May 5, 1964 LA VERN R. TIETZ 3,132,097

FILTER

Filed March 28, 1960 2 Sheets-Sheet 1

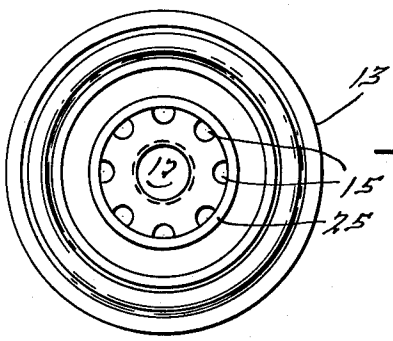



FIG. 3.

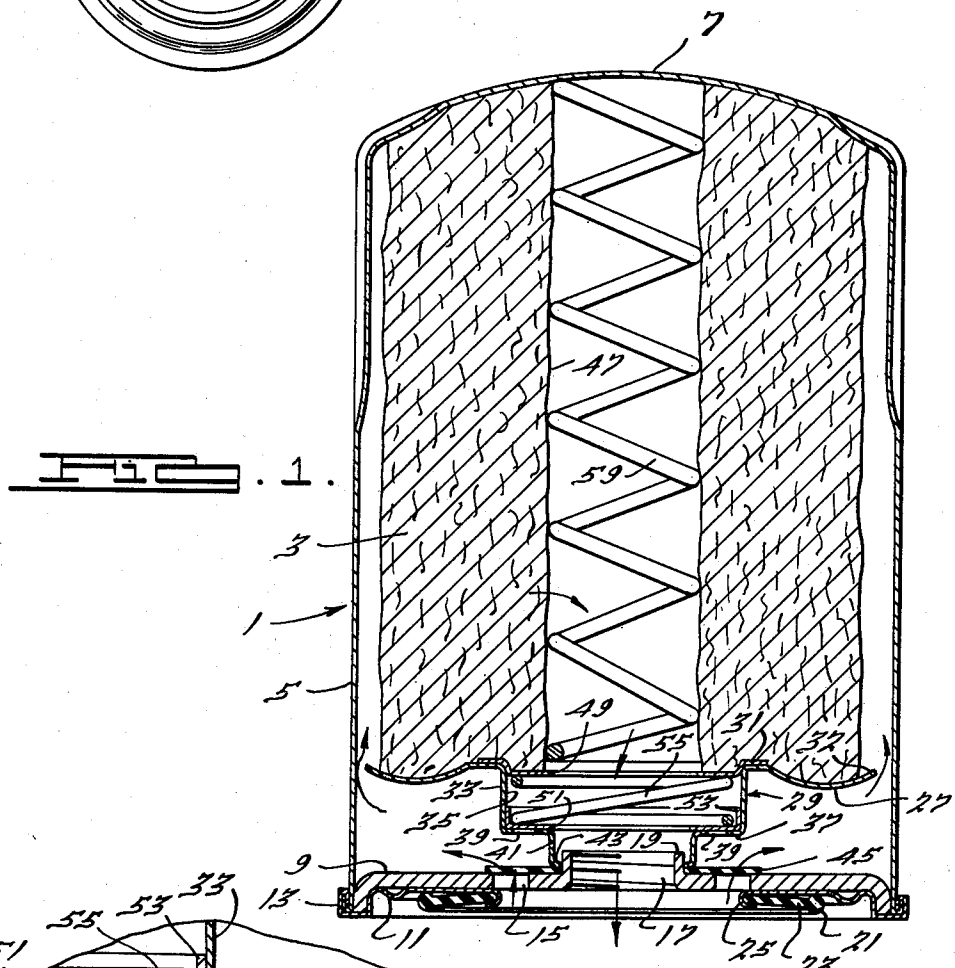



FIG. 1.

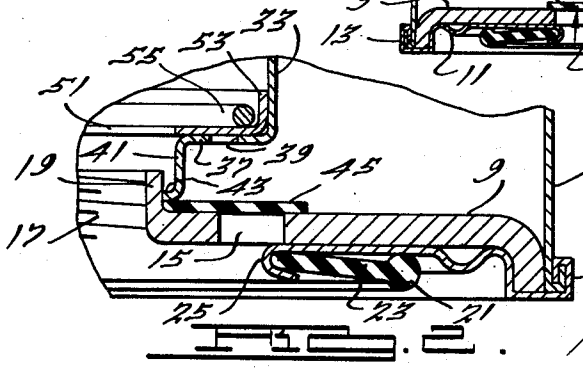



FIG. 2.

INVENTOR.
LaVern R. Tietz
BY
Harness, Dickey & Pierce
ATTORNEYS

May 5, 1964 LA VERN R. TIETZ 3,132,097

FILTER

Filed March 28, 1960 2 Sheets-Sheet 2

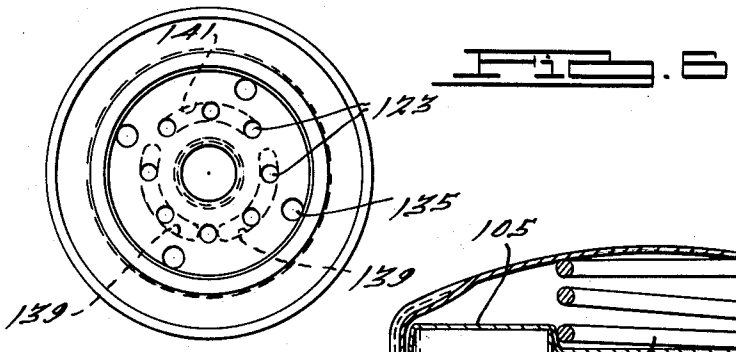



FIG. 5




FIG. 4.

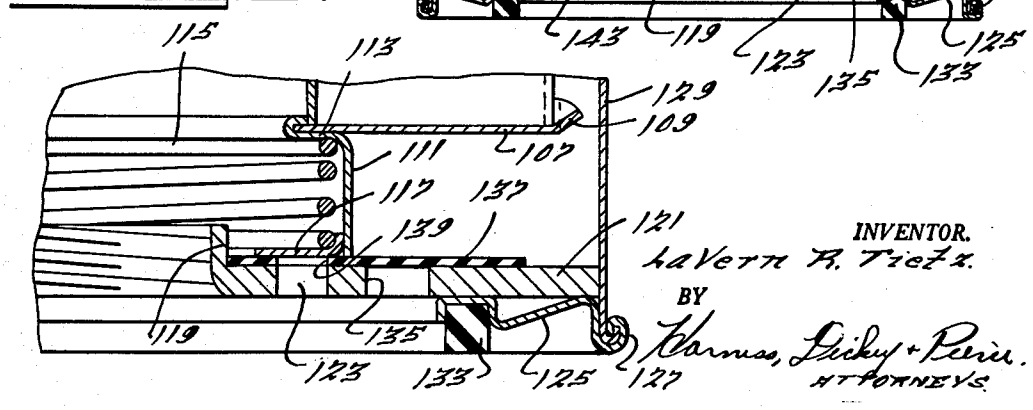



FIG. 3.

INVENTOR.
LaVern R. Tietz
BY
Harness, Dickey & Pierce.
ATTORNEYS

United States Patent Office 3,132,097 Patented May 5, 1964



3,132,097

# FILTER

La Vern R. Tietz, Racine, Wis., assignor to Walker Manufacturing Company, a corporation of Delaware

Filed Mar. 28, 1960, Ser. No. 18,115
3 Claims. (Cl. 210—130)

My invention relates to filters and, while not so limited, is particularly concerned with a disposable filter unit for use in the lubricating systems of internal combustion engines.

It is the object of my invention to provide a more compact and economical arrangement of relief and check valves for a filter unit.

In accordance with my invention both the check valve and the relief valve are provided at one end of the filter. In previous commercial units it has been common practice to separate these valves, the relief valve normally being located a considerable distance from the point at which fluid enters or leaves the filter. My arrangement makes possible certain economies in manufacture and approaches the maximum in compactness.

More features, objects, and advantages of the invention will become apparent upon consideration of the accompanying drawings in which:

FIGURE 1 is a vertical, longitudinal cross section through one embodiment of a disposable oil filter utilizing my invention;

FIG. 2 is an enlargement of a portion of the base structure of FIG. 1;

FIG. 3 is a reduced scale bottom view of the structure of FIG. 1;

FIG. 4 is a vertical, longitudinal cross section through another embodiment of the invention;

FIG. 5 is an enlargement of a portion of the base of FIG. 4; and

FIG. 6 is a reduced bottom view of the structure of FIG. 4.

Referring first to the throwaway oil filter unit **1** of FIGS. 1–3, there is a tubular filter body **3** preferably of compressible, fibrous material such as cotton, sisal, wood, or mixtures thereof, enclosed within but spaced radially from the sidewall of a casing **5** that has an integral wall to close the top end **7** but no integral wall at the bottom end. The bottom end is closed however, by a multipurpose, relatively heavy, gauge plate **9**, the plate being held in position by a thinner gasket holding plate **11** that is interlocked at **13** in a fluid tight joint with the bottom end of the casing **5**. The plate **9** has a plurality of circumferentially spaced, smaller openings **15** and a threaded, larger central opening **17** formed in a neck **19**. The openings **15** comprise the oil inlet and the opening **17**, the oil outlet, though conceivably by suitable modifications these functions could be reversed if desired. The threads in opening **17** serve as a means for mounting the unit **1** on a standpipe (not shown). The bulb end **21** of gasket **23**, which is held pinched by rebent flange **25** on plate **11**, serves as a seal means to engage a flat surface (not shown) to provide an inlet chamber for oil to enter openings **15**.

The top of the filter body **3** is held pressed tightly against top **7** of the casing to prevent by-passing. The bottom end of the body **3** is supported by a cupped flange **27** integral with spacer and separator **29** and by retainer plate **31** overlying flange **27**, flange **27** extending beyond the body **3** in a lip **32**. The spacer **29** has a tubular section **33** forming a valve chamber **35** and then a radial section **37** containing a plurality of circumferentially spaced by-pass openings **39**. Further, the spacer **29** has a small diameter, tubular section **41** which terminates in a small radial flange **43** that fits around neck **19** and also holds the inner circumferential edge of an annular



rubber valve **45** tightly against the inside top face of plate **9**. The free, outer radial portion of rubber disc **45** acts as a flap-type check or anti-drainback valve that will lift to allow liquid to enter through openings **15** but will seal against plate **9** to prevent back flow through these openings. It is apparent that, when the unit **1** is operative to filter, liquid entering through openings **15** will flow up into the annular space surrounding body **3** and then will be filtered as it flows transversely through the body to the central passage **47** in it. From passage **47** it will flow down through opening **49** in plate **31** and through an opening **51** in a valve member **53** within chamber **35** to the outlet **17**.

The valve member **53** is cup or pan-shaped and is slidable up and down on its sidewall which engages the tubular section **33** of spacer **29**. The bottom face of valve **53** engages spacer section **37** and covers by-pass openings **39** being pressed against face **37** with a predetermined force supplied by coil spring **55** which is confined and compressed inside chamber **35** by retainer plate **31**. The plate **31** may be spotwelded to flange **27** or may be simply held against it by the axial forces on all the parts when assembled as illustrated. The coil spring **59** within passage **47** can be used if desired to engage plate **31** and react against spring **55** in addition to its function of providing internal support for the body **3**.

In the event that the resistance to flow through body **3** exceeds the value determined by spring **55**, fluid pressure on valve **53** will lift it from its seat **37** permitting fluid to by-pass directly from inlets **15** to the top of neck **19** and out through outlet **17** without coming in contact with any contaminated filter body surfaces.

The filter unit **101** of FIGS. 4–6 contains a filter element **103** which is illustrated in the form of a pleated paper structure adhered to top end cap **105** and a bottom end cap **107** having outer annular lip **109**. Secured by crimping to an inner flange of the lower end cap **107** is the top end of a tubular spacer **111**, the spacer having a top radial surface or shoulder **113** engaging the bottom of end plate **107** and forming a back-up surface for coil spring **115**. This spring supplies closing force for the pan or cup-shaped valve **117** that is slidable inside of spacer **111**. The valve is substantially larger in diameter than the neck **119** of heavy plate **121** but overlies a series of regularly circumferentially spaced by-pass holes **123** formed in plate **121**.

The plate **121**, unlike plate **9**, is entirely flat. It abuts against gasket plate **125** that is interlocked at **127** in a fluid tight joint with the bottom end of casing **129**. The inner portion of plate **125** is formed to provide an annular recess **131** that tightly receives and holds the upper side of a gasket ring **133** of rectangular, preferably square, cross section, the lower side being capable of deforming to provide an effective seal when the neck **119** is screwed on a standpipe to force gasket **133** against a seating surface (not shown).

The plate **121** also has a series of circumferentially spaced inlet holes **135** spaced outward of by-pass holes **123**. The holes **135** are covered by a rubber disc type anti-drain back or check valve **137** which has an inner diameter that fits snugly around the outside of neck **119**. The portion of valve **137** that overlies by-pass openings **123** has three kidney shaped slots **139** and **141** of the relative circumferential lengths revealed in FIG. 6 so that no matter what angular position is occupied by the disc **137** no more than one opening **123** will be covered by it and rendered inoperative for by-pass flow. The disc **137** is held in place by the bottom end of spacer **111** which is aligned with annular portion **143** of plate **121** between holes **123** and **135**. A spring **145** between the top of casing **129** and imperforate top end plate **105**

holds the entire assembly of parts tightly against plate **121** and in turn against gasket plate **125**.

In operation, oil to be filtered will enter openings **135** and raise rubber disc **137** above the bottom of spacer **111** as a fulcrum. It will flow up and transversely through the filter element and then down and out through the outlet neck **119**. It cannot drain back through openings **135** because this tendency will force the disc **137** against the top of plate **121** to seal off the openings.

In the event that resistance to flow through the filter exceeds the setting of spring **115** oil will lift valve **117** and flow up through openings **123** in plate **121** and then through openings **139** and **141** in the disc **137** and around the inner periphery of valve **117**, up and around the neck **119** and then out through it. Thus, a direct by-pass from the inlet reservoir beneath plate **121** to the outlet in neck **119** is provided with no flow by contaminated filter surfaces.

It will now be realized that the invention provides a filter unit of the throwaway type wherein the location of the relief or by-pass valve at the bottom, close to the inlet and outlet, provides a compact, economical, and efficient structure. Variations may be made in the specific structures illustrated without departing from the spirit and scope of the invention.

I claim:

1. In a filter element, a housing, a filter body in the housing, a plate closing one end of the housing and having a centrally located outlet opening and first and second inlet means spaced radially outwardly at different distances respectively from said outlet opening, a tubular member having one end enclosing the first inlet means and the outlet opening and the other end engaging and spacing the filter body from the plate and serving as



means to support the body on the plate, a valve slidably supported inside said tubular member and controlling flow through the first of said inlet means and into the tubular member and thus to said outlet opening to by-pass said filter body, resilient means inside the tubular member controlling the opening pressure of the valve, and a check valve associated with said second of said inlet means and mounted on the plate and acting to prevent back-flow of fluid through the second inlet means, said check valve means being held in position on said plate by said tubular member.

2. The invention set forth in claim 1 wherein said second inlet means is located radially outwardly of said first inlet means and said check valve means has an opening therein aligned with the first inlet means to permit by-pass flow into said tubular member.

3. The invention set forth in claim 2 wherein said check valve comprises a rubber disc.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,261,098 | Wicks | Oct. 28, 1941 |
| 2,311,320 | Williams | Feb. 16, 1943 |
| 2,598,322 | Vokes | May 27, 1952 |
| 2,877,902 | Chase et al. | Mar. 17, 1959 |
| 2,888,141 | Coates et al. | May 26, 1959 |
| 2,995,249 | Boewe et al. | Aug. 8, 1961 |
| 2,995,250 | Boewe et al. | Aug. 8, 1961 |

OTHER REFERENCES

"New Sudglok," advertisement of the Champion Laboratories, Inc., West Salem, Illinois; received in the Patent Office on December 2, 1959.