

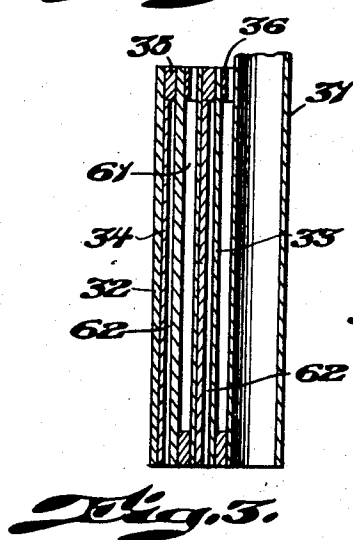
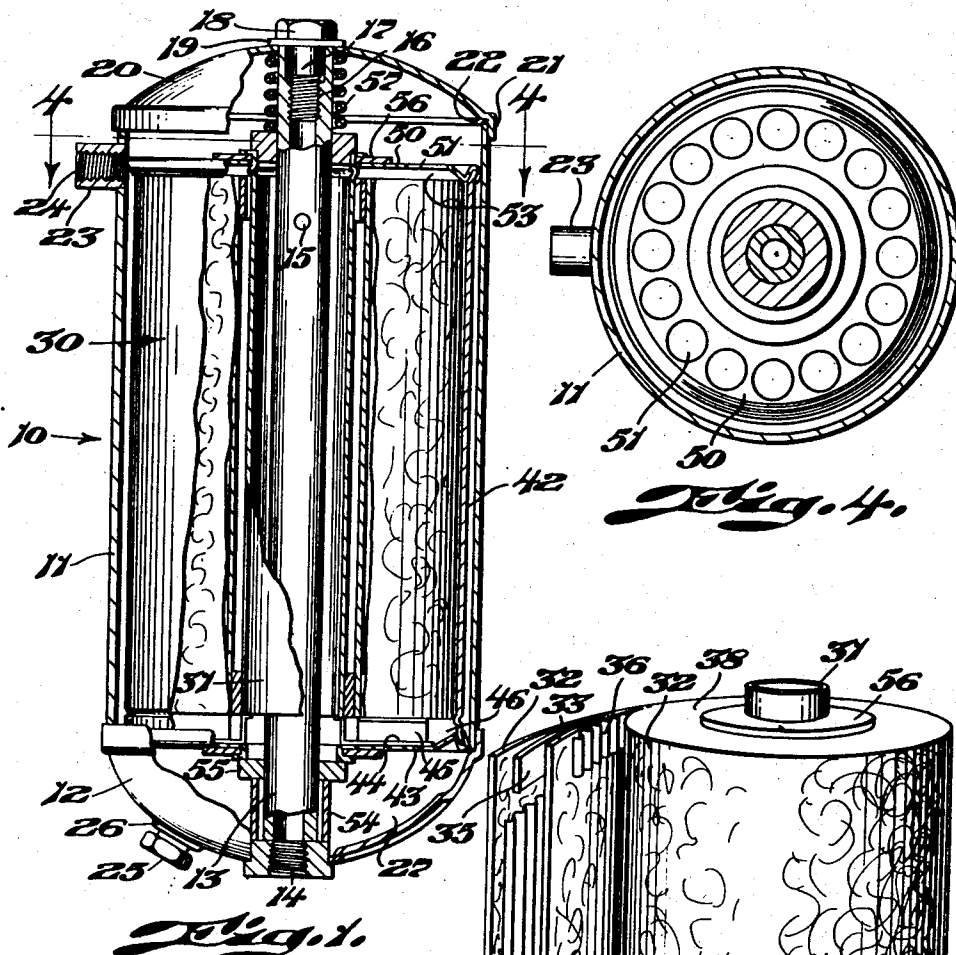
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FILTER CARTRIDGE

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FILTER CARTRIDGE

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3 Claims. (Cl. 210-169)

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This invention is a continuation in part of my application Ser. No. 37,675, dated July 8, 1948, now abandoned, and relates to a filter for fluids and is concerned more particularly with the element through which the fluid passes.

In the use of filters of this general type in which there are cells provided for collecting contaminant which is filtered from the fluid, various means have been utilized in the construction of the filter for the formation of cells, usually resulting in the cutting of a multiplicity of separate filter webs and spacers in appropriate shapes to be built-up such as by stacking one upon the other to provide a filter of generally rectangular or cylindrical overall construction for the use which they are to perform.

One of the objects of this invention is to provide a filter which will be of simpler construction and one which may be more easily and simply formed.

Another object of this invention is to provide a construction of paper in which there will be a minimum amount of cutting of the paper in its formation.

Another object of this invention is to provide a construction from web-like material in which there will be a minimum of waste of the material.

Another object of the invention is to provide a construction in which there will be a maximum of usable area of filter material for the weight of material used.

Another object of the invention is to provide a maximum filtering surface within a cylindrical unit and yet a structure which will be of strong construction and withstand the pressures to which the same may be subjected.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a sectional view showing different parts broken away for the better illustration of the construction of the filter element;

Fig. 2 is a perspective view showing the filter element partially uncoiled for better illustrating its construction;

Fig. 3 is a sectional diagrammatic view illustrating the flow line of the filtrate through the element;

Fig. 4 is a sectional view on line 4-4 of Fig. 1;

In proceeding with this invention, I spirally coil two generally parallel webs of filtering material such as paper. Means are provided to space each convolution from the previous con-

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volution as the pair of webs are coiled, and means are also provided between the webs prior to coiling so as to space the pair apart. Also, as this coil occurs there is a strip provided at one edge of the coil to seal the spacer between the convolution and there is also provided at the opposite edge of the coil a strip to seal the space between the webs.

Usually this coiling occurs about a tubular core which extends beyond the ends of the coil. Means may also be utilized for engaging one or both ends of the coil for providing a space between the ends of the coil and the end walls of the shell. Openings in the shell are provided to lead into the space at one end of the shell while a space is provided for the fluid to pass from the chamber at the other end of the shell into a filtrate discharge conduit. This shell serves as a cartridge which may be inserted into the filter case for receiving fluid in the case and directing it to a discharge therefrom.

With reference to the drawings, 10 designates a filter case having a cylindrical side wall 11 with a generally bulbous bottom wall 12 from which there extends upwardly a center tube 13 having an internally threaded connection 14 for a drain conduit to be attached thereto. This center tube 13 has openings into it at 15 so that when liquid gets to the level of the opening 15 it will pass into and down through the center tube 13. The upper end of this center tube is internally threaded as at 16 to receive a screw 17 which is headed as at 18 to engage a washer 19 and hold the cover 20 onto the cylindrical casing 11. This cover is flanged as at 21 and receives a gasket 22 between the top of the cover and the casing. A boss 23 extends outwardly from the cylindrical wall 11 of the casing and is internally threaded as at 24 to provide an inlet opening into the casing. A drain plug 25 is threaded into an internally threaded boss 26 for draining such contaminant material as may settle into the sump 27 formed by the bulbous bottom wall of the casing.

A filter element 30 is located within the casing and is in the form of a cylindrical cartridge which may be easily positioned in the casing when the cover 20 is removed, or removed therefrom for replacement as the same collects contaminant from the fluid to be filtered.

This element 30 consists essentially of a tubular core 31 about which there is spirally coiled a pair of webs of filter material 32 and 33 (see Fig. 2), such as paper or paper treated with a chemical. These webs are spaced from each other by

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some sort of a roughened piece of web material 34 which may conveniently be corrugated sheet aluminum which will serve to permit fluid or liquid to pass axially of the coil between the surfaces of the filter material 32 and 33. At one end 38 of the coil and sandwiched between the margins of the webs 32 and 33 there is a sealing strip 35 so that as the webs are coiled the strip 35 will seal between the webs 32 and 33 and will prevent the passage of fluid into or from this end of the cell formed between the strips 32 and 33.

As the webs 32 and 33 are coiled, a strip 36, having a corrugated or roughened surface such as serrated or corrugated aluminum and of a narrow width, is located adjacent the end 38 of the coil of webs so as to space the edge of the web 33 from the previous convolution of web 32 and provide a cell between the convolutions of the pairs of webs as they are coiled. At the opposite end 39 of the coil, a sealing strip 40 is sandwiched between the convolutions of the parts of webs 32 and 33 as they are coiled so as to provide a seal between the web 33 and the previous convolution of the web 32. The sealing strips 35 and 40 may be of soft paper or cardboard and secured in place by tightly rolling to form a seal, or they may be glued along their surfaces or at a portion of their surfaces to tack them in place as the webs are coiled. The core 31 extends beyond the ends of the coil and will usually be formed of some sort of sheet metal. The spacing is omitted from the outer convolution of the coil so that a soft outer surface is provided to fit the shell tightly and seal the ends of both spaces between webs.

The element as above described is positioned within a cylindrical shell 42 having a bottom end wall 43 between which and the coil there is a spacer positioned comprising a plate 44 with fins 45 extending radially outwardly and which may be of any number so as to space the end 39 of the coiled webs from the bottom wall and provide a collecting chamber 46 for fluid, which collecting chamber will communicate with the center of the core 31 at the end thereof. The coil of web material will fit tightly within the shell 42.

The opposite end 38 of the coil of webs is spaced from a top wall 50 and in cases where the cartridge is to remain substantially vertical with the inlet of the cartridge tending to force the coil downwardly, no means need be provided for spacing the cartridge from this end wall, although in some cases such spacing means may be desirable. This end wall is perforated as at 51 so that fluid to be filtered may enter this shell freely into the space chamber 53 provided at the upper end for this fluid. This shell thus provided has an opening through it and will be positioned within the casing 10. It will be spaced from the bottom wall by means of a stool or spacer 54 upon which there rests a soft gasket 55 to engage the bottom wall 43, while at the upper end there is a gasket 56 to engage the top wall 50. A spring 57 will force this gasket and the cartridge 30 downwardly to provide a good seal between the cartridge and the center tube 13 which extends through it.

In operation, the fluid to be filtered will enter the inlet at 24, fill the space between the cartridge 30 and the casing 10. Such heavy con-

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taminants as may be in the fluid will settle out in the sump 27. Some pressure is provided upon the fluid to be filtered and it will enter the openings 51, into the chamber 53, and then pass into the cell 61 formed by means of a spacer 36 and pass through the webs 32 and 33 into the cell 62 formed between the webs 32 and 33, leaving a deposit in the spiral cell 61 of the contaminant while the filtrate fluid passes downwardly in the spiral cell 62 into the chamber 46 thence into the hollow core 31 to rise in this hollow core to the level of the opening 15 and thence downwardly in the center tube 13 and outwardly from the filter case.

By this arrangement, a large amount of filter surface is provided upon which contaminant may collect and a very fast flowing filtering means is provided in which there is little restriction to the filtrate. As soon as the contaminant space is filled with contaminant, the cartridge, including the shell, will be removed and replaced by a fresh one. As a large amount of contaminant space is provided, the change may be infrequent.

I claim:

1. A filter element comprising a pair of spirally coiled webs of filter material spaced from each other providing a first spiral space and with the convolutions spaced providing a second spiral space, an impervious strip between the marginal edges of said webs throughout their length at one end of the coil to block the passage of fluid to or from the first said spiral space, and an impervious strip between the marginal edges of said webs throughout their lengths at the other end of the coil to block the passage of fluid to or from the second said spiral space, a corrugated sheet of material between said webs in the first said space throughout the major portion of said space and a corrugated narrow strip in the second said space between said webs and at the marginal edges thereof maintaining said spaced relation, whereby fluid to be filtered may enter the second spiral space at one end of the coil, pass through the filter web into the first space and be discharged therefrom at the other end of the coil.

2. A filter element as set forth in claim 1 wherein said corrugated sheet is of metal.

3. A filter element as set forth in claim 1 wherein said corrugated sheet is of aluminum.

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