Sept. 27, 1966 S. D. FRITZ 3,275,154

COMB FOR STRING TYPE VACUUM FILTER

Filed July 19, 1965

FIG. 1

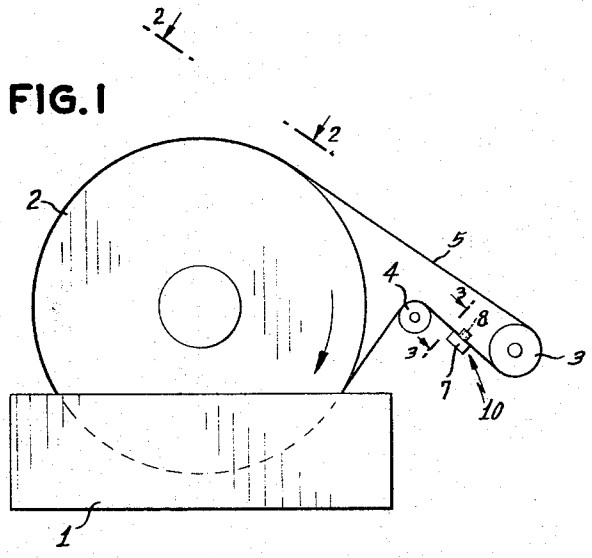


FIG. 2

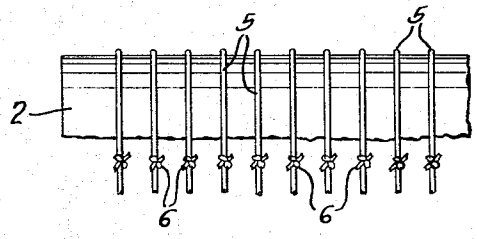
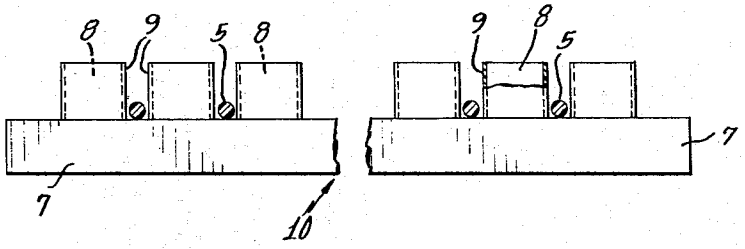


FIG. 3



INVENTOR.
Samuel D. Fritz
BY
Samuel Kahn
ATTORNEY

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COMB FOR STRING TYPE VACUUM FILTER

Samuel D. Fritz, New York, N.Y., assignor to Engelhard Industries, Inc., Newark, N.J., a corporation of Delaware

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The invention relates to a continuous rotary drum vacuum filter and more particularly to a comb for aligning cake discharge strings employed in the string type rotary vacuum filter.

Continuous rotary vacuum filters consist of a cloth covered drum revolving in a tank filled with a slurry to be filtered. Such a drum per se is illustrated and described in U.S. Patent 2,371,417. The surface of such a drum is divided into shallow compartments which are connected by pipelines and automatic valves so that vacuum can be applied to each compartment individually. As the drum rotates in contact with the slurry in the tank, each compartment is subject to the vacuum which causes the mother liquor to flow through the filter cloth into the internal piping while solids are stopped on the outside of the cloth to form a cake. As the drum rotates, each compartment goes through the same cycle of operation of filtering, de-watering and subsequently discharging the cake. In the string type rotary vacuum filters, a plurality of laterally spaced endless strings, spaced axially of the drum, are positioned over the surface of the filter cloth and also over the surface of a string discharge roll spaced from and in parallel relationship with the drum. Since the cake is built up over the endless strings, the strings cause the cake to be separated from the drum as they travel in the direction of the discharge roll, and such cake is carried by the strings to the discharge roll where the cake is freed from the strings and deposited in a suitable container.

In order to maintain the plurality of endless strings in lateral alignment, an elongated comb, in parallel relationship with the drum and roll, is positioned to receive the strings so that the strings may be maintained in lateral alignment as they continue to pass over the drum. Each endless string is made continuous by tying the ends into a knot. As the strings continue to pass through the comb, they become somewhat abrasive to the comb finger, and they wear grooves into these comb fingers so that subsequently the string knots are caught in the grooves and the strings break. Because of string breakage, the apparatus has to be re-strung with substitute endless strings, which becomes an expensive and time-consuming problem.

It has now been discovered that the life of the filter springs can be greatly lengthened by the provision of an improved aligning comb adapted to operate in combination with the filter discharge strings. It has herein been discovered that there is an improvement provided with the comb is composed of a material compatible with the material of the filter strings whereby the comb becomes more resistant to the abrasive action of the strings.

It is an object of the invention to provide a comb for string type vacuum filters which comprises surfaces reristant to the abrasive action of the strings.

It is another object of the invention to provide the combination of strings and comb composed of materials, which in combination with each other, extend the useful life of the filter strings.

Other objects and advantages of the invention will become apparent from the description hereinafter following and the drawings forming a part hereof, in which:

FIGURE 1 illustrates a side view of a simplified rotary string type vacuum filter apparatus,

FIGURE 2 illustrates a top view of a string arrangement along lines 2—2 of FIGURE 1, and

FIGURE 3 illustrates a side view of a string aligning comb along lines 3—3 of FIGURE 1.

Referring to the figures, the string type vacuum rotary filter herein contemplated comprises a slurry tank **1** with a filter drum **2** rotatably mounted above the tank with a portion thereof extending into the tank. A discharge roll **3** is suitably mounted in spaced parallel relationship with the drum **2**, and a guide roll **4** is suitably mounted in parallel relationship with and between the drum **2** and discharge roll **3**. A plurality of parallel endless strings **5** composed of a synthetic resin material, e.g. nylon, are mounted to pass over both the drum **2** and discharge roll **3**. The strings are spaced from each other axially of the drum and discharge roll. The strings are rendered endless by having the end portions thereof tied into knots **6** as illustrated by FIGURES 1 and 2.

The guide roll **4** is adjustable to maintain the strings in taut condition as they pass thereover prior to engaging the downward side of the drum in proper laterally spaced relationship. In order to assure a constant lateral spacing between the strings **5**, there is provided a string aligning comb **10** co-extensive with bank of strings and parallel with the drum and rolls. The comb comprises an elongated body portion **7** with a plurality of fingers **8** spaced laterally of each other longitudinally of the body portion and extending a common direction. Combs of this type which are known per se are usually composed of metal, e.g., aluminum metal or stainless steel. However, when the strings are made of a resin material such as nylon, the strings are abrasive to the comb fingers **8** and tend to wear grooves into the fingers which ultimately wear to a depth which snags the knots **6** resulting in string breakage necessitating restringing. In order to alleviate this condition, the fingers in accordance with the invention are provided with synthetic resin sleeves **9** which are compatible with the resin strings in that they are resistant to grooving by string abrasive action. In such case, the grooving of the fingers is substantially eliminated thereby preventing the knots **6** from snagging with a consequent prolonged string life. Such resin sleeves covering the fingers are superior to metal fingers for contacting the resin strings in part because of relatively much lower friction factors. Especially favorable resin sleeves are made of nylon or Teflon tubing. The sleeves are fitted snugly over fingers, which are suitably of square or circular cross section.

A ¼" aluminum plate had served as the comb for conventional filter operation with grooves between the fingers so positioned that the continuous nylon strings were situated ⅝" apart. String breakage due to wearing grooves in the sides of the comb fingers as has been discussed occurred as frequently as once a week. Usually it was possible to replace a broken string and continue filtration with only brief shut down of the filter; however, filtration time was lost and assignment of man power to watch for broken strings was necessary.

A composite comb was made of Micarta, a laminated glass-reinforced phenol formaldehyde thermal setting resin as a support. The Micarta was in the form of a sheet 13/32" thick. Square fingers 13/32" in both cross section dimensions on one side of the Micarta sheet were separated by grooves or channels for nylon strings, the grooves being 7/32" across and the strings about 3/32" in diameter. 7/16" I.D. nylon tubing of about 1/32" wall was snuggly fitted over each finger. The filter was operated with this a composite comb for about a year's time without string breakage. It was decided to replace the Micarta plastic comb with a stainless steel comb with fingers and grooved spaces of the same size. The stain-

less steel comb comprised a hollow pipe positioned horizontally with stainless steel cylindrical rods directed upwardly as the fingers. Nylon tubes are placed on the stainless steel fingers and nylon strings are used as before with long favorable operation without string breakage. The improvement in operation due to use of synthetic resin sleeves as aforesaid is clearly seen.

Various modifications of the invention are contemplated within the scope of the appended claims.

What is claimed is:

1. In a continuous rotary drum filter of the type comprising in spaced parallel relationship a vacuum drum and a discharge roll and having a plurality of parallel endless strings composed of a synthetic resin material passing over the drum and roll, the strings being spaced from each other axially of and passing over the drum and roll, a string aligning comb having an elongated body portion with a plurality of fingers spaced laterally of each other longitudinally of the body portion and extending in a common direction, sleeve members coaxially mounted on the fingers, the sleeve members being

composed of a synthetic resin material resistant to abrasion by said strings, the body portion and fingers being composed of a stiff and rigid material different from that of the sleeve members and being capable of withstanding relatively high temperature operating conditions, the comb being positioned in parallel relationship with the discharge roll and positioned to receive between each pair of adjacent sleeves an endless string passing over the discharge roll.

2. In a continuous rotary drum filter according to claim 1, the strings being composed of nylon and the sleeve members being composed of nylon.

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REUBEN FRIEDMAN, *Primary Examiner.*

SAMIH N. ZAHARNA, *Examiner.*