

(12) UK Patent Application (19) GB (11) 2 303 082 (13) A

(43) Date of A Publication 12.02.1997

(21) Application No 9614405.0
(22) Date of Filing 09.07.1996
(30) Priority Data
(31) 9514089 (32) 11.07.1995 (33) GB
9516893 17.08.1995

(71) Applicant(s)
Pall Corporation

(Incorporated in USA - New York)

2200 Northern Boulevard, East Hills, New York 11548,
New York, United States of America

(72) Inventor(s)
Roger Edward Page
George B Peacock

(74) Agent and/or Address for Service
Mathisen Macara & Co
The Coach House, 6-8 Swakeleys Road, Ickenham,
UXBRIDGE, Middlesex, UB10 8BZ, United Kingdom

(51) INT CL⁶
B01D 35/143 // B01D 27/10 35/14
(52) UK CL (Edition O)
B1D DNFC
(56) Documents Cited
GB 2299031 A WO 94/22551 A1 US 5192424 A
US 4685066 A
(58) Field of Search
UK CL (Edition O) **B1D DNFC DNFF , B1T TNFC**
INT CL⁶ **B01D 27/10 35/14 35/143**
ONLINE: WPI

(54) Filter with electronically readable label

(57) The filter includes a filter cartridge and a memory device 12 containing electronically readable information. This may be information regarding the static condition of the filter such as its rating and size or may be dynamic information received from a sensor 14 such as the ambient pressure and temperature or the degree of blockage of the filter. The information is readable by an external reader via, for example, either a transmitter or an output connection.

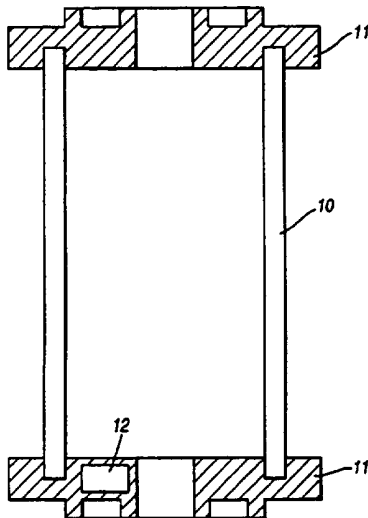


Fig. 1

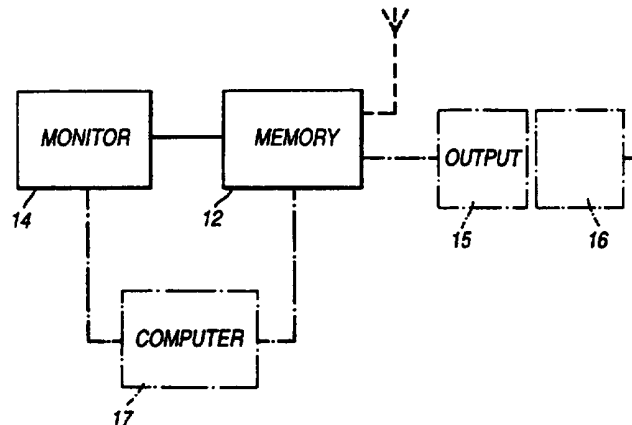


Fig. 3

GB 2 303 082 A

1/2

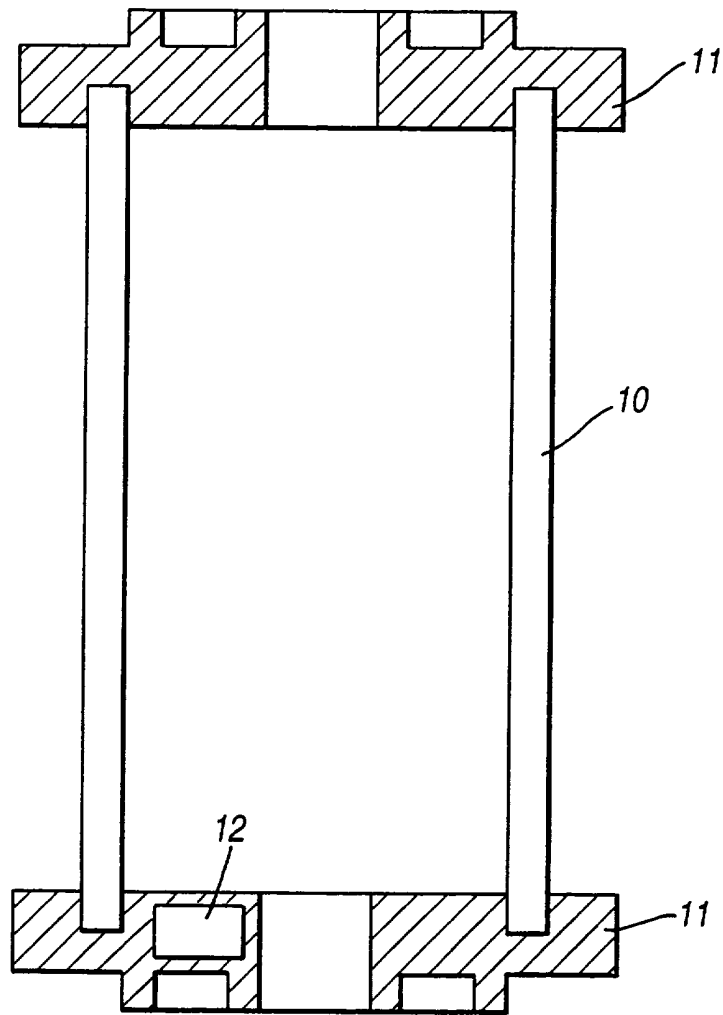


Fig. 1

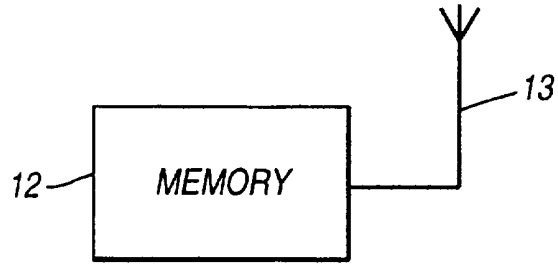


Fig. 2

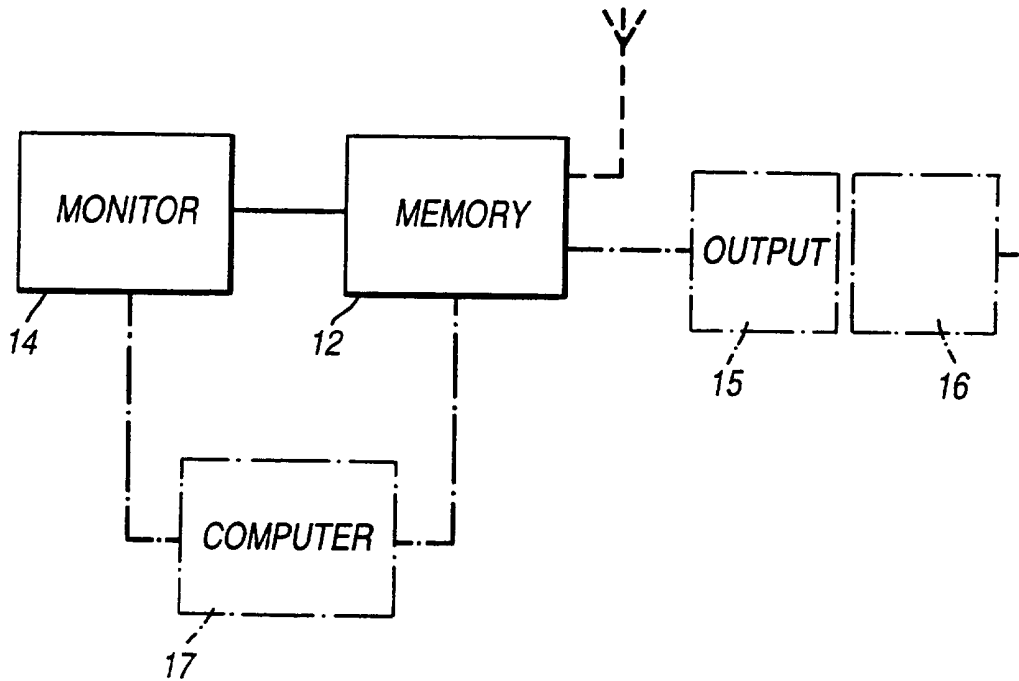


Fig. 3

FILTERS

The invention relates to filters.

Filters are in the majority of cases designed for specific
5 applications. For example, there are filters designed for use
in specific medical applications such as blood filters or heat
and moisture exchange filters and there are filters designed
for specific industrial applications such as the filtration of
lubricants or the filtration of drinks. In all cases, it is
10 important that the correct filter is used for a particular
application. In some cases, filters can be used side-by-side
that look very similar but which have different
characteristics. Although the filters may be packaged in
packaging that gives information regarding the characteristics
15 of the associated filter, once the filters are unpackaged, it
can be difficult to know whether a filter is being used that
is appropriate for the desired application.

It has previously been proposed to provide filter assemblies
including a filter cartridge within a housing, where the
20 housing includes a sensor which monitors filter performance.
For example, in US-A-4626344 the housing carries a sensor for
sensing when engine oil has become restricted and requires
replacement. US-A-4006083 has a switch in the housing for

determining when the filter cartridge is clogged. US-A-4578186 has a pressure sensitive switch in a filter inlet port of the housing to determine an increase in pressure. GB-A-983750 discloses a fuel injection system including a filter cartridge and a switch in an inlet passageway of the housing to detect clogging. US-A-5061364 discloses a component surrounding a filter cartridge and producing an alternating electromagnetic field across the filter cartridge. An eddy current detector detects changes in the field caused by particles on the filter cartridge. US-A-3936284 discloses indicators mounted on the housing to monitor changes in pressure in inlet and outlet chambers of the housing. US-A-5192424 discloses a filter cartridge carrying a tag bearing an identification mark.

According to a first aspect of the invention, there is provided a filter comprising a filter cartridge including a memory device containing a string of electronically readable information.

In one aspect, this string of information can be information regarding the characteristics of the filter so that it can be determined electronically whether, for example, the correct filter is being used for a particular application.

In addition, filters are designed to operate in particular

environments and are designed not to last for an infinite time. If the environment changes or a filter reaches a state in which it no longer functions effectively, the filter will need to be removed and replaced. In general, this is
5 determined by monitoring the operating conditions of the filter and by looking at the pressure drop across the filter. This, however, can only give an approximate indication of the operating conditions of the filter.

Preferably, therefore, the memory device is associated with
10 an input device, said input device feeding to the memory a string of information that can be read electronically from the memory.

The input device can determine when, for example, the filter is operating at a temperature range for which it is not
15 designed and/or can determine when the filter is becoming clogged. Reading the information in the memory can therefore allow the filter to be changed at an appropriate time.

The following is a more detailed description of an embodiment of the invention, by way of example, reference
20 being made to the accompanying drawings in which:
Figure 1 is a cross-section of a filter cartridge
Figure 2 is a schematic view of a first memory device for use with the cartridge of Figure 1,

Figure 3 is a schematic view of a second memory device for use with the cartridge of Figure 1.

Referring to Figure 1, the filter cartridge comprises a filter medium 10 of a polymeric material provided with two end caps 11. Each end cap 11 is formed from a plastics material. One end cap 11 receives one of the ends of the polymeric filter medium 10 and the other end cap 11 receives the other of the ends of the filter medium 10. The end caps 11 allow the filter cartridge to be mounted in a housing (not shown).

One end cap 11 incorporates a memory device 12 containing a string of electronically readable information.

In one embodiment, shown in Figure 2, the memory 12 is an electronic read-only memory containing information regarding the characteristics of the filter. These could be the physical dimensions of the filter and/or its rating and/or other information such as a reference number, manufacturer's details, operating temperature limits, safety information or operating instructions. The memory is associated with a transmitter or transponder 13 that transmits this string of information to an appropriate reader on receipt of an interrogation signal from the reader.

Alternatively, the memory 12 may be associated with an output device to allow physical electrical connection between

the reader and the memory. The connection may be a permanent hard wired connection. Alternatively, the memory could be provided with a cover that may be removed to allow electrical connection between the reader and the memory. Another possibility is for the cover to be pierceable by a suitable connector to allow electrical connection between the connector and the memory.

In an alternative arrangement shown in Figure 3, the memory 12 is associated with an input device in the form of an electrical monitor 14 for feeding to the memory 12 a string of electronic information that can be read electronically from the memory. For example, the electrical monitor 14 could detect blockage of the filter element 10 or could monitor temperature or pressure or any other desired variable parameter relating to the filter.

A further possibility is the inclusion of an electrical sensor that detects particular biochemicals, such as enzymes, proteins, antibodies, antigens, bacteria, viruses and produces a string of electrical information related to said biochemicals. This information may be used to identify the presence of a particular biochemical or biochemicals and/or as an integrity measurement and/or to control the feed of fluid to the filter or to control the effluent from the filter. The

electronic memory 12 could simply receive a string of electrical information from such a monitor 14 or sensor or receive this information and include fixed information regarding the filter 10 of the kind described above with reference to Figure 1. Another possibility is the inclusion of an electronic computer 17 for processing electronic data from the monitor 14 and storing the output data in the memory 12.

This information may be output by an electrical transmitter 13 as described above or by an electrical output device 15 which makes physical engagement with an input device 16 of a reader in any of the ways described above with reference to Figure 2.

The memory 12 could be programmed to transmit an electronic warning signal when a particular detected parameter exceeds a predetermined limit.

In any of the embodiments described above with reference to the drawings, the memory 12 and its associated components (including the computer 17, where provided) may be formed on a single electronic chip. Alternatively, the memory 12 could be written to remotely from remote sensors or from a manually operated input device. A manually operated input device could, for example, be used to input to the memory 12 an

electronic signal corresponding to the number of cycles experienced by the filter 10. The memory 12 may be associated with its own power source, such as a battery.

In general, of course, the information will be stored in binary form as a string of bits of information. Preferably this will be more than 100 bits of information and more preferably more than 1000 bits of information.

Any of the memory devices described above could be used with filter cartridges other than the cartridge shown in Figure 1 with the filter medium and the end caps being of any suitable material. In addition, the memory device could be incorporated in a part of the cartridge other than in an end cap 11. It could be incorporated in the filter medium. The final output need not be electronic; the electronically readable information could be converted into speech.

CLAIMS

1. A filter comprising a filter cartridge including a memory device containing a string of electronically readable information.
- 5 2. A filter according to claim 1 wherein the memory device is a read-only memory.
3. A filter according to claim 1 wherein said memory device is associated with an input device, said input device feeding to the memory device a string of information readable
10 electronically from the memory device.
4. A filter according to claim 3 wherein the input device is a monitoring means for feeding to the memory device information regarding a variable parameter monitored by the monitoring means.
- 15 5. A filter according to any one of claims 1 to 4 wherein the memory device includes a transmitter for transmitting an electrical signal including said string of information.
6. A filter according to any one of claims 1 to 5 wherein the memory device includes an output connection for connection
20 to a reader for reading the string of information in the memory device.
7. A filter substantially as hereinbefore described with reference to Figures 1 and 2 or to Figures 1 and 3 of the accompanying drawings.



Application No: GB 9614405.0
Claims searched: 1-7

Examiner: Peter Emerson
Date of search: 1 November 1996

**Patents Act 1977
Search Report under Section 17**

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.O): B1D (DNFC, DNFF), B1T TNFC
Int CI (Ed.6): B01D 27/10, 35/14, 35/143
Other: Online WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2299031 A (PALL) - Whole document, esp. p5 lines 12-14.	1, 2
X	WO 94/22551 A1 (DOCTRO) - Whole document.	1-3, 5, 6
X	US 5192424 A (ISP) - Col 3, lines 15-22.	1, 2
X	US 4685066 A (CATERPILLAR) - Whole document.	1, 3-6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.