Aug. 12, 1969 T. E. LLEWELLYN 3,460,679

MAGNETIC BELT ASSEMBLY FOR OIL FILTER CARTRIDGE

Filed Dec. 2, 1966

FIG. 1

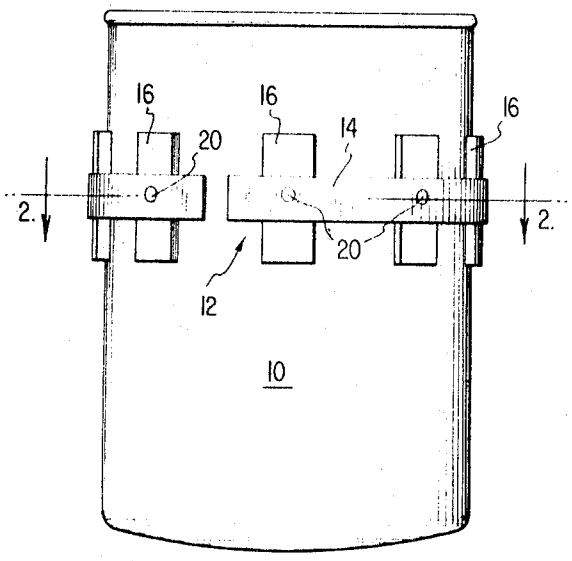


FIG. 2

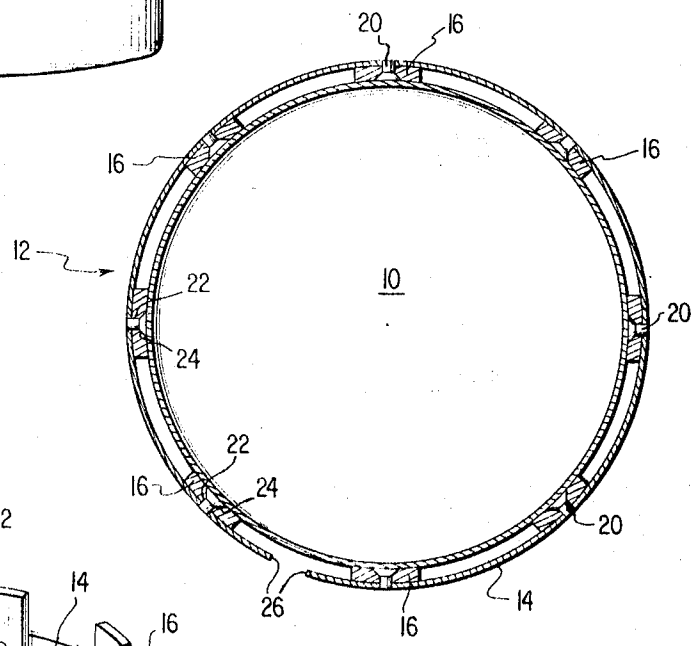
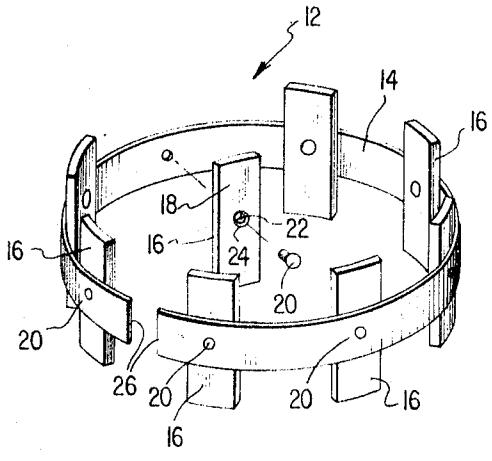


FIG. 3



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United States Patent Office 3,460,679
Patented Aug. 12, 1969

3,460,679

MAGNETIC BELT ASSEMBLY FOR OIL FILTER CARTRIDGE

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Filed Dec. 2, 1966, Ser. No. 598,860
Int. Cl. B03c 1/02; B01d 35/06, 27/00
U.S. Cl. 210—222 6 Claims

ABSTRACT OF THE DISCLOSURE

An annular spring steel belt having a number of permanent magnets secured to its inner surface with the inner surfaces of the magnets being fully exposed. In use the belt is placed around an oil filter cartridge with the inner surfaces of the magnets in complete engagement with the outer surface of the cartridge. Made of magnetizable material, the cartridge is magnetized by the magnets for attracting metallic particles from the oil contained therein. For purposes of assembly and disassembly as well as adjustment to various cartridge diameters, the belt is discontinuous with closely positioned opposite ends thus permitting the belt to be expanded or retracted radially. The belt is removably secured to the cartridge through the magnetic attraction of the magnets and the spring-like quality of the belt.

The present invention broadly relates to oil filter cartridges or the like which are used in automobiles and more particularly to a new and improved magnetic belt assembly that is attached to the oil filter cartridge to magnetize the same for removing metallic particles from oil contained therein.

One of the objects of the present invention is to provide a new and improved magnetic belt assembly that may be easily attached to an oil filter cartridge to effectively magnetize the same for removing meallic particles from oil contained therein.

A further object of the present invention is to provide such a magnetic belt assembly that may be quickly and easily removed from a used oil filter cartridge and then reused on another or new cartridge.

A still further object of the present invention is the provision of such a magnetic belt assembly which may be employed on conventional oil filter cartridges but which is also adjustable so as to permit adaptation to various cartridges or similar containers.

Another object of the present invention is to provide such a magnetic belt assembly which successfully achieves the above objects and yet may be economically manufactured in mass production and will experience a long and useful service life.

Other objects and advantages of the present invention will become apparent from the following detailed description in conjunction with the attached drawings, in which:

FIG. 1 is an elevational view of an oil filter cartridge equipped with a magnetic best assembly embodying the present invention;

FIG. 2 is a cross-sectional view taken generally along lines 2—2 of FIG. 1; and

FIG. 3 is a perspective view of the magnetic belt assembly with a portion thereof shown in exploded fashion.

Referring to the drawings in detail there is shown for illustrative purposes only, a typical oil filter cartridge, generally designated **10**, for use in an automobile (not shown), the cartridge being equipped with a magnetic belt assembly generally designated **12** constructed in accordance with the present invention. Cartridge **10** may have a conventional construction including a metallic cylindrical outer wall with a diameter of 3.625 inches and a length of approximately 5.250 inches.

In the preferred embodiment shown in the drawings, the magnetic belt assembly includes an elongated belt **14** having a generally circular or ring-like shape and a plurality of permanent magnets attached to the belt at points spaced along the inner circumference thereof. Preferably, belt **14** is made from S.A.E. 1050 to 1070 spring steel approximately .030 inch thick and .375 inch wide. As shown by the extremities **26** of belt **14**, the latter has a discontinuous construction permitting radial expansion or contraction of the belt for purposes of facilitating installation or removal relative to the filter cartridge. Additionally this discontinuous nature of the belt **14** permits adjustment to various cartridge sizes.

Permanent magnets **16** may be made from any suitable magnetic material and in the described embodiment are 1¼ inches in length, ½ inch in width and ⅛ inch in thickness. Additionally the inner surface **18** of the magnets have a concave shape dimensioned to conform to the outer cylindrical surface of cartridge **10**. While this latter feature is preferred, magnet members of generally planar shape (not shown) may also be employed in accordance with the invention. Magnets **16** are fixed to the inner surface of belt **14** and extend transversely thereto on opposite sides of the belt. Additionally for employment with a conventional filter cartridge having the dimensions described above, eight magnetic members are attached to the belt so that when applied to the cartridge, the magnetic members will be equally spaced around the circumference of the cartridge.

While other suitable means may be employed to attach the magnet members **16** to the belt, one preferred method is through rivets **20** received through apertures **22** in the center of the magnetic members and corresponding apertures in belt **14**. Rivets **20** may have a 3/32 inch diameter and preferably the end of aperture **22** adjacent the internal face **18** of the magnetic members, is countersunk as indicated at **24** to receive the head of the rivet. In this manner the rivet heads are substantially flush with the inner surface **18** of the magnetic members and full contact between the magnetic members and the cartridge is achieved.

In use the magnetic belt assembly **12** is installed about the oil filter cartridge as shown in FIG. 1 and if necessary or desirable, the belt may be expanded to facilitate this installation. Once on the filter cartridge, magnetic members **16** are effective to magnetically hold the belt assembly in fixed position on the cartridge. When the cartridge is installed in an automobile, metallic particles in oil contained in the cartridge, will be attracted to the internal surface of the cartridge, the latter being magnetized by the permanent magnets **16**. When the cartridge is spent and therefore to be disposed, the magnetic belt assembly may be removed from the cartridge and applied to a new cartridge in the same manner described above. Again the discontinuous nature of belt **14** facilitates removal of the magnetic belt assembly from the spent cartridge.

In case it is desired to insure secure attachment to the belt assembly to the cartridge, a spring means (not shown) may be placed between the extremities **26** of the belt to maintain the latter in fixed position against the cartridge. Additionally in this instance, the resilient quality of the belt itself may help retain the assembly on the cartridge.

In addition to the above noted advantages, it is apparent that with the present invention, the magnets do not come into contact with the oil or the metallic particles attracted therefrom. Consequently the magnets are always kept clean thus minimizing maintenance, while at the same time increasing attractive power of the assembly.

Other modifications will be apparent from the foregoing description and the accompanying drawings. For example a different number of permanent magnets may be employed and also with different shapes. Additionally other belt constructions and materials may be employed consistent with the present invention. Moreover, the belt assembly of the present invention may be applied for the same purpose to other containers.

What is claimed is:

1. In combination with a container including an outer surface formed of magnetizable material and enclosing a fluid containing magnetizable particles; a magnetic belt assembly for magnetizing the container to attract the particles from the fluid to the inner surface of the container, said magnetic belt assembly including an annular belt formed from spring-like self supporting material substantially surrounding said outer surface of the container, a plurality of permanent magnet members secured to the belt in spaced locations along the belt and having inner surfaces engaging said outer container surface to magnetize the same while maintaining the belt in fixed position around the container, said belt being radially expandable and retractable for installation or removal with respect to the container as well as for adjusting the overall cross dimension of the belt in accordance with the overall cross dimension of the container.

2. The combination defined in claim 1 wherein said belt is discontinuous and has closely spaced opposite ends permitting the said radial expandable and retractable movement of the belt.

3. The combination defined in claim 2 wherein said magnet members are attached to the inner surface of said belt with the entire internal surface of each magnetic

member in complete engagement with said outer container surface.

4. The combination defined in claim 3 wherein said outer container surface and said belt have cylindrical shapes and wherein the inner surfaces of said magnet members are concave to conform to the cylindrical surface of said container.

5. The combination defined in claim 2 wherein the resilience of said belt urges the belt into engagement with the container to help maintain the belt on the container.

6. The combination defined in claim 5 wherein the belt is made from spring steel.

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U.S. Cl. X.R.

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