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WASHING ATTACHMENT FOR FILTERS

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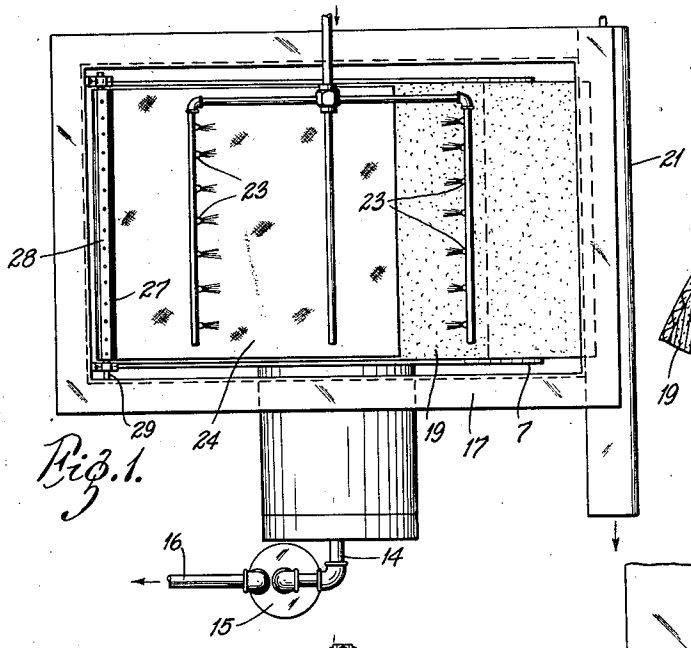


Fig. 1.

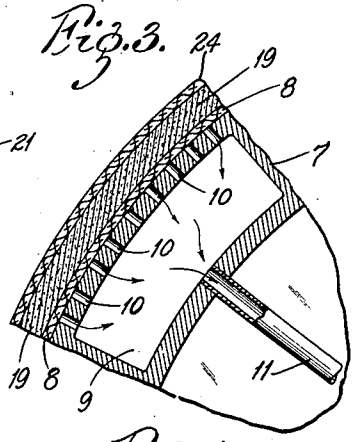


Fig. 3.

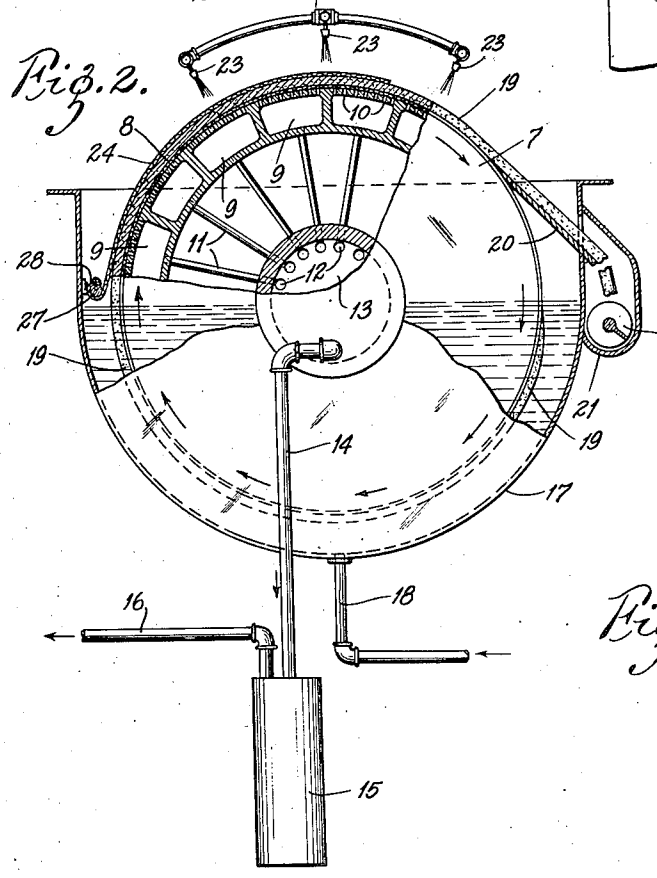


Fig. 2.

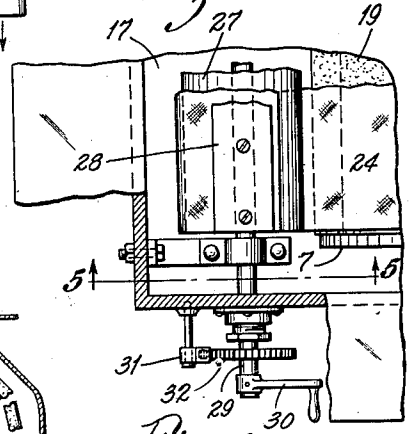


Fig. 4.

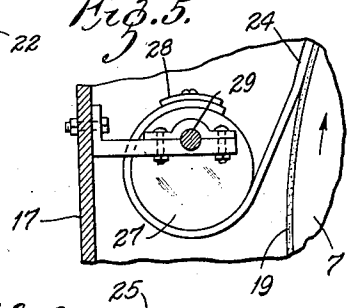


Fig. 5.

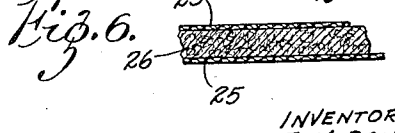


Fig. 6.

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WASHING ATTACHMENT FOR FILTERS

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6 Claims. (Cl. 210—201)

This invention relates to washing attachments for filters, one of the objects being to produce a simple and inexpensive means for distributing liquid over the material deposited on a moving filter. The invention is adapted for use in the delivery of liquid to various types of filters, and it is especially advantageous in connection with a rotary filtering apparatus wherein pressure or suction is employed to force the filtrate through the periphery of a rotary filter.

An object of the invention is to efficiently and uniformly wash the mass of material deposited on the filter, without using excessive quantities of the solvent or other liquid employed for this purpose. Another object is to provide a desirable degree of friction on the surface of the more or less plastic material to be washed, while covering this material with a flexible, absorbent mat which excludes air therefrom, and at the same time provides a constant supply of liquid uniformly distributed over the area to be washed or otherwise treated with the liquid.

With the foregoing and other objects in view, the invention comprises the novel construction, combination and arrangement of parts hereinafter more specifically described and shown in the accompanying drawing, which illustrates one form of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications within the scope of the claims hereunto appended.

To illustrate one form of the invention we will hereafter refer to a rotary filter wherein suction is employed to draw the filtrate through the periphery of a rotating drum, the residue being deposited on the drum and then carried to a washing device including a web of absorbent material saturated with the washing liquid. Suction or pressure may be employed to transmit the washing liquid from the web and through the deposited residue. The saturated web intimately engages, but does not travel with the deposited residue, so there is a frictional wiping contact between the traveling residue and the relatively stationary web. The washed material may be removed from the rotary drum in any suitable manner. However, it is to be understood that the invention is not limited to a filtering apparatus of this kind, except as specified in the claims.

Fig. 1 is a top view of a filtering apparatus provided with a washing device embodying features of this invention.

Fig. 2 is a diagrammatical side elevation of the filtering apparatus, with parts broken away to more clearly show the interior of the apparatus.

Fig. 3 is an enlarged fragmentary section showing portions of the filtering drum, and the absorbent web contacting with material deposited on the periphery of said drum.

Fig. 4 is a fragmentary view of one corner of the apparatus.

Fig. 5 is a section on the line 5—5 in Fig. 4.

Fig. 6 is a fragmentary section illustrating another form of the absorbent web, or mat.

As an illustration of one type of filter to which the invention may be applied, we have diagrammatically shown a conventional vacuum filter including a rotary drum 7 having the usual filter cloth 8 (Fig. 3) at its periphery, said cloth being closely fitted to compartments 9 having perforations 10 for the filtrate which passes through the cloth 8. The compartments 9 and the filter cloth 8 rotate with the drum. Radial suction tubes 11 extend from the compartments 9 to passageways 12 leading to a chamber 13, and a suction pipe 14 extends from said chamber 13 to a receiver 15, the latter having a suction pipe 16, which may communicate with a vacuum pump. We do not deem it necessary to show or describe all of the details of this filtering apparatus, as it is a well known type of vacuum filter, and the invention may be applied to other types of filters.

The rotary filtering drum is arranged horizontally in a receptacle 17 provided with an inlet pipe 18 for the mixture to be filtered. The lower portion of this rotary drum is submerged in the liquid in said receptacle, while the upper portion of said drum lies above the liquid level. The drum is constantly rotated in the direction indicated by arrows in Fig. 2. The suction device draws the filtrate through the filter cloth 8 at the periphery of the drum, while the residual material is deposited on the outer face of said cloth in the form of a more or less plastic cake, shown at 19. The filtrate passes through the compartments 9 and eventually reaches the receiver 15, shown in Fig. 2. The deposited cake of material 19 may be removed in any suitable manner. For example, as shown diagrammatically in Fig. 2, a stationary knife 20 may be located at a descending peripheral portion of the drum, so as to remove said material 19 and deflect it into a trough 21 provided with a screw conveyor 22.

The washing device herein shown comprises spray nozzles 23 located above the drum, and any suitable arrangement of pipes may be employed to conduct the washing liquid to said nozzles. To distribute this liquid, a flexible cover 24 made of any suitable absorbent material, extends over

an upper peripheral portion of the filtering drum, so as to contact with the material 19 deposited on said drum. This absorbent web, or mat, 24 may be a single sheet of cloth, or as shown in Fig. 6, it may consist of several layers of material, such as fabric sheets 25 with absorbent cotton 26 between them. Any suitable flexible, absorbent material may be employed.

As shown in Figures 2 and 5, the lower marginal portion of this absorbent web may be anchored near, but not connected to the rising peripheral portion of the rotating drum 7, so as to permit rotation of the drum independently of said absorbent web. This simple web, or mat, is otherwise free to yieldingly engage the traveling deposit 19 carried by the filtering drum, so that the web will freely adjust itself to irregularities in the surface of said traveling deposit. The frictional contact with the traveling deposit 19 moving away from the anchored lower margin of the flexible web 24 constantly tends to retain said web in the desired operative condition, wherein it intimately contacts with the deposited cake of material 19. This arrangement insures free transmission of the washing liquid to the numerous pores in the traveling cake, at the same time providing a degree of friction which tends to smooth and compact the traveling cake, while wiping the surface of the cake, and distributing the washing liquid over the surface to be washed.

The absorbent web 24 is constantly supplied with washing liquid from the spray nozzles, and the rate of flow may be regulated to maintain the desired saturation of the web. This washing liquid is drawn from the web, through the suction tubes 11, and conducted to the receiver 15 (Fig. 1) which communicates with said tubes.

Prior to this invention, spray nozzles similar to those shown at 23 in Fig. 2 have been employed, without using the absorbent web 24 to distribute the washing liquid. It will be observed that the spray nozzles alone will not uniformly distribute the liquid over the area to be washed, and that in the absence of the web 24, the washing liquid would freely flow downwardly on the surface of the deposited cake 19, requiring the use of excess washing liquid which flows into the mixture in the receptacle 17.

In filtering oil solutions containing solidified wax particles, we have found that an advantage is gained by excluding air from the wax cake before and during the washing operation, and this can be accomplished by anchoring the lower margin of the web 24 at a point near the surface of the liquid in the receptacle 17, as shown in Fig. 2. The wax cake is then well covered by the saturated web, which apparently prevents cracking of the cake, while also tending to prevent the formation of a relatively hard film at the surface of the wax. It will be understood that cracking is undesirable, as the washing liquid would freely flow through the cracks, instead of being uniformly distributed throughout the area to be washed. However, after the cake passes from the saturated web 24 it may receive liquid directly from spray nozzles 23 at the right hand portion of Fig. 2.

In using this device to wash the wax cake deposited on a filter of the type herein shown, any suitable solvent may be sprayed onto the web 24 to wash oil from the wax, and in actual practice, we have found that the present invention substantially increases the yield of oil from the wax, and also provides the various other advantages herein set forth.

It will be observed that all of these advantages are gained in a very simple manner, without resorting to any complex or expensive mechanical devices, and without adding any means for operating the simple web 24 during the washing operation.

However, if desired, the web may be adjustable as shown in Figures 4 and 5 wherein the means for securing the lower margin of said web comprises a roller 27, a metallic strip 28 engaging said margin, and screws detachably securing said strip 28 to the roller 27. A shaft 29 is eccentrically secured to the roller 27 and provided with an operating handle 30 whereby the roller can be adjusted to vary the positions of the web 24. By turning this eccentric roller, the lower portion of the web 24 can be adjusted toward and away from the rotary drum. The roller can be likewise adjusted to wind and unwind the web, thereby varying the locations of the upper margin of the web 24. After the web is adjusted, the adjusting means can be secured in any suitable manner. For example, a pawl 31 (Fig. 4) may be engaged with a ratchet wheel 32 on the shaft 29 to prevent unwinding of the web in response to the pulling action due to friction between the non-traveling web and the traveling cake 19 deposited on the filter.

We claim:

1. A filter provided with a receptacle for the mixture to be filtered, a rotary filtering drum having a lower portion submerged in said mixture and an upper portion above the mixture, said rotary drum having a filtering element at its periphery to receive the mixture in said receptacle, a suction device to draw the filtrate through said filtering element, means for removing the material deposited on said filtering element, said means being located at a descending peripheral portion of said rotary drum, and a washing device comprising a flexible cover made of absorbent material extending over the rising peripheral portion of said rotary drum to contact with the rising material deposited on said filtering element, said absorbent cover having a lower marginal portion located adjacent to the submerged portion of said drum and anchored near, but not connected to, the rising peripheral portion of said rotary drum so as to permit rotation of said drum independently of said absorbent cover, said cover being otherwise free to frictionally contact with and adjust itself to the traveling deposit carried by the rising side portions of said filtering element, and means for delivering washing liquid to said absorbent cover.

2. A filter comprising a receptacle for the mixture to be filtered, a rotary filtering drum having a filtering element at its periphery to receive the mixture in said receptacle, the lower portion of said drum being submerged in said mixture, and a combined washing, smoothing and covering device adapted to frictionally contact with the material deposited on said rotary drum, said combined device including an anchor located adjacent to the level of the mixture in said receptacle and also adjacent to the rising side of said rotary drum, a flexible, absorbent cover having a lower portion secured by said anchor and a free upper portion remote from said anchor, said flexible cover being free in the areas beyond said anchor, so as to rest upon

and frictionally engage the deposited material on the rising side portions of said rotary drum in the area above said anchor, said anchored cover being thus adapted to freely adjust itself to the rising peripheral deposit and then exert a frictional smoothing action on said rising deposit, and means for discharging liquid onto said cover.

3. A filter comprising a receptacle for the mixture to be filtered, a rotary filtering drum having a filtering element at its periphery to receive the mixture in said receptacle, the lower portion of said drum being submerged in said mixture, and a combined washing, smoothing and covering device adapted to frictionally contact with the material deposited on said rotary drum, said combined device including an anchor located adjacent to the level of the mixture in said receptacle and also adjacent to the rising side of said rotary drum, a flexible, absorbent cover having a lower portion secured by said anchor and an upper portion near the top of said drum, said flexible cover being free in the areas beyond said anchor, so as to rest upon and frictionally engage the deposited material on the rising side portions of said rotary drum in the area extending approximately from the submerged portion of said drum to the top of said rising side portions, said drum being free to rotate independently of said anchor, so as to tension the anchored frictional cover while permitting said anchored cover to freely adjust itself to the rising peripheral deposit and then exert a smoothing action on said rising deposit, and means for discharging liquid onto said cover at points substantially higher than said anchor, so as to permit downward flow of liquid on the cover in the areas above said anchor.

4. In a filter for wax-containing mixtures, a receptacle for the mixture to be filtered, a rotary filtering drum having a filtering element at its periphery to receive the mixture in said receptacle, said drum being approximately horizontal and its lower portion being submerged in the mixture to be filtered, a suction device associated with said drum to draw the filtrate through said filtering element, a cover arranged to exclude air from rising portions of the wax deposit above the submerged portion of the drum, said cover comprising a web of absorbent material extending over the rising side portion of said drum, so as to contact with the wax deposit on said rising side of the drum, a holder secured to the lower portion of said web to permit rotation of the drum independently of said web, and means for delivering washing liquid to said web.

5. A filter provided with a rotary filtering drum, and a washing device including a web of absorbent material extending over a portion of the periphery of the drum to contact with the material deposited on said peripheral portion, means for delivering liquid to said web and an adjustable anchoring device secured to said web, said adjustable device being movable to vary the location of said web with relation to said rotary drum, and said web being otherwise free to adjust itself to the material deposited on said peripheral portion of the drum.

6. A filter provided with a rotary filtering drum, and a washing device including a web of absorbent material extending over a portion of the periphery of the drum to contact with the material deposited on said peripheral portion, means for delivering liquid to said web and an adjustable anchoring device secured to the lower portion of said web, said adjustable device being movable toward and away from said drum and also movable to vary the location of the upper portion of said web, and the said web being otherwise free to adjust itself to the traveling deposit on the rising side portion of said drum.

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