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PORTABLE SAMPLE WASHERS

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Fig. 1.

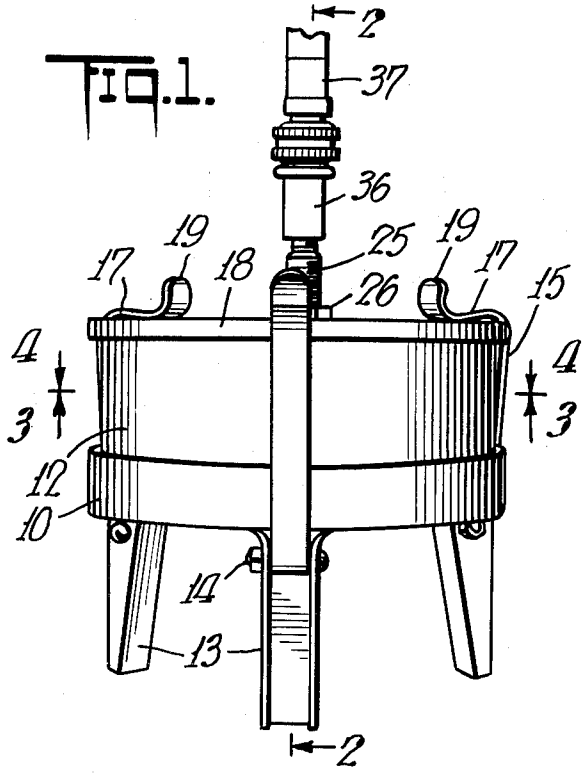


Fig. 3.

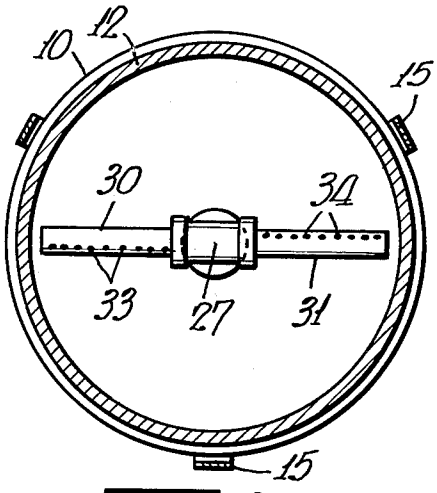


Fig. 4.

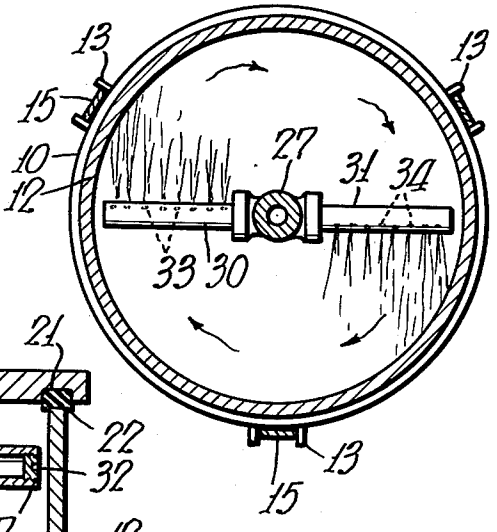
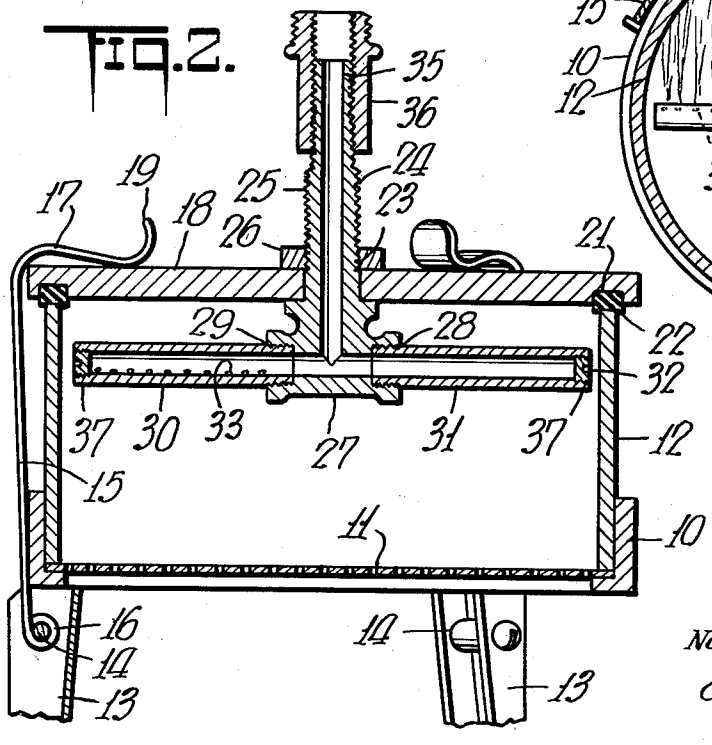


Fig. 2.



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PORTABLE SAMPLE WASHERS

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2 Claims. (Cl. 209—273)

This invention relates to washers such as are commonly used for separating fine fragments of rocks and minerals from coarser particles, or for separating fossil microorganisms from silt or clay particles in which they are embedded. This invention finds particular application for example at the site of a drilling well or in close proximity to places where rock, mineral, or fossil bearing materials are collected, in that it enables the prompt determination of the structure of such materials, so that geological or paleontological conclusions may be reached, which effect economies during the period a well is being drilled or while a surface soil is being analyzed or geological survey is being conducted.

Sample washers are known, such as rotating paddle-machines for washing samples and separating fines, silt and other small particles therefrom. In these washers the constituents of the samples are forcibly ground against a screen with consequent rapid wear and tear of the screen, and at times undesirable breaking of microscopic fossils present in the samples. Other washers have been suggested involving manual or mechanical means for operating the washers, e. g., shaking it as by hand or with the use of a motor. The use of motor driven washers are objectionable not only because the motor adds to the weight and complexity of the washer, but also because it requires a source of power for driving the motor and involves the expense in so doing. Manually operated washers are objectionable because they involve the expense of man-power in the treatment of samples, some of which may require washing for long periods of time, several hours and longer, in order to remove the fines, silt or clay particles to conditioned the residual material for microscopic examination.

It is among the objects of the present invention to provide a sample washer which is simple in design, small in size, light in weight, and hence readily and easily carried or moved, which consists of few parts, which are inexpensive, readily assembled and easily cleaned, thus eliminating the hazard of contamination of the samples, and which washer does not require the use of manual or mechanical operative means to effect the washing of the sample.

Another object of the invention is to provide a washer which effects washing of the sample in a relatively short period of time, in the use of which minerals and microscopic fossils are not forcibly ground against the screen, but are protected by a water cushion or blanket, and which in operation once it has started to wash a sample, requires no further attention until the sample has been completely washed and is conditioned for removal from the washer and microscopic examination of the residual material.

Other objects and advantages of this invention will be apparent from the following detailed description thereof;

In the accompanying drawing forming a part of this specification, and showing for purpose of exemplification a perfect form of this invention without limiting the claimed invention to this illustrative instance:

Fig. 1 is a perspective view of a sample washer embodying this invention, the washer is shown with the cover clamped in place and with the parts assembled so that the washer is operative to effect washing of a sample therein;

Fig. 2 is a vertical section through the washer of Fig. 1, taken in a plane passing through line 2—2 of Fig. 1;

Fig. 3 is a horizontal section looking up through the underside of the screen, i. e., taken in the direction indicated by the arrows 3—3 on Fig. 1;

Fig. 4 is a horizontal section looking down from the top of the washer, i. e., taken in a direction indicated by the arrows 4—4 on Fig. 1.

The washer comprises a base 10 which acts as a support for screen 11, which may be of any desired mesh, such as 100, 150 or 200 mesh, depending on the sample to be washed. The base 10 and screen 11 may, for example, be a unitary device such as the well known Curtin screen used extensively in the oil industry, in which the screen is removable from the annular pan or collar in which it is mounted to permit the insertion of new screens at will.

Suitably secured to base 10, is a cylindrical shell forming cylindrical side wall 12 of the washer, this shell desirably is of wear resistant metal, e. g. steel. If desired base 10, cylindrical side wall 12 and screen 11 may be formed as one unit. Depending from the base 10 are the legs 13, three in the embodiment of the invention shown on the drawing, equally spaced around the periphery of base 10. Desirably each of the legs is channel shaped i. e., "U" shaped in cross section.

Pivot pins 14 are suitably secured near the tops of legs 13 in the channel of the legs. Clamps 15 have their lower ends pivoted as at 16 on the pins 14, and have their upper ends 17 shaped as shown in the drawing to provide a strong clamping pressure on a cover 18. The ends of a clamps 15 may be curled upwardly as at 19, to provide an ear which can be firmly grasped to move the clamps about pivot 14 and thus permit removal of the cover 18.

Cover 18 which may be of transparent material such as Plexiglas or heavy plate glass, or when it is not important to view the sample being washed, of metal or other suitable construction material is provided with an annular groove or channel 21, in which is secured a gasket 22. Gasket 22 may be of rubber, plastic or other flexible material so that when the cover 18 is clamped in place by the clamps 15 on the upper edge of side wall 12, a liquid tight closure between side wall 12 and cover 18 results.

Cover 18 is provided with a central opening 23. A fitting 24 passes through this central opening. Fitting 24 desirably is threaded as at 25, and cooperates with a threaded collar 26, which when in position shown in Fig. 2 serves to lock the fitting in place providing a liquid tight seal. The lower end of fitting 24 is formed with a T union 27, having interiorly threaded ends 28 and 29, for the reception of the jet conduits 30 and 31. Each of the conduits 30 and 31 is provided with a threaded plug 32 at the terminal end thereof; this plug can readily be removed to permit cleaning of the conduits.

Conduit 30 is formed with a series of spaced small openings 33 forming jets when liquid is passed therethrough. Conduit 31 is provided with a series of spaced small openings 34, positioned diametrically opposite the openings 33 in conduit 30. The openings 33 and 34 in their respective conduits are so positioned and dimensioned that when liquid under pressure is passed therethrough, flow occurs in the form of jets at an angle from 30° to 45° to the surface of screen 11. The threaded connection between union 27 and these conduits permits adjustment to be effected readily of the angle between these jets and the surface of the screen. The jets thus

produced by flow through openings 33, it will be noted, are in a direction diametrically opposite to that of the jets produced by flow through openings 34 in conduit 31, as clearly shown in Fig. 4.

Fitting 24 has its upper end 35 threaded into a hose connection 36, which may be of any well known type, and which is arranged to connect with hose 37, desirably a flexible hose for supplying liquid, preferably water, under pressure. The washer will work with tap water or other water or liquid under pressure. The assembly of cover 18, fitting 24 and conduits 30 and 31 are removable as a unit, by simply removing the cover 18 on which these parts are mounted. When thus removed any desired adjustments may be made, e. g. in the height of the conduits above the screen, or in the angle of the jets to the surface of the screen. Also the conduits 30 and 31 and connected piping can be cleaned easily and readily.

In operation the sample to be washed is prepared in the customary manner as for other washers. It may be a firmly cemented or indurated rock, mineral or fossil bearing material, or a sample of loose soil, drilling well fragments, etc. Indurated samples may first be crushed so that most fragments will pass a ¼" mesh screen. The resultant sample is then placed in a pan of water, Varsol (petroleum spirit) hydrogen peroxide, or sal-soda solution, and allowed to stand until partially separated. This treatment is primarily to disintegrate the samples into washable fragments, whose maximum diameter will be little more than ¼ of an inch, without the risk of breaking the microscopic fossils by crushing. In many cases the samples collected for washing are already of desired small size, in which case they may be put on screen 11 without any prior preparation. Thereafter, cover 18 is clamped in place by means of the clamps 15 and the hose 37 connected to a suitable source of liquid under pressure, e. g. tap water. Clamping of the cover 18 in place automatically positions the conduits 30 and 31 the desired distance above screen 11 on which the sample rests. This distance should be such that the jets emerging from openings 30 and 31 strike the sample with sufficient force to cause the particles thereof to rotate, turn and move with the stream of liquid formed on screen 11, so that in effect the particles of the sample move through a continuous circulatory path indicated by the arrows on Fig. 4, this path being along the outer marginal surface of screen 11. In the event the conduits 30 and 31 are not at this desired height above screen 11, they may readily be moved to this position by loosening nut 26, lowering fitting 24 to properly position conduits 30 and 31 and then again tightening nut 26 to provide a liquid tight seal between fitting 24 and opening 23 in cover 18.

Upon turning on the liquid the jets cause the sample to rotate and flow in a generally circular direction as above described. Sludge, silt and other fine particles are carried through the screen, liquid also flowing therethrough and thus preventing clogging of the screen. As the action proceeds, the larger particles which are in rapid rotary motion around the screen have adhering mud, loosened, washed off and removed through the screen. The washer requires no observation or watching. The washing action proceeds until it is completed, which in the case of soft sediments, such as those from the Gulf Coast region of the United States may be effected within one or two minutes. Indurated limestones may take 15 minutes or longer.

In the case of very indurated sediments, the jets are lowered so that they exert maximum striking force on the sample, and the conduits 30 and 31 are turned so that the jets make an angle of 30° with the screen. When washing softer samples, the jets may be positioned at an angle of 45° to the screen, and the conduits 30 and 31 disposed near the top of the washer.

While the construction shown in the drawings involves a multiplicity of spaced openings in conduits 30 and 31, it will be understood that the number of these openings may be varied as desired and the washer may have only one or a few such openings in each of the conduits 30 and 31 disposed in diametrically opposite directions. In a construction involving only one or a few of such openings, the openings are positioned near the terminal, or free ends 37 of the conduits 30 and 31. Alternatively the adjustable fitting 24 may be provided with two jets extending in diametrically opposite directions, each jet disposed to provide a stream of water at an angle of 30° to 45° to the screen, and to strike for the most part the side wall 12. As indicated in Fig. 4 of the drawings, the openings in conduits 30 and 31 are positioned to form a multiplicity of jets, the major force of which is exerted on the side wall 12 and is not directed for the most part on the surface of the screen 11. This results in a material reduction in wear and tear of the screen. Side wall 12 which may be of heavy metal or other durable construction material can withstand the force of the liquid without appreciable wear taking place. Furthermore, this direction of the flow of the jets causes a continuously rotating motion of the fragments of the samples and also provides a swirling stream which as indicated by the arrows on Fig. 4, extends over the complete surface of the screen 11, acting as a cushion or blanket to protect the fragments of the sample of a size larger than the screen openings. This stream provides an endless path through which the fragments of the sample are continuously moved while rotating thus effecting efficient washing of the samples.

It will be noted that this invention provides a washer which is unusually simple in design and which consists of relatively few parts, all of which are inexpensive to fabricate, are readily assembled and easily cleaned. The washer is small in size, light in weight, and hence readily carried from place to place and can be used in the field wherever a source of water or other liquid under pressure is available. In use, the washer effects efficient washing of the sample in an exceptionally short period of time and does not forcibly grind the sample against the screen. The particles of the sample are protected by a liquid cushion. When once placed in operation the washer does not require further attention until the sample has been completely washed.

It is understood that this invention is not restricted to the present disclosure, otherwise than as defined by the appended claims. Thus while a washer having two conduits 30 and 31 are disclosed in the drawing, washers having more than two such conduits, say three or more, may be used, each of the conduits forming jets at an angle of 30° to 45° to the screen, which jets produce a circulatory stream of liquid over the surface of the screen and effect agitation, rotation and movement of the sample particles in and through this stream.

What is claimed is:

1. A portable device for washing specimens, comprising, in combination, a cylindrical housing, a screen in the base of said housing, means for supporting said housing and screen in a position permitting the free flow of liquid and fines through said screen, a liquid tight closure for the top of said housing, said closure having a central opening, a fixed fitting passing through said central opening, two conduits in said housing extending in opposite directions from said fitting in substantially longitudinal alignment with each other and both positioned above said screen, one of said conduits having therein a series of spaced openings arranged to form a plurality of jets of liquid each at an angle of from 30° to 45° to said screen, the other of said conduits having therein a series of spaced openings to form jets extending in a direction diametrically opposite to that of the first-mentioned jets, the second-mentioned jets being at an angle of from 30° to 45° to said screen and both series of jets being directed for the most part in a direction towards the wall of said housing, whereby the liquid thus projected through said jets forms a continuously flowing rotating cushion of liquid over the surface of said screen, which effects rotation of the con-

stituents of said specimens, and movement thereof in a circular path over the surface of the screen, so that the fine particles are washed through the openings of said screen leaving coarser particles on said screen.

2. A portable device for washing specimens, comprising, in combination, a cylindrical housing, a screen in the base of said housing, legs secured to the base of said housing for supporting it in a position to permit the free flow of liquid through said screen, a cover for said housing, gasket of flexible material in said cover and arranged to rest on the upper edge of said housing, spring clips having their lower ends pivoted to said legs and arranged to have their upper ends moved into engagement with said cover to clamp said gasket onto said upper edge of said housing to form a liquid tight seal between said cover and said housing, said cover having a central opening, a fitting passing through said central opening, means for adjusting the position of said fitting within said housing, adjustable

conduits extending in opposite directions from said fitting, one of said conduits having openings therein arranged to form a plurality of jets of liquid each at an angle of from 30° to 45° to said screen, and the other of said conduits having therein a series of openings to form jets extending in a direction diametrically opposite to that of the first mentioned jets, the second mentioned jets being at an angle of from 30° to 45° to said screen, and both series of jets being directed for the most part in a direction towards the wall of said housing.

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