottom of the tank at a position between the portion of the wall at said high portion and said baffle, a drain from said tank on the other side of the baffle on the bottom and an outlet at the top, a slime receiving surface within the tank, the walls and baffle being of transparent material, means for replacing the flow of the opaque fluid medium by a transparent fluid medium whereby the slime-receiving surface may be observed when the contents of the tank are clear.

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