Oct. 18, 1966

E. A. STOKES

3,279,615

LIQUID FILTER ELEMENTS

Filed Oct. 8, 1963

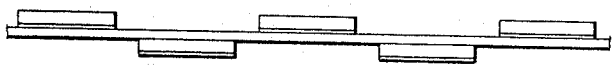


FIG.1

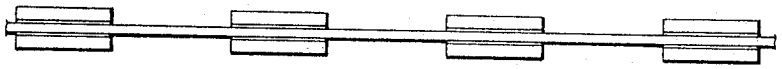


FIG.2

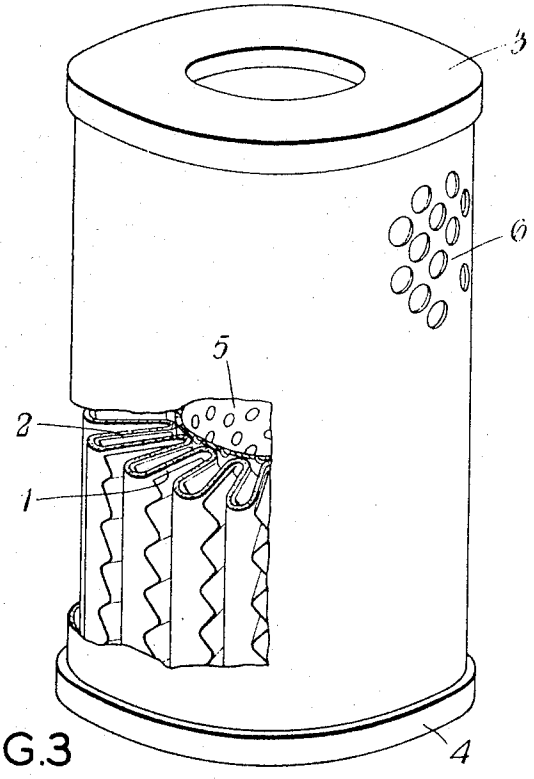


FIG.3

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LIQUID FILTER ELEMENTS

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This invention concerns improvements in liquid filters, such as are used for the filtration of lubricating oil.

There is an increasing demand for liquid filters which are capable of withstanding large pressure drops between their dirty and clean sides and the present invention has among its objects the provision of liquid filters employing standard material but of great strength.

According to the invention I provide a liquid or oil filter element comprised by a layer of standard filter material (felt, impregnated paper and the like) folded in zig-zag manner into deep pleats, a stiffener element of suitable material giving access of liquid to the face of the filter material being bonded to one side face of each pleat.

The pleated element may be used in the form of a flat panel bonded into a frame but it is preferred to form it into a cylinder with the pleats tightly pressed together and held between suitable end caps.

A corrugated cardboard or stiffened paper or like material with relatively narrow crinkled pleats is found to be excellent in use as a spacer/stiffener. The material known as "Carbion" made by Spicers, Ltd., is among the best so far tried in practice.

An element may be made up very simply from a sheet of felt or the like having one series of strips of the chosen stiffening material bonded to one of its faces upon areas spaced from each other by approximately the width and thickness of one strip and a second series of strips bonded to its opposite face upon intervening areas. The finished sheet has a series of stiffened areas separated by lines of weakness and is easily folded in zig-zag fashion so that the pleats formed each include a stiffener.

An element may be similarly made up from a sheet of felt or the like having strips of stiffening material bonded to both faces over areas separated by blank areas approximately equal in width to the width and thickness of one strip. When such a sheet is folded in zig-zag fashion the strips similarly lie within each formed pleat and are bonded to one side face thereof.

The above and other parts of the invention are embodied in one preferred form of filter element which will now be described as an example with reference to the accompanying drawings in which:

FIG. 1 shows an end view of one form of bonded sheet material ready for folding.

FIG. 2 shows an end view of an alternative form of bonded sheet.

FIG. 3 shows a cut-away perspective view of a completed filter.

Filtering material of the form shown in either FIG. 1 or FIG. 2 is formed into deep pleats spaced by stiffening strips by folding in zig-zag fashion and is then formed

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into a cylinder by bonding the end pleats of a sheet together with the several pleats pressed tightly together.

In FIG. 3 there is shown a filter of approximately one foot height which has pleats about two inches deep formed into a cylinder of some six inches diameter. The pleats are tightly compacted one against the other at the inside circumference and are spaced by little more than the thickness of the corrugated spacer strips **2** (whose corrugations are transverse to the pleat folds) at the outside circumference.

Dished end caps **3** and **4** and internal and external foraminous metal formers **5** and **6** are bonded by suitable adhesive to each other and to the ends of the pleats.

The completed filter element is of exceptionally sturdy construction, does not involve excessive back pressures and can withstand a pressure difference across the filtering medium much greater than can a conventionally formed element.

It will be understood that the invention is not restricted to the details of the specific embodiment described which may be varied without departing from the scope of the following claims.

I claim:

1. A filter comprising a coaxial pair of inner and outer foraminous metal cylinders disposed one within the other, a sheet of filter material having deep pleats formed by folding and bent into a cylinder disposed between said pair of metal cylinders with the fold lines parallel to the common axis of and along the metal cylinders, a plurality of stiffener strips disposed parallel to the fold lines of said pleats and having corrugations transverse to the pleat folds, one stiffener strip being bonded to an exterior face of each pleat and another stiffener strip being bonded to an interior face of the same pleat and both serving to space the pleats, and a pair of dished annular caps secured to the ends of both of the metal cylinders to enclose the space therebetween.

2. A filter according to claim **1** wherein said end caps are bonded to both said metal cylinders and to the ends of the cylinder formed of filter material.

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