

[11] 3,624,779

[54] FILTER UNIT
1 Claim, 21 Drawing Figs.

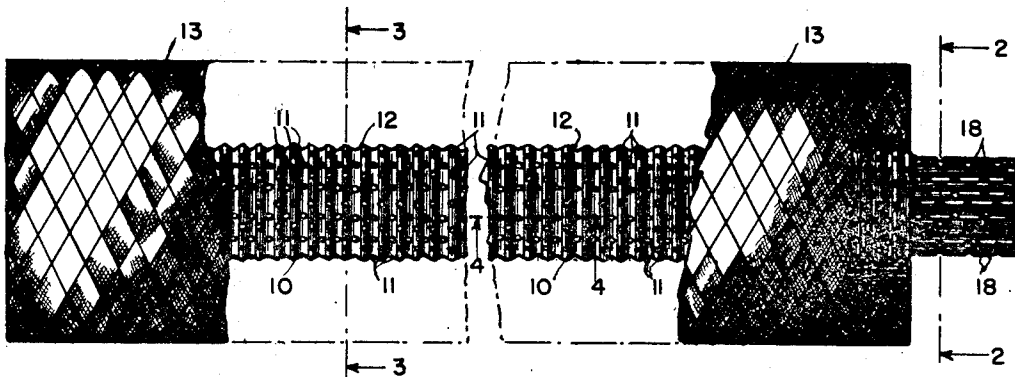
[52] U.S. Cl...... **210/457,**
210/459, 210/497.1

[51] Int. Cl...... **B01d 23/06**

[50] Field of Search..... 210/497.1,
232, 494, 457, 459

Primary Examiner—Reuben Friedman
Assistant Examiner—T. A. Granger
Attorneys—J. Wesley Everett and George L. Brehm

ABSTRACT: A fluid filter unit having a rigid perforated core and a filter covering extending over a substantial area thereof the core having a projecting end portion adapted to fit into a supporting means, or ferrule mounted in a header in a filter housing or casing, in which the header is provided with one or more openings therethrough, the projecting end portion of the core being made adaptable to the diameter of the supporting means associated with the said header openings, which vary in diameter by rendering the projecting end portion of the core compressible by corrugating, slotting, or otherwise equivalently fashioning the same to accomplish this result.



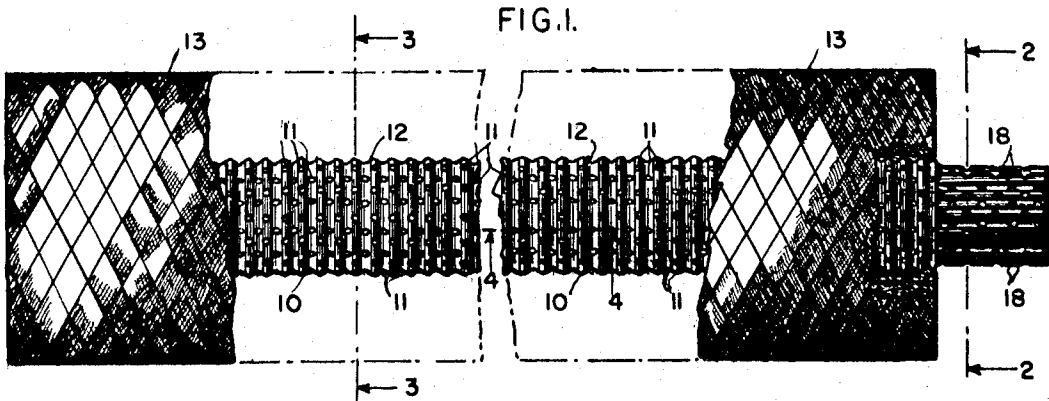


FIG. 2.

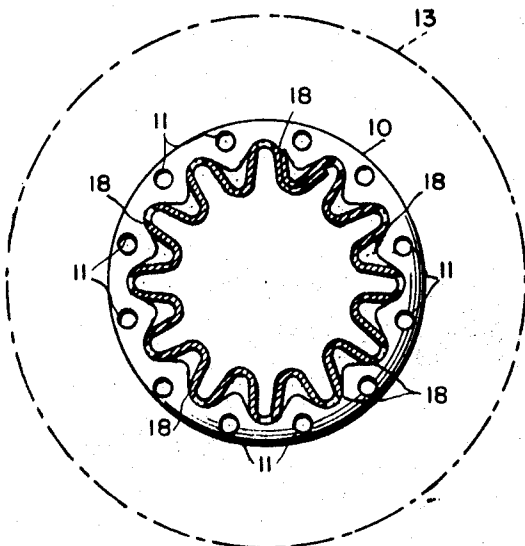


FIG. 3.

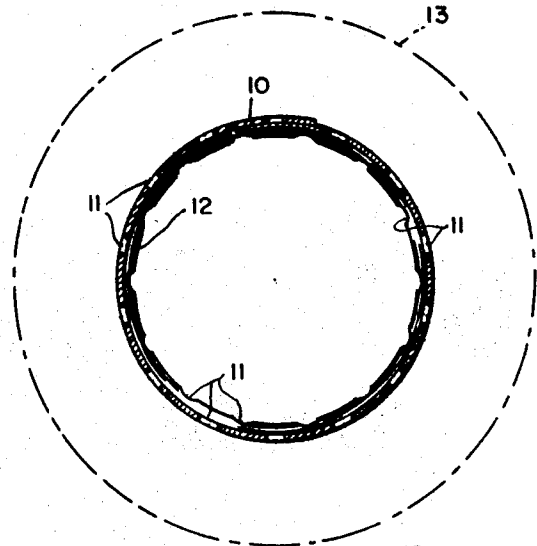


FIG. 5.

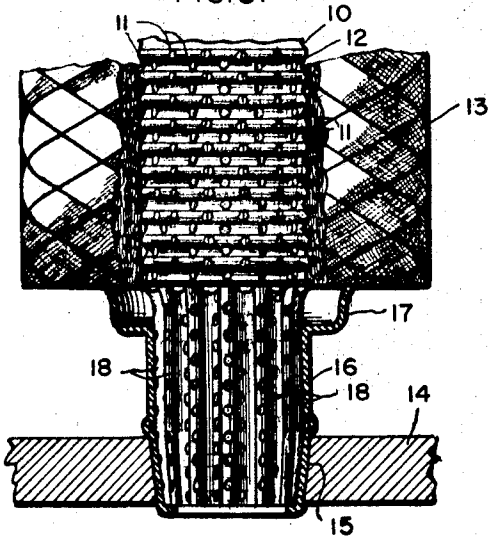
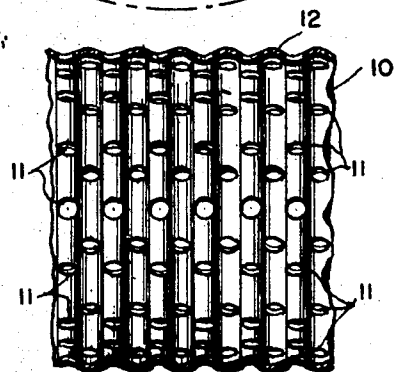


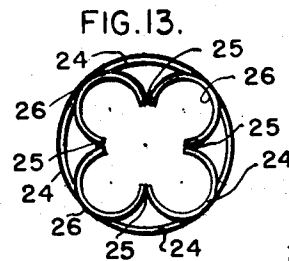
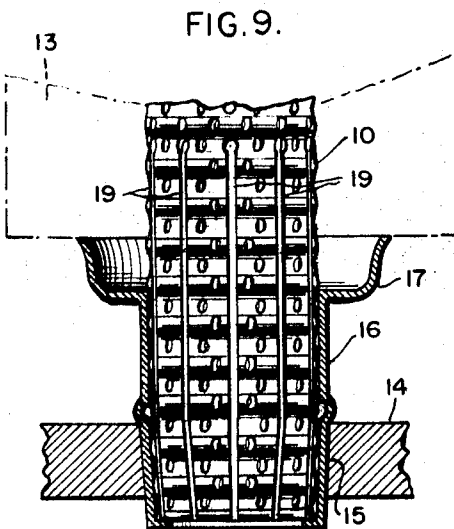
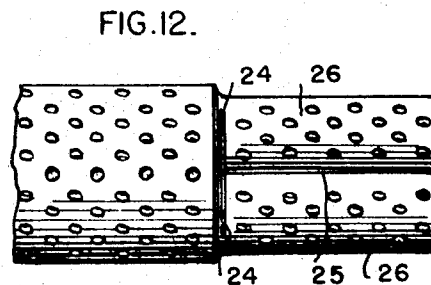
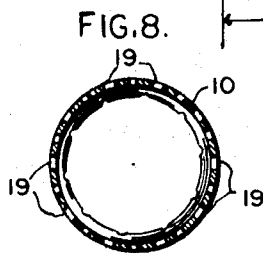
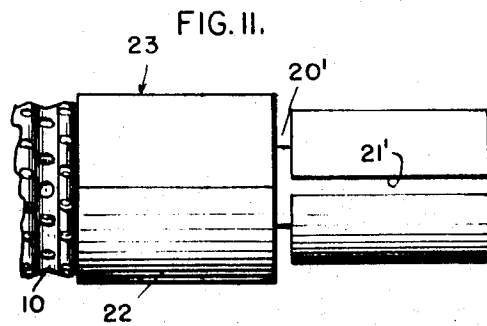
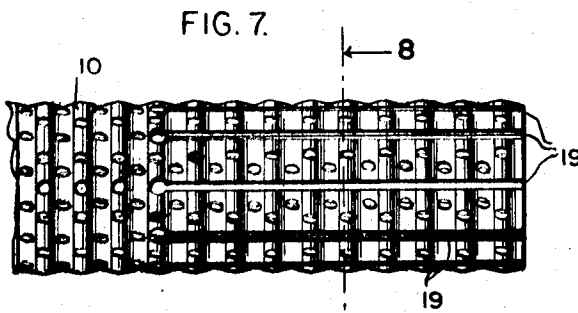
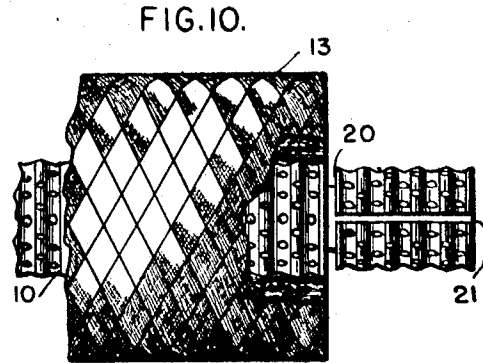
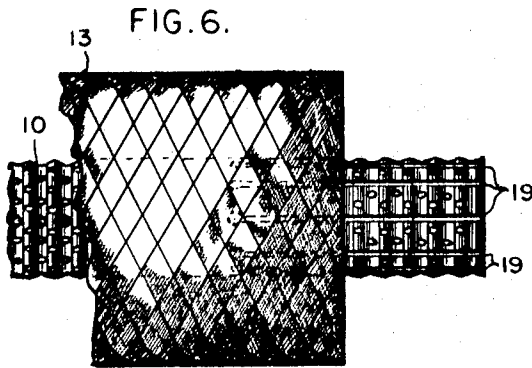
FIG. 4.



INVENTOR

CHARLES A. MILLER, JR.
JOSEPH B. MASASCHI

BY *Robert W. Miller, Jr.* ROBERT W. MILLER, JR. ATT.
George C. Brehm AGENT.



INVENTOR

CHARLES A. MILLER, JR.

JOSEPH B. MASASCHI

BY

ROBERT W. MILLER, JR.

James H. Brehm ATT. AGENT.

FIG. 14.

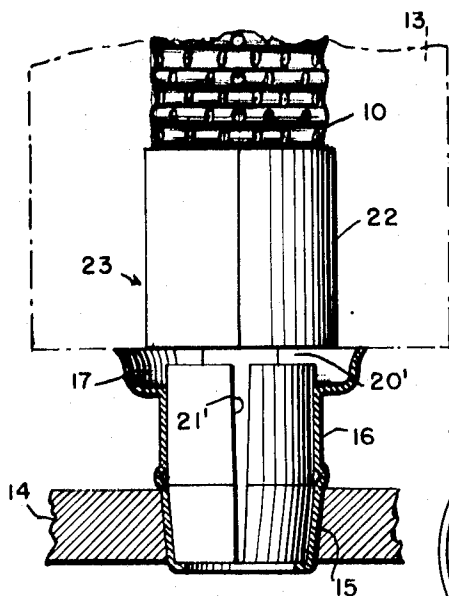


FIG. 15.

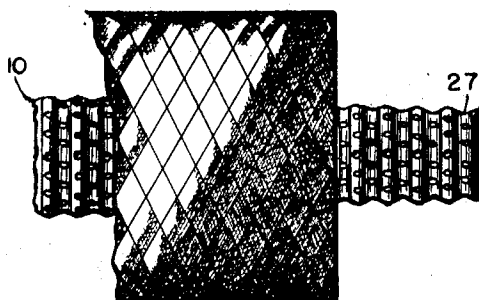


FIG. 16.

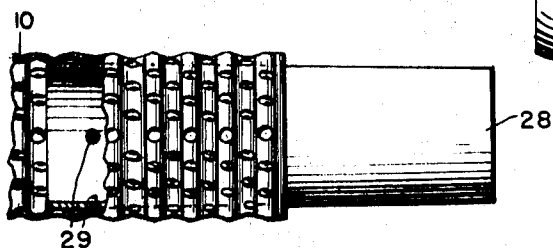


FIG. 17.

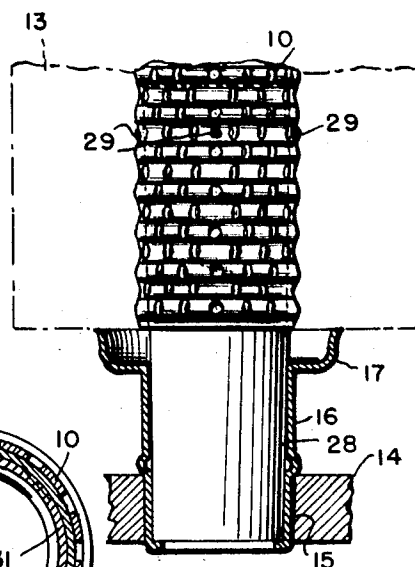


FIG. 18.

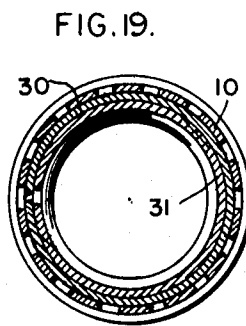


FIG. 19.

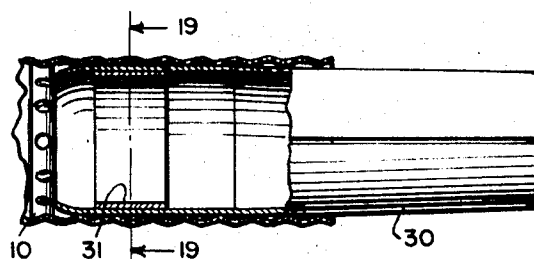


FIG. 20.

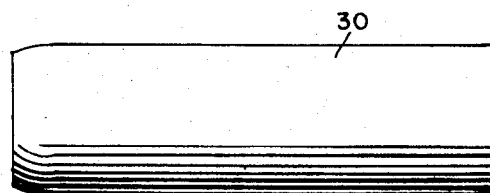
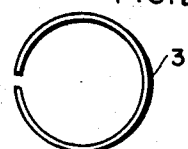


FIG. 21.



INVENTOR

CHARLES A. MILLER, JR.
JOSEPH B. MASASCHI

BY ROBERT W. MILLER, JR.

George C. Schmitt ATT. AGENT.

FILTER UNIT

This is a continuation of application, Ser. No. 743,485, filed July 9, 1968, now abandoned.

This invention relates in general to tubular-type filter units having a perforated core and a cover of filtering material. One or more of these filter units are normally mounted in a casing, or housing. The casing being provided with a divider or header plate, dividing the casing in at least two compartments in which, the fluid in one compartment to be filtered, flows from without the tubular filter or filters, as the case may be, inwardly to the center thereof and out through the center to a companion compartment of the casing, or conveyed away in some suitable manner.

In filters of this type each tubular filter unit takes the form of a perforated tubular core of rigid material, such as metal, plastic, etc., having a substantial portion of its area covered with a filtered material which may be in the form of a helically or spirally wound strand, such as yarn. However, the filter cover may take any suitable form, such as being molded, stamped from sheet material, etc.

To ensure flow of the fluid through the filter unit from without the unit through the filter material and into the perforated core, one end of the unit is closed and the other end mounted in the opening in the header within the casing with inlet to the casing on that side of the header plate containing the unit, and the outlet on the opposite side of the header in communication with the core of the unit.

The mounting of the unit on the header shown as a divider plate dividing the casing must provide a seal to avoid leakage of unfiltered fluid into the outlet side of the filter and in addition must provide a good mechanical connection of the filter unit in the header plate. As to the latter, it is frequently found that difficulty is experienced in the mounting of the filter units in the header plate as variations in size occur in the filter supporting elements in the header plate. It is with this problem and its solution to which this invention specifically relates. Applicant has found that many of the problems in this regard may be obviated by providing the projecting end of the core of the unit with some means to adapt the same to slight variations in size of the supporting elements. Such means include slotting the projecting end to enable it to be contracted or, corrugating the same for the same purpose, or other equivalent means.

It is therefore one object of this invention to provide a filter unit which is adapted to fit a range of sizes of supporting means associated with the openings in the header.

It is another object to provide such a unit with a standard or fixed size core but still adapted to different sizes of supporting elements.

It is still another object to provide a unit which offers the stated advantages but which is simple in structure and economical to manufacture.

The above and other objects and advantages will become more apparent as this description proceeds and reference is had to the accompanying drawings forming a part of this specification, in which like parts are indicated by like reference characters in the several views.

In said drawings:

FIG. 1 is a side elevation of one form of filter unit partly broken away showing one form of the invention;

FIG. 2 is a section of line 2—2 of FIG. 1;

FIG. 3 is a section on line 3—3 of FIG. 1;

FIG. 4 is a fragmentary detail sectional view of a portion of the core member, on line 4—4 of FIG. 1;

FIG. 5 is a fragmentary sectional view of one end of a filter unit mounted in a supporting receptacle or thimble and header plate;

FIG. 6 is a fragmentary side elevation of a modified form of filter unit;

FIG. 7 is a view of the core element of the form shown in FIG. 6;

FIG. 8 is a section on line 8—8 of FIG. 7;

FIG. 9 is a partial section of the modification of FIG. 6 mounted in a supporting receptacle or thimble and header plate;

FIG. 10 is a fragmentary side elevation of another modification;

FIG. 11 is a fragmentary side elevation of a core element of still another modification;

FIG. 12 is a side elevation of the end portion of the core element incorporating another modification;

FIG. 13 is an end view of the modification shown in FIG. 12;

FIG. 14 is a view of the form shown in FIG. 11 mounted in a mounting thimble and header plate;

FIG. 15 is a fragmentary side elevation of still another form;

FIG. 16 is a fragmentary side elevation of a core member incorporating yet another modification;

FIG. 17 shows the modification of FIG. 16 mounted in a supporting receptacle or thimble and header plate;

FIG. 18 is a sectional view of another form of core;

FIG. 19 is a section on line 19—19 of FIG. 18;

FIG. 20 is side elevation of an adapter sleeve similar to that used in the form shown in FIG. 18; and

FIG. 21 is an end view of the expansion spring used in the modified form shown in FIG. 20.

Referring more specifically to the drawings, a filter unit of the type to which this invention generally relates is shown in FIG. 1 and comprises a core 10 of rigid material such as metal provided with perforations 11 over its entire surface. This core is here shown as corrugated circumferentially at 12 to increase its rigidity but this is not necessary in many instances.

The core 10 is covered with some form of filter material, in this instance with a multilayered helical or spiral winding of heavy napped yarn 13 through which the fluid to be filtered is forced to flow.

One or more of the filter units just described is mounted in a casing to make up the complete filter. The casing is internally provided with a header or divider plate, a fragmentary portion of which is shown, for example, at 14 in FIG. 5 an opening 15 is provided in the header plate for each filter unit. A thimble-type support 16 is shown located in each opening and receives the projecting end portion of the core of the unit. The thimble is flared outwardly at one end and is formed with a flange 17 adapted to abut the end face of the covering of filter material to form a seal therewith and prevent leakage of unfiltered fluid past the filter material and into the core of the unit.

While the support and sealing of the filter unit is shown and described as a thimble 16, other suitable means may be employed such as forming the header itself to provide a support and seal for the filter unit. It is also true that the casing may be of any suitable form including casings adapted to accommodate either singular or multiple filter units.

In order to obviate the necessity for accurately dimensioning the size of the core in each unit to fit into the supporting element (in filters of different makes the diameters of supports have been found to vary considerably) it has been found advantageous to make the core extensions that must be received in the supports or thimbles capable of fitting a number of sizes, within limits, and it is the means providing this capability to which this invention particularly pertains.

In the form shown in FIGS. 1 to 5, the core 10 is provided at its end projecting beyond the covering of filter material with longitudinal corrugations 18 best shown in FIG. 2, which allow for contraction of the end portion if it is found necessary when fitting the same in the support or thimble 16. It is also evident that such corrugations will allow a single size filter unit to fit quite a number of different size supports.

Means other than that shown in FIGS. 1 to 5 may be employed to accomplish the same result, for example, in FIGS. 6, 7, 8 and 9 another form is illustrated. In this modification the end of the rigid core 10 is provided with a plurality of longitudinal cuts or kerfs 19 which render the core extension contractable and thus adapt it to supports or thimbles which may vary in size.

FIG. 10 illustrates still another modification in which the core extension is slit partly around as shown at 20 and longitudinally at 21 forming a partially severed collar portion on the core extension which is readily contractable.

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The form shown in FIG. 10 may be varied if found desirable by making the core extension as a separate member 22 (FIGS. 11 and 14) attached to the core 10. Split collar portion 23 of this separate member in this instance is fitted over the core 10 and may be permanently attached thereto by spot welding or it may be held in place by the filter covering placed thereover while transverse slit 20' and longitudinal slit 21' then forms the partially severed contractable collar.

FIGS. 12 and 13 show another form which is a slight variation of the form shown in FIGS. 1 to 5. Here the core extension is provided with four equally spaced circumferential slits 24 with portions of the extension bent sharply inwardly on four longitudinal lines 25 to form four large lobes or corrugations 26.

To adapt the filter unit to supports or thimbles of slightly different sizes the core extension may also be provided with an integral tapered end 27 (FIG. 15) or the extension may be made as a separate element 28 spot welded to the core as shown at 29 (FIGS. 16 and 17).

FIGS. 18, 19, 20 and 21 illustrate a still further modification. Here a separate sleeve member 30 forms the core extension and this element is preferably split and is held in the core

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by an expansion spring 31. This separate sleeve may be cylindrical or slightly tapered as desired.

Having thus described several preferred embodiments of our invention we do not desire to be limited strictly thereto but to include all modifications and variations as fall within the spirit of the invention as defined in the appended claims.

What is claimed is:

1. A fluid filter unit adapted for use in a filtering system having a casing for receiving the filter unit and a supporting and sealing means associated with said casing for directing the said fluid through the filter unit, said filter unit comprising:

- a. a rigid tubular core having walls pervious to the passage of fluid therethrough;
- b. a covering of filter material surrounding a substantial portion of the core;
- c. said core having a portion extending beyond at least one end of the covering of the filter material;
- d. the extended end of the core having longitudinal corrugations rendering same adaptable for inserting the extended portion in a supporting means of a lesser diameter as compared to said core.

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